

A close-up photograph of an excavator bucket digging into the ground, showing soil and rocks. The bucket is yellow and black, and the background is a blurred green field.

STAGE 2 GEO-ENVIRONMENTAL REPORT

AT

ST MARY'S CHURCH

MARYVALE

SKELMSDALE

ON BEHALF OF

**TAWD VALLEY
DEVELOPMENTS LTD**

ARP GEOTECHNICAL LTD

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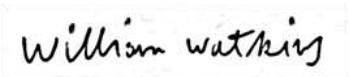
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1.0 EXECUTIVE SUMMARY

The pertinent conclusions of the report are tabulated below. However, the information below is not exhaustive, and it is recommended the report is read in its entirety.

Proposed Development	Residential dwellings with private gardens.
Existing Site Description	Densely vegetated land with numerous mature trees. The site surrounds St Marys Church and car park.
Site History	No development shown on historical maps. Aerial images from 2005 show a haul road crossing the site, serving construction works at the adjacent school to the west.
Geology	Devensian Till over undifferentiated bedrock of the Pennine Middle Coal Measures Formation. A fault is located in the far the northeastern corner of the site, with sandstone beyond to the northeast.
Coal Mining	The site is considered to be stable with regard to coal mining.
Hazardous Gases	No radon protection measures are required. No landfills are located within 250m. Infilled reservoirs are located 30m to the north. Gas monitoring was undertaken as part of REFA's Oct 2019 report and site classified as CS1 (no protection required).
Ground Conditions	Up to 3m of natural clays, overlying sandstone bedrock on the southwest and mudstone to the northeast of the site.
Contamination and Remediation.	No contamination identified. No remedial measures required.
Foundations	Strip/trench fill foundations will be suitable across the site, founded on the firm to stiff natural clay.
Excavations	Likely to be stable within natural strata.
Concrete	GEN1 designation for unreinforced buried concrete. For any reinforced concrete, other design-specific mixes will apply.
Soakaways	Disposal of surface water using soakaways is not considered to be practical on the site.

Road Pavement	A design CBR value of at least 2% is likely to be applicable on the natural clay.
Other Issues	A Tree Protection Order (TPO) is in place for trees towards the northern end of the site.

2.0 TERMS OF REFERENCE

- 2.1 Tawd Valley Developments Ltd is considering developing the site adjacent to St Mary's Church, Maryvale, Skelmersdale, into residential properties with private gardens. It was considered appropriate to provide information to aid viability assessment and design of any subsequent development. In October 2019, Robert E Fry & Associates Ltd (REFA), issued a combined Stage 1 & 2 Geo-Environmental Investigation Report (Reference 19153/GEIR, dated 30th October 2019). In February 2023, ARP Geotechnical Ltd issued a Stage 1 Desk Study Report (Reference NW134/01/4r1, dated 3rd February 2020). This involved an assessment of the geological and coal mining aspects, Ordnance Survey archive maps, radon gas, indicative flood risk, hydrogeology, landfill, and other environmental issues, primarily by assessment of a Landmark Envirocheck Report. In addition to comments and conclusions on a wide range of environmental and geotechnical issues, the report also provided recommendations for intrusive investigation and assessment.
- 2.2 In September 2023, as the investigation information from the REFA investigation was significantly restricted due to the dense vegetation across the majority of the site, ARP Geotechnical Ltd was appointed by Tawd Valley Developments Ltd to undertake further investigation works, comprising five trial pits and eight hand augers to better assess the ground conditions.
- 2.3 The investigation was implemented generally in accordance with BS 5930:2015 +A1:2020 "Code of practice for site investigations", NHBC Standard Chapter 4.1 "Land quality – managing ground conditions", Environment Agency LCRM "Land Contamination Risk Management" and BS10175 : 2011 + A2 : 2017 "Investigation of potentially contaminated sites – Code of practice". This report is limited to the data obtained as part of this investigation. It should be noted that there is a possibility of variation in ground conditions between test locations and interpretation of strata is given for guidance only. No liability is accepted for changes to site conditions, including groundwater levels, after the preparation of this report.

- 2.4 The findings or contents of the REFA combined Stage 1 & 2 Geo-Environmental Investigation Report, and ARP Stage 1 Desk Study Report, are not reproduced here in full, and it is recommended that this report is read in conjunction with the combined Stage 1 & 2 Geo-Environmental Investigation Report and Stage 1 Report.
- 2.5 The general observation and assessment of the ground surface, and the identification/classification of vegetation is made in general terms only. It would be prudent for a specialist to undertake a more detailed survey, including for any invasive/harmful weeds.
- 2.6 The assessment of any topsoil is carried out in terms of potential chemical effects on human health only, and no account is taken of aesthetic or horticultural properties. Such considerations should be referred to a horticulturist or landscape architect.
- 2.7 The report has been prepared for the use and reliance of the Client only. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Geotechnical Ltd. For the avoidance of any doubt, where ARP Geotechnical Ltd enters into a letter of reliance for the benefit of a third party, that third party will be permitted to rely on the report. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without ARP Geotechnical Ltd.'s consent.
- 2.8 Attention is drawn to the requirements of the Construction Design and Management Regulations 2015, and in particular the duties and obligation of the Client.
- 2.9 The report refers to, and includes, a copy of an indicative proposed layout. This is only for the purposes of generating a conceptual site model for the contamination risk assessment. Unless the proposed layout changes significantly, such that the conceptual model and risk assessment is affected, there is no requirement to re-issue this report when the layout is revised.

3.0 THE SITE

Site Location

- 3.1 The site, which is centred on Ordnance Survey Grid Reference 348390, 407280, is located adjacent to St Mary's Church, Maryvale in Skelmersdale.
- 3.2 A site location plan and aerial photograph are presented in Appendix A.
- 3.3 A walkover survey was conducted on the 22nd January 2020 as part of the Stage 1 Desk study Report. Details obtained during the site walkover are discussed below and have been updated where appropriate (the site was re-visited by ARP on 21st November 2023 to carry out the ground investigation).

On – Site Features

- 3.4 The site is an irregular “C” shaped piece of land extending to an area of 1.7 hectares, with overall dimensions of approximately 140m north to south by 122m east to west.
- 3.5 During the site walkover, access to the site was located at the end of an access road (Maryvale) which is itself accessed from a large roundabout of the A557 (Houghton Road). The site comprised densely vegetated land with numerous mature trees. The denser vegetation and trees were located along the perimeter of the site, particularly around the north and west. However, pathways had recently been cleared through the vegetation in some areas. A small area of lawn was located in the far northeastern end of the site.
- 3.6 The site surrounds St Mary's Church and its associated car park. At the time of the site walkover, there was localised evidence of fly tipping.
- 3.7 The site generally slopes down towards the west. The site steps down slightly, approximately 0.5m, from the access road (Maryvale) to the wooded area to the north. The A557 along the

southern boundary is at a higher level than the site, with a densely vegetated embankment sloping down to the north, towards the site.

Site Boundaries and Surrounding Land Use

- 3.8 The site is bounded to the north by residential properties of the Manfield estate, to the west by Cobbs Brow School and associated playing fields, to the south by Houghton Road (A557) with residential properties beyond and to the east by a large roundabout on Houghton Road (A557).

Site History

- 3.9 Ordnance Survey archive maps were obtained for the site as part of the Phase 1 Desk study report, a summation of which is given below.
- 3.10 In summary, the historical maps indicate that there has been no previous development on the site. However, aerial imagery from 2005 suggests that a haul road crossed the centre of the site connecting Maryvale to construction works on the adjacent school to the west. The surrounding area was developed significantly between the 1960s and 1980s, with the construction of houses, a school, and an upgraded road network. Several reservoirs and ponds were located at between 30m and 150m north of the site and most infilled by the 1960s. Several collieries were located to the west and southwest between the 1890s and the 1920s, with the closest being 150m to the west.

4.0 ENVIRONMENTAL SETTING

- 4.1 The environmental setting for the site was established by the Stage 1 Desk Study Report undertaken by ARP Geotechnical Ltd under reference NW134/01/4r1, dated 3rd February 2020. A Landmark Envirocheck Report was obtained by ARP for the site, as part of the Phase 1 Desk Study. The findings of the Desk Study Report, updated and amended where deemed appropriate, are summarised below.

Geology

- 4.2 The British Geological Survey 1:10,000 Series Geology Maps, shows the site to be underlain by Devensian Till (glacial deposits, usually comprising clays with variable granular content up to boulder size) over undifferentiated strata (mudstone, siltstone and minor sandstone) of the Pennine Middle Coal Measures Formation.
- 4.3 The map infers that a northwest-southeast trending fault is present just (around 5m) inside the northeastern corner of the site, with sandstone beyond the fault, to the northeast. A second fault is inferred to be present approximately 20m beyond the southwestern corner of the site, trending northwest-southeast.
- 4.4 Historical BGS logs for the site indicate that the site is underlain by topsoil to approximately 0.3m, over firm to stiff, locally soft, glacial clay to variable depths. This is underlain by weathered shale (mudstone) or sandstone to depths of between 2.5m and 3.3m in the west and 1.8m to 2.3m in the east.

Coal Mining

- 4.5 The site is not within a Development High Risk Area as defined by the Coal Authority, but is within a coal mining referral area, in which a Coal Mining Report is advised.

- 4.6 A CON29M coal mining report was obtained from Terra Firma, as part of the Phase 1 Desk Study, and a summary is given below.
- 4.6.1 The Site is recorded to be underlain by deep underground coal mine workings of nine seams at an approximate depth of 74m to 795m. The last working date is recorded as 1923.
- 4.6.2 The Site is not within a surface area that could be affected by historical, known or unrecorded shallow underground mining.
- 4.6.3 The Site is not affected by any current or future proposed underground coal mining. Reserves of coal are stated to exist in the local area which could be worked at some time in the future, but given the effective abandonment of the coalfields, this is considered highly unlikely.
- 4.6.4 No mine entries are recorded within 20m of the Site.
- 4.6.5 Deep (over 30m) underground coal mine workings are recorded beneath the site and there is a recorded fault within the influence of the Site. Geological features such as faults and fissures can cause ground movement when located above deep underground coal mining. However, this normally occurs shortly after mining activity ceased and/or mines are abandoned. Due to the age of the workings, associated ground movement from this fault is considered unlikely.
- 4.6.6 The site is unaffected by any past, present, or future proposed opencast coal mining.
- 4.7 In the light of the above, the site is considered stable with regard to coal mining.

Coal Recovery

- 4.8 There is not anticipated to be seams beneath the site at depths which could be worked by open excavation. It is extremely unlikely that there will be any arisings of coal during proposed development works, and it will not be possible to win any coal from the site by open excavation before development.
- 4.9 In September 2023 a minerals safeguarding report was issued for the site by ARP (Reference NW134/01/4/l2WWjc, dated 25th September 2023) to assess the potential impact of past, and possible future, coal and mineral extraction on the site. The Report concluded that The REFA site investigation (and historical logs) has confirmed that no minerals of economic significance are present beneath the site. The CON29M mining report indicates there are no significant coal seams beneath the site at depths which could be worked by open excavation. No other mineral resources have been identified on or near the site from available online resources.

