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EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Cundall Johnstone and Partners, on behalf of Balfour Beatty Construction Limited, with respect to the redevelopment of this site by the construction of a new four-storey school with areas of hardstanding and soft landscaping. The purpose of the investigation has been to assess the ground conditions, investigate the presence of contamination and to provide information for the design of spread and piled foundations. An outline desk study has previously been carried out by Manchester City Council with the information having been provided by the client.

DESK STUDY FINDINGS

The desk study indicated that the site had previously been undeveloped farmland prior to the construction of the existing school between 1954 and 1960. At the same time the majority of the surroundings were developed into the residential area of Wythenshawe. A previous ground investigation indicated a thin covering of made ground beneath which firm becoming stiff clay was encountered and graded into Mercia Mudstone within around 2.0 m. This material was initially very weak and became less weathered with depth, typically with SPT "N" values of over 75 occurring within 3.0 m. Groundwater was measured as seepages at depths of between 0.5 m and 1.2 m. Contamination testing has not previously been undertaken. On the basis of the desk study information the site is assessed to have a low risk of contamination.

GROUND CONDITIONS

Within the 22 boreholes drilled, beneath a covering of made ground, firm becoming stiff sandy clay was found to extend to depths of between 1.6 m and 2.3 m. The clay was found to overlie layers of very weak to strong highly fractured mudstone and siltstone. Refusal with an SPT in excess if 75 generally occurred at depths of between 2.0 m and 3.0 m with the material subsequently being proved to a depth of 12.0 m by rotary coring. Groundwater was found to rest at depths of between about 0.30 m and 1.00 m in the area of the proposed buildings. In general contamination was not encountered but elevated concentrations of arsenic and nickel were measured within a single borehole in the eastern part of the site with a single elevated PAH and TPH also being measured.

RECOMMENDATIONS

Spread foundations bearing within the stiff clay encountered at a minimum depth of 0.75 m may be designed to apply a net allowable bearing pressure in the order of 150 kN/m^2, increasing to around 250 kN/m^2 at a depth of between 2.0 m and 3.0 m where the mudstone was encountered. Given the anticipated column loadings it is, however considered that the depth and size of such pads may prove uneconomical and consideration could alternatively be given to piled foundations. Continuous flight auger piles are considered to be the most suitable with a preliminary design suggesting that a 600 mm diameter pile founding at a depth of 8 m should provide a safe working load in the order of 800 kN.

The firm sandy glacial till should be suitable for the support of the anticipated relatively lightly loaded ground bearing floor slabs but it is recommended that formation level be proof rolled prior to casting concrete.

Initial gas results suggest a Gas Characteristic Situation 1 for the proposed buildings with a 1200 gauge damp proof membrane and in situ concrete slab likely to suffice; the source of the gas thought to be the former pond in the east of the site. The laying of the hard covering of the proposed car park and location of the proposed buildings will effectively break any contamination pathway. At this stage, no soil remedial work is anticipated to be required.

Part 1: INVESTIGATION REPORT

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by Balfour Beatty Construction and in consultation with Cundall Johnstone and Partners, to carry out a ground investigation at Parklands High School, Simonsway in Wythenshawe, Manchester. Desk study information with limited interpretation was undertaken by Manchester City Council and supplied to GEA with the enquiry documents.

1.1 Proposed Development

It is proposed to redevelop this site through the construction of a new school structure of up to four storeys, together with new car parking and areas of soft landscaping. The current preferred development option shows the proposed buildings to be sited to front entirely onto Simonsway.

This report is specific to the proposed development and the advice herein should be reviewed if the development proposals are amended.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows.

- to review supplied desk study information;
- to determine the ground conditions and their engineering properties;
- to provide information to assist in the design of spread and piled foundations;
- to provide information in respect of ground gas;
- provide information for use in the design of pavements; and
- to investigate the presence of contamination.

1.3 Scope of Work

In order to meet the above objectives, a ground investigation was carried out and comprised, in summary, the following activities:

- four rotary boreholes, cored to a maximum depth of 12.0 m;
- a series of 18 small diameter open-drive boreholes advanced to a maximum depth of 3.45 m;
- equivalent in-situ CBR testing using a Mexe-cone penetrometer;

- testing of selected soil samples for geotechnical and contamination purposes; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

2.1 Site Description

The site is located within the suburb of Wythenshawe and lies some 10 km south of Manchester city centre. It is occupied by and currently in use as a high school with sports facilities to the rear. The site fronts onto Simonsway to the south with office buildings lying beyond the eastern boundary. The site is bounded on the remaining sides by the residential properties of Greenwood Drive to the west, Mottershead Road to the north and Gladeside Road and Leybrook Road to the northeast. The site may additionally be located by National Grid Reference 382110 387210.

The site is irregular in shape and is of approximate maximum dimensions 380 m north to south by 300 m east to west. The northern half of the site area is currently in use as playing fields; mostly set to grass but with a complex of high-fenced artificial pitches adjacent to the school. The school buildings lie roughly centrally on the site and soft landscaping stretches between the buildings and Simonsway. The school buildings are a mixture of single, two and three storeys in height and are of mainly masonry construction with external tarmac and paved areas. The site was accessed from two points, the first from Simonsway and the main car park; the second from Greenwood Road adjacent to the single storey caretaker's house.

A particularly soft area of grass was noted in the southeastern part of the site. The caretaker suggested that this may have been a backfilled former pond.

2.2 Site History

A formal desk study has not been supplied but historical maps and environmental data were obtained by Manchester City Council in 2005 from the Landmark Information group. This information was provided as apart of the enquiry documentation along with a previous site investigation report. The report was referenced SI 5983 and dated August 1993 by Northern Foundations (Investigations) Limited.

The first map studied dated 1877 shows the site to be undeveloped farmland with a small copse and buildings in the southeastern part of the site along with a small pond. The map dated 1935 shows the buildings to be named as North Poundswick Farm and that the houses on Leybrook Road had been built. No change to the site itself is indicated until the map dated 1960, when the school, along with playgrounds and tennis courts is shown. Little or no further change is shown

on the subsequent maps to 1977 when an L-shaped building is shown to have been added to the west of the school. The map dated 1990 map shows that the office buildings east of the site had been constructed with no further change until the time of this investigation.

2.3 Other Information

A search of public registers and environmental databases was made by Manchester City Council in 2005 via the Envirocheck database and was provided within the enquiry documents. More detailed information relating to the search can be provided by Manchester City Council.

The search has not indicated any information that pertains directly to or should affect the safe redevelopment and occupation of the site.

No pollution incidents to controlled waters have been recorded within 400 m of the site with the nearest being a leak of diesel into the River Mersey in 1995, located some 439 m northeast of the site and having been denoted as a Category 3 - Minor Incident is considered not to affect the site. The nearest discharge consent, albeit of revoked status, is located some 700 m northeast of the site and at the time of enquiry no licences for groundwater abstraction are recorded within 1000 m of the site.

No recorded local authority landfill sites or waste management facilities are recorded within 1000 m of the site.

The site does not lie within a Fluvial Indicative Flood Zone.

The site is located in an area where less than 1 % of homes are above the Radon Action Level; radon protection measures are therefore not indicated as being necessary.

The Geological Survey map of the area indicates that the site is underlain by Glacial Till overlying the Middle Coal Measures, the latter being soils listed as a non aquifer and therefore low leaching potential. A Geological Assessment, carried out by the BGS on behalf of Manchester City Council, was provided with the enquiry documents and confirms the site to be underlain by limited depth of Glacial Till overlying the Bollin Mudstone Member.

Although not in an area in which coal mining is expected, a Coal Mining Report, reference 10080069-05 and dated 9 March 2005, was carried out by the Coal Authority on behalf of Manchester City Council. The report confirms that the site is not within the likely zone of physical influence on the surface from past, present of future workings.

The previous site investigation report found made ground extending to around 0.75 m which was in turn underlain by firm becoming stiff clay which grades into brown and grey mudstone.

2.4 Preliminary Risk Assessment

Given the historical agricultural background of the site and subsequent use as a school; it is considered that there is a low risk of contamination.

3.0 EXPLORATORY WORK

In order to meet the objectives described in Section 1.2, a series of 18 shallow boreholes was advanced using a tracked open-drive sampling rig under the supervision of a geotechnical engineer from GEA. In addition four boreholes were advanced using a rotary coring rig to obtain information on the strength of the mudstone with depth. Standard Penetration Tests (SPTs) were carried out at regular intervals within the open-drive boreholes. Disturbed and undisturbed samples were recovered from the boreholes at regular intervals for subsequent laboratory examination and geotechnical and contamination analyses.

Four combined soil gas and groundwater monitoring standpipes were installed at locations specified by the consulting engineer. A programme of gas and groundwater monitoring is currently underway and the results obtained thus far are appended; those for subsequent visits will be reported as an addendum to this report. In situ equivalent CBR was determined at a number of locations around the site using a Mexe-cone penetrometer; the results are presented within the appendix.

The borehole records and the results of the laboratory analyses are appended, together with a site plan indicating the borehole locations. The locations and nomenclature of the boreholes were specified by the consulting engineer with the location of Borehole Nos 1, 3 and WS8 requiring adjustment on site to avoid buried services. Borehole levels have been interpolated from spot heights and contours on electronic drawing reference Parklands Topo.dwg which was supplied by the client.

3.1 Sampling Strategy

It is understood that the borehole locations were selected to give an indication of the ground conditions across the site and with particular focus in the area of the proposed building. The recovered soil samples were selected for geotechnical purposes and to provide a general view of the soluble sulphate concentrations.

Eight samples of the made ground were recovered at selected depths to investigate the degree of contamination across the site. These selected samples have been subjected to chemical analyses to determine concentrations of a range of typical soil contamination indicative parameters. For this investigation the analytical suite included a range of metals, speciated total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide, and monohydric phenols. The contamination analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. Details of the accreditation and test methods are summarised in the Appendix together with the analytical results; full MCERTS details are available upon request.

4.0 GROUND CONDITIONS

The boreholes generally encountered the expected ground conditions, consistent with the previous report in that below made ground that was up to 1.4 m in thickness, sandy clay was encountered grading into mudstone by around 2.0 m depth; the mudstone being proved to the maximum depth investigated of 12.0 m.

4.1 Made Ground

Beneath the surfacing of grass or tarmac, made ground was encountered at each location and was found to extend to depths of between 0.2 m and 1.4 m. The made ground was found to generally

comprise soft dark brown humic sandy clay with traces of gravel, ash, coal and occasionally clinker or brick fragments. Within Borehole Nos WS6 and WS9 the made ground was found to contain layers of very sandy gravel and fragments of tarmac; this material is believed to derive from the construction of the sports hall and surrounds to which they are in close proximity.

Within Borehole No WS11, the made ground was found to extend to a depth of 1.4 m; the material being similar to the above, and considered to be material placed to backfill the excavation for the nearby sewer.

Coal, ash and clinker were generally observed to be present within the made ground. These materials are considered to be evidence of possible contamination; with ash and clinker being commonly rich in metallic elements and are typically high in PAH. Further within Borehole No WS17, which was located in the area of a former pond traces of slag were observed along with the ash and clinker.

Eight samples of the made ground have been tested for the presence of contamination and the results are discussed in Section 4.4.

4.2 Glacial Till

This stratum was encountered as a thin layer beneath the made ground and was found to generally comprise soft or firm becoming stiff orange brown and grey mottled silty sandy clay. This material was found to extend to depths of between 0.7 m and 2.1 m. Laboratory analysis has identified these soils to be of low shrinkability.

No visual or olfactory evidence of contamination was identified in the natural soils during this investigation

4.3 Mercia Mudstone

This stratum generally comprised firm becoming stiff and then very stiff reddish brown and pale grey mottled silty clay with abundant fragments of reddish brown mudstone and pale grey siltstone. These fragments graded into discrete layers of mudstone and siltstone at depths of between 1.6 m and 2.25 m in the area of the proposed building. The Mercia Mudstone was found to extend to the maximum depth of all of the boreholes with effective refusal occurring within the open-drive boreholes with an SPT 'N' value greater than 75 at depths of between 2.35 m and 3.38 m. Laboratory analysis has identified these soils to be of low shrinkability.

The advancement of four boreholes by rotary coring has revealed the mudstone to generally comprise layers of very weak to strong thinly laminated to thinly bedded reddish brown mudstone, pale greenish grey siltstone with a layer of fine grained sandstone. The material was found to be consistently highly fractured with RQD of generally zero and fracture index of greater than 20. Point load index testing has indicated that the mudstone varies in strength between 0.05 MPa and 5.2 MPa.

4.4 Groundwater

Groundwater was encountered in a number of the boreholes within the mudstone at depths of between 1.2 m (55.4 m OD) and 2.85 m (53.65 m OD). In addition within the rotary holes, seepages were noted at depths of between 0.8 m and 2.0 m with a faster ingress of groundwater at a depth of 4.5 m (52 m OD to 54.5 m OD) and rest levels of between 52.7 m OD and 55.4 m OD.

During subsequent ground gas monitoring, the depths to groundwater were measured at between

approximately 0.30 m (58.8 m OD) and 1.65 m (55.9 m OD).

