



**GEO-ENVIRONMENTAL
APPRAISAL REPORT**

**Proposed Low Secure Unit
&
Residential Development
Mold Road
Wrexham
LL11 4AF**

**November 2017
Report Ref: 10/1014/001**

Prepared on Behalf of:

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EXECUTIVE SUMMARY

Client	ASC Real Estate Investments Ltd
Location	The site is located off Mold Road in Wrexham at OS Grid Reference 331536, 353823.
Description	The site forms an irregular shaped parcel of land covering an area of approximately 2.6 hectares and currently forms part of the Westminster Industrial Estate comprising several vacant commercial “shed” type buildings and single storey offices. External areas comprise a mixture of tarmac, concrete and gravel hardstanding and roughly vegetated soft landscaping. A number of former above ground fuel tanks and heating oil tanks are present within the western portion of the site.
Development	The proposed development will include a two-storey low secure unit and assessment centre in the western part of the site along with 36 two and three storey residential dwellings and apartments with associated soft landscaping and car parking in the east
Site History	The historical OS maps dating back to 1872 indicate that the site was first occupied by colliery stockpiles belonging to an adjacent colliery along the western boundary of the site. The stockpile extended in size from 1872 to 1961 covering the whole of the western and part of the northern site area before being removed around 1969. From 1974 the development of industrial buildings occurred including a council depot, works and unidentified industrial buildings along with an electrical sub-station as part of the wider Westminster Industrial Estate. The surrounding area has been occupied by mixed residential and industrial land with a colliery located to the south of the site along with tanks, smithy, brickworks, disused tip and drill shed. Alongside this a railway is located adjacent to the eastern boundary of the site running north south.
Geology	Geological maps indicate the site is underlain by superficial deposits of Glacial Till in the west and Glaciofluvial Deposits in the east. The superficial deposits are anticipated to be underlain by sandstone of the Cefn Rock, a member of the Pennine Middle Coal Measures Formation.
Mining	The site is located within a likely zone of influence from workings in nine seams of coal at 110m to 320m depth and include the Smith, Browsell, Powell, Two Yard and Crank Seams last worked in 1926. The Coal Authority indicated that ground movement in the seams should have ceased. The site has historically been part of the Gwersyllt Colliery which was operational between 1881 and 1925. The historical maps and Coal Authority report show there are two shafts associated with the colliery, one within 20m of the site near the access road. The Coal Authority records show information on the southern mine shaft, located within 20m from the site access road having been capped and grouted. In view of the above, whilst the site was historically part of a colliery there is no evidence to suggest that the site is at risk from shallow mine workings or shafts
Environmental Setting	The superficial deposits underlying the west of the site (Glacial Till) are classified as an Unproductive Aquifer with the superficial deposits in the east of the site (Glaciofluvial Deposits) are classified as a Secondary A Aquifer. The solid strata located beneath site is classified as a Secondary A Aquifer.

	The site is not located within a Groundwater Source Protection Zone and there are no groundwater abstraction points within 2km of the site. The nearest surface watercourse is located 700m distant.
Radon	The Radon Guidance on protective measures for new dwellings indicates that the site is in an area where 3% to 5% of properties are above action level and basic radon protection is required for all new structures.
Ground Conditions	The ground investigation has identified Made Ground across the site which is typically between 0.5m and 1.5m in depth. In one location (WS6) the Made Ground was found to be deeper reaching 2.45m. The filled ground typically comprises concrete, tarmac or gravel hardstanding underlain by clayey sand or clay with inclusions of limestone, sandstone, brick, slate, metal, siltstone and mudstone. Natural strata have been found to be variable in nature and comprising very clayey sand with gravel inclusions of sandstone, siltstone and coal and sandy gravelly clay. These strata are often found to be interbedded. The strength / density of the natural strata has also been found to be variable with the granular soils typically in a loose to medium dense condition with the cohesive strata in a firm to stiff condition. Very weak weathered micaceous sandstone was recorded in five locations in the north-western portion of the site at depths between 1.1m and 3.9m. Possible highly weathered sandstone bedrock was also recorded in a number of other locations, recovered as very dense reddish- brown fine to coarse sand with gravel of sandstone at depths between 2.6m and 4.1m. Perched groundwater was encountered across the site at depths ranging from 0.35m to 2.0m.
Contamination	Chemical testing carried out on the Made Ground and natural soils beneath the proposed development site did not identify any elevated levels of contaminants when compared to the LQM/CIEH S4ULs for Human Health Risk Assessment 2015 along with DEFRA Category 4 Screening Levels (C4SLs) SSVs for a residential end use. Concentrations of petroleum hydrocarbons have however been identified in several locations, associated with above ground fuel storage tanks, which may present a risk to controlled waters (underlying aquifers) and further consideration of this risk is required. An asbestos cement tile has been recorded in one location in the south western part of the site and although this in itself does not warrant additional investigations we have recommended that the appointed ground works contractor carry out a watching brief during any excavations in this area of the site to check for the presence of asbestos containing materials.
Hazardous Ground Gas	Gas monitoring wells have been installed across the site and the results to date have recorded a maximum steady carbon dioxide concentration of 8.0% during the first visit with concentrations of 4.0% also recorded in two locations with associated oxygen depletion. Whilst gas flow rates have so far been absent, given the above, along with the presence of hydrocarbon contamination in the western portion of the site we would recommend that allowance is made for the installation of gas protective measures in accordance CS2 conditions as set out in BS8485 "Code of Practice for The Design of Protective

	Measures for Methane & Carbon Dioxide Ground Gases for New Buildings” (2015). Given the presence of hydrocarbons in the western portion of the site, we would recommend that the secure unit buildings also be provided with a hydrocarbon vapour resistant membrane. It must also be ensured that the gas protective measures installed are suitable to mitigate the risk posed from radon gas.
Foundations	The proposed two-storey low secure hospital in the western portion of the site could utilise shallow strip and trench fill foundations using the firm to stiff clay and medium dense sand located at depths of 1.5m to 2.0m bgl. In the eastern portion of the site where the proposed two and three storey residential housing and apartment blocks are to be constructed, the ground conditions have been found to be in a loose / soft to firm condition locally. We have not been provided with proposed loadings for the new structures, but the use of shallow strip and trench fill foundations may not be possible, and some units may require a piled foundation solution. Given the variability of the ground conditions, for this area of the site we would recommend further investigation be undertaken on a plot by plot basis to confirm the most suitable foundation solution.
Infiltration Testing	The results of the infiltration testing indicate generally poor drainage characteristics. Whilst the soakaway testing carried out during this investigation was not successful, the use of soakaways may be possible where granular material is present and further targeted testing should be considered. The presence of hydrocarbon contamination in some parts of the site will need to be considered if soakaways are to be adopted to ensure that any surface water infiltration does not mobilise potential contaminants.
Further Works	Based on the findings of this investigation, we would recommend the following additional works will be required: • Further site investigation in the eastern part of the site to determine the most suitable foundation options for the residential dwellings and apartments. • Supervision and inspection of the removal of all above ground fuel storage tanks. Excavation of trial pits should then be carried out directly beneath and around the tanks with further soil samples recovered for chemical testing. • Assessment of hydrocarbon contamination risk to controlled waters following additional testing. Possible requirement for DQRA and some form of remediation. • Additional trial pits to be excavated beneath existing building footprints following demolition to confirm the ground conditions and depth of filled ground. • Possible requirement for additional targeted soakaway testing. • Provision of gas protective measures in accordance with CS2 conditions with allowance for a hydrocarbon vapour resistant membrane in the western portion of the site. The gas protective measures must also be suitable to comply with the requirement for basic radon gas protection.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1.0	INTRODUCTION.....	1
1.1	BACKGROUND.....	1
1.2	OBJECTIVES	1
1.3	LIMITATIONS OF THE STUDY	1
2.0	SITE SETTING & DESCRIPTION	2
3.0	PHASE 1 DESK BASED STUDY.....	2
3.1	SITE HISTORY	2
3.2	GEOLOGY.....	2
3.3	MINING & GROUND STABILITY	3
3.4	HYDROGEOLOGY.....	3
3.5	HYDROLOGY	3
3.6	FLOOD RISK	3
3.7	RADON RISK POTENTIAL	4
3.8	LANDFILL SITES	4
3.9	INDUSTRIAL LAND USES.....	4
3.10	SENSITIVE LAND USES.....	4
3.11	PRELIMINARY GAS RISK ASSESSMENT	4
3.12	POTENTIAL SOURCES OF CONTAMINATION	4
4.0	SITE INVESTIGATION	5
4.1	INVESTIGATION DESIGN & OBJECTIVES	5
4.2	EXPLORATORY FIELDWORK.....	5
4.3	GROUND CONDITIONS	5
4.3.1	<i>Made Ground</i>	5
4.3.2	<i>Natural Strata</i>	6
4.4	GROUNDWATER	6
4.5	LABORATORY TESTING	6
5.0	TIER 1 CONTAMINATION ANALYSIS	6
5.1	SOIL GUIDELINES	6
5.2	INORGANIC CONTAMINATION	7
5.3	ORGANIC CONTAMINATION.....	7
5.4	ASBESTOS CONTAMINATION.....	8
5.5	CALORIFIC VALUE	8
6.0	CONTAMINATION ASSESSMENT	8
6.1	GENERAL	8
6.2	ENVIRONMENTAL SETTING & END USE.....	8
6.3	CONTAMINATION & REMEDIATION OPTIONS.....	9
7.0	HAZARDOUS GROUND GAS	10
7.1	GENERAL	10
7.2	SCOPE OF WORKS	10
7.3	MONITORING RESULTS	10
7.4	DISCUSSION	11
8.0	GEOTECHNICAL ASSESSMENT	11
8.1	GENERAL	11
8.2	IN SITU GEOTECHNICAL TESTING.....	11
8.3	GEOTECHNICAL LABORATORY TESTING	12
8.4	PLASTICITY INDICES	12
8.5	FOUNDATION RECOMMENDATIONS	12
8.6	CONCRETE CLASSIFICATION	13
8.7	INFILTRATION TESTS.....	14
8.8	WASTE MANAGEMENT	14
8.9	EXCAVATIONS.....	15
9.0	CONCLUSIONS AND RECOMMENDATIONS.....	15

DRAWINGS

Drawing No. 10/1014/001	Site Location Plan
Drawing No. 17-0.32-110	Proposed Site Layout Plan
Drawing No. 9963_T:200:1:2	Topographic Survey
Drawing No. 10/1014/002	Exploratory Hole Location Plan

APPENDICES

Appendix I	Drawings
Appendix II	Photographic Record
Appendix III	Exploratory Hole Logs
Appendix IV	Chemical Test Results
Appendix V	Gas Monitoring Results
Appendix VI	Geotechnical Test Results
Appendix VII	Infiltration Test Results

1.0 INTRODUCTION

1.1 Background

Clancy Consulting Limited has been instructed by ASC Real Estate Investments Ltd to carry out a Geo-Environmental Appraisal for a site located off Mold Road in Wrexham. A site location plan is presented as Drawing No. 10/1014/001 in Appendix I.

We understand that the site is being considered for redevelopment comprising a low secure unit and assessment centre in the western part of the site along with 36 residential dwellings and apartments with associated soft landscaping and car parking in the east. A proposed site layout plan is presented as Condy Lofthouse Architects Drawing no. 17-0.32-110 in Appendix I.

1.2 Objectives

The objectives of this investigation are summarised below:

- Provide a review of the sites land use history by reference to ordnance survey maps of the area.
- Assess the environmental setting, geology, hydrology, hydrogeology, mining and subsidence history of the site and surrounding area.
- Develop a detailed 'preliminary risk assessment' and 'conceptual site model' with regard to potential contamination sources, pathways and receptors.
- Consider the potential risk to end users of the site from hazardous ground gas.
- Undertake a ground investigation comprising the drilling of window sample boreholes and excavation of trial pits to assess the ground conditions at the site.
- Carry out chemical testing of the soils to assess whether any contamination risk exists to the environment and / or human health.
- Refine the Preliminary Risk Assessment and Conceptual Site Model with regard to potential contamination sources, pathways and receptors.
- Carry out geotechnical testing of the soils to further assess their physical characteristics and provide recommendations for foundations.
- Provide recommendations regarding the requirement for further investigations, if required, to satisfy the Local Planning Authority.

1.3 Limitations of the Study

Clancy Consulting Limited cannot be held responsible for any omissions, misrepresentation, errors or inaccuracies with the supplied third party report information. The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information or improved practices and changes in legislation may require a reinterpretation of the report in whole or in part.

Clancy Consulting Limited reserves the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use of ASC Real Estate Investments Ltd for the objectives discussed previously only, and is confidential to them.

The report may not be relied upon by any other party without prior written consent of Clancy Consulting Limited. Those using this information in subsequent assessments or evaluations do so at their own risk.

2.0 SITE SETTING & DESCRIPTION

The site is located off Mold Road in Wrexham at OS Grid Reference 331536, 353823. The site forms an irregular shaped parcel of land covering an area of approximately 2.6 hectares and currently forms part of the Westminster Industrial Estate comprising several vacant commercial “shed” type buildings and single storey offices. External areas comprise a mixture of tarmac, concrete and gravel hardstanding and roughly vegetated soft landscaping. A number of former above ground fuel tanks and heating oil tanks are present within the western portion of the site.

Residential dwellings schools and a leisure centre are located within close proximity of the site along with further industrial units belonging to Westminster Industrial Estate to the south east. The surrounding area is predominantly occupied by residential buildings and open fields. A railway line is located to the east of the site running north south.

A topographical survey showing the existing site layout is presented in Appendix I along with a photographic record which is presented in Appendix II.

3.0 PHASE 1 DESK BASED STUDY

A desk based study has been carried out for the site by TerraConsult in July 2014, the findings of which are presented in their report referenced 2079R01 Issue 2. We understand that the TerraConsult report is being used as part of the planning submission. A summary of the salient desk study findings derived from the TerraConsult report is presented below:

3.1 Site History

The historical OS maps dating back to 1872 indicate that the site was first occupied by colliery stockpiles belonging to an adjacent colliery along the western boundary of the site. The stockpile extended in size from 1872 to 1961 covering the whole of the western and part of the northern site area before being removed around 1969. From 1974 the development of industrial buildings occurred including a council depot, works and unidentified industrial buildings along with an electrical sub-station as part of the wider Westminster Industrial Estate.

The surrounding area has been occupied by mixed residential and industrial land with a colliery located to the south of the site along with tanks, smithy, brickworks, disused tip and drill shed. Alongside this a railway is located adjacent to the eastern boundary of the site running north south.

3.2 Geology

The 1:50,000 British Geological Survey (BGS) scale map for the area indicates that the site is underlain by superficial deposits of Glacial Till in the west and Glaciofluvial Deposits in the east. The superficial deposits are anticipated to be underlain by sandstone of the Cefn Rock, a member of the Pennine Middle Coal Measures Formation.

3.3 Mining & Ground Stability

The site is located within a likely zone of influence from workings in nine seams of coal at 110m to 320m depth and include the Smith, Browsell, Powell, Two Yard and Crank Seams last worked in 1926. The Coal Authority indicated that ground movement in the seams should have ceased.

The site is not located in an area with any present underground coal workings.

The site has historically been part of the Gwersyllt Colliery which was operational between 1881 and 1925. The main colliery buildings were located along the southern site boundary. The historical maps and Coal Authority report show there are two shafts associated with the colliery, one within 20m of the site near the access road. This shaft appears the main shaft used within the colliery to extract the coal as the buildings and railway lines are located around it. The second shaft is located 40m from the access road and 40m from the south east corner of the main study site. The shaft is likely to be the entrance / exit shaft.

The Coal Authority records show information on the southern mine shaft, located within 20m from the site access road. Following a collapse of the shaft at the surface this entry and the resultant crater was filled in December 1956. Following a further collapse in September 1974 the shaft was capped with reinforced concrete in December 1975 by the N.C.B with the shaft immediately beneath the cap being grouted.

From the historical maps, there is no evidence of mineral extraction or quarrying on site. The closest surface ground workings are a collection of sand and gravel pits located 73m to the east.

In view of the above, whilst the site was historically part of a colliery there is no evidence to suggest that the site is at risk from shallow mine workings or shafts.

3.4 Hydrogeology

According to the Environment Agency groundwater vulnerability maps the superficial deposits underlying the west of the site (Glacial Till) are classified as an Unproductive Aquifer with the superficial deposits in the east of the site (Glaciofluvial Deposits) are classified as a Secondary A Aquifer. The solid strata located beneath site is classified as a Secondary A Aquifer.

The site is not located within a Groundwater Source Protection Zone and there are no groundwater abstraction points within 2km of the site.

3.5 Hydrology

The nearest watercourse is located 700m to the south west of the site and is classified as a primary river. Secondary / tertiary watercourses are located 600m to the north east, east and 750m to the north east.

A pollution incident is recorded 282m to the north of the site involving petrol however, it is shown to have no environmental impact.

3.6 Flood Risk

According to Environment Agency records the site is located in a Flood Zone 1 where the risk of flooding from surface waters each year is less than 1 in 1000 (0.1%) from nearby rivers.

Given the size of the site (>1 ha) a flood risk assessment and drainage strategy will however be required by the local planning authority.

3.7 Radon Risk Potential

The Radon Guidance on protective measures for new dwellings indicates that the site is in an area where 3% to 5% of properties are above action level. This would indicate that basic Radon protection measures are required. However, according to "BRE211 Radon: Guidance on protective measures for new buildings – 2015" it suggests the area is at greater risk with 5% to 10% of properties about action level and that full Radon protection is required.

A geological assessment of the surrounding areas indicates that there are no significant radon sources (i.e. Limestone and Granite or faulting) near the site or at depth.

TerracConsult conclude that there is a low radon risk and that basic radon gas protective measures should be installed in all new structures.

3.8 Landfill Sites

There are ten records of historic Environmental Agency Landfills within 1.5km of the site. Three are within 500m of the site and are specified to have taken inert, industrial, commercial, household and special wasters. The closest is located 43m to the south west associated with a disused refuse tip.

3.9 Industrial Land Uses

There are thirteen recorded entries of potentially contaminated industrial sites within 250m of the site. There are two works located on site, a disused refuse tip located 43m to the south west and a motor and vehicle second hand dealers 65m to the south.

A fuel station is located 129m to the north.

3.10 Sensitive Land Uses

There are two site of Special Scientific Interest (SSSI) within 2km of the site. There are also six recorded Ancient Woodland areas within 2km of the site, though the proposed development will not impact on these sites.

3.11 Preliminary Gas Risk Assessment

The site has been developed in part since the late 1900s however, prior to this the site was occupied by a colliery spoil stockpile. Made Ground deposits are anticipated to be present and may be relatively deep in areas where the former colliery stockpile was located i.e. along the west of the site. The immediate surrounding area has been subject to industrial development with the presence of the colliery to the south east of the site and the railway line to the east. This may have resulted in extensive filled ground being located close to the site boundary i.e. from the former railways sidings and adjacent colliery. In addition, a former refuse tip has been identified 43m to the south west.

Any filled ground could potentially contain organic materials with the potential to generate hazardous ground gases. The potential risk at this site is considered to be low to moderate. Given the sensitive nature of the proposed development (residential) a gas monitoring program should be carried out in accordance with CIRIA Report C665 during any site investigations.

3.12 Potential Sources of Contamination

The potential sources of contamination are outlined below:

- Asbestos from former and existing buildings on site.
- Hydrocarbon contamination from the heating oil tanks and fuel / waste oil tanks. These tanks were above ground however there is evidence of spillages at surface.
- Mineral oils and PCBs from the electrical sub-station.
- PAH and sulphate contamination and possible combustible material from colliery waste.
- Radon risk.
- Hazardous ground gas risk.
- Migration of off-site contamination from adjacent refuse tip, colliery and industrial sites.

