



PHASE 2 GEOENVIRONMENTAL ASSESSMENT

FORMER BALDERSTONE SCHOOL

KIRKHOLT, ROCHDALE

For Gleeson Homes (North West)

January 2016

Phase 2 Geoenvironmental Assessment
Former Balderstone School
Kirkholt, Rochdale
for
Gleeson Homes (North West)

H15235	Phase 2 Geoenvironmental Assessment, Former Balderstone School, Kirkholt, Rochdale
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Revision	Date of issue	Comments	Prepared by	Checked by
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1	12.01.16	2 nd issue	JR	SMB

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INTRODUCTION

Commission

Patrick Parsons Ltd (PPL) was commissioned by Gleeson Homes (North West) (GH) to undertake a Phase 2 Geoenvironmental Assessment of land comprising the Former Balderstone School, Queen Victoria Street, Kirkholt, Rochdale.

PPL have previously undertaken a Phase 1 desk study (H13078, Desk Top Geoenvironmental Appraisal, April 2013) of the site, which includes a larger parcel of land incorporating former playing fields to the east of the main school site, and this report should be read in conjunction with this Phase 2 assessment.

The site is proposed for redevelopment for a residential end-use, as shown on Richard Ward Design, Proposed Sketch Layout drawing 394-01, which is included in **Appendix A**.

Limitations

This report has been prepared for GH and their appointed agents only and should not be relied upon by any third party without the written permission of PPL. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill.

It is presented in a tabulated format, based on the information sources cited below. PPL cannot take responsibility for variations in ground conditions not revealed between exploratory holes.

In preparing this report PPL have undertaken a walkover survey to inspect the site.

Objectives

The objectives of this investigation are as follows:

- To establish the environmental setting of the site, including details of the geology, hydrogeology and hydrology;
- To identify potential impacts of past mining and/or quarrying;
- To establish the land-use history of the site using available historical plans;
- To identify potential geotechnical issues, which could affect foundation and infrastructure design and construction;
- To confirm whether the site has previously been used for a purpose that may have given rise to significant soils or groundwater contamination and to identify potential risks from contamination and from hazardous gas;
- To undertake a preliminary assessment of the environmental impact of the development
- To construct a revised geoenvironmental conceptual model; and
- To present recommendations, addressing potential abnormalities in the context of proposed redevelopment.

At the time of writing, it has been assumed that levels will remain substantially the same as at present. If this is not the case some modification to the preliminary recommendations made in this report may be required.

Site Details	Location The site is located approximately 1.7km to the south of Rochdale town centre, at NGR 390247mE 411446mN, west of Oldham Road (A671) and south of Queensway (A664). It has an approximate area of 4.2ha (10.4 Acres). A site location plan is attached as Drawing H15235-701 included in Appendix A .
	Description The site forms a rectangular parcel of land, with levels falling steadily from northeast to southwest. The southeastern corner lies at approximately 141.0m

	AOD with levels falling to a minimum of approximately 137.5m AOD along the western site boundary. The site is almost entirely surfaced with demolition-derived materials (from the recent demolition of the former school buildings). The exceptions are the central northern and northeastern parts, which are under coated macadam hardstanding and the northwestern corner, eastern/northeastern and southern boundaries, which are grassed. In the far north of the site an electricity substation is present. Semi-mature and mature trees are present along all boundaries, with the exception of the northern boundary. An infestation of probable Japanese Knotweed was noted along the southeastern site boundary. A section of remnant concrete retaining wall occupies the southwestern corner of the site, retaining adjacent higher land, by approximately 2 to 2.5m. There is a slight fall in levels away from the site by between 1 and 1.5m along the eastern/southeastern boundary. The site is bounded to the north/northwest by Queen Victoria Street, with light industrial premises beyond, to the east/northeast by vacant land, to the south/southeast west by Balderstone Park and by residential properties to the west/southwest. A plan showing current site features is attached as Drawing H15235-702, included in Appendix A.
Geoenvironmental Setting	The geoenvironmental setting of the site has been previously assessed as part of the desk study with the salient points listed below. • The site is underlain by undifferentiated Carboniferous Lower Coal Measures strata (mudstones, siltstones and sandstones). Superficial soils underlying the majority of the site are glacial moraine deposits (poorly sorted sand, gravel and silty clay) in turn underlain by glacial till (Boulder Clay). Alluvium is present beneath the extreme western edge of the site • The Arley coal seam is indicated as outcropping immediately north of the site dipping to the west • The superficial soils and solid strata are classed as Secondary A aquifers • There are no groundwater abstraction licences within 500m of the site. A single surface water abstraction is recorded approximately 235m north of the site relating to a boiler feed use • The site does not lie within 500m of a Source Protection Zone • The nearest surface water feature is a partially culverted watercourse (Sudden Brook) located approximately 150m northeast and southeast of the site • The site is within 250m of a Zone 2 or Zone 3 floodplain • There are no historic or current landfills within 250m of the site • The site is unaffected by past shallow or present underground coal mining. A Development High Risk Area lies immediately north of the site • There are no records of any pits or quarries on or within 250m of the site. However, there may be areas of surface workings associated with the construction of historic reservoirs in the west of the site (see site history below).

History	A comprehensive review of the site's history has been undertaken as part of the desk study. The main points are presented below. On-site During the mid to late 19th century the site was open agricultural land until buildings (part of Balderstone Hall) are shown in the east of the site with, two reservoirs indicated in the west. By the early 20th century, the buildings are titled Balderstone Hall Farm with a recreation ground occupying the central part and tennis courts in the southeast. Rochdale Grammar School within the east and tennis courts in the west occupied the site since the mid 1950s, undergoing expansion during the 1970s. The school remained as Balderstone High School until recent demolition. Off-site During the mid and late 19th century, the surrounding area was similarly under agricultural land-use, with a large cotton mill complex to the north. Residential development gradually encroached from the north, with a rapid expansion of Kirkholt taking place in the 1950s and 1960s. Balderstone Park is present to the south. Since the 1970s, an industrial development and later a technology park was constructed to the north.
Investigation Rationale	Based on the information obtained from the desk study, the scope of the intrusive works was designed to address both contamination and geotechnical aspects, as outlined below, with areas of concern targeted as well as providing a general coverage of the site.
Fieldwork	The fieldwork was undertaken between 30th September and 1st October 2015 and comprised: • 23 no. machine excavated trial pits (TP1 to TP23) to a maximum depth of 4.5m
Ground Conditions	<i>Central and Eastern Areas</i> Topsoil and Reworked Topsoil Topsoil and reworked topsoil were proven at the surface, generally in the northwestern and southern areas of the site, at thicknesses of between 300 and 700mm. Made Ground Made ground, predominantly comprising 'loose' and 'loose' to compact granular materials (demolition-derived) of gravel, cobble and occasional boulder size limestone hardcore, brick, concrete and coated macadam with occasional ash, cinder, slag and timber content, with lesser inclusions of reworked natural cohesive clays, was proved to between 0.3 and 2.3m below existing ground level (begl). Natural Granular Soils Natural 'loose' and compact silty sands and gravelly sands were encountered extensively across the site and proved to the base of the majority of the trial pits, to a maximum depth of 4.5m begl. These were noted as organic in parts, containing organic debris. Natural Cohesive Organic Soils Very soft, soft and firm (very low, low and medium strength) silty organic clays and silts were present site wide, generally interbedded within the granular soils at thicknesses of less than 1m. However, more extensive deposits of these materials were proven, to in excess of 2m thickness. Hand shear-vane readings recorded values of between 14 and 36kN/m² for these strata.

	Peat Localised deposits of very soft (very low strength) plastic amorphous peat (containing visible organic debris) were proved at depths of between 0.8 and 1.2m begl (at thicknesses of between 200 and 400mm) in TP10, TP13, TP15, TP19 and TP21, located in the central and southern parts of the site. <i>Western Area (Former Reservoirs)</i> Made Ground Made ground, comprising 'loose' granular materials of gravel, cobble and boulder size limestone hardcore, brick, concrete, sandstone, cinder, slag, coal and burnt shale was proved to between approximately 2.0 and 3.2m begl beneath the footprint of the former southern reservoir (TP14 and TP16) and to around 2.5m begl beneath the former northern reservoir (TP17 and TP18). TP23 was positioned over the eastern edge of the former northern reservoir and proved a sandstone masonry wall at between 0.9 and 1.6m begl. Beneath approximately 1.5m begl in the southern reservoir area, reworked natural sands containing bricks and boulder size sandstone and concrete were proved. In TP16, a possible concrete floor slab (probable base of former southern reservoir) was proved at 3.2m begl, with further excavation not possible. <u>The full depth of made ground could not be proven beneath the southern reservoir, however it is likely that the concrete forms the basal slab to the former reservoir.</u> Natural Granular and Cohesive Soils Beneath the made ground materials within the former northern reservoir, natural soft (low strength) silty clays and clayey silts were proven to approximately 3.0m begl, underlain by 'loose' to compact silty sand. TP18 proved firm (medium strength) silty clay beneath the sand, to a maximum depth of 4.0m begl. Hand shear-vane readings within the clays recorded values of between 24 and 50kN/m². Groundwater Across the central and eastern areas, the trial pits were noted as damp between 1 and 3m begl, with free perched groundwater encountered at depths of between 1 and 4m begl and with heavy seepages apparent in the western central part of the site. In the west (area of the former reservoirs) free 'perched' groundwater was noted at between 1.5 and 2.5m begl, recorded as 'rapid' inflows. Evidence of Contamination There was no evidence of significant or gross contamination within the materials encountered. Except for the presence of ash-based soils, visual and olfactory evidence of hydrocarbon impact of soils was noted within the made ground soils in TP3 (eastern area) at between 0.9 and 2.2m begl and in TP18 (former northern reservoir) at between 0.6 and 2.5m begl. Observations on site did not suggest that asbestos containing materials (ACMs) were present within the soils. However, given the historical use of the site, there is the potential for ACMs to be present beneath any remnant floor slabs and in made ground. Obstructions and Excavation Stability Generally, within the made ground and natural soils, no significant excavation problems or obstructions were encountered. However, TP16 was halted at 3.2m begl on a possible concrete floor of the former southern reservoir and TP23 proved a remnant sandstone masonry wall between 0.9 and 1.6m begl on the eastern
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	edge of the former northern reservoir. TP11 encountered a drain at 1.9m and TP22 encountered a drain at 2.7m begl. No remnant foundations and substructures relating to the former school buildings were encountered. The excavation faces were noted as unstable within the made ground and natural soils throughout their full depth. Exploratory hole records are included as Appendix B and their locations are shown on Drawing H15235-702 included in Appendix A.
Laboratory and Field Testing	Chemical Test Results A total of 10 samples (2 of topsoil and 8 of shallow made ground) were sent to a UKAS and MCERTS accredited laboratory for chemical analysis. All samples were scheduled for a standard suite of determinants including metals, speciated PAHs, pH, water soluble sulphate, calorific value determination, TOC and asbestos presence. Speciated TPH analyses were undertaken on 6 of the above samples. In addition, a further 7 samples of natural soils were tested for water soluble sulphate and pH determinations. The majority of the soils recorded concentrations of determinands below their respective generic assessment criteria (GAC) values, appropriate for a residential end-use with home-grown produce. However, a single sample of ash-based shallow made ground recovered from TP14 (former southern reservoir) recorded an elevated concentration of lead above the GAC. Shallow ash-based made ground (TP18 within the former northern reservoir) and demolition-derived made ground (TP10 in the centre of the site) recorded exceedances of their respective GACs with respect to the PAHs benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene. Samples of topsoil recovered from the northwestern and southern areas of the site (TP8 and TP13) recorded elevated concentrations of benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(ah)anthracene above their respective assessment criteria. None of the samples of shallow made ground positively identified the presence of asbestos. The laboratory testing certificates are included in Appendix C together with an accompanying LQM/CIEH GAC 'Suitable 4 Use Levels' (S4UL) reference table. Geotechnical Test Results Samples of the natural soils were submitted for Atterberg limits testing, particle size distribution and remoulded CBR testing at a UKAS accredited laboratory. The laboratory testing certificates are included in Appendix D. <i>Classification Tests</i> Plasticity indices undertaken on 8 samples of the natural clays at between less than 1m and 2.5m ranged between 23% (with 100% passing the 0.425µ sieve) and 71% (with 95% passing the 0.425µ sieve). On this basis the clay soils may be classed as being of medium to high shrinkability (medium to high volume change potential), in accordance with NHBC Guidance. <i>Particle Size Distribution Tests</i> Three samples of natural sands were scheduled for classification testing with between 20 and 38% of the samples passing the 0.063µ sieve (silt size and below).