Hydrogeology

- 4.10 The Landmark Envirocheck Report obtained by ARP Indicates the Superficial Aquifer to be "Secondary Undifferentiated and the Bedrock Aquifer Designation to be "Secondary A ". These Aquifers comprise "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".
- 4.11 There are no groundwater abstractions within 1km of the site.
- 4.12 The site is not within a groundwater Source Protection Zone.

Hydrology

- 4.13 The general area slopes to the northwest. The nearest downslope surface water is the River Tawd, at 350m to the northwest. Any surface water runoff from the site is likely to enter nearby road drainage on Manfield (road) to the northwest, probably eventually entering the river.

- 4.14 The site is not in an area at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage, are not considered here. If such risk needs to be quantified, a separate specialist Flood Risk and Drainage Report should be commissioned, if not already available.
- 4.15 There are no surface water abstractions within 1km of the site.

Other Environmental Data

- 4.16 The Landmark Envirocheck Report, obtained as part of the Stage 1 Desk Study Report, contains information on numerous environmental aspects. A summary of the pertinent findings, not already covered, with additional comments, is given below.
- 4.16.1 There are no Pollution Control Authorisations within 500m of the site.
- 4.16.2 There are no discharge consents relating to, or immediately adjacent to, the site.
- 4.16.3 There are no closed or currently licenced landfills within 250m of the site. However, several infilled ponds and reservoirs are located at between 30m and 150m to the north.
- 4.16.4 No radon protective measures are stated to be necessary for new dwellings or extensions on the site, and the site is within a “lower probability radon area”.
- 4.16.5 There are no contemporary trade directory entries relating to any activities which could have significant impact on the site.
- 4.16.6 There are no fuel station entries within 250m of the site.

5.0 SITE INVESTIGATIONS

2019 Investigation (REFA)

- 5.1 The relevant details of the REFA combined Stage 1 & 2 Geo-Environmental Investigation Report for the site, including logs, gas monitoring & laboratory testing results can be found in Appendix D. A summary of REFA's investigation is provided below.
- 5.2 The initial intrusive investigation, by REFA in September 2019, consisted of five trial pits and five window sample boreholes. The pits were excavated to depths between 1.9m and 2.6m, below existing ground level (bgl) and the boreholes drilled to depths of between 2.25m and 4.45m.
- 5.3 Monitoring wells were installed in three of the Window Sample Boreholes (WS1, WS2 and WS5) and a program of gas monitoring was undertaken comprising six visits over a period of three months.
- 5.4 Chemical analysis of one sample of the onsite topsoil stockpile, and five samples of in situ topsoil, were undertaken.
- 5.5 Geotechnical testing undertaken included plasticity testing of five samples of cohesive natural superficial deposits; with one sample of the topsoil stockpile, and five samples of in situ topsoil tested for sulphate content and pH.

2023 Investigation (ARP)

- 5.6 A site investigation was undertaken by ARP Geotechnical Ltd on 21st of November 2023. The purpose of the investigation was to target areas not investigated during the initial investigation and confirm depth to bedrock to the west to provide geotechnical information to aid design of the development.

- 5.7 Trial pits and hand augers were sampled across the site. Five trial pits (TP01 to TP05) were excavated, to depths of between 2.4m and 3.5m; and eight hand augers (HA01 to HA08) were excavated, to depths of between 0.4m and 0.5m. The trial pits and auger holes were organised, supervised and logged by an Engineer from ARP Geotechnical Ltd. Justifications for the investigation locations are given below.

LOCATION	RATIONALE
TP01 -TP05	To confirm depth to bedrock
HA01-HA08	To investigate within areas of dense vegetation.

- 5.8 The ARP trial pit and auger hole location plan (including REFA Trial pit and window sample positions), and logs is included in Appendix B.
- 5.9 Chemical analysis of 10 soil samples, for metals, inorganics, speciated PAH, TPH, phenols, and asbestos, was undertaken by the UKAS was undertaken by the UKAS accredited Eurofins Chemtest Laboratory in Newmarket. The test certificates are included in Appendix C.

6.0 SUMMARY OF GROUND CONDITIONS

2019 Investigation (REFA)

- 6.1 All of the REFA trial pit and window sample locations encountered topsoil from surface to between 0.3m and 0.5m depth, with no made ground being encountered. A trial pit was excavated within the stockpiled soil located within the central area of the site and encountered entirely topsoil material. Underlying the topsoil, superficial deposits comprising mainly firm to very stiff clays were recorded to a maximum depth of 4.45m bgl. In situ standard penetration tests (SPTs) were conducted within the window sample boreholes and recorded SPT 'N' values ranging between 16 and 34 between 1m and 4m depth within the superficial deposits, indicating high to very high strength. TP05 recorded a light grey fine to medium sand at depths of between 1.1m and 1.4m bgl.
- 6.2 Rockhead was recorded within locations TP04, TP05 and WS05 at between 1.4m and 1.7m depth. Bedrock was recorded as slightly weathered, strong, fine to coarse grain sandstone and was recorded to a maximum depth of 2.25m bgl. Groundwater ingress was not recorded within any of the exploratory locations.

2023 Investigation (ARP)

- 6.3 The ARP ground investigation recorded topsoil across the site, with a thickness of 0.3m. The topsoil comprised natural cohesive material described generally as a dark brown, sandy, slightly gravelly, clayey topsoil.
- 6.4 The topsoil was typically underlain by firm to stiff, reddish brown, slightly sandy, slightly gravelly clay with low cobble content, to depths of between 2.0m and 3.0m bgl. The gravel content comprised fine to coarse, subangular to subrounded mudstone, quartz and sandstone. The cobble content comprised subrounded to subangular sandstone. The exception was TP5, where made ground was recorded to 1.0m comprising a firm, brown, sandy, slightly gravelly clay. The sand component was fine to coarse. The gravel component

comprised fine to coarse, subrounded to angular mudstone and sandstone. Occasional fragments of pottery, glass, and ceramics, were noted.

- 6.5 Bedrock was encountered in all trial pits. TP01, TP02 and TP03 encountered sandstone bedrock at depths between 2.0m and 3.0m, described as medium strong, massive light greyish yellow fine to medium sandstone. TP04 and TP05 encountered mudstone bedrock at depths between at depths between 2.0m and 3.0m respectively described as extremely weak to weak, thinly laminated, dark grey mudstone.
- 6.6 Groundwater ingress was not encountered in any of the intrusive locations. All trial pits were stable and were backfilled with arisings upon completion. No monitoring wells were installed as part of the investigation.

7.0 CONTAMINATION ANALYSIS

Screening Values - Soils

- 7.1 There is presently conflicting opinion with regard to the appropriate generic assessment criteria, or screening values, for soils which should be used in contamination assessment for proposed development. In March 2014, DEFRA published Category 4 Screening Levels (C4SLs) for six contaminants: arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead. The values are based on the toxicological benchmark of a "low level of toxicological concern" (LLTC) rather than the previous regulatory approach of "minimal or tolerable level of risk". As the C4SLs are less protective of health than the previous approach, the Chartered Institute of Environmental Health (CIEH) has advocated an alternative approach based on minimal risk, but with some adjustment of exposure parameters to more realistic scenarios than those previously used. To this end, the CIEH has collaborated with Land Quality Management to publish "Suitable 4 Use Levels" (S4ULs) "The LQM/CIEH S4ULs for Human Health Risk Assessment", November 2014 (LQM/CIEH). However, DEFRA has reiterated its intention that the C4SLs should be used in generic risk assessment for proposed development, and there is indication that other parties will collaborate, in the near future, to extend the range of C4SL determinands beyond the six published so far.
- 7.2 In the absence of a final resolution to the debate, soil contamination test results in this report have been compared first against the more conservative S4UL, and where a C4SL exists for the same determinand, consideration given to the use of the C4SL for any exceedances of the S4UL, within the site specific context (including the use of benzo(a)pyrene as a surrogate marker for genotoxic PAH compounds, where appropriate). Where no S4UL exists for a determinand, for example lead, the C4SL has been used. The LQM/CIEH screening values have been calculated for soil organic matter contents of 1% and 2.5%, as well as 6%, and the appropriate screening value is used for the organic matter content of the soil. All the C4SL values published are for a soil organic matter content of 6%.
- 7.3 A table showing the screening values utilised is included in Appendix C.

2019 Investigation (REFA)

- 7.4 For all six topsoil samples tested, including the stockpile, all the results were below screening values and no asbestos was identified. Chemical testing results from the REFA investigation are presented in Appendix D.

2023 Investigation (ARP)

- 7.5 Six soil samples were submitted to Chemtest for the suite of testing (As, Cd, Cr (VI), Cr(III), Cu, Hg, Ni, Pb, Se, Zn, Total Sulphate, Water Soluble Sulphate, pH, Phenol-monohydric, Speciated PAH, Total TPH, Asbestos, and Organic Matter). The testing comprised:

- Four samples of the topsoil Stockpile SP1A, SP1B, SP1C and SP1D
- Five samples of the Topsoil, from TP5, TP3, TP2, HA2 and HA8
- One sample of made ground, from TP5.

- 7.6 All the results were below screening values and no asbestos was identified. Therefore, no remedial measures will be required with regards to contamination.

Updated Risk Assessment and Conceptual Model

- 7.7 In the light of the above, there are no contamination sources identified within the soils on site. With respect to the proposed development, no remediation is required for contamination purposes.

8.0 GEOTECHNICAL TESTING

2019 Investigation (REFA)

- 8.1 During the 2019 investigation (REFA) five samples of the natural superficial cohesive strata were submitted to Murray Rix Laboratories Ltd. testing for plasticity indices and moisture content testing. Test certificates are presented in Appendix D and a summary of the results, including Modified Plasticity Indices, is given below.

Location	Depth (m)	MC	LL	PL	PI	<425µm	I'p
TP1	2.0	14	36	11	25	89	22
TP2	1.5	14	38	12	26	90	23
TP3	1.2	17	40	12	28	88	24.6
TP4	1.0	18	37	13	24	85	20
TP5	1.0	21	34	11	23	88	20
No. of results		5	5	5	5	5	5
Min.		19	49	23	0	96	0.0
Max.		19	49	23	26	96	25.0

I'p	VCP
>40%	High
20% - <40%	Medium
10% - <20%	Low

MC = Moisture Content (%)	LL = Liquid Limit (%)	PL = Plastic Limit (%)
PI = Plasticity Index (%)	I'p = Modified PI (%)	VCP = NHBC Standard Chapter 4.2 Volume Change Potential

- 8.2 The plasticity test data shows clays of low to intermediate plasticity, in accordance with BS 5930:2015 +A1:2020 "Code of Practice for Site Investigations". When the percentage retained on the 425 micron BS sieve is considered, the Modified Plasticity Index, in accordance with NHBC Standard Chapter 4.2 "Building Near Trees" is a maximum of 24.64. In accordance with the Standard, this equates to Medium Volume Change Potential.

