

Phase 2 Geo-Environmental Investigation & Assessment

For

Mayton Street, Openshaw

Undertaken on behalf of

Eco-Res LLP

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Executive Summary

Site Location	Land off Mayton Street, Openshaw, Manchester. It is centred on approximate Ordnance Survey National Grid Reference 387518E, 397619N with an indicative postcode of M11 2FN.
Development Proposals	It is currently proposed to construct 23 no low rise residential structures with private gardens and external hardstanding for parking.
Ground Conditions	Ground conditions comprised made ground to depths of between 0.60 and 1.80mbgl, this being underlain by glacial till to depths of 22.20 and 23.10mbgl. The till is underlain by sandstone and mudstone of the Pennine Upper Coal Measures.
Site Preparation and Earthworks	Ground obstructions in the form of existing foundations, floor slabs and other buried obstructions may be encountered and will need to be broken out to suitable depths below formation levels where they are to impinge on the proposed redevelopment. Construction near retained trees and importantly within any RPAs should be undertaken with due regard to guidance provided in BS5837:2012 'Trees in relation to design, demolition and construction – recommendations'. The possible location of the culvert in the central section of the site will need to be established and accurately determined, along with the associated easement, so that its integrity can be maintained during the construction works.
Coal Seams and Shallow Mine Workings	Based on the desk study information and results of the rotary boreholes, the risk to the proposed development from shallow unrecorded mine workings is low with no specific remedial action considered necessary.
Foundations and Floor Slabs	New structures can be supported on spread foundations within the firm / stiff glacial till encountered at depths of between 1.00 and 2.00mbgl, where a net allowable bearing pressure of 100kN/m² is anticipated. In view of the anticipated relatively light loadings imposed by the Passive House construction, alternative consideration should be given to supporting the structures on a thickened and reinforced raft designed on a net allowable bearing pressure not exceeding 50kN/m² to limit total differential settlements to tolerable limits. Such foundations should be constructed on a minimum 600mm layer of selected and imported granular fill which should be compacted to a suitable engineering specification on proof-rolled ground and incorporating geo-grid reinforcement. As part of the Passive House design, floor slabs are required to be ground bearing. However, should a traditional construction be considered, the thickness of made ground would determine that new floor slabs to be suspended.
Excavations and Groundwater	Perched groundwater inflows should be anticipated within excavations although conventional 'sump and pump' dewatering measures will likely to be adequate to keep excavations dry.
Pavements	New road pavement design should be based on a CBR value of no more than 2.5% in made ground.
Concrete Classification	The typical design sulphate (DS) class and "Aggressive Chemical Environment for Concrete" (ACEC) class for the site are DS-1 and AC-1 respectively.
Soakaways	In consideration of the site being underlain by cohesive soils, soakaways are not considered to be a suitable drainage option for the site.
Ground Gas	The initial results give a maximum composite Q _{hg} value of 0.008l/hr and indicate the site to classify as Characteristic Situation (CS) 2 – 'Low Gas Risk'. However, this will need to be confirmed on completion of the ground gas monitoring and updated risk assessment in due course.
Contamination Assessment	The test results indicate that made ground beneath the site contains levels of arsenic, lead and PAH compounds that are slightly elevated above their respective SL's. A single sample of made ground included amosite asbestos in the form of insulation,

	presumed to be from historical demolition at the site. A direct contact pollution linkage is plausible in proposed garden areas and it is recommended that these be capped by clean soil comprising 150mm of topsoil and 450mm of subsoil, where underlain by made ground. As there is a low possibility of asbestos fibres becoming airborne during site enabling and ground works, all groundworks within made ground soils should be undertaken under a watching brief with any ACM so encountered being segregated for removal to landfill. Such operations should also incorporate specific control measures such as dust suppression, perimeter air monitoring and appropriate PPE. Should ACM be encountered in significant quantities, consideration should also be given to providing lined service trenches and clean in-fill to prevent possible exposure during any future maintenance work. It is anticipated that a remediation strategy will be required to bring the site to a condition suitable for the intended use. The strategy will need to be submitted to the local planning authority for their approval prior to any development commencing. The risk to controlled waters from the site is considered low with no environmental remediation necessary in this respect.
Potable Water Supplies	The requirement for specific materials and measures to protect the water supply from ground contamination is not envisaged.
Waste Soils	It is likely that the majority of made ground would be classified as Non-Hazardous with natural deposits classified as Inert for landfill disposal.

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1.0 INTRODUCTION

Appointment

- 1.1 WML Consulting has been commissioned by Eco-Res LLP to undertake a Phase 2 Geo-environmental Investigation and Assessment of a site located off Mayton Street in the Openshaw area of Manchester.

Proposed Development

- 1.2 It is currently proposed to construct 23no low-rise residential structures with private gardens and external hardstanding for parking.
- 1.3 A copy of the proposed development plans by GWP, referenced 1914-GWP-01-01-DR-A-(PA)-0003, is presented in Appendix 01.

Objective

- 1.4 The objective of the ground investigation and assessment was to provide geotechnical recommendations for construction design purposes together with a geo-environmental risk assessment in terms of possible ground contamination.
- 1.5 To achieve the objective, the following tasks were undertaken:
- Review the existing desk study report for the site and design a Phase 2 Ground Investigation in accordance with the Environment Agency (2004) Model Procedures for the Management of Land Contamination, CLR11.
 - Characterise the ground conditions in terms of geology, soil geotechnical parameters and ground contamination from information provided by the ground investigation.
 - Provide recommendations regarding suitable foundations, floor slabs and new pavement construction, together with any other geotechnical considerations that could affect possible future development.
 - Determine a ground conceptual model for the site so as to undertake an appropriate Phase 2 ground contamination Generic Quantitative Risk Assessment (GQRA).

Scope

- 1.6 A Phase 1 Desk Study for the site area has been undertaken by WML and is presented in the following report:
- Phase 1 Desk Study and Preliminary Geoenvironmental Assessment Report, Reference 8755G-WML-00-XX-RP-G-0001, dated June 2019.
- 1.7 This report includes the findings of a ground investigation designed on conclusions and recommendations within the desk study report. For ease of reference, the findings of the desk study are summarised in the following sections. However, the two reports are not exclusive and should be read in conjunction.
- 1.8 The ground investigation comprised the formation of window sample probeholes undertaken with reference to BS5930:2015 + A1:2020 Code of Practice for Ground Investigation and BS10175:2011 together with A1:2013, "Investigation of Potentially Contaminated Sites - Code of Practice" except where superseded by EN ISO 22475-1 "Geotechnical Investigation and Assessment – Sampling by Drilling and Excavation and Groundwater Measurements".
- 1.9 Rotary drilling to determine the presence of suspected abandoned mine workings was undertaken under the Coal Authority Permit 20125 in accordance with the HSE Guidance on Managing the Risk of Hazardous Gases when Drilling or Piling Near Coal and CIRIA Special Publication C758D: 2019 "Abandoned Mine Workings Manual".

- 1.10 The Relevant Coal Authority Permit and completed closure form are included in Appendix 03.
- 1.11 Samples for chemical analysis were obtained and handled generally in accordance with the current guidelines (BS10175: 2011 and A1:2013).
- 1.12 The ground investigation has also been undertaken with reference to BS8576:2013, Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs).

2.0 SITE LOCATION AND DESCRIPTION

Site Location

- 2.1 The site comprises land off Mayton Street, Openshaw, Manchester. It is centred on approximate Ordnance Survey National Grid Reference 387518E, 397619N with an indicative postcode of M11 2FN.
- 2.2 The site is bounded by:-
- North – Dulgar Street / Beede Street.
 - East – Residential properties off Parkhouse Street and Herne Street.
 - South – Herne Street.
 - West – Residential properties and Herne Street.

Site Description

- 2.3 At the time of the investigation in June 2020, the majority of the site was landscaped and surfaced with grass intersected with several asphalt and paved pedestrian footpaths generally providing access through the landscaped areas.
- 2.4 The north-eastern apex of the site comprised Thames Close, an asphalt-surfaced road providing residential access to two areas of parking off Herne Street to the east.
- 2.5 Additional areas of residential parking are located off Mayton Street in the north-west and a small car park off Herne Street to the south.
- 2.6 The south-eastern section of the site comprises a rectangular children's playground surfaced with asphalt.
- 2.7 Mature deciduous trees are located sporadically around the site and in particular within the central and southern sections.

3.0 SUMMARY OF ENVIRONMENTAL AND HISTORICAL SETTING

3.1 The following paragraphs summarise the most relevant findings of the desk study report.

Geology

- 3.2 The site is indicated by the BGS to be underlain by Devensian Glacial Till comprising mainly clay but possibly with interbedded sand and gravel horizons. The till is underlain by the Carboniferous Pennine Upper Coal Measures Formation (PUCM). These generally comprise interbedded mudstone, siltstone, sandstone and coal seams.
- 3.3 A geological fault, which extends generally north-east to south-west, with downthrow to the east, is inferred to truncate the PUCM in the eastern section of the site. To the east of the fault, the superficial deposits are underlain by the Triassic Chester Formation of the Sherwood Sandstone Group which generally comprise sandstone. These are underlain by the PUCM at greater depth.
- 3.4 The Openshaw coal seam is inferred to sub-outcrop 27m north of the site with the Charlotte Coal and Bradford Three Quarters Coal some 270m and 396m north respectively. Solid strata are indicated to dip to the south-west at angles of around 16 degrees. Therefore, due to the strata dip and dip direction, the Openshaw Coal, Charlotte Coal and Bradford Three Quarters Coal are likely to underlie the site at unknown depths.
- 3.5 the Coal Authority (CA) Mining Report indicates that the property is in the likely zone of influence from 8no seams of coal between 130m to 1,050m depth, these being last worked in 1957. The report goes on to state that ground movements from these workings should have stopped by now.
- 3.6 However, the site is within an area where the CA believes there is coal at or close to the surface, which may have been worked (but not recorded) at some time in the past. The CA states that there are no known mine entries at, or within 100m of the boundary of the property.
- 3.7 A review of the CA interactive (web-based) viewer indicates that the extreme northern section of the site is located within a 'Development High Risk Area', associated with probable shallow coal workings attributed to the Openshaw Coal Seam. These are described by the Authority as 'an area where one or more recorded coal mining related features with the potential for instability or a degree of risk to the surface from the legacy of coal mining operations has been identified'.

