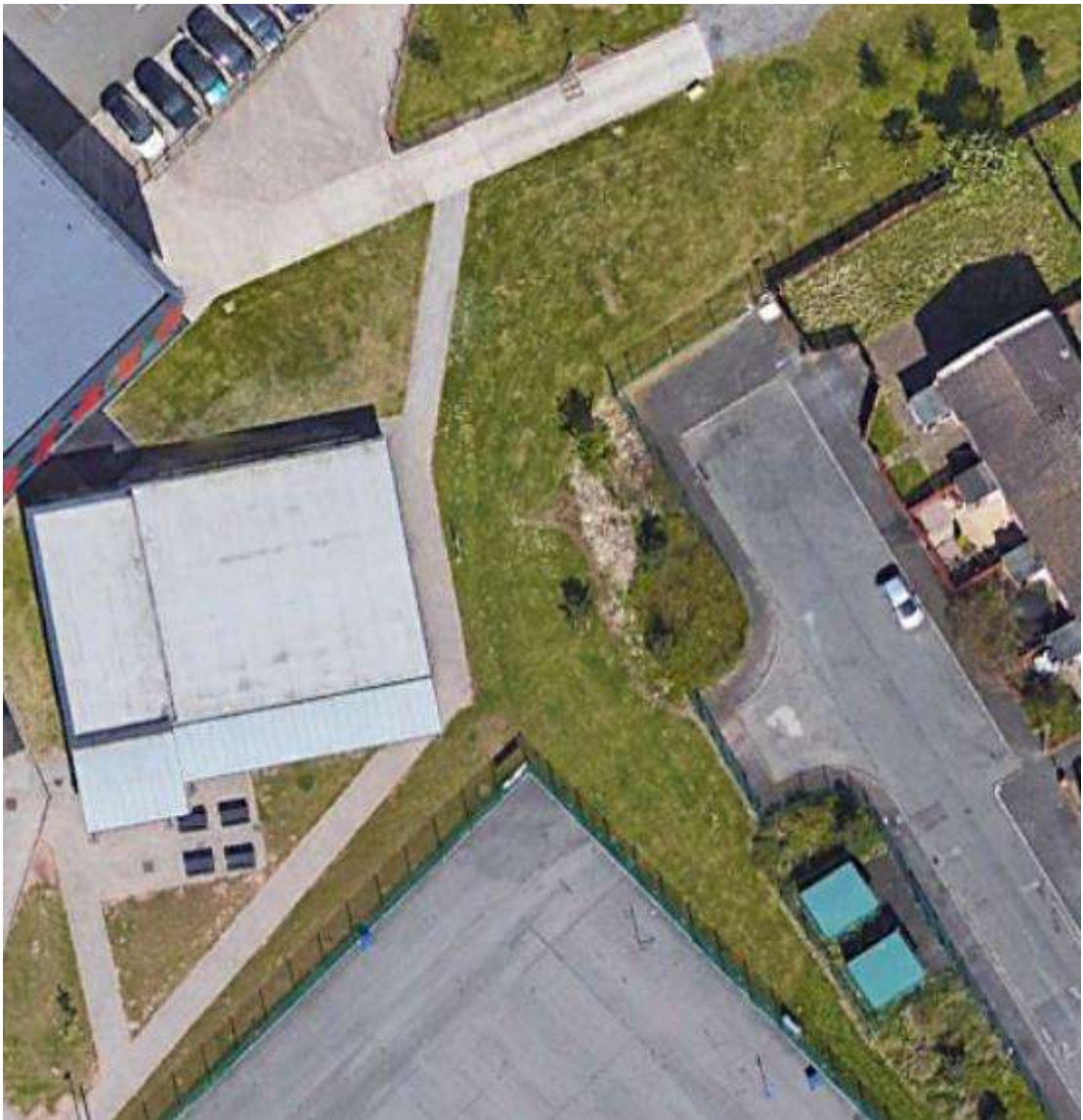


Remediation & Risk-Reduction Strategy

Dean Trust Academy, Ardwick, Manchester



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Contract No./Report Type: 22-012/RMS
Produced for The Dean Trust

