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Carter Jonas

Ruabon Park, Wrexham

Phase 2 Preliminary Geoenvironmental Assessment Report

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773135-DWG-ENV-001 Exploratory hole location plan

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Executive Summary

Details	Summary of Main Text
Introduction	This report has been prepared on the instructions of Carter Jonas which proposes to market the site on behalf of their client, for mixed industrial and residential purposes It presents the results of a preliminary ground investigation and geoenvironmental assessment.
Site description	The 24.62 acre site consists of farmland.
Environmental Setting	The site is underlain by Glaciofluvial Sand and Gravel within the north east section of the site and Glacial Till beneath the remaining areas of the site. The majority of the site is underlain by strata of the Etruria Formation with a small section along the western edge of the site underlain by Pennine Coal Measures strata. The site is not within a groundwater source protection zone. A large pond is located in the centre of the site. The site is bordered to the east by James Caravan Park with the A483 and fields beyond this, to the North by the A539 with residential properties beyond, to the West by Clwyd Caravan & Leisure with the B5605 beyond and to the South by farmland.
Ground Investigation	
Ground Conditions Encountered	Topsoil (maximum proven depth 0.50m bgl) Made Ground (maximum proven depth 1.10m bgl) Glacial Till (maximum proven depth 4.50m bgl) Glaciofluvial Deposits (maximum proven depth 3.40m bgl) Etruria Formation (maximum proven depth 5.00m bgl)
Groundwater	Encountered at between 2.30m and 4.50m bgl during the investigation. Recorded post-fieldwork at depths ranging from 1.64m to 3.40m bgl.
Geotechnical Assessment	
Existing Construction	There is a possible section of partially constructed road within the north of the site although this was not noted during the site investigation works. Unless it is to be incorporated within the new development, any old construction encountered should be fully penetrated by all new foundations and broken well away from any new construction.
Excavations	Excavation to proposed founding depth generally should be readily achievable with standard excavation plant.
Foundations	The preliminary investigation indicates that the following foundation options would be suitable for the site, however these would need to be confirmed following further deeper investigations; Strip/trench fill foundations at between 1.0m bgl and 1.5m bgl. Pad foundations at between 1.0m bgl and 1.5m bgl. Net allowable bearing pressure – 100kN/m^2 (all soils). Deepening of foundations/heave protection is likely to be required to allow for the effects of trees.
Ground Floors	Slab-on-ground or suspended/constructed on granular fill in clay areas due to risk of swelling and shrinkage
Pavements	CBR values should be confirmed by in-situ testing, however a design CBR value of 2% may be assumed within the made ground materials and natural clay soils. A CBR value of 5% is considered appropriate for the sands and gravels.
Soakaways	Soakaway drainage may be suitable within the north east of the site within the sand and gravel materials, however this would need to be confirmed.
Buried Concrete	Design Sulphate Class – DS - 1 and ACEC Class – AC – 1.

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Details	Summary of Main Text
Contamination	
Soil Contamination	Soil contamination was not present with respect to human health for the proposed mixed residential and commercial development.
Gas/Vapour Contamination	Slightly elevated levels of carbon dioxide were noted. Based on these isolated elevated levels the site is designated CIRIA Characteristic 2/NHBC Amber 1
Remediation	Possible incorporation of gas protective measures within new construction at the site. Incorporation of radon protective measures within new construction at the site.
Further Work	
	A tree survey is required prior to site clearance, to determine the potential influence of trees on and adjacent to the site. Further gas and groundwater monitoring to better define and delineate the ground gas regime. Further deeper boreholes across the site area to confirm the findings of the site investigation and to determine the characteristics of the deeper ground conditions and to confirm the foundation design for the development.

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Limitations and Exceptions

1 This report and its findings should be considered in relation to the terms and conditions proposed and scope of works agreed between MLM Consulting Engineers Ltd (MLMCEL) and the client.

2 The Executive Summary, Conclusions and Recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon until considered in the context of the whole report and the development, if any, proposed.

3 The assessment and interpretation of contamination and associated risks are based on the scope of work agreed with the client and the report may not be sufficient to fully address contaminations or to allow detailed remediation design to proceed without further investigation and analysis.

4 Any assessments made in this report are based on the ground conditions as revealed by the exploratory holes and pits, together with the results of any field or laboratory testing undertaken and, where appropriate, other relevant data which may have been obtained for the sites including previous site investigation reports. There may be special conditions appertaining to the site, however, which have not been revealed by the investigation and which have not, therefore, been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available.

5 Interpretations and recommendations contained in the report represent our professional opinions, which were arrived at in accordance with currently accepted industry practices at the time of reporting and based on current legislation in force at that time.

6 Where the data available from previous site investigation reports, supplied by the Client, have been used, it has been assumed that the information is correct. No responsibility can be accepted by MLMCEL for inaccuracies within the data supplied.

7 Whilst the report may express an opinion of possible configuration of strata between or beyond exploratory hole or pit locations, or on the possible presence of features based on visual, verbal or published evidence, this is for guidance only and no liability can be accepted for the accuracy.

8 Comments on groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. It should be noted that groundwater levels can vary due to seasonal or other effects.

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10 This report is prepared and written in the context of the proposals stated in the introduction to this report and should not be used in a differing context. Furthermore, new information, improved practices and legislation may necessitate an alteration to the report in whole or in part after its submission. Therefore, with any change in circumstances or after the expiry of one year from the date of the report, the report should be referred to us for re-assessment and, if necessary, re-appraisal.

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1 Introduction

1.1 General

This report has been prepared by MLM Consulting Engineers Limited (MLMCEL) on the instructions of Carter Jonas (Client), which is proposing to market the site on behalf of their client, for mixed use including residential and commercial development.

The objective of this report is to provide an initial assessment of ground conditions with respect to design of foundations, slabs and infrastructure and gives general recommendations for appropriate solutions. It also includes a preliminary generic quantitative risk assessment (GQRA) of contamination risks to human health and the environment and provides, where necessary, a summary of recommended mitigation or remediation measures.

This report has been prepared to provide details for marketing of the site and to outline potential constraints to development at the site which may require further investigation and assessment prior to development.

1.2 Terms of Reference

The terms of reference for the work were set out in the MLMCEL proposal 773135-FEE-ENV-001 dated 22 July 2015.

1.3 Technical Approach

The work undertaken by MLMCEL follows the Association of Geotechnical and Geoenvironmental Specialists (AGS) *Good Practice Guidelines for Site Investigations.*

The process of contamination assessment adopted in this report generally follows the model procedures for the management of contaminated land described in the Environment Agency Contaminated Land Report 11. It also takes into account the guidance issued in the National Planning Policy Framework (NPPF) and NHBC Standards Chapter 4.1 *Land quality: Managing ground conditions*.

The format of the report is in general accordance with the reporting requirements of BS5930:2015.

1.4 Proposed Development

It is understood that the proposed development will comprise 139,500 sq ft of office space, 50,000 sq ft of warehouse, 20,000 sq ft of retail, 30,000 sq ft of leisure and/or hotel use, and 319 residential units.

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2 The Site

2.1 Location and Description

The site is located in Ruabon Park, Wrexham, LL14 3EH. The National Grid Reference for the site is 329736 343226.

It is irregular in shape and covers an area of 24.62 hectares. The site currently consists of farmland. No hardstanding was noted across the fields at the time of the ground investigation works. A large lake is located within the centre of the site with a small brook feeding the lake from the north. Ditches are present along the southern boundary of the site.

Aerial photography indicates a small section of possible road construction within the north of the site, however this was not noted during the walk over survey or site investigation works.

The site is bordered to the East by James Caravan Park with the A483 and fields beyond this, to the North by the A539 with residential properties beyond, to the west by Clwyd Caravan & Leisure with the B5605 beyond and to the south by farmland.

A location plan of the site is presented as Figure 1.

2.2 Geology

Published geology is of Glacio-fluvial deposits within the north east of the site and Glacial Till deposits across the central and south west section of the site overlying the Etruria Formation (mudstone) recorded below the majority of the site, with the Pennine Lower Coal Measures Formation recorded beneath the western edge of the site.

The site is in a known mining area, with one historical mine indicated on site in the Groundsure Report. However, no evidence of mine workings or made ground associated with mine workings were encountered during the site investigation.

The site is in an area affected by radon as between 10% and 30% of properties are above the Action Level. Full radon protective measures are necessary.

The site is shown to lie in an area unaffected by historical landslips.

2.3 Hydrogeology

The Environment Agency website provides the following hydrogeological information:

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Table 2.1 Aquifer Properties

Aspect	Designation	Description
Groundwater Source Protection Zone	No SPZ	The site is not within a catchment area where groundwater is discharged to a source.
Superficial Aquifer Designation Glacio-fluvial deposits	Secondary Aquifer (A)	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Superficial Aquifer Designation Till	Unproductive Strata	These are deposits with low permeability that have negligible significance for water supply or river base flow.
Bedrock Aquifer Designation Etruria Formation	Secondary Aquifer (A)	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Bedrock Aquifer Designation Pennine Lower Coal Measures		

2.4 Hydrology

A large pond is located in the centre of the site. There are no other significant surface water features within the vicinity of the site.

There are no abstractions from surface waters within 500m of the site.

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3 Ground Investigation

3.1 Site Work

Site work was carried out between the 21 September and 28 September 2015and included the following.

Table 3.1 Summary of Exploratory Holes

Type	Ref.	Depth Range (m bgl)
Windowless sampler boreholes	WS01 – WS15	2.00 - 5.00
Trial pits	TP01 – TP50	1.90 – 4.50
Soakaway pits	TP12, TP21, TP32, TP33	1.90 – 2.20

The exploratory holes were set out by an MLMCEL engineer based on the findings of the desk study in locations to maximise the available data, whilst operating within the constraints of the site.

All exploratory holes were logged by a Geoenvironmental engineer in general accordance with BS5930: 2015.

The exploratory hole logs are presented in Appendix A.

3.2 Investigation Rationale

The rationale for the investigation is presented in Tables 3.2 and 3.3 below.

Table 3.2 Rationale for Contamination Sampling and Testing

Target/Area	Potential Contamination	Exploratory Hole(s)
Made ground/Entire site	Ground gas, metals, TPH, PAH, sulphate, pH	All

Table 3.3 Rationale for Geotechnical Sampling and Testing

Target/Area	Potential Geotechnical Feature	Exploratory Hole(s)
Made ground/Entire site	Strength	All
Natural ground/Entire site	Strength	All

The locations of all the exploratory holes are presented on Drawing 773135-DWG-ENV-001.

3.3 Installations

Combined gas and groundwater monitoring standpipes were installed in WS01 to WS04, WS07, WS09, WS11 and WS13 toWS15.

Details of the installations are provided on the relevant borehole logs.

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3.4 In Situ Testing

Standard penetration tests (SPTs) were undertaken at regular intervals in the windowless sampler boreholes.

Hand shear vane tests were undertaken at shallow depth (<1.2m) in the trial pits and on samples recovered from depth in trial pits and the windowless sampler boreholes.

In situ test types and depths are recorded on the relevant exploratory hole records.

3.5 Sampling

Continuous soil cores were recovered from the windowless sampler boreholes in clear PVC liners to prevent cross contamination and aid sample recovery.

Disturbed samples were recovered from all exploratory holes: in bulk bags and/or tubs depending on the soil types and proposed laboratory testing.

Contamination samples were recovered in plastic tubs and glass jars, appropriate for the laboratory analysis undertaken.

Sample types and depths are recorded on the relevant exploratory hole records.

3.6 Post-Fieldwork Monitoring

Post-fieldwork monitoring of ground gas/organic vapour concentrations and groundwater levels has been undertaken on one occasion on 7 October 2015. The results are presented in Appendix B.

3.7 Laboratory Analysis

3.7.1 Geotechnical Testing

The following laboratory tests were scheduled on soil samples recovered from the exploratory holes.