Environmental Setting

- 3.8 The property is not in a radon affected area as defined by the BGS/Public Health England as less than 1% of properties are above the action level of exposure. Therefore, no radon protection measures are necessary for new structures as described in publication BR211 by the Building Research Establishment.
- 3.9 The superficial deposits underlying the site are classified as a 'Secondary (Undifferentiated) Aquifer'. The underlying bedrock is classified as a 'Secondary (A) Aquifer'. However, the Chester Formation, inferred to underlie the eastern area of the site, is classified as a Principal Aquifer.
- 3.10 The site is not within an Environment Agency Source Protection Zone (SPZ) and there are no groundwater abstraction licences within 250m of the site.
- 3.11 Corn Brook extends roughly east to west, some 154m south of the site. However, early historical plans indicate that Clayton Brook extended north to south through the central section of the site and may have been diverted or culverted by 1891.
- 3.12 There are no active or closed landfills within 250m of the site. Although a former clay-pit located immediately south of the site was infilled by 1891.

Site History

- 3.13 The earliest map dated 1848 indicates the site to have been undeveloped and in rural / agricultural use. The plans indicate that Clayton Brook extended roughly southwards through the central section before being culverted beneath High Bank to the south.
- 3.14 Between 1891 and 1906, the site had been developed for residential housing around a series of roads including Clayton Lane South, which extended generally north to south within the eastern section. By this time Clayton Brook appears to have been diverted or culverted beneath the site.
- 3.15 The site remained relatively unchanged until the mid-1970's when the terraced housing and roads were cleared and the site redeveloped with lower density residential housing. Phased clearance of the structures was then undertaken between 2002 and 2014 and the site landscaped into its current configuration.
- 3.16 The surrounding area originally comprised undeveloped rural/agricultural land with localised residential developments. During the 1890's and 1900's, mixed residential and industrial development occurred within the surrounding area. During this time the following were noted.
- Clay Pit – Immediately south-west, infilled by 1891;
 - Church Fields Brickworks - 100m north-east, infilled by 1908;
 - Gas and Oil Engineering Works – 125m south;
 - Clayton Dye Works - 250m north-east;
 - Bradford Bleach Works – 250m north-west;
 - Clayton Colliery – 350m north

Preliminary Contamination Risk Assessment

- 3.17 Based on the above findings, the desk study report concluded that potential pollution linkages were, on the whole, considered unlikely or low with associated preliminary risks being assessed as generally low.
- 3.18 However, the approach at the desk study stage is precautionary until such time as uncertainties in the conceptual model can be verified by appropriate site investigation.
- 3.19 The investigations were to comprise sampling and chemical analysis of the near surface soil and the possible installation of ground gas monitoring standpipe with subsequent monitoring for hazardous ground gas concentrations and flow.
- 3.20 In addition, investigations were to be undertaken to establish the risks from unrecorded mine workings in the extreme northern section of the site together with geotechnical parameters for the design of foundations, floor slabs and pavement construction.

4.0 SITE INVESTIGATION

Rationale

- 4.1 Intrusive investigations were undertaken primarily to provide geotechnical parameters for structural design purposes but also to verify the preliminary site conceptual model and confirm the anticipated low environmental risk.
- 4.2 Window sample probeholes were undertaken to provide information on near surface deposits and to obtain samples for chemical analysis. Due to the small diameter of the probing equipment, the depth of penetration achieved is dependent on favourable ground conditions. As such, ground penetration may be restricted in circumstances where the ground is particularly strong or contains relatively large obstructions such as cobbles and/or boulders.
- 4.3 It was also considered prudent to extend 2no boreholes to a depth of 40.00mbgl within the extreme northern section of the site to establish whether any coal seams or abandoned shallow mine workings occurred at shallow depth beneath the site.
- 4.4 Monitoring standpipes were installed in selected probeholes for the measurement of ground gas and groundwater levels.
- 4.5 Chemical analysis of a general suite of contaminants was undertaken on selected samples of soil. This was to confirm the anticipated low contamination risk and to establish the chemical suitability of soils for possible re-use within the development.
- 4.6 The chemical analysis included for the identification of asbestos fibres in view of previous demolition works at the site.

Intrusive Works

- 4.7 Ground investigation work was undertaken by Geoventures UK Ltd between 25th and 26th June 2020. This comprised the formation of 9no window sample probeholes to a maximum depth of 5.00 metres below ground level (mbgl) and 2no rotary boreholes to a maximum depth of 40.00mbgl.
- 4.8 All exploratory holes commenced by excavation to 1.20mbgl to check for buried services, with the excavations being logged and sampled by the WML geotechnical engineer.
- 4.9 The exploratory hole records are presented in Appendix 02 of this report whilst the exploratory hole locations are shown on drawing 8755G-SK01 in Appendix 01.

Monitoring Standpipes

- 4.10 Monitoring wells for ground gas and groundwater measurements were installed in 4no probeholes as indicated on the logs presented in Appendix 02.

Geotechnical and Chemical Testing

- 4.11 In-situ geotechnical testing was undertaken at regular intervals during the formation of the probeholes in the form of Standard Penetration Tests (SPTs). The results for this testing are presented on the descriptive logs in Appendix 02.
- 4.12 Geotechnical soils testing was undertaken on selected samples for the following:
- Natural Moisture Content.
 - Liquid and Plastic Limit.
- 4.13 The results of the geotechnical testing are presented in Appendix 04.

- 4.14 Chemical analysis was undertaken on selected soil samples for the following contaminants of concern:
- Total Arsenic, Boron, Cadmium, Chromium VI, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc.
 - Total Cyanide, Phenols, Sulphur, Sulphate.
 - Speciated USEPA Polyaromatic Hydrocarbons (PAH).
 - Asbestos Screen and Identification.
 - 2:1 water/soil sulphate extract, pH.
 - Organic Matter Content.

- 4.15 The results of the chemical analysis are presented in Appendix 05.

Gas and Groundwater Monitoring

- 4.16 Ground gas and groundwater monitoring has been carried out on one occasion to date on 6th July 2020. The monitoring results are presented in Appendix 06.

5.0 GROUND CONDITIONS

Stratigraphy

- 5.1 Ground conditions encountered during the intrusive investigation comprised made ground to depths of between 0.60 and 1.80mbgl, this being underlain by glacial till to depths of 22.20 and 23.10mbgl where the till was underlain by sandstone and mudstone of the Pennine Upper Coal Measures.

Made Ground

- 5.2 Made ground was encountered within all of the exploratory holes from ground level to depths of between 0.60 and 1.80mbgl.
- 5.3 The made ground generally comprised a surface horizon of dark brown, slightly silty, slightly gravelly sand with rootlets to depths of between 0.20 and 0.30mbgl. Gravel sized fragments included sandstone and brick.
- 5.4 This was underlain by made ground comprising brown and grey, sandy gravel and locally gravelly sand to depths of between 0.60 and 1.80mbgl. Gravel sized fragments include brick, sandstone, concrete, slate and locally glass, clinker and ceramic. In parts, the made ground was noted to have a medium cobble content of brick and locally sandstone.
- 5.5 Within WS09, in the eastern section of the site, the granular made ground encountered across the site was underlain at 1.20mbgl by a dark brown and grey mottled, slightly sandy, slightly gravelly, silty clay which extended to a depth of 1.60mbgl.
- 5.6 SPT 'N' values within the made ground of 0, 4 and 12 indicate a generally very loose state of compaction.
- 5.7 A Natural moisture content of 30% was recorded within a sample of cohesive made ground with a Liquid Limit of 49% and corresponding Plasticity Indices of 27% (modified to 26%) indicate clay of intermediate plasticity and medium volume change potential.

Glacial Till

- 5.8 Glacial till was encountered beneath the made ground in all the exploratory holes to depths of 22.20 and 23.10mbgl.
- 5.9 This generally comprised initially firm, becoming stiff, brown, slightly silty, slightly sandy, slightly gravelly clay.
- 5.10 SPT 'N' values within the upper 1.50m or so of the glacial till ranged between 9 and 16 confirming a firm consistency. 'N' values beyond this depth range from 17 to 41 confirming a generally stiff consistency.
- 5.11 Natural moisture contents of between 18% and 28% were recorded within samples of cohesive Glacial Till. Liquid Limits of between 44% and 64% together with corresponding Plasticity Indices of between 24% and 28% (modified to 23% and 37%) indicate clay of intermediate and high plasticity and medium volume change potential.

Pennine Upper Coal Measures

- 5.12 Rotary boreholes BH01 and BH02 encountered solid strata of the Pennine Upper Coal Measures (PUCM) beneath the glacial till at depths of 22.20 and 23.10mbgl.
- 5.13 The PLCM strata generally comprised grey mudstone and grey sandstone to proven depths of 40.00mbgl.

- 5.14 No coal seams were encountered within the boreholes, although traces of coal were noted in BH01 between 28.40 and 30.60mbgl and within BH02 from 29.10m to 31.80mbgl.
- 5.15 No voids or loss of drilling flush, which could indicate the presence of shallow mine workings were noted within the exploratory holes during formation.

Visual/Olfactory Evidence of Contamination

- 5.16 No visual and/or olfactory evidence of significant ground contamination was identified within the exploratory holes during the investigation.

Groundwater

- 5.17 Perched groundwater seepages were encountered within the granular made ground during the formation of WS05 and WS06 at depths of 1.80 and 1.50mbgl respectively.
- 5.18 During the monitoring visit, standing groundwater was recorded at depths of between 1.46 and 2.47mbgl. However, WS01 was noted to be dry beyond the base of the installation at 4.20mbgl.
- 5.19 It should be appreciated that the groundwater monitoring described above has been undertaken during a very short period of time. Significant variations in the long-term groundwater regime may occur at other times, particularly with prolonged, extreme weather conditions, and that no account can be taken of such in this report.

General

- 5.20 It should also be appreciated that ground conditions may vary between and away from the exploratory hole positions, and that no account can be taken in this report of such variations.