4.5 Soil Contamination

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

The use of a risk-based approach, which is presented in Part 2 of this report, means that it is not appropriate to determine the significance of contamination test results by simply comparing individual contaminant concentrations to a single "trigger" or "target" concentration.

The significance of the results is therefore considered in more detail in Part 2, whilst the table below sets out the values measured within the eight samples.

Determinant	Maximum Concentration Recorded (mg/kg)	Minimum Concentration Recorded (mg/kg)	Number of samples below detection limit	Normalised upper bound US_{95}
Arsenic	76	9	None	35
Cadmium	1	<1.0	7	
Chromium	34	19	None	27
Copper	150	27	None	76
Lead	240	37	None	133
Mercury	2	<1	7	1.4
Nickel	57	16	None	34
Selenium	<2	<2	All	<2
Zinc	180	70	None	128
Total Cyanide	6	<1	7	3
Total Phenols	<1	<1	All	<1
Sulphide	23	<10	All	<10
Sulphate Total	0.19 %	0.09 %	None	0.15 %
Soluble Chloride	<50 mg/l	<50 mg/l	All	<50 mg/l
PAH	160	0.36	None	59
TPH (C8-C10)	<10	<1	All	4
TPH (C10-C12)	<10	<1	All	4
TPH (C12-C16)	17	<1	6	7
TPH (C16-C21)	180	<1	3	68
TPH (C21-C35)	800	<1	3	300
Total Organic Carbon	9.2 %	1.7 %	None	5 %
pH	7.5	5.7	-	-

Note: The use of the normalised upper bound for 95th percentile confidence aims to remove some of the uncertainty associated with calculation of an arithmetic sample mean of a relatively small number of samples. The US95 value is the upper bound of the range within which it can be stated with 95% confidence that the true mean concentration of the data set will fall.

4.6 Soil Gas

To date, a single visit to monitor methane, carbon dioxide and oxygen has been undertaken as part of a regime of six visits. The results are presented within the appendix. Thus far no measurable concentrations of methane have been recorded. Carbon dioxide has been measured at concentrations of between less than 0.1 % vol and 0.4 % vol with the higher concentration recorded in Borehole No WS17. The implications of these results are discussed in Part 2 of this report.

Part 2: DESIGN BASIS REPORT

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations for foundations and other aspects of the development.

5.0 INTRODUCTION

Consideration is being given to the redevelopment of this site through the construction of a four storey concrete framed school building and associated car parking and soft landscaping. Anticipated loadings have been indicated by the engineer to be in the generally in the range of 3000 kN to 4000 kN for columns, 100 kN/m to 250 kN/m for strips and 15 kN/m^2 for ground floor slabs.

6.0 GROUND MODEL

On the basis of the investigation, the ground conditions at this site can be characterised as follows.

- Made ground is present extending to depths of between 0.2 m and 1.4 m and comprises generally sandy clay with fragments of brick, ash, coal and clinker;
- beneath the made ground, glacial till comprising generally firm becoming stiff sandy clay was found to extend to a depths of between 0.7 m and 2.1 m;
- The till was underlain by Mercia Mudstone, initially encountered as a stiff clay grading into very weak mudstone at depths of between 1.6 m and 2.25 m and proved to a depth of 12.0 m; and
- groundwater was encountered within the ten of the 22 boreholes and rests at depths of between 0.32 m and 1.64 m.

6.1 Contaminants of Concern

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site specific risk assessments. To this end the table below indicates those contaminants of concern that have US95 values in excess of a generic human health risk based guideline value which is either that of the CLEA[1] Soil Guideline Value where available, or is a Generic Guideline Value calculated using the CLEA UK Beta Version 1.0 software assuming a residential end use without plant uptake, as the proposed landscaping is understood not to be used for produce. Where contaminant concentrations are measured in excess of these values it is considered that there is a potential for there to be some risk to human health and hence site specific risk assessment, soil remediation or risk management may be required. Values measured at concentrations below these values are not deemed to require further consideration with regard to human health.

1 CLR 7 (2002) *Assessment of risks to human health from land contamination: an overview of the development of soil guideline values and related research;* CLR8 (2002) *Priority contaminants for the assessment of land;* CLR 9 (2002) *Contaminants in soil: collation of toxicological data and intake values;* CLR10 (2002) *The contaminated land exposure model (CLEA): technical basis and algorithms,* and reports CLR TOX1-25 and CLR SGV1-10,15 and 16; all DEFRA and Environment Agency.

The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

Contaminant of Concern	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Normalised upper bound US_{95}	Generic Risk-Based Screening Value
Arsenic	76	9	35	20
Nickel	57	16	34	50
PAH	160	0.36	59	35

* *Threshold values marked thus are for compounds with a limited human toxicity hence the threshold values adopted are not derived on a risk based methodology. Justification for all of the values quoted is provided in the appended table of Generic Risk Based Threshold Soil Guideline Values*

The US95 values calculated indicate concentrations of arsenic and nickel to be in excess of the risk based screening value in a single borehole; No WS17. The source of these contaminants is considered to the slag within the made ground; since ash and clinker occur elsewhere on the site but have not been measured to contain concentrations of arsenic or nickel which are above the respective guideline values.

Speciated analysis of the TPH within Borehole No WS9 has indicated the TPH to be in the carbon range C21 to C35 and almost entirely aliphatic in structure; the likely source is therefore considered to be the tarmac fragments noted within the sample. The concentration of 800 mg / kg is well below the GGV for such material and therefore requires no further consideration. The elevated PAH are similarly considered to derive from this source; the concentrations of the individual carcinogens within this sample falling below their respective guideline values.

The implications of the contaminants of concern are assessed in detail in the developed conceptual site model in Section 7.6.

7.0 ADVICE AND RECOMMENDATIONS

The proposed building is proposed to be sited to front onto Simonsway and within the area investigated by Borehole Nos 2, 3, WS15, WS11, WS12, WS16, WS13, WS14 and WS17. Spread foundations bearing within the firm and stiff clay and piled foundations bearing within the mudstone are both considered to provide suitable foundation schemes although the final choice is more likely to be made on economic rather than technical issues.

7.1 Spread Foundations

Shallow spread foundations placed upon the stiff clay representing the completely weathered mudstone at a minimum depth of 0.75 m may be designed to apply a net allowable bearing pressure of 150 kN/m^2. This value includes an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits. If foundations were extended to bear on the mudstone or siltstone which was encountered at depths of between 2.0 m and 3.0 m then a higher value of 250 kN/m^2 could be adopted. It is recommended that foundation excavations are inspected by a geotechnical engineer to confirm the weathering profile of the mudstone prior to casting concrete.

It was reported that former pond lies close to the northeastern corner of the proposed building and Borehole No WS17 was located to investigate this feature. Within this borehole stiff clay was

encountered at a depth of 0.55 m and was found to be underlain by the mudstone at a depth of 1.7 m. It is likely therefore that the pond was located slightly further north and closer to Borehole No 10 where softer material was encountered.

7.2 Piled Foundations

As an alternative to the use of relatively deep spread foundations, relatively shallow piled foundations could be adopted. The shallow depth to mudstone and the largely residential surroundings would effectively preclude the use of driven piles, however bored piles could provide a cost effective foundation solution.

Given the groundwater conditions encountered within the rotary coring, bored piles installed using a continuous flight auger (CFA) are considered appropriate for the ground conditions encountered although account should be taken of the possibility of moderately strong and strong siltstone and sandstone layers within the mudstone.

The following parameters, based upon the ground conditions revealed in the boreholes are considered suitable for the preliminary design of straight-shafted bored piles.

Ultimate Skin Friction		***kN/m²***
Made Ground	GL to 1.0 m	Ignore
Weathered Mercia Mudstone (Stiff clay)	1.0 m to 3.0 m	70
Mercia Mudstone	below 3.0 m	150

Ultimate End Bearing		***kN/m²***
Mercia Mudstone	below 3 m	2500

It is standard practice to apply a factor of safety of between 1.5 and 3.0 to the above parameters in the computation of working loads of individual piles.

As a guide to the use of the above parameters it has been estimated that a 600 mm diameter CFA pile founding within the Mercia Mudstone at a depth of around 8 m should provide a safe working load of about 800 kN on the basis of an overall factor of safety of 3.0.

The example given above is for guidance and preliminary design only. The advice of a specialist piling contractor should be sought in respect of the particular type of pile which should be considered in the ground conditions encountered and with the site constraints that will apply.

7.3 Excavations

On the basis of the observations of the materials on site it is anticipated that excavations in the made ground and mudstone are likely to remain stable in the short to medium term. Water ingress should be expected on the basis of the observations to date but such inflows are considered likely to be adequately controllable with conventional sump pumping techniques

Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides provided in order to comply with

normal safety requirements.

7.4 Ground Floor Slabs

It is considered that the firm sandy glacial till could be suitable for the relatively lightly loaded ground bearing floor slabs. However any pockets of softer clay or deeper made ground such as found in Borehole Nos WS11 and WS14 will require removal and replacement with compacted granular material. It is therefore recommended that the formation level be proof rolled prior to casting concrete. Should such measures prove unacceptable a suspended ground floor slab solution should be adopted.

7.5 Effect of Sulphates

Chemical analyses of selected soil samples have revealed low concentrations of total sulphate corresponding to concrete class DS-1 of Table C2 of BRE Special Digest 1: SD1 Third Edition (2005); buried concrete may therefore be designed to Class DS-1. The measured pH conditions are slightly acidic such that with mobile groundwater conditions assumed for concrete, an ACEC classification of AC-2z may be adopted.

The guidelines contained in the above digest should be followed in the design of foundation concrete.

7.6 Pavement Design

The in-situ equivalent CBR has been measured using a Mexe-cone penetrometer instrument at locations adjacent to some of the Boreholes and at two further locations close to the former purported former pond. These tests have indicated the CBR values generally in the range of <2 % to 4 % could be attained, although higher values were measured within Borehole Nos WS9 and WS17 within the made ground.

It is therefore suggested at this stage that the above values be adopted for pavement design, with a value of “less than 2 %” adopted for formations of made ground.

Regardless of the formation material it would be prudent to proof roll the formation level of all such proposed pavements and to replace any soft spots revealed with suitable compacted granular fill.

7.7 Contamination Conceptual Model

The results of the contamination tests have confirmed the presence of arsenic and nickel contamination within a single location within the made ground, which is probably a result of the inclusion of ash, clinker and slag. Such contaminants have not been measured to be present to any great extent on the playing fields.

In addition concentrations of PAHs and TPHs measured within the single sample from Borehole No 9 are likely to derive from tarmac inclusions within the made ground.

The following tables summarises the Conceptual Model for the site and provides indication where pollution linkages may occur for which remedial action may be required.

SOURCE	RECEPTOR	PATHWAY	COMMENTS
Arsenic and nickel contamination within near surface soils	groundwater	percolation	percolation is not considered to pose a risk due to the proved depths of essentially impermeable clay which protects the underlying mudstone aquifer
		groundwater	the metallic contaminants appear to be present only within the made ground which is above and therefore isolated from the current groundwater where it exists within the mudstone
	end users	direct contact	end users will be effectively isolated from contaminants by the new buildings and hardstanding areas
	site workers during construction	ingestion of contaminated soil or dust, skin contact, inhalation	appropriate protective equipment and working practices will be required during groundworks, however once the hard coverage of the site is in place dusting of the contaminated soils will not occur
	vegetation	uptake via soil, groundwater or vapour	the extent of landscaping is not known at this stage. Appropriate thickness of clean imported topsoil may be required to be laid to break any pathway
TPH and PAH contamination	groundwater	percolation	percolation is not considered to pose a risk due to the proved depths of essentially impermeable clay which protects the underlying mudstone aquifer and the potential hard covering of the area as playgrounds
		groundwater	the hydrocarbon contaminants appear to be present within the made ground, in a largely insoluble form, above and therefore isolated from the current groundwater where it exists within the mudstone
	end users	vapours	in the area of Borehole No WS9, vapours are not considered a risk due to open ventilation to the atmosphere
	end users	direct contact	end users will be effectively isolated from contaminants by the potential playground hardstanding
	site workers during construction	ingestion of contaminated soil or dust, skin contact, inhalation	appropriate protective equipment and working practices will be required during demolition and groundworks
	plastic services	direct contact	protection from hydrocarbon contaminants may be necessary unless the hydrocarbon contaminated soil is to be removed or remediated
	vegetation	uptake via soil, groundwater or vapour	the extent of landscaping is not known at this stage. Appropriate thickness of clean imported topsoil may be required to be laid to break any pathway

Each of the potential pollution linkages is considered in more detail below.

7.7.1 Groundwater

The groundwater appears to exist within the Mercia Mudstone. The clay which represents the weathered mudstone may generally be considered to protect the groundwater from the vertical migration of contaminants from the made ground above. This protection will be enhanced by the hard covering of the site in the areas of car parking and playground as well as the area covered by the proposed buildings.

The full extent of hard covering and soft landscaping are not known at this stage.

7.7.2 End Users

7.7.2.1 Direct Contact

End users will be effectively isolated from direct contact with the identified contaminants by the extent of buildings and potential areas of external hardstanding. Areas of soft landscaping have not yet been defined but may require an appropriate depth of clean topsoil prior to planting.