Table 3.4 Summary of Geotechnical Testing

Test	No.
Natural moisture content	19
Atterberg limits	7
Particle Size Distribution	3
Sedimentation	1
pH and soluble	5

Geotechnical testing was undertaken by a UKAS-accredited laboratory to BS1377 and the results are presented in Appendix C.

3.7.2 Contamination Analysis

Based on the results of the Phase 1 Contamination Assessment, the following laboratory analysis was scheduled on soil samples recovered from the exploratory holes:

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Table 3.5 Summary of Contamination Analysis - Soil

Test	No.
MLM soils suite : Metals (As, Cd, Cr, Cu, Ni, Zn, Pb, Hg, Se), speciated Polycyclic Aromatic Hydrocarbons (PAH USEPA16), Total Petroleum Hydrocarbons (TPH CWG AA-splits), total cyanide, total phenols, sulphur, water soluble sulphate and pH	12
Metals (As, Cd, Cr (total), Cr(vi), Cu, HG, Ni, Pb, Se, Zn)	48
Total sulphate, water soluble sulphate	47
pH	47
Soil Organic Matter	15
Asbestos	7

Table 3.7 Summary of Contamination Analysis – Groundwater

Test	No.
Metals (As, Cd, Cr, Cu, Ni, Zn, Pb, Hg, Se)	10
PAH (speciated USEPA 16)	10
Petroleum hydrocarbons (speciated TPHCWG)	10
Sulphate	10
Hardness	10

Contamination analysis was undertaken by a UKAS-accredited laboratory and the results are presented in Appendix D.

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4 Ground and Groundwater Conditions

4.1 General

The following general strata sequence was encountered across the site. Interpolation between exploratory hole positions has been undertaken based on visual observations and laboratory testing.

Table 4.1 Generalised Strata Sequence

Stratum	Depth range (m bgl)		Proven Thickness range (m)
	Top	Base	
Topsoil	GL	0.20 – 0.50	0.20 – 0.50
Made ground	0.30 – 0.50	0.70 – 1.10	0.40 - 0.80
Glacial Till*	0.20 – 1.10	2.00 - 4.50*	0.40 – 3.80*
Glacio-fluvial Deposits*	0.30 – 0.60	1.90 – 3.40*	1.60 - 3.10*
Etruria Formation*	1.80 – 3.40	2.60 – 5.00*	0.10 – 1.70*

* Base of stratum not proven in all holes

Features, structures or certain ground conditions may be present between exploratory hole locations, which are different to those encountered during the investigation but which may impact upon construction.

The findings of the site investigations generally match the published geology for the area.

4.2 Topsoil

For the purposes of this report topsoil is defined as a near surface soil which appears from visual inspection alone to be capable of supporting plant growth. The description of topsoil within this report does not imply compliance with BS3882.

Topsoil was encountered in all the boreholes and trial pits on site. This is considered to represent the ploughed horizon across the agricultural fields and had at the time of the investigation work been harvested.

4.3 Made Ground

Underlying the topsoil, made ground was present in trial pits TP02-TP07, TP10-TP11 and TP45 in the northwest and centre of the site and comprised reworked Glacial Till deposits with occasional fragments of brick and concrete.

4.4 Glacial Till

Underlying the topsoil/made ground in trial pits TP01-TP31, TP38-TP50 and boreholes WS01-WS10 and WS12-15, a mixture of sandy gravelly clays and sand and gravels were encountered with lenses of stiff brown grey clay. These are considered to be Glacial Till deposits. These deposits contained abundant cobbles and large boulders of sandstone and quartzite, which is consistent with their environment. Boreholes WS01-WS10 and trial pits TP01-TP17, TP19-TP21, TP24, TP26-TP28, TP31, TP38, TP41, TP43 and TP49 were terminated within these soils.

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4.5 Glacio-fluvial deposits

Underlying the topsoil in TP32-TP37 and WS11 in the northeast of the site sand and gravels were encountered. These are considered to be Glacio-fluvial Deposits. These deposits contained abundant cobbles and large boulders of sandstone and quartzite, which is consistent with their environment. These exploratory holes were terminated within these soils.

4.6 Etruria Formation

Underlying the glacial till in boreholes WS12-WS15 and trial pits TP18, TP22-TP23, TP25, TP29-TP30, TP39-TP40, TP42-TP48 and TP50 in the south and east of the site, stiff to hard slightly sandy gravelly silty clay was encountered. These deposits are considered to be part of the Etruria Formation. Boreholes WS12-WS15 and trial pits TP18, TP22-TP23, TP25, TP29-TP30, TP39-TP40, TP42-TP48 and TP50 were terminated within these soils.

4.7 Groundwater Conditions

Groundwater seepages were encountered during the fieldwork in boreholes WS01-WS02, WS06-WS07, WS09-WS12 and trial pits TP02, TP04, TP10, TP13-TP15, TP17, TP19-TP20, TP24, TP26, TP30, TP34, TP37-TP41, TP43 and TP48-TP50 across the site, at depths ranging from 2.30m bgl to 4.50m bgl.

During post-fieldwork monitoring water levels were recorded at depths ranging from 1.64m bgl to 3.40m bgl.

The groundwater is from the base of the glacial till/glacio-fluvial deposits and is considered to be representative of the groundwater table in the area which is confirmed by the large pond in the centre of the site.

4.8 Contamination Observations

Made ground was present, including fragments of brick, within trial pits TP02-TP07, TP10-TP11 and TP45 in the northwest and centre of the site with concrete and wood (potentially treated) present in trial pits TP02 and TP03 in the northwest of the site.

No other visual or olfactory evidence of contamination was noted at the site.

4.9 Ground Gas and Vapour Conditions

The presence of made ground in the centre and northwest of the site indicates the potential for ground gases to be present. There was no visual or olfactory evidence of hydrocarbon contamination in soil or groundwater to indicate the potential presence of organic vapour.

A summary of the range of readings is presented in table 4.3 below.

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Table 4.3 Summary of Gas Monitoring

Date	Methane (%)	Carbon Dioxide (%)	Flow Rate (l/hr)	Barometric Pressure (mb)
07/05/15	<0.10 – 0.50	1.40 – 6.50	<0.10 – 0.50	991 - 995

4.10 Underground Obstructions

It is understood a football ground and tennis courts was located within the southwest corner of the site. Whilst there is a potential for buried construction (e.g. foundations and/or services) in these areas, the risk is considered low given the ongoing farming activities currently being undertaken within this area.

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5 Material Properties

5.1 General

The following presents a summary of the properties of the soils encountered, based on field observations, in situ field testing and laboratory test results.

For the purposes of property designation, soils are divided into fine soils (clays and silts) and coarse soils (sands and gravels).

Soil plasticity class for fine soils is based on the classification system of BS5930, adopting modified plasticity index values (based on percentage passing 425µm sieve).

Volume change potential of fine soils on change of moisture content has been assessed using guidance provided in NHBC Standards/BRE Digest 240 - Part 1.

Equivalent approximate undrained shear strengths (c_u) and equivalent approximate coefficients of volume compressibility (m_v) have been calculated from recorded SPT N values, adopting f_1 and f_2 values respectively (based on CIRIA 143) appropriate to the recorded plasticity.

The angle of shearing resistance (φ) of the coarse soils has been derived from the uncorrected standard penetration resistance N using the relationship published by Hatanaka and Uchida (1996).

5.2 Made Ground

The made ground is inherently variable and as such representative values of geotechnical properties are impracticable to determine. On this basis, no laboratory geotechnical testing has been undertaken on it.

5.3 Glacial Till

Natural moisture contents in the fine fraction of these materials range from 9% to 20% and modified plasticity indices range from 10% to 13%. On this basis these soils are classified as of low plasticity (CL soils) and of low swelling/shrinkage potential on change of moisture content.

In situ SPT N values within the fine fraction of these materials range from 1 to 36, but are generally within the range 9 to 15. Approximate undrained shear strengths based on these results range from 62kN/m^2 to 103kN/m^2, adopting an f_1 value of 6.9 (based on an 'average' plasticity of 12%).

5.4 Glacio-fluvial Deposits

In situ SPT N values within the coarse fraction of these materials range from 2 to 39 but are generally within the range 8 to 20, showing them to be of low to medium relative density. Angles of shearing resistance based on these results range from 30° to 34°.

5.5 Etruria Formation

Natural moisture contents in the fine fraction of these materials range from 10% to 30% and modified plasticity indices are between 8% and21%. On this basis these soils are classified as of low to intermediate plasticity (CL/CI soils) and of low to medium swelling/shrinkage potential on change of moisture content.

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In situ SPT N values within the fine fraction of these materials range from 32 to 48. Approximate undrained shear strengths based on these results range from 205kN/m^2 to 307kN/m^2, adopting an f_1 value of 6.4 (based on an 'average' plasticity of 15%).

5.6 Summary

In summary the following geotechnical parameters have been recorded and/or calculated:

Table 5.1 Geotechnical Parameters

Stratum	Moisture Content (%)	Plasticity Index* (%)	SPT N Values	Calculated Shear Strength (kN/m^3)
Made Ground	4.9 to 5.1	N/A	N/A	N/A
Glacial Till	9.1 to 20	9.7 to 13	1 to 36	62 to 103
Glacio-fluvial Deposits	9.1 to 14	N/A	2 to 39	N/A
Etruria Formation	10 to 30	7.8 to 21	32 to 48	205 to 307

* Modified

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6 Geotechnical Assessment

6.1 General

This geotechnical assessment is based on the parameters determined from the field work and laboratory analysis as described in Section 5. It presents a geotechnical assessment of possible foundation solutions and infrastructure design; it does not constitute a detailed design report for the proposed development.

The merits of the available options discussed should be reviewed by the foundation/structural engineers.

It is understood that the proposed development will comprise 139,500 sq ft of office space, 50,000 sq ft of warehouse, 20,000 sq ft of retail, 30,000 sq ft of leisure and/or hotel use, and 319 residential units.

It is anticipated that finished ground levels will be at, or close to, existing ground levels. Should this not be the case then this assessment may need to be reviewed.

6.2 Existing Buried Construction

There is a former development to the southwest corner of the site and it is possible that existing buried construction including foundations and services will be encountered below the site.

Unless it is to be incorporated within the new development, any old construction encountered should be fully penetrated by all new foundations and broken well away from any new construction.

Any soil disturbed by excavation of foundations and services should also be fully penetrated by new foundations.

6.3 Excavations

Excavation to anticipated founding depths should be readily achievable using standard excavation plant.

Instability of excavation faces was noted during excavation of the trial pits. This is prevalent in the natural coarse soils.

Random and sudden falls should be expected from the faces of near vertically sided excavations put down at the site. This situation is likely to be prevalent in the natural coarse soils and is likely to be exacerbated by water inflows.

Temporary trench support, or battering of excavation sides, is likely to be required for all excavations that are to be left open for any length of time, and will definitely be required where man entry is required.

Particular attention should be paid to excavation at, or close to, site boundaries where collapse of excavation faces could have a disproportionate effect.

A risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015).

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Based on site observations, it is considered that sump pumping is likely to be sufficient to deal with anticipated flows. However, it should be recognised that groundwater levels will fluctuate seasonally and the timing of construction may dictate the extent of groundwater control required.

Any water pumped from excavations is likely to need to be passed via settlement tanks before being discharged to the sewer; discharge consents will also be required.

6.4 Foundations

This foundation assessment is based on the information available and is for the purposes of initial site appraisal. The investigation works examined the shallow soils to depths of up to circa 5.0m below ground level across the area of the site. Further investigation works to prove the deeper soil conditions and to determine the nature of the underlying solid strata, together with more detailed laboratory analysis and geotechnical assessment would be required to better quantify the foundation depths and allowable bearing pressures appropriate for the proposed development.