6.0 GEOTECHNICAL APPRAISAL

Site Preparation and Earthworks

- 6.1 Due to the previously developed nature of the site, ground obstructions in the form of existing foundations, floor slabs and other buried obstructions may be encountered and will need to be broken out to suitable depths below formation levels where they are to impinge on the proposed redevelopment.
- 6.2 As part of the site clearance, the removal of vegetation should be undertaken in consultation with an ecological specialist.
- 6.3 It is anticipated that localised trees will need to be removed from around the perimeter of the site with some being retained. It is assumed that the current development configuration has been outlined in consideration of retained trees and specifically Root Protection Areas (RPA) as would need to be determined by the landscape architect.
- 6.4 Notwithstanding this, construction near retained trees and importantly within any RPAs should be undertaken with due regard to guidance provided in BS5837:2012 'Trees in relation to design, demolition and construction – recommendations'.
- 6.5 The location of a culvert in the central section of the site will need to be established and accurately determined, along with the associated easement, so that its integrity can be maintained during the construction works.
- 6.6 Subject to being proven suitable by further chemical analysis, topsoil stripped from the area of redevelopment and considered for re-use in garden/landscaped areas should be stockpiled and protected from inclement weather.
- 6.7 The site is relatively level with no significant earthworks envisaged to form development platforms.

Coal Seams and Shallow Abandoned Mine Workings

- 6.8 Rotary boreholes have indicated the solid strata beneath the site to generally comprise sandstone and mudstone with no coal seams present within the upper 40.00mbgl.
- 6.9 No voids or loss of drilling flush, which could indicate the presence of shallow mine workings, were noted.
- 6.10 It is concluded therefore that the risk to the proposed development from shallow unrecorded mine workings is low with no specific remedial action considered necessary.

Foundations

- 6.11 Made ground should be considered unsuitable for the direct support of structural loads as its loose nature will result in unacceptable total and differential settlements on loading.
- 6.12 The majority of new structures can be supported on spread foundations constructed firm to stiff glacial till encountered at depths of between 1.00 and 1.50mbgl, where a net allowable bearing pressure of 100kN/m² is anticipated.
- 6.13 Locally however, foundations will need to be extended through deeper made ground to anticipated depths of around 2.00mbgl.
- 6.14 The requirement for adequate support measures and possible dewatering of foundation excavations, together with the requirement to dispose of surplus excavated made ground, may render this option impractical and/or uneconomical.

- 6.15 Therefore, in such areas and in view of the anticipated relatively light loadings imposed by the Passive House construction, consideration should be given to supporting the structures on a thickened and reinforced raft designed on a net allowable bearing pressure not exceeding 50kN/m² to limit total differential settlements to tolerable limits. Such foundations should be suitably reinforced and constructed on a minimum 600mm layer of selected and imported granular fill which should be compacted to a suitable engineering specification on proof-rolled ground and incorporating geo-grid reinforcement.
- 6.16 Any loose, soft or otherwise unsuitable material identified at proof-rolling stage should be removed and replaced with well compacted granular fill.
- 6.17 Consideration will also need to be given to foundations constructed in clay soils where a close proximity to existing and/or removed trees is identified. Identification of the tree species should be undertaken to determine its water demand as provided in Appendix 4.2-A of NHBC Standards 2010, Foundations, Chapter 4.2, Building Near Trees. Assessment as to the soil heave or shrinkage potential should be undertaken in consideration of a medium volume change potential for the clay with foundations designed to appropriate depths where such effects are envisaged.
- 6.18 All formations will need to be carefully inspected to confirm the anticipated soil strength. Any soft/loose or otherwise incompetent soils so encountered should be excavated and replaced with foundation concrete.
- 6.19 The exposed formation should also be covered as soon as possible to minimise the potential for further softening of the ground and potential heave effects of the clay as described.

Floor Slabs

- 6.20 As part of the Passive House design, floor slabs are required to be ground bearing, being underlain by proprietary insulation on a suitable thickness of well compacted granular fill incorporating geo-grid reinforcement.
- 6.21 However, should a traditional construction be considered, the thickness of made ground would determine that new floor slabs to be suspended.

Excavations and Groundwater

- 6.22 Excavations at the site will be feasible using conventional hydraulic plant. All excavations requiring man-entry will need adequate lateral support, or will need to be battering back to a safe angle to ensure their stability.
- 6.23 Perched groundwater inflows should be anticipated within excavations although conventional 'sump and pump' dewatering measures will likely to be adequate to keep excavations dry.

Pavement Design

- 6.24 In consideration of the ground conditions, it is recommended that new road pavement design should be based on a California Bearing Ratio (CBR) value of no more than 2.5% in made ground.
- 6.25 The CBR will need to be reviewed and confirmed by site inspection and possibly suitable in-situ testing at formation levels following any earthwork operations and prior to pavement construction.
- 6.26 In any event, all formations should be proof-rolled with any soft, loose or otherwise unsuitable material being removed and replaced with compacted granular fill.

Concrete Design

- 6.27 Design/mix of buried concrete should be undertaken in accordance with the "Aggressive Chemical Environment for Concrete" (ACEC) classification, of BRE Special Digest 1:2005 (Concrete in Aggressive Ground). With reference to the site history, it is deemed appropriate to classify the site as "Brownfield", with respect to BRE Special Digest.
- 6.28 At anticipated foundation depths, values of 2:1 water/soil extract for sulphate for soils range from less than 10 to 45mg/l. Values of pH range from 7.6 to 8.1 indicating slightly alkaline conditions.
- 6.29 On the basis of these results, the typical design sulphate (DS) class and "Aggressive Chemical Environment for Concrete" (ACEC) class for the site are DS-1 and AC-1 respectively.

Drainage and Soakaways

- 6.30 In consideration of the site being underlain by cohesive soils, soakaways are not considered to be a suitable drainage option for the site.

7.0 GENERIC QUANTITATIVE RISK ASSESSMENT (GQRA)

General

- 7.1 A review of the desk study information has concluded that pollution linkages are generally considered unlikely to low with the overall preliminary risk on the whole being assessed as low.
- 7.2 Further to this, no visual and/or olfactory evidence of significant ground contamination has been identified within the exploratory holes during the investigation.
- 7.3 However, in view of the site being brownfield, it has been considered prudent to adopt a precautionary principal and undertake chemical analysis of the sub-surface soils to establish in more detail the human health risk status of the site.

Human Health

- 7.4 Selected samples have been analysed for a general suite of contaminants of concern and compared against Screening Levels (SL's) for human health to determine the significance of the measured concentrations in relation to the site conceptual model. Thus, a Generic Quantitative Risk Assessment has been undertaken in line with guidelines provided in CLR11, Model Procedures for the Management of Land Contamination, 2004.GQRA).
- 7.5 The criteria for a limited number of contaminants have been derived by DEFRA in their document entitled SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, April 2014.
- 7.6 Within the document, Category 4 Screening Levels (C4SL's) are described as being more pragmatic than previous screening criteria and represent concentrations in soil that present an 'acceptable' level of risk within the context of Part 2A.
- 7.7 The National Planning Policy Framework states that 'after development, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990'. Therefore, by inference, the C4SL's are appropriate for use in the planning context.
- 7.8 Although the SP1010 document states that C4SL only apply for a 'sandy loam soil with 6% soil organic matter', it is generally accepted that assessment criteria for metals are not sensitive to changes in soil organic content (SOM). The C4SL's have therefore been adopted as assessment criteria in this report for the listed metals within the SP1010.
- 7.9 Subsequent to SP1010, LQM/CIEH have published a document entitled 'The LQM/CIEH S4ULs for Human Health Risk Assessment' 2015. In brief, the document provides updated assessment criteria which have been derived in accordance with UK legislation, national as well as EA policy and using a modified version of the CLEA software and available guidance. The new screening criteria, or Suitable 4 Use Levels (S4ULs), are intended to provide a complete and updated replacement to the previous LQM/CIEH GAC of 2009. As such they are considered appropriate for use in this assessment for other contaminants not covered by C4SL's and/or for organic contaminants assuming a worst-case Soil Organic Matter (SOM) of 1% as an initial conservative assessment.
- 7.10 For each contaminant, S4UL's and C4SL's have been calculated for six land use scenarios, namely:
- Residential with homegrown produce.
 - Residential without homegrown produce.
 - Allotments.
 - Commercial.
 - Public Open Space near residential housing.
 - Public Parks (remote from residential housing).

- 7.11 In light of the proposed development, the SL's for a "Residential with homegrown produce" end-use are considered appropriate for a conservative assessment at this stage.
- 7.12 A table of relevant SL's protective of human health are provided in Appendix 07.

Soil Test Results

- 7.13 10no soil samples were analysed for a suite of Contaminants of Concern (CoC).
- 7.14 The soil Organic Matter (SOM) content for the samples range from 1.1 to 3.6%. However, all elevated PAH's were recorded within samples where the SOM exceeded 2.5%. It has therefore been considered appropriate to adopt SL's relating to a 2.5% SOM in the generic assessment.
- 7.15 The majority of the concentrations measured are below the SL's for "Residential with homegrown produce", with the following exceptions.

Contaminant	Number of Samples Exceeding SL	SL (mg/kg)	Recorded Concentrations (mg/kg)	Sample
Arsenic	2	37	44 & 92	WS05 0.30m WS09 0.40m
Lead	2	200	270 & 470	WS08 0.30m WS09 0.40m
Napthalene	1	2.5	15	WS09 0.40m
Benzo[a]anthracene	1	11	15	WS09 0.40m
Benzo[b]fluoranthene	4	3.3	3.4 - 19	WS03 0.40m WS06 0.20m WS07 0.40m WS09 0.40m
Benzo[a]pyrene	3	2.7	3.6 - 14	WS03 0.40m WS06 0.20m WS09 0.40m
Dibenz[a,h]anthracene	5	0.28	0.64 – 2.9	WS01 0.20m WS03 0.40m WS06 0.20m WS07 0.40m WS09 0.40m

- 7.16 Asbestos in the form of amosite insulation was detected in a single sample in WS06 at 0.20mbgl.

Discussion and Conclusions

Human Health

- 7.17 The test results indicate that made ground beneath the site contains levels of arsenic, lead and PAH compounds that are elevated above their respective SL's.
- 7.18 A single sample of made ground (WS06 at 0.20mbgl) included amosite asbestos in the form of insulation, presumed to be from historical demolition at the site.
- 7.19 As the site is currently disused and in transient use, the risk to human health from direct contact with these contaminants is considered low.