7.7.2.2 Vapours

Whilst the measured concentrations of TPH and some of the PAHs are likely to be a potential source of explosive or hazardous vapours and nuisance odours, the source of the highest concentrations will probably be beneath the playground or car park hardstanding. Further, the concentration within Borehole No WS9 was at shallow depth at 0.2 m. It is considered that this shallow depth is within the zone likely to be removed during the demolition of the surrounding buildings and relaying of playgrounds or car parks. If removed from site the source to receptor linkage will have effectively been broken.

7.7.3 Site Workers

Site workers should be made aware of the contamination, albeit in localised areas and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE[2] and CIRIA[3] and the requirements of the Local Authority Environmental Health Officer.

7.7.4 Services

Given the proposal to site the building fronting onto Simonsway it is thought unlikely that new services will be required in the area of concern. This will require confirmation when further details are made available.

7.8 Soil Gas

Analysis of the results received thus far indicates that for the proposed building a Gas Characteristic Situation 1 seems appropriate, wherein no special measures would be required. At this stage, and on the basis of the single result it may be prudent to allow nominal measures such as a 1200 gauge gas DPM with an in situ concrete slab and review the requirement in the light of the full set of readings when they become available.

The mildly elevated carbon dioxide concentration measured within Borehole Nos WS17 is thought likely to derive from the former pond which is located nearby or else from normal aerobic degradation within the soils covering the playing field.

Further monitoring us currently underway and the results will be drawn together in an addendum to this report in due course.

7.9 Waste Disposal

Any spoil arising from excavations or landscaping works will need to be disposed of to a licensed tip. Under the European Waste Directive landfills are classified as accepting inert, non-hazardous

2 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land* HMSO

3 CIRIA (1996) *A guide for safe working on contaminated sites* Report 132, Construction Industry Research and Information Association

or hazardous wastes in accordance with the EU waste Directive. The classification of soils discarded during the development of this site as Inert or Hazardous waste which are to be disposed of at landfill may need to be established by comparison with the Waste Acceptance Criteria (WAC) based upon the results of CEN method bulk leaching tests or percolation tests. Such tests should be carried out upon representative samples from the waste stream once the extent of the materials to be discarded has been established.

Based upon the results of the analyses carried out and the technical guidance provided by the Environment Agency[4] it is considered likely that the made ground and natural soils from this site would be generally classified as non-hazardous. This classification should be confirmed by the receiving landfill once the soils to be discarded have been defined. In order to finalise this classification it may be necessary to carry out further analyses including WAC CEN method bulk leaching tests should an inert waste classification be sought.

8.0 FURTHER WORK

Further investigation is recommended when the building layout and extent of both hard and soft landscaping have been determined. Such work could further develop the pile and spread foundation design as well as developing the site conceptual model.

[4] Environment Agency 2003. *Hazardous Waste: Interpretation of the definition and classification of hazardous waste.* Technical Guidance WM2

APPENDIX

Borehole Records

SPT Summary

Core Photographs

In Situ equivalent CBR Results

Laboratory Test Results
: Summary of Geotechnical Results
Particle Size Distribution Test Results
Triaxial Test Results
Point Load Strength Results

Chemical Test Results

Gas Monitoring Results

Envirocheck Report

Historic Maps

Coal Authority Report

Site Plan

GEA Geotechnical & Environmental Associates
Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Site
Parklands High School, Simonsway, Wythenshawe, Manchester

Number
WS01

Excavation Method
Open drive lined percussive sampler

Dimensions

Ground Level (mOD)
57.04

Client
Balfour Beatty Construction Limited

Job Number
J06360

Location

Dates
28/11/2006

Engineer
Cundall Johnston and Partners LLP

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.25)	Made Ground (Dark brown humic clayey sand with rootlets and occasional medium gravel of mudstone and fine gravel of ash)		
				56.79	0.25			
0.20	D1				(0.20)			
				56.59	0.45	Firm brown sandy CLAY		
				56.49	(0.10)			
0.60	D2			56.34	0.55	Pale brown clayey SAND		
0.80	D3							
				56.14	(0.15)			
1.00-1.45	SPT N=10		1,1/2,1,2,5		0.70	Firm pale brown slightly sandy CLAY		
					(0.20)			
					0.90	Firm pale grey silty slightly sandy CLAY		
				55.54	(0.60)			
1.50	D4				1.50	Firm becoming stiff reddish-brown slightly sandy CLAY with a thin siltstone layer at 1.15 m		
				55.34	(0.20)			
1.80	D5				1.70	Very weak reddish brown weathered MUDSTONE recovered as reddish-brown clayey sandy gravel		
2.00-2.36	SPT 50/205		13,11/11,18,21		(0.66)			
				54.68	2.36	Very weak thinly and thickly laminated reddish-brown MUDSTONE		
						Complete at 2.36m		

Remarks
Groundwater not encountered

Scale (approx)
1:50

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EMA

Figure No.
J06360.WS01

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS02**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		56.40	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 28/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Made Ground (Dark brown humic silty slightly sandy gravelly clay with rootlets and occasional fine gravel of ash)		
0.20	D1			56.10	0.30	Stiff orange-brown sandy CLAY with occasional grey mottling with depth and rare medium gravel		
0.50	D2							
1.00-1.45	SPT N=15		2,2/3,3,4,5		(1.70)			
1.10	D3							
1.90	D4							
2.00-2.45	SPT N=42		5,7/7,11,12,12	54.40	2.00	Very weak reddish-brown weathered MUDSTONE recovered as reddish brown sandy gravel		
2.30	D5				(0.40)			
				54.00	2.40	Very stiff reddish brown sandy CLAY		
				53.80	(0.20) 2.60			
2.80	D6				(0.40)	Very weak reddish-brown weathered thinly and thickly laminated MUDSTONE		
3.00-3.26	SPT 25*/140 50/120		10,15/29,21	53.40	3.00			
3.30	D7			53.10	(0.30) 3.30	Weak pale grey SILTSTONE		
						Complete at 3.30m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	EMA
	Figure No.	
	J06360.WS02	

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GEA Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS03**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		56.20	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 28/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D1				(1.00)	Made Ground (Dark brown humic silty clayey sand with abundant roots, rootlets and occasional fine gravel sized fragments of ash)		
1.00-1.45	SPT N=12		1,2/2,3,3,4	55.20	1.00			
1.20	D2				(0.50)	Firm becoming stiff pale grey and reddish-brown mottled very sandy CLAY		
				54.70	1.50			
1.70	D3				(0.50)	Stiff reddish-brown silty sandy CLAY with occasional grey mottling and occasional fine gravel of mudstone		
2.00-2.45	SPT N=32		1,2/2,6,12,12	54.20	2.00			
2.20	D4				(0.50)	Very stiff pale grey very silty CLAY		
				53.70	2.50			
2.70	D5				(0.70)	Weak pale grey thinly and thickly laminated SILTSTONE with occasional orange-brown mottling		
3.00-3.18	CPT 25*/80 49/100		20,5/37,12	53.00	3.20			
						Complete at 3.20m		

Remarks
Water recorded at 2.0 m

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS03

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GEA Geotechnical & Environmental Associates
Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Site
Parklands High School, Simonsway, Wythenshawe, Manchester

Number
WS04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Open drive lined percussive sampler		57.20	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 28/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.40)	Made Ground (Dark brown silty sand with rootlets, and occasional gravel of ash)		
				56.80	0.40			
					(0.35)	Firm pale grey and orange-brown mottled sandy CLAY		
0.60	D2			56.45	0.75			
0.90	D3					Pale grey and pale brown clayey silty fine SAND with fragments of pale grey siltstone		
1.00-1.45	SPT N=11		1,2/3,2,3,3		(0.75)			
				55.70	1.50			
					(0.30)	Pale grey fine to medium siltstone GRAVEL within a matrix of pale grey and orange-brown silty clay		
1.70	D4			55.40	1.80			
1.90	D5					Very weak pale grey thickly laminated SILTSTONE		
2.00-2.28	SPT 50/130		9,15/21,29		(0.50)			
				54.90	2.30			
						Complete at 2.30m		

Remarks
Groundwater not encountered

Scale (approx)	Logged By
1:50	EMA

Figure No.
J06360.WS04

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS05**
Excavation Method Open drive lined percussive sampler	**Dimensions**	**Ground Level (mOD)** 57.40	**Client** Balfour Beatty Construction Limited	**Job Number** J06360
	Location	**Dates** 30/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	D1			57.10	(0.30) 0.30	Made Ground (Dark brown very sandy clay with rootlets and occasional fragments of brick, coal and ash)		
0.50	D2			56.60	(0.50) 0.80	Firm orange-brown very sandy CLAY becoming reddish-brown with depth and with occasional pale grey mottling and rare medium siltstone gravel		
1.00-1.45 1.10	SPT N=17 D3		2,2/3,4,4,6	56.55 56.45 56.20	(0.05) 0.85 (0.10)	Stiff pale grey silty CLAY Firm reddish-brown very sandy CLAY with occasional medium siltstone gravel		
1.90 2.00-2.45	D4 SPT N=49		7,10/12,13,12,12	55.95 55.40	0.95 (0.25) 1.20 (0.25) 1.45 (0.55) 2.00	Firm pale grey silty CLAY with pale grey coarse gravel sized fragments of siltstone Firm reddish-brown CLAY with fragments of thinly laminated reddish brown mudstone and pale grey siltstone		
2.40	D5				(1.00)	Very weak reddish brown weathered MUDSTONE recovered as clayey sandy gravel		
2.80	D6					Very weak thinly laminated reddish-brown MUDSTONE		
3.00-3.35	SPT 50/195		11,14/19,19,12	54.40	3.00	Complete at 3.35m		

Remarks
Groundwater encountered at 1.2 m and settled to 2.55 on completion of the borehole

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS05

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS06**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		57.50	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 29/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				57.40	(0.10) 0.10	Made Ground (Dark brown sandy clay with occasional ash fragments)		
					(0.80)	Made Ground (sandy gravel sub-base)		
0.80	D1			56.60	0.90			
1.00-1.45	SPT N=13		1,2/2,3,4,4	56.50	(0.10) 1.00	Firm pale grey and orange-brown mottled very sandy CLAY		
1.20	D2				(0.45)	Firm pale grey and pale brown mottled sandy CLAY with occasional medium to coarse gravel		
				56.05	1.45 (0.20)			
				55.85	1.65	Stiff pale grey very sandy CLAY with fragments of grey siltstone and reddish-brown mudstone		
1.70-2.00	U1				(0.35)			
2.00-2.45	SPT N=26		2,3/3,6,7,10	55.50	2.00	Stiff reddish-brown CLAY with abundant fragments of grey siltstone and reddish brown mudstone		
					(0.75)	Firm to stiff reddish-brown slightly silty slightly sandy CLAY with coal fragments		
				54.75	2.75 (0.25)	Very weak thinly laminated weathered reddish brown MUDSTONE recovered as sandy gravel within a clay matrix		
2.90	D3			54.50	3.00			
						Complete at 3.00m		

Remarks
Groundwater not encountered

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS06

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GEA Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS07**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		57.80	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 28/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	D1				(1.00)	Made Ground (Dark brown silty very sandy clay with rootlets, occasional coarse gravel and fine gravel framents of ash and brick)		
0.90	D2			56.80	1.00			
1.00-1.45	SPT N=11		1,1/2,2,3,4		(0.50)	Medium dense pale yellowish-brown slightly clayey fine to medium SAND		
1.30-1.40	D3			56.30	1.50			
					(0.50)	Medium dense reddish-brown clayey SAND		
1.90-2.00	D4			55.80	2.00			
2.00-2.45	SPT N=16		2,2/2,2,5,7		(0.45)	Firm reddish-brown silty sandy CLAY		
2.20	D5			55.35	2.45			
					(0.25)	Fine reddish-brown clayey silty SAND		
2.90	D6			55.10	2.70	Very weak reddish-brown thinly laminated MUDSTONE		
3.00-3.23	SPT 25*/130 50/100		10,15/25,25		(0.55)			
				54.55	3.25	Complete at 3.25m		

Remarks
Moist below 1.5 m

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS07

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS08**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		57.70	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 30/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Made Ground (Dark brown sandy clay with fragments of coal and brick)		
0.30	D1			57.20	0.50			
					(0.40)	Made Ground (Dark brown sandy clay with fragments of pottery, brick and ash)		
0.85	D2			56.80	0.90			
1.00-1.45	SPT N=11		1,1/2,2,3,4		(0.60)	Stiff orange-brown and yellowish grey mottled very sandy CLAY with occasional fine gravel		
1.20	D3			56.20	1.50			
					(0.30)	Stiff reddish-brown CLAY with fragments of mudstone and siltstone		
				55.90	1.80			
				55.80	(0.10)	Stiff grey silty CLAY with fragments of pale grey siltstone		
2.00-2.45	SPT N=23		3,4/5,5,5,8		1.90 (0.50)	Stiff reddish brown sandy CLAY with fragments of mudstone		
2.30	D4			55.30	2.40			
					(1.00)	Very weak reddish brown thinly laminated MUDSTONE		
3.00-3.38	SPT 25*/145 50/235		11,14/12,13,20,5					
3.00	D5			54.30	3.40			
						Complete at 3.40m		