- 8.3 Geochemical testing (water soluble sulphate and pH) was undertaken on selected samples by Element Laboratories who are an MCERTS and UKAS accredited laboratory facility. The testing comprised six samples of natural strata. In accordance with the BRE Special Digest 1 "Concrete in aggressive ground", the characteristic values for the natural materials are given in the Characteristic Values table, see section 8.4 below:

2023 Investigation (ARP)

- 8.4 Geotechnical testing was not undertaken as part of the ARP investigation. However Geochemical testing (water soluble sulphate and pH) was undertaken on selected samples by Chemtest with regard to the made ground encountered in TP05 in the northeast of the site and has been included in the Characteristic Values table below.

Characteristic Values

Material	pH	SO₄
Made Ground	7.1	34
Natural	5.62	9.7

SO₄ = Sulphate content in mg/l on a 2:1 water : soil extract pH = Acidity

- 8.5 The geochemical analyses show the natural strata to have low water soluble sulphate content and slightly acidic pH. The Aggressive Chemical Environment for Concrete (ACEC) class is AC-1s. The use of GEN1 designated concrete will be satisfactory for unreinforced buried concrete, in accordance with BS 8500-1:2015+A2:2019. For any reinforced buried concrete, other design-specific mixes will apply.

9.0 GEOTECHNICAL ASSESSMENT

Coal Mining and Coal Recovery

- 9.1 The site is considered stable with regard to coal mining. There should be no significant arisings of coal during proposed development works, and it will not be possible to win any coal from the site by open excavation before development

Foundations

- 9.2 The natural firm to stiff clays, encountered below the topsoil and any made ground on the site, are considered suitable for the use of strip/trench fill foundations. An allowable bearing pressure of 120kN/m² is considered applicable. Intact rock is present from depths of between around 2m to 3m. For any foundations seated on/within the rock, an allowable bearing pressure of 300kN/m² is considered applicable.
- 9.3 The clays were shown to be of medium volume change potential. Therefore, in accordance with NHBC Standard Chapter 4.2 "Building Near trees", in the absence of trees, a minimum foundation depth of 0.9m below existing or proposed ground level is applicable, whichever is the lower. However, in the presence of any proposed, existing or removed trees, the foundation may need to be deepened, depending on the type of tree and its distance from the face of the foundation. If not already available, a tree survey may be required to enable a foundation schedule to be prepared. The tree survey will also need to consider trees on third party properties.
- 9.4 The foundation should be taken below the depth of any existing made ground or obstructions, onto natural ground. The whole plan area of the foundation should be placed on similar natural material. Foundations should be reinforced where it is necessary to transition from suitable granular to suitable cohesive strata within a proposed building footprint.

- 9.5 If bedrock is encountered on part of a foundation excavation, the rest of the plot should be deepened to ensure founding on similar material. However, if rock is not encountered by 2.5m depth on the remainder of the plot, then the Engineer should be contacted for further advice.
- 9.6 Foundations within 20m of the geological fault indicated to cross the northeastern corner of the site, will need to be 300mm thick and reinforced with two layers of B503 mesh – one near the bottom and one near the top, to mitigate any potential differential settlement associated with more deeply weathered zones or tilted/stepped strata.

Excavations

- 9.7 It is likely that excavations into the natural strata will remain stable in the short term, requiring minimal trench support, in accordance with the prevailing statutory guidance. However, instability may be anticipated within the made ground encountered within TP05 in the northeastern corner of site.
- 9.8 No groundwater seepages were recorded during either the ARP or REFA ground investigations, therefore ingress during construction works is considered unlikely. If any ingress does occur, this should be controllable by pumping from an artificial sump.
- 9.9 Excavations should be readily achieved using conventional hydraulic plant. However, excavations into intact bedrock are likely to require a hydraulic breaker.

Chemical Precautions

- 9.10 The Aggressive Chemical Environment for Concrete (ACEC) class is AC-1s for the natural strata, on the basis that the site does not have mobile groundwater and the pH value is >3.5 . The use of GEN1 designated concrete will be satisfactory for unreinforced buried concrete, in accordance with BS 8500-1:2015+A2:2019. For any reinforced buried concrete, other design-specific mixes will apply.

Road Pavement Construction

- 9.11 For any areas of road pavement, including parking areas, the formation will be the natural clay deposits. Based on the observed characteristics of the material, a design California Bearing Ratio (CBR) value of 3% is considered applicable, below any obvious soft spots, and at equilibrium moisture content. If considered necessary, this should be confirmed by testing at proposed subgrade level before construction. Formation of roads on the existing made ground will not be acceptable.

Flooding and Soakaways

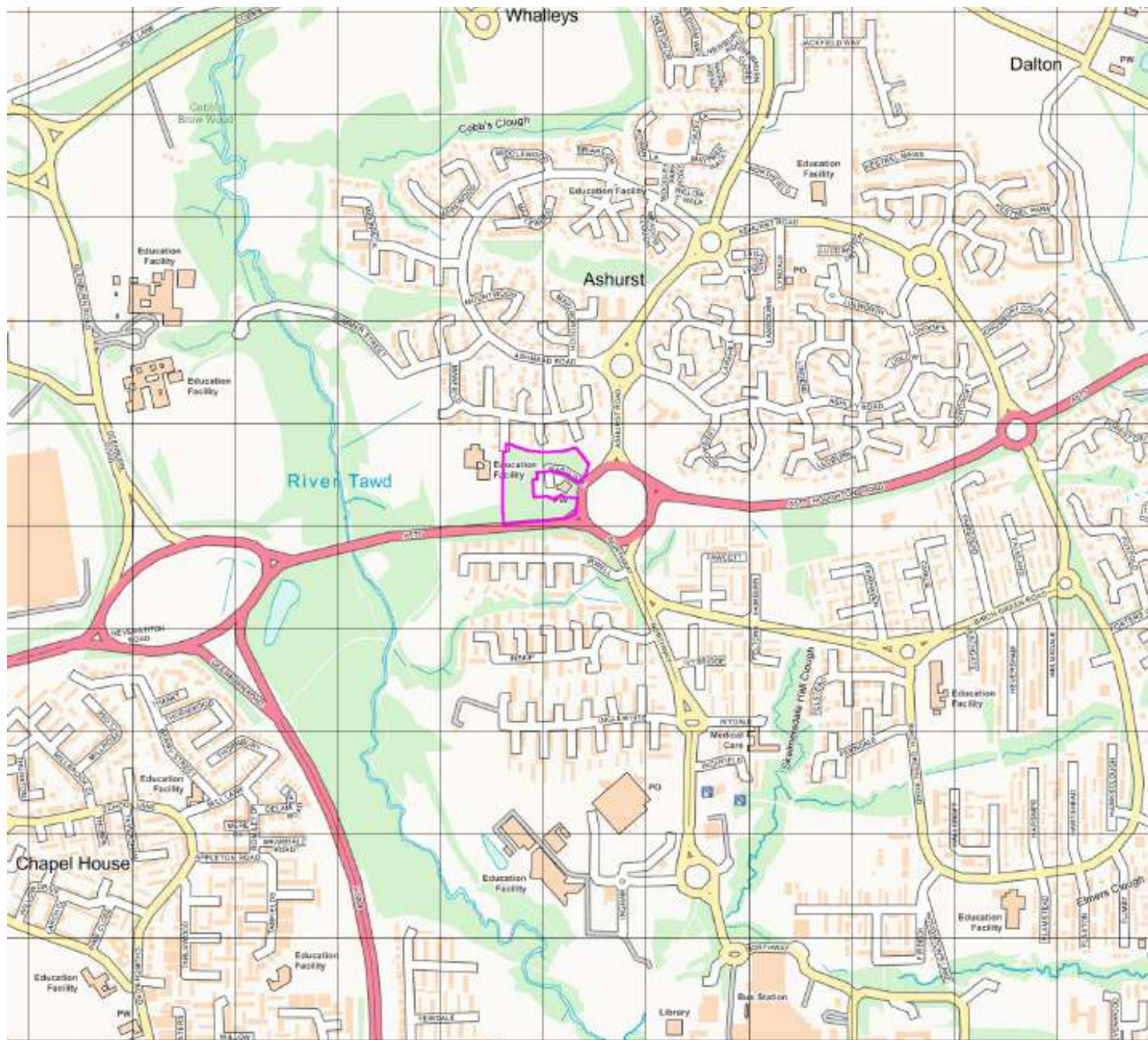
- 9.12 The site is not at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage, are not considered here. If such risk needs to be quantified, a separate specialist Flood Risk and Drainage Report should be commissioned, if not already available.
- 9.13 The disposal of surface water using soakaways is not considered to be practical on the site due to the underlying cohesive strata recorded during the site investigations.

Gas Protection

- 9.14 No radon protective measures are required for properties constructed on the site.
- 9.15 There are no landfills within 250m of the site, and no shallow coal seams/coal workings affecting the site. However, as part of their 2019 investigation, REFA carried out a full programme of ground gas monitoring. This identified CS1 (NHBC Green) ground gas conditions within the site, which does not require any ground gas precautions to be installed into properties on the proposed development.

A P P E N D I X A

SITE LOCATION PLAN, AERIAL PHOTOGRAPH and INDICATIVE PROPOSED SITE LAYOUT



0m 400m

Approximate Scale



ARP NORTH WEST LTD
CHARTERED CONSULTING ENGINEERS

2nd Floor · 3 Hardman Square · Manchester M3 3EB
Telephone : 0113 245 8498 · E-Mail : manchester@arnorthwest.co.uk

Project

ST MARYS CHURCH
SKELMERSDALE

Client

TAWD VALLEY DEVELOPMENTS LTD

Title

SITE LOCATION

Date

September 2023

Drawn

WW

Scale

AS SHOWN

Job No.

NW134-01-4



ARP NORTH WEST LTD
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Project

ST MARYS CHURCH
SKELMERSDALE

Client

TAWD VALLEY DEVELOPMENTS LTD

Title

AERIAL IMAGE

Date

September 2023

Drawn

WW

Scale

AS SHOWN

Job No.

NW134-01-4

Dimensions are to be checked on site. Do not scale from drawings. Report discrepancies to the Architect.