- 7.20 Following development, there will be no mechanism for a direct contact pollution linkage with contaminated soil where the site is surfaced with buildings and hardstanding. However, a direct contact pollution linkage is plausible in proposed garden areas and it is recommended that these should be capped by clean sub-soil and topsoil thus removing the pollution linkage. This will normally comprise a 600mm clean cover, comprising 150mm of topsoil and 450mm of subsoil, where underlain by made ground.
- 7.21 Notwithstanding the above, as there is a low possibility of asbestos fibres becoming airborne during site enabling and ground works, there is a perceived risk to construction workers and the general public of exposure, particularly during dry weather conditions.
- 7.22 All groundworks within made ground soils should therefore be undertaken under a watching brief with any ACM so encountered being segregated for removal to landfill. Such operations should also incorporate specific control measures such as dust suppression, perimeter air monitoring and appropriate Personal Protective Equipment (PPE).
- 7.23 Although not anticipated, should ACM be encountered in significant quantities, consideration should also be given to providing lined service trenches and clean in-fill to prevent possible exposure during any future maintenance work.
- 7.24 In consideration of the above, it is anticipated that a remediation strategy will be required to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health. The strategy will need to be submitted to the local planning authority for their approval prior to any development commencing.

Controlled Waters

- 7.25 In terms of sensitivity, groundwater within both the superficial 'Secondary (Undifferentiated) Aquifer' and underlying 'Secondary (A) Aquifer' are likely to be considered limited resource value and utilisation. However, the Principal Aquifer underlying the eastern section of the site which has the potential to be used as a source of potable water.
- 7.26 Also, relatively impermeable, cohesive glacial till and its relatively low transmissivity rates would limit vertical migration of any localised contamination towards the more sensitive Chester Formation Principal Aquifer receptor.
- 7.27 The site is not within an Environment Agency Source Protection Zone (SPZ) and there are no groundwater abstraction licences within 250m.
- 7.28 Clayton Brook will be afforded protection from any mobile contamination by the culvert construction and the relatively impermeable nature of the glacial till.
- 7.29 Therefore, the risk to controlled waters from the site is considered low with no environmental remediation necessary in this respect.

8.0 GROUND GAS RISK ASSESSMENT

Methodology

- 8.1 Current guidance for the assessment of risk associated with the presence of hazardous ground gases (principally methane and carbon dioxide) is provided in two key documents, namely:
- Code of practice for the Characterisation and remediation from Ground Gas in Affected Developments. British Standard Institution (BS 8485: 2015 & A1:2019); and
 - Assessing Risks posed by Hazardous Ground Gases to Buildings CIRIA (C665, 2007).
- 8.2 The assessment presented herein is primarily based on the BS8485 document.
- 8.3 Hazardous ground gas qualitative risk assessment is based on a conceptual model similar to that used for soil and groundwater contamination sources (i.e., source-pathway-receptor pollutant linkages). A semi-quantitative estimate of risk can be assessed based on knowledge of the conceptual model and a measure of hazardous gas concentration and gas flow at the site within monitoring standpipes.
- 8.4 Based on the measured flow rates and hazardous gas concentrations, individual "hazardous gas flow rates" (Q_{hg}) can be derived for each monitoring point, from which the "site characteristic hazardous gas flow rate" (Q_{hgs}), and then the "Characteristic Situation" (CS) can be determined.
- 8.5 BS8485 provides guidance on the level of gas protection requirements based upon the characteristic situation and the proposed development based on building type as outlined in Table 3.

Table 3 - Building Types

	Type A	Type B	Type C	Type D
Ownership	Private	Private or commercial/ Public, possible multiple	Commercial / Public	Commercial / Industrial
Control (Change of use)	None	Some but not all	Full	Full
Room Sizes	Small	Small/ medium	Small to Large	Large Industrial/ Retail Park

- 8.6 The proposed development therefore is indicated to comprise the construction of Type A buildings which include:
- Private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.

Ground Gas Conceptual Model

- 8.7 The property is not in a radon affected area as defined by UK Radon as less than 1% of properties are above the action level of exposure. Therefore, no radon protection measures are necessary for new structures as described in publication BR211 by the Building Research Establishment.
- 8.8 There are no active or historic landfills recorded within 250m of the site.
- 8.9 Due to the age since infilling and the size of the clay pit (pre 1891) at the southern boundary, the potential to generate significant volumes of ground gas is considered unlikely.

- 8.10 No appreciable thickness of organic degradable natural soils or made ground from historical in-filling have been encountered beneath the site during the investigations.
- 8.11 The presence of relatively impermeable glacial till will significantly reduce the potential for any ground gas to migrate towards the site from any unrecorded sources.
- 8.12 In consideration of the above, the preliminary risk to the development from ground gas has been assessed as low. However, it has been considered prudent to undertake limited, confirmatory ground gas monitoring, primarily for methane and carbon dioxide, with associated flow rates, on 1no occasion to date, on 6th July 2020.

Results and Recommendations

- 8.13 The results indicate concentrations of peak and steady state methane not exceeding 0.1% by volume in air (v/v) with peak and steady state carbon dioxide concentrations ranging from 2.3 to 7.8% by volume in air (v/v).
- 8.14 No detectable ground gas flows have been recorded during the initial monitoring visit.
- 8.15 The initial results give a maximum composite Qhg value of 0.008l/hr and indicate the site to classify as Characteristic Situation (CS) 2 – 'Low Gas Risk'. Therefore, in consideration of the carbon dioxide exceeding 5% in WS05 on the initial visit, it cannot be ruled out that ground gas protection could be required within new structures. However, this will need to be confirmed on completion of the ground gas monitoring and updated risk assessment in due course.
- 8.16 Once completed this should also be confirmed with the local authority Environmental Health / Building Control Officer prior to any building design being finalised.

9.0 OTHER POTENTIAL DEVELOPMENT CONSIDERATIONS

Excavated Soils

- 9.1 Groundworks undertaken during the development will produce excavated soil which will require appropriate site management. Principally, and in line with the sustainable development agenda, any soils arising from site excavations should firstly be considered for re-use where possible by incorporation into the development.
- 9.2 However, due to the restricted nature of the site, sorting and segregation of excavated soils to render them suitable for re-use may not be feasible.
- 9.3 Where soils are surplus to requirements, they will need to be removed from site through appropriate waste management.
- 9.4 It should be noted that the chemical analysis results for disposal classification are assessed against different assessment criteria to those relating to contamination risk assessment. Soils that are deemed suitable for use in terms of risk to human health and the environment may not necessary be uncontaminated and could be classified as 'Non-Hazardous' or even 'Hazardous' for disposal purposes.
- 9.5 For guidance and based on the current information, it is likely that the majority of made ground would be classified as Non-Hazardous with natural deposits classified as Inert for landfill disposal.
- 9.6 However, where excavated made ground, following inspection, is found to include significant ACM and/or fibres that cannot be segregated, it may classify as Hazardous, subject to further quantification testing.
- 9.7 It will be the responsibility of the waste producer to undertake testing and classification of any waste soils for disposal to an appropriately licenced landfill in accordance with current guidelines and Duty of Care requirements.

Imported Fill

- 9.8 Imported fill will be subject to specific quality requirements and should be accompanied by appropriate certification to confirm its suitability. Allowance should also be made for testing imported fill materials prior to placement to ensure suitability.

Water Supply Pipes

- 9.9 The relevant water supply provider will need to be consulted with regards the selection of suitable water supply pipe materials for the development. In light of the ground conditions encountered, the requirement for specific materials and measures to protect the water supply from ground contamination is not envisaged.

APPENDIX 01

Drawings



This drawing is the property of GWP Architecture. Copyright is reserved by them and the drawing is issued on the condition that it is not copied, reproduced, retained, or disclosed to any unauthorised person, either wholly or in part, without the consent in writing of GWP Architecture.

All drawings and specifications should be read in conjunction with the project health and safety plan, any possible conflicts should be presented to the Planning Coordinator.

All work to be carried out in accordance with current Building Regulations.

Contractors must verify all dimensions at the job before commencing any work or making shop drawings.

Written dimensions should be taken.

Do not scale off drawing.

Do not take digital dimensions from this drawing.

Any discrepancies to be reported to the Architect.



Scale - 1:750 @A3

Tarmac Roads / Paths

Screening Planting

Green Spaces / Gardens

Existing Trees - To be retained where possible location & size subject to tree survey

Recently Planted Trees - To be retained where possible, subject to tree survey

Omitted Trees

Proposed Trees

Proposed Site Development Boundary

40m 4-arm Rotary Clothes Drying Line & associated ground fixing

Bike Store - Tiger Low Pent Compact 7X3 Timber Bike Shed. Capacity- 2x Bicycles (refer to drawing 0008-Bike storage)

200l Water butts

Existing Levels

Proposed Levels

Electric Vehicle Charging Point

P03	30.01.20	in response to planning comments	CT	DT
P02	27.11.19	General update	CT	DT
P01	06.11.19	Issued for planning	CT	DT
Rev	Date	Comment	Dr	Ch



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architecture@gwp-arch.com | www.gwp-arch.com

GWP Job Reference (299)1914

Job Title Mayton Street



Proposed Site Plan

Name 1914-GWP-01-01-DR-A-(PA)-0003

Scale 1:750@A3 Revision P03

Drawn/Checked DT/JW First Issue 06.11.19

Drawing Status D - Planning

BitCloud: BIMServer-HP - BIMcloud Basic for ARCHICAD 22/Mayton - (299)1914
GWP-01-DR-A-Manchester-One-P03



Hard Surfacing

Tarmac Roads / Paths

Dwelling Paving. 450 x 450 concrete flags in natural grey

Private car parking. Plasmor Modena 50 - Granite Stone

Tactile Paving

Play Area (Retained)