AG Geo-Consultants Ltd

Report Title
Remediation & Risk-Reduction Strategy

Project	Project No./Report Type
Dean Trust Academy, Ardwick, Manchester	22-012/RMS

Client Name
The Dean Trust

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Dean Trust Academy, Ardwick, Manchester

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Executive Summary

Client	The Dean Trust																																								
Site and Location	Dean Trust Academy, Ardwick, Manchester Approximate postcode = M13 0LF																																								
Proposed Development	A new temporary/portable classroom (portacabin type), with tarmac footpaths surrounding it. There is no new landscaping proposed, just the relocation of 2no. trees. A tarmac covered “ courtyard ” is to be constructed under a separate contract, just east of the new classroom.																																								
Client Brief	To assist with <i>what is required pre-dig and to satisfy condition 5 of the consent notice</i> . Condition 5a requires desk study, site investigation and remediation strategy. Condition 5b deals with implementation and validation of any remediation and risk-reduction measures, as well as unforeseen contamination. Planning also requires that the new development not compromise any existing remedial measures (i.e. the site’s clean cover system).																																								
Previous studies	A desk study and ground investigation assessment reports have previously been produced by Brownfield Solutions Ltd (BSL). Both reports summarise a large number of earlier desk studies, site investigation and remediation/validation, reports. The two reports contain a lot of information irrelevant to the new classroom area and so this was reassessed by us to concentrate on the classroom area. BSL’s investigation formed no new exploratory holes in the proposed classroom area.																																								
History of Site & Surroundings	<u>On Site (classroom location)</u> - by 1848 the site was fields. - by 1891 it became a police station and an open yard next to it. - By 1933 a wash house (later Laundry) appeared on our site. - by 1991 the site was a Playground and then the current academy. - Currently the area is footpaths and grassed areas. <u>In the Surroundings</u> By 1848 ponds lay nearby, which were later infilled. Most of the immediate surrounding area to the new classroom was originally residential housing. At least 50m south of our site once lay the <i>Manchester Carriage & Tramway Company Depot</i> . The <i>brewery</i> on the now school site lay ~100m west of our site. By 1922 the <i>Daisy Bank works</i> replace the old Carriage & Tramway Depot and lay ~40m south of our site. By 1991, all the housing has gone on site and it contained a school in the east and a school off-site to the north, with playing fields and playground occupying most of the school site.																																								
Ground Conditions	3no. ground investigation have exploratory holes in (5no. holes) and surrounding (6no. holes) our proposed classroom footprint. They find: <table border="1"> <thead> <tr> <th rowspan="2">Strata</th><th colspan="2">Depth Encountered (mBGL)</th><th rowspan="2">Description & Comments</th></tr> <tr> <th>Top</th><th>Bottom</th></tr> </thead> <tbody> <tr> <td>MG: Topsoil (clean cover)</td><td>0</td><td>0.1# (TP04) 0.3 to 0.8</td><td>Brown slightly sandy silt/clayey sand, with no anthropogenic components.</td></tr> <tr> <td>MG: clayey gravelly sand/sandy gravel</td><td>0.1 to 0.4</td><td>0.55 to 2.0</td><td>Includes 0.4m of concrete in BH05. Anthropogenic components= brick cobbles, ash and gravel of concrete and brick. Rare concrete boulders and rare metal fragments.</td></tr> <tr> <td>Glacial Till: CLAY</td><td>0.55 to 2.0</td><td>18.3</td><td>Firm/Stiff to very stiff. Extremely high strength at 3m depth.</td></tr> <tr> <td>Chester Sandstone Formation; SAND</td><td>18.3</td><td>>21.45</td><td>-</td></tr> <tr> <td colspan="4">Infilled Former Laundry Basement (TP02a)</td></tr> <tr> <td>MG: Topsoil</td><td>0</td><td>0.5</td><td>Geotextile found at underside</td></tr> <tr> <td>MG: gravel, clay and cobbles in varying proportions</td><td>0.5</td><td>3.1</td><td>Gravel and cobbles are brick and concrete,</td></tr> <tr> <td>MG: concrete basement floor</td><td>3.1</td><td>3.3</td><td>-</td></tr> </tbody> </table> #: geotextile marker fabric found generally at underside of topsoil, but in TP04 the topsoil was only 0.1m thick and then had 0.4m of made ground before the geotextile was found, i.e. made ground lay above the marker fabric .			