The appropriate foundation solution adopted for the site will depend not only on ground conditions, but also on structural loading, load distribution and the limiting criteria for movement or settlement of the buildings, which may have high specification finishes and unevenly distributed loadings so that settlement, and particularly differential settlement, will need to be maintained within tight tolerances.

The superficial Glacial Till soils are of low swelling/shrinkage potential on change of moisture content.

Trees are noted in the central parts of the site close to the lake and along the southern, western and northern boundaries although they are of unknown size, species or maturity. Plots constructed within influencing distance of these trees (whether on or off site and whether to remain or be removed), should be constructed in accordance with NHBC Standards for residential housing or the recommendations of BRE Digest 240 for commercial and retail buildings.

On the basis of the above, minimum founding depths are likely to be around 1.0m within the firm to stiff clay or medium dense sand and gravel soils. A number of isolated areas of soft / loose ground were identified within particular investigation positions where foundations would need to be deepened to penetrate the low strength soils.

Foundations that are carried deep due to tree influence may be stepped up, in accordance with a suitable specification, such as BS8004:2015, as long as a suitable founding stratum is present at shallower depth.

If trees are to be removed, the roots should be grubbed out and foundations extended to below the zone of disturbance created by this activity.

6.4.1 Strip/Trench Fill Foundations

Traditional strip/trench fill foundations are considered suitable for the proposed residential development and based on the design soil parameters provided in earlier sections of this report, as a guide, an allowable net bearing capacity of 100kN/m^2 should be available for a 600mm wide strip/trench fill foundation bearing on the natural superficial clay and sand and gravel soils.

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Excavation of trench fill foundations to depths in excess of 2.5m bgl is unlikely to be economical and may be impracticable to undertake. Care should be taken to ensure the verticality of deep, narrow foundations to prevent eccentric loading.

6.4.2 Pad Foundations

Pad foundations are considered an appropriate solution for the proposed commercial / retail development and based on the design soil parameters provided in earlier sections of this report, as a guide, an allowable net bearing pressure of 100kN/m^2 should be available for a pad 1.5m square bearing on the natural superficial clay and sand and gravel soils.

Should enlarging the pads be considered (for example because loads are such that the quoted bearing pressure is inadequate based on the size of foundation identified) this will probably lead to increased settlements and the above recommendations should be reviewed.

6.4.3 Heave Protection

A number of plots across the site are to be constructed within the influencing distance of trees and heave protection will be required on the inside faces of the ground beams.

Consideration should be given to the possible effect of direct root action on foundations or services, and to the continued stability of existing trees, where buildings are constructed very close to existing trees that are to remain.

6.5 Ground Floor Slabs

Ground conditions at the site are such that ground bearing slabs should be acceptable for the residential and commercial/retail development at the site. However, consideration should be given to the swelling and shrinkage potential of the near surface soils, with reference to NHBC and/or BRE Digest 412, which may require ground floor slabs to be suspended over a void or constructed over a layer of granular fill of a thickness based on the anticipated degree of swelling/shrinkage.

6.6 Pavement Construction

Following site preparation/regrading the sub-grade will comprise mainly natural superficial clay, and sand and gravel materials. Made ground materials were noted within the north west of the site and comprise generally re-worked natural material with inclusions of brick and broken concrete.

For the natural clay soils a design CBR value of 2% should be adopted, and for the sands and gravels, a design CBR of 5% is considered appropriate.

The made ground is mixed and variable and it is recommended that, where encountered at formation level, these deposits be excavated to a depth of 0.5m below formation level (or to suitable natural soils, whichever is reached first) and the sub-formation rolled. The excavated material should be sorted to remove any oversize or otherwise unsuitable materials, prior to recompacting the suitable materials in thin layers compatible with the compaction plant employed. Any deficit in material should be made up in suitable imported material suitably compacted as above. Following this treatment an overall design CBR of 2% should be available.

It is recommended that the above design CBR values be confirmed by in situ testing.

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6.7 Below Ground Concrete Design

Based on the results of the pH and water soluble sulphate determinations on soil and groundwater samples and in accordance with the categorisation system of BRE Special Digest 1, the soils below the site fall within the classes presented in Table 6.2 below.

Table 6.2 Summary of Concrete Design Class

Soil Type	Design Sulphate Class (DS)	Aggressive Chemical Environment for Concrete (ACEC)
Topsoil	DS – 1	AC – 1[d]
Made ground	DS – 1	AC – 1[d]
Till/Glaciofluvial	DS - 1	AC – 1[d]

6.8 Soakaway Potential

Soakaway testing was undertaken as part of the investigation within TP12, TP21, TP32 and TP33. The results of these tests are presented in Appendix E. Three of the four soakaway tests undertaken (TP12, TP21 and TP32) were not completed in the time allowed due to the slow infiltration rate of the water. Approximated infiltration rates for these three soakaway tests gained by extrapolating the results of the information indicate infiltration rates in the order of 5×10^{-6}m/sec. The soakaway test undertaken within TP33, recorded an infiltration rate of 2.96×10^{-4}m/sec within the glacio-fluvial sand and gravel materials in the north east of the site.

Given the variability of the soils across the site, further testing should be considered once the location of any proposed soakaway drainage scheme is known.

6.9 Reuse of Materials

The made ground below the site should be suitable for re-use as fill at the site below areas of hard-standing or buildings following sorting to remove any deleterious oversize or otherwise unsuitable materials.

Excavated natural fine soils are considered suitable for re-use as fill at the site, in landscaped areas and gardens, but as they will be liable to long term consolidation settlement their use should be limited to areas where long-term settlements would not be an issue. Excavated natural coarse soils are considered suitable for re-use as fill at the site below areas of hard-standing or buildings or in landscaped areas and gardens, following sorting to remove any deleterious, oversize or otherwise unsuitable materials.

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7 Assessment of Soil Chemical Data

7.1 Guidelines

This section presents a generic quantitative risk assessment (GQRA) to identify potential sources of contamination for further evaluation in the Contaminated Land Risk Assessment section of the report. GQRA involves a comparison of chemical laboratory test results to soil screening levels that are considered to be appropriate to the context of the intended site use.

Soil screening values used in this human health risk assessment have been drawn from the following publications:

- Suitable for Use Levels (S4ULs) were published in 2015 by Land Quality Management Ltd (LQM) and the Chartered Institute of Environmental Health (CIEH). S4ULs are based on the principles of 'minimal' or 'tolerable' risk and are therefore sufficiently conservative for GQRAs under the planning regime, which need only demonstrate that new development is 'safe' and 'suitable for use'. By reproducing these S4ULs, MLMCEL acknowledges "Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3184. All rights reserved".
- Category 4 Screening Levels (C4SLs) were published in 2014 by Defra and have been used for lead, which has no S4UL.
- There is no S4UL for cyanide and, in the absence of UK guidance, a Dutch Intervention Value (DIV) of 50mg/kg has been used.
- Generic Assessment Criteria (GAC) were published jointly in 2009 by the Environmental Industries Commission, Association of Geotechnical and Geoenvironmental Specialists and Contaminated Land: Applications in Real Environments (EIC/AGS/CL:AIRE) for a range of organic and inorganic contaminants not covered by S4ULs.

Risks to water supply pipes have been assessed using guidance published by the United Kingdom Water Industry Research Ltd (UKWIR). The guidance provides threshold concentrations above which organic compounds can permeate water supply pipes, impact on their construction and cause a water quality issue for consumers. For the purposes of this assessment it is assumed that polyethylene water supply pipework will be adopted.

Potential risks to plant life, such as for proposed landscaping, are assessed through BS3882:2007. This standard sets out the threshold values in soil above which phytotoxic effects can occur from the metals copper, nickel and zinc.

A full list of screening levels used in the assessment is included in Appendix F.

Appropriately sensitive testing methods have been adopted throughout and on this basis, where contaminants are recorded at less than detection limits, they are considered to be 'not present'.

7.2 Risks to Human Health

The development proposals are for mixed residential and commercial and for the purpose of this human health risk assessment the intended land use scenario is considered to be residential with homegrown produce (RWHP)

Soil organic matter tests in samples of soil gave values of between 0.62% and 7.6% with a mean of 1.76%, therefore a generic SOM of 2% has been used for selecting appropriate screening levels.

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None of the measured contaminant concentrations are above screening levels and therefore further assessment of these contaminants in relation to risks to human health is not considered to be necessary.

Asbestos fibres were not identified in any of the seven soil samples tested.

7.3 Risks to Water Supply

None of the measured concentrations are above UKWIR threshold levels and therefore further assessment of these contaminants in relation to risks to new water supplies is not considered to be necessary.

7.4 Risks to Plant Life

Recorded concentrations of copper, nickel and zinc are below BS3882:2007 threshold values.

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8 Assessment of Soil Leachate and Groundwater Chemical Data

This section presents a GQRA to identify potential sources of soil leachate and groundwater contamination that could impact on controlled waters.

8.1 Guidelines

The site is underlain by a Secondary 'A' Aquifer and therefore the results of the analyses have been compared to the UK Drinking Water Standards (DWS).

The site is close to a surface water body and therefore the results of the analyses have been compared to Environmental Quality Standards (EQS). Where there are no EQS for a contaminants of concern reference will be made to appropriate alternatives.

EQS for some metals are banded according to water hardness. Water hardness values ranging from 320 to 670 $CaCO_3$/l have been recorded and for the purposes of this assessment the EQS values for the >250 mg $CaCO_3$/l range have been adopted.

8.2 Groundwater

None of the contaminant concentrations are recorded above DWS and/or EQS and therefore further assessment of these contaminants in relation to groundwater risks is not considered to be necessary.

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9 Assessment of Ground Gas and Organic Vapour Data

This section presents a GQRA to identify potential sources of gas and organic vapour in the ground that could impact on human health.

9.1 Guidelines

The proposed development is mixed low-rise residential and commercial and the potential impact of ground gas on development is assessed through the British Standard BS8485:2007 and the Traffic Light designations published by the National House Building Council and the Characteristic Situations published by CIRIA.

A generic quantitative risk assessment for organic vapour (v-GQRA) has been undertaken in accordance with the CIRIA VOC Handbook C682 to assess the potential impact on human health from the indoor inhalation of vapour generated by organic compounds in soil. For TPH, the LQM S4ULs are considered to be protective of human health from the indoor inhalation of hydrocarbon vapour.

9.2 Screening Assessment – Ground Gas

One visit to site has been made following site work. A summary of site maximum monitoring results are presented in Table 9.1 below from which Gas Screening Values (GSVs) have been calculated.

Table 9.1 Site Maximum Gas Concentrations and Flow Rate

Parameter	Site Maximum	GSV
Methane	0.50%	0.0025 l/hr
Carbon dioxide	6.50%	0.035 l/hr
Flow rate	0.50l/hr	

The screening assessment places the site in a CIRIA Characteristic Situation 2 / NHBC Traffic Light Amber 1 for carbon dioxide.

9.3 Screening Assessment – Organic Vapour

Based on soil test results, S4ULs for TPH compounds in soil are not exceeded, which indicates that there is no potential risk to human health for the inhalation of vapour generated by organic compounds in soil.

9.4 Nature and Distribution of Ground Gas and Organic Vapour Contamination

The assessment of the gas regime at the site is based on the results of one monitoring round and will need to be updated following further monitoring undertaken. The monitoring indicates generally low levels of carbon dioxide across the majority of the site with methane generally below the detection limit of the gas monitoring equipment. An isolated elevated level of 6.5% carbon dioxide and 0.5% methane was noted within WS02 to the west of the existing lake.