KEY:

Site boundary (Planning)

Land ownership/Tenure split

2.1m high concrete post and timber panel (and gate)

1.5m high concrete post and timber panel fence with 0.3m trellis

0.9m high metal railings

1.2m high post and wire fence

Tree to be removed

Tree location

Planting area

Grassed area

450x450mm PC concrete paving slabs

Tarmac/adam to adopted highways

Block pavers to private driveways

Electric vehicle charging point

Wheellie bin storage locations

N

NOTE THAT
S SURVEY
AND
ONLY TREES
HAVE BEEN

SCHEDULE OF ACCOMMODATION:

Block 01	Plot 01	3B5P T3 House*	m2	Rent to Buy
Block 01	Plot 02	4B6P T5 House*		Rent to Buy
Block 02	Plot 03	2B4P T1 House		Rent to Buy
Block 02	Plot 04	2B4P T1 House		Rent to Buy
Block 03	Plot 05	2B4P T1 House		Rent to Buy
Block 03	Plot 06	2B4P T1 House		Rent to Buy
Block 04	Plot 07	2B4P T1 House		Rent to Buy
Block 04	Plot 08	2B4P T1 House		Rent to Buy
Block 05	Plot 09	3B5P T2 House		Rent to Buy
Block 05	Plot 10	3B5P T2 House		Rent to Buy
Block 06	Plot 11	3B5P T1 House		Rent to Buy
Block 06	Plot 12	3B5P T2 House*		Rent to Buy
Block 07	Plot 13	3B5P T2 House*		Rent to Buy
Block 07	Plot 14	3B5P T1 House		Rent to Buy
Block 08	Plot 15	4B6P T4 House		Rent to Buy
Block 08	Plot 16	3B5P T1 House		Rent to Buy
Block 09	Plot 17	3B5P T1 House		Rent to Buy
Block 09	Plot 18	4B6P T4 House		Rent to Buy
Block 10	Plot 19	3B5P T1 House		For Rent
Block 10	Plot 20	3B5P T1 House		For Rent
Block 11	Plot 21	3B5P T1 House		For Rent
Block 11	Plot 22	3B5P T1 House		For Rent
Block 12	Plot 23	3B5P T1 House		For Rent
Block 12	Plot 24	3B5P T1 House		For Rent
Block 13	Plot 25	3B5P T1 House		For Rent
Block 13	Plot 26	4B6P T4 House		For Rent
Block 14	Plot 27	3B5P T1 House		For Rent
Block 14	Plot 28	3B5P T1 House		For Rent
Block 14	Plot 29	4B6P T4 House		For Rent

*with garage

PROJECT

ST.MARY'S CHURCH
MARYVALE

TITLE

PROPOSED
SITE PLAN

DATE

10.08.23

SCALE (1:250)

STATUS

PLANNING

PROJECT No

1761

DRAWING No

L03

DRAWN BY

JM

CHECKED

DATE

10.08.23

SCALE (1:250)

JOHN MCCALL ARCHITECTS LTD

No.1 Arts Village, Henry Street, Liverpool L1 5BS Tel: 0151 707 1818 Fax: 707 1819

Old Coop Building, Church Street, Hayfield, SK22 2JE e-mail: admin@johnmccall.co.uk

APPENDIX B

BOREHOLE & TRIAL PIT LOCATION PLAN & LOSS



0m ————— 40m

Approximate Scale

-  Bund of Topsoil - SP1
-  REFA Trial Pit SEPT 19
-  REFA WS Borehole SEPT 19
-  ARP Trial Pit NOV 23
-  ARP WS Borehole NOV 23



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS
 Northwest House 5-6 Northwest Business Park Servia Hill Leeds LS6 2QH
 Telephone : 0113 245 8498 Fax : 0113 244 3864 E-Mail : leeds@arpassociates.co.uk

Project ST MARYS CHURCH SKELMERSDALE	
Client TAWD VALLEY DEVELOPMENTS LTD	
Title SITE INVESTIGATION PLAN	
Date NOVEMBER 2023	
Drawn WW	Scale AS SHOWN
Job No. NW134/01/4	



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site
St Mary's Church, Skelmersdale

Trial Pit Number
TP01

Machine : Takeuchi TB260 with Smooth 600mm Bucket

Dimensions
Top of Pit: 3.0m x 0.6m
Bottom of Pit: 2.0m x 0.6m

Ground Level (mOD)

Client
Tawd Valley Developments Ltd

Job Number
NW134/01/04

Method : Trial Pit

Location

Dates
21/11/2023

Project Contractor
A1 Plant Hire

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20	J				(0.30)	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to angular of quartz sandstone and mudstone. Rare fragments of glass and pottery.		
					0.30	Firm to stiff reddish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine. Gravel is fine to coarse subrounded to subangular of quartz sandstone and mudstone. Cobbles are subrounded to subangular sandstone.		
					(1.70)			
					2.00	Medium strong massive light greyish yellow fine to medium SANDSTONE. Arisings recovered as sandy fine to coarse angular gravel with low cobble content. Cobbles are angular.		
					(0.40)			
					2.40	Complete at 2.40m		

Plan

Remarks

4. Ground checked for services with CAT prior to excavation.
3. Trial pit terminated at 2.4 m below ground level due to encountering intact sandstone bedrock.
2. No groundwater encountered.
1. Pit walls stable. Pit infilled with arisings to surface.

Scale (approx)

1:25

Logged By

W.W

Figure No.

NW134/01/04.TP01



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site
St Mary's Church, Skelmersdale

Trial Pit Number
TP02

Machine : Takeuchi TB260 with Smooth 600mm Bucket		Dimensions Top of Pit: 3.0m x 0.6m Bottom of Pit: 2.0m x 0.6m		Ground Level (mOD)		Client Tawd Valley Developments Ltd		Job Number NW134/01/04	
Method : Trial Pit		Location		Dates 21/11/2023		Project Contractor A1 Plant Hire		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20	J				(0.30)	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to angular of quartz sandstone and mudstone.		
					0.30	Firm to stiff reddish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine. Gravel is fine to coarse subrounded to subangular of quartz sandstone and mudstone. Cobbles are subrounded to subangular sandstone.		
					(2.60)			
					2.90	Medium strong massive light greyish yellow fine to medium SANDSTONE. Arisings recovered as sandy fine to coarse angular gravel with low cobble content. Cobbles are angular.		
					(0.30)			
					3.20	Complete at 3.20m		

Plan					Remarks			
.	.	.	.	.	4. Pit walls stable. Pit Infilled with arisings to surface. 3. No groundwater encountered. 2. Trial pit terminated at 3.2 m below ground level due to encountering intact sandstone bedrock. 1. Ground checked for services with CAT prior to excavation.			
.	.	.	.	.				
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.	.	.	.	.				
.	.	.	.	.				
					Scale (approx)		Logged By	Figure No.
					1:25		W.W	NW134/01/04.TP02



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site
St Mary's Church, Skelmersdale

Trial Pit Number
TP03

Machine : Takeuchi TB260 with Smooth 600mm Bucket

Dimensions
Top of Pit: 3.0m x 0.6m
Bottom of Pit: 2.0m x 0.6m

Ground Level (mOD)

Client
Tawd Valley Developments Ltd

Job Number
NW134/01/04

Method : Trial Pit

Location

Dates
21/11/2023

Project Contractor
A1 Plant Hire

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20	J				(0.30)	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to angular of quartz sandstone and mudstone.		
1.00-1.00	J				0.30	Firm to stiff reddish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine. Gravel is fine to coarse subrounded to subangular of quartz sandstone and mudstone. Cobbles are subrounded to subangular sandstone.		
					(2.70)			
					3.00	Medium strong massive light greyish yellow fine to medium SANDSTONE. Arisings recovered as sandy fine to coarse angular gravel with low cobble content. Cobbles are angular.		
					(0.30)			
					3.30	Complete at 3.30m		

Plan

Remarks

1. Ground checked for services with CAT prior to excavation.
2. Trial pit terminated at 3.3 m below ground level due to encountering intact sandstone bedrock.
3. No groundwater encountered.
4. Pit walls stable. Pit infilled with arisings to surface.

Scale (approx)

1:25

Logged By

W.W

Figure No.

NW134/01/04.TP03



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site
St Mary's Church, Skelmersdale

Trial Pit Number
TP04

Machine : Takeuchi TB260 with Smooth 600mm Bucket		Dimensions Top of Pit: 3.0m x 0.6m Bottom of Pit: 2.0m x 0.6m		Ground Level (mOD)		Client Tawd Valley Developments Ltd	Job Number NW134/01/04
Method : Trial Pit		Location		Dates 21/11/2023		Project Contractor A1 Plant Hire	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20	J				(0.30) 0.30	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to angular of quartz sandstone and mudstone. Rare fragments of fabric and plastic.		
1.20-1.20	J				(1.70)	Firm to stiff reddish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine. Gravel is fine to coarse subrounded to subangular of quartz sandstone and mudstone. Cobbles are subrounded to subangular sandstone.		
					2.00 (0.50)	Extremely weak to weak thinly laminated dark grey MUDSTONE. Moderately weathered.		
					2.50	Complete at 2.50m		

Plan					Remarks		
.	.	.	.	.	1. Ground checked for services with CAT prior to excavation. 2 Trial pit terminated at 2.5 m below ground level due to encountering mudstone bedrock. 3. No groundwater encountered. 4. Pit walls stable pit Infilled with arisings to surface.		
.	.	.	.	.			
.	.	.	.	.			
.	.	.	.	.			
.	.	.	.	.			
.	.	.	.	.			
					Scale (approx)	Logged By	Figure No.
					1:50	W.W	NW134/01/04.TP04



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site
St Mary's Church, Skelmersdale

Trial Pit Number
TP05

Machine : Takeuchi TB260 with Smooth 600mm Bucket

Dimensions
Top of Pit: 3.0m x 0.6m
Bottom of Pit: 2.0m x 0.6m

Ground Level (mOD)

Client
Tawd Valley Developments Ltd

Job Number
NW134/01/04

Method : Trial Pit

Location

Dates
21/11/2023

Project Contractor
A1 Plant Hire

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20	J				(0.30)	MADE GROUND. Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to angular of quartz sandstone and mudstone. Rare fragments of glass and pottery.		
0.60-0.60	J				(0.70)	MADE GROUND. Firm brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded to angular of mudstone and sandstone. Occasional fragments of pottery glass and ceramics.		
					1.00	At 0.90m: Disused land drain encountered, 0.15m in diameter.		
					(2.00)	Firm to stiff reddish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine. Gravel is fine to coarse subrounded to subangular of quartz sandstone and mudstone. Cobbles are subrounded to subangular sandstone.		
					3.00	Extremely weak to weak thinly laminated dark grey MUDSTONE. Moderately weathered.		
					(0.50)			
					3.50	Complete at 3.50m		

Plan

Remarks

4. Pit walls stable. Pit Infilled with arisings to surface.
3. No groundwater encountered.
2 Trial pit terminated at 3.5 m below ground level due to encountering mudstone bedrock.
1. Ground checked for services with CAT prior to excavation.

Scale (approx)

1:25

Logged By

W.W

Figure No.

NW134/01/04.TP05



St Mary's Church, Skelmersdale

Number
HA01

Method : Drive-in Windowless Sampler

Dimensions

Ground Level (mOD)

Tawd Valley Developments Ltd

Job Number
NW134/01/0

Location

Dates	21/11/2023
--------------	------------

A1 Plant Hire

Sheet
1/1

Depth
(m)

Sample / Tests

Water
Depth
(m)

Field Records

Level
(mOD)Depth
(m)
(Thickness)

Description

Legend

Water

Dark brown slightly sandy slightly gravelly clayey TOPSOIL.
Sand is fine. Gravel is fine to medium subangular to angular of quartz sandstone and mudstone.

Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone.