	<i>Remoulded CBR Tests</i> A single sample of near surface natural clay and 4 samples of shallow sands were scheduled for laboratory CBR testing. The results ranged between <1% (clay and clayey sand) and 16% (gravelly sand) with 3 of the 5 results recording values of 1% or less. <i>Sulphate Tests</i> A total of 9 samples of made ground, 7 of natural soils and 2 of topsoil were tested to determine their sulphate content and pH value. For the made ground soils, 3 aqueous extract results were between 0.68 and 1.8g/l sulphate with the remainder below 0.5g/l and pH values of between 5.2 and 11.1. The natural soils all recorded aqueous extract concentrations of below 0.5g/l sulphate and pH values of between 6.0 and 7.3. Topsoil concentrations were below 0.01g/l sulphate and near-neutral pH values.
Geotechnical Assessment and Recommendations	Foundations The site is proposed for redevelopment with residential 2 to 3 storey detached and semi-detached properties, as shown on the Richard Ward Design, proposed sketch layout included in Appendix A. The intrusive investigation has proved a part cover of topsoil and site wide made ground soils to a maximum depth of 2.3m begl across the central and eastern areas and to at least 3.2m begl in the west (area of former reservoirs). Within the central and eastern areas these overlie variable natural soils comprising predominantly 'loose' and compact sands interbedded with very low and low strength silty organic clays and silts clays, generally less than 1m thick. Peat is present at thicknesses of less than 400m at around 1m begl. Similarly, in the west of the site, variable interbedded low strength silty clays and 'loose' sands are present to at least 4m begl. Free 'perched' groundwater is present at between 1 to 4m begl. The use of trench fill strip foundations bearing upon the natural sands at between 1 and 2.5m depth are considered appropriate within the northern and southern parts of the site (approximately 30%), <u>subject to confirmation of these materials being at least medium dense by additional intrusive investigation and in situ testing</u>. In these areas, foundations will need to be deepened through low strength organic clays and loose sands. In addition, the peat layers will require fully penetrating during foundation excavations to found beneath these soils. It may be that each plot requires an inspection prior to casting of foundations. Consideration will need to be given to groundwater control, excavation stability and disposal or re-use of foundation excavation arisings. In the central and central northern areas (approximately 40%) potentially competent bearing strata, comprising natural sands, were not proved until at least 3m begl. <u>Subject to further intrusive investigation and in situ testing to confirm the strength of these underlying soils</u>, the use of piles may be appropriate in this area of the site with specialist advice sought prior to design. Similarly, the use of piles may be considered in the west of the site (approximately 30%), where deep made ground and weak soils have been proved to at least 4m begl. <u>Again, additional intrusive investigation will be required to determine the nature and strength of the deeper soils in this part of the site</u>. Bored piles may be more appropriate given the remnant substructures or alternatively the made ground (up to 3m) could be turned over and such obstructions broken out ahead of using piles with appropriate specialist advice recommended.

	Vibro-improvement techniques could be used as an alternative to piling in the central and western areas, with widened reinforced strip foundations, subject to specialist advice and design. Consideration will need to be given to the made ground content, presence of low strength organic soils, peat layers and perched groundwater as to how effective such vibro-improvement techniques might be. Preliminary sketch drawings showing the depth to competent bearing strata and foundation zoning for the site are included as drawings H15235-703 and 704 respectively in Appendix A and are best estimates based upon the exploratory holes undertaken to date. The natural sands, <u>subject to confirmation of being at least medium dense</u>, are considered capable of sustaining maximum static loads of up to 100kN/m² with total settlements less than 25mm. Where natural cohesive soils are present, deepening of foundations will be required where within the influence of trees, in accordance with current guidelines and assuming a high volume change potential for the clay soils. Floor Slabs Suspended floor slabs should be assumed given the presence of extensive and deep made ground at the site. Mining The site is unaffected by historic shallow coal mining and, as such, no special structural precautions are considered warranted during the redevelopment of the site. Pavement Design Based on a visual assessment and <i>in situ</i> testing, preliminary CBR values of 1% are considered appropriate for the granular and reworked cohesive made ground soils at formation, 1% for the natural soft to firm (low to medium strength) clays and 2% for the natural sands, subject to proof-rolling and treatment of any soft spots. The natural sands should be regarded as being frost susceptible. Subject to the scope of enabling earthworks together with the presence of underlying weaker organic soils, a thickened capping and geotextile may be required. <i>In situ</i> CBR testing is recommended and if roads are to be adopted, early liaison and confirmation of design proposals by the local authority is recommended. Sulphate Precautions On the basis of the chemical test results, Class DS-1 and AC-1 for natural soils and Class DS-2 and AC-3z for made ground soils, in accordance with BRE Special Digest 1: 2005, is recommended assuming mobile groundwater conditions with concrete designed accordingly. Soakaway Drainage: Across the site, the use of soakaways is not considered feasible due to the presence of relatively high perched groundwater levels. Although, widespread granular soils may potentially make them viable, subject to the results of field testing. Excavations Within the made ground and natural soils, excavations should be achievable using conventional plant. However, the use of hydraulic breakers should be anticipated given the likelihood of remnant foundations and subsurface obstructions associated with the past uses of the site.
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	The provision of support or the battering back of excavations within made ground and natural soils will be required. All excavations will need support if man entry is required, in accordance with CIRIA report 97 (1983). On the basis of observations made during the intrusive investigation, significant groundwater ingress is considered unlikely above 2m with any such occurrences being adequately dealt with by localised pumping from sumps. However, the use of dewatering techniques should be considered for deeper excavations with local groundwater control measures put in place. Care should be taken within granular soils to prevent the loss of fines during pumping and the resulting potential instability caused to adjacent structures.	
Contamination Assessment and Risk Assignment (with reference to Geo-environmental Conceptual Site Model included as Appendix E)	Soils Lead within shallow made ground and PAHs within ash-based shallow made ground and topsoil have been recorded at concentrations in excess of their GAC values for the proposed end-use.	Risk to human health - construction personnel LOW to MODERATE Risk to human health - end users LOW to MODERATE
	Asbestos No suspected ACMs were identified during the fieldwork and no asbestos was positively identified during laboratory testing. <i>However, asbestos was a widely used construction material and ACMs can commonly be present beneath remnant floor slabs/ hardstandings and in associated made ground.</i>	Risk to human health - LOW (on basis of findings)
	Groundwater (and surface water) [including leachate risk]	Risk to aquifers; superficial (Secondary A) and Coal Measures strata (Secondary A) from leaching of on-site contaminants - LOW to MODERATE (based on extensive granular strata beneath the site, perched groundwater and culverted Sudden Brook)
	Ground Gas (Radon precautions are not presently required in this area)	Risk of ground gas ingress from on-site made ground and organic soils LOW to MODERATE (on the basis of intrusive findings) Risk of ground gas ingress from off-site sources - NEGLECTIBLE to LOW
Remediation	The shallow made ground soils and existing topsoil are considered as potentially presenting a significant human health risk to future occupants as a consequence of elevated concentrations of lead and PAHs. The risk to environmental receptors (Secondary A aquifers and Sudden Brook) is assessed as negligible to low to moderate. The provision of clean capping is considered warranted with 600mm (including topsoil) recommended in gardens where made ground remains and 450mm (including topsoil) thick capping in areas of soft landscaping or POS. It is likely that some 80% of properties will require provision of clean capping of which some may be derived from re-use of site won soils. These recommendations are subject to approval by regulators.	

	The existing topsoil within parts of the site is not considered likely to be acceptable for re-use within the proposed redevelopment of the site from the results of the laboratory to date. Further chemical testing of the topsoil is not warranted due to its limited occurrence. Construction personnel should be vigilant during redevelopment works, with appropriate protective measures and working practices adopted as/if necessary. Good practice should be adhered to with regard to the presence of asbestos and as recommended in CIRIA publication C733 (2014). If during site redevelopment works, potentially significant soil (or groundwater) contamination is encountered, then all works should cease and the advice of a geoenvironmental engineer should be sought. Any soils imported to site should be tested at source, to ensure that they meet the required quality standards and be approved by regulators before import.
Ground Gas Risk Assessment	Based upon the findings of the intrusive investigation, namely the presence of deep made ground (former reservoirs) together with natural organic soils and layers of peat across the site, this suggests there is a potential for a significant risk from ground gas at the site. It is recommended that monitoring wells are installed using mini percussion boreholes in order to undertake a gas risk assessment through a ground gas monitoring programme, in accordance with CIRIA 665. At this stage, a preliminary classification of Characteristic Situation 2 or NHBC traffic light classification 'Amber 1' is recommended, subject to completion of the monitoring programme and discussions and approval by the local authority. No radon protection measures are necessary for new development in this area at the present time.
Buried Services	The results of laboratory chemical tests should be provided to the appropriate utility companies to allow assessment and selection of pipework materials entering the site. Additional testing may be required.
Waste Disposal	A preliminary assessment of chemical laboratory results suggests the made ground and natural soils may be classified as non-hazardous or inert. However, slightly elevated concentrations of PAHs above the threshold values may deem these to be classified as stable non-reactive. However, until such time as materials have been generated and further WAC testing is undertaken, as is likely to be required by the receiving landfill prior to any off-site disposal, a final waste classification cannot be made. Duty of Care Regulations 1991 and Hazardous Waste Regulations 2005 would apply to off-site disposal.
Additional Comments/Further Work	<i>Further Intrusive Investigation</i> In order to confirm the nature of the underlying deeper soils, the following additional works are proposed at the site. • 2 days of mini percussive drilling to determine the nature and strength of the deeper natural soils (up to 10 no. to between 5 and 8m depth) including <i>in-situ</i> testing • Installation of 5 no. combined gas and groundwater monitoring wells • Ground gas monitoring programme (6 no. visits over 3 months). <i>Ecological Survey (Invasive Species)</i> It is recommended that an ecological survey is undertaken to include a check for notifiable plants, e.g. Japanese Knotweed, which is suspected along the southern site boundary with recommendations for appropriate treatment.
Approvals	This report should be passed to regulators for approval of the recommendations made, before construction commences. Responses from regulators should be

	forwarded to PPL so that any issues raised can be identified and actioned promptly.
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APPENDIX A

Drawings



HOUSE TYPES		
CODE	TYPE	NO.
201	2 Bed semi-det	25
202	2 Bed semi-det	18
301	3 Bed semi-det	22
302	3 Bed semi-det	26
303	3 bed semi-det	8
304	3 Bed detached	13
309	3 Bed semi-det	16
310	3 Bed detached	9
401	4 Bed detached	3
404	4 Bed detached	7
405	4 Bed detached	2
406	4 Bed detached	3

TOTAL 146

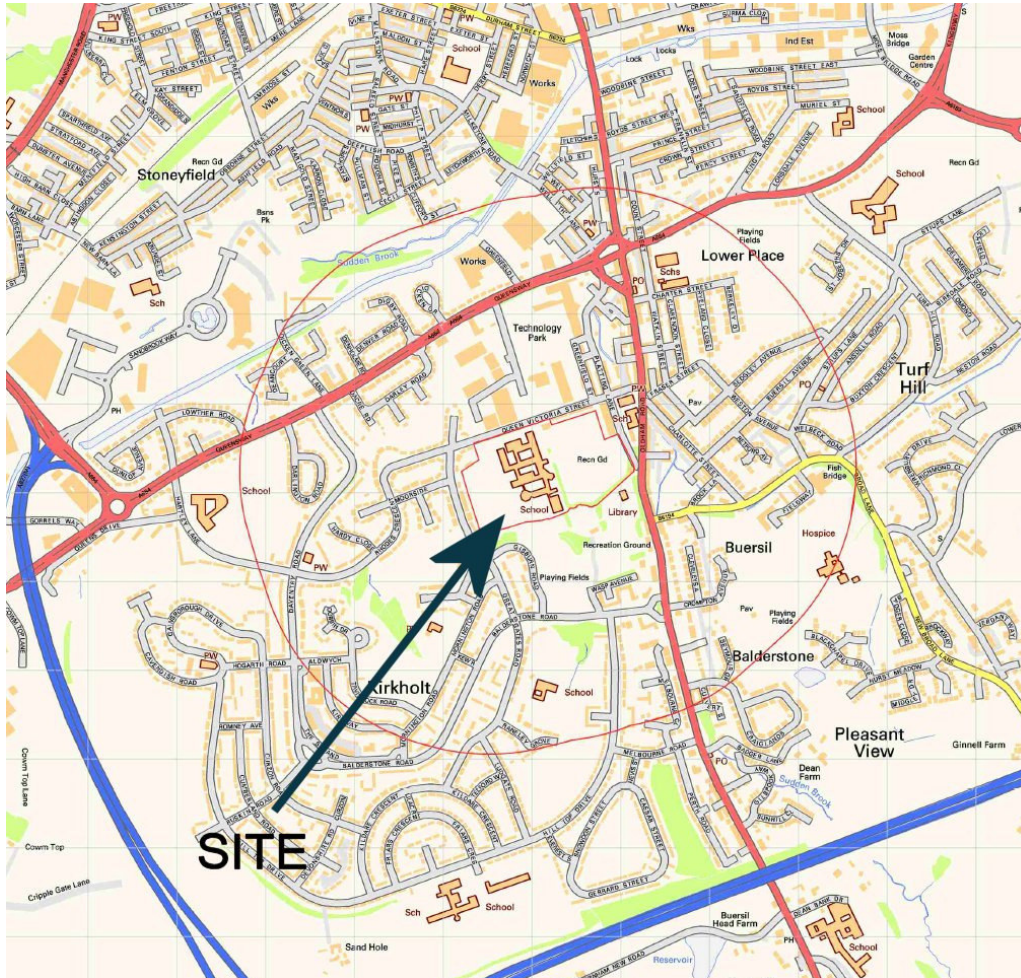
Richard Ward Design **RW**
 Chartered Architectural Technologist
 Architectural Design & Development Consultant
 Richard S. Ward 2. Burtram Close
 M.C.I.A.T. Weston Favell
 Telephone 01604 410943 Northampton NN3 3PH

**BALDERSTONE SCHOOL SITE
 KIRKHOLT ROCHDALE**

Sketch layout.