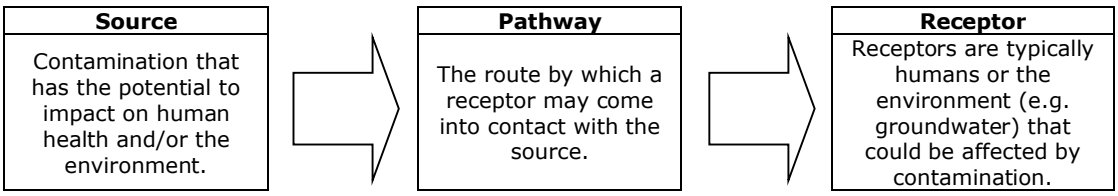
The Phase 1 Contamination Assessment report concluded that the site is within an area where full radon protective measures are likely to be necessary within new buildings.

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10 Contaminated Land Risk Assessment and Conceptual Site Model

10.1 General Approach

The assessment of risk from contamination follows the source-pathway-receptor (SPR) approach. Each of these elements is described as follows.



Without a source-pathway-receptor linkage in place, it is considered that there is no risk of harm and remediation is unlikely to be required. If, however, there is a linkage between source and receptor then a risk-based approach is used to assess the significance or potential impact of the SPR-linkage to determine if remediation is required.

Such an assessment involves Quantitative Risk Assessment (QRA). The QRA process involves the identification of sources based on site investigation findings (eg compound concentration exceeding S4UL) together with identification of the exposure pathway and sensitive receptor. A Conceptual Site Model (CSM) is then developed and presented that shows the possible pollution linkages.

In terms of identifying *significant* pollution linkages (i.e. those that require remediation), a level of risk (ranging from Very Low to Very High) is assigned to each. Where the level of risk is 'Moderate' or greater, then the pollution linkage is considered to be 'significant' and remediation is required. Risk definitions are provided in Appendix G.

10.2 Identified Contamination Sources

Based on the GQRA presented in the previous sections, sources of contamination that could impact on receptors have been identified and are summarised in Table 11.1 below.

Table 10.1 Identified Sources of Contamination

Receptor type	Source
Human health	Carbon dioxide in superficial soils
Human Health	Radon contamination from underlying geology.

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10.3 Potential Exposure Pathways

Table 10.2 below presents a review of potential pathways and receptors for the site.

Table 10.2 Potential Exposure Pathways and Receptors

Receptor	Pathway	Notes	SPR Link
Human Health			
Future site users	Dermal contact, ingestion or inhalation of soil and soil dust	No soil contamination identified above screening levels.	✘
	Migration in permeable strata and inhalation of gas/organic vapour	Ground gas including radon could enter new buildings and accumulate. Gas monitoring has recorded elevated concentrations of carbon dioxide albeit with low flow.	✓
	Migration in permeable strata, accumulation and risk of explosion	Gas monitoring has not recorded elevated concentrations of methane.	✘
Adjacent site users	Ingestion/inhalation of windblown dust	No soil contamination identified above screening levels.	✘
	Migration in groundwater and direct contact	Off site residents are unlikely to come into contact with groundwater.	✘
	Migration in groundwater and inhalation of organic vapour	However no soil contamination above screening levels was identified.	✘
Construction workers and services maintenance staff	Dermal contact, ingestion or inhalation of soil and soil dust	No soil contamination identified above screening levels.	✘
Development			
Future plant life	Plant uptake in garden or landscape area	No soil contamination identified above screening levels.	✘
Water supply pipes	Contact with contaminated material	No soil contamination identified above screening levels.	✘
Environment			
Surface water: Lake within centre of site	Surface runoff	No soil contamination identified above screening levels.	✘
	Groundwater movement	No soil contamination identified above screening levels.	✘
Groundwater: Superficial Secondary 'A' aquifer (Glaciofluvial deposits)	Leaching from soil and vertical fluid movement	No soil or groundwater contamination identified above screening levels.	✘
Groundwater Superficial aquifer (Glacial Till)	Leaching from soil and vertical fluid movement	Superficial aquifer materials are unproductive strata. No soil or groundwater contamination identified above screening levels.	✘
Groundwater: Bedrock Secondary 'A' aquifer	Leaching from soil and vertical fluid movement	No soil or groundwater contamination identified above screening levels.	✘

Potentially complete SPR linkages are carried forward for further assessment in Table 10.3.

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10.4 Phase 2 Updated Conceptual Model

Based on the sources, pathways and receptors identified above, Table 10.3 below summarises all complete pollutant linkages for the site and identifies the level of risk from each.

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Table 10.3 Phase 2 Updated Conceptual Site Model

Source	Area Affected	Contaminants	Pathway	Receptor	Likelihood	Potential Magnitude	Overall Risk	Notes
Superficial Materials / Made Ground	North west area of site	Ground gas (carbon dioxide)	Inhalation	Site users	Likely	Severe	High	The site is designated NHBC traffic light Amber 1 for carbon dioxide. Low flow measured during monitoring.
				Site construction/ maintenance workers	Low Likelihood	Severe	Moderate	Carbon dioxide was present in excess of 5% and could accumulate in deep excavations and services voids.

11 Remediation and Risk Management

11.1 General

This assessment has identified potential hazards at the site with possible SPR-linkages, which could represent potentially unacceptable risks to identified receptors.

Mitigation of the SPR-linkages summarised in Table 10.3 is recommended to reduce the impact of contamination on site occupants.

The following is for guidance only and does not represent final design of a remediation scheme. Remediation schemes can require the submission of a remediation strategy and verification plan to the Local Authority and/or Environment Agency.

11.2 Soil Remediation

Based on the GQRA and CSM, soil remediation is not considered to be required.

11.3 Groundwater Remediation

DWS and EQS are not exceeded and remediation for the protection of groundwater is not considered to be necessary.

11.4 Gas and Organic Vapour Protection

Further monitoring of ground gas levels will be required across the site to better determine the ground gas regime at the site. The further monitoring would also look to delineate the area of elevated carbon dioxide within the north west of the site area around WS02.

Hydrocarbon vapour protection is not considered to be required for new buildings.

11.5 Off Site Disposal

All waste soils which are to be removed from site (e.g. foundation arisings) need to be classified in terms of waste disposal prior to export.

The waste classification and ability to accept the waste soils can be confirmed by the proposed receiving landfill site, who should be provided with a copy of the laboratory test results in Appendix D.

Some additional testing may be necessary for the receiving landfill site to confirm its ability to accept the waste.

Natural soils form an uncontaminated site (excluding peat and topsoil) would normally be classified as Inert for off-site disposal without the need for further testing.

Non-hazardous soils require pre-treatment prior to disposal. Effective pre-treatment, involving separation, sorting and screening can offer cost reductions. Costs for disposal of non-hazardous and hazardous soils are significant compared to disposal of inert material.

11.6 Remediation Documentation

Based on the findings of this report, remediation for soils and groundwater contamination is not considered to be required and under the conditions of planning, a remediation strategy document will not need to be submitted to the planning authority.

11.7 Construction Health and Safety

It is recommended that construction workers at the site adopt appropriate personal hygiene precautions at the site and use personal protective equipment as required, particularly provision of washing facilities, wearing of gloves and avoidance of hand to mouth contact (e.g. eating or smoking), especially when dealing with made ground.

Handling of soil and water should be minimised and dust suppression measures should be implemented, particularly during any excavation through the made ground. Soils should be dampened during excavation and handling to limit dust, and lorries suitably sheeted. Surface run-off from vehicle washing, dust suppression or storms, during construction, should be controlled to prevent entry into watercourses and off-site drainage systems.

Gas and vapour monitoring should be carried out before entry into deep excavations or confined spaces.

These precautions are considered to be industry standard when developing sites of this nature, and reference can be made to the HSE document HSG66 *Protection of workers and the general public during development of contaminated land* for further information.

11.8 Land Remediation Relief

At the time of writing, Land Remediation Relief (LRR) is a 150% credit on corporation tax claimable by certain corporate bodies against qualifying expenditure when undertaking investigation and remediation of potentially contaminated or derelict sites.

12 Summary and Recommendations

Published geology is Glacio-fluvial deposits within the north east of the site and Glacial Till deposits across the central and south west section of the site overlying the Etruria Formation mudstone recorded below the majority of the site, with the Pennine Lower Coal Measures Formation recorded beneath the western edge of the site.

Existing construction including foundations and services, may possibly be present as a result of the previous development of the site.

12.1 Geotechnical

Strip and or trench fill foundations are considered appropriate for the residential development across the site. It is considered that where the commercial and retail units are constructed as concrete or steel frame units, pad foundations would be considered suitable.

The infiltration capacity for soakaway drainage is variable across the site with adequate capacity more likely within the north east of the site. The local conditions should be confirmed once the drainage strategy for the site has been confirmed.

Excavated natural soils should be suitable for re-use at the site.

The natural superficial clay and sand and gravel should be suitable as a founding stratum and an allowable net bearing capacity of 100kN/m^2 should be available for a strip/trench fill foundation 600mm wide or a 1.5m square pad foundation. These values should result in settlements of not more than 20mm and 25mm respectively, keeping differential settlements within acceptable limits.

Heave protection is likely to be required where foundations are within the influencing distance of trees.

Ground floors may be constructed as ground bearing slabs. Buried construction should be broken away from the slab to avoid interaction. Heave protection, such as suspended over void, or constructed on a granular fill maybe required locally due to swelling and shrinkage of clay soils.

The soils at the site fall within Design Sulphate Class DS-1 with a corresponding ACEC Class of AC-1^d.

12.2 Contamination

Soil contamination above human health screening levels is absent.

Soil contamination above BS3882:2007 threshold levels is absent.

Soil contamination above UKWIR threshold levels is absent.

Ground gas monitoring identified an isolated elevated level of carbon dioxide above the generic assessment level. The site is therefore classified as Amber 1 in accordance with the NHBC and CIRIA Characteristic Situation 2.

Groundwater contamination above DWS and EQS is absent.

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Levels of carbon dioxide noted within one location at the site exceeded the guidance value classifying the site as Amber 1 / Characteristic Situation 2. In addition, the BGS records the site to be within an area where full radon protective measures would be required within new buildings across the site.

12.3 Further Work

A current tree survey is required to determine the potential influence of trees on and adjacent to the site, to the proposed foundation solution.

Further monitoring and assessment would be required to determine whether gas protection measures would be required to be incorporated into the design of structures at the site.

Further investigation of the deeper ground conditions should be undertaken to confirm the foundation depths and bearing capacities across the site area.