All footpaths 2m wide

Existing unction / access to car park amended for new road

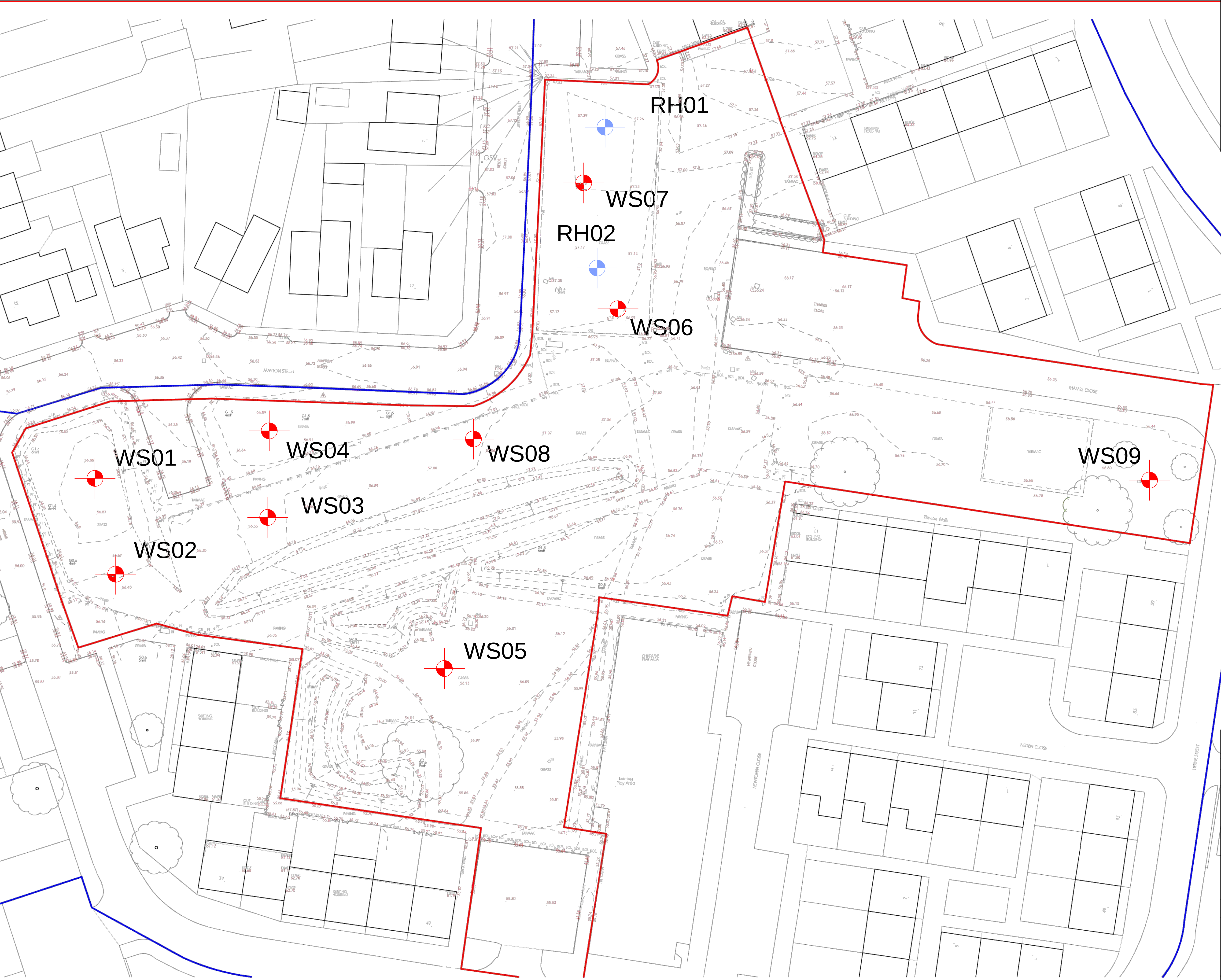
Accommodation Schedule

Existing Development

3b4p Home 13

2b3p Home 10

Total Dwellings 23



GENERAL NOTES

1. DO NOT SCALE FROM THIS DRAWING WORK TO FIGURED DIMENSIONS ONLY.
2. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS ALLOWED WITHOUT PRIOR PERMISSION IN WRITING.
3. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND THE SPECIFICATION.
4. THE CONTRACTOR SHALL INCORPORATE ALL THE REQUIREMENTS OF THE PRE-TENDER STAGE HEALTH & SAFETY PLAN.

KEY	
—	APPROXIMATE DEVELOPMENT BOUNDARY
+	RH01 ROTARY BOREHOLE
+	WS01 WINDOW SAMPLE PROBEHOLE

P1	FIRST PRELIMINARY ISSUE.	JAN20	SCS	PGD
Rev.	Amendment	Date	By	Chkd
Project MAYTON STREET				
Client ECO-RES				
Title EXPLORATORY HOLE LOCATION PLAN				
Drawn SCS	Checked PGD	Date 06-07-20	Scale 1:250@A1	
WML CONSULTING Chartered Civil and Structural Engineers No.8 Oak Green Earl Road Stanley Green Business Park Cheshire Hulme Cheshire SK8 6QL Tel 0161 482 0600 Fax 0161 486 9210 e-mail info@wmlconsulting.com www.wmlconsulting.com				
Job No. 8755G		Drawing No. SK-01-		

APPENDIX 02

Exploratory Hole Records

		Project Title: Mayton Street				WS01	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 25/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.20	E				0.30	Turf over brown, slightly gravelly SAND. Gravel is angular to subangular, fine to coarse, including brick, concrete and metal. (MADE GROUND)		
1.20	D	N=14			1.00 1.10	Brown, sandy, angular to subangular, fine to coarse GRAVEL including brick, concrete, slate and sandstone. High cobble content. Cobbles are subangular, of brick. (MADE GROUND)		
		N=17			2.00	Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
		N=25			3.00			
		N=21			4.00			
		N=23			5.00			
					6.00	End Of Borehole At 5.00 m		

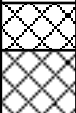
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa  - Groundwater Strike  - Groundwater Level 		REMARKS No Groundwater Encountered Scale: 1:40	Water Strikes <table border="1"> <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> </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																			Date	Casing	Water	From	To	Hours												
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Date	Casing	Water	From	To	Hours																																								

		Project Title: Mayton Street				WS02	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 25/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.50	E				0.25	Turf over brown, slightly gravelly, silty SAND. Gravel is angular to subangular, fine to coarse, including brick. (MADE GROUND)		
1.20	J	N=9			1.00	Brown, sandy, angular to subangular, fine to coarse GRAVEL including brick, slate and sandstone. High cobble content. Cobbles are subangular, of brick. (MADE GROUND)		
		N=15			2.00	Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
		N=25			3.00			
		N=22			4.00			
		N=20			5.00	End Of Borehole At 5.00 m		
					6.00			

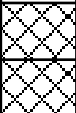
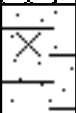
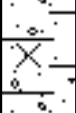
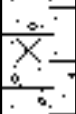
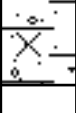
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Date	Casing	Water	From	To	Hours																								

		Project Title: Mayton Street				WS03	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 25/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.40	E				0.25	Turf over brown, slightly gravelly, clayey SAND. Gravel is angular to subangular, fine to coarse, including brick, and sandstone. (MADE GROUND)		
		N=16			0.60			
					1.00	Brownish grey, slightly clayey, sandy, angular to subangular, fine to coarse GRAVEL including brick, slate and sandstone. Medium cobble content. Cobbles are subangular, of brick. (MADE GROUND)		
		N=23			2.00	Firm, brown and grey mottled, slightly silty, slightly sandy CLAY. (GLACIAL TILL)		
					3.00	Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
		N=26			4.00			
		N=18				End Of Borehole At 4.00 m		
					5.00			
					6.00			

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  Scale: 1:40	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> </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																			Date	Casing	Water	From	To	Hours												
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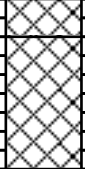
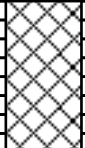
		Project Title: Mayton Street				WS04	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 25/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.10	E				0.30	Turf over dark brown, slightly gravelly, silty SAND. Gravel is angular to subangular, fine to coarse, including brick, and sandstone. (MADE GROUND) Brownish grey, slightly silty, sandy, angular to subangular, fine to coarse GRAVEL including brick and sandstone. (MADE GROUND) Firm, brown and grey mottled, slightly silty, slightly sandy CLAY. (GLACIAL TILL) Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
1.00	D	N=12			0.60			
		N=19			1.00			
		N=22			1.30			
		N=20			2.00			
					3.00			
					4.00	End Of Borehole At 4.00 m		
					5.00			
					6.00			

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 	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> </tbody> </table> <table border="1"> <thead> <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> </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																			Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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Scale: 1:40

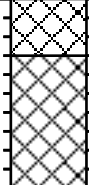
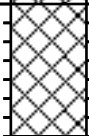
		Project Title: Mayton Street				WS05	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 25/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.30	E				0.20	Turf over dark brown, slightly gravelly SAND with roots. Gravel is angular to subangular, fine to coarse, including brick and sandstone. (MADE GROUND)		
1.20	D	N=4			0.90 1.00	Dark grey, slightly sandy, angular to subangular, fine to coarse GRAVEL including ash, clinker, brick and ceramic. Low cobble content. Cobbles are subangular, including brick. (MADE GROUND)		
2.00	J	N=23			1.80 2.00	Dark greyish brown, slightly gravelly, silty CLAY with organic flecks. Gravel is subangular, fine to coarse, including brick and ash. (MADE GROUND)		
		N=25			3.00			
		N=25			4.00			
		N=41			4.70			
					5.00	End Of Borehole At 4.70 m		
					6.00			

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 	<table border="1"> <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>29/06/2020</td> <td>1.8</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"> <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	29/06/2020	1.8																	Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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Scale: 1:40

		Project Title: Mayton Street				WS06	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 26/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.20	E				0.30	Turf over brown, slightly silty, slightly gravelly SAND. Gravel is angular to subangular, fine to coarse, including brick and sandstone. (MADE GROUND)		
		N=12			1.00	Dark brown, slightly clayey SAND and angular to subangular, fine to coarse GRAVEL including brick, concrete and sandstone. Low cobble content. Cobbles are subangular, of brick and concrete. (MADE GROUND)		
		N=18			1.70	Brown, slightly sandy, gravelly CLAY. Gravel is subangular, fine to coarse, including brick and sandstone. (MADE GROUND)		
		N=23			2.00	Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
		N=24			3.00	3.00 - 4.00 No recovery.		
					4.00	End Of Borehole At 4.00 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 	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>29/06/2020</td> <td>1.5</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	29/06/2020	1.5																											
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Scale: 1:40

		Project Title: Mayton Street				WS07	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 26/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.40	E				0.30	Turf over brown, slightly gravelly, clayey SAND. Gravel is angular to subangular, fine to coarse, including brick and sandstone. (MADE GROUND)		
1.10 1.20	D J	N=16			1.00	Brownish grey, slightly clayey, SAND and angular to subangular, fine to coarse GRAVEL including brick, ceramic, slate and sandstone. Low cobble content. Cobbles are subangular, of brick. (MADE GROUND)		
		N=25			2.00	Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
		N=26			3.00			
		N=27			4.00			
					5.00	End Of Borehole At 5.00 m		
					6.00			