4.0 SITE INVESTIGATION

4.1 Investigation Design & Objectives

The design approach was based on guidance provided in BS 10175 Code of Practice for Investigation of Potentially Contaminated Land (2011).

The aim of the investigation was to position window sample boreholes beneath the proposed development areas in order to characterise the general ground conditions, refine the Conceptual Site Model and carry out targeted contamination and geotechnical assessments.

4.2 Exploratory Fieldwork

The ground investigation works were carried out between 12th September 2017 and 15th September 2017. Eighteen boreholes (WS1 to WS17 including WS4A) were drilled across the site with WS1 to WS10 and WS12 beneath the proposed low security units and access ways, with WS11 beneath the proposed car park and WS13 to WS17 beneath the proposed residential housing. Eleven trial pits were also excavated across the site. TP1 to TP7 were excavated within close proximity to the above ground former tanks with TP11 excavated adjacent to the sub-station. Two hand excavated trial pits were excavated (SP1 and SP2) within the stockpiled material and two soakaway tests (SA1 and SA2) were carried out within the proposed car park area.

Soil samples for chemical and geotechnical laboratory testing were collected at regular intervals from each exploratory hole location and sealed in appropriate plastic and glass containers provided by the laboratory. The borehole locations are shown on Drawing No. 10/1014/002 in Appendix I.

4.3 Ground Conditions

Details of the ground conditions encountered beneath the proposed development site, along with records of the soil samples taken are presented on the exploratory hole records in Appendix III with a summary of the ground conditions provided below.

4.3.1 Made Ground

Made Ground was encountered in all locations to a maximum depth of 1.6m (WS2). Tarmac was encountered in WS1 to WS5, TP1, TP2, TP5 to TP6 and SA1 to SA3 to a maximum depth of 0.15m. Concrete hardstanding was encountered in WS8, WS10 to WS12, WS17, TP3, TP7 and TP8 to a depth of 0.1. In the remaining locations gravel hardstanding was recorded to depth typically between 0.3m and 0.45m.

The surface hardstanding was underlain by clayey sand or clay with inclusions of limestone, sandstone, brick, slate, metal, siltstone and mudstone to a maximum depth of 2.45m in WS6.

Visual and olfactory evidence of hydrocarbon contamination was encountered in the Made Ground and natural soils in WS1, WS11, WS15, TP1, TP3, TP4, TP7, TP9 and TP10. These locations are typically in the areas of the former above ground tanks.

4.3.2 Natural Strata

Natural strata have been found to be variable in nature and distribution comprising very clayey sand with gravel inclusions of sandstone, siltstone and coal and sandy gravelly clay. These strata are often found to be interbedded.

Very weak weathered micaceous sandstone was recorded in five locations (WS1, WS5, TP3, TP9 and TP10) in the north western portion of the site at depths between 1.1m (TP10) and 3.9m (WS1).

Possible highly weathered sandstone bedrock was also recorded in a number of locations (WS2, WS7, WS9, WS10 to WS12, WS14 and WS17) recorded as very dense reddish brown fine to coarse sand with gravel of sandstone at depths between 2.6m and 4.1m.

4.4 Groundwater

Perched groundwater was encountered in WS1, WS2, WS3, WS9, WS10, WS13, WS14, TP1 to TP4, TP6 and TP10 at depths ranging from 0.35m to 2.0m.

4.5 Laboratory Testing

Given the development history of the site and surrounding area it is possible that some ground contamination exists beneath the site. Made Ground was encountered in all locations to a maximum depth of 2.45m and visual and olfactory evidence of contamination was observed in numerous locations. Select soil samples were recovered at regular intervals and submitted to a UKAS/MCerts accredited laboratory for a general suite of analysis which included the following:

In total, twenty five soil samples (eighteen from the Made Ground and seven from the underlying natural strata) were tested for *arsenic, beryllium, cadmium, chromium (VI), copper, lead, mercury, nickel, selenium, vanadium and zinc*.

In addition, selected samples were tested for *speciated PAH, speciated TPH, PCBs, calorific value, Total Organic Carbon, Asbestos Identification and water soluble sulphate*.

Copies of the laboratory test certificates and statistical analysis worksheets are presented in Appendix IV.

5.0 TIER 1 CONTAMINATION ANALYSIS

5.1 Soil Guidelines

At a Tier 1 stage the long term human health toxicity of the soil has been assessed with reference to The LQM/CIEH S4ULs for Human Health Risk Assessment 2015 along with DEFRA Category 4 Screening Levels (C4SLs). As the proposed development will comprise new low secure units and residential apartments and houses the chemical test results have been compared against SSVs for a residential with plant uptake end use as a worst case scenerio.

The statistical significance of the chemical test results has been assessed by reference to the CIEH & CL:AIRE publication "Guidance on Comparing Soil Contamination Data with a Critical Concentration" (2008).

For the purpose of this report we have used a 'planning scenario' which aims to demonstrate that there is a 95% probability that the true population mean falls below the critical concentration (soil screening value).

5.2 Inorganic Contamination

Eighteen samples of the Made Ground and seven samples of the natural strata were submitted for chemical testing. Statistical analysis of the test results has been carried out for the Made Ground and natural soils separately, a copy of which is presented in Appendix IV.

The test results and statistical analyses indicate that all 95%^{ile} concentrations for the inorganic determinands tested for both Made Ground and natural strata fall below their respective SSVs when compared to values generated for a residential with plant uptake end use.

Individual elevated concentrations were recorded for beryllium and lead within the Made Ground soils. For beryllium elevated concentrations were recorded in WS2 at 1.3m, TP1 at 0.7m and TP6 at 0.6m at a concentration of 2.0 mg/kg when compared to a SSV of 1.7 mg/kg. An elevated concentration of lead was recorded in WS1 at 0.2m at a concentration of 292 mg/kg when compared to a SSV of 200 mg/kg. The elevated lead concentration was recorded as a statistical outlier.

Statistical outliers were recorded for copper and lead within the Made Ground soils though the concentrations were all below the relevant SSVs, and therefore are not considered to be significant.

In the natural soils, a statistical outlier was recorded for arsenic in WS2 at 2.7m with a concentration of 20 mg/kg compared to the SSV of 37 mg/kg. Again, as the concentration recorded does not exceed the SSV, the concentration is not significant.

5.3 Organic Contamination

Visual and olfactory evidence of hydrocarbon contamination was observed in the Made Ground and natural soils in WS1, WS11, WS15, TP1, TP3, TP4, TP7, TP9 and TP10. Targeted testing was carried out in these areas along with other random tests. In total seventeen samples of the Made Ground and six samples of the natural strata were tested for speciated PAH analysis to assess background concentrations with select samples also tested for speciated TPH.

Eight samples were tested for Total Organic Carbon from across the site. The values recorded ranged from 0.31% to 13.0% however the majority of samples range from 2.0% to 3.4%. As such an SSV of 2.5% soil organic matter has been used. This correlates with the predominantly mixed granular and cohesive material found on site.

No elevated concentrations were recorded for any of the 16 PAH compounds or TPH fractions tested with regard to human health.

It is however noteworthy that concentrations of hydrocarbons were recorded in several locations which may present a risk to the underlying aquifers. Concentrations exceeded the solubility saturation limits in the aliphatic C12 to C16, C16 to C21 and C21 to C35 fractions in WS1 at 0.2m, TP1 at 0.7m, TP3 at 0.25m and 1.8m, TP4 at 1.1m and TP7 at 0.5m. In all of these locations visual and / or olfactory evidence of hydrocarbon impacted soils were recorded during the fieldwork.

All of the locations where the elevated hydrocarbon concentrations have been recorded are located in the western part of the site, in close proximity to the above ground fuel storage tanks.

No elevated concentrations of PCBs were recorded.

5.4 Asbestos Contamination

Six samples of the Made Ground soils and two bulk samples of possible asbestos tile were sent to a UKAS/MCerts accredited laboratory for asbestos identification.

One of the bulk samples (S02) tested positive for amosite within the slate tile. However, no other asbestos was identified within any other samples tested.

5.5 Calorific Value

Due to the presence of colliery spoil and coal bearing strata below the site there is a possibility that fires may spontaneously start and propagate beneath ground surface. There is potential for these to break through to the surface and for flames to appear. The measurement of calorific value is used as an initial screening of potentially combustible materials.

Where values exceed 10 MJ/kg these materials are seen as certainly combustible while those with values below 2 MJ/kg are unlikely to burn. Within this range of values there is likely to be a large number of potentially combustible material as specified in "ICRCL: Notes on the fire hazards of contaminated land – July 1986".

Three samples were tested for calorific values in WS2 at 1.3m, WS10 at 0.5m and in TP4 at 0.5m recording calorific values of 3.05 MJ/kg, 0.116 MJ/kg and 1.96 MJ/kg respectively.

The results recorded are at the lower end of the range where the potential for combustion exists and it is not considered a significant hazard.

6.0 CONTAMINATION ASSESSMENT

6.1 General

Based on the information obtained during the ground investigation and laboratory testing, the 'Preliminary Conceptual Site Model' has been amended accordingly. The Conceptual Site Model is used as a basis to identify contamination sources, pathways and receptors and is subject to constant refinement as more information becomes available.

6.2 Environmental Setting & End Use

The ground investigation has identified up to 2.45m of Made Ground comprising concrete, tarmac, gravel of limestone, clayey sandy gravel or silty sand. This was underlain by clayey sand or clay with gravel and fragments inclusions of limestone, sandstone, brick, slate, metal, siltstone and mudstone. Alongside this, gravel of limestone or brick was also encountered to a maximum depth of 1.5m.

Visual and olfactory evidence of hydrocarbons was encountered in the Made Ground and natural soils in WS1, WS11, WS15, TP1, TP3, TP4, TP7, TP9 and TP10. Many of these locations were located close to former above ground fuel storage tanks.

Natural strata comprised very loose, loose and medium dense clayey sand with gravel inclusions of sandstone, siltstone and coal. Bands of firm sand clay and stiff clay with gravel inclusions of sandstone, siltstone and coal.

Very weak weathered micaceous sandstone was recorded in five at depths between 1.1m and 3.9m with possible highly weathered sandstone bedrock was also recorded in a number of locations where it was observed as very dense reddish brown fine to coarse sand with gravel of sandstone at depths between 2.6m and 4.1m.

Perched groundwater was encountered across the site at depths ranging from 0.35m to 2.0m.

The information gathered during the intrusive investigation has not altered significantly from that discussed in the TerraConsult Phase 1 Desk Based Study report. The Secondary A Aquifers located within the drift and solid strata are considered the main environmental receptors. Given the presence of mixed granular and cohesive drift and shallow bedrock the aquifers are potentially at risk from mobile contaminants migrating into them from the shallow soils. However, the site is not located within a groundwater source protection zone and abstractions for potable supply are recorded within 2km. As such, the environmental setting can be considered to be of 'low' to 'moderate' sensitivity.

With regard to human health, the proposed new development which is to be of residential end use can be thought of as a 'high' sensitivity development.

6.3 Contamination & Remediation Options

The "suitable for use" approach is adopted for the assessment of contaminated land and remedial measures are only undertaken where unacceptable risk exists to human health or the environment. For a potential risk to be present there must be a viable pollutant linkage whereby a contamination source may impact upon a receptor.

The following contamination sources have been identified:

- Amosite slate tile observed at ground surface in SO2.
- Hydrocarbon contamination in WS1, TP1, TP3, TP4 and TP7 at depths ranging from 0.2m to 1.8m bgl.

The presence of the amosite slate tile is considered to be an isolated occurrence. No evidence of any other asbestos containing materials have been observed during the fieldwork or via laboratory detection. As such, we recommend that no additional intrusive work is required but would recommend that the appointed ground works contractor is made aware that an asbestos tile was recorded in the location of SO2 and that a watching brief is carried out during excavations in this area of the site. The person undertaking the watching brief must have up to date asbestos awareness training. Should any suspected asbestos containing materials be encountered the works should be halted immediately and a qualified environmental consultant engaged to recover samples and determine if any remedial action is required.

Whilst the hydrocarbon contamination recorded does not present a risk to end users of the site at the concentrations recorded they do present a potential risk to controlled waters i.e. the underlying Secondary A Aquifers in the drift and solid strata.

Leaving the hydrocarbon contamination in-situ and untreated might be acceptable if it can be demonstrated, probably by means of Quantitative Risk Assessment (QRA), that the contamination poses no risk to controlled waters. However, based on a qualitative review of the data obtained to date, it is possible that some contaminated soil may require removal from site or some form of treatment.

At this stage however we would recommend that further investigation is carried out in the location of the above ground fuel storage tanks following demolition of the existing buildings and removal of the tanks when access will be possible without any restrictions. During the removal of the tanks we would recommend that a qualified environmental consultant is present to observe the condition of the underlying soils and to recover soil samples for laboratory analysis.

Depending on the results of these additional investigations the above conclusions maybe be subject to change.

Site workers involved in excavations for foundations, roads, sewers etc. may come into direct contact with Made Ground soils which are impacted by hydrocarbon contamination. We would therefore recommend that simple precautionary measures be adopted during the construction phase i.e. good personal hygiene, provision of welfare facilities including washing and showers and that basic personal protective equipment is provided i.e. gloves and safety glasses.

7.0 HAZARDOUS GROUND GAS

7.1 General

Made Ground soils were encountered up to 2.45m bgl comprising concrete, tarmac, gravel of limestone, clayey sandy gravel or silty sand. This was underlain by clayey sand or clay with gravel and fragments inclusions of limestone, sandstone, brick, slate, metal, siltstone and mudstone.

The immediate surrounding area has been subject to industrial development with the presence of the colliery to the south east of the site and coal bearing strata have the potential to generate hazardous ground gases at concentrations which could be harmful to human health. In addition, a former refuse tip has been identified 43m to the south west. It can therefore be concluded that potential hazardous ground gas sources are present on site and in the immediate surrounding area.

7.2 Scope of Works

In view of the above, seven gas monitoring wells were installed in WS6, WS9, WS11, WS12, WS14, WS15 and WS16. The response zones were positioned in either the Made Ground or natural strata where possible. An initial monitoring programme comprising six monitoring visits is planned over three months in general accordance with CIRIA Report C665 "Assessing Risks Posed by Hazardous Ground Gases to Buildings".

7.3 Monitoring Results

Monitoring has been undertaken on one occasion to date with and atmospheric pressure in a steady condition at 1011mb. A further five visits are yet to be conducted. Copies of the results available to date are presented in Appendix V and summarised in Table 1 below.

Table 1 – Gas Monitoring Results

Hole ID	Max Methane (%v/v)	Max Carbon Dioxide (%v/v)	Steady Carbon Dioxide (%v/v)	Flow Rate (l/hr)	Gas Screening Value (l/hr)	Characteristic Situation
WS6	0.0	4.0	4.0	0.1	0.0040	CS1
WS9	0.0	2.7	2.7	0.1	0.0027	CS1
WS11	0.0	8.1	8.0	0.1	0.0080	CS2
WS12	0.0	4.0	4.0	0.1	0.0040	CS1
WS14	-	-	-	-	-	-
WS15	0.0	1.9	1.8	0.1	0.0018	CS1
WS16	0.0	0.0	0.0	0.1	0.0001	CS1

During the first visit WS14 was not recorded as the monitoring well was inaccessible.

Carbon dioxide concentrations have been recorded in most locations reaching a maximum of 8.0% in WS11. In WS6 and WS12 concentrations of carbon dioxide reached 4.0% with depleted oxygen also recorded in WS11 and WS12 with values of 5.9% and 5.4% respectively.

The monitoring results have not recorded any significantly elevated concentrations of methane and gas flows have been absent, with a default value of 0.1l/hr prescribed simply to allow a GSV to be calculated.

Based on the monitoring results available to date, the worst-case Gas Screening Value (i.e. 8.0% carbon dioxide and 0.1 l/hr flow) is 0.0080 l/hr.

7.4 Discussion

The monitoring results have recorded a maximum steady carbon dioxide concentration of 8.0% during the first visit with concentrations of 4.0% also recorded in two locations with associated oxygen depletion.

Whilst gas flow rates have so far been absent, given the above, along with the presence of hydrocarbon contamination in the western portion of the site we would recommend that allowance is made for the installation of gas protective measures in accordance CS2 conditions as set out in BS8485 "Code of Practice for The Design of Protective Measures for Methane & Carbon Dioxide Ground Gases for New Buildings" (2015).

Given the presence of hydrocarbons in the western portion of the site, we would recommend that the secure unit buildings also be provided with a hydrocarbon vapour resistant membrane. It must also be ensured that the gas protective measures installed are also suitable to mitigate the risk posed from radon gas.

Please note that the further monitoring is still required, and these recommendations may be subject to change. Once the monitoring programme has been completed we will update this report with the final results and recommendations.

The gas protective measures should be installed and verified in accordance with guidance provided in CIRIA Report C735 "Good practice on the Testing & Verification of Protection Systems for Buildings Against Hazardous Ground Gases" (2014).

Please note the relatively recent change in guidance now requires the installation of gas protective measures to be fully verified by an independent verifier / consultant. In advance of the works a verification plan should be produced and following the installation process a verification report is required to assist in the discharge of planning conditions relating to contaminated land.

8.0 GEOTECHNICAL ASSESSMENT

8.1 General

It should be noted that this Section does not comprise or represent a Geotechnical Design Report (GDR) but instead provides preliminary information and recommendations based on the findings of the Ground Investigation.

The geotechnical section of the ground investigation was designed in general accordance with guidance presented in BS EN 1997-2:2007. The objective of the investigation was to obtain preliminary information in order to assess the geotechnical properties of the ground and provide recommendations for foundation and infrastructure design.

8.2 In Situ Geotechnical Testing

In-situ standard penetration tests (SPTs) were carried out in all of the boreholes during drilling at approximately 1.0m centres in order to determine the soil strength / density.

The SPTs carried out in the natural cohesive strata recorded “N” values ranging from 10 to 32 indicating that these soils are in a ‘firm’, ‘stiff’ and ‘very stiff’ condition. In general however, the ‘N’ values range from 10 to 20 indicating that these soils are typically in a ‘firm’ to ‘stiff’ condition.

The SPTs carried out in the natural granular strata recorded “N” values ranging from 2 to >50 indicating that these soils are in a ‘very loose’ to ‘very dense’ condition.

In general, the SPTs carried out at 1.2m and 2.0m recorded “N” values of 5 to 19 indicating that the upper horizons of these soils are in a ‘loose’ to ‘medium dense’ condition. In general, the ‘N’ values increased with depth.

SPTs recorded within the weathered sandstone bedrock recorded “N” values above 50.

8.3 Geotechnical Laboratory Testing

Particle Size Distribution Tests

Four soil samples were recovered from the shallow natural granular soils from WS10 at 2.75m, WS17 at 2.7m, TP6 at 2.1m and TP9 at 1.5m and submitted to a UKAS accredited laboratory for particle size distribution tests (PSDs).

These results confirm that these soils comprise gravelly sandy clay and very clayey gravelly sand.

8.4 Plasticity Indices

Five soil samples were recovered from the shallow natural clay deposits from WS5 at 1.5m, WS7 at 1.7m, WS13 at 3.5m, WS14 at 2.4m and TP6 at 2.1m. The five samples were submitted to a UKAS accredited laboratory for Determination of Liquid and Plastic Limits in accordance with BS1377: Part 2: 1990: Methods 3.0, 4.4 and 5.0.

NHBC Standards Chapter 4.2 (Building Near Trees) states that in order to assess the volume change potential of cohesive soils, the Modified Plasticity Index should be calculated. The Modified Plasticity Index is defined as the Plasticity Index of the soils multiplied by the percentage of particles less than 425µm.