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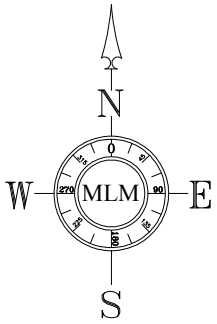
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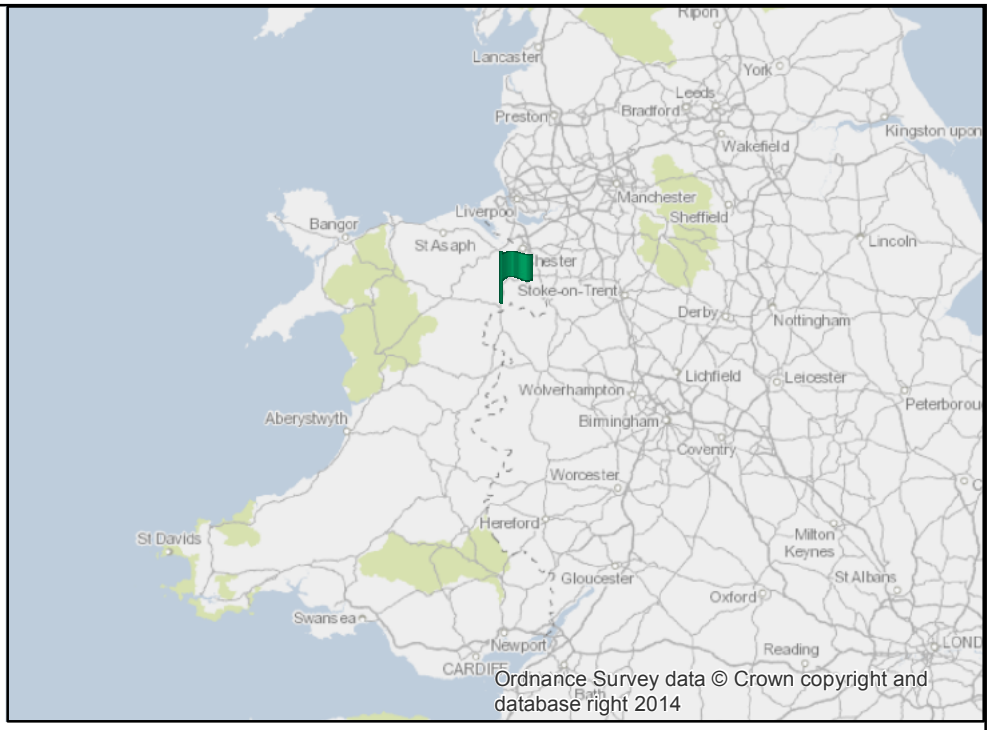
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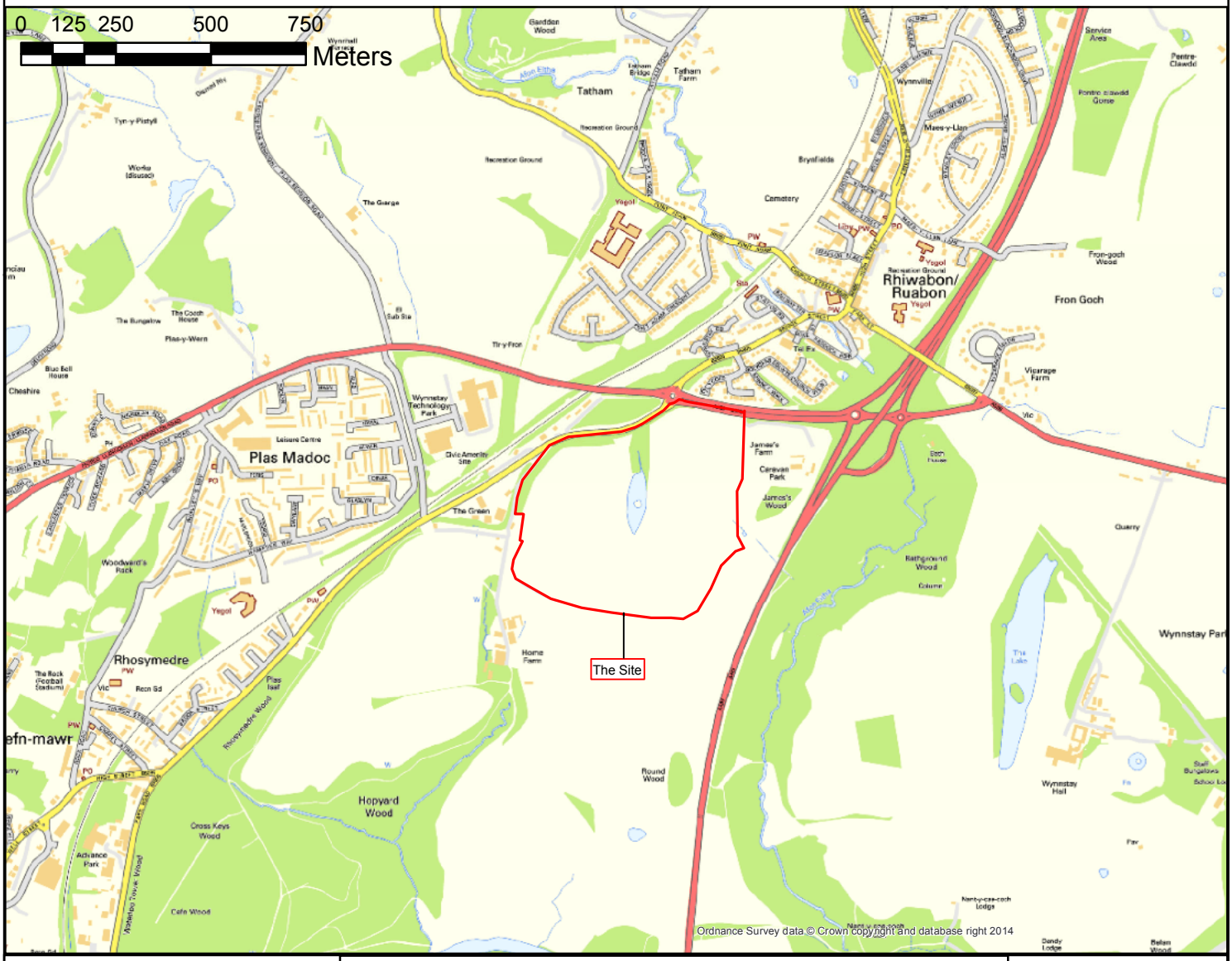
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Figures

Figure 1: Site Location Plan







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Ruabon Park Wrexham

Site Location Plan

Job No.
773135

Figure No.
1

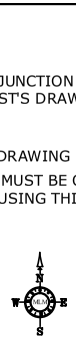
Drawings

773135-DWG-ENV-001 Exploratory Hole Location Plan

NOTES

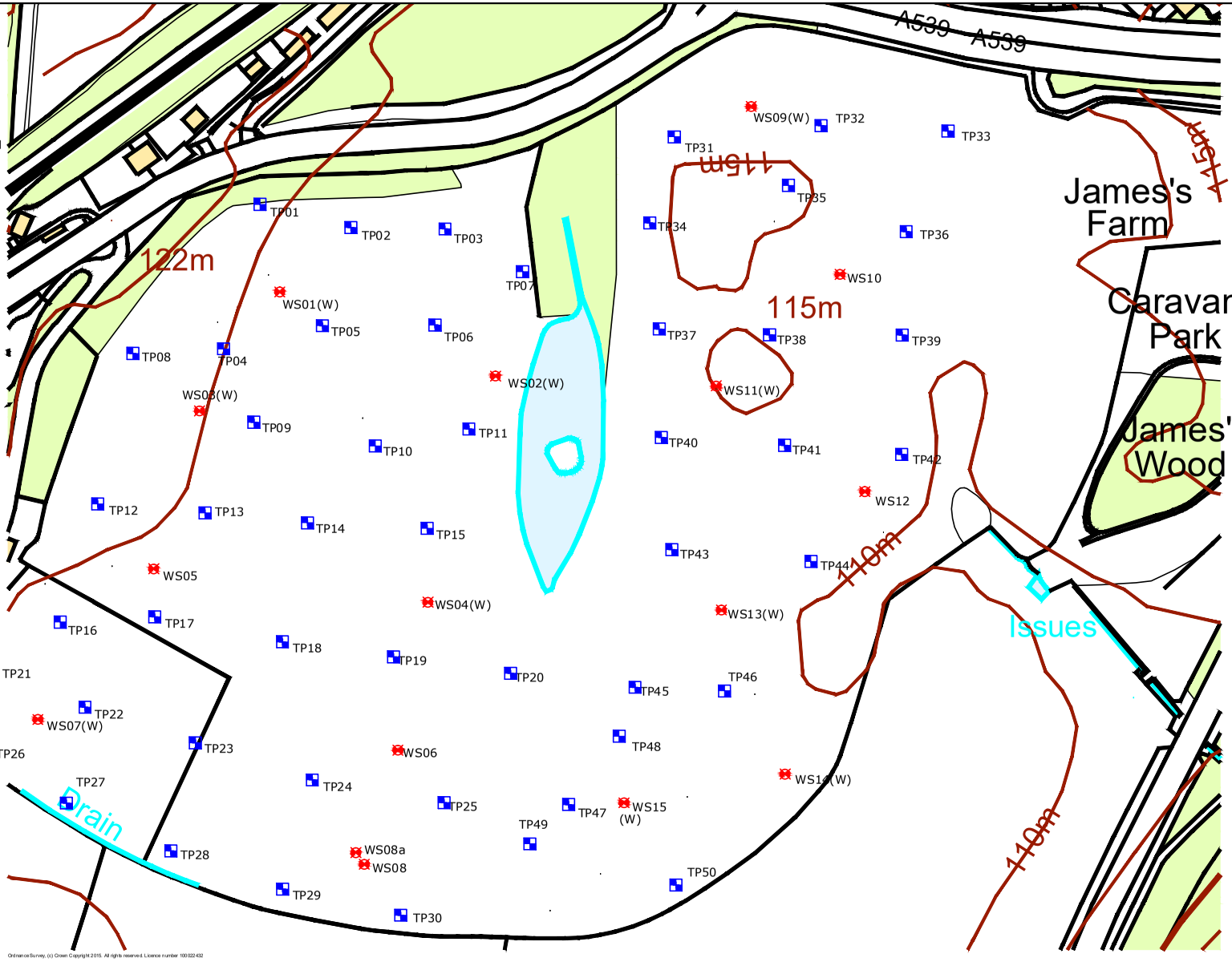
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LEGEND

TP1	TRIAL PIT LOCATION
WS1	WINDOWLESS SAMPLER BOREHOLE LOCATION
(W)	MONITORING WELL LOCATION



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Drawing Status: FINAL ISSUE

Client: CARTER JONAS

Project: RUABON PARK, WREXHAM

Drawing Title: EXPLORATORY HOLE LOCATION PLAN

Drawn/Design	ER	Date	OCT 2015	Scales	NTS @ A1
Checked	HD	Approved	DG		1:2500 @ A3

Drawing No.: 773135-DWG-ENV-001

Rev: .

Appendices

Appendix A: Exploratory Hole Logs
Appendix B: Gas and Groundwater Monitoring Results
Appendix C: Geotechnical Test Results
Appendix D: Results of Chemical Analysis
Appendix E: Soakaway Test Results
Appendix F: Generic Assessment Criteria
Appendix G: Defining Risk

Appendix A

Exploratory Hole Logs

MLM

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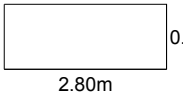
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Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329592.14E - 343398.13N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.30	D1			0.50		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
1.00	B1			1		Orange brown slightly clayey SAND and GRAVEL, becoming less clayey with depth. Gravel of fine to coarse angular to sub-rounded quartzite, sandstone and quartz. Cobbles of sandstone and quartzite.	1.50	
1.00	D2							
				2.00		Firm grey to brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and quartz.	1.00	
				3.00		Stiff grey to brown sandy CLAY.	1.00	
3.50		120						
4.00		125		4.00		End of trial pit at 4.00 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m

Dimensions:



Stability: Stable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	21/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329638.26E - 343398.90N

TP02

1:25

Sheet 1 of 1

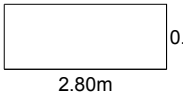
Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		MADE GROUND: Light brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded, sandstone, concrete, quartzite, quartz, wood and brick.	0.40	
0.80	D1					Firm grey gravelly very sandy CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
2.20	D2			2.10		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
				3.00		Firm grey gravelly very sandy CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
				3.50		Firm to stiff grey to brown silty CLAY.		
4.00		70					1.00	
4.50		105		4.50		End of trial pit at 4.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 4.50m

Dimensions:



Stability: Stable

MLM

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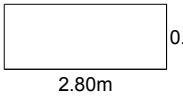
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Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329693.72E - 343398.09N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						MADE GROUND: Light brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded, sandstone, quartzite, quartz, concrete and brick. Cobbles of sandstone, quartzite and brick.	0.80	
1.20	D2			1.10		Firm brown to dark brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded quartzite and sandstone. Cobbles and boulders of sandstone and quartzite.	2.30	
3.50		70		3.40		Firm grey to brown silty CLAY. Decayed roots.	0.10	
3.50	D3			3.50		End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	21/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329559.64E - 343343.27N