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 	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> </tbody> </table> <table border="1"> <thead> <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> </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																			Daily Log Of Depths			Chiselling			Date	Casing	Water	From	To	Hours												
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Scale: 1:40

		Project Title: Mayton Street				WS08	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 26/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.30	E				0.20	Turf over dark brown, slightly silty, slightly gravelly SAND. Gravel is angular to subangular, fine to coarse, including brick and sandstone. (MADE GROUND) Brownish grey, sandy, angular to subangular, fine to coarse GRAVEL including brick, ceramic and sandstone. Low cobble content. Cobbles are subangular, of brick. (MADE GROUND) Firm, brown and grey mottled, slightly silty, slightly sandy CLAY. (GLACIAL TILL) Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
1.10	J	N=13		0.60				
		N=18		1.00				
		N=22			1.20			
		N=24			2.00			
					3.00			
					4.00			
					5.00			
					6.00			
						End Of Borehole At 5.00 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  Scale: 1:40	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> </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																			Date	Casing	Water	From	To	Hours												
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		Project Title: Mayton Street				WS09	
		Project Number: 8755G-A		Client: Eco-Res			
		GL (mAOD):		N Coord: 0		E Coord: 0	
Date: 26/06/2020		Method: Window Sample		Driller: Geo-Ventures (UK) Ltd		Logged By: TPB	

Depth (m)	Type	Test Result	Level	Legend	Depth (m)	Description	Water	Standpipe
0.10	E				0.25	Turf over dark brown, slightly silty, slightly gravelly SAND. Gravel is angular to subangular, fine to coarse, including brick and sandstone. (MADE GROUND)		
0.40	E				0.70			
0.80	E				1.00			
1.30	D	N=0			1.20	Brownish grey, sandy, angular to subangular, fine to coarse GRAVEL including brick, concrete, sandstone and glass. Low cobble content. Cobbles are subangular, of brick. (MADE GROUND)		
					1.60			
					2.00			
		N=23				Dark grey, subangular, fine to coarse GRAVEL including ash, clinker and brick. (MADE GROUND)		
								
								
		N=23			3.00	Soft, dark brownish grey, slightly sandy, silty CLAY. (MADE GROUND)		
								
								
		N=29			4.00	Firm to stiff, brown and initially grey mottled, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular, fine to coarse of mixed lithologies. (GLACIAL TILL)		
								
								
						End Of Borehole At 4.00 m		
					5.00			
					6.00			

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 	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> </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																			Date	Casing	Water	From	To	Hours												
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Scale: 1:40

		Project Title: Mayton Street						RH01																																																											
		Project Number: 8755G-A			Client: Eco-Res							Sheet 1 Of 3																																																							
		GL (mAOD):			N Coord: 0			E Coord: 0																																																											
Date: 25/06/2020		Method: Rotary Drilling			Driller: Geo-Ventures (UK) Ltd			Logged By: Driller																																																											
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							+ + + + +	33.00 34.00 34.30 35.00 36.00 37.00 38.00 39.00 40.00 41.00 42.00 43.00 44.00 45.00 46.00 47.00 48.00	Grey sandstone. (PENNINE UPPER COAL MEASURES) Grey mudstone with occasional hard sandstone bands. (PENNINE UPPER COAL MEASURES) End Of Borehole At 40.00 m																																																								
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		Project Title: Mayton Street						RH02																																		
		Project Number: 8755G-A			Client: Eco-Res							Sheet 1 Of 3																														
		GL (mAOD):			N Coord: 0			E Coord: 0																																		
Date: 25/06/2020		Method: Rotary Drilling			Driller: Geo-Ventures (UK) Ltd			Logged By: Driller																																		
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								15.00																																		
								16.00																																		
									Borehole Continues																																	
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 Voids Encountered				Water Strikes <table border="1"> <thead> <tr> <th>Date</th> <th>Strike</th> <th>Level</th> <th>Minutes</th> <th>Casing</th> <th>Remarks</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	Remarks																								
Date	Strike	Level	Minutes	Casing	Remarks																																					
						Scale: 1:100				Daily Log Of Depths Flushing Medium <table border="1"> <thead> <tr> <th>Date</th> <th>Casing</th> <th>Water</th> <th>From</th> <th>To</th> <th>Type</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> </tbody> </table>			Date	Casing	Water	From	To	Type																								
Date	Casing	Water	From	To	Type																																					

APPENDIX 03

Coal Authority Permit and Closure Form



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 20125

Name and Address of Permit Holder:

*Eco-Res Ltd
Suite 11
Newby Hall
Ripon
HG4 5AE*

Site Location:

*Landscaped Area off
Mayton Street
Openshaw
Manchester
M11 2FN*

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by three boreholes to 40mbgl to determine presence of shallow mine workings within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of 12 months from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*

Signed: *Jake Morris* Granted Date: *10/06/2020*

For and on behalf of The Coal Authority

Nominated Representative: Jake Morris, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

Tel: 01623 637450; E-Mail: permissions@coal.gov.uk



Permit Ref: 20125

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Permit Ref.	20125	Project / Site Location	Landscaped Area off, Mayton Street, Openshaw, Manchester, M11 2FN
-------------	--------------	-------------------------	--

Please supply all relevant documents, including this completed form within 3 months of the permitted works being completed.

Where relevant the report should include; borehole logs and details of mine or mine entry treatment works carried out (incl. engineering drawings, grout takes etc.) and a scaled site layout plan (correlated to O.S N' Grid) showing all relevant mine entry positions, coal seams, voids and broken ground proved by the works.

Summary of works

Start date

26/06/2020

Finish date

27/06/2020

Have any variations occurred? No ~~Yes~~ If so was the Authority notified? No Yes

Please describe;

NA**Did if any of the following incidents occur?**

~~Spontaneous combustion~~ ~~Water emission~~ ~~Gas emission (elevated or above action levels)~~
~~Geotechnical instability~~ ~~Legal issues incl. damage or potential claims~~ **None**

If yes, please detail each item;

NA**Were any of the following encountered? Please give a brief summary of the works undertaken.**

Intact coal only Broken ground Backfilled ground Voids

Description;**None**

Will further works be necessary that require a Permit? No ~~Yes~~

If yes, please describe, including any recommendations;

Name: Samantha Seddon	Email: sam.seddon@wmlconsulting.com
Company: WML Consulting	Tel: 0161 486 0600

APPENDIX 04

Geotechnical Test Results



LABORATORY REPORT



4043

Contract Number: PSL20/3387

Report Date: 14 July 2020

Client's Reference:

Client Name: WML Consulting
No 8 Oak Green Earl Road
Stanley Green Business Park
Cheadle Hulme
Cheshire
SK8 6QL

For the attention of: Sam Seddon

Contract Title: Mayton Street

Date Received: 8/7/2020

Date Commenced: 8/7/2020

Date Completed: 14/7/2020

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)

S Royle
(Laboratory Manager)

A Watkins
(Director)

S Eyre
(Senior Technician)

R Berriman
(Quality Manager)

L Knight
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

Mayton Street

Contract No:

PSL20/3387

Client Ref:

8755G

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL

Professional Soils Laboratory

Mayton Street

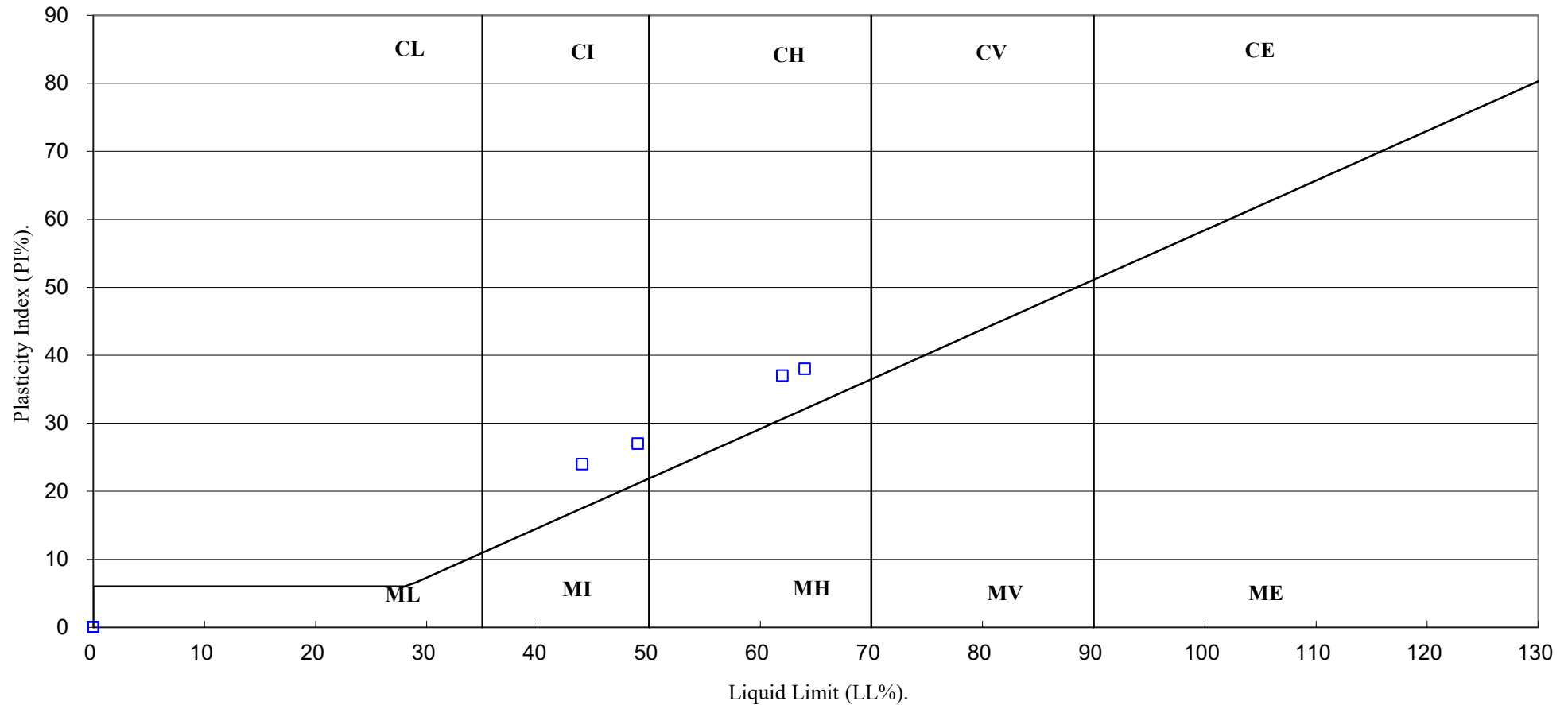
Contract No:

PSL20/3387

Client Ref:

8755G

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

Mayton Street

Contract No:

PSL20/3387

Client Ref:

8755G

APPENDIX 05

Chemical Analytical Results



2183

Final Report

Report No.:	20-16533-1		
Initial Date of Issue:	06-Jul-2020		
Client	WML Consulting Ltd		
Client Address:	No. 8 Oak Green Stanley Green Business Park Earl Rd Cheadle SK8 6QL		
Contact(s):	Sam Seddon		
Project	9855G Mayton St		
Quotation No.:		Date Received:	30-Jun-2020
Order No.:	8795G	Date Instructed:	30-Jun-2020
No. of Samples:	14		
Turnaround (Wkdays):	5	Results Due:	06-Jul-2020
Date Approved:	06-Jul-2020		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: 9855G Mayton St

Client: WML Consulting Ltd	Chemtest Job No.:				20-16533	20-16533	20-16533	20-16533	20-16533	20-16533	20-16533	20-16533	20-16533
Quotation No.:	Chemtest Sample ID.:				1024183	1024184	1024185	1024186	1024187	1024188	1024189	1024190	1024191
Order No.: 8795G	Client Sample Ref.:				E	E	J	E	E	E	J	E	E
	Sample Location:				WS01	WS02	WS02	WS03	WS04	WS05	WS05	WS06	WS07
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.20	0.50	1.20	0.40	0.10	0.30	2.00	0.20	0.40
	Date Sampled:				25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	26-Jun-2020	26-Jun-2020
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-		-	-	-		Insulation	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		Amosite	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-		-	-	-		Stereo Microscopy	-
Moisture	N	2030	%	0.020	10	13	19	15	8.2	17	15	12	15
pH	U	2010		4.0	7.6	8.0	7.6	8.1	7.2	7.5	7.9	7.4	8.1
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.1	1.1		1.2	1.2	1.2		1.2	1.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	0.045	< 0.010	< 0.010	0.057	< 0.010	< 0.010	< 0.010
Total Sulphur	U	2175	%	0.010	0.061	0.061	0.031	0.073	0.034	0.28	0.082	0.065	0.071
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50		< 0.50	< 0.50
Sulphate (Total)	U	2430	mg/kg	100	1000	1000		1900	470	2600		850	1000
Arsenic	U	2450	mg/kg	1.0	13	19		19	6.8	92		21	18
Cadmium	U	2450	mg/kg	0.10	0.30	0.30		1.3	0.23	0.45		0.40	0.70
Copper	U	2450	mg/kg	0.50	38	27		43	31	160		52	46
Mercury	U	2450	mg/kg	0.10	0.20	0.16		0.38	0.24	0.99		0.51	0.29
Nickel	U	2450	mg/kg	0.50	26	18		29	12	68		28	28
Lead	U	2450	mg/kg	0.50	63	59		120	56	200		150	150
Selenium	U	2450	mg/kg	0.20	0.31	< 0.20		0.29	0.39	1.1		0.54	0.29
Vanadium	U	2450	mg/kg	5.0	31	24		33	8.6	70		26	26
Zinc	U	2450	mg/kg	0.50	60	56		430	63	120		96	190
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50		< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	2.8	1.1		4.8	1.5	8.5		2.8	2.6
Naphthalene	U	2700	mg/kg	0.10	0.84	< 0.10		1.1	0.47	0.40		2.6	0.29
Acenaphthylene	U	2700	mg/kg	0.10	0.13	< 0.10		0.52	< 0.10	0.15		0.26	0.15
Acenaphthene	U	2700	mg/kg	0.10	0.75	< 0.10		0.80	0.61	0.70		2.0	0.50
Fluorene	U	2700	mg/kg	0.10	0.56	< 0.10		1.2	0.63	0.60		1.5	0.43
Phenanthrene	U	2700	mg/kg	0.10	3.7	0.92		7.7	2.3	3.4		7.9	3.2
Anthracene	U	2700	mg/kg	0.10	0.76	0.14		1.8	0.53	0.51		1.6	0.70
Fluoranthene	U	2700	mg/kg	0.10	5.4	1.6		8.4	3.1	4.2		9.5	5.5
Pyrene	U	2700	mg/kg	0.10	5.8	1.7		9.1	3.0	4.3		9.0	5.9
Benzo[a]anthracene	U	2700	mg/kg	0.10	2.6	0.68		4.0	1.3	1.7		3.9	2.7
Chrysene	U	2700	mg/kg	0.10	2.8	0.80		4.3	1.3	2.3		5.2	2.9
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	2.8	< 0.10		3.7	1.3	1.9		3.5	3.4
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	1.6	< 0.10		2.1	0.96	1.0		2.5	1.5
Benzo[a]pyrene	U	2700	mg/kg	0.10	2.4	< 0.10		3.6	1.3	1.6		3.5	2.6
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	1.6	< 0.10		2.4	0.86	0.98		2.2	1.7
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	0.71	< 0.10		0.95	< 0.10	0.11		0.82	0.64

Results - Soil

Project: 9855G Mayton St

Client: WML Consulting Ltd	Chemtest Job No.:				20-16533	20-16533	20-16533	20-16533	20-16533	20-16533	20-16533	20-16533
Quotation No.:	Chemtest Sample ID.:				1024183	1024184	1024185	1024186	1024187	1024188	1024189	1024190
Order No.: 8795G	Client Sample Ref.:				E	E	J	E	E	E	J	E
	Sample Location:				WS01	WS02	WS02	WS03	WS04	WS05	WS05	WS06
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.20	0.50	1.20	0.40	0.10	0.30	2.00	0.20
	Date Sampled:				25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	25-Jun-2020	26-Jun-2020
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	1.9	< 0.10		2.7	1.3	0.79		2.6
Total Of 16 PAH's	U	2700	mg/kg	2.0	34	5.8		54	19	25		59
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30		< 0.30	< 0.30	< 0.30		< 0.30

Results - Soil

Project: 9855G Mayton St

Client: WML Consulting Ltd	Chemtest Job No.:				20-16533	20-16533	20-16533	20-16533	20-16533
Quotation No.:	Chemtest Sample ID.:				1024192	1024193	1024194	1024195	1024196
Order No.: 8795G	Client Sample Ref.:				J	E	J	E	E
	Sample Location:				WS07	WS08	WS08	WS09	WS09
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.20	0.30	1.10	0.10	0.40
	Date Sampled:				26-Jun-2020	26-Jun-2020	26-Jun-2020	26-Jun-2020	26-Jun-2020
	Asbestos Lab:					COVENTRY		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
ACM Type	U	2192		N/A		-		-	-
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected		No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A		-		-	-
Moisture	N	2030	%	0.020	14	12	17	17	14
pH	U	2010		4.0	8.1	8.0	7.8	6.8	8.3
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		1.1		1.2	1.2
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.043	< 0.010	0.039	< 0.010	< 0.010
Total Sulphur	U	2175	%	0.010	0.041	0.085	0.023	0.053	0.16
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50		< 0.50	< 0.50
Sulphate (Total)	U	2430	mg/kg	100		1200		870	1400
Arsenic	U	2450	mg/kg	1.0		24		14	44
Cadmium	U	2450	mg/kg	0.10		0.47		0.26	0.93
Copper	U	2450	mg/kg	0.50		49		28	180
Mercury	U	2450	mg/kg	0.10		0.28		0.15	1.2
Nickel	U	2450	mg/kg	0.50		23		15	95
Lead	U	2450	mg/kg	0.50		270		56	470
Selenium	U	2450	mg/kg	0.20		0.28		0.54	0.36
Vanadium	U	2450	mg/kg	5.0		37		22	60
Zinc	U	2450	mg/kg	0.50		79		58	200
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50		< 0.50	< 0.50
Organic Matter	U	2625	%	0.40		2.8		2.9	3.6
Naphthalene	U	2700	mg/kg	0.10		< 0.10		< 0.10	15
Acenaphthylene	U	2700	mg/kg	0.10		< 0.10		< 0.10	1.1
Acenaphthene	U	2700	mg/kg	0.10		< 0.10		< 0.10	8.9
Fluorene	U	2700	mg/kg	0.10		< 0.10		< 0.10	6.3
Phenanthrene	U	2700	mg/kg	0.10		0.88		< 0.10	40
Anthracene	U	2700	mg/kg	0.10		0.16		< 0.10	8.0
Fluoranthene	U	2700	mg/kg	0.10		1.5		0.77	38
Pyrene	U	2700	mg/kg	0.10		1.9		0.87	40
Benzo[a]anthracene	U	2700	mg/kg	0.10		0.83		< 0.10	15
Chrysene	U	2700	mg/kg	0.10		0.96		< 0.10	16
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		< 0.10		< 0.10	19
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		< 0.10		< 0.10	7.1
Benzo[a]pyrene	U	2700	mg/kg	0.10		< 0.10		< 0.10	14
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		< 0.10		< 0.10	8.8
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		< 0.10		< 0.10	2.9

Results - Soil

Project: 9855G Mayton St

Client: WML Consulting Ltd	Chemtest Job No.:				20-16533	20-16533	20-16533	20-16533	20-16533
Quotation No.:	Chemtest Sample ID.:				1024192	1024193	1024194	1024195	1024196
Order No.: 8795G	Client Sample Ref.:				J	E	J	E	E
	Sample Location:				WS07	WS08	WS08	WS09	WS09
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.20	0.30	1.10	0.10	0.40
	Date Sampled:				26-Jun-2020	26-Jun-2020	26-Jun-2020	26-Jun-2020	26-Jun-2020
	Asbestos Lab:					COVENTRY		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		< 0.10		< 0.10	9.4
Total Of 16 PAH's	U	2700	mg/kg	2.0		6.2		< 2.0	250
Total Phenols	U	2920	mg/kg	0.30		< 0.30		< 0.30	< 0.30