Complete at 0.50m

Remarks

1. Ground checked for services with CAT prior to excavation.
2. Hand auger terminated at 0.5 m below ground level due to encountering natural subsoil.
3. No groundwater encountered.

Scale (approx)

1:25

Logged
By

W.W

Figure No.

NW134/01/04-HA01



St Mary's Church, Skelmersdale

Number
HA02

Method : Drive-in Windowless Sampler

Dimensions

Ground Level (mOD)

Tawd Valley Developments Ltd

Job Number
NW134/01/0

Location

Dates

21/11/2023

Project Contractor

A1 Plant Hire

Sheet
1/1

Depth
(m)

Sample / Tests

Water
Depth
(m)

Field Records

Level
(mOD)Depth
(m)
(Thickness)

Description

Legend

Water

0.20-0.20

J

(0.30)
0.30
(0.20)
0.50

Dark brown slightly sandy slightly gravelly clayey TOPSOIL.
Sand is fine. Gravel is fine to coarse subangular to angular
of quartz sandstone and mudstone.

Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone.

Complete at 0.50m

Remarks

2 Hand auger terminated at 0.5 m below ground level due to encountering natural subsoil.
3. No groundwater encountered.
1. Ground checked for services with CAT prior to excavation.

Scale (approx)

1.25

Logged
By

W W

Figure No.

NW134/01/04.HA02



St Mary's Church, Skelmersdale

Number
HA03

Method : Drive-in Windowless Sampler

Dimensions

Ground Level (mOD)

Tawd Valley Developments Ltd

Job Number
NW134/01/0

Location

Dates

21/11/2023

Project Contractor

A1 Plant Hire

Sheet

1/1

Depth
(m)

Sample / Tests

Water
Depth
(m)

Field Records

Level
(mOD)Depth
(m)
(Thickness)

Description

Legend

Water

0.20-0.20

J

(0.30)

$$\begin{array}{r} 0.30 \\ (0.10) \\ 0.40 \end{array}$$

Dark brown slightly sandy slightly gravelly clayey TOPSOIL.
Sand is fine. Gravel is fine to coarse subangular to angular
of quartz sandstone and mudstone.

Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone.

Complete at 0.40m

1. Ground checked for services with CAT prior to excavation.
2. Hand auger terminated at 0.4 m below ground level due to encountering natural subsoil.
3. No groundwater encountered.

Scale (approx)

1:25

Logged
By

W.W

Figure No.

NW134/01/04-HA03



St Mary's Church, Skelmersdale

Number
HA04

Method : Drive-in Windowless Sampler

Dimensions

Ground Level (mOD)

Client

Tawd Valley Developments Ltd

Job Number
NW134/01/0

Location

Dates

21/11/2023

Project Contractor

A1 Plant Hire

Sheet
1/1

Depth
(m)

Sample / Tests

Water
Depth
(m)

Field Records

Level
(mOD)Depth
(m)
(Thickness)

Description

Legend

Water

0.20-0.20

J

(0.30)

$$\begin{array}{r} 0.30 \\ (0.10) \\ 0.40 \end{array}$$

Dark brown slightly sandy slightly gravelly clayey TOPSOIL.
Sand is fine. Gravel is fine to coarse subangular to angular
of quartz sandstone and mudstone.

Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone.

Complete at 0.40m

1. Ground checked for services with CAT prior to excavation.
2. Hand auger terminated at 0.5 m below ground level due to encountering natural subsoil.
3. No groundwater encountered.

Scale (approx)

1:25

Logged
By

W.W

Figure No.

NW134/01/04-HA04



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site

St Mary's Church, Skelmersdale

Number
HA05

Machine : Hand Auger

Method : Drive-in Windowless
Sampler

Dimensions

Ground Level (mOD)

Client

Tawd Valley Developments Ltd

Job
Number
NW134/01/04

Location

Dates

21/11/2023

Project Contractor

A1 Plant Hire

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20	J				(0.30)	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to angular of quartz sandstone and mudstone.		
					0.30			
					(0.20)	Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone.		
					0.50			
						Complete at 0.50m		

Remarks

1. Ground checked for services with CAT prior to excavation.
2. Hand auger terminated at 0.5 m below ground level due to encountering natural subsoil.
3. No groundwater encountered.

Scale
(approx)

1:25

Logged
By

W.W

Figure No.

NW134/01/04.HA05



St Mary's Church, Skelmersdale

Number
HA06

Method : Drive-in Windowless Sampler

Dimensions

Ground Level (mOD)

Tawd Valley Developments Ltd

Job Number
NW134/01/0

Location

Dates

21/11/2023

Project Contractor

A1 Plant Hire

Sheet
1/1

Depth
(m)

Sample / Tests

Water
Depth
(m)

Field Records

Level
(mOD)Depth
(m)
(Thickness)

Description

Legend

Water

0 20-0 20

1

(0.30)

$$\begin{array}{r} 0.30 \\ (0.10) \\ \hline 0.40 \end{array}$$

Dark brown slightly sandy slightly gravelly clayey TOPSOIL.
Sand is fine. Gravel is fine to coarse subangular to angular
of quartz sandstone and mudstone.

Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone.

Complete at 0.40m

1. Ground checked for services with CAT prior to excavation.
2. Hand auger terminated at 0.4 m below ground level due to encountering natural subsoil.
3. No groundwater encountered.

Scale (approx)

1.25

Logged
By

W W

Figure No.

NW134/01/04.HA06



ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

Site

St Mary's Church, Skelmersdale

Number
HA07

Machine : Hand Auger

Method : Drive-in Windowless
Sampler

Dimensions

Ground Level (mOD)

Client

Tawd Valley Developments Ltd

Job
Number
NW134/01/04

Location

Dates

21/11/2023

Project Contractor

A1 Plant Hire

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.20	J				(0.30) 0.30 (0.10) 0.40	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to medium subangular to angular of quartz sandstone and mudstone. Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone. Complete at 0.40m		

Remarks

1. Ground checked for services with CAT prior to excavation.
2. Hand auger terminated at 0.4 m below ground level due to encountering natural subsoil.
3. No groundwater encountered.

Scale
(approx)

1:25

Logged
By

W.W

Figure No.

NW134/01/04.HA07

 ARP GEOTECHNICAL LTD CHARTERED CONSULTING ENGINEERS						Site St Mary's Church, Skelmersdale		Number HA08	
Machine : Hand Auger Method : Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Tawd Valley Developments Ltd		Job Number NW134/01/04	
		Location		Dates 21/11/2023		Project Contractor A1 Plant Hire		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.20-0.20	J				(0.30)	Dark brown slightly sandy slightly gravelly clayey TOPSOIL. Sand is fine. Gravel is fine to coarse subangular to angular of quartz sandstone and mudstone.			
					0.30	Firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium subrounded to subangular of quartz sandstone and mudstone.			
					(0.20)				
					0.50				
						Complete at 0.50m			
Remarks 1. Ground checked for services with CAT prior to excavation. 2. Hand auger terminated at 0.5 m below ground level due to encountering natural subsoil. 3. No groundwater encountered.							Scale (approx) 1:25		Logged By W.W
							Figure No. NW134/01/04.HA08		

A P P E N D I X C

GEOLOGY MAPS AND CON29M REPORT



ARP GEOTECHNICAL LIMITED
SOIL CONTAMINANT SCREENING VALUES
RESIDENTIAL WITH HOME-GROWN PRODUCE

Determinand	S4UL (mg/kg)			C4SL (mg/kg)		
Arsenic	37			37		
Cadmium	11			22		
Chromium (trivalent)	910					
Chromium (hexavalent)	6			21		
Copper	2400					
Lead				200		
Inorganic Mercury	40					
Nickel	180					
Selenium	250					
Zinc	3700					
Acidity (pH)	*Should be Greater Than 5			*Should be Greater Than 5		
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM
Naphthalene	2.3	5.6	13			
Acenaphthylene	170	420	920			
Acenaphthene	210	510	1,100			
Fluorene	170	400	860			
Phenanthrene	95	220	440			
Anthracene	2,400	5,400	11,000			
Fluoranthene	280	560	890			
Pyrene	620	1,200	2,000			
Benzo(a)anthracene	7.2	11	13			
Chrysene	15	22	27			
Benzo(b)fluoranthene	2.6	3.3	3.7			
Benzo(k)fluoranthene	77	93	100			
Benzo(a)pyrene	2.2	2.7	3			5
Indeno(1,2,3-cd)pyrene	27	36	41			
Dibenzo(a,h)anthracene	0.24	0.28	0.30			
Benzo(g,h,i)perylene	320	340	350			
Phenols	120	200	380			
Total TPH	*Above 500, speciate and compare with values below:					
C5 to C6 Aliphatic	42	78	160			
C6 to C8 Aliphatic	100	230	530			
C8 to C10 Aliphatic	27	65	150			
C10 to C12 Aliphatic	130	330	760			
C12 to C16 Aliphatic	1100	2,400	4,300			
C16 to C35 Aliphatic	65,000	92,000	110,000			
C35 TO C44 Aliphatic	65,000	92,000	110,000			
C5 to C7 Aromatic (Benzene)	70	140	300			
C7 to C8 Aromatic (Toluene)	130	290	660			
C8 to C10 Aromatic	34	83	190			
C10 to C12 Aromatic	74	180	380			
C12 to C16 Aromatic	140	330	660			
C16 to C21 Aromatic	260	540	930			
C21 TO C35 Aromatic	1100	1,500	1,700			
C35 TO C44 Aromatic	1100	1,500	1,700			
Asbestos	*Should be None Detected			*Should be None Detected		

* In House Value/Approach S4UL = Suitable 4 Use Level, CIEH/LQM 2014 C4SL = Cat 4 Screening Level, DEFRA, 2014

Blank cell indicates no published value or in-house value. Some values presented are above saturation limits.