Strata	Depth Encountered (mBGL)		Description & Comments	Top	Bottom	MG: Topsoil (clean cover)	0	0.1# (TP04) 0.3 to 0.8	Brown slightly sandy silt/clayey sand, with no anthropogenic components .	MG: clayey gravelly sand/sandy gravel	0.1 to 0.4	0.55 to 2.0	Includes 0.4m of concrete in BH05. Anthropogenic components= brick cobbles, ash and gravel of concrete and brick. Rare concrete boulders and rare metal fragments.	Glacial Till: CLAY	0.55 to 2.0	18.3	Firm/Stiff to very stiff. Extremely high strength at 3m depth.	Chester Sandstone Formation; SAND	18.3	>21.45	-	Infilled Former Laundry Basement (TP02a)				MG: Topsoil	0	0.5	Geotextile found at underside	MG: gravel, clay and cobbles in varying proportions	0.5	3.1	Gravel and cobbles are brick and concrete,	MG: concrete basement floor	3.1	3.3	-
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	The infilled basement to the former laundry lies under the site and has been located in TP02a. The obstruction at 1.5m depth in TP05 is considered not to be the basement, but some structure under the former road/former footpath.
Hydrogeology & Hydrology	Not applicable other than groundwater strikes and seepages occur at >5m depth.
Contamination Considerations	- No coal related aspects are shown to pose risks to the site. - No landfills lie nearby. - There is unlikely to be any significant UXO risk. Asbestos-containing-materials have been found on the school site elsewhere, associated with the large Daisy Bank works and tram depot. This new classroom area (apart from being a laundry and police station) lies in a former residential area and so the lack of ACM in this area is not unexpected. ACM could still be found during redevelopment. - Anthropogenic components of the made ground comprise: fragments/gravel/cobbles of brick and concrete, plus rare metal. - There were no visual or olfactory indications of contamination in the classroom footprint, nor in the immediate surroundings. That included there being no signs of ACM. - The chemical results from previous investigations were reassessed to modern standards and to Public Open Space (Parks) (POS) guidelines. - No soils lying below the current topsoil cover system layer at the proposed classroom location, have been tested for contamination. That said they are not significantly dissimilar to the made ground found on other holes close by and testing of those holes found no concentrations exceeding POS (parks) guidelines. - No risks have been found to site end-users (even if the clean cover system were removed). - No protection is required for Radon. - No potential sources of ground gas have been found.
Strategy for Remediation & Risk Reduction	- The site currently contains a topsoil clean cover system. As a precautionary approach, this must be maintained in the final development of this area. Raised ground in one location, will require removal of the made ground below the clean cover topsoil in order to reduce the levels, and then replacement of the same topsoil thickness. - No remediation is required. - By design, the new classroom has protection against the above, due to it's design having a clear air void beneath the entire footprint. Although no significant gas risk appears to exist, we recommend that this air gap should not be bridged by any structural elements and should not be removed. - PE and PVC water supply pipes should be acceptable. - No long-term monitoring and maintenance of remediation is required. - A watch should be kept for asbestos containing materials in the soils and any other unforeseen contamination. If such is found, then work should stop and AGGC should be contacted for advice and assessment. - Any recycled aggregates that are planned to be imported to site, should be assessed for contamination (especially asbestos) prior to import. - Topsoil and subsoil should be assessed for contamination prior to import. - Site, landscape and maintenance workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided. Excavations or below ground voids should be checked for the presence of harmful gases and vapours prior to personnel entry.

This is only a summary and should not be read in isolation from the main text.