GLEESON HOMES & REGENERATION

Scale 1:500 @ A1 Date 24.04.13 Dwg No. 394-01



Former Balderstone School
Kirkholt, Rochdale
Site Location Plan

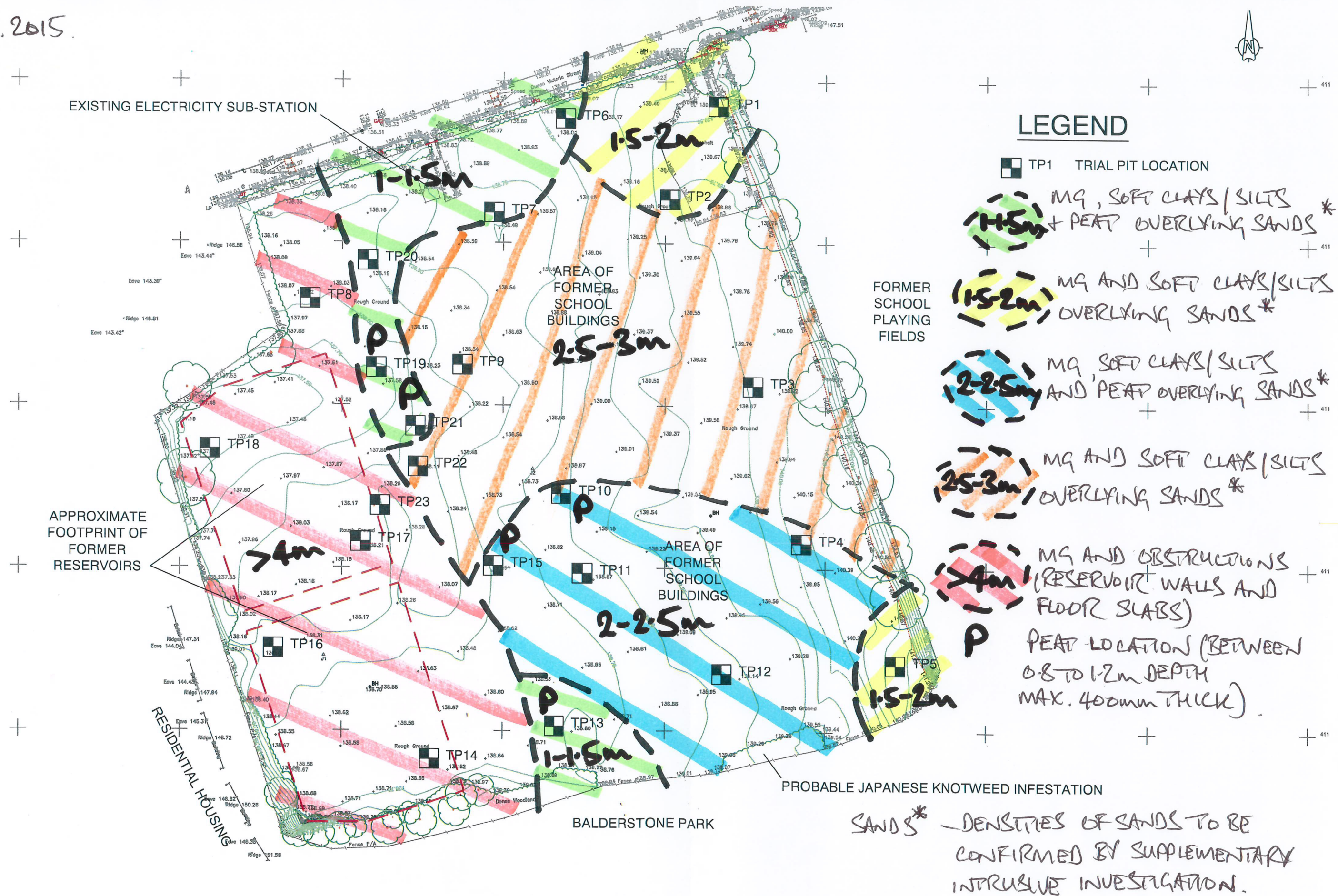
Client:	Gleeson Homes (North West)
Job No:	H15230
Date:	November 2015
Drawing Ref:	H15235-701



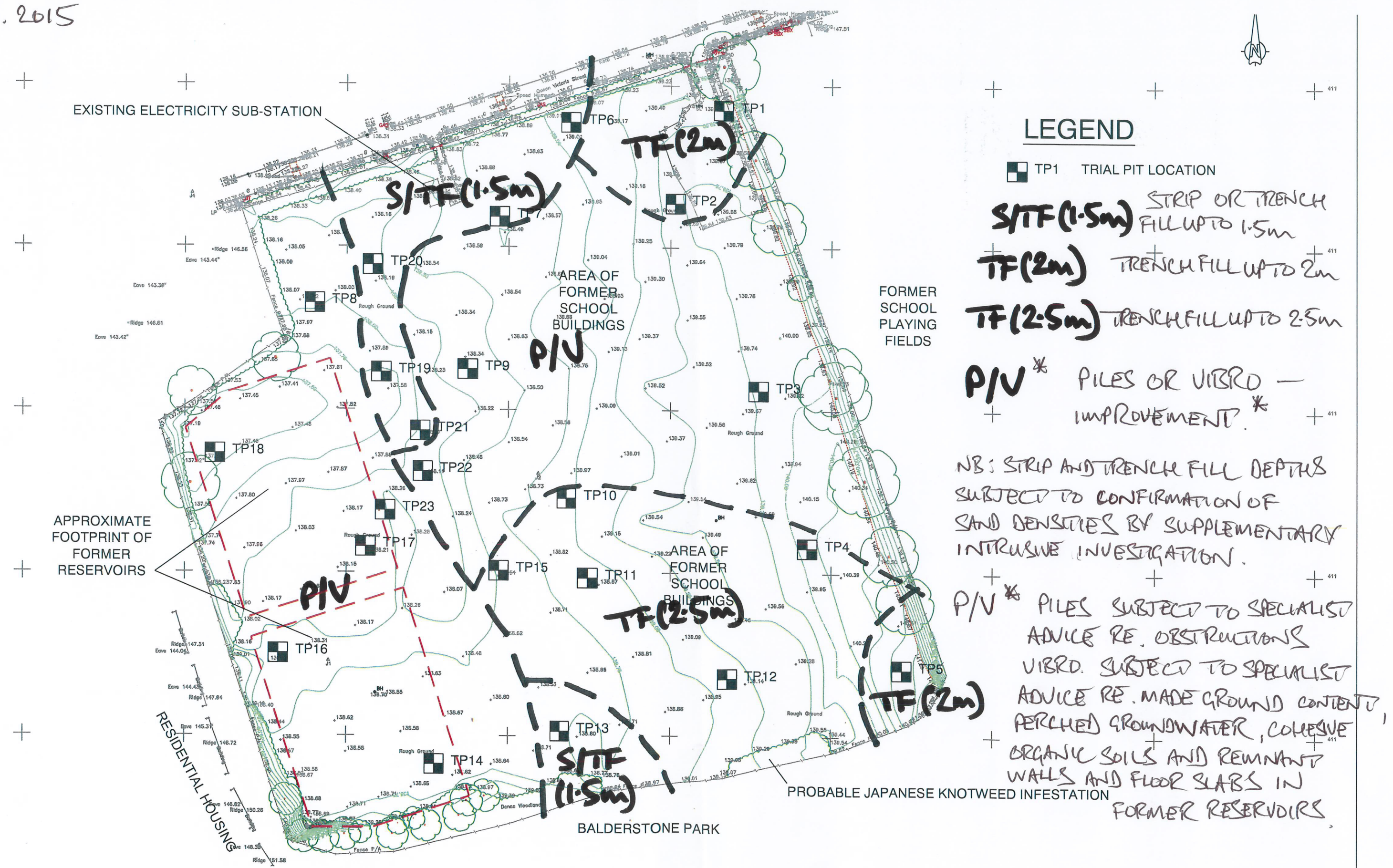
HIS235 FORMER BALDERSTONE SCHOOL, KIRKHOOT

DWG. HIS235-703 : DEPTH TO COMPETENT BEARING STRATA SKETCH - PRELIMINARY

JUN. 2015



H15235 FORMER BALDERSTONE SCHOOL, KIRKHOPE
 JWQ. H15235-704: PRELIMINARY FOUNDATION ZONING SKETCH
 Jan. 2015



LEGEND

TP1 TRIAL PIT LOCATION

S/TF (1.5m) STRIP OR TRENCH FILL UP TO 1.5m

TF (2m) TRENCH FILL UP TO 2m

TF (2.5m) TRENCH FILL UP TO 2.5m

P/V * PILES OR VIBRO IMPROVEMENT *

NB: STRIP AND TRENCH FILL DEPTHS SUBJECT TO CONFIRMATION OF SAND DENSITIES BY SUPPLEMENTARY INTRUSIVE INVESTIGATION.

P/V * PILES SUBJECT TO SPECIALIST ADVICE RE. OBSTRUCTIONS VIBRO. SUBJECT TO SPECIALIST ADVICE RE. MADE GROUND CONTENT, PERCHED GROUNDWATER, COHESIVE ORGANIC SOILS AND REMNANT WALLS AND FLOOR SLABS IN FORMER RESERVOIRS

PROBABLE JAPANESE KNOTWEED INFESTATION

BALDERSTONE PARK

RESIDENTIAL HOUSING

APPROXIMATE FOOTPRINT OF FORMER RESERVOIRS

EXISTING ELECTRICITY SUB-STATION

AREA OF FORMER SCHOOL BUILDINGS

AREA OF FORMER SCHOOL BUILDINGS

FORMER SCHOOL PLAYING FIELDS

APPENDIX B

Exploratory Hole Records

Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

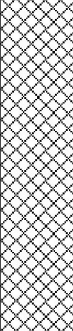
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.50m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.20	D		1.10			'Loose' dark brown and black sandy gravelly clayey COBBLES, with low boulder content. Gravel is angular to subangular fine to coarse of various lithologies including tarmac and sandstone. Boulders are angular to subangular sandstone (MADE GROUND).	1
						Compact orange brown slightly clayey gravelly fine to medium SAND. Gravel is angular to subangular sandstone.	
			1.80			Soft to firm grey mottled orange brown silty CLAY, with numerous sand partings. Occasional organic debris. Organic odour noted.	2
			2.10			'Loose' to compact light brown slightly gravelly fine to medium SAND. Gravel is angular to subangular fine to coarse of various lithologies including sandstone.	
			4.50			Trialpit Complete at 4.50 m	4

Remarks: Mexecone test at 1.1m: 1,2,1,2,2,5,5,5.
Trial pit unstable - collapsing between ground level and 1.1m and below 3.5m.

Groundwater: Damp below 3m.
Slight seepage at 4m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.15			'Loose' reddish brown slightly clayey very sandy angular to subangular fine to coarse GRAVEL. Gravel is of various lithologies including red brick (MADE GROUND). 'Loose' black angular to subangular coarse limestone GRAVEL (MADE GROUND).	
1.50	ES		1.00			'Loose' to compact brown slightly clayey sandy angular to subangular fine to coarse GRAVEL. Gravel is of various lithologies including red brick and concrete. Occasional plastic, plastic pipe and ceramic tile (MADE GROUND).	1
2.00	D		1.80			'Loose' to compact light brown slightly gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse of various lithologies including sandstone.	2
			4.00			Trialpit Complete at 4.00 m	4

Remarks: Trial pit unstable - all sides collapsing below ground level.

Groundwater: Damp below 2.5m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.00						'Loose' reddish brown sandy very gravelly angular to subangular COBBLES of half and full red brick (MADE GROUND).	
1.20	ES					'Loose' to compact black slightly clayey sandy angular to subangular fine to coarse GRAVEL. Gravel is of various lithologies including sandstone. With frequent plastic, decaying/burnt wood, wires and glass. Hydrocarbon odour noted (MADE GROUND).	1
2.70							2
2.90	D					'Loose' to compact orange brown slightly gravelly fine to medium SAND. garvel is subangular to subrounded fine to coarse of various lithologies including sandstone.	3
4.00							4
Trialpit Complete at 4.00 m							

Remarks: Trial pit unstable, all sides collapsing below 2.7m.

Groundwater: Damp below 3m.
Below 3.5m, seepage of groundwater into pit.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

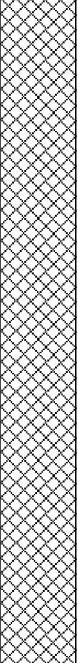
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
3.50m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50	ES					'Loose' brown slightly clayey sandy very gravelly COBBLES. Gravel is angular to subangular fine to coarse of various lithologies including red brick and concrete. Cobbles are angular to subangular of half and full red brick and concrete (MADE GROUND).	1
2.30	D		2.20			'Loose' to compact grey fine to medium SAND. Gravel is subangular to subrounded fine to coarse of various lithologies including sandstone.	2
			3.50			Below 3.2m, becoming reddish brown.	3
						Trialpit Complete at 3.50 m	4

Remarks: Trial pit unstable, collapsing below 3m.

Groundwater: Influx of ground water at 3.5m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

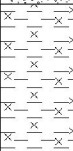
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.70 0.50-1.00	D B		0.30			'Loose' brown slightly sandy angular to subrounded fine to coarse GRAVEL. Gravel is of various lithologies including sandstone and concrete (MADE GROUND).	
						Compact gravelly fine to medium SAND. Gravel is subangular to rounded fine to coarse of various lithologies including sandstone.	1
1.40	D		1.30			Soft to firm grey mottled orange brown slightly silty CLAY, with numerous orange brown fine sand partings. Occasional organic debris. Organic odour noted.	
			1.80			Compact light grey fine to medium SAND.	2
			2.10			Compact orange brown gravelly fine to medium SAND. Gravel is subangular to rounded fine to coarse of various lithologies including sandstone.	3
			4.00			Trialpit Complete at 4.00 m	4

Remarks: Trial pit stable.
Mexecone test at 0.8m: 1,1,1,5,5,9,refused.

Groundwater: No groundwater encountered.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

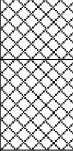
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.40	ES		0.20			'Loose' reddish brown very sandy angular to subangular red brick GRAVEL, with medium cobble content. Cobbles are angular to subangular of half red brick (MADE GROUND).	
0.70 0.50-1.00	D B		0.50			'Loose' to compact cream angular to subangular medium to coarse limestone GRAVEL (HARDCORE) (MADE GROUND). Soft to firm brown becoming dark brown slightly silty CLAY. With occasional organic debris. Organic odour noted.	1
1.20	D		1.20			'Loose' to compact orange brown slightly gravelly fine to medium SAND. Gravel is subangular fine to coarse of various lithologies including sandstone.	
			4.00				2 3 4
						Trialpit Complete at 4.00 m	

Remarks: Mexecone test at 0.6m: 1,1.5,refused.
Trial pit unstable below 1.7m, all sides collapsing.