The results recorded Modified Plasticity Indices of 12.74% in WS5, 8.91% in WS7, 6.64% in WS13, 9.2% in WS14 and 7.29% in TP6. Therefore, in accordance with Table 1 of NHBC Standards Chapter 4.2, the volume change potential of the shallow clay soils at the site is low.

Copies of the geotechnical laboratory results are attached in Appendix VI.

8.5 Foundation Recommendations

The following foundation recommendations assume that the proposed development will comprise a low secure unit and assessment centre in the western part of the site along with 36 residential dwellings and apartments with associated soft landscaping and car parking in the east. We also assume that site levels will not change significantly from those encountered during this investigation.

The ground investigation has identified Made Ground across the site which is typically between 0.5m and 1.5m in depth. In one location (WS6) the Made Ground was found to be deeper reaching 2.45m. The filled ground typically comprises concrete, tarmac or gravel hardstanding underlain by clayey sand or clay with inclusions of limestone, sandstone, brick, slate, metal, siltstone and mudstone.

Natural strata have been found to be variable in nature and comprising very clayey sand with gravel inclusions of sandstone, siltstone and coal and sandy gravelly clay. These strata are often found to be interbedded. The strength / density of the natural strata has also been found to be variable with the granular soils typically in a loose to medium dense condition with the cohesive strata in a firm to stiff condition.

Very weak weathered micaceous sandstone was recorded in five locations in the north-western portion of the site at depths between 1.1m and 3.9m. Possible highly weathered sandstone bedrock was also recorded in a number of other locations, recovered as very dense reddish-brown fine to coarse sand with gravel of sandstone at depths between 2.6m and 4.1m.

Perched groundwater was encountered across the site at depths ranging from 0.35m to 2.0m.

Made Ground soils are not considered suitable as a founding stratum due to their inherently heterogeneous nature. Foundations should therefore be taken through the Made Ground and be placed in natural strata of adequate bearing capacity.

The proposed two-storey low secure hospital in the western portion of the site could utilise shallow strip and trench fill foundations using the firm to stiff clay and medium dense sand located at depths of 1.5m to 2.0m bgl.

The foundations would need to be over-deepened in areas where deeper Made Ground has been identified i.e. WS6. Plasticity indices testing has confirmed that the clay soils are of low volume change potential, however, foundations may need to be deepened near trees in accordance with NHBC Standards Chapter 4.2.

Foundations will almost certainly span different strata types and we would recommend that footings are reinforced to prevent potential differential settlement.

Whilst strip or trench fill footings generally represent a simple and inexpensive foundation solution, their use would generate a large volume of waste arisings which given the presence of hydrocarbon contamination may require costly disposal as hazardous waste.

In the eastern portion of the site where the proposed two and three storey residential housing and apartment blocks are to be constructed, the ground conditions have been found to be in a loose / soft to firm condition locally. We have not been provided with proposed loadings for the new structures, but the use of shallow strip and trench fill foundations may not be possible, and some units may require a piled foundation solution. Given the variability of the ground conditions, for this area of the site we would recommend further investigation be undertaken on a plot by plot basis to confirm the most suitable foundation solution.

Given the depth of Made Ground is typically greater than 0.6m we would recommend the use of suspended ground floor slabs.

8.6 Concrete Classification

In accordance with BRE Special Digest 1, the site has been classified as "brownfield" with a mobile groundwater regime.

Foundations will be extended through any Made Ground into the underlying natural strata. Three soil samples were taken at depths of 0.5m to 1.3m and submitted for pH and water soluble sulphate testing.

The concentrations of sulphate in aqueous extractions in natural soils were determined using the gravimetric method, with samples of Made Ground tested using ion chromatography. The pH value of each sample was determined using the electrometric method.

BRE SD1 states that where a data set contains a small number of samples the highest sulphate concentration should be taken as the characteristic value along with the lowest pH. As such, the characteristic water soluble sulphate value is 86 mg/l with the lowest recorded pH of 7.03.

Therefore, in accordance with Table C2 of SD1, sub-surface concrete for this site will likely be classified as Design Sulphate Class DS-1 with an ACEC classification of AC-1.

8.7 Infiltration Tests

Falling head permeability tests were undertaken in two boreholes (WS15 and WS16) in the eastern part of the site to give an initial indication of the soils permeability. Infiltration rates have been calculated for each location as an indication of the soils drainage characteristics. The permeability (k) values ranged from 7.95×10^{-7} in WS15 to 5.57×10^{-5} .

Soakaway testing was also undertaken in SA1 and SA2 in the southern part of the site. The tests were carried out in general accordance with BRE Digest 365 "Soakaway Design". Mechanically excavated trial pits were undertaken to roughly 2.0m bgl with the vertical sides trimmed and squared before being partially filled with water and the rate of infiltration recorded.

In accordance with guidance provided in BRE Digest 365, the infiltration rate should be calculated for the time taken for the water level to fall from 75% to 25% of the effective depth. The water infiltrated sufficiently in SA1 and recorded an infiltration rate of 5.79×10^{-6} .

The water did not infiltrate sufficiently for the head to fall to 25% in SA2. The infiltration rate for SA2 has therefore been calculated for the entire test time against the infiltration achieved to provide an estimated infiltration rate. The infiltration in SA2 has been recorded as 4.54×10^{-7} .

The results of the infiltration testing indicate generally poor drainage characteristics. Whilst the soakaway testing carried out during this investigation was not successful, the use of soakaways may be possible where granular material is present and further targeted testing should be considered.

The presence of hydrocarbon contamination in some parts of the site will need to be considered if soakaways are to be adopted to ensure that any surface water infiltration does not mobilise potential contaminants.

A copy of the soakaway test results is presented in Appendix VII.

8.8 Waste Management

Arisings generated from excavations for foundations and service trenches etc. may be classified as waste and it is the responsibility of the holder of such material to form a view as to whether or not it constitutes waste.

Guidance on how this can be achieved is set out in the Development Industry Code of Practice (CoP) (CL:AIRE, March 2011).

The handling, re-use or disposal of waste materials is regulated by the Environment Agency, who take account of the CoP in determining if materials are classified as waste. If materials are dealt with in accordance with the CoP it is considered that they are unlikely to be waste at the point when they are used during development. This might be because the materials were never

discarded or because they have been processed as part of a 'recovery' operation and therefore ceased to be waste.

Should site won material be intended for re-use on site a Materials Management Plan will be required from a suitably qualified environmental consultant.

Given the presence of hydrocarbon contamination it is likely that some soil arisings will be classified as hazardous waste for disposal purposes and we would recommend that allowance is made for the removal of such material, particularly in the western portion of the site where the above ground storage tanks are located.

8.9 Excavations

Based on the results of the investigation, groundwater ingress may be encountered at shallow depth. Given the variability of the ground conditions excavations remaining open for significant periods may require shoring.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The site is being considered for redevelopment comprising a two-storey low secure unit and assessment centre in the western part of the site along with 36 two and three storey residential dwellings and apartments with associated soft landscaping and car parking in the east. Should the proposed end use change it will be necessary to amend the conclusions accordingly. The report also assumed that the final site levels will not be significantly altered.

Historical OS maps dating back to 1872 indicate that the site was first occupied by colliery stockpiles belonging to an adjacent colliery along the western boundary of the site. The stockpile extended in size from 1872 to 1961 covering the whole of the western and part of the northern site area before being removed around 1969. From 1974 the development of industrial buildings occurred including a council depot, works and unidentified industrial buildings along with an electrical sub-station as part of the wider Westminster Industrial Estate.

The surrounding area has been occupied by mixed residential and industrial land with a colliery located to the south of the site along with tanks, smithy, brickworks, disused tip and drill shed. Alongside this a railway is located adjacent to the eastern boundary of the site running north south.

The superficial deposits underlying the west of the site (Glacial Till) are classified as an Unproductive Aquifer with the superficial deposits in the east of the site (Glaciofluvial Deposits) are classified as a Secondary A Aquifer. The solid strata located beneath site is classified as a Secondary A Aquifer.

The site is not located within a Groundwater Source Protection Zone and there are no groundwater abstraction points within 2km of the site. The nearest surface watercourse is located 700m distant.

The Radon Guidance on protective measures for new dwellings indicates that the site is in an area where 3% to 5% of properties are above action level and basic radon protection is required for all new structures.

Site investigation works have been carried out comprising the drilling of eighteen window sample boreholes and excavation of eleven trial pits.

The ground investigation has identified Made Ground across the site which is typically between 0.5m and 1.5m in depth. In one location (WS6) the Made Ground was found to be deeper reaching 2.45m. The filled ground typically comprises concrete, tarmac or gravel hardstanding underlain by clayey sand or clay with inclusions of limestone, sandstone, brick, slate, metal, siltstone and mudstone.

Natural strata have been found to be variable in nature and comprising very clayey sand with gravel inclusions of sandstone, siltstone and coal and sandy gravelly clay. These strata are often found to be interbedded. The strength / density of the natural strata has also been found to be variable with the granular soils typically in a loose to medium dense condition with the cohesive strata in a firm to stiff condition.

Very weak weathered micaceous sandstone was recorded in five locations in the north-western portion of the site at depths between 1.1m and 3.9m. Possible highly weathered sandstone bedrock was also recorded in a number of other locations, recovered as very dense reddish-brown fine to coarse sand with gravel of sandstone at depths between 2.6m and 4.1m.

Perched groundwater was encountered across the site at depths ranging from 0.35m to 2.0m.

Chemical testing carried out on the Made Ground and natural soils beneath the proposed development site did not identify any elevated levels of contaminants when compared to the LQM/CIEH S4ULs for Human Health Risk Assessment 2015 along with DEFRA Category 4 Screening Levels (C4SLs) SSVs for a residential end use.

Concentrations of petroleum hydrocarbons have however been identified in several locations, associated with above ground fuel storage tanks, which may present a risk to controlled waters (underlying aquifers) and further consideration of this risk is required.

Leaving the hydrocarbon contamination in-situ and untreated might be acceptable if it can be demonstrated, probably by means of Quantitative Risk Assessment (QRA), that the contamination poses no risk to controlled waters. However, based on a qualitative review of the data obtained to date, it is possible that some contaminated soil may require removal from site or some form of treatment.

We would recommend that further investigation is carried out in the location of the above ground fuel storage tanks following demolition of the existing buildings and removal of the tanks when access will be possible without any restrictions. During the removal of the tanks we would recommend that a qualified environmental consultant is present to observe the condition of the underlying soils and to recover soil samples for laboratory analysis.

An asbestos cement tile has been recorded in one location in the south western part of the site and although this in itself does not warrant additional investigations we have recommended that the appointed ground works contractor carry out a watching brief during any excavations in this area of the site to check for the presence of asbestos containing materials.

Gas monitoring wells have been installed across the site and the results to date have recorded a maximum steady carbon dioxide concentration of 8.0% during the first visit with concentrations of 4.0% also recorded in two locations with associated oxygen depletion.

Whilst gas flow rates have so far been absent, given the above, along with the presence of hydrocarbon contamination in the western portion of the site we would recommend that allowance is made for the installation of gas protective measures in accordance CS2 conditions as set out in BS8485 "Code of Practice for The Design of Protective Measures for Methane & Carbon Dioxide Ground Gases for New Buildings" (2015).

Given the presence of hydrocarbons in the western portion of the site, we would recommend that the secure unit buildings also be provided with a hydrocarbon vapour resistant membrane. It must also be ensured that the gas protective measures installed are suitable to mitigate the risk posed from radon gas.

The proposed two-storey low secure hospital in the western portion of the site could utilise shallow strip and trench fill foundations using the firm to stiff clay and medium dense sand located at depths of 1.5m to 2.0m bgl.

In the eastern portion of the site where the proposed two and three storey residential housing and apartment blocks are to be constructed, the ground conditions have been found to be in a loose / soft to firm condition locally. We have not been provided with proposed loadings for the new structures, but the use of shallow strip and trench fill foundations may not be possible, and some units may require a piled foundation solution. Given the variability of the ground conditions, for this area of the site we would recommend further investigation be undertaken on a plot by plot basis to confirm the most suitable foundation solution.

The results of the infiltration testing indicate generally poor drainage characteristics. Whilst the soakaway testing carried out during this investigation was not successful, the use of soakaways may be possible where granular material is present and further targeted testing should be considered.

The presence of hydrocarbon contamination in some parts of the site will need to be considered if soakaways are to be adopted to ensure that any surface water infiltration does not mobilise potential contaminants.

Laboratory testing indicates that sub-surface concrete should be prepared as Design Sulphate Class DS-1 with an ACEC classification of AC-1.

Based on the findings of this investigation, we would recommend the following additional works will be required:

- Further site investigation in the eastern part of the site to determine the most suitable foundation options for the residential dwellings and apartments.
- Supervision and inspection of the removal of all above ground fuel storage tanks. Excavation of trial pits should then be carried out directly beneath and around the tanks with further soil samples recovered for chemical testing.
- Assessment of hydrocarbon contamination risk to controlled waters following additional testing. Possible requirement for DQRA and some form of remediation.
- Additional trial pits to be excavated beneath existing building footprints following demolition to confirm the ground conditions and depth of filled ground.
- Possible requirement for additional targeted soakaway testing.
- Provision of gas protective measures in accordance with CS2 conditions with allowance for a hydrocarbon vapour resistant membrane in the western portion of the site. The gas protective measures must also be suitable to comply with the requirement for basic radon gas protection.

The above conclusions and recommendations are based on the findings of this investigation and it is entirely possible that ground conditions and contamination exists at the site which differ from those identified during this study.

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Appendix I

Client **Condry Lofthouse Architects Ltd**

Project **Proposed Low Secure Units & Residential Development, Mold Rd, Wrexham**

Title **Site Location Plan**

Office **Altrincham** Discipline **Geo-environmental**

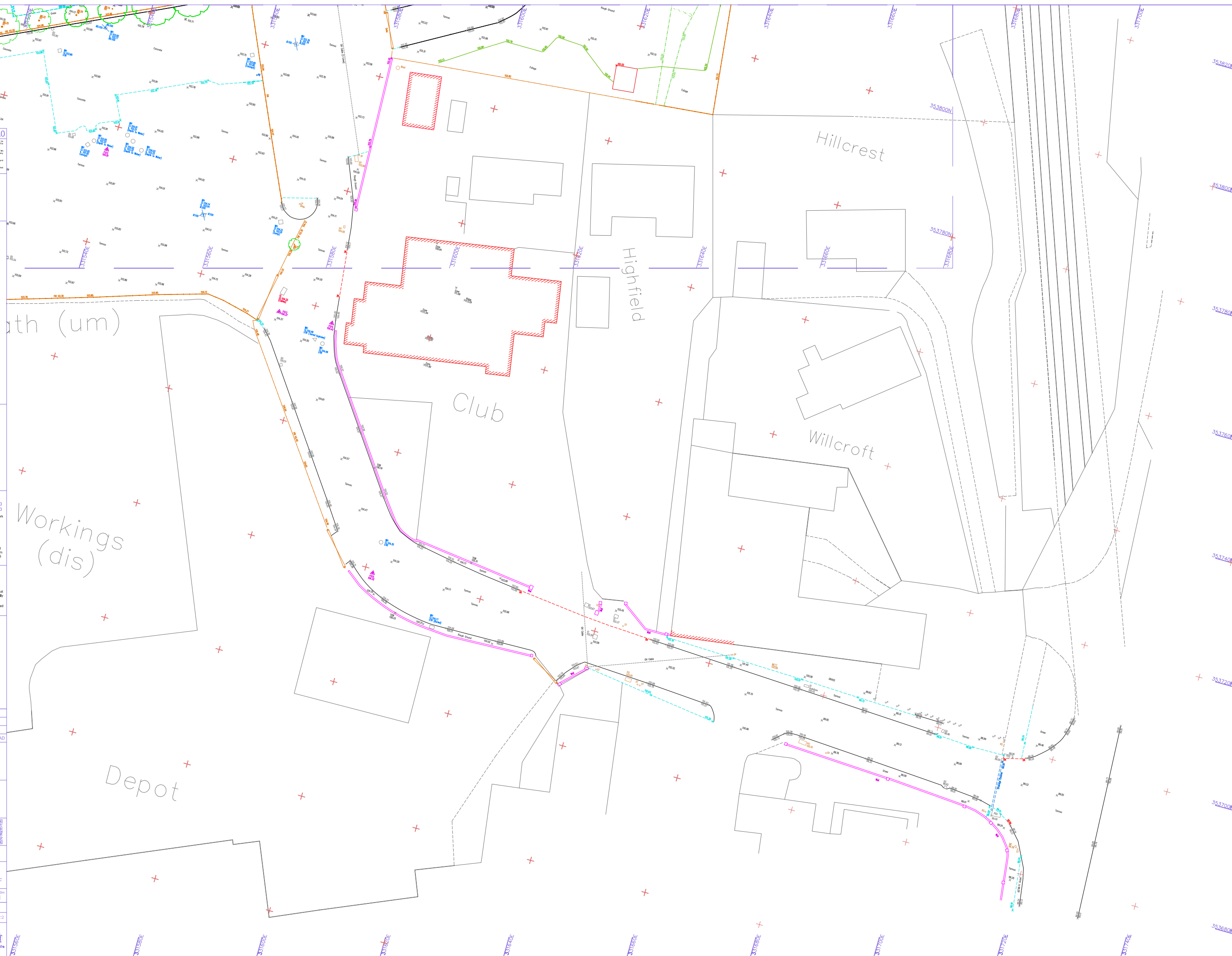


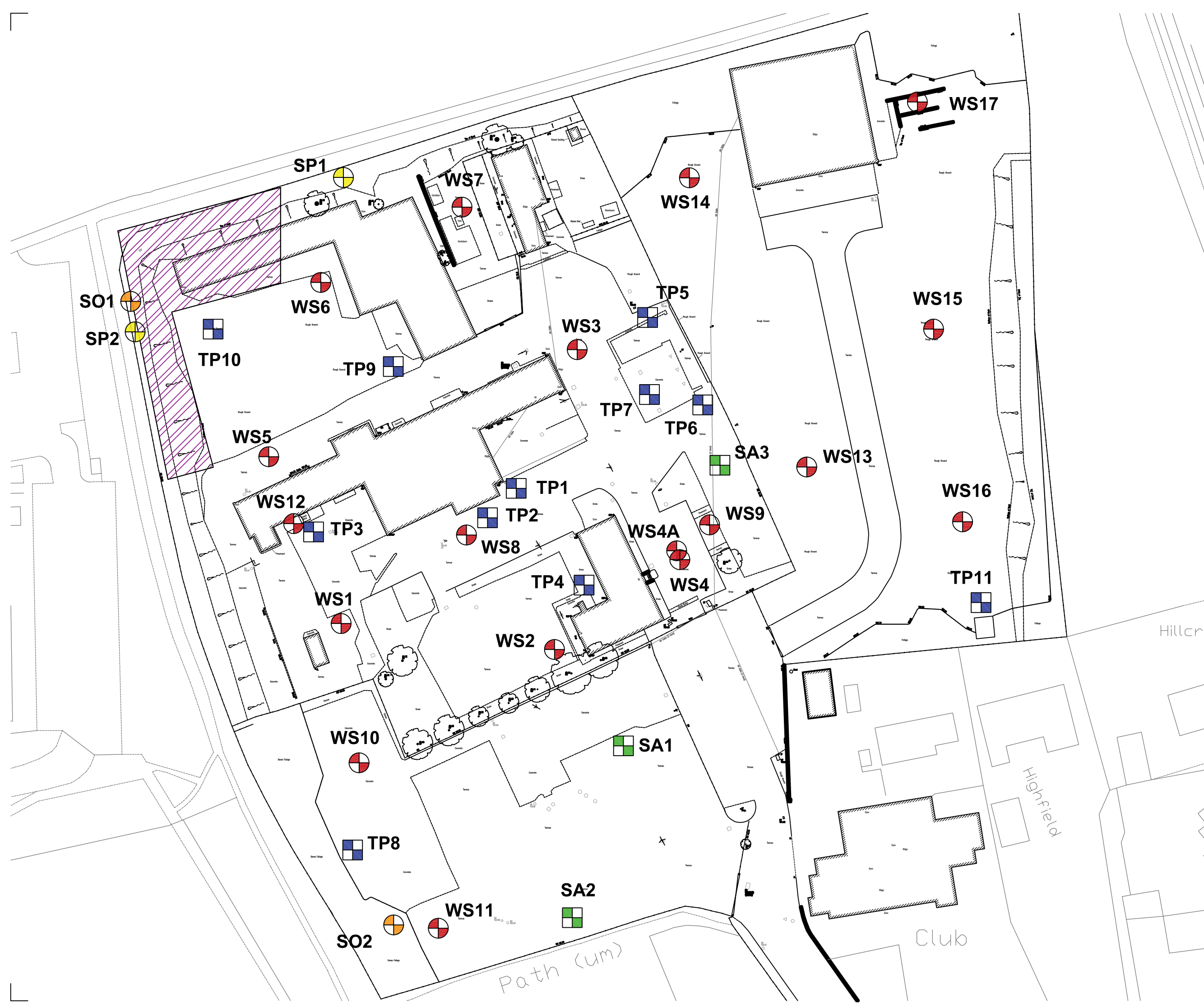
REV	DATE	DESCRIPTION	BY	CHK.	APP.	Drawn	Date	Job number	Drawing number	Revision
Rev	Date	Description	By	Check	App.	SHP	October 2017	10/1014	001	A
						Checked	Scale @ A4 NTS			
						Approved	Status			
						NR				

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SITE PLAN - AS PROPOSED



[illegible]



Key

- Soakaway Test
- Trial Pit
- Window Sample Borehole
- Hand Excavated Trial Pit
- Fragment Sample
- Approximate Extent of Japanese Knotweed

REV	DATE	DESCRIPTION	BY	CHK.	APP.
Rev	Date	Description	By	Check	App.