1 Introduction

1.1 Introduction and Brief

AG Geo-Consultants Ltd (AGGC) were commissioned by Daccus ACM on behalf of The Dean Trust (the Client) to produce a Remediation & Risk-Reduction Strategy report for a site known as Dean Trust Academy, Ardwick, Manchester (our/the “Site”).

The client’s brief was to assist with:

- *what is required pre-dig and to satisfy condition 5 of the consent notice.*

1.2 Proposed Development

The proposed development (see plan in Appendix A) comprises a **new temporary/portable classroom** (portacabin type), with tarmac footpaths surrounding it. There is no new landscaping proposed, just the relocation of 2no. trees.

A **tarmac covered “courtyard”** is to be constructed under a separate contract, just east of the new classroom.

1.3 Scope of Works

The objectives of the work were to:

- Review existing reports and plans, etc.
- Produce a remediation & risk-reduction strategy.

1.4 Limitations

This report is provided for the benefit only of the party to whom it is addressed and we do not accept responsibility to any third party for the whole or any part of the contents and we exercise no duty of care in relation to this report to any third party.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work and on the results of laboratory and field tests performed during the investigation. However, subsoils are inherently variable and hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed as part of this assessment. In particular, it should be noted that groundwater levels vary due to seasonal and other effects and may at times differ to those measured during the investigation.

This assessment has been based to a large extent on data acquired from Third Parties. This data has been taken at face value and has not been subjected to any additional validation.

Unless specifically noted to the contrary, it should be assumed that this report has not been submitted to any regulatory authorities for approval.

2 Previous Reports

Ground/contamination assessments have previously been completed at the site. The detailed findings of the assessments are included in:

- ***Phase I Desk Study Assessment Report***, for The Dean Trust, at Dean Trust Academy, Ardwick, Manchester, by Brownfield Solutions Ltd, GP/M4246/8660 Rev B, August 2021.
- ***Phase II Geo-Environmental Assessment Report***, for The Dean Trust, at Dean Trust Academy, Ardwick, Manchester, by Brownfield Solutions Ltd, NS/M4246/10353, August 2021.

Both reports summarise a large number of earlier desk studies, site investigation and remediation/validation, reports.

The two reports contain a lot of information irrelevant to the new classroom area. AGGC have reassessed the significant aspects of the above reports, relative to the new classroom location, and summarise them in the following sections.

3 Desk Study

We have reviewed the previous desk study and refined as follows, in order to concentrate upon the new classroom area.

Table 2.1 Desk Study

Planning conditions	We have inspected the planning portal for permission 129761/FO/2021. Condition 5 contains the usual contaminated land planning conditions, namely: • Pre-commencement (condition 5a): Desk Study and site investigation reporting and Remediation strategy report. • Pre-occupation (condition 5b): implement remediation (and risk-reduction measures), validate and report. Unforeseen contamination condition. The conditions also state that <i>Any further development must not compromise any existing remedial measures previously installed at the site as part of Planning Permission ref: 108783/VO/2015/N2.</i> In addition, the NPPF reminds developers that they are responsible for providing developments that are free of significant risks (both contamination and geotechnical). Furthermore, there are ground assessment requirements within Building Regulations.
Current Use of Site and Surroundings	On Site Footpaths and grassed areas. In the Surroundings School grounds, housing with associated roads, to the east
Anticipated Ground Conditions	<u>BGS Mapping Suggests:</u> • Made Ground (MG): None shown. • Drift Deposits: <i>Glacial Till</i> (firm to stiff boulder clay with sand and gravel). • Solid Geology: Chester Sandstone Formation, which typically comprises a fine to coarse sandstone with rounded gravel, cobbles, pebbles and boulders. • Fault Lines: One lies about 90m SW but should not pose any issues to our site.
Hydrology and Hydrogeology	Watercourses: There are no surface water features within 250m of the site. Aquifers: Secondary and Principal aquifers Groundwater: Struck/seepages at 5-7m depth. Source Protection Zones (SPZ): None Abstractions: 525m away
Historical Site Use	On Site The history of the proposed classroom area is: • by 1848 the site was fields. • by 1891 it became a police station and an open yard next to it. • By 1933 a wash house (later Laundry) appeared on our site. • by 1991 the site was a Playground and then the current academy. In the Surroundings By 1848 ponds lay nearby, which were later infilled. Most of the immediate surrounding area to the new classroom was originally residential housing. At least 50m south of our site once lay the <i>Manchester Carriage & Tramway Company Depot</i>. The <i>brewery</i> on the now school site lay ~100m west of our site.