TP04

1:25

Sheet 1 of 1

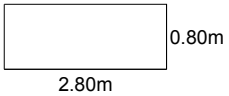
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INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.40		MADE GROUND: Light brown to brown silty sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and brick, Cobbles of sandstone and quartzite.	0.70	
1.00	D1			1.10		Soft grey gravelly very sandy CLAY. Gravel of fine to coarse sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
2.00	D2			2.50		Grey gravelly SAND. Gravel of fine to medium sub-angular to rounded sandstone and quartzite.	2.00	
4.50	D3			4.50		End of trial pit at 4.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Partial pit collapse at 4.50m. Slow GW seepage at 3.00m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

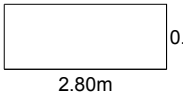
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Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329621.56E - 343340.93N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.30	D1			0.50		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
				0.90		MADE GROUND: Brown sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite, quartz and rare brick. Cobbles and boulders of sandstone and quartzite.	0.40	
				1.90		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and quartz. Cobbles and boulders of sandstone and quartzite.	1.00	
2.00		95				Very stiff grey to brown silty CLAY.	1.10	
3.00		140		3.00		End of trial pit at 3.00 m		
3.00	D2							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Concrete pipe at 1.20m

Dimensions:



Stability: Stable

MLM

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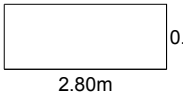
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Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329687.85E - 343341.40N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
0.50	D1					MADE GROUND: Light brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and brick. Cobbles and boulders of sandstone and quartzite.	0.70	
				1.10		Firm grey sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	1.60	
1.50	D2							
				2.70		Stiff grey to brown sandy CLAY.	0.30	
3.00		82		3.00		End of trial pit at 3.00 m		
3.00	D3							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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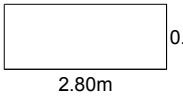
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Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329733.22E - 343340.01N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						MADE GROUND: Dark brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and brick. Cobbles and boulders of sandstone.	0.50	
0.80	D1			0.80		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone.	0.60	
				1.40		Grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone.	1.80	
2.00	D2							
2.00	B1							
				3.20		Stiff grey to brown sandy CLAY.	0.50	
3.50		140						
3.70	D3			3.70		End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m

Dimensions:



Stability: Stable

MLM

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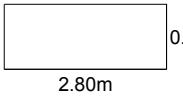
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Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329519.94E - 343289.23N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	B1					Brown to light brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.00	D1			1.10		Grey to brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.70	
				2.80		Grey gravelly very sandy clay. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone.	0.70	
3.50	D2			3.50		End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.50m

Dimensions:



Stability: Unstable

MLM

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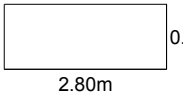
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Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329581.11E - 343284.02N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.60		Red brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.20	
				1		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.50	D2			1.40		Firm brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.60	
				2 2.00		Firm grey to dark grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.50	
				3				
3.50	D3			3.50		End of trial pit at 3.50 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Partial pit collapse at 3.50m

Dimensions:



Stability: Unstable

MLM

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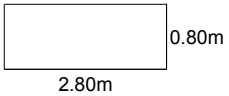
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Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329645.26E - 343286.68N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.40		MADE GROUND: Brown to grey sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite, quartz and brick. Cobbles and boulders of sandstone and quartzite.	0.60	
1.00	D1			1.00		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and quartz. Cobbles and boulders of sandstone and quartzite.	0.70	
				1.70		Stiff grey to brown sandy CLAY.	1.40	
2.50	B1							
3.00		82						
3.10	D2			3.10		End of trial pit at 3.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Slow GW seepage at 3.10m

Dimensions:



Stability: Stable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	21/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329707.85E - 343280.01N

TP11

1:25

Sheet 1 of 1

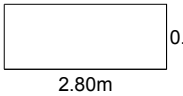
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INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.30		MADE GROUND: Brown sand and gravel. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick. Cobbles of sandstone and quartzite.	0.40	
0.50	D1			0.70		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
				1.60		Firm grey to brown silty CLAY.	0.40	
2.00		65		2.00		End of trial pit at 2.00 m		
2.00	D2							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m

Dimensions:



Stability: Stable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	24/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329488.90E - 343235.78N

TP12

1:25

Sheet 1 of 1

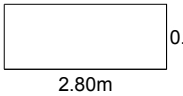
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INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.30		Brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
1.00	D1			1				
				1.20		Brown clayey gravelly SAND. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
				2 2.00		End of trial pit at 2.00 m		
				3				
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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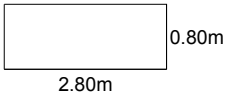
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Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329552.22E - 343230.54N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
1.00	D1			1.10		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.50	D2					Soft to firm grey to dark grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.70	
3.50	D3			3.80		End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.80m. Slow GW seepage at 3.80m

Dimensions:



Stability: Unstable

MLM

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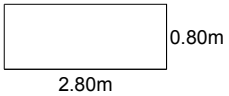
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Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329612.66E - 343224.63N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.30	D1			0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				1.10		Firm brown to grey silty CLAY. Root traces throughout.	0.70	
1.50	B1					Stiff grey to brown silty CLAY. Root traces throughout	1.30	
2.00		85						
2.00	D2			2.40		End of trial pit at 2.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Slow GW seepage at 2.40m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

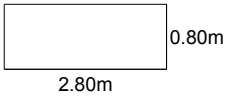
Project:	Ruabon Park, Wrexham	Method: TP	TP15
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329683.22E - 343221.44N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
0.50	D1			0.40		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.00		62		0.80		Firm to stiff brown to grey silty CLAY.	1.20	
1.50		78		1				
				2.00		Brown silty fine to coarse SAND.	0.30	
				2				
				2.30		Firm grey to brown sandy silty CLAY.	0.40	
				2.70		Stiff to very stiff fissile grey silty CLAY.	1.40	
3.00		90		3				
3.50		98						
4.00		92		4				
4.10	D2			4.10		End of trial pit at 4.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Slow GW seepage at 4.10m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

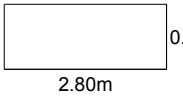
Project:	Ruabon Park, Wrexham	Method: TP	TP16
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329457.95E - 343188.80N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
0.50	D1					Brown to light brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.05	
				1.40		Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.		
2.00	B1						1.20	
				2.60		Firm to stiff grey gravelly sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.		
							1.30	
3.90	D2			3.90		End of trial pit at 3.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

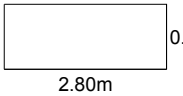
Project:	Ruabon Park, Wrexham	Method: TP	TP17
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329522.51E - 343169.17N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.90		Brown to light brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.60	
1.50	D2			1.60		Brown very clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite	0.70	
				2.60		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.00	
				3.30		Brown to grey clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
3.50	D3			3.50		Brown to grey gravelly very sandy CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.20	
						End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.50m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

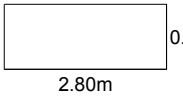
Project:	Ruabon Park, Wrexham	Method: TP	TP18
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329597.94E - 343154.41N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	D1			0.60		Light brown to brown slightly sandy gravelly silty CLAY. Gravel of fine to coarse sandstone and quartzite. Cobbles of sandstone.	0.30	
				2.70		Soft to firm brown to grey gravelly very sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	2.10	
3.00		140				Stiff to hard dark grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	1.10	
3.50		140						
3.80	D2			3.80		End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

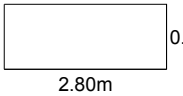
Project:	Ruabon Park, Wrexham	Method: TP	TP19
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329663.37E - 343145.55N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	D1			0.60		Firm light brown to brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.30	
1.20	D2			1.50		Firm brown to grey slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.90	
2.00		83		2.70		Stiff grey to brown silty CLAY. Root traces throughout.	1.20	
2.50		86		3.20		Stiff fissile grey silty CLAY. Root traces throughout.	0.50	
2.70	B1					End of trial pit at 3.20 m		
3.00		98						
3.20	D3							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.20m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

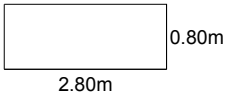
Project:	Ruabon Park, Wrexham	Method: TP	TP20
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329732.49E - 343135.82N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.10	D1			0.20		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.20	
				0.50		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
0.60		85				Stiff to very stiff grey to brown silty CLAY.	0.70	
1.00	D2			1.20		Stiff to very stiff grey silty CLAY.	0.60	
1.10		140						
1.50		140		1.80		Firm brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
				2.20		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone.	0.70	
2.50	D3			2.90		End of trial pit at 2.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.20m. Partial pit collapse at 2.90m. Fast GW seepage at 2.70m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

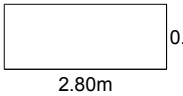
Project:	Ruabon Park, Wrexham	Method: TP	TP21
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329425.52E - 343138.97N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1					TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
				0.35		Brown to light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.65	
				1.00		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.20	
2.00	D2							
				2.20		End of trial pit at 2.20 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

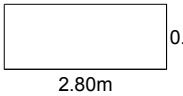
Project:	Ruabon Park, Wrexham	Method: TP	TP22
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329481.38E - 343115.87N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.40	
				1.10		Firm light brown to grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
2.00	D2			2.80		Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.70	
3.00		85		4.10		Stiff to hard dark grey to purplish grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.30	
4.00		140						
4.00	D3					End of trial pit at 4.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 4.10m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	22/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329546.63E - 343094.79N

TP23

1:25

Sheet 1 of 1

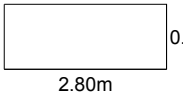
Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
1.00	D1			1.20		Light brown clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.85	
2.80	D2			3.00		Soft to firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.80	
3.50		140		3.50		Stiff to hard dark grey to purplish grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
						End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Partial pit collapse at 3.50m

Dimensions:



Stability: Unstable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	22/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329615.48E - 343072.94N

TP24

1:25

Sheet 1 of 1

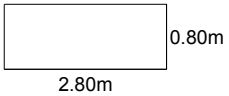
Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
1.00	D2			1.10		Firm brown to grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.80	
1.20	B1			1.60		Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	0.50	
				3.50		Soft to firm grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.90	
						End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM

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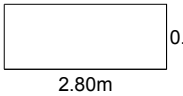
Project:	Ruabon Park, Wrexham	Method: TP	TP25
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329693.19E - 343059.49N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.00	D1					Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.		
1.50	B1						1.90	
				2.60		Firm to stiff grey to dark grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.		
3.00		80					1.20	
3.50		94						
3.80	D2			3.80		End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

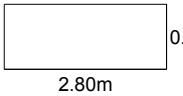
Project:	Ruabon Park, Wrexham	Method: TP	TP26
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329422.42E - 343093.29N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.40	
1.00	D1			1.50		Light brown to grey sandy very gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
3.70	D2			3.70		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	2.20	▼
						End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.70m. Slow GW seepage at 3.70m

Dimensions:



Stability: Unstable

MLM

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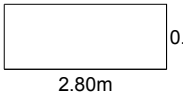
Project:	Ruabon Park, Wrexham	Method: TP	TP27
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329470.46E - 343059.25N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						Light brown firm gravelly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
1.50	D1			1.20		Soft red brown to brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and quartz. Cobbles and boulders of sandstone and quartzite.	1.20	
3.00	D2			2.40		Soft to firm grey sandy gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.40	
				3.80		End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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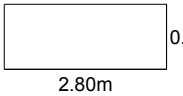
Project:	Ruabon Park, Wrexham	Method: TP	TP28
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329532.01E - 343031.04N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.20		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.20	
0.50 0.50	D1 B1			1.10		Firm brown slightly sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
				2.80		Soft to firm brown to grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.70	
3.70	D2			3.80		Firm to stiff grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00	
						End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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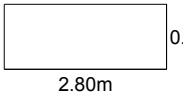
Project:	Ruabon Park, Wrexham	Method: TP	TP29
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329597.97E - 343008.51N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Stiff light brown to grey slightly gravelly slightly sandy silty clay. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.50	D1			1		Firm brown to grey sandy very gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	2.00	
2.00	B1			2				
				2.70		Stiff to hard grey to dark grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and claystone.	1.00	
3.00		87		3				
3.50		140						
3.50	D2			3.70		End of trial pit at 3.70 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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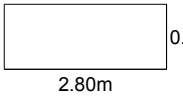
Project:	Ruabon Park, Wrexham	Method: TP	TP30
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329667.63E - 342993.11N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.00	D1			1		Firm brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.10	
2.00		79		1.80		Stiff to hard dark grey to purplish grey slightly gravelly slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.70	
2.00	D2			2				
3.00		140		3				
3.50		140		3.50		End of trial pit at 3.50 m		
3.50	D3			4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	24/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329844.97E - 343462.98N