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Client	Condy Lofthouse Architects Ltd
Project	Proposed Low Secure Units & Residential Development Mold Rd, Wrexham
Office	Altrincham
Discipline	Geo-environmental
Title	Exploratory Hole Location Plan

Drawn	SHP	Date	September 2017
Checked	NR	Scale @ A3	NTS
Approved	NR	Status	



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Job number	Drawing number	Revision
10/1014	002	A

Birmingham 0121 200 7800, Glasgow 0141 222 1720, Liverpool 0151 227 5300, London 020 3077 0970, Manchester 0161 613 6000, Newcastle 0191 221 0702, Newport 01633 365196, Plymouth 01752 475015, Reading 0118 947 7888

Appendix II

Site Photographs



1. Looking east over the north of the site.



2. Suspected Japanese Knotweed in north west of the site.



3. Storage containers in north of the site.



4. Fuel tank in north of the site.



5. Looking north west at the buildings in the centre of the site and historic fuel tank position.



6. Looking north at the buildings in the centre of the site.



7. Potential ACMs from cladding on the buildings in the centre of the site.



8. Looking south at the building in the central south of the site.



9. The location of the buried fuel tanks in the centre of the site.



10. Looking north at the east of the site.



11. Electricity sub-station in the south east of the site.



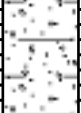
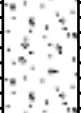
12. Looking north at the south west of the site.



13. Looking North east at the south west of the site.

Appendix III

		Project Title: Mold Road, Wrexham				WS1	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 12/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: SHP	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.20	D				0.10 0.25	MADE GROUND: Tarmac.		
1.20 - 1.45	SPT	N=13			1.00	MADE GROUND: Dark grey clayey gravelly fine to coarse sand. Gravel is fine to coarse angular to sub-rounded of limestone, sandstone and brick. Frequent fragments of slate and metal (strong visual and olfactory evidence of hydrocarbons).		
2.00 - 2.45	SPT	N=10			2.00	Medium dense orangish brown clayey slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded of sandstone and siltstone with occasional fragments of coal.	▼	
2.30	D				2.50			
3.00 - 3.45	SPT	N=17			3.00	Medium dense brown slightly gravelly fine to coarse SAND. Gravel is fine to medium sub-rounded of sandstone.		
4.00 - 4.40	SPT	pp 65/220mm			3.90 4.00	Very weak very weathered light yellowish brown thinly bedded slightly micaceous SANDSTONE.		
					4.40	End Of Borehole At 4.40 m		
					5.00			
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa ▼ - Groundwater Strike ▼ - Groundwater Level		REMARKS Perched groundwater encountered at 1.9m. Visual and olfactory evidence of hydrocarbons encountered between 0.1m and 0.25m. Borehole terminated in sandstone bedrock. Borehole backfilled with arisings.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr> <td>12/09/2017</td> <td>1.9</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed	12/09/2017	1.9																
Date	Strike	Level	Minutes	Casing	Sealed																						
12/09/2017	1.9																										
		Scale: 1:50	Daily Log Of Depths <table border="1"> <thead> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Date	Casing	Water	From	To	Hours																		
Date	Casing	Water	From	To	Hours																						

		Project Title: Mold Road, Wrexham				WS2	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 12/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: SHP	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.40	D				0.50	MADE GROUND: Tarmac.		
					0.70	MADE GROUND: Reddish brown slightly clayey gravelly fine to coarse sand. Gravel is fine to coarse angular of brick.		
1.20 - 1.65	SPT	N=55			1.00	MADE GROUND: Grey clayey gravelly fine to coarse sand. Gravel is fine to coarse angular of siltstone.		
1.30	D				1.50	MADE GROUND: Dark grey slightly clayey slightly ashy fine to coarse sand and gravel of siltstone and mudstone with fragments of brick and coal.		
2.00 - 2.45	SPT	N=19			2.00	Medium dense grey becoming brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded of sandstone and siltstone with occasional fragments of coal.		
2.70	D				3.00	Loose grey becoming brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded of sandstone and siltstone with occasional fragments of coal.		
3.00 - 3.45	SPT	N=9			3.70	Very dense brown fine to coarse SAND and fine to coarse sub-rounded GRAVEL of sandstone and quartz.		
3.70 - 4.10	SPT	N=60			4.00	End Of Borehole At 4.10 m		
					4.10			
					5.00			
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS Perched groundwater encountered at 1.6m. Borehole terminated in very dense sand and gravel. Borehole backfilled with arisings.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr> <td>12/09/2017</td> <td>1.6</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed	12/09/2017	1.6																
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Date	Casing	Water	From	To	Hours																						

		Project Title: Mold Road, Wrexham				WS3	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 12/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: SHP	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
1.10 1.20 - 1.65	D SPT	N=13			0.10	MADE GROUND: Tarmac.		
					0.80 0.90 1.00	MADE GROUND: Light brown sandy fine to coarse angular gravel of limestone (sub-base).		
					1.30	MADE GROUND: Greyish brown sandy fine to coarse angular to sub-angular gravel of brick.		
					1.60	MADE GROUND: Boulder of siltstone.		
1.70 2.00 - 2.45	D SPT	N=13			2.00 2.10	MADE GROUND: Dark grey sandy clay with fragments of coal.		
						Medium dense brown clayey gravelly fine to medium SAND. Gravel is fine to coarse sub-rounded of sandstone.		
3.00 - 3.45 3.10	SPT D	N=12			3.00	Firm brown sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone and siltstone.		
						Medium dense brown slightly clayey slightly gravelly fine to medium SAND. Becoming very gravelly towards the base of the unit.		
4.00 - 4.45	SPT	N=16			4.00	End of Borehole At 5.45 m		
5.00 - 5.45	SPT	N=15			5.00 5.45			
					6.00 7.00 8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS Perched groundwater encountered at 2.0m. Borehole terminated in medium dense clayey sand. Borehole backfilled with arisings.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr> <td>12/09/2017</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> Daily Log Of Depths <table border="1"> <thead> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed	12/09/2017	2																	Date	Casing	Water	From	To	Hours												
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Date	Casing	Water	From	To	Hours																																								

			Project Title: Mold Road, Wrexham				WS4																																											
			Project Number: 10/1014		Client: Condry Lofthouse Architects					Sheet 1 Of 1																																								
			GL (mAOD):		N Coord: 0		E Coord: 0																																											
Date: 12/09/2017			Method: Window Sampler		Driller: WB Drilling		Logged By: SHP																																											
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe																																										
				  	0.10 0.40 0.70 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00	MADE GROUND: Tarmac. MADE GROUND: Reddish brown sandy fine to coarse sub-angular gravel and cobbles of brick. MADE GROUND: Grey very clayey fine to coarse sandy fine to coarse angular to sub-angular gravel and cobbles of brick, sandstone and siltstone with fragments of coal. End Of Borehole At 0.70 m																																												
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			Project Title: Mold Road, Wrexham				WS4A																																											
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		Project Title: Mold Road, Wrexham				WS5	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: SHP	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.30	D	N=20			0.15	MADE GROUND: Tarmac.		
			0.40		MADE GROUND: Grey sandy fine to coarse angular gravel of limestone (sub-base).			
1.20 - 1.65	C		1.00		Stiff brown sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded of sandstone and siltstone with fragments of coal. Becoming very sandy from 1.75m.			
1.50	D							
2.00 - 2.45	C	2.00						
2.70 - 3.15	C	2.70						
		N=57			3.00	Light yellowish brown very weak very weathered thinly bedded SANDSTONE.		
			3.15	End Of Borehole At 3.15 m				
					4.00			
					5.00			
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa - Groundwater Strike - Groundwater Level	REMARKS No Groundwater Encountered Borehole terminated in sandstone bedrock. Borehole backfilled with arisings.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6">Water Strikes</th> </tr> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3">Daily Log Of Depths</th> <th colspan="3">Chiselling</th> </tr> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	Water Strikes						Date	Strike	Level	Minutes	Casing	Sealed																			Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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Scale: 1:50

		Project Title: Mold Road, Wrexham				WS6	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.30	D	N=22			0.60	MADE GROUND: Light grey slightly clayey sandy fine to coarse sub-angular to sub-rounded gravel of limestone, brick and mudstone.		
1.20 - 1.65	C				0.90 1.00	MADE GROUND: Light grey gravelly clay. Gravel is fine to coarse angular to sub-rounded of mudstone.		
2.00 - 2.45	C		N=67			1.40 1.64 1.77	MADE GROUND: Light orange slightly sandy gravelly clay. Gravel is fine to coarse sub-angular to sub-rounded of mudstone, sandstone and quartz.	
2.30	D				2.00 2.20	MADE GROUND: Light yellowish orange clayey sandy fine to coarse angular to sub-angular gravel of sandstone.		
					2.45 3.00	MADE GROUND: Reddish orange fine to coarse angular to sub-angular gravel of brick.		
					3.00 4.00	MADE GROUND: Brown clayey sandy fine to coarse sub-angular gravel of brick, sandstone, mudstone and quartz.		
					4.00 5.00	MADE GROUND: Light yellowish sandy fine to coarse angular to sub-rounded gravel of brick and sandstone.		
					5.00 6.00	MADE GROUND: Redish brown sandy gravelly clay. Gravel is fine to coarse, angular to sub-rounded of brick, mudstone and sandstone.		
					6.00 7.00			
					7.00 8.00			
						End Of Borehole At 2.45 m		

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa - Groundwater Strike - Groundwater Level 	REMARKS No Groundwater Encountered Borehole terminated in Made Ground. Borehole installed with monitoring well to 2.0m. Scale: 1:50	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6">Water Strikes</th> </tr> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3">Daily Log Of Depths</th> <th colspan="3">Chiselling</th> </tr> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	Water Strikes						Date	Strike	Level	Minutes	Casing	Sealed																			Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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		Project Title: Mold Road, Wrexham				WS7	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.20	D	N=10			0.20	MADE GROUND: Light grey fine to coarse angular to sub-angular gravel of limestone.		
0.60	D					MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is fine to coarse sub-angular to rounded of limestone, mudstone and sandstone.		
1.20 - 1.65	C				1.00	Mottled greyish yellow slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of quartz and sandstone with occasional cobbles of sandstone.		
1.70	D	N=12			1.25	Medium dense yellowish orange slightly clayey fine to coarse SAND and fine to coarse sub-angular to rounded GRAVEL of quartz and sandstone.		
2.00 - 2.45	C				1.50			
					2.00			
3.00 - 3.45	C	N=12			2.80	Firm orange becoming brown slightly sandy very gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded of sandstone, mudstone, quartz and coal.		
3.60	D				3.00			
3.80 - 4.25	C				3.40			
		N=>50			3.70	Medium dense orange sandy gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded of sandstone, mudstone and quartz with fragments of coal.		
					4.00			
					4.25			
					5.00			
					6.00			
					7.00	Very dense yellowish brown slightly sandy fine to coarse sub-angular GRAVEL of sandstone (weathered bedrock). End Of Borehole At 4.25 m		
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa - Groundwater Strike - Groundwater Level	REMARKS No Groundwater Encountered Borehole terminated in weathered sandstone bedrock. Borehole backfilled with arisings. Scale: 1:50	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6">Water Strikes</th> </tr> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3">Daily Log Of Depths</th> <th colspan="3">Chiselling</th> </tr> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	Water Strikes						Date	Strike	Level	Minutes	Casing	Sealed																									Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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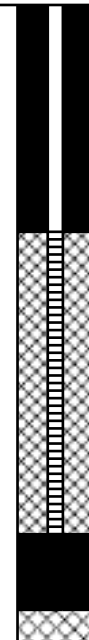
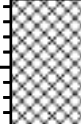
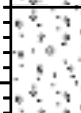
		Project Title: Mold Road, Wrexham				WS8	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.40	D				0.10	MADE GROUND: Concrete.		
					0.30			
					0.70	MADE GROUND: Grey fine to coarse sub-angular to sub-rounded gravel of limestone (sub-base).		
					1.00			
					2.00	MADE GROUND: Red fine to coarse angular to sub-angular gravel and cobbles of brick.		
					3.00			
					4.00	End Of Borehole At 0.70 m		
					5.00			
					6.00			
					7.00			
8.00								

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa - Groundwater Strike - Groundwater Level	REMARKS No Groundwater Encountered Borehole terminated in Made Ground due to an obstruction. Borehole backfilled with arisings.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6">Water Strikes</th> </tr> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3">Daily Log Of Depths</th> <th colspan="3">Chiselling</th> </tr> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	Water Strikes						Date	Strike	Level	Minutes	Casing	Sealed																			Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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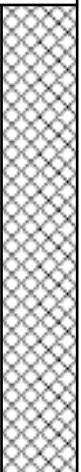
Scale: 1:50

		Project Title: Mold Road, Wrexham				WS9	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.70	D	N=22			0.55	MADE GROUND: Dark brown slightly gravelly slightly sandy clay. Gravel is fine to coarse sub-angular of sandstone.		
1.20 - 1.65	C				1.00	MADE GROUND: Red medium to coarse angular gravel of brick and mudstone.		
2.00 - 2.45	C	N=12			1.40	Firm becoming stiff light yellowish orange slightly gravelly sandy CLAY. Gravel is fine to coarse sub-angular to rounded of sandstone, mudstone and quartz with fragments of coal.		
3.00 - 3.45	C	N=20			2.00			
3.45	D				3.00			
3.80 - 4.25	C	N=>50			3.50	Very dense light yellowish brown slightly clayey fine to coarse SAND and fine to coarse sub-angular to sub-rounded GRAVEL of sandstone and mudstone.		
					4.00			
					4.25	End Of Borehole At 4.25 m		
					5.00			
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS Perched groundwater encountered at 0.5m. Borehole terminated in very dense sand and gravel. Borehole installed with monitoring well to 3.5m.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr> <td>13/09/2017</td> <td>0.55</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed	13/09/2017	0.55																
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Date	Casing	Water	From	To	Hours																						

		Project Title: Mold Road, Wrexham				WS10	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.50	D	N=14			0.13 0.23	MADE GROUND: Concrete.		
1.20 - 1.65	C				1.00 1.10	MADE GROUND: Light grey fine to coarse angular to sub-angular gravel of limestone (sub-base).		
2.00 - 2.45	C	N=10			2.00 2.20	MADE GROUND: Light yellowish grey fine to coarse angular to sub-rounded gravel of limestone, sandstone and mudstone.		
2.75 2.80 - 3.10	D C	pp 52/150mm			2.70 3.00 3.10	Firm brown sandy slightly gravelly CLAY. Gravel is fine to coarse of sandstone, mudstone and quartz with fragments of coal.		
					4.00 5.00 6.00 7.00 8.00	Loose to medium dense brown clayey slightly sandy fine to coarse sub-angular GRAVEL of sandstone, mudstone and quartz.		
						Very dense redish brown fine to coarse SAND and fine to coarse angular to sub-angular GRAVEL of sandstone (weathered sandstone bedrock).		
						End Of Borehole At 3.10 m		

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS Perched groundwater encountered at 0.65m. Borehole terminated in weathered bedrock. Borehole backfilled with arisings.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr> <td>13/09/2017</td> <td>0.65</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed	13/09/2017	0.65																
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Date	Casing	Water	From	To	Hours																						

		Project Title: Mold Road, Wrexham				WS11	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller:		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.40	D	N=20			0.10 0.30	MADE GROUND: Concrete.		
1.10 1.20 - 1.65	D C				0.90 1.00	MADE GROUND: Light grey fine to medium angular to sub-angular gravel of limestone.		
2.00 - 2.45	C	N=15			1.50 1.70	MADE GROUND: Dark grey clayey sandy fine to coarse angular to sub-rounded gravel of mudstone, sandstone, brick and coal with frequent fragments of wood.		
2.60	D	N=>50			2.00 2.20	MADE GROUND: Red sandy fine to coarse angular gravel of brick.		
3.00 - 3.45	C				2.60 2.70	MADE GROUND: Dark grey very sandy clay. Slight hydrocarbon odour.		
					3.00 3.45	Medium dense grey clayey fine to coarse angular to sub-angular GRAVEL of sandstone and quartz.		
					3.45 4.00	Orange very clayey slightly gravelly fine to coars SAND. Gravel is fine to coarse angular to sub-rounded of quartz and sandstone.		
					4.00 5.00	Firm reddish orange slightly sandy slightly gravelly CLAY. Gravel is fine to medium angular to sub-rounded of sandstone and mudstone.		
					5.00 6.00	Brown sandy slightly gravelly CLAY. Gravel is fine to medium angular to sub-rounded of sandstone and mudstone.		
					6.00 7.00	Very dense reddish orange gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to sub-rounded of sandstone.		
					7.00 8.00	End Of Borehole At 3.45 m		