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

APPENDIX 06

Gas Monitoring Results

WMLCONSULTING

Atmospheric Pressure
Start:- 1008mb
End:- 1008mb
Trend:- Rising

Operator:- T Booth

[illegible]

Additional Comments

GAS MONITORING METHODOLOGY

1. The following are recorded upon arrival or at each location as the monitoring progresses:-
 - Operator name;
 - Instrumentation name i.e. Gas Data - GFM436;
 - Atmospheric pressure;
 - Time of commencement of the monitoring visit;
 - Ground conditions e.g. wet, dry waterlogged etc.;
 - General weather conditions, as the prevailing conditions may affect the results; and
 - Condition of the monitoring point e.g. damaged, covered etc.
2. The background oxygen concentration in the vicinity of the monitoring point is recorded to ensure that the instrument is zeroed.
3. Where appropriate, both the flow and pressure differential are recorded at each monitoring point prior to obtaining the gas concentrations.
4. Concentrations of light hydrocarbon gas, comprising methane (%v/v), carbon dioxide (%v/v), oxygen (%v/v), hydrogen sulphide (ppm), carbon monoxide (ppm) and hexane % are monitored continuously over a 90 seconds period. The highest concentrations of methane, carbon dioxide, carbon monoxide and hydrogen sulphide and the lowest concentration of oxygen are then recorded.
5. If/where concentrations stabilise after 90 seconds, the steady-state concentrations are recorded. If concentrations are still varying, monitoring is continued until steady-state conditions are attained and concentrations then recorded. The accuracy for light hydrocarbon gases is :-
 - Methane - +/-0.2% at 5%.
 - Carbon dioxide - +/-0.1% at 10%.
6. Depth to water level and base of installation are recorded as the movement of groundwater can affect gas migration and migration pathways to monitoring points.
7. The above steps are to be repeated at each monitoring point.
8. The following are then recorded upon completion of the monitoring process:-
 - Atmospheric pressure;
 - Time of completion of the monitoring visit.

Key For Gas Monitoring Records

BH/WS	- Readings taken from gas valve within borehole or window sample probehole.	PD	- Pressure differential measured in millibars
Flow	- Gas flow measured in litres per hour	%	- Percentage
<0.1	- Where flows are less than 0.1/hr are recorded	ppm	- Parts Per Million
CO ₂	- Carbon Dioxide	l/hr	- Litres per hour
O ₂	- Oxygen	CH ₄	- Methane
H ₂ S	- Hydrogen Sulphide	mbgl	- Metres below ground level
CO	- Carbon Monoxide	GSV	- Gas Screening Value

TEST DATE AND CONDITIONS			
Date	14/08/19		
Atmospheric Pressure	993	mB	
Ambient Temperature	21.9	°C	
EnviroNics Serial No.	5089		

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit 4, Fairfield Court

Seven Stars Estate

Wheler Rd

Coventry

CV3 4LJ

Tel 02476303311

Fax 02476307711



Customer	WML Consulting Ltd
Certificate Number	121220
Order Number	323564

Serial Number	12969
Software Version	G436-00.0027/0010

Recalibration DUE Date
14/08/20

Instrument Checks			
Keyboard	✓		Display Contrast
Pump Flow In	500	Accept > 200 cc/min	Pump Flow @ -200mB
Clock Set / Running	✓		Labels Fitted
			✓

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	60	60	40	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5	5	5	5	6	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N ₂	0	0	0	0	0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H ₂ S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0
CO	2000	1000	0	Accept ±0.0	1000	Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0

Cross Gas Effects								
Applied Gas (ppm)		Instrument Readings (ppm)						
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX	
H2S	1500	1500		0		0		
CO	1000	40		1000		0		
Hexane	2.0%	0		0		1.99		

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		993	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200mh	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30.3	Accept ± 3.0	-556	-570	Accept ± 50
-3	-3	Accept ± 1.0	-23	-22	Accept ± 6.0
0	0	Accept ± 0.0	0	0	Accept ± 0.5
3	3	Accept ± 0.5	17	17	Accept ± 3.0
30	30	Accept ± 3.0	385	384	Accept ± 50
60	60	Accept ± 6.0	1192	1193	Accept ± 130
90	90.4	Accept ± 9.0	2362	>>>>	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading °C	
Applied Temperature °C		
-10	-10	Accept ± 2.0
0	0	Accept ± 1.0
30	30	Accept ± 1.0
60	60	Accept ± 1.0
100	100	Accept ± 1.0

Technician:
Jack Rutland

Date Tested:
15/08/19

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

APPENDIX 07

Site Specific Acceptance Criteria

Site Specific Assessment Criteria for Residential (with homegrown produce) assuming a 2.5% SOM for Hydrocarbons

Contaminant	Assessment Criteria for Residential (mg/kg)
Metals	
Arsenic	37
Boron	290
Cadmium	26
Chromium III	910
Chromium VI	6
Copper	2,400
Lead*	200
Mercury	1.2
Nickel	130
Selenium	250
Vanadium	410
Zinc	3,700
Non – Metals	
Phenol	200
Polyaromatic Hydrocarbons (PAH)	
Benz[a]anthracene	11
Benzo[a]pyrene	2.7
Benzo[b]fluoranthene	3.3
Benzo[ghi]perylene	340
Benzo[k]fluoranthene	93
Chrysene	22
Dibenz[ah]anthracene	0.28
Fluoranthene	560
Indeno[123-cd]pyrene	26
Naphthalene	5.6
Pyrene	1,200

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* Where not included in the S4UL's criteria for a limited number of contaminants, namely lead, have been derived by DEFRA in their document entitled SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, April 2014.

Contaminant	Criteria for Residential End Use (mg/kg)
Volatile Organic Compounds (VOCs)	
Benzene	0.17
Ethylbenzene	110
Toluene	290
Xylene	130
1,2-Dichloroethane	0.011
1,1,1-Trichloroethane	18
Tetrachloroethane	3.4
Tetrachloroethene (PCE)	0.39
Tetrachloromethane	0.056
Trichloroethene (TCE)	0.034
Trichloromethane	1.7
Vinyl Chloride	0.00087
Semi-Volatile Organic Compounds (SVOCs)	
1,2-Dichlorobenzene	55
1,4-Dichlorobenzene	150 ^f
1,2,4-Trichlorobenzene	6.4
Hexachlorobenzene	3.3 (0.5) ^{vap}
Total Petroleum Hydrocarbons (TPH)	
Aliphatic C5-6	78
Aliphatic C6-8	230
Aliphatic C8-10	65
Aliphatic C10-12	330(118) ^{vap}
Aliphatic C12-16	2,400(59) ^{sol}
Aliphatic C16-35	92,000(21) ^{f, sol}
Aliphatic C35 - 44	92,000(21) ^{f, sol}
Aromatic C5 – 7 (benzene)	140
Aromatic C7 – 8 (toluene)	290
Aromatic C8-10	83
Aromatic C10-12	180
Aromatic C12-16	330
Aromatic C16-21	540 ^f
Aromatic C21-35	1,500 ^f
Aromatic C35 - 44	1,500 ^f

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* Where not included in the S4UL's criteria for a limited number of contaminants, namely lead, have been derived by DEFRA in their document entitled SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, April 2014.

The GAC's for the assessment of potential groundwater contamination have been derived from very conservative guidelines protective of drinking water and environmental quality, namely:

- UK Environmental Quality Standards (EQS) for Freshwater, 2000;
- Petroleum Products in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality, 2011.

Table 1: Inorganic Tier 1 Water Environment Screening Criteria

Contaminant	Units	Hardness Banding (CaCO ₃ mg/l)	EQS /WFD (Freshwater)	UK DWS
Arsenic	µg/l	-	50	10
Ammonia	mg/l	-	0.2	0.5
Boron	µg/l	-	2000	1000
Cadmium	µg/l	-	5	5
Chromium	µg/l	0-50	2	50
		50-100	10	
		100-150	10	
		150-200	20	
		200-250	20	
Copper	µg/l	0-10	0.5	2000
		10-50	0.5	
		50-200	3	
		200-250	8	
		>250	12	
Cyanide (Free)	µg/l	-	1	-
Cyanide		-	-	50
Iron	µg/l	-	1000	200
Lead	µg/l	0-50	4	10
		50-150	10	
		150-250	20	
		>250	20	
Mercury	µg/l	-	1	1
Nickel	µg/l	0-50	8	20
		50-100	20	
		100-150	20	
		150-250	40	
		>250	40	
Selenium	µg/l	-	-	10
Sulphate (SO ₄)	mg/l	-	400	250
Zinc	µg/l	0-50	8	5000
		50-150	15	
		150-250	50	
		>250	50	
pH	-	-	6-9	-

Table 2: Organic Tier 1 Water Environment Screening Criteria

Contaminant	Units	UK DWS	WHO
PAHs - The sum of • Benzo(b)fluoranthene, • Benzo(ghi)perylene, • Benzo(k)fluoranthene, • indeno(1,2,3-c,d)pyrene)	µg/l	0.1	-
Phenol (total)	µg/l	0.5	-
MTBE	µg/l	-	15
Aliphatic C5-C6	µg/l	-	15,000
Aliphatic C6-C8	µg/l	-	15,000
Aliphatic C8-C10	µg/l	-	300
Aliphatic C10-C12	µg/l	-	300
Aliphatic C12-C16	µg/l	-	300
Aliphatic C16-21	µg/l	-	(300) *
Aliphatic C21-35	µg/l	-	(300)*
Aromatic C6-C7	µg/l	1 (benzene)	10 (benzene)
Aromatic C7-C8	µg/l	-	700 (toluene)
Aromatic C8-C10	µg/l	-	300 (ethylbenzene)
Aromatic C10-12	µg/l	-	100
Aromatic C12-C16	µg/l	-	100
Aromatic C16-C21	µg/l	-	90
Aromatic C21-C35	µg/l	-	90

Notes

The WHO Guideline Values for petroleum products in drinking water have been applied in the absence of current TPH water quality standards. However, for the aromatic TPH bandings of C6-C7, C7-C8 and C8-C10, the more conservative UK specific WQS for benzene, toluene and ethylbenzene have been used.

In the absence of specific WHO Guideline Values for the aliphatic ranges C16-C21 and C21-C35, the guideline values for the aliphatic C8-C10 through to C12-C16 ranges of 300µg/l have been used. This is however considered conservative due to the increased stability and lower volatility of the longer chain aliphatics.