TP31

1:25

Sheet 1 of 1

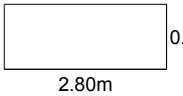
Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.30	D1			0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
1.00	D2			1.40		Brown to light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.05	
				1.70		Firm red brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
3.40	D3			3.40		Brown silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.70	
						End of trial pit at 3.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m. Partial pit collapse at 3.40m

Dimensions:



Stability: Unstable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	24/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329915.52E - 343459.08N

TP32

1:25

Sheet 1 of 1

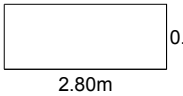
Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	D1					Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
				1.10		Brown clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.90	D2			1.90		End of trial pit at 1.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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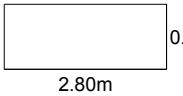
Project:	Ruabon Park, Wrexham	Method: TP	TP33
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329990.39E - 343455.83N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.45	
0.50	D1			0.45		Light brown to grey silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.45	
				0.90		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
1.90	D2			1.90		End of trial pit at 1.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.45m

Dimensions:



Stability: Stable

MLM

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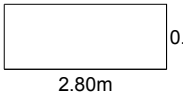
Project:	Ruabon Park, Wrexham	Method: TP	TP34
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329814.54E - 343401.62N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.30		Dark brown to brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.60	
0.60	D1			0.90		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.30	
2.20	B1			2.20		Brown to green brown very clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.20	
				2.40		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
3.40	D2			3.40		End of trial pit at 3.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	24/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329888.04E - 343402.70N

TP35

1:25

Sheet 1 of 1

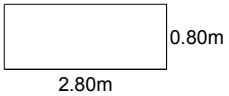
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INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Brown to light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.20	D1					Light brown to orange brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	2.20	
2.90	D2			2.90		End of trial pit at 2.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 2.90m

Dimensions:



Stability: Unstable

MLM

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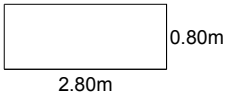
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Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329965.76E - 343396.54N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.50		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
0.70	D1					Brown to orange brown silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
0.80	B1			0.90		Brown to orange brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.60	
				1.50		Brown to orange brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
2.00	D2							
2.90	D3			2.90		End of trial pit at 2.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Partial pit collapse at 2.90m

Dimensions:



Stability: Unstable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	24/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329820.11E - 343339.01N

TP37

1:25

Sheet 1 of 1

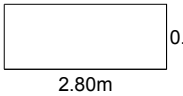
Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.60	
				0.60		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.20	
1.00	D1			1				
				1.80		Brown to red brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
2.00	B1			2				
				2.60		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	▼
3.00	D2			3	3.00	End of trial pit at 3.00 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.00m. Slow GW seepage at 2.75m

Dimensions:



Stability: Unstable

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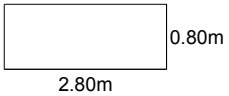
Project:	Ruabon Park, Wrexham	Method: TP	TP38
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329885.17E - 343335.64N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
1.00	D1			1.10		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
2.00	D2			2.30		Firm brown to grey gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.20	
3.70	D3			3.70		Brown silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
						End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Partial pit collapse at 3.70m. Slow GW seepage at 3.70m

Dimensions:



Stability: Unstable

MLM

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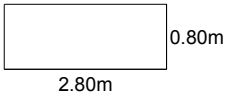
Project:	Ruabon Park, Wrexham	Method: TP	TP39
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329963.43E - 343335.49N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
1.00	D1			1.10		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.75	
1.50		93				Stiff to very stiff grey silty CLAY. Becoming sandy with depth.		
1.50	B1						1.30	
2.00		140		2.40		Brown to grey gravelly SAND. Gravel of fine to medium sub-rounded to rounded sandstone and quartzite.	0.90	
				3.30		Stiff red brown to purplish brown gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
3.50		86						
3.60	D2			3.60		End of trial pit at 3.60 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM

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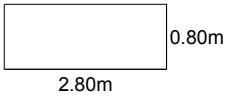
Project:	Ruabon Park, Wrexham	Method: TP	TP40
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329821.34E - 343275.03N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
				1.10		Firm grey to dark grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
				1.60		Grey to purple grey slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.70	
2.00	D2							
2.30	B1			2.30		Firm to stiff purple grey to grey slightly gravelly sandy CLAY. Gravel of fine to coarse sub-rounded to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
2.50		80						
2.60	D3			2.60		End of trial pit at 2.60 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 2.80m. Slow GW seepage at 2.30m

Dimensions:



Stability: Unstable

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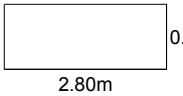
Project:	Ruabon Park, Wrexham	Method: TP	TP41
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329894.03E - 343270.38N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.40		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.40	
1.00	D1			0.80		Firm mottled brown grey to orange brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
				1.80		Grey slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded. Cobbles of sandstone and quartzite.	1.20	
3.00	D2			3.00		End of trial pit at 3.00 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Partial pit collapse at 3.00m. Slow GW seepage at 3.00m

Dimensions:



Stability: Unstable

MLM

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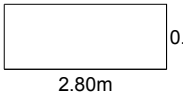
Project:	Ruabon Park, Wrexham	Method: TP	TP42
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329963.12E - 343265.06N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				1.00		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
1.50	D1			1.70		Brown to orange brown very clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
2.00	D2			2.50		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
3.00		140		3.10		Stiff to hard grey to purplish grey gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.60	
3.10	D3					End of trial pit at 3.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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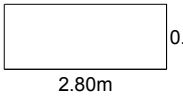
Project:	Ruabon Park, Wrexham	Method: TP	TP43
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329827.57E - 343208.82N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
1.00	D1			1.20		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.85	
1.50		140		2.10		Very stiff dark grey to purple grey silty CLAY. Root traces throughout.	0.90	
2.00		140		2.70		Very stiff dark grey to purple grey slightly sandy very gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.60	
2.50		140		3.20		Dark grey to purple grey clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
3.00		140				End of trial pit at 3.20 m		
3.20	D2							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m. Slow GW seepage at 3.10m

Dimensions:



Stability: Stable

MLM

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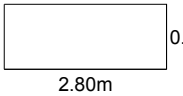
Project:	Ruabon Park, Wrexham	Method: TP	TP44
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329909.61E - 343201.87N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
1.00	D1			1.40		Firm light brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.00	
2.00	D2			2.40		Firm brown gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
2.50		140				Very stiff to hard grey to purple grey silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.10	
3.00		140						
3.50	D3			3.50		End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m

Dimensions:



Stability: Stable

MLM

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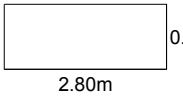
Project:	Ruabon Park, Wrexham	Method: TP	TP45
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329805.86E - 343127.56N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
0.50	D1			0.80		MADE GROUND: Light brown to brown silty sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and brick, Cobbles and boulders of sandstone and quartzite.	0.45	
2.00	D2			2.40		Firm to stiff brown sandy gravelly CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.60	
2.50		140				Very stiff to hard grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
3.00		140						
3.20	D3			3.20		End of trial pit at 3.20 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM

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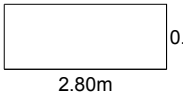
Project:	Ruabon Park, Wrexham	Method: TP	TP46
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329876.41E - 343123.66N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
				0.60		Light brown to brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.25	
1.00	D1			1		Brown to red brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	0.80	
1.50	B1			1.40		Firm to very stiff brown to red brown slightly sandy very gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
				2				
				2.20		Very stiff to hard grey to purple grey gravelly silty CLAY. Gravel of fine to coarse sub-rounded to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.		
2.50		140					1.00	
3.00		140		3				
3.20	D2			3.20		End of trial pit at 3.20 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM

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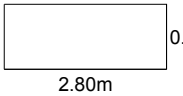
Project:	Ruabon Park, Wrexham	Method: TP	TP47
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329766.66E - 343058.42N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.50		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
				0.80		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
1.40	D1			1.50		Brown to red brown clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	0.70	
2.20	D2			2.40		Brown to dark brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
3.00		82				Firm to stiff dark grey to purplish grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.30	
3.50		89						
3.70	D3			3.70		End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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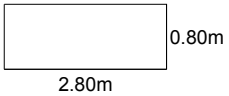
Project:	Ruabon Park, Wrexham	Method: TP	TP48
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329836.62E - 343063.15N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
				0.90		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.55	
1.50	D1			2.00		Stiff brown to red brown slightly sandy very gravelly CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.10	
2.20	B1			3.20		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.20	
3.50		140		3.50		Very stiff to hard grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	0.30	
3.50	D2					End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m. Partial pit collapse at 3.50m. Slow GW seepage at 3.10m

Dimensions:



Stability: Unstable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	23/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329755.66E - 342996.05N

TP49

1:25

Sheet 1 of 1

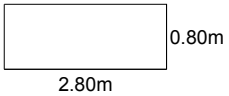
Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.60		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.30	
				1.30		Brown clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
1.50	D1					Firm brown to red brown sandy gravelly CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.10	
				2.40		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
3.40	D2			3.40		End of trial pit at 3.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.40m. Fast GW seepage at 3.30m

Dimensions:



Stability: Unstable

MLM

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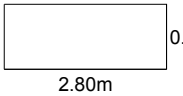
Project:	Ruabon Park, Wrexham	Method: TP	TP50
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329830.00E - 343010.87N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.80		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	0.50	
1.50	D2			2.40		Firm to stiff red brown to red slightly sandy very gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.60	
2.80	B1			3.30		Firm brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.90	
3.50		140		3.70		Stiff to hard grey to purplish grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
3.70	D3					End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.70m

Dimensions:



Stability: Stable

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Project:	Ruabon Park, Wrexham	Method: WS	WS01
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329589.59E - 343371.22N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
				0.60		Grey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.30		
D1 : 0.90m						Orange brown to brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.40		
1.00	N=16 (13,10/6,4,3,3) ()			1.00		Firm brown gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
D2 : 1.50m									
2.00	N=12 (4,2/3,3,3,3) ()								
3.00	N=13 (2,2/3,3,4,3) ()						4.00		
4.00	N=36 (3,4/6,6,11,13) ()								
D3 : 4.90m									
5.00	50 (24 for 105mm/50 for 225mm) ()			5.00		End of borehole at 5.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 5.00m. GW at 3.00m. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS02
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329697.58E - 343317.18N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
				0.40		Brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
D1 : 0.70m									
1.00	N=37 (10,8/10,8,10,9) ()			1			1.10		
				1.50		Firm to stiff brown gravelly sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.			
D2 : 1.80m									
2.00	N=17 (6,4/4,5,4,4) ()			2			1.20		
				2.70		Firm to stiff brown to grey silty CLAY. Occasionally sandy.			
3.00 3.00	N=24 (5,5/5,6,6,7) ()	57		3					
4.00 4.00	N=20 (6,4/4,5,5,6) ()	78		4			2.30		
D3 : 4.90m									
5.00 5.00	N=26 (6,6/6,7,6,7) ()	83		5					
				5.00		End of borehole at 5.00 m			
				6					
				7					
				8					
				9					

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
GW at 4.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	4.00			