Groundwater: Damp below 1.5m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

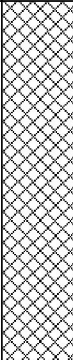
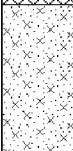
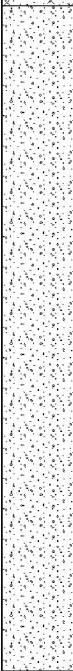
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
3.90m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.30	D		1.20			'Loose' brown very sandy angular to subangular fine to coarse GRAVEL, with high cobble content. Gravel is angular to subangular fine to coarse of various lithologies including red brick and concrete. Occasional plastic. Cobbles are angular to subangular of half and full red brick and concrete (MADE GROUND).	1
						'Loose' to compact light brown silty fine to medium SAND.	
			1.70			'Loose' to compact reddish brown slightly gravelly SAND. Gravel is subangular to rounded fine to coarse of various lithologies including sandstone.	2
			3.90				3
						Trialpit Complete at 3.90 m	4

Remarks: Trial pit unstable below 1.7m, all sides collapsing.

Groundwater: Damp below 1.7m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2001

Location: Kirkholt, Rochdale

Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	ES					TOPSOIL	
0.40-0.90	B		0.40			'Loose' to compact greyish brown fine to medium SAND, with frequent bands (<100mm) of slightly silty clay, with fine sand partings.	
			0.90			'Loose' to compact light brown slightly gravelly fine to medium SAND. With bands (<100mm) of fine grey slightly silty sand. 1.4m becoming orange brown.	1
2.30	D		2.20			Very low strength grey thinly laminated sandy CLAY/SILT. With bands (<100mm) of orange brown fine to medium sand.	
2.50	IVN 1	3					3
			4.00				4
Trialpit Complete at 4.00 m							

Remarks: Mexecone test at 1m: 2,4,8,refused.
Trial pit unstable, all sides collapsing below 0.9m.

Groundwater: Damp below 1m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

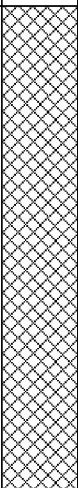
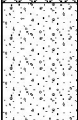
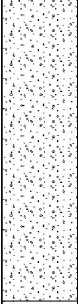
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.60	ES					'Loose' grey gravelly angular to subangular COBBLES. Gravel is angular to subangular fine to coarse concrete. Cobbles are of concrete and half red brick (MADE GROUND).	1
2.00	D		1.60			'Loose' grey slightly silty gravelly fine to medium SAND. Gravel is angular to subangular fine to coarse of various lithologies including sandstone.	2
2.20	IVN 1	36	2.00			Low strength grey thinly laminated slightly sandy silty ORGANIC CLAY. With frequent decaying plant remains. Organic odour noted. Silt and fine sand on laminae. With occasional bands (<100mm) of fine to medium grey and orange brown sand.	3
			3.00			'Loose' reddish brown slightly gravelly fine to medium SAND. With occasional bands (<100mm) of orange brown sand.	4
			4.00			Trialpit Complete at 4.00 m	

Remarks: Trial pit unstable throughout.

Groundwater: Seepage of groundwater below 1.6m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
30/09/2015

Location: Kirkholt, Rochdale

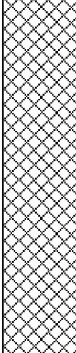
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
3.60m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50	ES					'Loose' brown very sandy very gravelly angular to subangular COBBLES. Gravel is angular to subangular fine to coarse of various lithologies including red brick, concrete, tarmac, slag and clinker. Cobbles are angular to subangular of red brick, slag and concrete (MADE GROUND).	1
			1.20			Plastic brown amorphous PEAT. Organic odour noted.	
1.50	D		1.40			'Loose' grey silty fine to medium ORGANIC SAND. Frequent decaying plant remains. Organic odour noted.	2
						At 3.2m, becoming orange brown.	3
			3.60			Trialpit Complete at 3.60 m	4

Remarks: Trial pit unstable, all sides collapsing between ground level and 1.4m.

Groundwater: Groundwater seepage below 1.2m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
3.10m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.40 1.40	IVN 1 D	24	0.20			'Loose' grey slightly clayey very gravelly angular to subangular COBBLES. Gravel is angular to subangular fine to coarse of red brick and concrete (MADE GROUND).	1
			1.30			Firm dark brown slightly silty slightly sandy slightly gravelly ORGANIC CLAY, with low cobble content. Gravel is angular to subangular fine to coarse of various lithologies including red brick. Cobbles are angular to subangular of red brick. Organic odour noted. With frequent decaying plant remains (MADE GROUND).	
			1.50			Low strength dark brown slightly silty slightly sandy slightly gravelly ORGANIC CLAY. Gravel is angular to subangular fine to coarse of various lithologies. Organic odour noted.	2
			2.40			Very soft grey clayey slightly sandy SILT.	
			3.10			'Loose' brown silty fine to medium SAND.	3
Trialpit Complete at 3.10 m							4

Remarks: At 0.7m, land drain running east to west at northern end of pit.
Drain at 1.9m, running east to west at northern end of pit.
Trial pit stable.

Groundwater: Groundwater seepages at 0.7 and 1.9m from drains.





Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	ES		0.30			TOPSOIL	
						Compact orange brown slightly gravelly fine to medium SAND.	
1.00-1.20 1.10	B D		1.00			Plastic brown amorphous PEAT. Organic odour noted.	1
			1.40			'Loose' to compact grey silty fine to medium ORGANIC SAND. With frequent traces of decaying plant remains. Organic odour noted. With bands (<150mm) of soft grey sandy silt.	
						At 2.8m, becoming light brown.	2
							3
			4.00				4
Trialpit Complete at 4.00 m							

Remarks: Trial pit stable.
Mexecone test at 0.7m: 1,1,1,1.5,1.5,1.5,2,2.

Groundwater: Below 2.8m, groundwater seepage.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
2.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.80	ES		0.10			'Loose' brown clayey sandy angular to subangular fine to coarse GRAVEL. Gravel is of various lithologies including mudstone and sandstone (MADE GROUND).	
			0.40			'Loose' grey angular to subangular limestone GRAVEL (HARDCORE) (MADE GROUND).	
			0.60			'Loose' grey very clayey very sandy angular to subangular fine to coarse GRAVEL. Sand is ash. Gravel is of various lithologies including sandstone, tarmac, slag and burnt shale (MADE GROUND).	
			1.20			'Loose' black very sandy angular to subangular fine to coarse GRAVEL, with medium cobble content. Gravel is of various lithologies including slag, red brick, burnt shale and coal. Sand is ash (MADE GROUND).	1
						'Loose' orange brown slightly silty fine to medium SAND (MADE GROUND).	
						Below 1.5m, high boulder content. Boulders are angular to subangular of concrete.	
			2.00			Trialpit Complete at 2.00 m	2
							3
							4

Remarks: Trial pit unstable - ground level to 1.2m all sides spalling. Beyond 1.2m all sides collapsing.
Trial pit terminated at 2m due to groundwater causing instability.

Groundwater: At 1.4m, influx of groundwater into pit.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

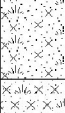
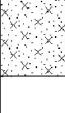
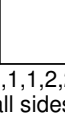
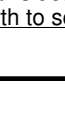
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

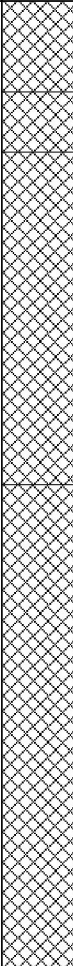
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50-0.80	B		0.10			'Loose' brown slightly clayey sandy angular to subangular fine to coarse GRAVEL. Gravel is of various lithologies including sandstone and limestone (MADE GROUND).	
			0.45			'Loose' black slightly sandy angular to subangular coarse limestone GRAVEL (MADE GROUND).	
						Compact orange brown fine to medium SAND.	
			0.80			Dark brown plastic amorphous PEAT. Organic odour noted.	
1.60	D		1.10			'Loose' to compact grey silty fine to medium ORGANIC SAND. With frequent decaying plant remains.	1
			1.40			Soft grey clayey sandy ORGANIC SILT. With frequent traces of decaying plant remains. Organic odour noted.	
							
			2.40			'Loose' to compact grey slightly silty fine to medium SAND.	
4.00							2
							
							3
							
							4
							
							
							

Remarks: Mexecone test at 0.8m: 1,1,1,1,1,2,2,5.
Trial pit unstable, below 2.4m all sides collapsing.
At 0.5m, land drain running north to south through pit.

Groundwater: Damp below 2.5m.



Project Name Former Balderstone School	Project No. H15235	Co-ords: - Level: -	Date 01/10/2015
Location: Kirkholt, Rochdale		Dimensions: - Depth 3.20m	Scale 1:25
Client: Gleeson Developments (NW)			Logged By EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.80	D		0.30			Firm brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, red brick and concrete (MADE GROUND).	1
			0.50			'Loose' dark grey angular to subangular coarse limestone GRAVEL (HARDCORE) (MADE GROUND).	
			1.60			'Loose' to compact dark brown and black very sandy very clayey angular to subangular fine to coarse GRAVEL with high cobble content. Gravel is of various lithologies including concrete, red brick and limestone. Cobbles are angular to subangular of half and full red brick (MADE GROUND). Below 1.0m, high boulder content. Boulders are angular to subangular of sandstone (0.4x0.3x0.15m).	
			3.20			'Loose' to compact brown silty fine to medium SAND. With bands of sandy silt/clay (MADE GROUND). Beyond 2m, angular to subangular sandstone boulders and frequent red bricks. At 2.1m, becoming grey.	
Trialpit Complete at 3.20 m							3
							4

Remarks:	Trial pit unstable, all sides spalling beyond 0.3m. Trial pit terminated at 3.2m, obstruction in base of pit (possible base of former reservoir).
Groundwater:	Groundwater seepage at 3.2m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

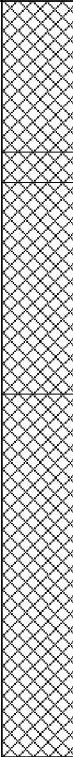
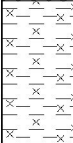
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
3.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
2.60	D		0.50 0.60		'Loose' brown slightly clayey sandy angular to subangular fine to coarse GRAVEL, with high cobble content. Gravel is of various lithologies including red brick, sandstone and concrete. Cobbles are angular to subangular of red brick and concrete (MADE GROUND).	1	
					'Loose' grey angular to subangular limestone GRAVEL (HARDCORE) (MADE GROUND).		
			1.30		'Loose' dark brown coarse SAND AND GRAVEL, with medium cobble content. Gravel is angular to subangular fine to coarse of various lithologies including tarmac, slag, and red brick. Cobbles are angular to subangular of half and full red brick (MADE GROUND).		
			2.50		'Loose' black very gravelly medium to coarse SAND. Gravel is angular to subangular of various lithologies including slag, clinker and mudstone. Sand is ash. Occasional metal and tile (MADE GROUND).		
			3.00		Soft brown silty CLAY, with fine sand partings. 		
Trialpit Complete at 3.00 m						3	
						4	

Remarks: Trial pit unstable below 1.3m.
Trial pit terminated at 3m due to instability caused by groundwater.

Groundwater: Influx of groundwater at 2m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.60-1.00 0.80	B ES		0.10			'Loose' brown clayey very sandy angular to subangular fine to coarse GRAVEL. Gravel is of various lithologies including limestone, sandstone, red brick and concrete (MADE GROUND).	
			0.60			'Loose' orange brown sandy very gravelly angular to subangular sandstone COBBLES (MADE GROUND).	
2.70	IVN 1	24	2.50			Low strength grey slightly sandy clayey SILT.	
			3.00			'Loose' to compact grey slightly silty fine to medium SAND.	
3.70	IVN 2	50	3.60			Medium strength brown silty CLAY.	
			4.00			Trialpit Complete at 4.00 m	

Remarks: All sides of trial pit spalling between 2 and 2.5m.

Groundwater: Groundwater seepage at 2.5m and 4m.



Date
01/10/2015

1:25

Logged By
EM

HoleBASE 3.1 (Bld 426.48) Standard Trialbit Log v2 dated 27th Nov 03

Groundwater: Influx of groundwater at 1 m.

Date
01/10/2015

Logged By
EM



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

Dimensions: -

Depth
4.20m



Scale
1:25

Client: Gleeson Developments (NW)

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.90			'Loose' brown very sandy clayey angular to subangular COBBLES. Gravel is angular to subangular fine to coarse of various lithologies. Cobbles are angular to subangular of various lithologies including concrete (MADE GROUND).	
			1.10			Compact grey slightly silty fine to medium SAND.	1
			1.50			Plastic brown amorphous PEAT.	
			4.20			Compact grey silty fine to medium SAND. Between 1.5 and 1.8m traces of decaying plant remains.	2
							3
							4
						Trialpit Complete at 4.20 m	

Remarks: Trial pit unstable, collapsing below 3m.

Groundwater: Damp below 1.5m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

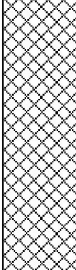
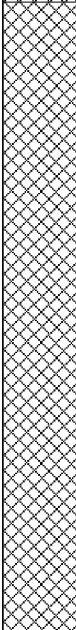
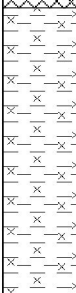
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
4.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.90			'Loose' greyish brown gravelly COBBLES. Gravel is angular to subangular fine to coarse of various lithologies including concrete and red brick. Cobbles are angular to subangular of concrete and half and full red brick (MADE GROUND).	
						'Loose' grey sandy silty clayey GRAVEL, with high cobble content. Gravel is angular to subangular fine to coarse of various lithologies including concrete and sandstone. Cobbles are angular to subangular of various lithologies including concrete (MADE GROUND).	1
			3.00			Firm brown slightly sandy silty CLAY.	3
			4.00				4
Trialpit Complete at 4.00 m							

Remarks: Trial pit unstable between groundlevel and 3.0m.
At 2.7m, ceramic pipe (300mm dia.) running east to west through trial pit.