Remarks
Groundwater not encountered but damp at 2.0 m

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS08

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS09**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		58.30	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 29/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.25)	Made Ground (Dark brown slightly sandy clay with coarse gravel sized fragments of tarmac)		
0.25	D1			58.05	0.25			
					(0.40)	Made Ground (Pale yellowish brown sand, sub-base gravel and occasional cobble)		
				57.65	0.65			
0.80	D2			57.60	(0.05)	Firm orange-brown sandy CLAY with occasional fine gravel		
1.00-1.45	SPT N=21		1,3/3,4,7,7	57.35	0.70 (0.25)	Stiff reddish-brown and pale grey very sandy CLAY with occasional black silt and fine gravel		
					0.95 (0.45)	Stiff pale grey silty sandy CLAY		
				56.90	1.40	Very weak reddish brown thinly laminated MUDSTONE recovered as mudstone gravel within a stiff clay matrix		
1.75	D3				(0.60)			
2.00-2.40	SPT 50/250		4,7/8,14,19,9	56.30	2.00			
2.10	D4			56.20	(0.10) 2.10	Weak Reddish-brown thinly and thickly laminated MUDSTONE		
						Complete at 2.10m		

Remarks
Groundwater not encountered

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS09

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GEA Geotechnical & Environmental Associates
Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Site
Parklands High School, Simonsway, Wythenshawe, Manchester

Number
WS10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Open drive lined percussive sampler		58.50	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 30/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Made Ground (Dark brown silty slightly clayey sand with rootlets and brick fragments and occasional coal fragments		
0.20	D1			58.20	0.30			
					(0.30)	Pale grey and yellowish-brown mottled SAND		
				57.90	0.60			
					(0.55)	Soft pale grey very silty CLAY		
0.90	D2							
1.00-1.45	SPT N=13		1,1/2,3,3,5	57.35	1.15			
					(0.50)	Soft reddish-brown sandy silty CLAY with cobble at 1.5 m		
1.40	D3							
1.65-2.10	CPT N=26		3,3/4,4,7,11	56.85	1.65			
					(0.70)	Very weak reddish brown MUDSTONE recovered as clayey sandy mudstone gravel		
2.00-2.35	SPT 25*/125 50/222		14,11/15,16,19	56.15	2.35			
						Complete at 2.35m		

Remarks
Groundwater encountered at 2.0 m
Refusal of sampler at 1.65 m, continued using SPT

Scale (approx)	Logged By
1:50	EMA

Figure No.
J06360.WS10

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS11**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		56.30	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 27/11/2007	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				56.10	(0.20) 0.20	Made Ground (Dark brown humic sandy clay)		
					(0.80)	Made Ground (Brown very sandy clay with fragments of mudstone, ash, gravel, siltstone and coal)		
0.90	J1			55.30	1.00			
1.00-1.45	SPT N=9		1,1/2,2,2,3		(0.40)	Made Ground (Pale brown and pale grey silty slightly sandy CLAY		
1.20	D2			54.90	1.40			
					(0.30)	Firm dark grey silty slightly sandy CLAY		
1.60	D3			54.60	1.70			
1.90	D4				(0.40)	Firm pale brown very sandy CLAY		
2.00-2.45	SPT N=29		1,1/2,5,11,11	54.20	2.10			
2.20	D5			54.05	(0.15) 2.25	Stiff pale grey very silty CLAY with fragments of very weak pale grey siltstone		
					(0.40)			
2.50	D6					Very weak reddish-brown thinly bedded MUDSTONE		
2.70	D7			53.65	2.65			
2.80-3.03	CPT 37/75		22,32/37	53.50	(0.15) 2.80	Very weak pale grey SILTSTONE thinly laminated with occasional laminations of very weak reddish-brown mudstone		
						Complete at 3.03m		

Remarks
Groundwater not encountered
Hand dug services inspection pit dug to a depth of 0.9 m

Scale (approx)	**Logged By**
1:50	MC

Figure No.
J06360.WS11

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS12**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		57.70	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 28/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				57.61	(0.09)	Made Ground (Tarmac)		
					0.09			
0.25	D1				(0.36)	Made Ground (Medium to coarse gravel)		
0.35	D2			57.25	0.45			
				57.15	(0.10)	Firm reddish brown very silty CLAY		
					0.55			
0.90	D3				(0.80)	Stiff reddish brown very silty CLAY with occasional coarse mudstone gravel		
1.00-1.45	SPT N=32		3,3/8,9,8,7					
				56.35	1.35			
1.40	D4					Very weak reddish brown weathered MUDSTONE recovered as sandy mudstone gravel		
					(0.90)			
1.80	D5							
2.00-2.24	CPT 25*/110 50/130		13,12/25,25					
				55.45	2.25			
						Complete at 2.25m		

Remarks
Groundwater not encountered

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS12

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS13**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		58.40	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 28/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				58.20	(0.20)	Made Ground (Dark brown slightly sandy humic clay with rootlets and roots)		
0.20	D1				0.20			
					(0.50)	Firm pale grey and reddish-brown mottled sandy CLAY with occasional fragments of mudstone and siltstone		
				57.70	0.70			
0.70	D2					Very stiff pale grey very silty CLAY with abundant fragments of weak pale grey siltstone		
1.00-1.45	SPT N=50		3,6/10,11,15,14					
1.00	D3							
					(1.65)			
1.60	D4							
2.00	D5							
				56.05	2.35			
						Complete at 2.36m		

Remarks
Groundwater not encountered

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS13

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Coursers Road
St Albans
AL4 0PG

Site
Parklands High School, Simonsway, Wythenshawe, Manchester

Number
WS14

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Open drive lined percussive sampler		58.50	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 29/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1			58.20	(0.30) 0.30	Made Ground (dark brown humic very sandy clay with rootlets and occasional fragments of brick and ash)		
0.50	D2			57.80	(0.40) 0.70	Soft dark brown slightly sandy CLAY with occasional coarse gravel		
1.00-1.45	SPT N=17		2,3/3,5,5,4	57.65	(0.15) 0.85	Firm pale greyand orange-brown mottled sandy CLAY		
1.20	D3			57.50	(0.15) 1.00	Firm reddish brown silty sandy CLAY		
1.90	D4			57.00	(0.50) 1.50	Stiff reddish-brown very sandy CLAY		
2.00-2.35	SPT 50/200		9,12/12,23,15	56.75	(0.25) 1.75	Very stiff reddish-brown CLAY with fragments of mudstone		
				56.15	(0.60) 2.35	Very weak thinly and thickly laminated reddish-brown MUDSTONE		
						Complete at 2.35m		

Remarks
Groundwater not encountered

Scale (approx)	Logged By
1:50	EMA

Figure No.
J06360.WS14

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS15**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		56.50	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 27/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Made Ground (greyish brown very sandy humic clay with traces of coal and rootlets)		
0.30	J1			56.10	0.40			
0.50	D2				(0.50)	Soft becoming firm pale reddish-brown very sandy CLAY		
0.60-0.80	U3			55.60	0.90			
1.00-1.45	SPT N=19		1,2/3,4,5,7		(0.30)	Stiff becoming very stiff reddish-brown very sandy CLAY with rare very thin laminations of very weak reddish brown mudstone and pale grey silty clay		
1.10	D3			55.30	1.20			
1.40	D4				(0.35)			
1.58	D5			54.95 54.90	1.55 (0.05)	Very stiff reddish-brown very sandy CLAY with fragments of very weak reddish-brown mudstone		
1.70	D6			54.72	1.60			
2.00-2.34	SPT 50/190		15,10/34,16		(0.18)	Pale grey slightly clayey weakly cemented thinly laminated SILTSTONE		
2.10	D7				1.78			
					(0.56)	Very weak reddish-brown thinly bedded MUDSTONE		
				54.16	2.34	Very weak pale grey thinly laminated SILTSTONEwith occasional laminations of very weak reddish-brown mudstone		
						Complete at 2.34m		

Remarks
Groundwater not encountered
1.0 m of plastic and 1.0 m of slotted standpipe installed

Scale (approx)	**Logged By**
1:50	MC

Figure No.
J06360.WS15

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS16**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		56.50	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 01/01/2007	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.25)	Made Ground (greyish brown humic very sandy clay with rootlets and occasional fragments of coal and ash)		
0.10	J1			56.25	0.25			
0.60	D2					Firm orange-brown rapidly becoming stiff reddish-brown silty very sandy CLAY with traces of very weak reddish-brown mudstone		
0.80-1.00	U3				(1.20)			
1.00-1.45	SPT N=19		1,1/3,5,5,6					
				55.05	1.45			
1.60	D4					Very weak reddish-brown thinly laminated clayey MUDSTONE with layers of very weak pale grey siltstone		
2.00-2.45	SPT N=49		5,8/10,11,14,14		(1.35)			
2.70	D5			53.70	2.80			
2.85-3.00	D6					Very weak pale grey thinly laminated SILTSTONEwith occasional laminations of very weak reddish brown mudstone		
3.00-3.30	CPT 50/145		8,13/20,30		(0.50)			
				53.20	3.30			
						Complete at 3.30m		

Remarks
1.0 m of plastic and 2.0 m of slotted standpipe installed
Groundwater encountered at 2.85 m

Scale (approx)	**Logged By**
1:50	MC

Figure No.
J06360.WS16

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Number** **WS17**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open drive lined percussive sampler		59.20	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 29/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				59.05	(0.15)	Made Ground (Dark brown humic slightly clayey medium sand with rootlets)		
0.25	D1			58.90	0.15 (0.15)	Made Ground (Dark reddish-brown medium sand with abundant fragments of brick, slag, ash and clinker)		
0.40	D2			58.65	0.30 (0.25)	Grey siltstone COBBLE		
					0.55			
1.00-1.45	SPT N=15		3,3/3,4,4,4		(0.95)	Stiff reddish brown and pale grey silty CLAY with occasional fragments of mudstone and siltstone		
1.50	D3			57.70	1.50	Very weak reddish brown weathered MUDSTONE recovered as very sandy mudstone gravel		
1.80	D4				(0.50)			
2.00-2.39	SPT 65/235		7,8/11,16,19,19	57.20	2.00	Very weak reddish-brown and pale grey thinly laminated clayey MUDSTONE		
2.10	D5			57.10	(0.10) 2.10			
						Complete at 2.39m		

Remarks
Water recorded at 0.95 m

Scale (approx)	**Logged By**
1:50	EMA

Figure No.
J06360.WS17

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Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Site
Parklands High School, Simonsway, Wythenshawe, Manchester

Number
WS18

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Open drive lined percussive sampler		58.14	Balfour Beatty Construction Limited	J06360
	Location	**Dates** 30/11/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				58.04	(0.10)	Made Ground (Tarmac)		
				57.91	0.10			
					(0.13)	MADE GROUND (tarmac overlying black medium to coarse sand)		
0.40	D1				0.23			
				57.54	(0.37)	Made Ground (Firm dark grey sandy clay with black staining and occasional ash inclusions)		
					0.60			
1.00-1.45	SPT N=16		2,2/3,4,4,5		(0.90)	Stiff reddish-brown CLAY and rare fine gravel of mudstone with occasional pale grey mottling		
1.00	D2							
				56.64	1.50	Very weak reddish brown thinly and thickly laminated clayey MUDSTONE		
1.70	D3							
					(0.85)			
2.00-2.34	SPT 50/190		5,10/15,19,16					
2.20	D4			55.79	2.35			
						Complete at 2.35m		

Remarks
Groundwater encountered at 2.0 m

Scale (approx)	Logged By
1:50	EMA

Figure No.
J06360.WS18

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Borehole Number** **BH01**

Machine : Hands England 45 **Flush :** Air mist **Core Dia :** 76 **Method :**	**Casing Diameter** 115mm cased to 2.00m	**Ground Level (mOD)** 58.00	**Client** Balfour Beatty Construction Limited	**Job Number** J06360
	Location	**Dates** 13/12/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						57.90	(0.10) 0.10	Brown topsoil		
								Stoney fill with occasional brick fragments		
							(0.70)			
					Seepage(1) at 0.80m.	57.20	0.80	Stoney grey CLAY (Driller's description)		▽1
							(0.60)			
						56.60	1.40	Reddish brown CLAY with scattered mudstone fragments (Driller's description)		
	75	13	0	>20			(1.20)			
						55.40	2.60	Moderately weak thickly laminated closely fractured pale greenish grey SILTSTONE		
							(0.70)			
						54.70	3.30			
						54.55	(0.15) 3.45	Stiff pale grey friable silty CLAY with fragments of pale grey siltstone		
								Very weak thickly laminated highly fractured pale greenish grey SILTSTONE with layers of moderately strong siltstone		▼2
							(1.05)			
4.50					Water strike(2) at 4.50m, rose to 4.00m in 20 mins.	53.50	4.50	Strong very thinly bedded highly fractured grey fine grained SANDSTONE		▽2
							(0.90)			
	81	19	0	>20		52.60	5.40			
						52.40	(0.20) 5.60	Moderately strong thickly laminated highly fractured pale greenish grey SILTSTONE		
							(0.40)			
6.00						52.00	6.00	Firm pale grey and reddish brown silty CLAY with fragments of highly weathered mudstone		
								Moderately weak very thinly bedded and thickly laminated highly fractured reddish brown MUDSTONE, clayey between 6.3 m and 6.5 m		
	86	5	0	>20			(2.20)			
7.50										
						49.80	8.20	Moderately weak thickly laminated highly fractured reddish brown MUDSTONE		
	83	20	0	>20		49.45	(0.35) 8.55	Moderately strong very thinly bedded highly fractured pale greenish grey SILTSTONE		
9.00										
							(1.45)			
	87	21	0	>20		48.00	10.00			