MLM

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Project:	Ruabon Park, Wrexham	Method: WS	WS03
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329549.94E - 343289.78N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
D1 : 0.90m 1.00	N=9 (4,2/2,2,2,3) ()			1.20		Brown to light brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.90		
D2 : 1.50m						Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.80		
2.00	N=9 (1,2/1,2,3,3) ()			2.00		Soft to firm dark brown slightly gravelly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.85		
3.00	N=29 (11,8/6,8,7,8) ()			2.85		Dark brown to grey gravelly silty SAND. Becoming gravelly very clayey sand. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.45		
4.00 D3 : 4.00m	50 (8,6/50 for 135mm) ()			4.30		End of borehole at 4.30 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.30m due to boulder. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS04
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329683.75E - 343177.86N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.20		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.20		
				0.50		Stiff orange brown to light brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.30		
D1 : 0.90m 1.00	N=14 (3,3/3,4,3,4) ()			1		Firm to stiff brown to orange brown slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.20		
				1.70		Firm to stiff brown to orange brown sandy very silty CLAY.	0.30		
D2 : 1.90m 2.00	N=11 (3,2/2,3,3,3) ()			2					
2.50		80		2.00		Firm to stiff grey silty CLAY.	1.00		
3.00	N=20 (3,3/3,4,6,7) ()			3					
				3.00		Brown slightly gravelly silty SAND. Gravel of fine to medium angular to sub-rounded sandstone and quartzite.	1.00		
D3 : 3.90m 4.00	N=50 (25 for 110mm/50 for 260mm) ()			4					
				4.00		End of borehole at 4.00 m			
				5					
				6					
				7					
				8					
				9					

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.00m. Live roots to 0.20m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM

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Project:	Ruabon Park, Wrexham	Method:	WS
Project ID:	773135	Start:	25/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329497.46E - 343199.27N

WS05

1:50

Sheet 1 of 1

Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
D1 : 0.50m						Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.70		
1.00 D2 : 1.20m	N=17 (7,4/4,4,4,5) ()			1.00		Firm brown to dark brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded quartzite and sandstone. Cobbles of sandstone and quartzite.	1.35		
2.00 D3 : 2.00m	50 (5,4/50 for 75mm) ()			2.35		End of borehole at 2.35 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 2.35m due to boulder, Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM

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Project:	Ruabon Park, Wrexham	Method: WS	WS06
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329665.90E - 343090.44N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
D1 : 0.90m 1.00	N=13 (3,3/3,4,3,3) ()					Stiff brown grey to orange brown silty CLAY.	1.20		
				1.50		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
D2 : 1.90m 2.00	N=31 (3,7/6,9,6,10) ()								
3.00	N=24 (4,3/4,6,6,8) ()						2.50		▼
D3 : 3.70m									
4.00	N=50 (10,11/50 for 285mm) ()			4.00		End of borehole at 4.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.00m. GW at 3.00m. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS07
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329453.63E - 343108.64N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
						Firm to stiff brown to light brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.60		
D1 : 0.90m 1.00	N=20 (3,4/7,5,4,4) ()			1.00		Firm brown to light brown slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
D2 : 1.80m 2.00	N=21 (5,5/5,5,4,7) ()			2.00		Firm to light brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.50		
3.00	N=34 (4,5/9,9,9,7) ()			3.50		Stiff grey slightly gravelly sandy CLAY. Gravel of fine to medium angular to sub-rounded sandstone and quartzite.	0.50		
D3 : 3.90m 4.00 4.00	50 (25 for 135mm/50 for 170mm) ()	90		4.00		End of borehole at 4.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.00m. GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM

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Project:	Ruabon Park, Wrexham	Method:	WS
Project ID:	773135	Start:	28/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329646.18E - 343023.17N

WS08

1:50

Sheet 1 of 1

Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
1.00	N=15 (2,3/4,4,3,3,4) ()					Firm brown to grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.70		
2.00	N=50 (10,13/50 for 230mm) ()			2.00		End of borehole at 2.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 2.00m due to boulder. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS08a
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: E - N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
						Firm to stiff brown to light brown slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.70		
D1 : 0.90m 1.00	N=12 (2,3/3,3,3,3) ()			1.00		Firm brown slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
D2 : 1.90m 2.00	N=50 (5,9/50 for 235mm) ()			2.00		End of borehole at 2.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 2.00m due to boulder. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS09
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329879.18E - 343486.92N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
D1 : 0.90m 1.00	N=9 (3,2/3,2,2,2) ()					Brown to light brown slightly clayey gravelly SAND. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.60		
D2 : 1.90m 2.00	N=7 (2,1/2,2,1,2) ()								
3.00	N=1 (1,0/0,0,0,1) ()			3.00		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
4.00	N=2 (1,0/0,1,0,1) ()			4.00		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	1.00		
D3 : 4.90m 5.00	N=8 (2,3/2,2,2,2) ()			5.00		End of borehole at 5.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS10
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329926.75E - 343371.24N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.00		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
				0.40		Light brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.80		
D1 : 0.90m 1.00	N=14 (4,4/4,3,3,4) ()			1.20		Firm to stiff brown slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.70		
D2 : 1.90m 2.00 2.00	N=13 (1,2/1,2,4,6) ()	92		1.90		Stiff grey silty CLAY. Root traces throughout.	0.40		
				2.30		Firm brown very sandy CLAY.	0.30		
				2.60		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	0.40		
D3 : 2.90m 3.00	0 (25 for 5mm/0 for 0mm) ()			3.00		End of borehole at 3.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 3.00m due to boulder. GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS11
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329853.75E - 343305.46N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
D1 : 0.90m 1.00	N=7 (2,2/2,1,2,2) ()			1.60		Orange brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.20		
D2 : 1.90m 2.00	N=9 (3,3/3,2,2,2) ()			2.40		Brown very clayey GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.80		
3.00	N=9 (2,2/3,2,2,2) ()					Orange brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.60		
4.00	N=8 (1,1/2,2,2,2) ()								
D3 : 4.90m 5.00	N=18 (3,5/5,4,4,5) ()			5.00		End of borehole at 5.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
GW at 3.50m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.50			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS12
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329952.37E - 343219.22N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
D1 : 0.20m				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
1.00	N=13 (3,4/2,4,3,3,4) ()			1.40		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
D2 : 1.90m 2.00	N=22 (3,3/3,4,7,8) ()			2.60		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.20		
3.00	N=39 (5,6/8,10,10,11) ()			3.20		Brown to light brown very clayey SAND.	0.60		▼
3.50		140		4.00		Very stiff to hard brown to purplish brown slightly gravelly very sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	0.80		
D3 : 3.90m 4.00	N=48 (11,12/11,11,12 ,14) ()					End of borehole at 4.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Collapse at 4.00m. GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS13
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329856.86E - 343173.18N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
						Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.60		
D1 : 0.80m				0.90					
1.00	N=33 (5,8/9,9,8,7) ()					Stiff brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.90		
D2 : 1.90m				1.80					
2.00	N=23 (7,11/7,6,5,5) ()	89				Stiff brown to purplish brown slightly gravelly slightly sandy silty CLAY.	0.70		
2.00				2.50					
D3 : 2.90m						Stiff grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub rounded sandstone and quartzite.			
3.00	N=24 (3,7/5,4,6,9) ()	92					1.50		
3.00									
4.00	N=22 (7,7/4,6,5,7) ()			4.00		Stiff grey to brown very sandy CLAY.	0.50		
4.50		140		4.50		Very stiff red to reddish brown slightly gravelly silty CLAY.	0.50		
5.00	N=37 (8,9/10,9,8,10) ()	140		5.00		End of borehole at 5.00 m			
5.00									

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM

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Project:	Ruabon Park, Wrexham	Method:	WS
Project ID:	773135	Start:	28/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329894.36E - 343076.41N

WS14

1:50

Sheet 1 of 1

Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
						Firm light brown to brown slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.50		
D1 : 0.90m 1.00	N=18 (2,4/4,4,5,5) ()			0.90		Stiff red brown to brown slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.10		
1.50		95							
D2 : 1.90m 2.00	N=35 (3,4/5,7,9,14) ()								
2.50		103							
D3 : 2.90m 3.00	0 (75 for 80mm/0 for 0mm) ()			3.00		End of borehole at 3.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 3.00m due to boulder. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

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Project:	Ruabon Park, Wrexham	Method: WS	WS15
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329785.43E - 343017.63N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
				0.40		Firm to stiff light brown to grey slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.55		
D1 : 0.90m 1.00	N=20 (3,6/5,5,4,6) ()			0.95 1.00		Red to red brown slightly clayey SAND.	0.05		
D2 : 1.90m 2.00	N=25 (3,4/4,7,7,7) ()					Firm to stiff brown to dark brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.00		
3.00	N=32 (9,8/8,7,8,9) ()			3.00		Very stiff to hard grey to purplish grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
3.50		140					1.70		
4.00	N=40 (5,7/7,10,11,12) ()								
4.50		140							
4.70 D3 : 4.70m	50 (25 for 115mm/50 for 145mm) ()			4.70		End of borehole at 4.70 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.70m due to boulder. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

STRATA


MADE GROUND / FILL


TOPSOIL


COBBLES AND BOULDERS


GRAVEL


SAND


SILT


CLAY


PEAT

WATER


WATER STRIKE


WATER STANDING

BACKFILL / INSTALLATIONS

Backfill Details


CONCRETE


BENTONITE


FILTER/GRAVEL


AR SINGS BACKFILL

Pipe Details


PLAIN PIPE


SLOTTED PIPE


PIEZOMETER TIP

SAMPLES

U100	OPEN DRIVE TUBE SAMPLE (100 mm NOMINAL DIAMETER)
UT100	OPEN DRIVE THIN WALL TUBE SAMPLE (100 mm NOMINAL DIAMETER)
U38	OPEN DRIVE TUBE SAMPLE (38 mm NOMINAL DIAMETER)
P	PISTON SAMPLE (100 mm NOMINAL DIAMETER UNLESS NOTED OTHERWISE)
D	SMALL DISTURBED SAMPLE
B	BULK DISTURBED SAMPLE
BLK	BLOCK SAMPLE
C	ROTARY CORE SAMPLE
G	GAS SAMPLE
U	UNDISTURBED SAMPLE
JT	TUBE SAMPLE
ES	ENVIRONMENTAL SAMPLE
W	WATER SAMPLE
SPTLS	STANDARD PENETRATION TEST LINER SAMPLE

IN SITU TESTING

S	STANDARD PENETRATION TEST USING THE SPLIT SPOON SAMPLER
C	STANDARD PENETRATION TEST USING A SOLID CONE

WHERE A TEST HAS BEEN COMPLETED THE TYPE OF TEST AND THE N-VALUE WILL BE REPORTED.

WHERE THE FULL 300 mm PENETRATION OF THE MAIN DRIVE HAS NOT BEEN COMPLETED, THE NUMBER OF BLOWS (NOT AN N-VALUE) WILL BE REPORTED.

THE FIELD RECORDS COLUMN ON THE LOG WILL SHOW EACH SET OF BLOW COUNTS PER 75 mm OF PENETRATION INCLUDING SEATING BLOWS AND WILL ALSO INDICATE THE PARTIAL PENETRATION ACHIEVED (mm) FOR INCOMPLETE TESTS.

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KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

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TOPSOIL


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GRAVEL


SAND


SILT


CLAY


PEAT

WATER


WATER STRIKE


WATER STANDING

BACKFILL / INSTALLATIONS

Backfill Details


CONCRETE

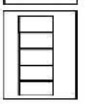

BENTONITE


FILTER/GRAVEL


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KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

STRATA


MADE GROUND / FILL


TOPSOIL


COBBLES AND BOULDERS


GRAVEL


SAND


SILT


CLAY


PEAT

WATER


WATER STRIKE


WATER STANDING

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