Groundwater: Influx of groundwater from drain at 2.7m.



Project Name
Former Balderstone School

Project No.
H15235

Co-ords: -
Level: -

Date
01/10/2015

Location: Kirkholt, Rochdale

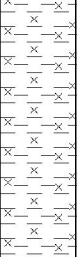
Dimensions: -

Scale
1:25

Client: Gleeson Developments (NW)

Depth
3.00m

Logged By
EM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.20			Grey sandy GRAVEL with high cobble content. Gravel is angular to subangular fine to coarse of various lithologies including sandstone and concrete. Cobbles are angular to subangular of sandstone and concrete. Sand is ash (MADE GROUND).	
			0.40			'Loose' to compact yellow brown sandy angular to subangular medium to coarse limestone GRAVEL (HARDCORE) (MADE GROUND).	
			0.80			'Loose' orange brown gravelly COBBLES, with high cobble content. Gravel is angular to subangular fine to coarse sandstone. Cobbles are angular to subangular sandstone (MADE GROUND).	
			1.80			Soft to firm light brown silty SAND. With bands (<100mm) of soft to firm silt.	1
						Trialpit Complete at 3.00 m	2
							3
							4

Remarks: Sandstone masonry wall between 0.9 and 1.6m on west side of trial pit (probable former reservoir wall).
Trial pit terminated at 3m due to instability caused by influx of water.

Groundwater: At 1.6m, influx of groundwater from west side of trial pit.



APPENDIX C

Laboratory Test Certificates - Chemical and GAC Screening Table

Soil GACs - Residential With Homegrown Produce

					
* Non SOM dependent		Residential with Homegrown Produce			Source
SOM %		1	2.5	6	
Metals and Inorganics *	Antimony				
	Arsenic		37		7
	Barium				
	Beryllium		1.7		7
	Boron		290		7
	Cadmium		11		7
	Chromium (III)		910		7
	Chromium (VI) (Hexavalent)		6		7
	Copper		2400		7
	Cyanide (Free)				
	Elemental Mercury		1.2		7
	Inorganic Mercury		40		7
	Methylmercury		11		7
	Lead		200		8
	Molybdenum				
	Nickel		130		7
	Selenium		250		7
	Tin				
	Vanadium		410		7
	Zinc		3700		7
Tributyltin oxide					
Polycyclic Aromatic Hydrocarbons	Acenaphthene	210	210	1100	7
	Acenaphthylene	170	420	920	7
	Anthracene	2400	5400	11000	7
	Benzo[a]anthracene	7.2	11	13	7
	Benzo[a]pyrene	2.2	2.7	3	7
	Benzo[b]fluoranthene	2.6	3.3	3.7	7
	Benzo[ghi]perylene	320	340	350	7
	Benzo[k]fluoranthene	77	93	100	7
	Chrysene	15	22	27	7
	Dibenz[ah]anthracene	0.24	0.28	0.3	7
	Fluoranthene	280	560	890	7
	Fluorene	170	400	860	7
	Indeno[123-cd]pyrene	27	36	41	7
	Naphthalene	2.3	5.6	13	7
	Phenanthrene	95	220	440	7
	Pyrene	620	1200	2000	7
	Coal Tar (B[a]P as surrogate marker)	0.79	0.98	1.1	7
Petroleum Hydrocarbons	Benzene	0.087	0.17	0.37	7
	Toluene	130	290	660	7
	Ethylbenzene	47	110	260	7
	m-Xylene	59	140	320	7
	o-Xylene	60	140	330	7
	p-Xylene	56	130	310	7
	Methyl tert-butyl ether (MTBE)				
	1,2,4-Trimethylbenzene				
	iso-Propylbenzene				
	Propylbenzene				
	Styrene				
	Aliphatic EC 5-6	42	78	160	7
	Aliphatic EC >6-8	100	230	530	7
	Aliphatic EC >8-10	27	65	150	7
	Aliphatic EC >10-12	130 (48) ^{vap}	330 (118) ^{vap}	760 (283) ^{vap}	7
	Aliphatic EC >12-16	1100 (24) ^{sol}	2400 (59) ^{sol}	4300 (142) ^{sol}	7
	Aliphatic EC >16-35	65000 (8.48) ^{f, sol}	92000 (21) ^{sol}	110000	7
	Aliphatic EC >35-44	65000 (8.48) ^{f, sol}	92000 (21) ^{sol}	110000	7
	Aromatic EC 5-7 (benzene)	70	140	300	7
	Aromatic EC >7-8 (toluene)	130	290	660	7
	Aromatic EC >8-10	34	83	190	7
	Aromatic EC >10-12	74	180	380	7
	Aromatic EC >12-16	140	330	660	7
	Aromatic EC >16-21	260	540	930	7
	Aromatic EC >21-35	1100	1500	1700	7
	Aromatic EC >35-44	1100	1500	1700	7
	Petroleum Hydrocarbons EC >44-70	1600	1800	1900	7

Source

7 LQM/CIEH S4UL 3279 (2014)

8 DEFRA C4SL SP1010 (2014)

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Scientific Analysis Laboratories is a
limited company registered in England and
Wales (No 2514788) whose address is at
Hadfield House, Hadfield Street, Manchester M16 9FE

Report Number: 514814-1

Date of Report: 15-Oct-2015

Customer: Patrick Parsons Ltd
5 Waverley Road
Huddersfield
West Yorkshire
HD1 5NA

Customer Contact: Mr Jonathan Roberts

Customer Job Reference: H15235

Customer Purchase Order: H15235/EM/1542

Customer Site Reference: Former Balderstone School Rochdale

Date Job Received at SAL: 02-Oct-2015

Date Analysis Started: 07-Oct-2015

Date Analysis Completed: 15-Oct-2015

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual



Report checked
and authorised by :
Bianca Prince
Customer Service Manager

Issued by :
Bianca Prince
Customer Service Manager



SAL Reference: 514814									
Project Site: Former Balderstone School Rochdale									
Customer Reference: H15235									
Soil					Analysed as Soil				
Miscellaneous									
SAL Reference					514814 001	514814 002	514814 003	514814 004	514814 005
Customer Sample Reference					TP2-ES1	TP3-ES1	TP12-ES1	TP6-ES1	TP14-ES1
Depth					1.5	1.2	0.5	0.4	0.8
Date Sampled					30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Calorific value	T40	M40	0.1	MJ/kg	<0.1	-	-	5.6	7.2
Moisture @ 105 C	T162	AR	0.1	%	9.2	18	13	14	18

SAL Reference: 514814 Project Site: Former Balderstone School Rochdale Customer Reference: H15235 Soil Analysed as Soil Miscellaneous									
SAL Reference				514814 006	514814 007	514814 008	514814 009	514814 010	
Customer Sample Reference				TP18-ES1	TP10-ES1	TP13-ES1	TP8-ES1	TP9-ES1	
Depth				0.8	0.5	0.2	0.2	0.6	
Date Sampled				30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015	
Type				Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units					
Calorific value	T40	M40	0.1	MJ/kg	-	0.6	-	-	1.3
Moisture @ 105 C	T162	AR	0.1	%	15	13	25	23	6.9

SAL Reference: 514814											
Project Site: Former Balderstone School Rochdale											
Customer Reference: H15235											
Soil Analysed as Soil											
Patrick Parsons Standard Soil Suite											
SAL Reference		514814 001		514814 002		514814 003		514814 004		514814 005	
Customer Sample Reference		TP2-ES1		TP3-ES1		TP12-ES1		TP6-ES1		TP14-ES1	
Depth		1.5		1.2		0.5		0.4		0.8	
Date Sampled		30-SEP-2015		30-SEP-2015		30-SEP-2015		30-SEP-2015		30-SEP-2015	
Type		Sandy Soil		Sandy Soil		Sandy Soil		Sandy Soil		Sandy Soil	
Determinand		Method	Test Sample	LOD	Units						
Arsenic		T6	M40	2	mg/kg	<2	5	5	8	35	
Asbestos ID		T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.	
Cadmium		T6	M40	1	mg/kg	<1	<1	<1	<1	<1	
Chromium		T6	M40	1	mg/kg	3	13	7	8	11	
Chromium (trivalent)		T85	AR	2	mg/kg	3	13	7	8	11	
Chromium VI		T6	AR	1	mg/kg	<1	<1	<1	<1	<1	
Copper		T6	M40	1	mg/kg	4	36	12	20	100	
Lead		T6	M40	1	mg/kg	15	110	49	57	350	
Mercury		T6	M40	1	mg/kg	<1	<1	<1	<1	<1	
Nickel		T6	M40	1	mg/kg	3	12	7	8	32	
pH		T7	AR			7.5	7.3	8.4	7.7	7.1	
Selenium		T6	M40	3	mg/kg	<3	<3	<3	<3	<3	
(Water Soluble) SO4 expressed as SO4		T242	AR	0.01	g/l	1.2	1.8	0.08	0.23	0.03	
SO4(Total)		T6	M40	0.01	%	0.44	4.6	0.18	0.21	0.34	
Total Organic Carbon		T21	M40	0.1	%	0.7	2.4	1.9	3.8	39	
Zinc		T6	M40	1	ma/kg	18	170	39	47	34	

Customer Reference: H15235

SAL Reference					514814 006	514814 007	514814 008	514814 009	514814 010
Customer Sample Reference					TP18-ES1	TP10-ES1	TP13-ES1	TP8-ES1	TP9-ES1
Depth					0.8	0.5	0.2	0.2	0.6
Date Sampled					30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T6	M40	2	mg/kg	7	9	4	5	6
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	6	9	4	6	9
Chromium (trivalent)	T85	AR	2	mg/kg	6	9	4	6	9
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	26	37	10	16	18
Lead	T6	M40	1	mg/kg	61	55	29	44	18
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	9	23	4	6	8
pH	T7	AR			7.0	9.9	7.1	7.0	11.1
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	0.09	0.03	<0.01	<0.01	0.02
SO4(Total)	T6	M40	0.01	%	0.12	0.24	0.12	0.11	0.42
Total Organic Carbon	T21	M40	0.1	%	3.4	13	4.4	4.0	0.7
Zinc	T6	M40	1	mg/kg	46	91	26	33	49

Customer Reference: H15235

SAL Reference					514814 002	514814 004	514814 005	514814 006	514814 007
Customer Sample Reference					TP3-ES1	TP6-ES1	TP14-ES1	TP18-ES1	TP10-ES1
Depth					1.2	0.4	0.8	0.8	0.5
Date Sampled					30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Benzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<1	<1	⁽⁹⁾ <10
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<2	2	⁽⁹⁾ <10
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<1	7	⁽⁹⁾ <10
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<4	74	⁽⁹⁾ <10
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<1	70	⁽⁹⁾ <10
TPH (Aliphatic) total	T85	M105		mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<4.0	150	⁽⁹⁾ <10
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<1	<1	⁽⁹⁾ <10
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	⁽⁹⁾ <10	⁽⁹⁾ <10	<1	9	⁽⁹⁾ <10
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	33	⁽⁹⁾ <10	<1	62	36
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	330	⁽⁹⁾ <10	<1	160	93
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	130	⁽⁹⁾ <10	<1	51	17
TPH (Aromatic) total	T85	M105		mg/kg	490	⁽⁹⁾ <10	<1.0	280	150
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/ka	490	⁽⁹⁾ <10	<4.0	430	150

/kg	<0.100
/kg	<0.10
/kg	<0.10
/kg	<1
/kg	<2
/kg	<1
/kg	<4
/kg	<1
/kg	<4.0
/kg	<0.10
/kg	<0.10
/kg	<0.10
/kg	<1
/kg	<1
/kg	<1
/kg	<1
/kg	<1
/kg	<1.0
/kg	<4.0

/kg	<0.100
/kg	<0.10
/kg	<0.10
/kg	<1
/kg	<2
/kg	<1
/kg	<4
/kg	<1
/kg	<4.0
/kg	<0.10
/kg	<0.10
/kg	<0.10
/kg	<1
/kg	<1
/kg	<1
/kg	<1
/kg	<1
/kg	<1.0
/kg	<4.0

SAL Reference: 514814 Project Site: Former Balderstone School Rochdale Customer Reference: H15235 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference					514814 006	514814 007	514814 008	514814 009	514814 010
Customer Sample Reference					TP18-ES1	TP10-ES1	TP13-ES1	TP8-ES1	TP9-ES1
Depth					0.8	0.5	0.2	0.2	0.6
Date Sampled					30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015	30-SEP-2015
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	0.3	1.1	<0.1	0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	0.9	2.3	0.1	0.5	<0.1
Fluorene	T207	M105	0.1	mg/kg	0.7	1.1	<0.1	0.5	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	4.1	13	1.1	5.3	<0.1
Anthracene	T207	M105	0.1	mg/kg	1.0	4.9	0.3	2.0	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	6.9	21	2.1	7.9	<0.1
Pyrene	T207	M105	0.1	mg/kg	6.2	18	1.9	6.6	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	3.5	8.8	1.5	3.7	<0.1
Chrysene	T207	M105	0.1	mg/kg	4.1	9.9	1.6	3.7	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	3.0	7.0	2.4	3.6	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	2.9	6.0	1.9	1.5	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	3.0	5.7	2.8	2.7	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	1.4	3.1	1.5	1.3	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	0.6	1.5	0.7	0.5	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	2.0	4.2	2.1	1.6	<0.1
PAH(total)	T207	M105	0.1	mg/kg	41	110	20	42	<0.1

Index to symbols used in 514814-1

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
AR	As Received
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
N.D.	Not Detected
9	LOD raised due to dilution of sample
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos was subcontracted to REC Asbestos