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Final Report

Report No.: 23-39894-1

Initial Date of Issue: 13-Dec-2023

Re-Issue Details:

Client ARP Geotechnical Ltd

Client Address: 5/6 Northwest Business Park
Servia Hill
Leeds
Yorkshire
LS6 2QH

Contact(s): William Watkins

Project NW134-01-04 St Mary's Church,
Skelmersdale

Quotation No.: Q23-30074

Date Received: 01-Dec-2023

Order No.: NW134-01-04

Date Instructed: 01-Dec-2023

No. of Samples: 10

Turnaround (Wkdays): 8

Results Due: 12-Dec-2023

Date Approved: 13-Dec-2023

Approved By:

Details: Stuart Henderson, Technical
Manager

Results - Soil

Project: NW134-01-04 St Mary's Church, Skelmersdale

Client: ARP Geotechnical Ltd	Chemtest Job No.:				23-39894	23-39894	23-39894	23-39894	23-39894	23-39894	23-39894	23-39894	23-39894
Quotation No.: Q23-30074	Chemtest Sample ID.:				1739596	1739597	1739598	1739599	1739600	1739601	1739602	1739603	1739604
Order No.: NW134-01-04	Client Sample Ref.:				A	B	C	D					
	Sample Location:				SP1	SP1	SP1	SP1	TP5	TP5	HA2	TP3	TP2
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.1	0.2	0.2	0.2	0.6	0.2	0.2	0.2	0.2
	Bottom Depth (m):				0.1	0.2	0.2	0.2	0.6	0.2	0.2	0.2	0.2
	Date Sampled:				21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	18	22	21	23	16	34	23	17	18
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones and Roots	Stones and Roots	None	Roots	Roots	Roots	Roots	Stones and Roots	None
Soil Texture	N	2040		N/A	Loam	Loam	Loam	Clay	Clay	Clay	Clay	Clay	Clay
pH at 20C	M	2010		4.0	6.5	7.2	7.4	7.3	7.1	6.9	6.9	6.9	6.4
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.034	0.013	0.014	0.012	0.034	0.025	0.013	0.012	< 0.010
Sulphate (Total)	U	2430	mg/kg	100	600	610	870	1300	1400	960	560	540	620
Arsenic	M	2455	mg/kg	0.5	12	18	15	9.9	13	15	16	14	18
Cadmium	M	2455	mg/kg	0.10	0.53	0.26	0.19	0.10	0.18	0.20	0.20	0.16	0.13
Chromium	M	2455	mg/kg	0.5	23	30	28	38	44	35	22	20	21
Copper	M	2455	mg/kg	0.50	27	36	28	20	38	33	29	29	29
Mercury	M	2455	mg/kg	0.05	0.09	0.10	0.08	< 0.05	0.07	0.11	0.18	0.07	0.07
Nickel	M	2455	mg/kg	0.50	17	20	21	25	37	27	18	16	18
Lead	M	2455	mg/kg	0.50	38	49	41	24	38	49	44	42	44
Selenium	M	2455	mg/kg	0.25	0.75	0.77	0.72	0.64	1.0	0.93	0.69	0.59	0.72
Zinc	M	2455	mg/kg	0.50	54	51	53	46	75	69	53	45	53
Chromium (Trivalent)	N	2490	mg/kg	1.0	23	30	28	38	44	35	22	20	21
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	3.4	3.5	2.9	4.0	1.7	5.3	3.5	2.7	3.1
Total TPH >C6-C40	M	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.39	< 0.10	< 0.10	< 0.10	0.33	0.17	0.18
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	0.16	< 0.10	0.15
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.14	0.45	0.21	< 0.10	< 0.10	0.39	0.16	0.21
Pyrene	M	2700	mg/kg	0.10	< 0.10	0.12	0.45	0.25	< 0.10	< 0.10	0.37	0.17	0.20
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	0.28	< 0.10	< 0.10	< 0.10	< 0.10	0.72	< 0.10	0.53
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.27	< 0.10	0.22
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.66	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10	< 0.10

Results - Soil

Project: NW134-01-04 St Mary's Church, Skelmersdale

Client: ARP Geotechnical Ltd	Chemtest Job No.:		23-39894	23-39894	23-39894	23-39894	23-39894	23-39894	23-39894	23-39894	23-39894	23-39894
Quotation No.: Q23-30074	Chemtest Sample ID.:		1739596	1739597	1739598	1739599	1739600	1739601	1739602	1739603	1739604	1739604
Order No.: NW134-01-04	Client Sample Ref.:		A	B	C	D						
	Sample Location:		SP1	SP1	SP1	SP1	TP5	TP5	HA2	TP3	TP2	
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):		0.1	0.2	0.2	0.2	0.6	0.2	0.2	0.2	0.2	0.2
	Bottom Depth (m):		0.1	0.2	0.2	0.2	0.6	0.2	0.2	0.2	0.2	0.2
	Date Sampled:		21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023	21-Nov-2023
	Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD								
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	3.3	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: NW134-01-04 St Mary's Church, Skelmersdale

Client: ARP Geotechnical Ltd	Chemtest Job No.:		23-39894		
Quotation No.: Q23-30074	Chemtest Sample ID.:		1739605		
Order No.: NW134-01-04	Client Sample Ref.:				
	Sample Location:		HA8		
	Sample Type:		SOIL		
	Top Depth (m):		0.2		
	Bottom Depth (m):		0.2		
	Date Sampled:		21-Nov-2023		
	Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	28
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Roots
Soil Texture	N	2040		N/A	Clay
pH at 20C	M	2010		4.0	5.9
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.019
Sulphate (Total)	U	2430	mg/kg	100	990
Arsenic	M	2455	mg/kg	0.5	10
Cadmium	M	2455	mg/kg	0.10	0.15
Chromium	M	2455	mg/kg	0.5	17
Copper	M	2455	mg/kg	0.50	23
Mercury	M	2455	mg/kg	0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	13
Lead	M	2455	mg/kg	0.50	32
Selenium	M	2455	mg/kg	0.25	0.52
Zinc	M	2455	mg/kg	0.50	47
Chromium (Trivalent)	N	2490	mg/kg	1.0	17
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	3.9
Total TPH >C6-C40	M	2670	mg/kg	10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10

Results - Soil

Project: NW134-01-04 St Mary's Church, Skelmersdale

Client: ARP Geotechnical Ltd	Chemtest Job No.:		23-39894		
Quotation No.: Q23-30074	Chemtest Sample ID.:		1739605		
Order No.: NW134-01-04	Client Sample Ref.:				
	Sample Location:		HA8		
	Sample Type:		SOIL		
	Top Depth (m):		0.2		
	Bottom Depth (m):		0.2		
	Date Sampled:		21-Nov-2023		
	Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH at 20°C	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

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

Charges may apply to extended sample storage

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

customerservices@chemtest.com

APPENDIX D

REFAS LOGS, LABORATORY CERTIFICATES & GAS MONITOR RESULTS

Trial Pit Log

TrialPit No

TP01

Sheet 1 of 1

Project Name: Cobbs Brow, Skelmersdale

Project No.
19153

Co-ords: -

Level:

Date

17/09/2019

Location: Cobbs Brow, Skelmersdale

		2.10
Dimensions (m)	0.70	

Scale

1:25

Logged
MGD

Client: Lancashire County Council

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00		HVP=61	0.35			Grass over TOPSOIL: Dark brown silty sand.	1 -
							Firm mottled orangish brown sandy CLAY. Sand is fine.	
				1.60			Firm to stiff dark brown gravelly CLAY. Gravel is fine to coarse, sub-angular to rounded of various lithologies.	2 -
						2.60	End of Pit at 2.60m	
						5 -		

Remarks: No groundwater ingress.

Stability: Pit stable.



 Robert L. Pryor Associates, 43 Ridgeway Terrace, Wigan, Lancs L97 01692 433 000 email@refa.co.uk				Trial Pit Log			Trial Pit No TP02 Sheet 1 of 1		
Project Name: Cobbs Brow, Skelmersdale				Project No. 19153		Co-ords: - Level:		Date 17/09/2019	
Location: Cobbs Brow, Skelmersdale						Dimensions (m) 0.70 2.10		Scale 1:25	
Client: Lancashire County Council								Logged MGD	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.50			Grass over TOPSOIL: Dark brown silty sand.		
	1.00		HVP=77				Firm to stiff mottled greyish brown gravelly CLAY. Gravel is fine to coarse, sub-angular to rounded of various lithologies.		
	1.50		HVP=92						
				2.30			End of Pit at 2.30m		
Remarks: No groundwater ingress. Stability: Pit stable.									



 Robert L. Pryor Associates, 43 Bridgeman Terrace, Wigan, WIR9 1PT (01942) 838-000 mail@refa.co.uk				Trial Pit Log			TrialPit No TP04 Sheet 1 of 1			
Project Name: Cobbs Brow, Skelmersdale				Project No. 19153		Co-ords: - Level:		Date 17/09/2019		
Location: Cobbs Brow, Skelmersdale				Dimensions (m) 0.70 2.10			Scale 1:25		Logged MGD	
Client: Lancashire County Council										
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	1.00		HVP=84	0.40			Grass over TOPSOIL: Dark brown sandy clay.			1
				1.20			Firm to stiff mottled greyish brown slightly sandy gravelly CLAY. Gravel is fine to coarse, sub-angular to rounded of various lithologies.			
				1.70			Light brown clayey fine to coarse GRAVEL. Gravel is angular of sandstone. (Highly weathered bedrock)			
				2.00			Slightly weathered brownish grey medium to coarse grained SANDSTONE.			
				End of Pit at 2.00m						
										3
										4
										5
Remarks: No groundwater ingress. Stability: Pit stable.										

 Robert E. Pryor Associates, 483 Bridgeway Terrace, Wigan, Lancashire, WN1 1LT (01693) 438-000 email@refa.co.uk				Trial Pit Log			Trial Pit No TP05 Sheet 1 of 1		
Project Name: Cobbs Brow, Skelmersdale				Project No. 19153		Co-ords: - Level:		Date 17/09/2019	
Location: Cobbs Brow, Skelmersdale						Dimensions (m) 0.70 2.10		Scale 1:25	
Client: Lancashire County Council								Logged MGD	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	1.00		HVP=92	0.40			Grass over TOPSOIL: Dark brown sandy clay.		
				1.10			Firm to stiff orangish brown sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse, sub-angular to rounded of various lithologies.		
				1.40			Light grey fine to medium SAND.		
	1.50		HVP=107	1.65			Stiff dark brown slightly sandy CLAY. Sand is fine.		
				1.90			Highly weathered reddish brown coarse grained SANDSTONE.		
							End of Pit at 1.90m		
1 2 3 4 5									
Remarks: No groundwater ingress. Stability: Pit stable.									
									