Remarks
115 mm Casing to 2.0 m
Borehole backfilled with bentonite/cement

Scale (approx)	**Logged By**
1:50	MC

Figure No.
J06360.BH01

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Borehole Number** **BH01**
Machine : Hands England 45 **Flush :** Air mist **Core Dia :** 76 **Method :**	**Casing Diameter** 115mm cased to 2.00m **Location**	**Ground Level (mOD)** 58.00 **Dates** 13/12/2006	**Client** Balfour Beatty Construction Limited **Engineer** Cundall Johnston and Partners LLP	**Job Number** J06360 **Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
								Moderately weak very ttinly bedded reddish brown highly fractured MUDSTONE		
10.50	92	12	0	>20			(2.00)			
12.00						46.00	12.00	Complete at 12.00m		

Remarks

Scale (approx)	Logged By
1:50	MC

Figure No.
J06360.BH01

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Borehole Number** **BH02**

Machine : Hands England 45 **Flush :** Air mist **Core Dia :** 76 **Method :**	**Casing Diameter** 115mm cased to 2.00m	**Ground Level (mOD)** 56.50	**Client** Balfour Beatty Construction Limited	**Job Number** J06360
	Location	**Dates** 13/12/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						56.30	(0.20)	Brown topsoil (Driller's description)		
						56.10	0.20 (0.20)	Brown clay (Driller's description)		
							0.40 (0.90)	Red and yellowish brown clay (Driller's description)		
						55.20	1.30	Red CLAY with scattered mudstone fragments (Driller's description)		
	90	9	0	>21			(1.20)			
						54.00	2.50	Reddish brown CLAY with scattered mudstone fragments (Driller's description)		
						53.50	(0.50) 3.00	Moderately weak thickly laminated closely fractured pale greenish grey SILTSTONE		▼1
							(1.20)			
						52.30	4.20	Strong very thinly bedded highly fractured grey fine grained SANDSTONE		▽1
4.50					Water strike(1) at 4.50m, rose to 3.80m in 20 mins.		(1.00)			
	65	12	0	>21		51.30	5.20	Moderately weak very thinly bedded and thickly laminated highly fractured reddish brown MUDSTONE		
6.00										
	77	0	0	>21			(2.30)			
7.50						49.00	7.50	Moderately weak thickly laminated highly fractured interbedded reddish brown MUDSTONE and pale grey SILTSTONE		
	69	11	0	>21			(0.50)			
9.00						48.50	8.00	Moderately strong very thinly bedded highly fractured pale greenish grey SILTSTONE		
							(2.50)			
	83	9	0	>21						

Remarks
115 mm Casing to 2.0 m
Borehole backfilled with bentonite/cement

Scale (approx)	**Logged By**
1:50	MC

Figure No.
J06360.BH02

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Borehole Number** **BH02**

Machine : Hands England 45 **Flush :** Air mist **Core Dia :** 76 **Method :**	**Casing Diameter** 115mm cased to 2.00m	**Ground Level (mOD)** 56.50	**Client** Balfour Beatty Construction Limited	**Job Number** J06360
	Location	**Dates** 13/12/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(2.50)			
10.50						46.00	10.50	Moderately weak thickly laminated highly fractured interbedded reddish brown MUDSTONE and pale grey SILTSTONE		
	92	7	0	>21		45.55	10.95	Moderately weak very thinly bedded reddish brown highly fractured MUDSTONE		
							(1.05)			
12.00						44.50	12.00	Complete at 12.00m		

Remarks

Scale (approx)	**Logged By**
1:50	MC

Figure No.
J06360.BH02

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Geotechnical & Environmental Associates	Tyttenhanger House, Coursers Road, St Albans, AL4 0PG	Site: Parklands High School, Simonsway, Wythenshawe, Manchester	Borehole Number: BH03

Machine : Hands England 45	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush : Air mist		59.00	Balfour Beatty Construction Limited	J06360
Core Dia : 76	Location	Dates	Engineer	Sheet
Method :		12/12/2006	Cundall Johnston and Partners LLP	1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						58.80	(0.20) 0.20	Brown topsoil (Driller's description)		
							(0.50)	Brown CLAY (Driller's description)		
						58.30	0.70			
							(0.50)	Brownish grey CLAY (Driller's description)		
						57.80	1.20			
							(0.50)	Light greyish green CLAY with scattered mudstone fragments (Driller's description)		
						57.30	1.70			
	60	0	0	>20	Seepage(1) at 2.00m.		(1.30)	Red CLAY with mudstone fragments (Driller's description)		▽1
						56.00	3.00	Weak very thinly bedded and thickly laminated highly fractured reddish brown MUDSTONE		▼2
							(1.20)			
						54.80	4.20	Moderately weak thickly laminated closely fractured interbedded pale greenish grey SILTSTONE and reddish brown MUDSTONE		▽2
4.50					Water strike(2) at 4.50m, rose to 3.60m in 20 mins.		(0.60)			
	93	35	12	>20		54.20	4.80	Moderately strong thickly laminated highly fractured pale greenish grey SILTSTONE		
							(0.60)			
						53.60	5.40	Moderately weak thickly laminated highly fractured reddish brown MUDSTONE		
6.00							(1.60)			
	81	4	0	>20		52.00	7.00			
							(0.40)	Moderately weak thickly laminated closely fractured interbedded pale greenish grey SILTSTONE and reddish brown MUDSTONE		
7.50						51.60	7.40	Weak thickly laminated highly fractured pale greenish grey SILTSTONE with layers of moderately strong siltstone		
	89	5	0	>20			(1.60)			
9.00						50.00	9.00			
							(0.50)	Moderately weak thickly laminated closely fractured interbedded pale greenish grey SILTSTONE and reddish brown MUDSTONE		
						49.50	9.50	Moderately weak very thinly bedded reddish brown highly fractured MUDSTONE		
	87	13	0	>20						

Remarks
Borehole backfilled with beconite/cement
115 mm Casing to 2.0 m

Scale (approx)	Logged By
1:50	MC

Figure No. J06360.BH03

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Geotechnical & Environmental Associates	Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester	**Borehole Number** **BH03**
Machine : Hands England 45 **Flush :** Air mist **Core Dia :** 76 **Method :**	**Casing Diameter**	**Ground Level (mOD)** 59.00	**Client** Balfour Beatty Construction Limited
	Location	**Dates** 12/12/2006	**Engineer** Cundall Johnston and Partners LLP
			Job Number J06360
			Sheet 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50	87	4	0	>20		47.70	(1.80) 11.30	Moderately weak thickly laminated closely fractured interbedded pale greenish grey SILTSTONE and reddish brown MUDSTONE		
						47.20	(0.50) 11.80			
12.00						47.00	(0.20) 12.00	Moderately weak very thinly bedded highly fractured pale greenish grey SILTSTONE		
								Complete at 12.00m		

Remarks

Scale (approx)	Logged By
1:50	MC

Figure No.
J06360.BH03

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GEA Geotechnical & Environmental Associates Tyttenhanger House Coursers Road St Albans AL4 0PG	**Site** Parklands High School, Simonsway, Wythenshawe, Manchester		**Borehole Number** **BH04B**
Machine : Hands England 45 **Flush :** Air mist **Core Dia :** 76 **Method :**	**Casing Diameter** 115mm cased to 2.00m	**Ground Level (mOD)** 58.00	**Client** Balfour Beatty Construction Limited	**Job Number** J06360
	Location	**Dates** 12/12/2006	**Engineer** Cundall Johnston and Partners LLP	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.20)	Brown topsoil (Driller's description)		
						57.80	0.20			
							(0.30)	Brown clay fill with scattered stones and cobbles (Driller's description)		
						57.50	0.50			
								Yellowish brown CLAY (Driller's description)		
							(0.80)			
						56.70	1.30			
								Greyish green and red CLAY with scattered mudstone fragments (Driller's description)		
	87	0	0	>20			(1.40)			
						55.30	2.70			
							(0.30)	Extremely rubbly and fragmented greyish green and red MUDSTONE (Driller's description)		
						55.00	3.00			
							(0.40)	Weak very thinly bedded reddish brown highly fractured MUDSTONE		
						54.60	3.40			
								Moderately weak thickly laminated closely fractured pale greenish grey SILTSTONE		▼1
							(1.50)			
4.50					Water strike(1) at 4.50m, rose to 3.90m in 20 mins.					▽1
	67	7	0	>20		53.10	4.90	Moderately weak very thinly bedded reddish brown highly fractured MUDSTONE		
							(1.40)			
6.00										
	75	19	0	>20		51.70	6.30	Moderately strong thickly laminated highly fractured pale greenish grey SILTSTONE		
							(1.52)			
7.50										
	83	20	0	>20		50.18	7.82	Moderately weak very thinly bedded and thickly laminated highly fractured interbedded reddish brown MUDSTONE and greenish grey SILTSTONE		
							(0.63)			
						49.55	8.45	Moderately weak thickly laminated highly fractured reddish brown MUDSTONE		
9.00										
	73	9	0	>20			(2.05)			

Remarks
Borehole backfilled with bentonite/cement
115 mm Casing to 2.0 m

Scale (approx)	Logged By
1:50	MC

Figure No.
J06360.BH04B

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Site
Parklands High School, Simonsway, Wythenshawe, Manchester

Borehole Number
BH04B

Machine : Hands England 45
Flush : Air mist
Core Dia : 76
Method :

Casing Diameter
115mm cased to 2.00m

Ground Level (mOD)
58.00

Client
Balfour Beatty Construction Limited

Job Number
J06360

Location

Dates
12/12/2006

Engineer
Cundall Johnston and Partners LLP

Sheet
2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(2.05)			
10.50						47.50	10.50			
	66	17	0	>20			(1.50)	Moderately weak very thinly bedded and thickly laminated highly fractured interbedded reddish brown MUDSTONE and greenish grey SILTSTONE		
12.00						46.00	12.00			
								Complete at 12.00m		

Remarks

Scale (approx)
1:50

Logged By
MC

Figure No.
J06360.BH04B

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Standard Penetration Test Results

Site : Parklands High School, Simonsway, Wythenshawe, Manchester

Client : Balfour Beatty Construction Limited

Engineer : Cundall Johnston and Partners LLP

Job Number J06360

Sheet 1 / 2

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
WS01	1.00	1.15	1.45	SPT	1	1	2	1	2	5	N=10	
WS01	2.00	2.15	2.36	SPT	13	11	11	18	21		50/205mm	
WS02	1.00	1.15	1.45	SPT	2	2	3	3	4	5	N=15	
WS02	2.00	2.15	2.45	SPT	5	7	7	11	12	12	N=42	
WS02	3.00	3.14	3.26	SPT	10	15	29	21			25*/140mm 50/120mm	
WS03	1.00	1.15	1.45	SPT	1	2	2	3	3	4	N=12	
WS03	2.00	2.15	2.45	SPT	1	2	2	6	12	12	N=32	
WS03	3.00	3.08	3.18	CPT	20	5	37	12			25*/80mm 49/100mm	
WS04	1.00	1.15	1.45	SPT	1	2	3	2	3	3	N=11	
WS04	2.00	2.15	2.28	SPT	9	15	21	29			50/130mm	
WS05	1.00	1.15	1.45	SPT	2	2	3	4	4	6	N=17	
WS05	2.00	2.15	2.45	SPT	7	10	12	13	12	12	N=49	
WS05	3.00	3.15	3.35	SPT	11	14	19	19	12		50/195mm	
WS06	1.00	1.15	1.45	SPT	1	2	2	3	4	4	N=13	
WS06	2.00	2.15	2.45	SPT	2	3	3	6	7	10	N=26	
WS07	1.00	1.15	1.45	SPT	1	1	2	2	3	4	N=11	
WS07	2.00	2.15	2.45	SPT	2	2	2	2	5	7	N=16	
WS07	3.00	3.13	3.23	SPT	10	15	25	25			25*/130mm 50/100mm	
WS08	1.00	1.15	1.45	SPT	1	1	2	2	3	4	N=11	
WS08	2.00	2.15	2.45	SPT	3	4	5	5	5	8	N=23	
WS08	3.00	3.15	3.38	SPT	11	14	12	13	20	5	25*/145mm 50/235mm	
WS09	1.00	1.15	1.45	SPT	1	3	3	4	7	7	N=21	
WS09	2.00	2.15	2.40	SPT	4	7	8	14	19	9	50/250mm	
WS10	1.00	1.15	1.45	SPT	1	1	2	3	3	5	N=13	
WS10	1.65	1.80	2.10	CPT	3	3	4	4	7	11	N=26	
WS10	2.00	2.13	2.35	SPT	14	11	15	16	19		25*/125mm 50/222mm	
WS11	1.00	1.15	1.45	SPT	1	1	2	2	2	3	N=9	
WS11	2.00	2.15	2.45	SPT	1	1	2	5	11	11	N=29	
WS11	2.80	2.95	3.03	CPT	22	32	37				37/75mm	
WS12	1.00	1.15	1.45	SPT	3	3	8	9	8	7	N=32	
WS12	2.00	2.11	2.24	CPT	13	12	25	25			25*/110mm 50/130mm	
WS13	1.00	1.15	1.45	SPT	3	6	10	11	15	14	N=50	
WS14	1.00	1.15	1.45	SPT	2	3	3	5	5	4	N=17	
WS14	2.00	2.15	2.35	SPT	9	12	12	23	15		50/200mm	
WS15	1.00	1.15	1.45	SPT	1	2	3	4	5	7	N=19	
WS15	2.00	2.15	2.34	SPT	15	10	34	16			50/190mm	
WS16	1.00	1.15	1.45	SPT	1	1	3	5	5	6	N=19	