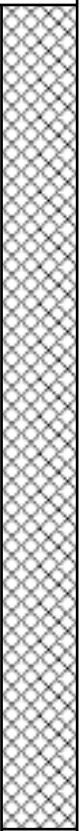
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa - Groundwater Strike - Groundwater Level	REMARKS No Groundwater Encountered Borehole terminated in very dense gravelly sand. Borehole installed with monitoring well to 1.5m. Scale: 1:50	Water Strikes <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> Daily Log Of Depths <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	Date	Strike	Level	Minutes	Casing	Sealed																									Date	Casing	Water	From	To	Hours																		
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		Project Title: Mold Road, Wrexham				WS12	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.60	D	N=24			0.10 0.30	MADE GROUND: Concrete.		
1.20 - 1.65	C				1.00	MADE GROUND: Light grey fine to coarse angular gravel of limestone (sub-base). Stiff brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to sub-rounded of sandstone, mudstone and quartz with fragments coal.		
2.00 - 2.45	C	N=22			1.80 2.00	Reddish brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to sub-rounded of quartz and sandstone.		
2.60	D	N=59			2.60	Stiff reddish brown slightly sandy very gravelly CLAY. Gravel is fine coarse angular to sub-rounded of sandstone, mudstone and quartz with fragments coal.		
3.00 - 3.45	C				3.00	Very dense brown gravelly fine to coarse SAND. Gravel is fine to medium sub-angular to sub-rounded of sandstone.		
					3.45	End Of Borehole At 3.45 m		
					4.00			
					5.00			
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS No Groundwater Encountered Borehole terminated in very dense gravelly sand. Borehole installed with monitoring well to 2.7m. 	Water Strikes																																
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		Project Title: Mold Road, Wrexham				WS13	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 14/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.50	D				0.45	MADE GROUND: Light grey clayey sandy fine to coarse angular to sub-rounded gravel of mudstone, limestone and sandstone.		
1.20 - 1.65	C	N=9			0.80 1.00	MADE GROUND: Greyish brown very clayey sandy fine to coarse sub-angular gravel of sandstone, mudstone and brick with fragments of coal.		
2.00 - 2.45	C	N=10			1.60 2.00	MADE GROUND: Grey slightly sandy gravelly clay. Gravel is fine to medium sub-angular to rounded of sandstone and mudstone with occasional fragments of wood.		
3.00 - 3.45	C	N=10			3.00	Loose light grey clayey slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to rounded of mudstone and sandstone.		
3.50	D				3.80	Mottled grey and redish brown sandy slightly gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of mudstone, sandstone and quartz.		
4.00 - 4.45	C	N=7			4.00 4.20	Firm reddish brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of mudstone and sandstone with fragments of coal.		
5.00 - 5.45	C	N=6			5.00	Loose reddish brown clayey fine to coarse SAND and fine to coarse sub-angular GRAVEL of mudstone and sandstone.		
					5.45	Loose reddish brown fine to coarse SAND.		
					5.45	End Of Borehole At 5.45 m		
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS Perched groundwater encountered at 0.5m. Borehole terminated in sand. Borehole backfilled with arisings.	Water Strikes <table border="1"> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> <tr> <td>14/09/2017</td> <td>0.5</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Date	Strike	Level	Minutes	Casing	Sealed	14/09/2017	0.5																
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Date	Casing	Water	From	To	Hours																						

		Project Title: Mold Road, Wrexham				WS14	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 14/09/2017		Method: Window Sampler		Driller: WB Drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.60	D	N=13			0.40	MADE GROUND: Light grey slightly clayey, sandy fine to coarse angular to sub-rounded gravel of mudstone, limestone and sandstone.		
1.00 - 1.45	C				0.70 1.00 1.10	MADE GROUND: Brown clayey sandy fine to coarse angular to sub-rounded gravel of mudstone, limestone, sandstone and brick with fragments of coal.		
2.00 - 2.45	C				1.50 2.00	MADE GROUND: Grey very clayey sandy fine to coarse angular to sub-rounded gravel of mudstone, limestone and sandstone with fragments of coal.		
2.40	D	N=11			2.60	Medium dense light grey clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to rounded of mudstone, sandstone and quartz with rare fragments of coal.		
3.00 - 3.45	C				3.00 3.45	Firm mottled grey and reddish brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to sub-rounded of mudstone, sandstone and quartz with fragments of coal.		
		N=56			4.00	Very dense brown slightly clayey sandy fine to coarse sub-angular to sub-rounded GRAVEL of mudstone, sandstone and quartz.		
					4.00	End Of Borehole At 3.45 m		
					5.00			
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS Perched groundwater encountered at 0.5m. Borehole terminated in very dense sandy gravel. Borehole installed with monitoring well to 2.6m.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr> <td>14/09/2017</td> <td>0.5</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed	14/09/2017	0.5																
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Date	Casing	Water	From	To	Hours																						

		Project Title: Mold Road, Wrexham		WS15			
		Project Number: 10/1014	Client: Condry Lofthouse Architects				
		GL (mAOD):		N Coord: 0	E Coord: 0		
Date: 14/09/2017		Method: Window Sampler		Driller: WB drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.80	D	N=15			0.60	MADE GROUND: Light grey sandy fine to coarse angular to sub-rounded gravel of mudstone, limestone and sandstone.		
1.20 - 1.65	C				1.00	MADE GROUND: Brown very clayey sandy fine to coarse angular to sub-rounded gravel of mudstone, limestone, sandstone and brick with frequent fragments of coal.		
1.40	D				1.45			
2.00 - 2.45	C	N=5			1.90	Firm mottled greyish yellow sandy gravelly CLAY. Gravel is fine to coarse angular to sub-rounded of mudstone, sandstone and quartz with fragments of coal. Slight hydrocarbon odour.		
					2.00			
3.00 - 3.45	C	N=11			2.60	Firm mottled greyish orange sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded of mudstone and sandstone.		
					3.00			
4.00 - 4.45	C		N=9			4.00	Loose reddish brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular to sub-rounded of mudstone and sandstone.	
					4.70			
5.00 - 5.45	C	N=32			5.00	Reddish brown sandy gravelly CLAY. Gravel is fine to medium sub-angular to rounded of mudstone, sandstone and quartz with fragments of coal.		
					5.45			
						6.00	Medium dense light brown fine to coarse SAND and fine to coarse angular to sub-angular GRAVEL of mudstone, sandstone and quartz.	
						Loose light brown fine to coarse SAND and fine to coarse angular to sub-angular GRAVEL of mudstone, sandstone and quartz.		
						Very stiff reddish brown slightly sandy gravelly CLAY. Gravel is fine to medium sub-angular to rounded of mudstone, sandstone and quartz.		
						End Of Borehole At 5.45 m		
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS No Groundwater Encountered Borehole terminated in very stiff sandy gravelly clay. Borehole installed with monitoring well to 3.0m.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed																								
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Date	Casing	Water	From	To	Hours																												

		Project Title: Mold Road, Wrexham				WS16	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 14/09/2017		Method: Window Sampler		Driller: WB drilling		Logged By: ACV	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.20	D				0.30	MADE GROUND: Light grey fine to coarse sub-angular gravel of limestone.		
1.00 - 1.45	C	N=11			1.00	MADE GROUND: Reddish brown sandy gravelly CLAY. Gravel is fine to coarse angular to sub-rounded of mudstone and sandstone with fragments of coal.		
1.80	D				2.00	Firm reddish brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to sub-rounded of mudstone and sandstone.		
2.00 - 2.45	C	N=5			2.60	Loose reddish brown clayey fine to coarse angular to sub-rounded GRAVEL of mudstone and sandstone with occasional fragments of coal.		
3.00 - 3.45	C	N=4			3.00	Very loose reddish brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to sub-rounded of mudstone and sandstone.		
3.80	D				3.60			
4.00 - 4.45	C	N=22			4.00	Light brown slightly gravelly CLAY. Gravel is fine to coarse angular to sub-rounded of mudstone, sandstone and rare fragments of coal.		
5.00 - 5.45	C	N=22			5.00	Medium dense reddish brown clayey becoming very clayey slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to rounded of mudstone and sandstone.		
					5.45	End Of Borehole At 5.45 m		
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa - Groundwater Strike - Groundwater Level	REMARKS No Groundwater Encountered Borehole terminated in medium dense clayey sand. Borehole installed with monitoring well to 3.5m. 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6">Water Strikes</th> </tr> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3">Daily Log Of Depths</th> <th colspan="3">Chiselling</th> </tr> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Hours</th> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	Water Strikes						Date	Strike	Level	Minutes	Casing	Sealed																									Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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Daily Log Of Depths			Chiselling																																																											
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		Project Title: Mold Road, Wrexham				WS17	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 14/09/2017		Method: Window Sampler		Driller: WB drilling		Logged By:	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.30	D	N=2			0.23	MADE GROUND: Concrete.		
						MADE GROUND: Light grey fine to coarse angular to sub-angular gravel of limestone (sub-base).		
1.20 - 1.65	C				1.00	MADE GROUND: Dark grey sandy fine to coarse angular to sub-angular gravel of limestone (sub-base).		
					1.20			
2.00 - 2.45	C	N=13			1.70	Very loose brown clayey slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to rounded of mudstone and sandstone with fragments of coal.		
					2.00	Brown sandy gravelly CLAY. Gravel is fine to coarse angular to sub-rounded of mudstone and sandstone.		
2.70	D	N=10						
3.00 - 3.45	C					3.00	Medium dense brown clayey fine to coarse SAND and fine to coarse angular to sub-rounded GRAVEL of mudstone, sandstone and quartz.	
					4.00			
4.00 - 4.45	C	N=>50			4.10			
					4.45	Very dense brown clayey slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to rounded of mudstone and sandstone.		
					5.00	End Of Borehole At 4.45 m		
					6.00			
					7.00			
					8.00			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level		REMARKS No Groundwater Encountered Borehole terminated in very dense clayey gravelly sand. Borehole backfilled with arisings.	Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Sealed</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Date	Strike	Level	Minutes	Casing	Sealed																								
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Date	Casing	Water	From	To	Hours																												

			Project Title: Mold Road, Wrexham			TP1	
			Project Number: 10/1014		Client: Condry Lofthouse Architects		
			GL (mAOD):		N Coord: 0	E Coord: 0	
Date: 13/09/2017			Method: JCB		Logged By: SHP	Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.70	D			     	0.30	MADE GROUND: Tarmac.	
					0.60	MADE GROUND: Light grey sandy fine to coarse angular to sub-angular gravel of limestone (sub-base).	
					1.00	MADE GROUND: Brown slightly clayey sandy fine to coarse angular gravel of brick, sandstone and limestone with fragments of slate and plastic.	
					1.10	MADE GROUND: Grey sandy boulders of siltstone. (Strong visual and olfactory evidence of hydrocarbons)	
					1.90	Light brown very sandy slightly gravelly CLAY. Gravel is fine to medium sub-rounded of sandstone and quartz (firm). (Slight olfactory evidence of hydrocarbons)	
1.70	D				2.00	Brown silty CLAY (firm to stiff).	
					2.10	End Of Trial Pit At 2.10 m	
					3.00		
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level 						REMARKS Perched groundwater encountered at 0.6m. Visual and olfactory evidence of hydrocarbons encountered between 0.6m and 1.9m. Trial pit terminated in silty clay. Trial pit backfilled with arisings.	

		Project Title: Mold Road, Wrexham				TP2	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method: JCB		Logged By: SHP		Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.50	D				0.40 0.50	MADE GROUND: Tarmac.	
0.90	D				0.80 1.00	MADE GROUND: Light grey sandy fine to coarse angular gravel of limestone (sub-base).	
1.50	D				2.00	MADE GROUND: Brown becoming dark grey slightly clayey sandy fine to coarse angular gravel of brick, sandstone and limestone with fragments of slate, ceramic tile, metal, wood, glass and plastic.	
					2.00	MADE GROUND: Grey sandy boulders of siltstone and sandstone.	
					2.00	MADE GROUND: Dark grey very sandy gravelly clay. Gravel is fine to coarse angular to sub-rounded of sandstone and siltstone with fragments of coal.	
					3.00	Brown very sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone (firm).	
					3.00	End Of Trial Pit At 2.00 m	
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa						REMARKS Perched groundwater encountered at 0.9m. Trial pit terminated in very sandy clay. Trail pit backfilled with arisings.	



			Project Title: Mold Road, Wrexham			TP3	
			Project Number: 10/1014		Client: Condry Lofthouse Architects		
			GL (mAOD):		N Coord: 0	E Coord: 0	
Date: 13/09/2017			Method: JCB		Logged By: SHP	Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.25	D				0.10 0.20 0.35	MADE GROUND: Concrete re-inforced with rebar.	
						MADE GROUND: Light grey sandy fine to coarse angular gravel of limestone (sub-base).	
1.30	D				1.00	MADE GROUND: Black sandy fine to coarse angular gravel of limestone. (Very strong olfactory evidence of hydrocarbons)	
					1.50	Brown clayey slightly gravelly fine to medium SAND. (Slight olfactory evidence of hydrocarbons)	
1.80	D				1.90 2.00	Light brownish grey very weak very weathered thinly bedded SANDSTONE with occasional siltstone laminations. (Slight visual and olfactory evidence of hydrocarbons)	
						End Of Trial Pit At 1.90 m	
					3.00		
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level 						REMARKS No Groundwater Encountered Olfactory evidence of hydrocarbons encountered from 0.35m to 1.9m. Trial pit terminated in sandstone bedrock. Trial pit backfilled with arisings.	

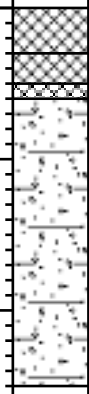
		Project Title: Mold Road, Wrexham				TP4	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017		Method:		Logged By: SHP		Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.50	D			    	0.40	MADE GROUND: Dark brown silty sand with abundant rootlets (topsoil).	
1.10	D		0.70		MADE GROUND: Dark grey sandy fine to coarse angular to sub-rounded gravel of sandstone, clinker, ash, siltstone and mudstone with occasional fragments of brick.		
			1.00		MADE GROUND: Grey sandy slightly clayey boulders of siltstone (strong olfactory evidence of hydrocarbons).		
1.80	D		1.20		Brown fine to medium SAND. Becoming clayey with depth (slight olfactory evidence of hydrocarbons).		
			1.90		2.30	Brown very sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone with occasional fragments of coal (firm).	
			2.00			End Of Trial Pit At 2.30 m	
			2.30				
			3.00				
			4.00				
			5.00				
			6.00				
			7.00				
			8.00				
			9.00				
			10.00				
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level 						REMARKS Perched groundwater encountered at 1.1m. Olfactory evidence of hydrocarbons encountered from 0.7m to 1.9m. Trial pit terminated in sandy gravelly clay. Trial pit backfilled with arisings.	

			Project Title: Mold Road, Wrexham			TP5	
			Project Number: 10/1014		Client: Condry Lofthouse Architects		
			GL (mAOD):		N Coord: 0	E Coord: 0	
Date: 13/09/2017			Method: JCB		Logged By: SHP	Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.90	D	V=75		     	0.55	MADE GROUND: Tarmac.	
1.30	V				0.60	MADE GROUND: Light grey sandy fine to coarse angular to sub-angular gravel of limestone (sub-base).	
1.80	D				1.00	MADE GROUND: Black sandy ash.	
					1.50	MADE GROUND: Grey clayey boulders of siltstone.	
					2.00	Firm brown sandy CLAY with occasional lenses of sand and cobbles of sandstone.	
					2.40	Brown very clayey slightly gravelly fine to medium SAND. Gravel is fine to coarse sub-rounded of sandstone, siltstone and quartz. Occasional fragments of coal.	
					3.00	End Of Trial Pit At 2.40 m	
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level 						REMARKS No Groundwater Encountered Trial pit terminated in clayey gravelly sand. Trial pit backfilled with arisings.	

			Project Title: Mold Road, Wrexham			TP6	
			Project Number: 10/1014		Client: Condry Lofthouse Architects		
			GL (mAOD):		N Coord: 0	E Coord: 0	
Date: 13/09/2017			Method: JCB		Logged By: SHP	Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.60	D			 0.30  0.50  0.65  0.90  1.00	0.30 0.50 0.65 0.90 1.00	MADE GROUND: Tarmac. MADE GROUND: Light grey sandy fine to coarse angular to sub-angular gravel of limestone (sub-base). MADE GROUND: Reddish brown slightly clayey sandy gravel and cobbles of brick and sandstone with fragments of coal and slate. MADE GROUND: Dark greyish black sandy ash and clinker. MADE GROUND: Dark grey clayey sandy boulders of siltstone with occasional fragments of wood and timbers	
2.10	D			 2.00  2.70  3.00  4.00  5.00  6.00  7.00  8.00  9.00  10.00	2.00 2.70 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00	Brown sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone, siltstone and quartz with fragments of coal (firm to stiff). End Of Trial Pit At 2.70 m	
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level 						REMARKS Perched groundwater encountered at 0.9m. Trial pit terminated in sandy gravelly clay and backfilled with arising.	

			Project Title: Mold Road, Wrexham			TP7		
			Project Number: 10/1014		Client: Condry Lofthouse Architects			Sheet 1 Of 1
			GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 13/09/2017			Method: JCB		Logged By: SHP		Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	
0.50	D				0.10	MADE GROUND: Concrete re-inforced with rebar. MADE GROUND: Light grey sandy fine to coarse angular gravel of limestone (sub-base). MADE GROUND: Dark greyish black ashy fine to coarse sand. 0.30 - 0.40 : Plastic pipe containing disused cables encountered. When breached, oily substance encountered with strong visual and olfactory evidence of hydrocarbons. MADE GROUND: Brown very sandy clay with fragments of ash and coal (strong olfactory evidence of hydrocarbons) MADE GROUND: Brownish grey clayey sandy boulders of siltstone (strong olfactory evidence of hydrocarbons). Brown very sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone, siltstone and quartz. Occasional fragments of coal. End Of Trial Pit At 1.50 m		
					0.30			
					0.40			
					0.60			
					0.90			
1.20	D				1.00			
					1.50			
					2.00			
					3.00			
					4.00			
					5.00			
					6.00			
					7.00			
					8.00			
					9.00			
					10.00			
KEY					REMARKS			
D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa					No Groundwater Encountered Olfactory evidence of hydrocarbons encountered between 0.3m to 0.9m. Trial pit terminated sandy gravelly clay. Trial pit backfilled with arisings.			
 - Groundwater Strike  - Groundwater Level								

			Project Title: Mold Road, Wrexham			TP8		
			Project Number: 10/1014		Client: Condry Lofthouse Architects			
			GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 15/09/2017			Method: JCB		Logged By: SHP		Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	
					0.15	MADE GROUND: Concrete re-inforced with rebar.		
					0.30	MADE GROUND: Light grey sandy fine to coarse angular gravel of limestone (sub-base).		
					0.70	MADE GROUND: Dark grey clayey fine to coarse sand with fragments of coal, siltstone and sandstone.		
					1.00	Brown very sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone and siltstone with occasional cobbles of sandstone and siltstone. Occasional bands of clayey fine to medium sand and fragments of coal. Becoming increasingly cobbly towards the base of the unit (firm).		
					2.00			
					3.00			
					4.00			
					5.00	End Of Trial Pit At 3.00 m		
					6.00			
					7.00			
					8.00			
					9.00			
					10.00			
KEY						REMARKS		
D - Disturbed Sample						No Groundwater Encountered		
B - Bulk Sample						Trial pit terminated in sandy gravelly clay. Trial pit backfilled with arisings.		
W - Water Sample								
V - Hand Shear Vane kPa								
 - Groundwater Strike								
 - Groundwater Level								
								

			Project Title: Mold Road, Wrexham			TP9		
			Project Number: 10/1014		Client: Condry Lofthouse Architects			
			GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 15/09/2017			Method: JCB		Logged By: SHP		Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	
0.55	D				0.30	MADE GROUND: Grey sandy fine to coarse angular gravel of limestone.		
					0.50	MADE GROUND: Greyish brown sandy fine to coarse angular to sub-angular gravel and cobbles of brick and limestone.		
					0.60	MADE GROUND: Grey slightly clayey boulders of siltstone. (Strong olfactory evidence of hydrocarbon contamination)		
1.50	D					Brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded of sandstone.		
					2.00			
					2.50		Very weak very weathered light brown thinly bedded SANDSTONE.	
					2.60			
					3.00	End Of Trial Pit At 2.60 m		
						4.00		
						5.00		
					6.00			
					7.00			
					8.00			
					9.00			
					10.00			
KEY					REMARKS			
D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa					No Groundwater Encountered Olfactory evidence of hydrocarbons encountered between 0.5m and 0.6m. Trial pit terminated in sandstone bedrock. Trial pit backfilled with arisings.			
 - Groundwater Strike  - Groundwater Level								

		Project Title: Mold Road, Wrexham				TP10	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 15/09/2017		Method: JCB		Logged By: SHP		Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.35	D				0.30 0.40	MADE GROUND: Grey sandy fine to coarse angular to sub-angular gravel of limestone.	
					1.00 1.10	MADE GROUND: Dark grey very sandy clay with fragments of coal, clinker and slate (slight olfactory evidence of hydrocarbons).	
1.30	D				1.50	Brown sandy slightly gravelly CLAY. Gravel is fine to medium sub-rounded of sandstone (soft to firm).	
					1.50	Very weak very weathered thinly bedded SANDSTONE.	
					2.00	End Of Trial Pit At 1.50 m	
					3.00		
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa						REMARKS Perched groundwater encountered at 0.4m. Olfactory evidence of hydrocarbons encountered from 0.3m to 0.4m. Trial pit terminated in sandstone bedrock. Trial pit backfilled with arisings.	