Geo-Ventures (UK) Limited Geotechnical and Environmental Services Site Cobbs Brown, Maryvale, Skelmersdale Number WS 1									
Excavation Method		Dimensions		Ground Level (mOD)		Client		Job Number	
Drive-in Windowless Sampler								19-1832	
		Location		Dates		Engineer		Sheet	
				19/09/2019		Robert E Fry & Associates Limited		1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				(0.30)	Brown clayey TOPSOIL with rootlets			
					0.30	Firm / stiff brown slightly sandy CLAY			
0.50	D				(0.50)				
					0.80	Stiff brown CLAY			
1.00-1.45	SPT(C) N=16		1,3/3,4,4,5		(0.90)				
1.00	D				1.70	Very stiff grey / brown CLAY			
2.00-2.45	SPT(C) N=30		3,4/6,7,8,9		(1.90)				
2.00	D								
3.00-3.45	SPT(C) N=34		4,5/8,8,9,9						
3.00	D								
3.60	D				3.60	Complete at 3.60m			
Remarks Services inspection pit excavated by hand No movement of sampler barrel at 3.60m							Scale (approx) 1:50	Logged By Dr J Crook	Figure No. 19-1832.WS 1

Geo-Ventures (UK) Limited Geotechnical and Environmental Services						Site Cobbs Brown, Maryvale, Skelmersdale		Number WS 2	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 19-1832	
		Location		Dates 19/09/2019		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				(0.40)	Brown clayey TOPSOIL with rootlets			
0.50	D				0.40	Stiff brown CLAY			
1.00-1.45 1.00	SPT(C) N=16 D		2,3/4,4,4,4		(1.60)				
2.00-2.45 2.00	SPT(C) N=21 D		3,5/5,6,5,5		2.00	Firm brown CLAY			
					(1.00)				
3.00-3.45 3.00	SPT(C) N=32 D		4,6/6,8,9,9		3.00	Stiff / very stiff brown CLAY			
					(0.70)				
3.70	D				3.70	Complete at 3.70m			
Remarks Services inspection pit excavated by hand No movement of sampler barrel at 3.70m							Scale (approx) 1:50	Logged By Dr J Crook	
							Figure No. 19-1832.WS 2		

Geo-Ventures (UK) Limited <i>Geotechnical and Environmental Services</i>						Site Cobbs Brown, Maryvale, Skelmersdale		Number WS 4	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client		Job Number 19-1832	
		Location		Dates 19/09/2019		Engineer Robert E Fry & Associates Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D				(0.30) 0.30	Brown clayey TOPSOIL with rootlets			
0.50	D					Stiff brown CLAY			
1.00-1.45 1.00	SPT(C) N=18 D		2,3/4,4,5,5		(2.10)				
2.00-2.45 2.00	SPT(C) N=24 D		2,4/5,5,6,8		2.40	Very stiff brown CLAY			
3.00-3.45 3.00	SPT(C) N=34 D		5,6/8,8,9,9		(1.20)				
3.60	D				3.60	Complete at 3.60m			
Remarks Services inspection pit excavated by hand No movement of sampler barrel at 3.60m							Scale (approx) 1:50		Logged By Dr J Crook
							Figure No. 19-1832.WS 4		

Geo-Ventures (UK) Limited Geotechnical and Environmental Services Site Cobbs Brown, Maryvale, Skelmersdale Number WS 5									
Excavation Method		Dimensions		Ground Level (mOD)		Client		Job Number	
Drive-in Windowless Sampler								19-1832	
		Location		Dates		Engineer		Sheet	
				19/09/2019		Robert E Fry & Associates Limited		1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				(0.30)	Brown clayey TOPSOIL with rootlets			
0.50	D				0.30	Stiff brown slightly sandy CLAY			
1.00-1.45	SPT(C) N=23		3,4/5,6,6,6		(1.10)				
1.00	D								
1.50	D				1.40	Strong grey / brown medium grained SANDSTONE			
2.00-2.25	SPT(C) 11/100		4,8/11		(0.85)				
2.00	D				2.25	Complete at 2.25m			
Remarks Refusal on SPT at 2.25m Services inspection pit excavated by hand							Scale (approx) 1:50	Logged By Dr J Crook	Figure No. 19-1832.WS 5

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS01	0.0	0	0.0				0.1		15.9		83.9		1.62	998	
WS02	0.0	0	0.0				0.0		16.0		83.9		DRY	998	
WS05	0.0	0	0.1				0.0		16.1		83.7		DRY	998	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by:
Weather :
Equipment used:
Visible signs of vegetation stress:
Boreholes sampled for laboratory analysis:

Other comments / observations:

Simon Edwards
Cool / windy
LMS Type G3 xi Gas Meter

Contract:
**Cobbs Brow, Maryvale
Skelmersdale**

Date:
01.10.2019

Job No.

Sheet No.
1

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD
Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS01	0.0	0	0.0				0.0		18.5		81.4		1.85	1012	
WS02	0.0	0	0.0				0.0		18.9		81.0		DRY	1012	
WS05	0.0	0	0.1				0.0		18.8		81.1		DRY	1012	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by:

Weather :

Equipment used:

Visible signs of vegetation stress:

Boreholes sampled for laboratory analysis:

Other comments / observations:

Simon Edwards

Dry

LMS Type G3 xi Gas Meter

Contract:

**Cobbs Brow, Maryvale
Skelmersdale**

Date:

17.10.2019

Job No.

Sheet No.

2

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS01	0.0	0	0.0				0.0		18.2		81.7		2.14	1012	
WS02	0.0	0	0.0				0.0		18.1		81.8		DRY	1012	
WS05	0.0	0	0.1				0.0		18.4		81.5		DRY	1012	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by:
Weather :
Equipment used:
Visible signs of vegetation stress:
Boreholes sampled for laboratory analysis:

Other comments / observations:

Simon Edwards
Cool
LMS Type G3 xi Gas Meter

Contract:
**Cobbs Brow, Maryvale
Skelmersdale**

Date:
21.11.2019

Job No.

Sheet No.
3

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD
Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS01	0.0	0	0.0				0.0		18.0		81.9		2.20	1002	
WS02	0.0	0	0.0				0.0		18.3		81.6		DRY	1002	
WS05	0.0	0	0.1				0.0		18.2		81.7		DRY	1002	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by:
Weather :
Equipment used:
Visible signs of vegetation stress:
Boreholes sampled for laboratory analysis:

Other comments / observations:

Simon Edwards
Dry
LMS Type G3 xi Gas Meter

Contract:
**Cobbs Brow, Maryvale
Skelmersdale**

Date:
15.02.2020

Job No.

Sheet No.
4

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD
Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS01	0.0	0	0.0				0.1		16.9		82.9		2.25	1031	
WS02	0.0	0	0.0				0.8		17.7		81.4		DRY	1031	
WS05	0.0	0	0.1				0.0		20.2		79.7		DRY	1031	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by:
Weather :
Equipment used:
Visible signs of vegetation stress:
Boreholes sampled for laboratory analysis:

Other comments / observations:

Simon Edwards
Sunny
LMS Type G3 xi Gas Meter

Contract:
**Cobbs Brow, Maryvale
Skelmersdale**

Date:
06.02.2020

Job No.

Sheet No.
5

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD
Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Ground Gas Monitoring Record

Borehole	Gas Flow (l/hr)	Borehole Pressure (Pa)	Methane (% v/v)		Methane (%LEL*)		Carbon Dioxide (%v/v)		Oxygen (%v/v)		Nitrogen (%v/v)		Depth to water (m bgl)	Atmospheric Pressure (mB)	Comments
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
WS01	0.0	0	0.0				0.0		21.1		78.8		2.05	998	
WS02	0.0	0	0.1				0.3		21.3		78.2		DRY	998	
WS05	0.0	0	0.0				0.1		21.1		78.7		DRY	998	

Notes:

Monitoring should be for not less than 3 Minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 mins.

* LEL = Explosive Limit = 5%v/v

ND - Not Detected

Relevant Information at times of monitoring

Monitored by:

Weather :

Equipment used:

Visible signs of vegetation stress:

Boreholes sampled for laboratory analysis:

Other comments / observations:

Simon Edwards

Cold. Rain

LMS Type G3 xi Gas Meter

Contract:

**Cobbs Brow, Maryvale
Skelmersdale**

Date:

13.02.2020

Job No.

Sheet No.

6

Geo-Ventures (UK) Limited

70 Riverside Close, Waterside, Howley, Warrington, Cheshire WA1 2JD

Tel. 01925 240476 email: paul.platt@geoventures.co.uk

Robert E Fry & Associates Ltd
45 Bridgeman Terrace
Wigan
WN1 1TT



Attention :	Matthew Dowling
Date :	24th September, 2019
Your reference :	19153
Our reference :	Test Report 19/15213 Batch 1
Location :	Cobbs Brow, Skelmersdale
Date samples received :	19th September, 2019
Status :	Final report
Issue :	1

Six samples were received for analysis on 19th September, 2019 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Phil Sommerton BSc

Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Robert E Fry & Associates Ltd
Reference: 19153
Location: Cobbs Brow, Skelmersdale
Contact: Matthew Dowling
EMT Job No: 19/15213

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2	3	4	5	6					Please see attached notes for all abbreviations and acronyms		
Sample ID	TP01	TP02	TP03	TP04	TP05	S1							
Depth	0.20	0.40	0.10	0.20	0.20	STOCKPILE							
COC No / misc													
Containers	J	J	J	J	J	J							
Sample Date	16/09/2019	16/09/2019	16/09/2019	16/09/2019	16/09/2019	16/09/2019							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019					LOD/LOR	Units	Method No.
Arsenic #	14.8	15.7	16.0	14.7	11.9	15.0					<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1	<0.1	<0.1	0.4	<0.1					<0.1	mg/kg	TM30/PM15
Chromium #	74.2	75.4	60.3	75.0	68.8	74.8					<0.5	mg/kg	TM30/PM15
Copper #	39	43	39	34	36	37					<1	mg/kg	TM30/PM15
Lead #	70	58	66	48	35	56					<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	mg/kg	TM30/PM15
Nickel #	24.3	24.1	23.0	23.1	27.9	26.8					<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	1	<1					<1	mg/kg	TM30/PM15
Zinc #	82	74	82	64	67	73					<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.05	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.05	<0.03	<0.03	<0.03	<0.03	<0.03					<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.46	0.05	<0.03	0.08	<0.03	<0.03					<0.03	mg/kg	TM4/PM8
Anthracene #	0.14	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.93	0.09	0.07	0.11	0.07	<0.03					<0.03	mg/kg	TM4/PM8
Pyrene #	0.88	0.07	0.07	0.10	0.07	<0.03					<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.64	0.10	<0.06	0.08	0.07	<0.06					<0.06	mg/kg	TM4/PM8
Chrysene #	0.68	0.05	0.05	0.07	0.06	<0.02					<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene #	1.15	0.10	<0.07	0.10	0.11	<0.07					<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.64	<0.04	<0.04	0.05	0.06	<0.04					<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	0.33	<0.04	<0.04	<0.04	0.05	<0.04					<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.06	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.29	<0.04	<0.04	<0.04	0.05	<0.04					<0.04	mg/kg	TM4/PM8
PAH 16 Total	6.3	<0.6	<0.6	<0.6	<0.6	<0.6					<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.83	0.07	<0.05	0.07	0.08	<0.05					<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.32	0.03	<0.02	0.03	0.03	<0.02					<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	102	102	103	104	103	104					<0	%	TM4/PM8
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15					<0.15	mg/kg	TM26/PM21
Natural Moisture Content	19.0	22.4	32.1	21.0	22.3	21.3					<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	15.9	18.3	24.3	17.3	18.2	17.6					<0.1	%	PM4/PM0
Sulphate as SO4 (2:1 Ext) #	<0.0015	0.0092	0.0088	0.0097	0.0086	0.0088					<0.0015	g/l	TM38/PM20
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	2.47	2.15	4.69	8.61	1.37	2.59					<0.02	%	TM21/PM24
Sulphide	<10	<10	<10	<10	<10	<10					<10	mg/kg	TM107/PM119

Element Materials Technology

Client Name: Robert E Fry & Associates Ltd
Reference: 19153
Location: Cobbs Brow, Skelmersdale
Contact: Matthew Dowling
EMT Job No: 19/15213

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Element Materials Technology

Notification of Deviating Samples

Client Name: Robert E Fry & Associates Ltd
Reference: 19153
Location: Cobbs Brow, Skelmersdale
Contact: Matthew Dowling

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 19/15213

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 19/15213

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885:2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes		AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes



TEST REPORT

Client Robert E Fry & Associates Ltd (REFA)

Address 45 Bridgeman Terrace
Wigan
WN1 1TT

Contract 19153 -
Cobbs Brow, Skelmersdale

Job Number MRN 3541/28
Date of Issue 27 September 2019
Page 1 of 6

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted. This does not, however, guarantee the balance of the materials from which the tested samples have been taken to be of equal quality.