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Standard Penetration Test Results

Site : Parklands High School, Simonsway, Wythenshawe, Manchester

Client : Balfour Beatty Construction Limited

Engineer : Cundall Johnston and Partners LLP

Job Number J06360

Sheet 2 / 2

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
WS16	2.00	2.15	2.45	SPT	5	8	10	11	14	14	N=49	
WS16	3.00	3.15	3.30	CPT	8	13	20	30			50/145mm	
WS17	1.00	1.15	1.45	SPT	3	3	3	4	4	4	N=15	
WS17	2.00	2.15	2.39	SPT	7	8	11	16	19	19	65/235mm	
WS18	1.00	1.15	1.45	SPT	2	2	3	4	4	5	N=16	
WS18	2.00	2.15	2.34	SPT	5	10	15	19	16		50/190mm	

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Core Photographs

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Client : Balfour Beatty Construction Limited

Engineer : Cundall Johnston and Partners LLP

Job Number J06360

Sheet 1 / 2

Borehole No 1

3.0 m



12.0 m

Borehole No 2

3.0 m



12.0 m

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Core Photographs

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Job Number J06360

Sheet 2 / 2





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Insitu CBR Test Results

Site : Parklands High School, Simonsway, Wythenshawe, Manchester

Client : Balfour Beatty Construction Limited

Engineer : Cundall Johnston and Partners

Job Number J06360

Sheet 1/4

Test No 1		Test No 2		Test No 3		Test No 4		Test No 5	
Location WS15		Location WS15		Location WS11		Location WS11		Location WS13	
Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %
75	<2	75	3	75	<2	75	<2	75	<2
150	<2	150	3	150	<2	150	<2	150	<2
225	<2	225	3	225	2-3	225	<2	225	2-3
300	<2	300	2-3	300	5	300	<2	300	4-5
375	2-3	375	<2	375	2-3	375	2-3	375	7
450	2-3	450	<2	450	3-4	450	3-4	450	5
525	3	525	<2	525	6-7	525	4-5	525	>14
600	3-4	600	2-3	600	6	600	2-3	600	

Remarks: Results for CBR equivalent values from Mexecone penetrometer

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Insitu CBR Test Results

Site: : Parklands High School, Simonsway, Wythenshawe, Manchester

Client: : Balfour Beatty Construction Limited

Engineer: : Cundall Johnston and Partners

Job Number J06360

Sheet 2/4

Test No 6		Test No 7		Test No 8		Test No 9		Test No 10	
Location WS13		Location WS14		Location WS14		Location WS17		Location WS17	
Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %
75	<2	75	<2	75	<2	75	<2	75	<2
150	<2	150	<2	150	<2	150	>14	150	>14
225	3-4	225	2-3	225	<2	225		225	
300	9	300	<2	300	<2	300		300	
375	10	375	<2	375	<2	375		375	
450	>10	450	<2	450	<2	450		450	
525	>14	525	<2	525	<2	525		525	
600		600	<2	600	<2	600		600	

Remarks: Results for CBR equivalent values from Mexecone penetrometer

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Insitu CBR Test Results

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Client: : Balfour Beatty Construction Limited

Engineer: : Cundall Johnston and Partners

Job Number J06360

Sheet 3/4

Test No 11		Test No 12		Test No 13		Test No 14		Test No 15	
Location WS10		Location WS10		Location WS09		Location WS09		Location CBR 1A	
Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %
75	<2	75	<2	75	<2	75	<2	75	<2
150	<2	150	<2	150	4.0	150	10	150	<2
225	<2	225	2-3	225	>10	225	7	225	<2
300	<2	300	3-4	300	>14	300	>14	300	<2
375	8-9	375	4	375		375		375	<2
450	>10	450	2-3	450		450		450	<2
525	3	525	2-3	525		525		525	<2
600	4-5	600	3	600		600		600	<2

Remarks: Results for CBR equivalent values from Mexecone penetrometer

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Insitu CBR Test Results

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Client : Balfour Beatty Construction Limited

Engineer : Cundall Johnston and Partners

Job Number J06360

Sheet 4/4

Test No 16		Test No 17		Test No 18		Test No 19		Test No 20	
Location CBR 1B		Location CBR 2A		Location CBR 2B		Location		Location	
Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %	Depth mm	CBR value %
75	<2	75	<2	75	4-5	75		75	
150	<2	150	<2	150	>14	150		150	
225	<2	225	<2	225		225		225	
300	<2	300	<2	300		300		300	
375	<2	375	<2	375		375		375	
450	<2	450	>14	450		450		450	
525	<2	525		525		525		525	
600	<2	600		600		600		600	

Remarks: Results for CBR equivalent values from Mexecone penetrometer

PROJECT NAME PARKLANDS SCHOOL, WYTHENSHAWE, MANCHESTER

PROJECT NO: GEO / 10848

Date	17/01/2007
Approved	J Sturges
Page	1 of 2

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			
WS No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI (%)	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
WS1	1.50	1	D	Firm red brown very silty slightly sandy CLAY	20	34	21	13	100									
WS2	1.90	4	D	Stiff red brown very silty layered CLAY	16	32	20	12	100									
WS3	1.70	3	D	Stiff mottled red and grey very silty CLAY	15	31	18	13	100									
WS5	1.10	3	D	Stiff mottled red and grey very silty CLAY	14	30	18	12	100									
WS6	1.70 - 2.00	1	U	Stiff fissured brown with traces of grey CLAY	18					2.21	1.88	40	297	149				
WS7	1.30	3	D	Brown clayey fine to coarse SAND														Particle Size Distribution Test
WS7	2.20	5	D												8.2	<0.05		
WS9	0.80	2	D	Stiff red brown very sandy silty CLAY with traces of fine gravel	12	26	12	14	98						8.1	<0.05		
WS10	0.90	2	D	Soft grey sandy very silty CLAY with traces of fine silt stone	26	42	22	20	98									
WS11	1.20	2	D												8.0	<0.05		
WS11	1.60	3	D	Firm brown slightly sandy silty CLAY	28	46	28	18	100									
WS11	2.20	5	D	Firm to stiff grey brown very silty CLAY	22	33	21	12	100									

SUMMARY OF GEOTECHNICAL TESTING

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PROJECT NAME **PARKLANDS SCHOOL, WYTHENSHAWE, MANCHESTER**

PROJECT NO: **GEO / 10848**

Date	17/01/2007
Approved	J Sturges
Page	2 of 2

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			
WS No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI (%)	<425 mic (%)	Bulk (Mg/m^3)	Dry (Mg/m^3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
WS12	0.90	3	D	Stiff red brown very silty CLAY with occasional weakly cemented silt stone	15	30	20	10	75									
WS13	2.00	5	D												8.4	<0.05		
WS13	1.00	3	D	Stiff to very stiff grey very silty CLAY with traces of silt stone	15	39	22	17	76									
WS14	1.20	3	D	Red very silty CLAY with traces of medium to fine silt stone	13	29	19	10	98						8.4	<0.05		
WS15	0.60 - 0.80	3	U	Firm fissured brown CLAY	22					2.04	1.67	15	132	66				
WS15	1.10	3	D	Sample not received														
WS15	1.70	6	D	Sample not received														
WS16	1.60	4	D	Red brown very silty CLAY with occasional coarse to fine silt stone	12	29	20	9	63									
WS17	1.50	3	D	Mottled red grey very silty CLAY with traces of fine to coarse siltstone fragments	16	31	19	12	96									
WS18	1.00	2	D	Stiff red brown very silty CLAY	22	45	25	20	100									

SUMMARY OF GEOTECHNICAL TESTING

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Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) • S Burke (Snr Tech)
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BS1377 : Part 2 : Clause 9 : 1990

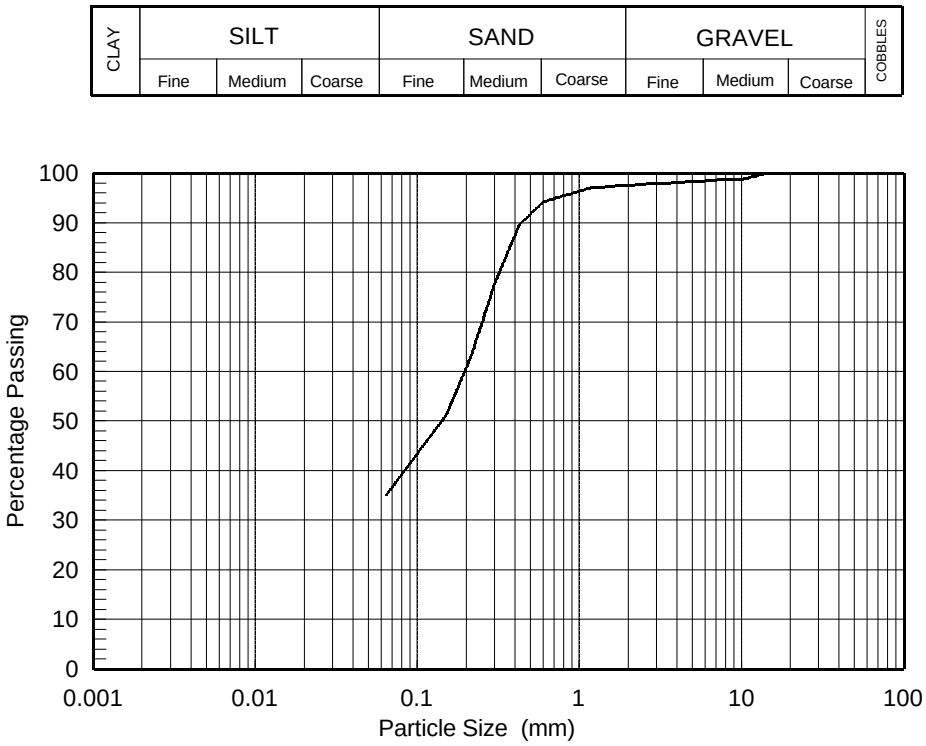
Determination of Particle Size Distribution

Window Sample:	WS 7
Sample Number:	3
Depth (m):	1.30

Description:
Brown clayey fine to coarse SAND

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	100
14 mm	100
10 mm	99
6.3 mm	99
5 mm	98
3.35 mm	98
2 mm	98
1.18 mm	97
600 µm	94
425 µm	90
300 µm	78
212 µm	63
150 µm	51
63 µm	35



Particle Proportions		
Cobbles	0.0	%
Gravel	2.3	%
Sand	62.8	%
Silt & Clay	34.9	%

Checked and Approved Initials: Date:	Project Number: **GEO / 10848** Project Name: **PARKLANDS SCHOOL, WYTHENSHAWE, MANCHESTER**	*GEOLABS*

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BS1377 : Part 7 : Clause 8 : 1990

Quick Undrained Triaxial Test

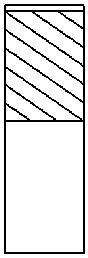
Window Sample:	WS6
Sample Number:	1
Depth (m):	1.70 - 2.00

Description:
Stiff fissured brown with traces of grey CLAY

Single Stage Specimen

Specimen details	Single Specimen
Specimen condition:	Undisturbed
Length (mm):	168.0
Diameter (mm):	83.9
Moisture Content (%):	18
Bulk Density (Mg/m³):	2.21
Dry Density (Mg/m³):	1.88
Test details	
Latex membrane thickness (mm):	0.3
Membrane correction (kPa):	1.0
Axial displacement rate (%/min):	1.5
Cell pressure (kPa):	40
Strain at failure (%):	14.0
Maximum Deviator Stress (kPa):	297
Shear Stress (kPa):	149

Orientation and position of sample



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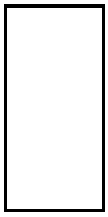

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BS1377 : Part 7 : Clause 8 : 1990

Quick Undrained Triaxial Test

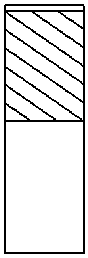
Window Sample:	WS15
Sample Number:	3
Depth (m):	0.60 - 0.80

Description:
Firm fissured brown CLAY

Single Stage Specimen

Specimen details	Single Specimen
Specimen condition:	Undisturbed
Length (mm):	197.6
Diameter (mm):	98.6
Moisture Content (%):	22
Bulk Density (Mg/m³):	2.04
Dry Density (Mg/m³):	1.67
Test details	
Latex membrane thickness (mm):	0.3
Membrane correction (kPa):	0.8
Axial displacement rate (%/min):	1.9
Cell pressure (kPa):	15
Strain at failure (%):	12.7
Maximum Deviator Stress (kPa):	132
Shear Stress (kPa):	66

Orientation and position of sample



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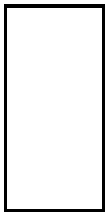