		Project Title: Mold Road, Wrexham				TP11	
		Project Number: 10/1014		Client: Condry Lofthouse Architects			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 15/09/2017		Method: JCB		Logged By: SHP		Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
0.80	D				0.15	MADE GROUND: Light grey sandy fine to coarse angular gravel of limestone. MADE GROUND: Dark brown silty fine to coarse sand with abundant rootlets (topsoil).	
					0.55		
					1.00	Brown sandy gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone and siltstone. Occasional cobbles of sandstone and siltstone. Fragments of coal throughout (soft becoming firm).	
					1.90		
					2.00		
						Brown slightly clayey fine to medium SAND with occasional cobbles of sandstone.	
					3.00		
					3.20	End Of Trial Pit At 3.20 m	
					4.00		
5.00							
6.00							
7.00							
8.00							
9.00							
10.00							
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa						REMARKS No Groundwater Encountered Trial pit terminated in clayey sand. Trial pit backfilled with arisings.	

 - Groundwater Strike
 - Groundwater Level



			Project Title: Mold Road, Wrexham			SA1	
			Project Number: 10/1014	Client: Condry Lofthouse Architects	Sheet 1 Of 1		
			GL (mAOD):	N Coord: 0	E Coord: 0		
Date: 15/09/2017			Method: JCB			Logged By: SHP	Scale: 1:50
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
					0.10	MADE GROUND: Tarmac.	
					0.45	MADE GROUND: Light grey sandy fine to coarse angular to sub-angular gravel of limestone (sub-base).	
					1.00	MADE GROUND: Grey slightly clayey fine to coarse sand and fine to coarse angular to sub-rounded gravel of brick, siltstone, concrete and sandstone. Common cobbles and boulders of concrete, masenry, sandstone and siltstone. Frequent fragments of coal.	
					1.60		
					1.80	1.25 - 1.30 Drainage pipe.	
					2.00	Mottled greyish brown very sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone (firm).	
						Mottled greyish brown clayey fine to medium SAND.	
						End Of Trial Pit At 2.00 m	
					3.00		
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa						REMARKS No Groundwater Encountered Trial pit excavated for soakaway testing. Trial pit backfilled with arisings.	

			Project Title: Mold Road, Wrexham			SA2	
			Project Number: 10/1014		Client: Condry Lofthouse Architects		
			GL (mAOD):		N Coord: 0	E Coord: 0	
Date: 15/09/2017			Method: JCB		Logged By: SHP	Scale: 1:50	
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
1.00	D			     	0.20	MADE GROUND: Tarmac.	
						MADE GROUND: Concrete.	
					0.70	MADE GROUND: Mottled brownish red and grey sandy gravelly cobbles of brick and boulders of siltstone with fragments of wood.	
					1.00		
					1.30	MADE GROUND: Black clayey gravelly fine to coarse sand. Gravel is fine to coarse angular to sub-angular of brick, siltstone, clinker, sandstone and mudstone with fragments of coal and ash.	
					1.40		
					2.00	MADE GROUND: Mottled dark brownish grey sandy clay.	
					2.10	Mottled greyish brown slightly clayey slightly silty fine to medium SAND.	
						End Of Trial Pit At 2.10 m	
					3.00		
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level 						REMARKS No Groundwater Encountered Trial pit excavated for soakaway testing. Trial pit backfilled with arisings.	

			Project Title: Mold Road, Wrexham			SA3	
			Project Number: 10/1014		Client: Condry Lofthouse Architects	Sheet 1 Of 1	
			GL (mAOD):		N Coord: 0	E Coord: 0	
Date: 15/09/2017			Method: JCB		Logged By: SHP		Scale: 1:50
Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water
					0.10	MADE GROUND: Tarmac.	
					0.60	MADE GROUND: Red fine to coarse sand.	
					0.70	MADE GROUND: Brownish grey sandy fine to coarse sub-angular gravel and cobbles of limestone (sub-base).	
					1.00	MADE GROUND: Dark grey slightly ashy sandy fine to coarse angular to sub-angular gravel and cobbles of brick and siltstone with fragments of siltstone and mudstone. Rare fragments of coal.	
					1.25	MADE GROUND: Grey sandy boulders of siltstone.	
					2.00	Brown very sandy slightly gravelly CLAY. Gravel is fine to coarse sub-rounded of sandstone and quartz. Frequent fragments of coal.	
						End Of Trial Pit At 2.00 m	
					3.00		
					4.00		
					5.00		
					6.00		
					7.00		
					8.00		
					9.00		
					10.00		
KEY						REMARKS	
D - Disturbed Sample B - Bulk Sample W - Water Sample V - Hand Shear Vane kPa						No Groundwater Encountered Trial pit excavated for soakaway testing. Slight oily sheen noted on the water during the soakaway test. Trial pit backfilled with arising.	
 - Groundwater Strike  - Groundwater Level							

Appendix IV

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/06315
Issue Number: 1

Date: 26 September, 2017

Client: Clancy Consulting
Dunham Court
2 Dunham Road
Altrincham
Cheshire
UK
WA14 4NX

Project Manager: Leanne Cooney/Sophie Harper-Pryce
Project Name: Mold Road, Wrexham
Project Ref: 10/1014
Order No: 21679
Date Samples Received: 15/09/17
Date Instructions Received: 18/09/17
Date Analysis Completed: 26/09/17

Prepared by:

Approved by:



Georgia King
Admins & Client Services Supervisor



Iain Haslock
Analytical Consultant

Envirolab Job Number: 17/06315

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06315/1	17/06315/4	17/06315/5	17/06315/6	17/06315/9	17/06315/11	17/06315/12	17/06315/13	Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	SP1	SO1	WS16	WS17		
Depth to Top	0.20	1.30	2.70	1.10	1.00		1.80	0.30		
Depth To Bottom										
Date Sampled	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	14-Sep-17	14-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Solid - Fragment / Tile	Soil	Soil		
Sample Matrix Code	6AB	6A	5A	3A	4A	8	5A	6A		
% Stones >10mm _A	31.1	5.4	<0.1	19.7	27.1	-	2.1	32.0	% w/w	A-T-044
pH _D ^{M#}	7.97	8.32	7.03	8.10	7.63	-	7.57	8.60	pH	A-T-031s
Chloride BRE, SO4 equiv. (water sol 2:1) _D ^{M#}	-	<7	-	-	-	-	-	-	mg/l	A-T-026s
Nitrate BRE, SO4 equiv. (water sol 2:1) _D	-	<0.4	-	-	-	-	-	-	mg/l	A-T-026s
Sulphate BRE (water sol 2:1) _D ^{M#}	-	86	-	-	-	-	-	-	mg/l	A-T-026s
Magnesium BRE (water sol 2:1) _D	-	22	-	-	-	-	-	-	mg/l	A-T-SOLMETS
Total Organic Carbon _D ^{M#}	3.31	13	-	-	-	-	-	-	% w/w	A-T-032s
Calorific Value (Gross/Total) _A	-	3050	-	-	-	-	-	-	kJ/kg	Subcon
Arsenic _D ^{M#}	2	10	20	2	4	-	<1	2	mg/kg	A-T-024s
Beryllium _D [#]	1	2	<1	1	1	-	1	<1	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	1.4	<1.0	<1.0	1.2	-	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	1.0	1.1	0.7	<0.5	0.9	-	0.6	<0.5	mg/kg	A-T-024s
Copper _D ^{M#}	198	51	15	14	32	-	13	8	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	-	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	292	46	22	28	86	-	20	20	mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	<0.17	-	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	22	40	20	15	27	-	18	11	mg/kg	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	<1	<1	-	<1	1	mg/kg	A-T-024s
Vanadium _D ^{M#}	20	41	14	12	20	-	15	12	mg/kg	A-T-024s
Zinc _D ^{M#}	81	61	39	65	83	-	39	24	mg/kg	A-T-024s

Envirolab Job Number: 17/06315

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06315/1	17/06315/4	17/06315/5	17/06315/6	17/06315/9	17/06315/11	17/06315/12	17/06315/13	Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	SP1	SO1	WS16	WS17		
Depth to Top	0.20	1.30	2.70	1.10	1.00		1.80	0.30		
Depth To Bottom										
Date Sampled	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	14-Sep-17	14-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Solid - Fragment / Tile	Soil	Soil		
Sample Matrix Code	6AB	6A	5A	3A	4A	8	5A	6A		
Asbestos in Soil (inc. matrix)										
Asbestos in soil _A [#]	NAD	-	-	-	NAD	-	-	NAD		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	-	-	-	N/A	-	-	N/A		
Bulk Fibre ID (inc. matrix)										
Bulk Fibre Identification _A [#]	-	-	-	-	-	NAD	-	-		A-T-045
Bulk Fibre Identification - Suitable for Water Absorption Test? _D	-	-	-	-	-	N/A	-	-		Gravimetry

Envirolab Job Number: 17/06315

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06315/1	17/06315/4	17/06315/5	17/06315/6	17/06315/9	17/06315/11	17/06315/12	17/06315/13	Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	SP1	SO1	WS16	WS17		
Depth to Top	0.20	1.30	2.70	1.10	1.00		1.80	0.30		
Depth To Bottom										
Date Sampled	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	14-Sep-17	14-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Solid - Fragment / Tile	Soil	Soil		
Sample Matrix Code	6AB	6A	5A	3A	4A	8	5A	6A		
PAH 16										
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	-	-	-	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	-	-	-	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	<0.07	-	-	-	mg/kg	A-T-019s
Chrysene _A ^{M#}	0.06	<0.06	<0.06	<0.06	<0.06	-	-	-	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	-	-	-	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	mg/kg	A-T-019s
Fluorene _A ^{M#}	0.02	0.01	<0.01	<0.01	<0.01	-	-	-	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	-	-	-	mg/kg	A-T-019s
Naphthalene _A ^{M#}	<0.03	0.10	<0.03	<0.03	<0.03	-	-	-	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	0.06	0.17	<0.03	<0.03	<0.03	-	-	-	mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	<0.07	-	-	-	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	0.29	0.28	<0.08	<0.08	<0.08	-	-	-	mg/kg	A-T-019s

Envirolab Job Number: 17/06315

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06315/1	17/06315/4	17/06315/5	17/06315/6	17/06315/9	17/06315/11	17/06315/12	17/06315/13	Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS2	WS3	SP1	SO1	WS16	WS17		
Depth to Top	0.20	1.30	2.70	1.10	1.00		1.80	0.30		
Depth To Bottom										
Date Sampled	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	12-Sep-17	14-Sep-17	14-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Solid - Fragment / Tile	Soil	Soil		
Sample Matrix Code	6AB	6A	5A	3A	4A	8	5A	6A		
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	0.03	-	-	-	-	-	-	-	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	8.8	-	-	-	-	-	-	-	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	71.1	-	-	-	-	-	-	-	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	211	-	-	-	-	-	-	-	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	1230	-	-	-	-	-	-	-	mg/kg	A-T-023s
Total Aliphatics _A	1520	-	-	-	-	-	-	-	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
Aro >C10-C12 _A [#]	1.3	-	-	-	-	-	-	-	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	18.8	-	-	-	-	-	-	-	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	58.4	-	-	-	-	-	-	-	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	248	-	-	-	-	-	-	-	mg/kg	A-T-023s
Total Aromatics _A	327	-	-	-	-	-	-	-	mg/kg	A-T-023s
TPH (Ali & Aro) _A	1840	-	-	-	-	-	-	-	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s
MTBE _A [#]	<0.01	-	-	-	-	-	-	-	mg/kg	A-T-022s

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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

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

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

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

Soil chemical analysis:

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

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

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

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

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

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

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

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

Asbestos:

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

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

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

Predominant Matrix Codes:

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

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

Secondary Matrix Codes:

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

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

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

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

Please contact us if you need any further information.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/06371
Issue Number: 1

Date: 29 September, 2017

Client: Clancy Consulting
Dunham Court
2 Dunham Road
Altrincham
Cheshire
UK
WA14 4NX

Project Manager: Leanne Cooney/Sophie Harper-Pryce
Project Name: Mold Road, Wrexham
Project Ref: 10/1014
Order No: 21679
Date Samples Received: 19/09/17
Date Instructions Received: 20/09/17
Date Analysis Completed: 29/09/17

Prepared by:



Danielle Brierley
Client Manager

Approved by:



Georgia King
Admins & Client Services Supervisor

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/1	17/06371/2	17/06371/3	17/06371/4	17/06371/5	17/06371/6	17/06371/7	17/06371/8	Units	Method ref
Client Sample No										
Client Sample ID	WS5	WS6	WS6	WS7	WS8	WS9	WS10	WS11		
Depth to Top	0.30	0.30	2.30	0.20	0.40	0.70	0.50	0.40		
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Solid	Soil		
Sample Matrix Code	4A	4A	5A	4A	4AB	6A	7	6A		
% Stones >10mm _A	45.8	43.9	1.3	13.8	-	9.4	<0.1	1.9	% w/w	A-T-044
pH _D ^{M#}	8.22	8.58	7.24	7.73	-	8.46	10.88	7.63	pH	A-T-031s
Chloride BRE, SO4 equiv. (water sol 2:1) _D ^{M#}	-	-	-	-	-	-	<7	-	mg/l	A-T-026s
Nitrate BRE, SO4 equiv. (water sol 2:1) _D	-	-	-	-	-	-	0.7	-	mg/l	A-T-026s
Sulphate BRE (water sol 2:1) _D ^{M#}	-	-	-	-	-	-	54	-	mg/l	A-T-026s
Magnesium BRE (water sol 2:1) _D	-	-	-	-	-	-	<1	-	mg/l	A-T-SOLMETS
Total Organic Carbon _D ^{M#}	-	-	-	2.03	-	-	0.31	-	% w/w	A-T-032s
Calorific Value (Gross/Total) _A	-	-	-	-	-	-	116	-	kJ/kg	Subcon
Arsenic _D ^{M#}	5	16	7	3	-	14	<1	11	mg/kg	A-T-024s
Beryllium _D [#]	1	1	1	1	-	1	1	1	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	1.3	mg/kg	A-T-027s
Cadmium _D ^{M#}	0.8	<0.5	0.8	0.6	-	0.9	0.9	0.6	mg/kg	A-T-024s
Copper _D ^{M#}	28	11	16	13	-	29	8	43	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	-	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	32	20	20	51	-	72	13	36	mg/kg	A-T-024s
Mercury _D	<0.17	0.37	<0.17	<0.17	-	<0.17	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	25	8	24	13	-	29	18	41	mg/kg	A-T-024s
Selenium _D ^{M#}	1	<1	<1	2	-	2	<1	2	mg/kg	A-T-024s
Vanadium _D ^{M#}	21	11	20	19	-	24	18	20	mg/kg	A-T-024s
Zinc _D ^{M#}	51	80	39	72	-	70	23	61	mg/kg	A-T-024s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/1	17/06371/2	17/06371/3	17/06371/4	17/06371/5	17/06371/6	17/06371/7	17/06371/8	Units	Method ref
Client Sample No										
Client Sample ID	WS5	WS6	WS6	WS7	WS8	WS9	WS10	WS11		
Depth to Top	0.30	0.30	2.30	0.20	0.40	0.70	0.50	0.40		
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Solid	Soil		
Sample Matrix Code	4A	4A	5A	4A	4AB	6A	7	6A		
Asbestos in Soil (inc. matrix)										
Asbestos in soil _A [#]	-	-	-	-	NAD	NAD	-	-		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	-	-	-	-	N/A	N/A	-	-		