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	By 1922 the <i>Daisy Bank works</i> replace the old Carriage & Tramway Depot and lay ~40m south of our site. By 1991, all the housing has gone on site and it contained a school in the east and a school off-site to the north, with playing fields and playground occupying most of the school site.
Environmental Datasheets	Show no potentially significant aspects.
Landfills?	No licensed ones shown on or significantly near to the site.
Area Affected by Coal Mining?	<i>An official CON29M Coal Mining Search identified no evidence of coal seams or coal mining on or within the vicinity of the site.</i> It also shows no coal related aspects pose risks to the site.
Potential UXO Risk?	Unlikely. The Site is assessed as very low to low risk of Unexploded Ordnance (UXO) being present .

4 Phase 2 Site Investigations

4.1 General

4no. site investigations have been carried out over the years that cover the area of the proposed new classroom. Only 3no. of those have exploratory holes that lie within, or close to, the footprint. The holes are shown in the following table.

Table 4.1 Exploratory Hole Details

Investigating Party	Inside development footprint	Just outside of development footprint
Patrick Parsons	TP02/02a, TP03, TP04, TP07	TP01, TP05, TP06
Solmek	None	BH03, BH01
Atkins/Geotechnics	None	BH05

The Brownfield Solutions Ltd Phase 2 investigation formed no holes in the area of the proposed new classroom, they only formed holes elsewhere on the school site.

4.2 Soil Findings

The following table provides a summary of the strata encountered in the exploratory holes at the classroom location, and the depth to the base of each stratum. MG = man-made ground.

The infilled basement to the former laundry lies under the site and has been located in TP02a and is detailed in the table below.

Table 4.2 Typical Strata

Strata	Depth Encountered (mBGL)		Description & Comments
	Top	Bottom	
MG: Topsoil (clean cover)	0	0.1# (TP04) 0.4 to 0.8	Brown slightly sandy silt/clayey sand, with no anthropogenic components.
MG: clayey gravelly sand/sandy gravel	0.1 to 0.4	0.55 to 2.0	Includes 0.4m of concrete in BH05. Anthropogenic components= brick cobbles, ash and gravel of concrete and brick. Rare concrete boulders and rare metal fragments.
Glacial Till: CLAY	0.55 to 2.0	18.3	Firm/Stiff to very stiff. Extremely high strength at 3m depth.
Chester Sandstone Formation; SAND	18.3	>21.45	-
Infilled Former Laundry Basement (TP02a)			
MG: Topsoil	0	0.5	Geotextile found at underside
MG: gravel, clay and cobbles in varying proportions	0.5	3.1	Gravel and cobbles are brick and concrete,
MG: concrete basement floor	3.1	3.3	-

#: geotextile marker fabric found generally at underside of topsoil, but in TP04 the topsoil was only 0.1m thick and then had 0.4m of made ground before the geotextile was found, i.e. made ground lay above the marker fabric.

The made ground topsoil is a **clean cover system** recommended by previous remediation strategies. Those strategies required 0.3-0.6m of clean cover in differing parts of the school site.

Trial pit TP05 was 2.6m long and 0.7m wide and encountered a concrete obstruction at 1.5m depth that prevented further excavation. The previous investigation report considered that to potentially be part of the basement as found in TP02a, but TP05 appears to lie under the footpath

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of the former road (South Street), or under the road itself and so is unlikely to be the basement. The former laundry ground floor slab appears to have been removed it's and then the basement void infilled.

4.3 Groundwater Findings

Most exploratory holes were shallow and so were dry. BH05 found groundwater at 17m depth and subsequent monitoring found it at ~14.5m depth.