MURRAY RIX

33C Vauxhall Ind. Estate, Greg Street
Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871



TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

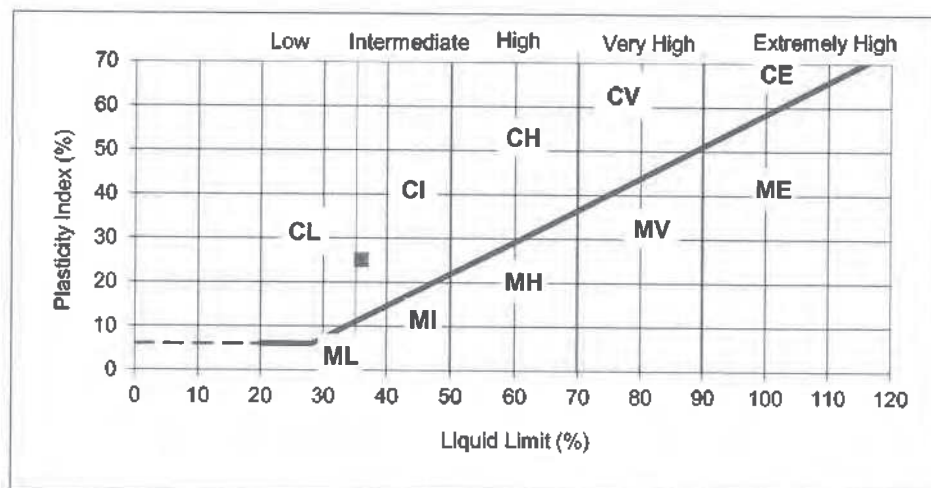
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	Robert E Fry & Associates Ltd (REFA)		
SITE	19153 - Cobbs Brow, Skelmersdale		
JOB NUMBER	MRN 3541/28		

SAMPLE LABEL	TP01 2m	DATE SAMPLED	17-Sep-19
SAMPLE No.	85823	DATE RECEIVED	19-Sep-19
DATE TESTED	23-Sep-19	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14	36	11	25	89



REMARKS

Sample tested in natural condition

SIGNED

NAME
Page 2 of 6

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

DATE 27-Sep-19

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

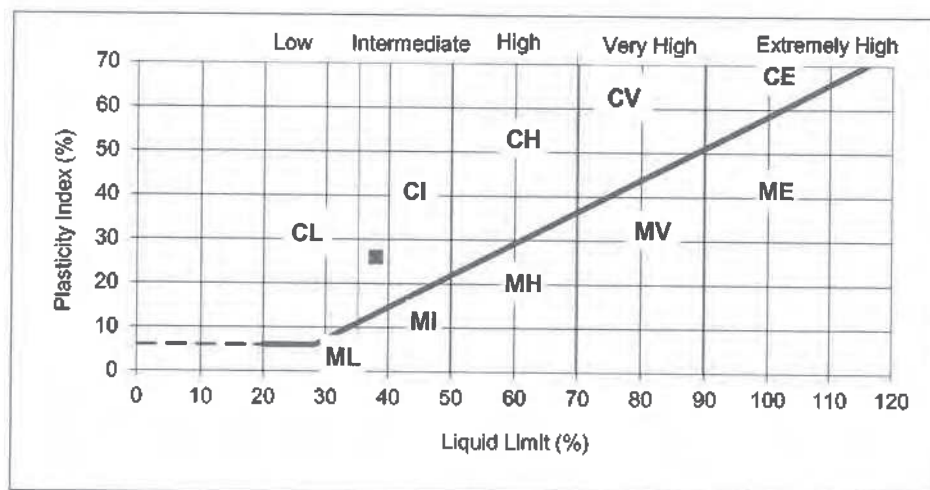
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	Robert E Fry & Associates Ltd (REFA)
SITE	19153 - Cobbs Brow, Skelmersdale
JOB NUMBER	MRN 3541/28

SAMPLE LABEL	TP02 1.5m	DATE SAMPLED	17-Sep-19
SAMPLE No.	85824	DATE RECEIVED	19-Sep-19
DATE TESTED	23-Sep-19	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14	38	12	26	90



REMARKS

Sample tested in natural condition

SIGNED

NAME

Page 3 of 6

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

DATE

27-Sep-19

MURRAY RIX

33C Vauxhall Ind. Estate, Greg Street
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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

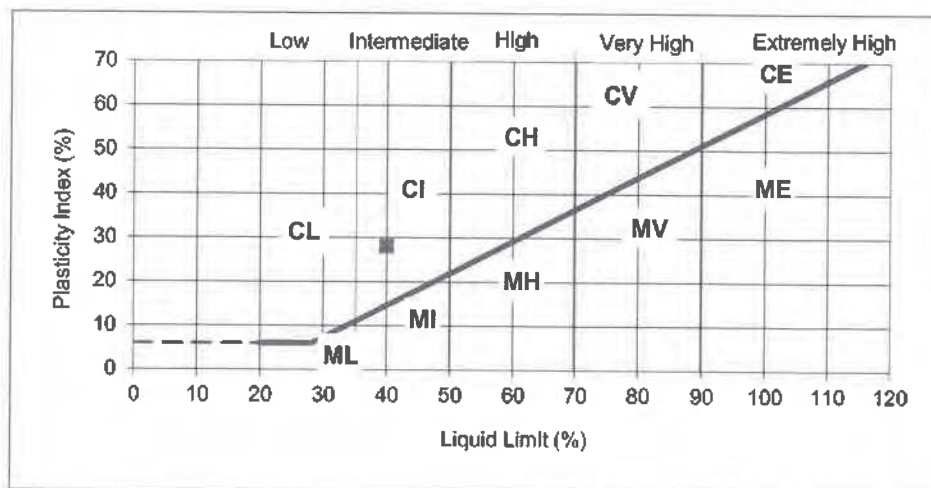
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	Robert E Fry & Associates Ltd (REFA)
SITE	19153 - Cobbs Brow, Skelmersdale
JOB NUMBER	MRN 3541/28

SAMPLE LABEL	TP03 1.2m	DATE SAMPLED	17-Sep-19
SAMPLE No.	85825	DATE RECEIVED	19-Sep-19
DATE TESTED	23-Sep-19	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	40	12	28	88



REMARKS

Sample tested in natural condition

SIGNED

NAME
Page 4 of 6

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

DATE 27-Sep-19

MURRAY RIX

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TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

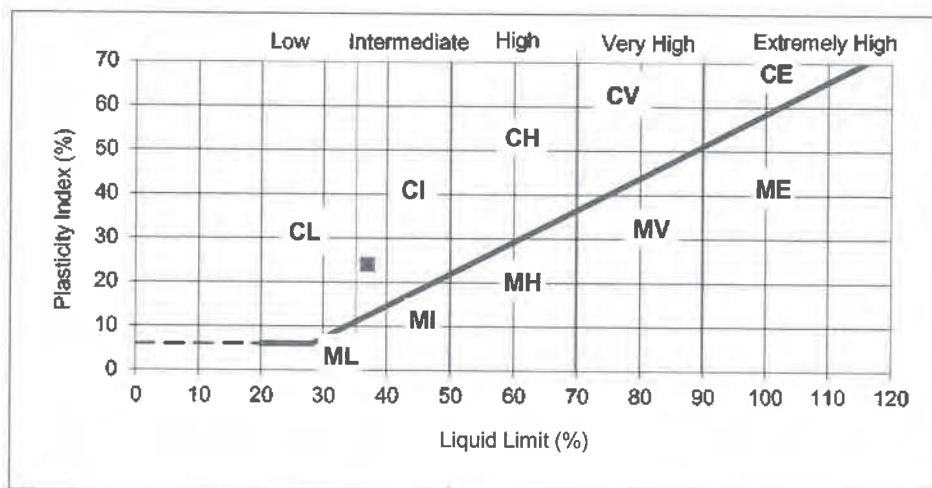
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	Robert E Fry & Associates Ltd (REFA)		
SITE	19153 - Cobbs Brow, Skelmersdale		
JOB NUMBER	MRN 3541/28		

SAMPLE LABEL	TP04 1m	DATE SAMPLED	17-Sep-19
SAMPLE No.	85826	DATE RECEIVED	19-Sep-19
DATE TESTED	23-Sep-19	SAMPLED BY	Client

MATERIAL	Stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18	37	13	24	85



REMARKS

Sample tested in natural condition

SIGNED

NAME

Page 5 of 6

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

DATE

27-Sep-19

MURRAY RIX

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TEST CERTIFICATE LIQUID AND PLASTIC LIMIT

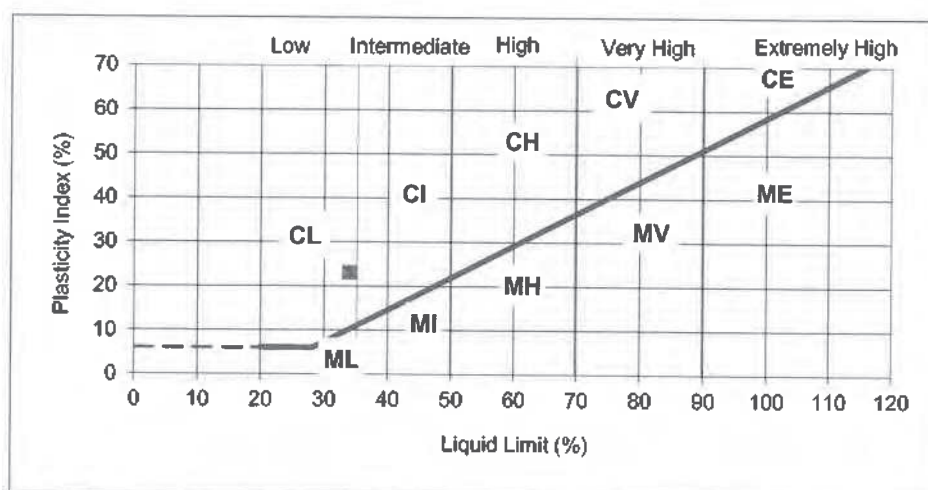
BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	Robert E Fry & Associates Ltd (REFA)
SITE	19153 - Cobbs Brow, Skelmersdale
JOB NUMBER	MRN 3541/28

SAMPLE LABEL	TP05 1m	DATE SAMPLED	17-Sep-19
SAMPLE No.	85827	DATE RECEIVED	19-Sep-19
DATE TESTED	23-Sep-19	SAMPLED BY	Client

MATERIAL	Firm to stiff brown silty sandy CLAY with rare gravel
ADVISED SOURCE	Site Investigation Sample

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21	34	11	23	88



REMARKS

Sample tested in natural condition

SIGNED

NAME
Page 6 of 6

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

DATE 27-Sep-19