Method Index

Value	Description
T207	GC/MS (MCERTS)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T6	ICP/OES
T21	OX/IR
T40	Bomb calorimetry
T162	Grav (1 Dec) (105 C)
T27	PLM
T206	GC/FID (MCERTS)
T8	GC/FID
T7	Probe
T85	Calc
T209	GC/MS(Head Space)(MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Calorific value	T40	M40	0.1	MJ/kg	N	001,004-005,007,010
Moisture @ 105 C	T162	AR	0.1	%	N	001-010
Arsenic	T6	M40	2	mg/kg	M	001-010
Asbestos ID	T27	AR			SU	001-010
Cadmium	T6	M40	1	mg/kg	M	001-010
Chromium	T6	M40	1	mg/kg	M	001-010
Chromium (trivalent)	T85	AR	2	mg/kg	N	001-010
Chromium VI	T6	AR	1	mg/kg	N	001-010
Copper	T6	M40	1	mg/kg	M	001-010
Lead	T6	M40	1	mg/kg	M	001-010
Mercury	T6	M40	1	mg/kg	M	001-010
Nickel	T6	M40	1	mg/kg	M	001-010
pH	T7	AR			M	001-010
Selenium	T6	M40	3	mg/kg	M	001-010
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	N	001-010
SO4(Total)	T6	M40	0.01	%	N	001-010
Total Organic Carbon	T21	M40	0.1	%	N	001-010
Zinc	T6	M40	1	mg/kg	M	001-010
Naphthalene	T207	M105	0.1	mg/kg	M	001-010
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-010
Acenaphthene	T207	M105	0.1	mg/kg	M	001-010
Fluorene	T207	M105	0.1	mg/kg	M	001-010
Phenanthrene	T207	M105	0.1	mg/kg	M	001-010
Anthracene	T207	M105	0.1	mg/kg	U	001-010
Fluoranthene	T207	M105	0.1	mg/kg	M	001-010
Pyrene	T207	M105	0.1	mg/kg	M	001-010
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-010
Chrysene	T207	M105	0.1	mg/kg	M	001-010
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-010
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-010
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-010
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-010
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-010
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-010
PAH(total)	T207	M105	0.1	mg/kg	U	001-010
Benzene	T209	M105	10	µg/kg	M	002,004-007,010
Toluene	T209	M105	10	µg/kg	M	002,004-007,010
EthylBenzene	T209	M105	10	µg/kg	M	002,004-007,010
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	002,004-007,010
O Xylene	T209	M105	10	µg/kg	M	002,004-007,010
M/P Xylene	T209	M105	10	µg/kg	M	002,004-007,010
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	002,004-007,010
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	002,004-007,010
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	002,004-007,010
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	N	002,004-007,010
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	M	002,004-007,010
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	002,004-007,010
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	002,004-007,010
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	002,004-007,010
TPH (Aliphatic) total	T85	M105		mg/kg	N	002,004-007,010
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	002,004-007,010
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	002,004-007,010
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	002,004-007,010
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	M	002,004-007,010
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	M	002,004-007,010
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	002,004-007,010
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	002,004-007,010
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	002,004-007,010
TPH (Aromatic) total	T85	M105		mg/kg	N	002,004-007,010
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	002,004-007,010

APPENDIX D

Laboratory Test Certificates - Geotechnical



Contract Number: 28574

Client's Reference: **H15235/EM/1543**

Report Date: **27-10-2015**

Client **Patrick Parsons Limited**
Doyle Consulting Engineers c/o Patrick Parsons
5 Waverley Road
Huddersfield
West Yorkshire
HD1 5NA

Contract Title: **Former Balderstone School, Kirkholt, Rochdale**
For the attention of: **Emma Meek**

Date Received: **07-10-2015**
Date Commenced: **07-10-2015**
Date Completed: **27-10-2015**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	8
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	8
pH Value of Soil 1377 : 1990 Part 3 : 9 - @ Non Accredited Test	8
Water Soluble Sulphate 2:1 extract 1377 : 1990 Part 3 : 5 - @ Non Accredited Test	8
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	3
CBR: Remoulded Specimen and tested at top only 1377 : 1990 Part 4 : 7 - * UKAS	5
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:

Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - D V Edwards (Managing Director)
Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager)

Client ref: H15235/ EM/ 1543
Location: Former Balderstone School, Kirkholt, Rochdale
Contract Number: 28574

[illegible]

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory



For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)

Date: 27.10.15

[Handwritten signature]



Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5

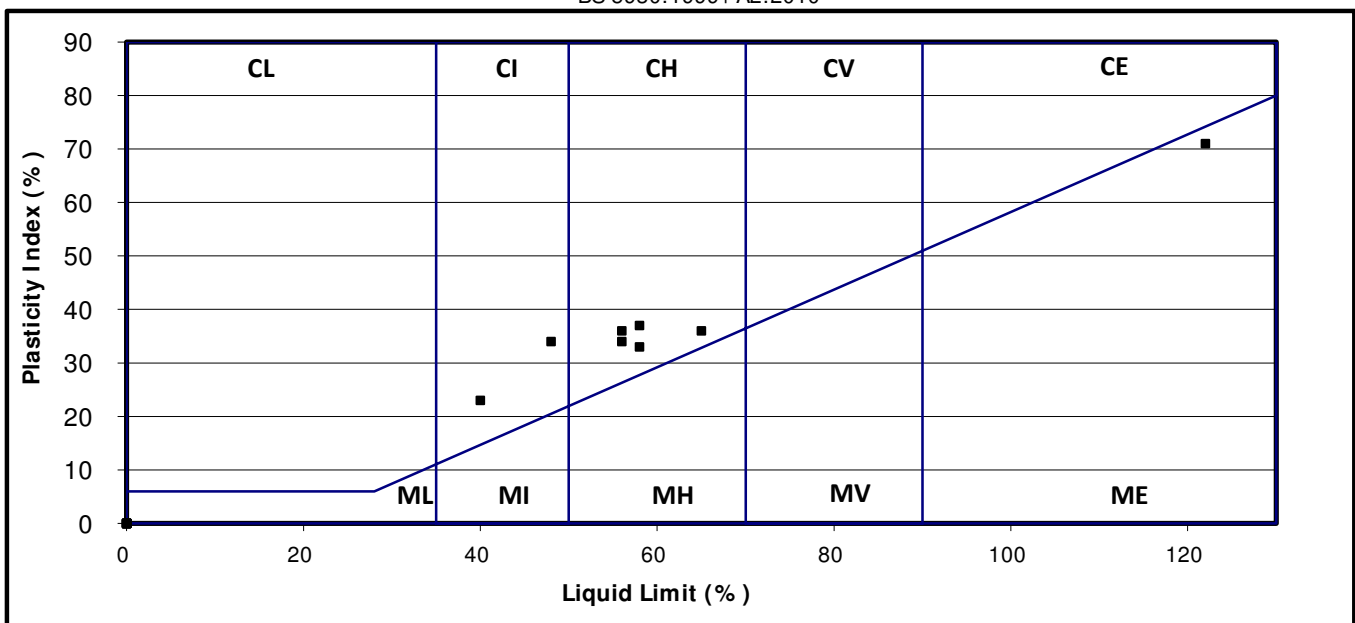
Client ref: H15235/ EM/ 1543
Location: Former Balderstone School, Kirkholt, Rochdale
Contract Number: 28574

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/ 4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
TP15/ 2	D	1.60	52	58	25	33	100	CH High Plasticity
TP5/ 3	D	1.40	67	122	51	71	95	ME Extremely High Plasticity
TP6/ 2	D	0.70	29	56	22	34	85	CH High Plasticity
TP11/ 1	D	1.40	48	65	29	36	94	CH High Plasticity
TP8/ 3	D	2.30	31	48	14	34	100	CI Intermediate Plasticity
TP17/ 1	D	2.60	33	40	17	23	100	CI Intermediate Plasticity
TP9/ 2	D	2.00	29	56	20	36	100	CH High Plasticity
TP6/ 3	B	0.50 - 1.00	29	58	21	37	100	CH High Plasticity

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

BS 5930:1999+ A2:2010



GSTL
GEO SITE & TESTING SERVICES LTD

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)

[Signature]

Date: 27.10.15



Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref: H15235/ EM/ 1543

Contract Number: 28574

Hole Number: TP8

Sample Number: 2

Depth from (m): 0.40

Depth to (m): 0.90

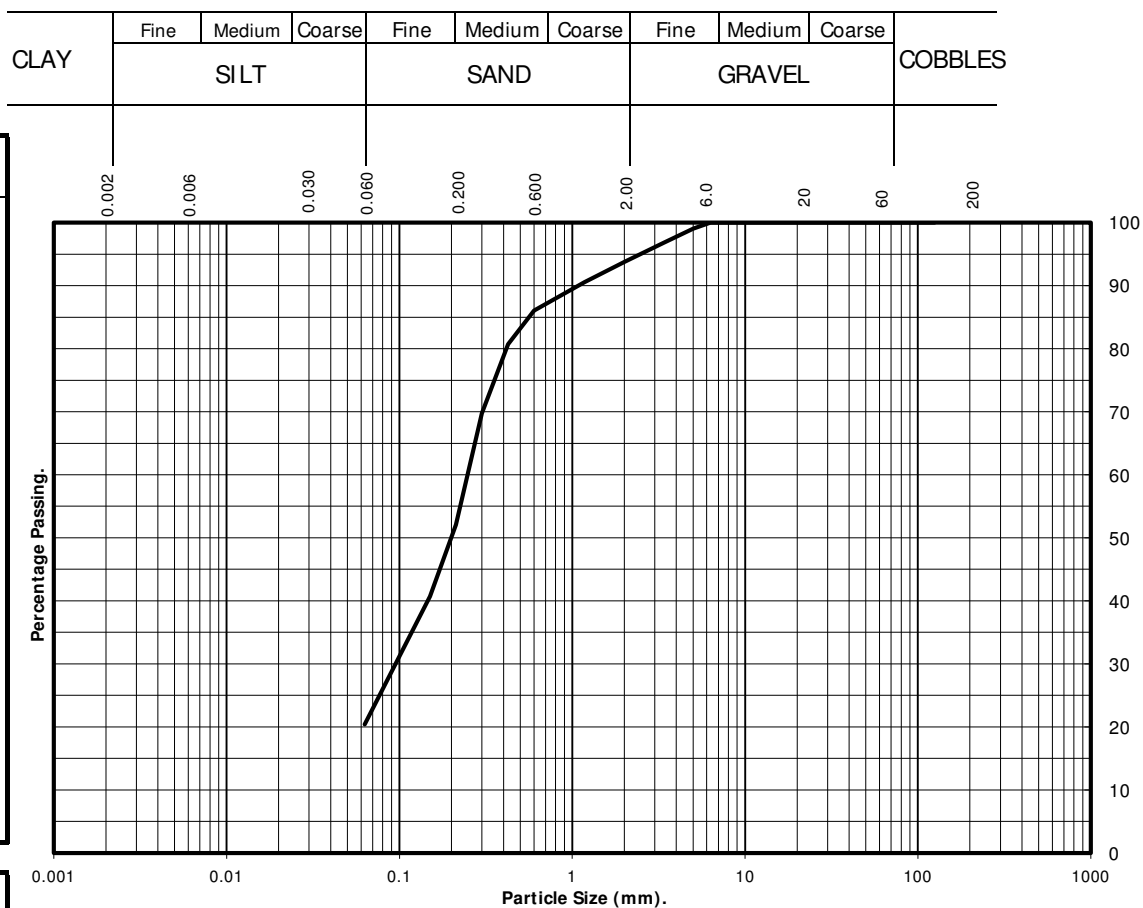
Sample Type: B

Location: Former Balderstone School, Kirkholt, Rochdale

Description: Brown slightly fine gravelly clayey silty fine to coarse SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	99
3.35	97
2.00	94
1.18	91
0.60	86
0.425	81
0.300	70
0.212	52
0.150	41
0.063	20

Particle Diameter	% Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	20	74	6	0	Total Percentage

Remarks:

- not determined

For and behalf of GEO Site & Testing Services Ltd

 Authorised By:
 Ben Sharp (Contracts Manager)

Date: 27.10.15

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref: H15235/ EM/ 1543

Contract Number: 28574

Hole Number: TP15

Sample Number: 1

Depth from (m): 0.50

Depth to (m): 0.80

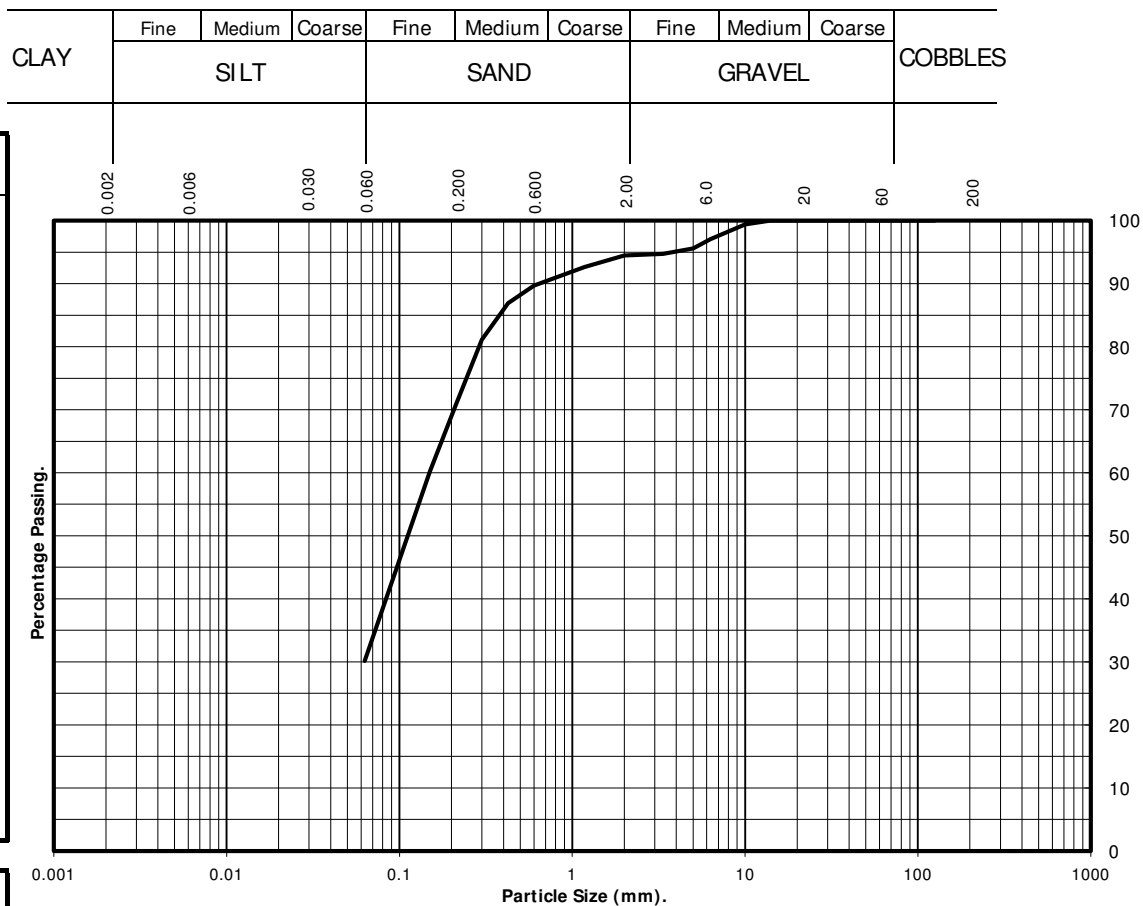
Sample Type: B

Location: Former Balderstone School, Kirkholt, Rochdale

Description: Brown slightly fine to medium gravelly clayey silty fine to coarse SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	99
6.3	97
5.0	96
3.35	95
2.00	94
1.18	93
0.60	90
0.425	87
0.300	81
0.212	71
0.150	60
0.063	30