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ISRM : 1985 : DETERMINATION OF POINT LOAD STRENGTH

BH No.	Depth (m)	Rock Type and Description	Test Type and Direction		Sample Width W (mm)	Platen Separation D (mm)	Failure Load P (kN)	Equivalent Diameter De (mm)	P/De² (MPa)	Correction Factor F	Point Load Index Is(50) (MPa)
1	4.95	Light grey MUDSTONE	A	Pl	58.88	72.22	5.1	74	0.94	1.19	1.12
1	4.95	Light grey MUDSTONE	D	Pd	72.22	32.29	6.6	32	6.33	0.82	5.20
1	5.30	Light grey MUDSTONE	A	Pl	55.64	71.90	5.6	71	1.10	1.17	1.29
1	5.30	Light grey MUDSTONE	D	Pd	71.9	45.83	11.0	46	5.24	0.96	5.04
1	9.30	Light grey MUDSTONE	A	Pl	74.94	72.05	2.4	83	0.34	1.26	0.43
1	11.50	Red MUDSTONE	A	Pl	77.76	72.19	1.7	85	0.24	1.27	0.30
1	11.50	Red MUDSTONE	D	Pd	72.19	51.13	7.0	51	2.68	1.01	2.70
2	5.40	Red MUDSTONE	D	Pd	65.94	31.35	0.5	31	0.46	0.81	0.37
2	6.80	Light grey MUDSTONE	A	Pl	78.49	72.06	0.2	85	0.03	1.27	0.04
2	7.70	Light grey MUDSTONE	A	Pl	78.37	71.76	5.4	85	0.75	1.27	0.96
2	7.70	Light grey MUDSTONE	D	Pd	71.76	33.09	4.2	33	3.84	0.83	3.19
2	9.20	Light grey MUDSTONE	A	Pl	60.18	71.77	4.1	74	0.75	1.19	0.89

Test Type and Direction :
D - Diametral A - Axial B - Block L -Irregular lump Pd - Perpendicular to planes of weakness R - Random or unknown orientation Pl - Parallel to planes of weakness

Checked and Approved
Initials : JS
Date : **25/01/2007**

Project Name :
PARKLANDS SCHOOL, WYTHENSHAWE, MANCHESTER
Project No:
GEO / 10982

GEOLABS

Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) [X] J Sturges (Snr Tech)
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Client: Geotechnical & Environmental Associates Limited, Unit 1, Church Farm, Gotham Road, Kingston-on-Soar, Nottinghamshire NG11 0DE

POINT LOAD TESTS

BH No.	Depth (m)	Rock Type and Description	Test Type and Direction		Sample Width W (mm)	Platen Separation D (mm)	Failure Load P (kN)	Equivalent Diameter De (mm)	P/De² (MPa)	Correction Factor F	Point Load Index Is(50) (MPa)
3	5.8	Red MUDSTONE	A	Pl	123.40	72.11	3.5	106	0.31	1.40	0.43
3	4.2	Light grey MUDSTONE	D	Pd	72.04	46.62	2.8	47	1.29	0.97	1.25
3	8.1	Light grey MUDSTONE	D	Pd	70.37	55.00	0.8	55	0.26	1.04	0.28
3	11.1	Red MUDSTONE	A	Pl	51.08	71.47	0.2	68	0.05	1.15	0.05
4b	3.2	Red and light grey mottled MUDSTONE	L	-	59.40	26.57	0.5	45	0.25	0.95	0.24
4b	7.4	Light grey MUDSTONE	A	Pl	46.67	71.98	1.5	65	0.35	1.13	0.40
4b	9.7	Red MUDSTONE	D	Pd	72.11	51.02	0.2	51	0.08	1.01	0.08
4b	5.1	Red MUDSTONE	A	Pl	47.75	71.96	1.3	66	0.30	1.13	0.34
4b	5.1	Red MUDSTONE	D	Pd	73.43	34.20	1.1	34	0.94	0.84	0.79

Test Type and Direction :

D - Diametral A - Axial B - Block L -Irregular lump Pd - Perpendicular to planes of weakness R - Random or unknown orientation Pl - Parallel to planes of weakness

Checked and Approved

Initials : JS

Date : **25/01/2007**

Project Name :

PARKLANDS SCHOOL, WYTHENSHAWE, MANCHESTER

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Client: Geotechnical & Environmental Associates Limited, Unit 1, Church Farm, Gotham Road, Kingston-on-Soar, Nottinghamshire NG11 0DE

Scientific Analysis Laboratories

Report Number:	90835-2
Date of Report:	19-Dec-2006
Client:	Geotechnical & Environmental Associates, Unit 1 Church Farm, Gotham Road, Kingston on Soar, Notts. NG11 0DE
Client Contact:	Mr Martin Cooper
Client Job Reference:	J06360
Client Site Reference:	Parklands High School, Wythenshawe, Manchester
Date Job Received at SAL:	04-Dec-2006
Date Analysis Started:	18-Dec-2006
Date Analysis Completed:	19-Dec-2006

The results reported relate to samples received at the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS or MCERTS 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

Key to symbols used in this report:
W: Analysis was performed at another SAL Laboratory
S: Analysis was sub-contracted
N: Analysis is not UKAS accredited
U: Analysis is UKAS accredited
M: Analysis is MCERTS accredited

Report checked and authorised by: Miss Helen Ashpool
Senior Project Manager

UKAS TESTING 1549 Group
MCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME 1549

Index to caveats used in this report

Value	Description
AR	As Received
A40	Air Dried <40C
9	LOD raised due to dilution of sample
33	Sample is outside the scope of MCERTS accreditation. Results are UKAS only

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
GEA Suite 1a

				SAL Reference	**90835 001**	**90835 001**	**90835 002**	**90835 002**
				Customer Sample Reference	**WS3 0.5m D1**	**WS3 0.5m D1**	**WS5 0.2m D1**	**WS5 0.2m D1**
				Test Sample	**AR**	**A40**	**AR**	**A40**
				Type	**Clay**	**Clay**	**Clay**	**Clay**
				Date Sampled				
				Depth	**0.5**	**0.5**	**0.2**	**0.2**
Determinant	**Technique**	**LOD**	**Units**	**Symbol**				
Arsenic	ICP/OES	2.0	mg/kg	U	-	-	-	-
Arsenic	ICP/OES	2	mg/kg	M	-	**17**	-	**12**
Cadmium	ICP/OES	1.0	mg/kg	U	-	-	-	-
Cadmium	ICP/OES	1	mg/kg	M	-	<1	-	<1
Chloride (2:1)	Titration	50	mg/l	N	<50	-	<50	-
Chromium	ICP/OES	1.0	mg/kg	U	-	-	-	-
Chromium	ICP/OES	1	mg/kg	M	-	**22**	-	**19**
Copper	ICP/OES	1.0	mg/kg	U	-	-	-	-
Copper	ICP/OES	1	mg/kg	M	-	**37**	-	**30**
Cyanide (Total)	Colorimetry	1	mg/kg	U	<1	-	<1	-
Lead	ICP/OES	1.0	mg/kg	U	-	-	-	-
Lead	ICP/OES	1	mg/kg	M	-	**85**	-	**56**
Mercury	ICP/OES	1.0	mg/kg	U	-	-	-	-
Mercury	ICP/OES	1	mg/kg	M	-	<1	-	<1
Nickel	ICP/OES	1.0	mg/kg	U	-	-	-	-
Nickel	ICP/OES	1	mg/kg	M	-	**16**	-	**16**
pH	Probe			U	-	-	-	-
pH	Probe			M	**7.2**	-	**7.4**	-
Phenols (Total-Mono)	Colorimetry	1	mg/kg	U	<1	-	<1	-
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	mg/kg	U	**2.0**	-	**0.98**	-
Selenium	ICP/OES	2.0	mg/kg	U	-	-	-	-
Selenium	ICP/OES	2	mg/kg	M	-	<2	-	<2
Sulphate (Total)	ICP/OES	0.01	%	N	-	**0.12**	-	**0.13**
Sulphide	Colorimetry	10	mg/kg	N	<10	-	**23**	-
Total Organic Carbon	OX/IR	0.1	%	N	-	**3.0**	-	**3.2**
Zinc	ICP/OES	1.0	mg/kg	U	-	-	-	-
Zinc	ICP/OES	1	mg/kg	M	-	**78**	-	**70**

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
GEA Suite 1a

				SAL Reference	**90835 003**	**90835 003**	**90835 004**	**90835 004**
				Customer Sample Reference	**WS9 0.3m D1**	**WS9 0.3m D1**	**WS10 0.2m D1**	**WS10 0.2m D1**
				Test Sample	**AR**	**A40**	**AR**	**A40**
				Type	**Clay**	**Clay**	**Clay**	**Clay**
				Date Sampled				
				Depth	**0.3**	**0.3**	**0.2**	**0.2**
Determinant	**Technique**	**LOD**	**Units**	**Symbol**				
Arsenic	ICP/OES	2.0	mg/kg	U	-	-	-	-
Arsenic	ICP/OES	2	mg/kg	M	-	**10**	-	**12**
Cadmium	ICP/OES	1.0	mg/kg	U	-	-	-	-
Cadmium	ICP/OES	1	mg/kg	M	-	**1**	-	<1
Chloride (2:1)	Titration	50	mg/l	N	<50	-	<50	-
Chromium	ICP/OES	1.0	mg/kg	U	-	-	-	-
Chromium	ICP/OES	1	mg/kg	M	-	**34**	-	**23**
Copper	ICP/OES	1.0	mg/kg	U	-	-	-	-
Copper	ICP/OES	1	mg/kg	M	-	**42**	-	**33**
Cyanide (Total)	Colorimetry	1	mg/kg	U	**6**	-	<1	-
Lead	ICP/OES	1.0	mg/kg	U	-	-	-	-
Lead	ICP/OES	1	mg/kg	M	-	**110**	-	**65**
Mercury	ICP/OES	1.0	mg/kg	U	-	-	-	-
Mercury	ICP/OES	1	mg/kg	M	-	**2**	-	<1
Nickel	ICP/OES	1.0	mg/kg	U	-	-	-	-
Nickel	ICP/OES	1	mg/kg	M	-	**19**	-	**20**
pH	Probe			U	-	-	-	-
pH	Probe			M	**7.6**	-	**6.5**	-
Phenols (Total-Mono)	Colorimetry	1	mg/kg	U	<1	-	<1	-
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	mg/kg	U	**160**	-	**0.36**	-
Selenium	ICP/OES	2.0	mg/kg	U	-	-	-	-
Selenium	ICP/OES	2	mg/kg	M	-	<2	-	<2
Sulphate (Total)	ICP/OES	0.01	%	N	-	**0.14**	-	**0.16**
Sulphide	Colorimetry	10	mg/kg	N	<10	-	<10	-
Total Organic Carbon	OX/IR	0.1	%	N	-	**4.1**	-	**4.2**
Zinc	ICP/OES	1.0	mg/kg	U	-	-	-	-
Zinc	ICP/OES	1	mg/kg	M	-	**180**	-	**90**

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
GEA Suite 1a

				SAL Reference	**90835 005**	**90835 005**	**90835 006**	**90835 006**
				Customer Sample Reference	**WS11 0.9m D1**	**WS11 0.9m D1**	**WS8 0.9m D1**	**WS8 0.9m D1**
				Test Sample	**AR**	**A40**	**AR**	**A40**
				Type	**Clay**	**Clay**	**Clay**	**Clay**
				Date Sampled				
				Depth	**0.9**	**0.9**	**0.9**	**0.9**
Determinant	**Technique**	**LOD**	**Units**	**Symbol**				
Arsenic	ICP/OES	2.0	mg/kg	U	-	-	-	-
Arsenic	ICP/OES	2	mg/kg	M	-	**11**	-	**12**
Cadmium	ICP/OES	1.0	mg/kg	U	-	-	-	-
Cadmium	ICP/OES	1	mg/kg	M	-	<1	-	<1
Chloride (2:1)	Titration	50	mg/l	N	<50	-	<50	-
Chromium	ICP/OES	1.0	mg/kg	U	-	-	-	-
Chromium	ICP/OES	1	mg/kg	M	-	**23**	-	**24**
Copper	ICP/OES	1.0	mg/kg	U	-	-	-	-
Copper	ICP/OES	1	mg/kg	M	-	**35**	-	**32**
Cyanide (Total)	Colorimetry	1	mg/kg	U	<1	-	<1	-
Lead	ICP/OES	1.0	mg/kg	U	-	-	-	-
Lead	ICP/OES	1	mg/kg	M	-	**37**	-	**75**
Mercury	ICP/OES	1.0	mg/kg	U	-	-	-	-
Mercury	ICP/OES	1	mg/kg	M	-	<1	-	<1
Nickel	ICP/OES	1.0	mg/kg	U	-	-	-	-
Nickel	ICP/OES	1	mg/kg	M	-	**22**	-	**21**
pH	Probe			U	-	-	-	-
pH	Probe			M	**7.6**	-	**7.7**	-
Phenols (Total-Mono)	Colorimetry	1	mg/kg	U	<1	-	<1	-
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	mg/kg	U	**0.51**	-	**1.4**	-
Selenium	ICP/OES	2.0	mg/kg	U	-	-	-	-
Selenium	ICP/OES	2	mg/kg	M	-	<2	-	<2
Sulphate (Total)	ICP/OES	0.01	%	N	-	**0.11**	-	**0.10**
Sulphide	Colorimetry	10	mg/kg	N	<10	-	<10	-
Total Organic Carbon	OX/IR	0.1	%	N	-	**2.0**	-	**1.7**
Zinc	ICP/OES	1.0	mg/kg	U	-	-	-	-
Zinc	ICP/OES	1	mg/kg	M	-	**100**	-	**80**