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/1	17/06371/2	17/06371/3	17/06371/4	17/06371/5	17/06371/6	17/06371/7	17/06371/8	Units	Method ref
Client Sample No										
Client Sample ID	WS5	WS6	WS6	WS7	WS8	WS9	WS10	WS11		
Depth to Top	0.30	0.30	2.30	0.20	0.40	0.70	0.50	0.40		
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Solid	Soil		
Sample Matrix Code	4A	4A	5A	4A	4AB	6A	7	6A		
PAH 16										
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	-	0.01	<0.01	<0.01	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	-	0.03	<0.01	<0.01	mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02	<0.02	-	0.07	<0.02	0.02	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	-	0.73	<0.04	0.07	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04	0.06	-	0.56	<0.04	<0.04	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05	0.08	-	0.63	<0.05	<0.05	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	-	0.22	<0.05	<0.05	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	-	0.27	<0.07	<0.07	mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06	<0.06	0.08	-	0.65	<0.06	0.10	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	-	0.07	<0.04	<0.04	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	<0.08	<0.08	-	0.81	<0.08	0.12	mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	0.02	<0.01	-	0.02	<0.01	<0.01	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	0.05	-	0.28	<0.03	<0.03	mg/kg	A-T-019s
Naphthalene _A ^{M#}	<0.03	0.04	0.07	<0.03	-	0.10	<0.03	0.30	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	<0.03	0.05	0.11	0.10	-	0.27	0.06	0.38	mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	-	0.82	<0.07	<0.07	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	<0.08	0.08	0.19	0.36	-	5.54	<0.08	0.99	mg/kg	A-T-019s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/1	17/06371/2	17/06371/3	17/06371/4	17/06371/5	17/06371/6	17/06371/7	17/06371/8	Units	Method ref
Client Sample No										
Client Sample ID	WS5	WS6	WS6	WS7	WS8	WS9	WS10	WS11		
Depth to Top	0.30	0.30	2.30	0.20	0.40	0.70	0.50	0.40		
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Solid	Soil		
Sample Matrix Code	4A	4A	5A	4A	4AB	6A	7	6A		
TPH CWG										
Ali >C5-C6 _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Total Aliphatics _A	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
Aro >C10-C12 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
Total Aromatics _A	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
TPH (Ali & Aro) _A	-	-	-	<0.1	-	-	-	-	mg/kg	A-T-023s
BTEX - Benzene _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
BTEX - Toluene _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s
MTBE _A [#]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-022s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/9	17/06371/10	17/06371/11	17/06371/12	17/06371/13	17/06371/14	17/06371/15	17/06371/16	Units	Method ref
Client Sample No										
Client Sample ID	TP1	TP1	TP3	TP3	TP4	TP4	TP4	TP5		
Depth to Top	0.70	1.70	0.25	1.80	0.50	1.10	1.80	1.80		
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17		
Sample Type	Soil	Soil	Solid	Solid	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	5A	7	7	4A	6A	5A	5A		
% Stones >10mm _A	19.6	18.0	<0.1	<0.1	42.8	<0.1	<0.1	<0.1	% w/w	A-T-044
pH _D ^{M#}	8.05	8.30	10.89	8.68	8.34	7.74	8.19	7.08	pH	A-T-031s
Chloride BRE, SO4 equiv. (water sol 2:1) _D ^{M#}	-	-	-	-	<7	-	-	-	mg/l	A-T-026s
Nitrate BRE, SO4 equiv. (water sol 2:1) _D	-	-	-	-	<0.4	-	-	-	mg/l	A-T-026s
Sulphate BRE (water sol 2:1) _D ^{M#}	-	-	-	-	<10	-	-	-	mg/l	A-T-026s
Magnesium BRE (water sol 2:1) _D	-	-	-	-	2	-	-	-	mg/l	A-T-SOLMETS
Total Organic Carbon _D ^{M#}	7.28	-	0.70	-	2.34	3.05	-	-	% w/w	A-T-032s
Calorific Value (Gross/Total) _A	-	-	-	-	1960	-	-	-	kJ/kg	Subcon
Arsenic _D ^{M#}	6	<1	<1	<1	-	1	1	<1	mg/kg	A-T-024s
Beryllium _D [#]	2	<1	<1	<1	-	1	1	1	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0	-	1.3	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	0.8	<0.5	0.6	<0.5	-	0.6	0.7	0.6	mg/kg	A-T-024s
Copper _D ^{M#}	33	5	7	3	-	20	17	14	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<5	<1	<6	-	<1	<5	<1	mg/kg	A-T-040s
Lead _D ^{M#}	112	7	66	4	-	43	14	25	mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	0.68	<0.17	-	<0.17	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	28	11	5	15	-	34	24	24	mg/kg	A-T-024s
Selenium _D ^{M#}	2	<1	<1	<1	-	2	1	<1	mg/kg	A-T-024s
Vanadium _D ^{M#}	23	12	7	13	-	34	19	19	mg/kg	A-T-024s
Zinc _D ^{M#}	207	21	52	25	-	60	42	40	mg/kg	A-T-024s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/9	17/06371/10	17/06371/11	17/06371/12	17/06371/13	17/06371/14	17/06371/15	17/06371/16	Units	Method ref
Client Sample No										
Client Sample ID	TP1	TP1	TP3	TP3	TP4	TP4	TP4	TP5		
Depth to Top	0.70	1.70	0.25	1.80	0.50	1.10	1.80	1.80		
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17		
Sample Type	Soil	Soil	Solid	Solid	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	5A	7	7	4A	6A	5A	5A		
PAH 16										
Acenaphthene _A ^{M#}	<0.05	<0.01	0.14	0.01	-	0.21	<0.01	<0.01	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.05	<0.01	<0.05	<0.01	-	<0.05	<0.01	<0.01	mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.10	<0.02	0.14	<0.02	-	<0.10	<0.02	<0.02	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.20	<0.04	<0.20	0.04	-	<0.20	<0.04	<0.04	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.20	<0.04	<0.20	<0.04	-	<0.20	<0.04	<0.04	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.25	<0.05	<0.25	<0.05	-	<0.25	<0.05	<0.05	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.25	<0.05	<0.25	<0.05	-	<0.25	<0.05	<0.05	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.35	<0.07	<0.35	<0.07	-	<0.35	<0.07	<0.07	mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.30	<0.06	<0.30	<0.06	-	<0.30	<0.06	<0.06	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.20	<0.04	<0.20	<0.04	-	<0.20	<0.04	<0.04	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.40	<0.08	0.45	0.09	-	<0.40	<0.08	<0.08	mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.05	<0.01	0.40	0.01	-	0.70	<0.01	<0.01	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.15	<0.03	<0.15	<0.03	-	<0.15	<0.03	<0.03	mg/kg	A-T-019s
Naphthalene _A ^{M#}	<0.15	<0.03	<0.15	<0.03	-	0.27	<0.03	<0.03	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	<0.15	<0.03	0.91	0.08	-	0.85	<0.03	<0.03	mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.35	<0.07	1.12	<0.07	-	<0.35	<0.07	<0.07	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	<0.40	<0.08	3.15	0.24	-	2.04	<0.08	<0.08	mg/kg	A-T-019s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/9	17/06371/10	17/06371/11	17/06371/12	17/06371/13	17/06371/14	17/06371/15	17/06371/16	Units	Method ref
Client Sample No										
Client Sample ID	TP1	TP1	TP3	TP3	TP4	TP4	TP4	TP5		
Depth to Top	0.70	1.70	0.25	1.80	0.50	1.10	1.80	1.80		
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17		
Sample Type	Soil	Soil	Solid	Solid	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	5A	7	7	4A	6A	5A	5A		
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	-	0.02	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	-	0.10	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	0.02	-	0.67	<0.01	-	0.41	<0.01	-	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	14.8	-	32.0	<0.1	-	31.1	1.0	-	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	72.6	-	184	8.2	-	116	3.2	-	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	277	-	274	16.4	-	142	7.1	-	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	7130	-	1360	110	-	37.9	21.6	-	mg/kg	A-T-023s
Total Aliphatics _A	7490	-	1850	134	-	328	33.0	-	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.01	-	0.04	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.01	-	0.28	<0.01	-	0.09	<0.01	-	mg/kg	A-T-022s
Aro >C10-C12 _A [#]	1.0	-	3.8	<0.1	-	2.7	<0.1	-	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	16.2	-	36.2	<0.1	-	37.1	<0.1	-	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	66.5	-	88.0	<0.1	-	61.3	<0.1	-	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	1150	-	258	<0.1	-	17.2	<0.1	-	mg/kg	A-T-023s
Total Aromatics _A	1230	-	386	<0.1	-	118	<0.1	-	mg/kg	A-T-023s
TPH (Ali & Aro) _A	8720	-	2230	134	-	446	33.0	-	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	-	0.02	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	-	0.02	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s
MTBE _A [#]	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	mg/kg	A-T-022s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/17	17/06371/18	17/06371/19	17/06371/20	17/06371/21				Units	Method ref
Client Sample No										
Client Sample ID	TP6	TP7	SO2	TP9	TP11					
Depth to Top	0.60	0.50		0.55	0.80					
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	15-Sep-17	15-Sep-17	15-Sep-17					
Sample Type	Soil	Soil	Solid - Fragment / Tile	Soil	Soil					
Sample Matrix Code	4A	6A	8	6A	5A					
% Stones >10mm _A	6.3	32.8	-	39.2	<0.1				% w/w	A-T-044
pH _D ^{M#}	8.50	9.09	-	7.76	7.33				pH	A-T-031s
Total Organic Carbon _D ^{M#}	-	2.83	-	-	-				% w/w	A-T-032s
Arsenic _D ^{M#}	5	7	-	4	1				mg/kg	A-T-024s
Beryllium _D [#]	2	1	-	1	<1				mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	-	<1.0	<1.0				mg/kg	A-T-027s
Cadmium _D ^{M#}	0.6	1.5	-	0.6	0.7				mg/kg	A-T-024s
Copper _D ^{M#}	31	18	-	24	12				mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	-	<1	<5				mg/kg	A-T-040s
Lead _D ^{M#}	82	42	-	30	21				mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	-	<0.17	<0.17				mg/kg	A-T-024s
Nickel _D ^{M#}	32	17	-	24	20				mg/kg	A-T-024s
Selenium _D ^{M#}	<1	1	-	1	1				mg/kg	A-T-024s
Vanadium _D ^{M#}	33	19	-	13	21				mg/kg	A-T-024s
Zinc _D ^{M#}	52	51	-	89	43				mg/kg	A-T-024s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/17	17/06371/18	17/06371/19	17/06371/20	17/06371/21				Units	Method ref
Client Sample No										
Client Sample ID	TP6	TP7	SO2	TP9	TP11					
Depth to Top	0.60	0.50		0.55	0.80					
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	15-Sep-17	15-Sep-17	15-Sep-17					
Sample Type	Soil	Soil	Solid - Fragment / Tile	Soil	Soil					
Sample Matrix Code	4A	6A	8	6A	5A					
Asbestos in Soil (inc. matrix)										
Asbestos in soil _A [#]	NAD	-	-	-	-					A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	-	-	-	-					
Bulk Fibre ID (inc. matrix)										
Bulk Fibre Identification _A [#]	-	-	Amosite	-	-					A-T-045
Bulk Fibre Identification Matrix (visual) _A	-	-	Slate Tile	-	-					A-T-045
Bulk Fibre Identification - Suitable for Water Absorption Test? _D	-	-	N/A	-	-					Gravimetry

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/17	17/06371/18	17/06371/19	17/06371/20	17/06371/21				Units	Method ref
Client Sample No										
Client Sample ID	TP6	TP7	SO2	TP9	TP11					
Depth to Top	0.60	0.50		0.55	0.80					
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	15-Sep-17	15-Sep-17	15-Sep-17					
Sample Type	Soil	Soil	Solid - Fragment / Tile	Soil	Soil					
Sample Matrix Code	4A	6A	8	6A	5A					
PAH 16										
Acenaphthene _A ^{M#}	<0.01	0.21	-	<0.05	<0.01				mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.05	-	<0.05	<0.01				mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	0.18	-	<0.10	<0.02				mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.20	-	<0.20	<0.04				mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.20	-	<0.20	<0.04				mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.25	-	<0.25	<0.05				mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.25	-	<0.25	<0.05				mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.35	-	<0.35	<0.07				mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.30	-	<0.30	<0.06				mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.20	-	<0.20	<0.04				mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.40	-	<0.40	<0.08				mg/kg	A-T-019s
Fluorene _A ^{M#}	0.01	0.68	-	0.14	<0.01				mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.15	-	<0.15	<0.03				mg/kg	A-T-019s
Naphthalene _A ^{M#}	0.10	<0.15	-	<0.15	<0.03				mg/kg	A-T-019s
Phenanthrene _A ^{M#}	0.18	1.15	-	0.27	<0.03				mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	0.65	-	<0.35	<0.07				mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	0.30	3.25	-	0.41	<0.08				mg/kg	A-T-019s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/17	17/06371/18	17/06371/19	17/06371/20	17/06371/21				Units	Method ref
Client Sample No										
Client Sample ID	TP6	TP7	SO2	TP9	TP11					
Depth to Top	0.60	0.50		0.55	0.80					
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	15-Sep-17	15-Sep-17	15-Sep-17					
Sample Type	Soil	Soil	Solid - Fragment / Tile	Soil	Soil					
Sample Matrix Code	4A	6A	8	6A	5A					
Speciated PCB-WHO12										
PCB BZ 81 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 105 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 114 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 118 _A ^{MF}	-	-	-	-	<0.007				mg/kg	A-T-004s
PCB BZ 123 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 126 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 156 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 157 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 167 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 169 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 189 _A	-	-	-	-	<0.005				mg/kg	A-T-004s
PCB BZ 77 _A	-	-	-	-	<0.005				mg/kg	A-T-004s

Envirolab Job Number: 17/06371

Client Project Name: Mold Road, Wrexham

Client Project Ref: 10/1014

Lab Sample ID	17/06371/17	17/06371/18	17/06371/19	17/06371/20	17/06371/21				Units	Method ref
Client Sample No										
Client Sample ID	TP6	TP7	SO2	TP9	TP11					
Depth to Top	0.60	0.50		0.55	0.80					
Depth To Bottom										
Date Sampled	13-Sep-17	13-Sep-17	15-Sep-17	15-Sep-17	15-Sep-17					
Sample Type	Soil	Soil	Solid - Fragment / Tile	Soil	Soil					
Sample Matrix Code	4A	6A	8	6A	5A					
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	0.02	-	<0.01	<0.01				mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.01	0.13	-	0.08	<0.01				mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	20.6	-	33.1	<0.1				mg/kg	A-T-023s
Ali >C12-C16 _A [#]	1.5	233	-	193	<0.1				mg/kg	A-T-023s
Ali >C16-C21 _A [#]	0.7	395	-	214	<0.1				mg/kg	A-T-023s
Ali >C21-C35 _A [#]	0.8	161	-	149	<0.1				mg/kg	A-T-023s
Total Aliphatics _A	2.9	810	-	590	<0.1				mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.01	0.05	-	<0.01	<0.01				mg/kg	A-T-022s
Aro >C10-C12 _A [#]	<0.1	2.1	-	2.7	<0.1				mg/kg	A-T-023s
Aro >C12-C16 _A [#]	1.0	72.3	-	55.3	<0.1				mg/kg	A-T-023s
Aro >C16-C21 _A [#]	1.1	166	-	91.1	<0.1				mg/kg	A-T-023s
Aro >C21-C35 _A [#]	0.3	78.3	-	56.4	<0.1				mg/kg	A-T-023s
Total Aromatics _A	2.6	319	-	205	<0.1				mg/kg	A-T-023s
TPH (Ali & Aro) _A	5.4	1130	-	796	<0.1				mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	-	<0.01	<0.01				mg/kg	A-T-022s

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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

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

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

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

Soil chemical analysis:

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

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

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

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

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

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

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

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

Asbestos:

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

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

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

Predominant Matrix Codes:

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

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

Secondary Matrix Codes:

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

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

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

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

Please contact us if you need any further information.

Appendix V

MONITORING RESULTS

CLIENT: Condy Lofthouse Architects

JOB NO: 10/1014

SITE: Mold Road, Wrexham

SHEET: 1 of 1

DATE: 04/10/2017

Ambient Concentration (% Volume)			CH4		0.0		CO2		0.0			
			O2		20.4							
Monitoring Point			Gas Concentration								Gas Flow Rate	Remarks
			Highest			Steady			Lowest	H2S		
Ref	GWL	Depth	CH4		CO2	CH4		CO2	O2			
	(m)BGL	(m) BGL	% LEL	% v/v	(%)	% LEL	% v/v	(%)	(%)	ppm	l/hr	
WS11 - #New#	DRY	1.5	0.0	0.0	8.1	0.0	0.0	8.0	5.9	NR	0.0	
WS12 - #New#	DRY	2.7	0.0	0.0	4.0	0.0	0.0	4.0	5.4	NR	0.0	
WS14 - #New#	-	2.6	-	-	-	-	-	-	-	-	-	Unable to open.
WS15 - #New#	DRY	3	0.0	0.0	1.9	0.0	0.0	1.8	18.9	NR	0.0	
WS16 - #New#	2.88	3.5	0.0	0.0	0.0	0.0	0.0	0.0	20.6	NR	0.0	
WS6 - #New#	DRY	1.8	0.0	0.0	4.0	0.0	0.0	4.0	14.0	NR	0.0	
WS9 - #New#	DRY	3.5	0.0	0.0	2.7	0.0	0.0	2.7	18.3	NR	0.0	

Barometric Pressure (mb): 1011	Monitoring Equipment: GA 2000
Barometric Trend: Steady	Date Of Last Calibration: 21/03/2018
Weather: Cloudy	Operator: SHP
Ground Condition: Wet	

KEY	Remarks
ND - None Detected NR - Not Recorded POS - Positive Flow NEG - Negative Flow	WS14 not monitored due to cap being stuck.

Checked: NR	Approved: NR
--------------------	---------------------

Appendix VI



LABORATORY REPORT REPORT



4043

Contract Number: PSL17/4865

Report Date: 17 October 2017
Client's Reference: 10/1014
Client Name: Clancy Consulting
Dunham Court
2 Dunham Road
Altrincham
Cheshire
WA144NX

For the attention of: Sophie Harper Pryce

Contract Title: Wrexham
Date Received: 4/10/2017
Date Commenced: 4/10/2017
Date Completed: 17/10/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

L Knight
(Senior Technician)

C Marshall
(Laboratory Manager)

A Fry
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

PSL
Professional Soils Laboratory

Wrexham

Contract No:

PSL17/4865

Client Ref:

10/1014

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS5			1.50		12			27	13	14	94	Low plasticity CL.
WS7			1.70		13			25	14	11	81	Low plasticity CL.
WS13			3.50		12			22	14	8	83	Low plasticity CL.
WS14			2.40		15			23	13	10	92	Low plasticity CL.
TP6			2.10		14			22	13	9	81	Low plasticity CL.

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

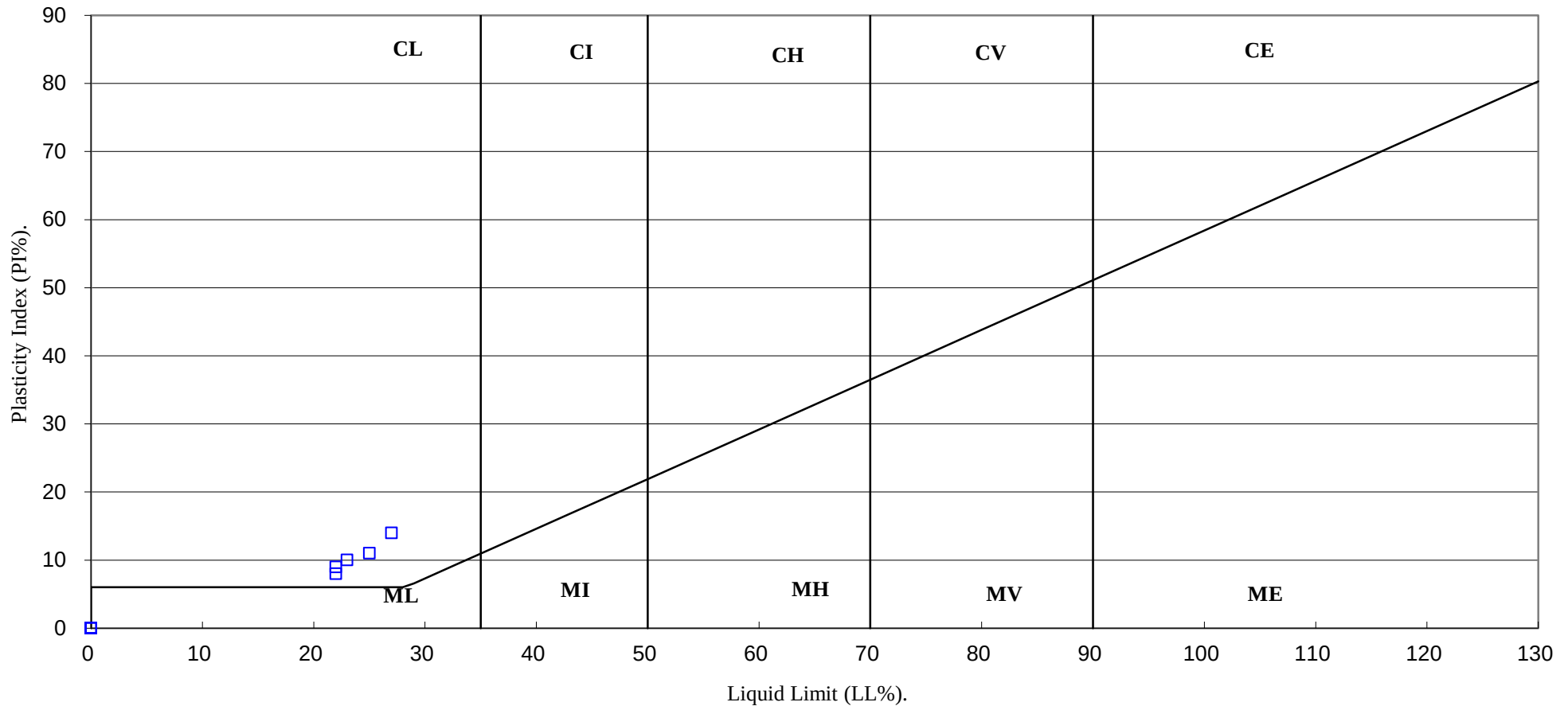


Wrexham

Contract No:
PSL17/4865
Client Ref:
10/1014

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



PSL
Professional Soils Laboratory

Wrexham

Contract No:

PSL17/4865

Client Ref:

10/1014

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

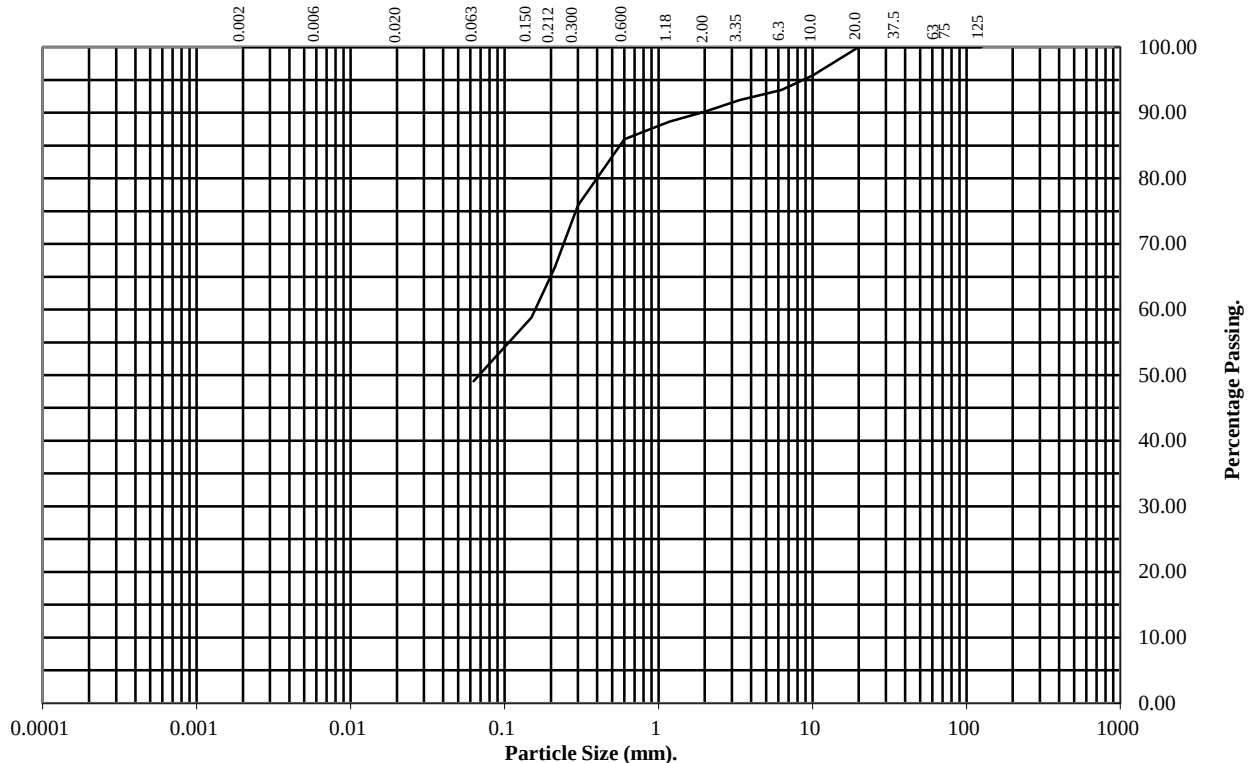
Hole Number: TP6

Top Depth (m): 2.10

Sample Number:

Base Depth(m):

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	96
6.3	93
3.35	92
2	90
1.18	89
0.6	86
0.3	76
0.212	66
0.15	59
0.063	49

Soil Fraction	Total Percentage
Cobbles	0
Gravel	10
Sand	41
Silt/Clay	49

Remarks:

See Summary of Soil Descriptions



Wrexham

Contract No:
PSL17/4865
Client Ref:
10/1014

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

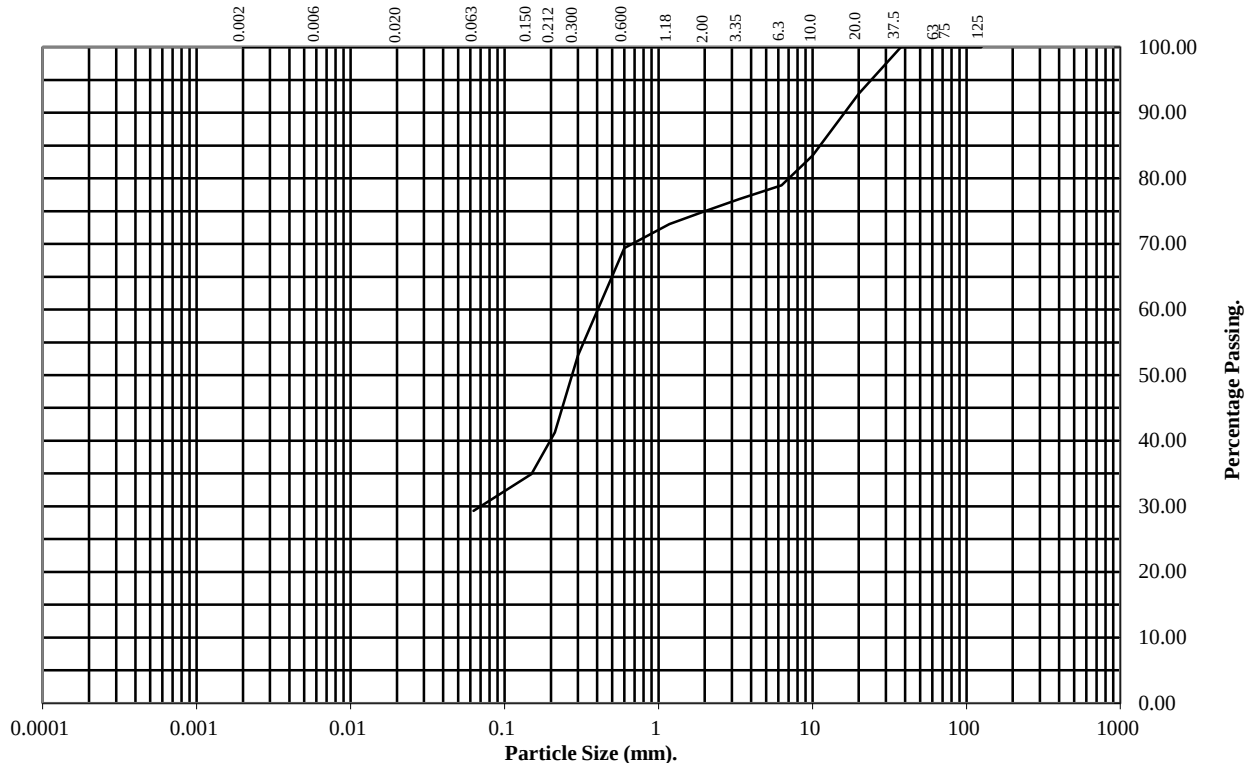
Hole Number: TP9

Top Depth (m): 1.50

Sample Number:

Base Depth(m):

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	93
10	83
6.3	79
3.35	77
2	75
1.18	73
0.6	69
0.3	53
0.212	41
0.15	35
0.063	29

Soil Fraction	Total Percentage
Cobbles	0
Gravel	25
Sand	46
Silt/Clay	29

Remarks:

See Summary of Soil Descriptions



Wrexham

Contract No:
PSL17/4865
Client Ref:
10/1014

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

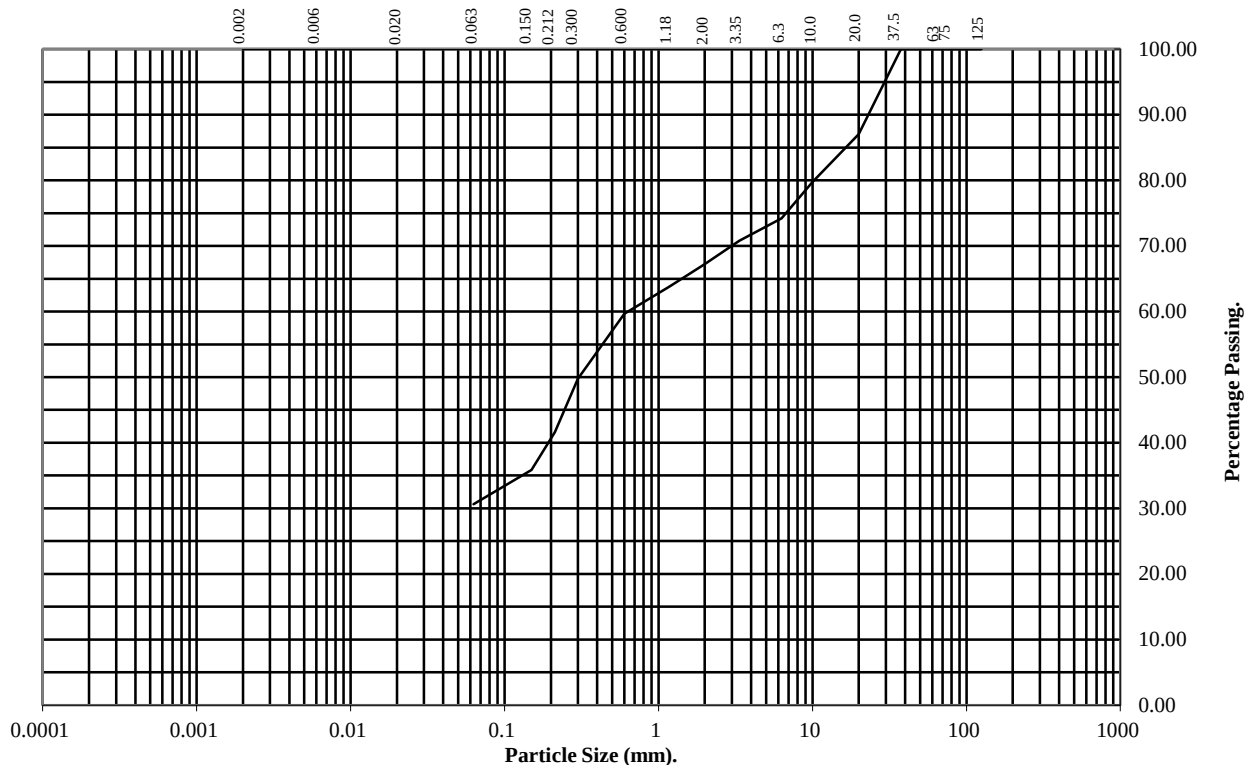
Hole Number: WS10

Top Depth (m): 2.75

Sample Number:

Base Depth(m):

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	87
10	80
6.3	74
3.35	71
2	67
1.18	64
0.6	60
0.3	50
0.212	42
0.15	36
0.063	31

Soil Fraction	Total Percentage
Cobbles	0
Gravel	33
Sand	36
Silt/Clay	31

Remarks:

See Summary of Soil Descriptions



Wrexham

Contract No:
PSL17/4865
Client Ref:
10/1014

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

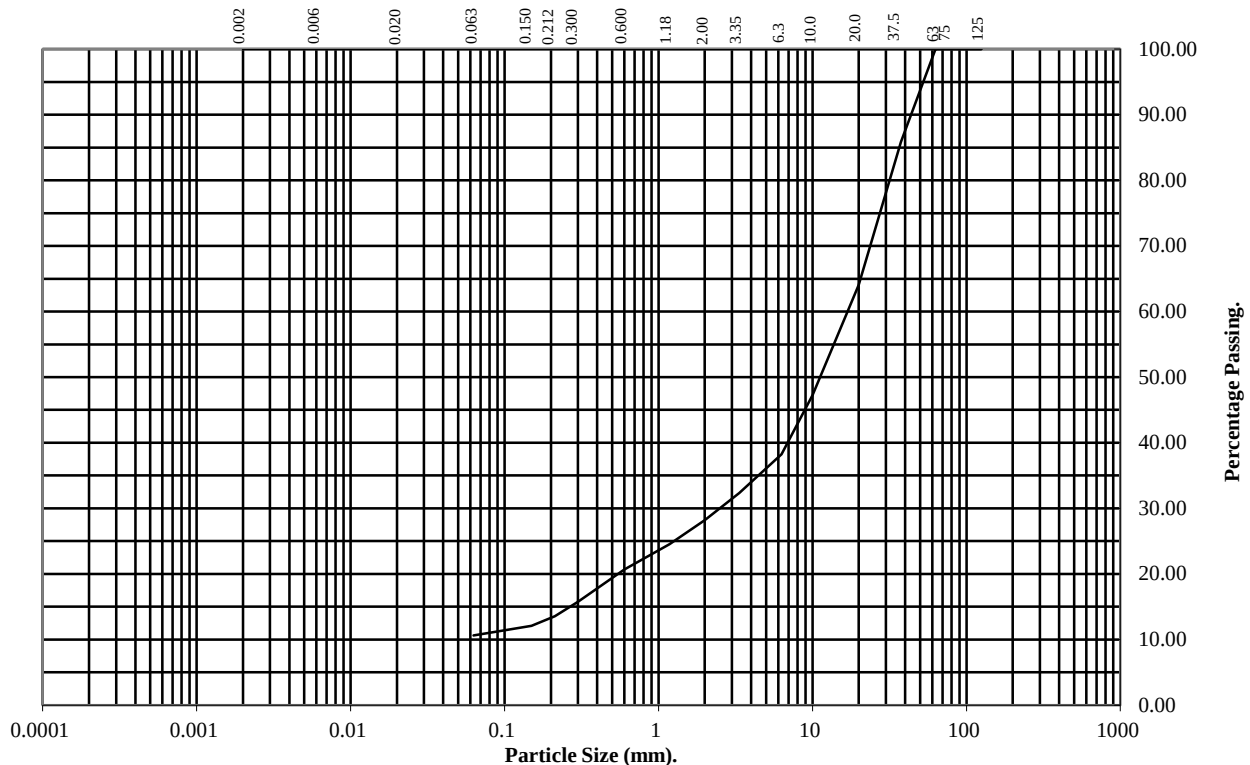
Hole Number: WS17

Top Depth (m): 2.70

Sample Number:

Base Depth(m):

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	86
20	64
10	47
6.3	38
3.35	32
2	28
1.18	25
0.6	21
0.3	16
0.212	14
0.15	12
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	72
Sand	17
Silt/Clay	11

Remarks:

See Summary of Soil Descriptions



Wrexham

Contract No:
PSL17/4865
Client Ref:
10/1014

Appendix VII



Dunham Court, 2 Dunham Road
Altrincham, Cheshire, WA14 4NX
TEL: 0161 613 6000
FAX: 0161 613 6099

Site Name	Job Number	Date
Mold Road, Wrexham	10/1014	Sep-17
Calculations For	Calcs By	Checked By
SA1	SHP	NR

Soil Infiltration Rate Calculations

Length of trial pit;	$l_{trial} =$	1.00	m
Width of trial pit;	$b_{trial} =$	2.50	m
Depth of trial pit	$d_{pit} =$	2.00	m
Depth of trial pit (below invert);	$d_{trial} =$	1.00	m

Free volume (if fill used);	$V_{trial} =$	100	%	1.00	Decimal
-----------------------------	---------------	-----	---	------	---------

		Water Remaining		Water Depth BGL	
Depth of water at start of test	$d_{start} =$	0.750	m	1.250	m
Depth of water at end of test	$d_{end} =$	0.250	m	1.750	m
Total water height	$d_{test} = (d_{start} - d_{end}) =$	0.500		m	

		Water Remaining		Water Depth BGL	
75% depth of pit;	$d_{75} = (d_{trial} \times 0.75) =$	0.750	m	1.250	m
50% depth of pit;	$d_{50} = (d_{trial} \times 0.50) =$	0.500	m	1.500	m
25% depth of pit;	$d_{25} = (d_{trial} \times 0.25) =$	0.250	m	1.750	m

Test Complete BRE 365 Compliant

Test 1 - time to fall from 75% depth to 25% depth;	$T_1 =$	600	mins	36000	sec
Test 2 - time to fall from 75% depth to 25% depth;	$T_2 =$	600	mins	36000	sec
Test 3 - time to fall from 75% depth to 25% depth;	$T_3 =$	600	mins	36000	sec
Longest time to fall from 75% depth to 25% depth;	$t_{lg} = \max(T_1, T_2, T_3) =$	600	mins	36000	sec

Storage volume from 75% to 25% depth;	$V_{p75_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial} =$	1.250	m ³
Internal surface area to 50% depth;	$a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50}) =$	6.000	m ²
Surface area of soakaway to 50% storage depth;	$A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2 =$	3.500	m ²

Soil infiltration rate;	$f = V_{p75_25} / (a_{p50} \times t_{lg}) =$	5.78704E-06	m/s
-------------------------	---	-------------	-----

	Dunham Court, 2 Dunham Road Altrincham, Cheshire, WA14 4NX TEL: 0161 613 6000 FAX: 0161 613 6099	Site Name	Job Number	Date
		Mold Road, Wrexham	10/1014	Sep-17
		Calculations For	Calcs By	Checked By
		SA2	SHP	NR
Soil Infiltration Rate Calculations				
Length of trial pit;	ltrial =	1.00	m	
Width of trial pit;	btrial =	2.40	m	
Depth of trial pit	dpit =	2.10	m	
Depth of trial pit (below invert);	dtrial =	1.10	m	
Free volume (if fill used);	Vtrial =	100	%	1.00 Decimal
		Water Remaining	Water Depth BGL	
Depth of water at start of test	dstart =	0.900	m	1.200 m
Depth of water at end of test	dend =	0.860	m	1.240 m
Total water height	dtest = (dstart-dend) =	0.040 m		
		Water Remaining	Water Depth BGL	
75% depth of pit;	d75 = (dtrial X 0.75) =	0.825	m	1.275 m
50% depth of pit;	d50 = (dtrial X 0.50) =	0.550	m	1.550 m
25% depth of pit;	d25 = (dtrial X 0.25) =	0.275	m	1.825 m
Test Incomplete - Failed to Drain to 25%				
Indication of Soil Infiltration Rate (NOT TO BRE Digest 365)				
Base area	baria = (ltrial X btrial) =	2.4	m ²	
Storage volume from start test to end test	Vtest = (baria X dtest) =	0.096	m ³	
Average wetted area	waria = (((ltrial X 2) + (btrial X 2)) X (dstart-dtest / 2)) + baria =	8.384	m ²	
Duration of test	T =	420	mins	
Soil infiltration rate;	f = ((Vtest / waria) / T) / 60 =	4.5438E-07	m/s	

Permeability Determination

WS15

Trial pit dimension	Dimensions (m)	0.1
	20 Perimeter (m)	0.314
	Area (m2)	0.00785
	h1	1.99
	h2	1.86
depth hole (m)	h	2
depth at 60sec BGL	D0	0.01 m
depth at 1800sec BGL	D1800	0.14 m

$$k/l * (t_2 t_1) = \log (h_1/h_2) - \log (ah_1 + 1/ ah_2 + 1)$$

$$k/l(t_2 - t_1) \quad 0.000743332$$

$$l = (h_1 - h_2)/2$$

$$\text{Average head } l \text{ (m)} \quad 1.925$$

$$k \quad 0.00000079$$

time	t1 (sec)	60
	t2(sec)	1800

$$\text{Permeability } k \quad 7.95E-07$$

Permeability Determination

WS16

Trial pit dimension	Dimensions (m)	0.1
	20 Perimeter (m)	0.314
	Area (m2)	0.00785
	h1	1.83
	h2	0.17
depth hole (m)	h	2
depth at 60sec BGL	D0	0.17 m
depth at 1800sec BGL	D1800	1.83 m

$$k/l * (t_2 - t_1) = \log (h_1/h_2) - \log (a h_1 + 1 / a h_2 + 1)$$

$$k/l(t_2 - t_1) = 0.100267$$

$$l = (h_1 - h_2) / 2$$

$$\text{Average head } l \text{ (m)} = 1$$

$$k = 0.00005570$$

time	t1 (sec)	60
	t2(sec)	1800

$$\text{Permeability } k = 5.57E-05$$