Particle Diameter	% Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	30	64	6	0	Total Percentage

Remarks:

- not determined

For and behalf of GEO Site & Testing Services Ltd

 Authorised By:
 Ben Sharp (Contracts Manager)

Date: 27.10.15

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref: H15235/ EM/ 1543

Contract Number: 28574

Hole Number: TP20

Sample Number: 1

Depth from (m): 0.70

Depth to (m): 1.00

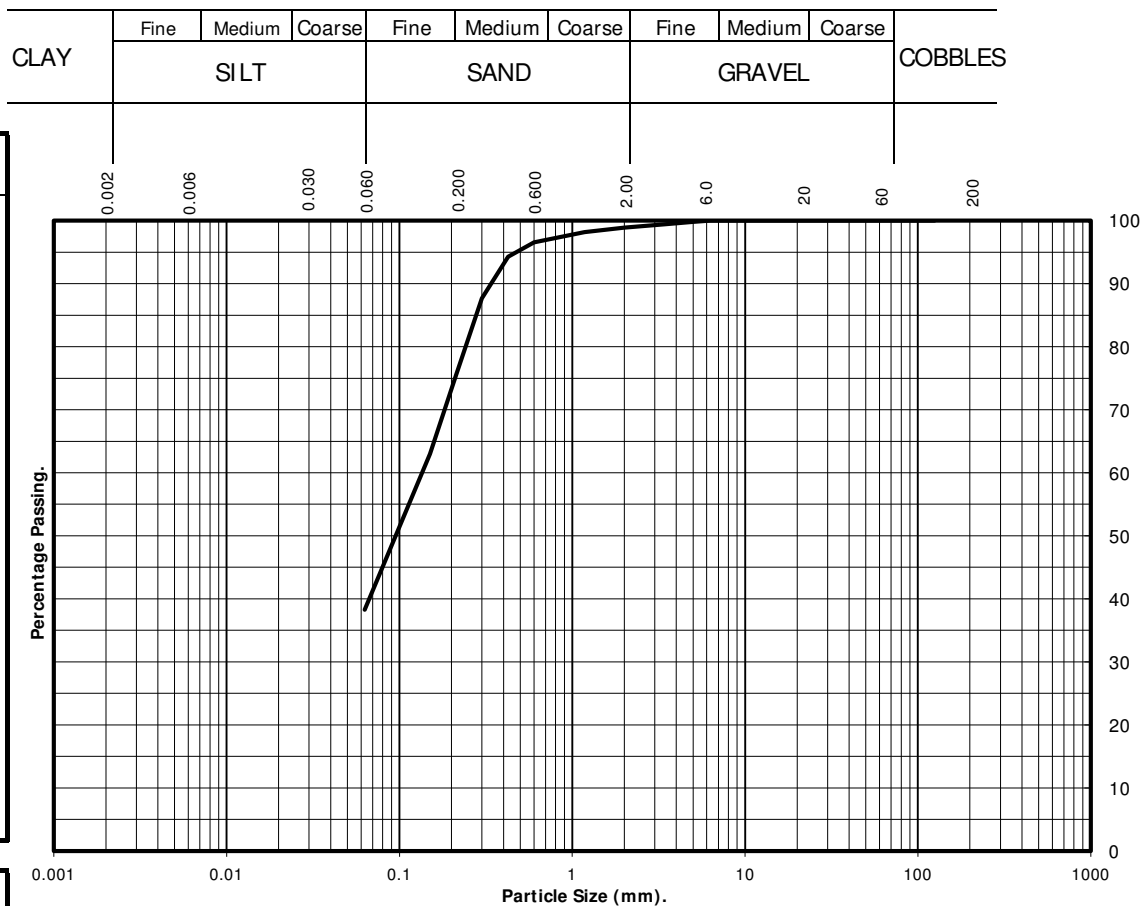
Sample Type: B

Location: Former Balderstone School, Kirkholt, Rochdale

Description: Brown slightly fine gravelly clayey silty fine to coarse SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	99
2.00	99
1.18	98
0.60	97
0.425	94
0.300	88
0.212	75
0.150	63
0.063	38

Particle Diameter	% Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	38	61	1	0	Total Percentage

Remarks:

- not determined

For and behalf of GEO Site & Testing Services Ltd

 Authorised By:
 Ben Sharp (Contracts Manager)

Date: 27.10.15

Certificate of Analysis

Date: 15/10/2015

Client: Patrick Parsons

Our Reference: 28574-071015

Client Reference: H15235/EM/1543

Contract Title: Former Balderstone School, Kirkholt, Rochdale

Description: (Total Samples) 8

Date Received: 07/10/2015

Date Started: 10/10/2015

Date Completed: 15/10/2015

Test Procedures: (B.S. 1377 : PART 3 : 1990)

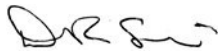
Notes:

Solid samples will be disposed 1 month and liquids 2 weeks

Approved By:

Authorised Signatories:

Emma Williams
Laboratory Office Manager


Dafydd Simon
Laboratory Team Leader


Paul Evans
Quality Manager

Contract No: 28574-071015
Client Ref: H15235/EM/1543
Location: Former Balderstone School, Kirkholt, Rochdale
Date: 15/10/2015

SUMMARY OF CHEMICAL ANALYSIS

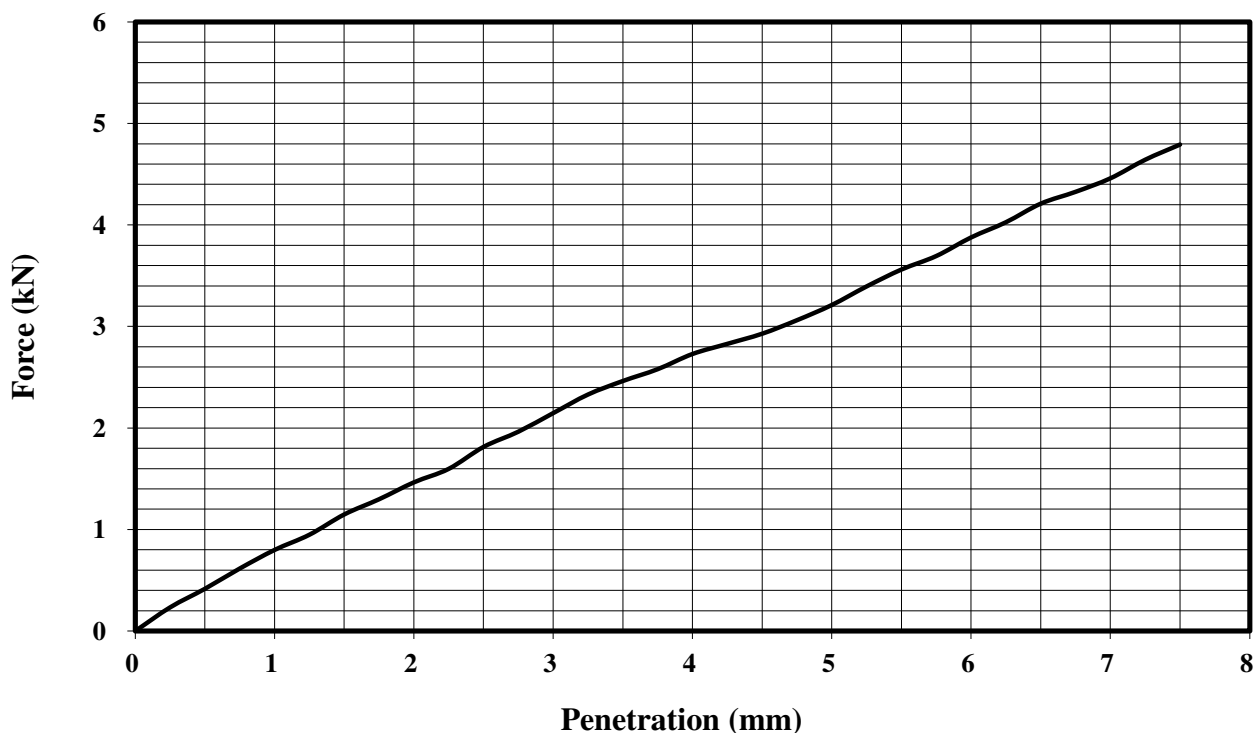
(B.S. 1377 : PART 3 : 1990)

[illegible]

NCP - No Chloride present

Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: H15235/ EM/ 1543
Location: Former Balderstone School, Kirkholt, Rochdale
Contract Number: 28574
Sample Type: B
Hole Number: TP5
Sample Number: 1
Depth (m): 0.50 - 1.00
Description: Brown fine to coarse gravelly silty SAND.



Initial Sample Conditions

Moisture Content: **9.2**
Bulk Density Mg/m³: **2.09**
Dry Density Mg/m³: **1.92**
C.B.R. Value % Sample Top **16.05**
Percentage retained on 20mm BS test sieve: **4**

Test Conditions

Surcharge Kg: **2.0**
Soaking Time (hrs): **N/ A**
Swelling mm: **N/ A**

Method of Compaction:
2.5 Kg Rammer

Remarks:



Checked By

Ben Sharp (Contracts Manager)

Date Approved:

Approved By:

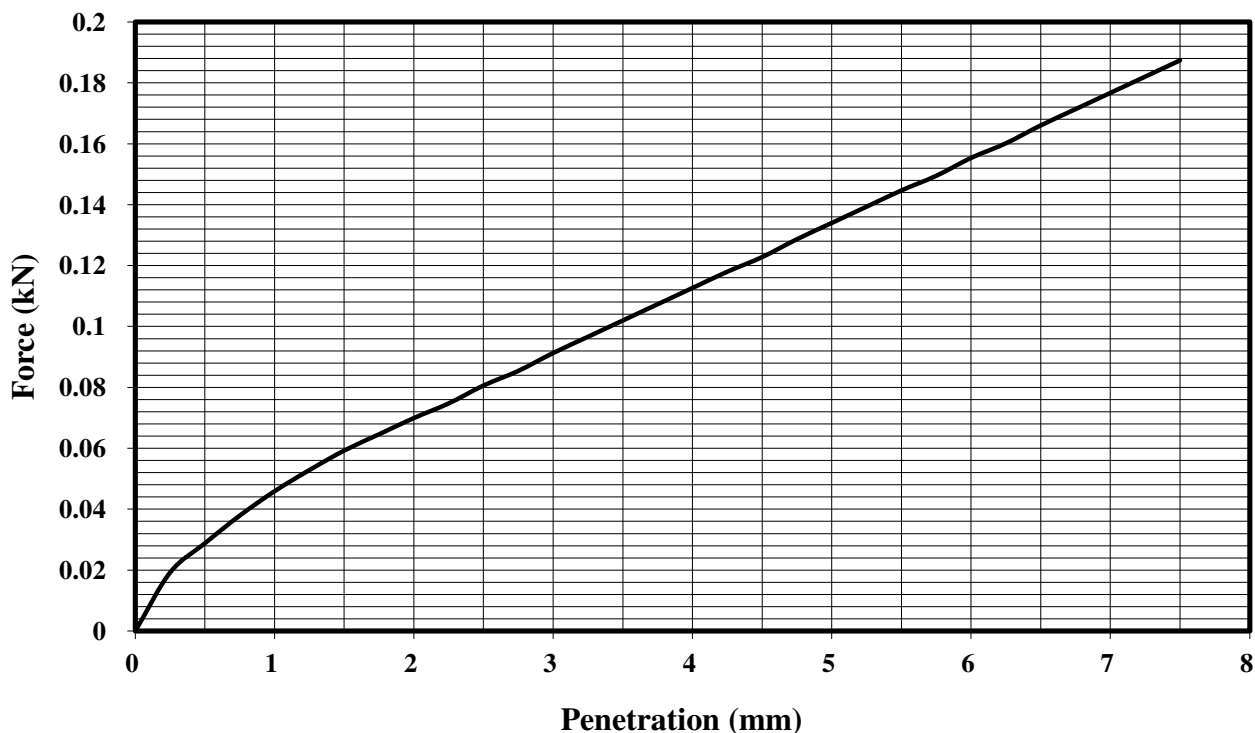
Paul Evans (Quality Manager)

27.10.15



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: H15235/EM/1543
Location: Former Balderstone School, Kirkholt, Rochdale
Contract Number: 28574
Sample Type: B
Hole Number: TP6
Sample Number: 3
Depth (m): 0.50 - 1.00
Description: Black/brown slightly fine to coarse gravelly slightly organic silty sandy CLAY.