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
GEA Suite 1a

				SAL Reference	**90835 007**	**90835 007**	**90835 008**	**90835 008**
				Customer Sample Reference	**WS14 0.1m D1**	**WS14 0.1m D1**	**WS17 0.3m D1**	**WS17 0.3m D1**
				Test Sample	**AR**	**A40**	**AR**	**A40**
				Type	**Topsoil**	**Topsoil**	**Fill**	**Fill**
				Date Sampled				
				Depth	**0.1**	**0.1**	**0.1**	**0.1**
Determinant	**Technique**	**LOD**	**Units**	**Symbol**				
Arsenic	ICP/OES	2.0	mg/kg	U	-	-	-	(33) **76**
Arsenic	ICP/OES	2	mg/kg	M	-	**9**	-	-
Cadmium	ICP/OES	1.0	mg/kg	U	-	-	-	(33) <1.0
Cadmium	ICP/OES	1	mg/kg	M	-	<1	-	-
Chloride (2:1)	Titration	50	mg/l	N	<50	-	<50	-
Chromium	ICP/OES	1.0	mg/kg	U	-	-	-	(33) **28**
Chromium	ICP/OES	1	mg/kg	M	-	**21**	-	-
Copper	ICP/OES	1.0	mg/kg	U	-	-	-	(33) **150**
Copper	ICP/OES	1	mg/kg	M	-	**27**	-	-
Cyanide (Total)	Colorimetry	1	mg/kg	U	<1	-	<1	-
Lead	ICP/OES	1.0	mg/kg	U	-	-	-	(33) **240**
Lead	ICP/OES	1	mg/kg	M	-	**47**	-	-
Mercury	ICP/OES	1.0	mg/kg	U	-	-	-	(33) <1.0
Mercury	ICP/OES	1	mg/kg	M	-	<1	-	-
Nickel	ICP/OES	1.0	mg/kg	U	-	-	-	(33) **57**
Nickel	ICP/OES	1	mg/kg	M	-	**18**	-	-
pH	Probe			U	-	-	(33) **6.8**	-
pH	Probe			M	**5.7**	-	-	-
Phenols (Total-Mono)	Colorimetry	1	mg/kg	U	<1	-	<1	-
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	mg/kg	U	**0.58**	-	**1.8**	-
Selenium	ICP/OES	2.0	mg/kg	U	-	-	-	(33) <2.0
Selenium	ICP/OES	2	mg/kg	M	-	<2	-	-
Sulphate (Total)	ICP/OES	0.01	%	N	-	**0.09**	-	**0.19**
Sulphide	Colorimetry	10	mg/kg	N	<10	-	<10	-
Total Organic Carbon	OX/IR	0.1	%	N	-	**2.7**	-	**9.2**
Zinc	ICP/OES	1.0	mg/kg	U	-	-	-	(33) **140**
Zinc	ICP/OES	1	mg/kg	M	-	**77**	-	-

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
Total Petroleum Hydrocarbons Banded (C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)

SAL Reference	**90835 001**	**90835 002**	**90835 003**	**90835 004**
Customer Sample Reference	**WS3 0.5m D1**	**WS5 0.2m D1**	**WS9 0.3m D1**	**WS10 0.2m D1**
Test Sample	**AR**	**AR**	**AR**	**AR**
Type	**Clay**	**Clay**	**Clay**	**Clay**
Date Sampled				
Depth	**0.5**	**0.2**	**0.3**	**0.2**

Determinant	Technique	LOD	Units	Symbol				
Total Petroleum Hydrocarbons (C8-C10)	GC/FID	1	mg/kg	U	<1	<1	(9)<10	<1
Total Petroleum Hydrocarbons (C10 - C12)	GC/FID	1	mg/kg	U	<1	<1	(9)<10	<1
Total Petroleum Hydrocarbons (C12-C16)	GC/FID	1	mg/kg	U	<1	<1	**17**	<1
Total Petroleum Hydrocarbons (C16-C21)	GC/FID	1	mg/kg	U	**5**	**3**	**180**	<1
Total Petroleum Hydrocarbons (C21-C35)	GC/FID	1	mg/kg	U	**12**	**8**	**800**	<1

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
Total Petroleum Hydrocarbons Banded (C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)

SAL Reference	**90835 005**	**90835 006**	**90835 007**	**90835 008**
Customer Sample Reference	**WS11 0.9m D1**	**WS8 0.9m D1**	**WS14 0.1m D1**	**WS17 0.3m D1**
Test Sample	**AR**	**AR**	**AR**	**AR**
Type	**Clay**	**Clay**	**Topsoil**	**Fill**
Date Sampled				
Depth	**0.9**	**0.9**	**0.1**	**0.1**

Determinant	Technique	LOD	Units	Symbol				
Total Petroleum Hydrocarbons (C8-C10)	GC/FID	1	mg/kg	U	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C10 - C12)	GC/FID	1	mg/kg	U	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C12-C16)	GC/FID	1	mg/kg	U	<1	<1	<1	**1**
Total Petroleum Hydrocarbons (C16-C21)	GC/FID	1	mg/kg	U	<1	**6**	<1	**12**
Total Petroleum Hydrocarbons (C21-C35)	GC/FID	1	mg/kg	U	<1	**52**	<1	**33**

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**90835 001**	**90835 002**	**90835 003**	**90835 004**
				Customer Sample Reference	**WS3 0.5m D1**	**WS5 0.2m D1**	**WS9 0.3m D1**	**WS10 0.2m D1**
				Test Sample	**AR**	**AR**	**AR**	**AR**
				Type	**Clay**	**Clay**	**Clay**	**Clay**
				Date Sampled				
				Depth	**0.5**	**0.2**	**0.3**	**0.2**
Determinant	**Technique**	**LOD**	**Units**	**Symbol**				
Moisture	Grav (1 Dec) (105 C)	0.1	%	N	**22**	**19**	**4.4**	**26**

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**90835 005**	**90835 006**	**90835 007**	**90835 008**
				Customer Sample Reference	**WS11 0.9m D1**	**WS8 0.9m D1**	**WS14 0.1m D1**	**WS17 0.3m D1**
				Test Sample	**AR**	**AR**	**AR**	**AR**
				Type	**Clay**	**Clay**	**Topsoil**	**Fill**
				Date Sampled				
				Depth	**0.9**	**0.9**	**0.1**	**0.1**
Determinant	**Technique**	**LOD**	**Units**	**Symbol**				
Moisture	Grav (1 Dec) (105 C)	0.1	%	N	**22**	**13**	**22**	**18**

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
Polyaromatic Hydrocarbons (US EPA16)

SAL Reference	**90835 003**
Customer Sample Reference	**WS9 0.3m D1**
Test Sample	**AR**
Type	**Clay**
Date Sampled	
Depth	**0.3**

Determinant	Technique	LOD	Units	Symbol	
Naphthalene	GC/MS	0.1	mg/kg	U	**0.2**
Acenaphthylene	GC/MS	0.1	mg/kg	U	**0.3**
Acenaphthene	GC/MS	0.1	mg/kg	U	**0.7**
Fluorene	GC/MS	0.1	mg/kg	U	**0.6**
Phenanthrene	GC/MS	0.1	mg/kg	U	**7.7**
Anthracene	GC/MS	0.1	mg/kg	U	**3.7**
Fluoranthene	GC/MS	0.1	mg/kg	U	**29**
Pyrene	GC/MS	0.1	mg/kg	U	**26**
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	U	**15**
Chrysene	GC/MS	0.1	mg/kg	U	**15**
Benzo(b/k)Fluoranthene	GC/MS	0.1	mg/kg	U	**25**
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	U	**14**
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	U	**8.3**
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	U	**2.6**
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	U	**8.7**

SAL Reference: 90835
Project Site: Parklands High School, Wythenshawe, Manchester
Customer Reference: J06360

Soil Analysed as Soil
Total Petroleum Hydrocarbons (C10-C35 aliphatic/aromatic)

SAL Reference	**90835 003**
Customer Sample Reference	**WS9 0.3m D1**
Test Sample	**AR**
Type	**Clay**
Date Sampled	
Depth	**0.3**

Determinant	Technique	LOD	Units	Symbol	
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GC/FID	1	mg/kg	N	(9)<10
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GC/FID	1	mg/kg	N	**190**
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GC/FID	1	mg/kg	N	**13**
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GC/FID	1	mg/kg	N	**63**
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GC/FID	1	mg/kg	N	**100**
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GC/FID	1	mg/kg	N	(9)<10
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GC/FID	1	mg/kg	N	**440**
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GC/FID	1	mg/kg	N	(9)<10

GEA Geotechnical & Environmental Associates

Tyttenhanger House
Coursers Road
St Albans
AL4 0PG

Site Plan

Site : Parklands High School, Simonsway, Wythenshawe, Manchester

Client : Balfour Beatty Construction Limited

Engineer : Cundall Johnston and Partners LLP

Job Number J06360

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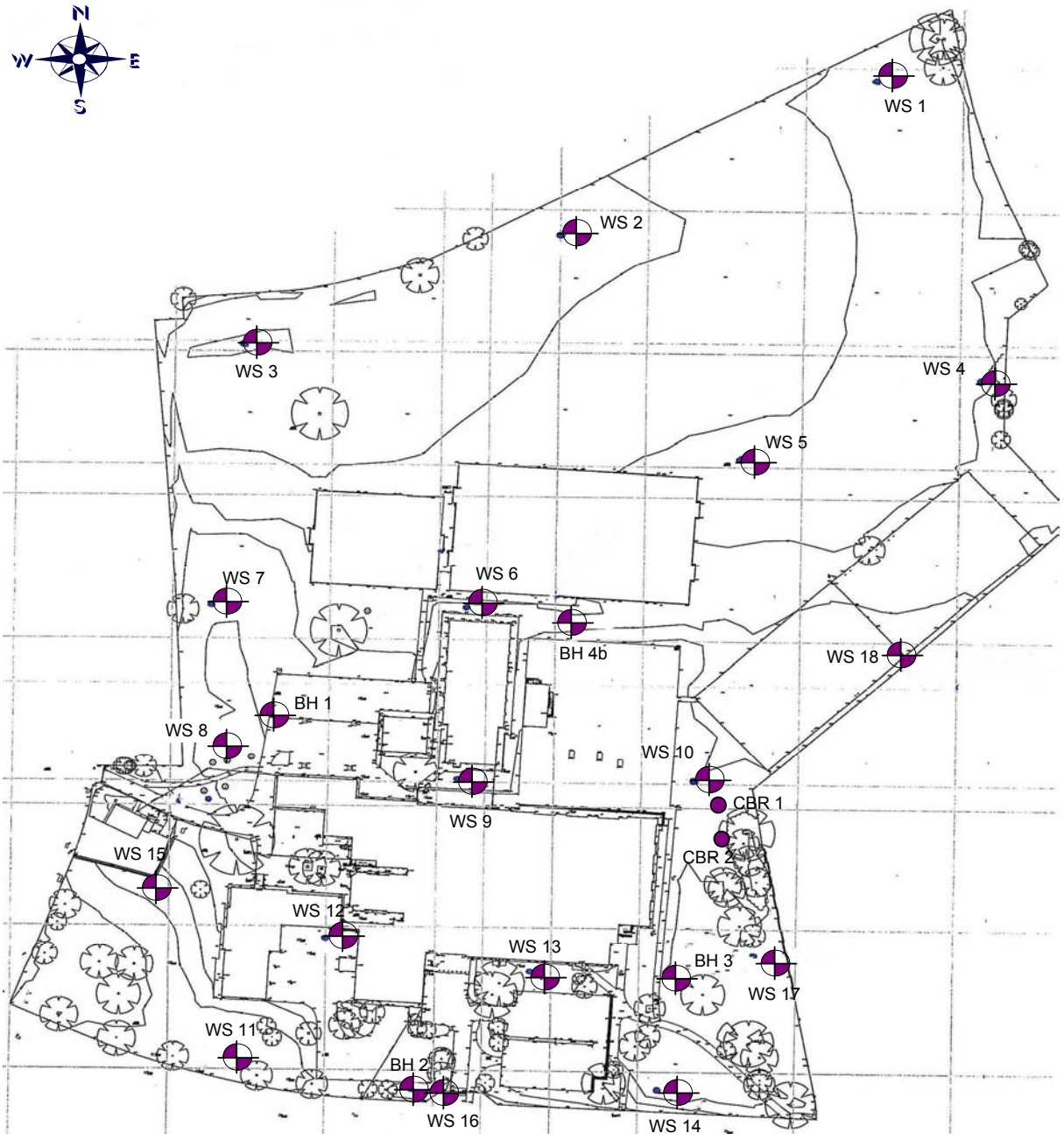

Approximate Scale in metres

0 50 100 150