Initial Sample Conditions

Test Conditions

Method of Compaction:
2.5 Kg Rammer

Moisture Content: **29.7**
Bulk Density Mg/m³: **1.86**
Dry Density Mg/m³: **1.44**
C.B.R. Value % Sample Top **0.67**

Surcharge Kg: **2.0**
Soaking Time (hrs): **N/A**
Swelling mm: **N/A**

Percentage retained on 20mm BS test sieve: **1**

Remarks:



Checked By

Ben Sharp (Contracts Manager)

Date Approved:

Approved By:

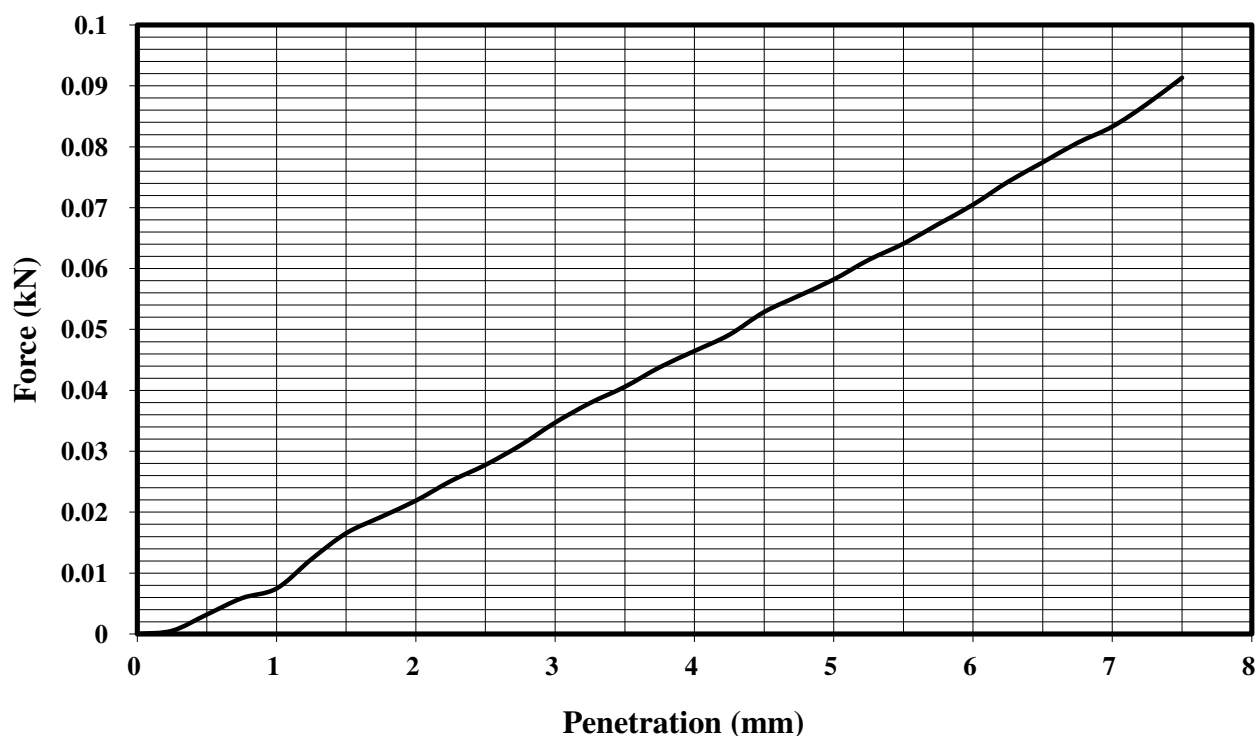
Paul Evans (Quality Manager)

27.10.15



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: H15235/ EM/ 1543
Location: Former Balderstone School, Kirkholt, Rochdale
Contract Number: 28574
Sample Type: B
Hole Number: TP8
Sample Number: 2
Depth (m): 0.40 - 0.90



Initial Sample Conditions

Test Conditions

Method of Compaction:
2.5 Kg Rammer

Moisture Content: **25.7**
Bulk Density Mg/m³: **1.95**
Dry Density Mg/m³: **1.56**
C.B.R. Value %

Surcharge Kg: **2.0**
Soaking Time (hrs): **N/ A**
Swelling mm: **N/ A**

Sample Top **0.29**

Percentage retained on 20mm BS test sieve: **0** Remarks:



Checked By

Ben Sharp (Contracts Manager)

Date Approved:

Approved By:

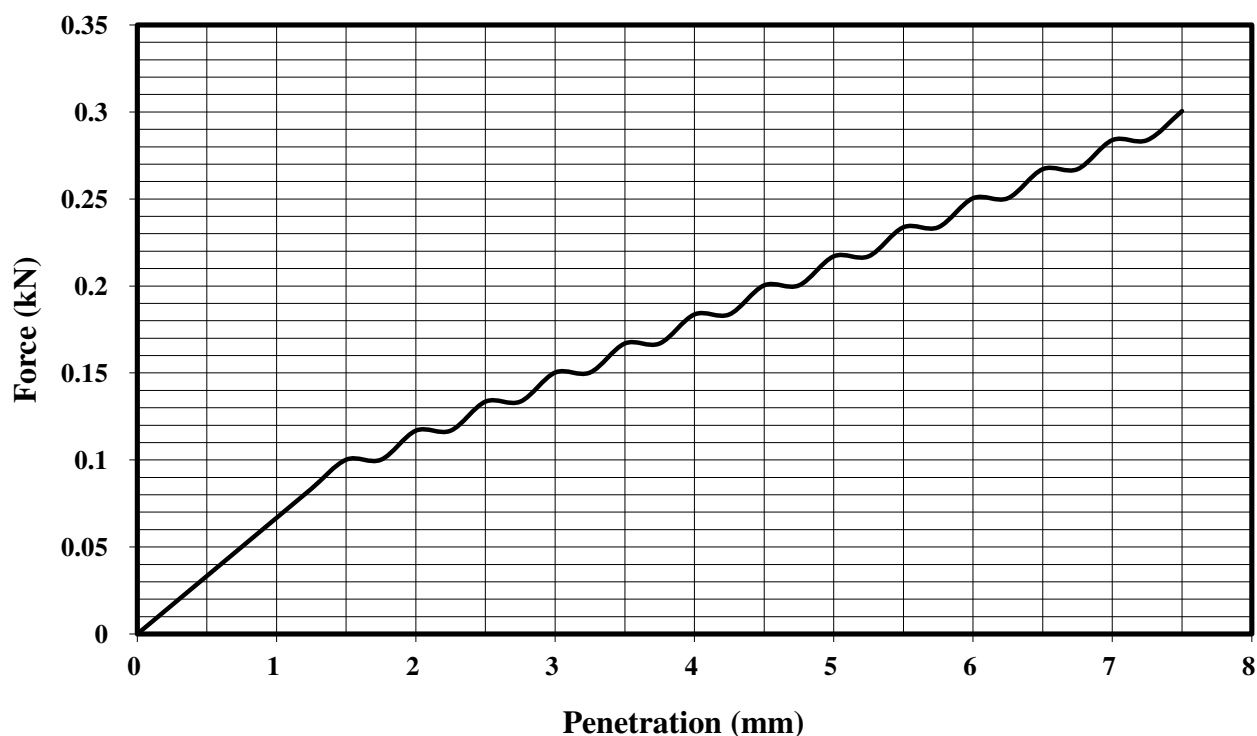
Paul Evans (Quality Manager)

27.10.15



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: H15235/ EM/ 1543
Location: Former Balderstone School, Kirkholt, Rochdale
Contract Number: 28574
Sample Type: B
Hole Number: TP15
Sample Number: 1
Depth (m): 0.50 - 0.80



Initial Sample Conditions

Test Conditions

Method of Compaction:
2.5 Kg Rammer

Moisture Content: **17.3**
Bulk Density Mg/m³: **2.06**
Dry Density Mg/m³: **1.75**
C.B.R. Value % Sample Top

Surcharge Kg: **2.0**
Soaking Time (hrs): **N/ A**
Swelling mm: **N/ A**

1.08

Percentage retained on 20mm BS test sieve: **0**

Remarks:



Checked By

Ben Sharp (Contracts Manager)

Date Approved:

Approved By:

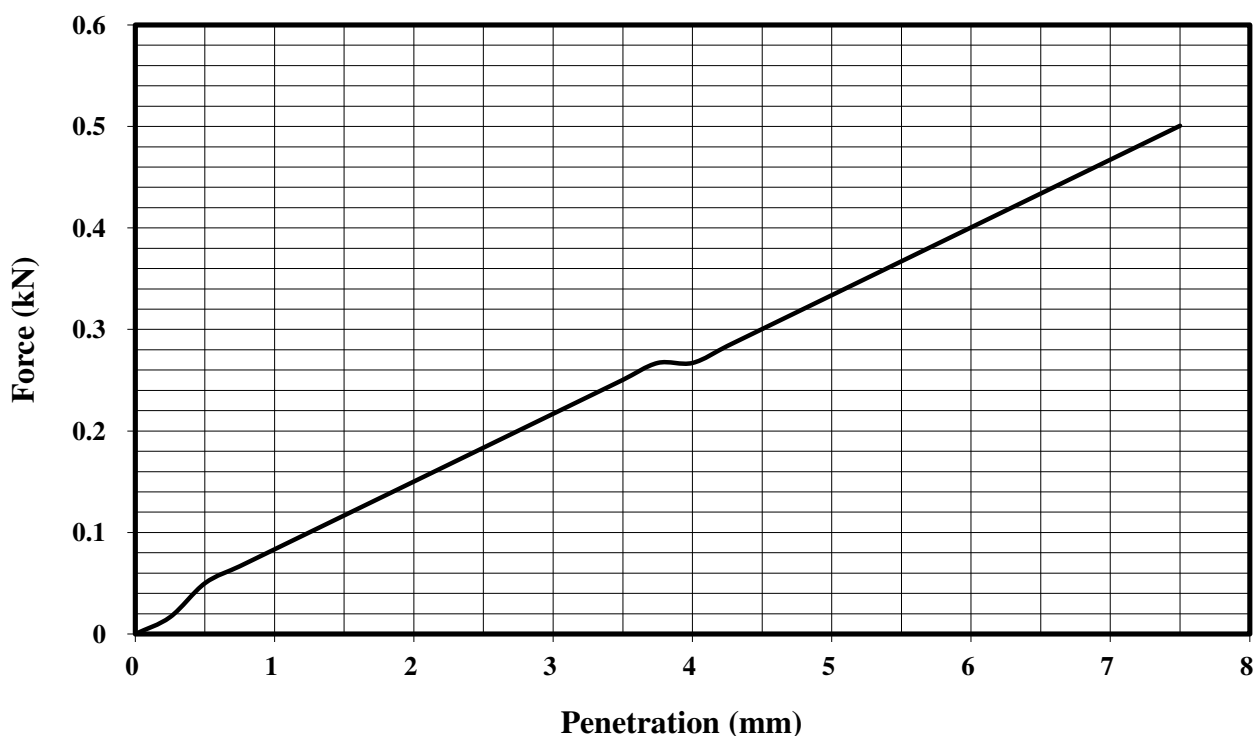
Paul Evans (Quality Manager)

27.10.15



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: H15235/ EM/ 1543
Location: Former Balderstone School, Kirkholt, Rochdale
Contract Number: 28574
Sample Type: B
Hole Number: TP20
Sample Number: 1
Depth (m): 0.70 - 1.00



Initial Sample Conditions

Moisture Content: **13.7**
Bulk Density Mg/m³: **2.09**
Dry Density Mg/m³: **1.83**
C.B.R. Value %
Percentage retained on 20mm BS test sieve: **0**

Test Conditions

Surcharge Kg: **2.0**
Soaking Time (hrs): **N/ A**
Swelling mm: **N/ A**

Method of Compaction:
2.5 Kg Rammer

Sample Top **1.67**

Remarks:



Checked By

Ben Sharp (Contracts Manager)

Date Approved:

Approved By:

Paul Evans (Quality Manager)

27.10.15



APPENDIX E

Geoenvironmental Conceptual Site Model

Geoenvironmental Conceptual Site Model - H15235 Former Balderstone School, Kirkholt

Source - Pathway - Receptor Risk Table

SOURCES	PATHWAYS	RECEPTORS	RISK
Soils - Lead is present within the shallow made ground and PAHs have been identified within both the ash-based made ground and topsoil at elevated concentrations.	Direct and indirect ingestion of and contact with soil and inhalation of airborne particles	End-users and construction workers	Risk to human health (construction personnel) - LOW to MODERATE Risk to human health (end-users) - LOW to MODERATE
Soils - Asbestos Asbestos screening has not detected its presence and no ACMs were noted during intrusive works. <i>(ACMs may be expected to be present within made ground and possibly beneath remnant floor slabs/hardstandings).</i>	Direct and indirect ingestion of and contact with soil - inhalation of airborne particles	End-users and construction workers	Risk to human health - LOW (on basis of findings)
Groundwater (and surface water)	Through soils/strata into underlying groundwater and surface water (leaching)	Ground and surface water receptors (Secondary A aquifers and nearby watercourses)	Risk to underlying superficial and Coal Measures strata Secondary A aquifers and to Sudden Brook (culverted) from leaching of on-site contaminants - LOW to MODERATE (based on extensive granular strata beneath the site, perched groundwater and culverted Sudden Brook)
Ground Gas From on site made ground and organic soils/peat From off-site made ground (Radon precautions are not required in this area at the present time)	Via strata/soils and made ground	End-users in buildings (confined spaces)	Risk of ground gas ingress from on-site sources - LOW to MODERATE Risk of ground gas ingress from off-site sources - NEGLIGIBLE to LOW