4.4 Contamination Indications

None of the exploratory holes, within the classroom footprint, or in the near surroundings, found any visual or olfactory evidence of contamination and that included there being no signs of asbestos containing materials (ACM).

ACM have been found on the school site elsewhere, associated with the large Daisy Bank works and tram depot. This new classroom area (apart from being a laundry and police station) lies in a former residential area and so the lack of ACM in this area is not unexpected. ACM could still be found during redevelopment.

4.5 Chemical Results - Soils

During the number of years that have passed since the investigations, guidelines have changed. The results have therefore been reassessed to the current guidelines (GAC) for **Public Open Space (POS)(parkland)**.

Table 4.3 Exploratory Hole Details

Investigating Party	Location	Results
Patrick Parsons	Inside classroom footprint: TP02/02a, TP03, TP04, TP07	None as it was a geotechnical investigation only.
	Outside footprint: TP01, TP05, TP06	
Solmek	Inside footprint: None	n/a
	Outside footprint: BH03, BH01	BH03 was not tested. In BH01 no asbestos was proven. None of the heavy metals, speciated TPH, BTEX, or PAHs exceeded the GAC in BH01.
Atkins/ Geotechnics	Inside footprint: None	n/a
	Outside footprint: BH05	None of the heavy metals, speciated TPH, BTEX, or PAHs exceeded the GAC. No asbestos was reported in BH05.

Recall that BSL had no exploratory holes in this new classroom area.

No soils lying below the current topsoil cover system layer, have been tested for contamination. That said they are not significantly dissimilar to the made ground found on other holes close by and testing of those holes found no concentrations exceeding POS (parks) GAC. Also, none of the hole within and near to the proposed classroom footprint, found any ACM nor visual or olfactory contamination indications.

4.6 Chemical Results - Groundwater

The results have not been assessed by us, as in their desk study, Patrick Parson assessed the potential risks to water resources and considered them to be low (due to the significant thickness of boulder clay).

4.7 Gas, Chemical Vapour & Radon Risks

Other than spotting that Atkins considered CS₂ gas protection to be required on some parts of the overall school site, the **gas results** have not been assessed by us, as the new building is to be portacabin type, having a clear air void beneath it.

No **Radon** Protection is required.

There were no olfactory indications of any **chemicals** in the ground in this area.

5 Final Conceptual Model and Risk Assessment

The previous conceptual model and risk assessment by *Brownfield Solutions Ltd* have been refined to focus upon the classroom area.

The method used for risk evaluation is qualitative based on interpretation of the available geoenvironmental and geotechnical data in order to provide an overall impression of the potential risks present at the site. This is described in terms of two variables as follows:

- **“Probability”** – being the likelihood that a hazard is present on site or in the surroundings.
- **“Consequence”** – being the potential outcome of the hazard.

The combination of these is used to define the risk. Clearly if a hazard is not present there can be no consequence. Similarly hazards that are potentially present will have different degrees of potential consequence. The combination of the presence of a hazard, and the potential severity of outcome of such a hazard within any event, can be used to manage the approach to management of the risk.

The **probability** (likelihood) of an event can be classified on a four point system using the following terms and definitions based on CIRIA C552:

- **Highly likely:** The event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;
- **Likely:** It is probable that an event will occur, or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;
- **Low likelihood:** Circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term;
- **Unlikely:** Circumstances are such that it is improbable the event would occur even in the long term.

The **consequence** (severity) can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to consequence are:

- **Severe:** Short term (acute) risk to human health likely to result in ‘significant harm’¹. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short term risk to an ecosystem or organism forming part of that ecosystem¹;
- **Medium:** Chronic damage to human health (‘significant harm’¹), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem¹;
- **Mild:** Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (‘significant harm’¹). Damage to sensitive buildings, structures or the environment; and
- **Minor:** Harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

(¹ Defined in Defra Circular on “Contaminated Land”, EPA 1990 Part 2a”, 01/2006, September 2006.)

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Once the probability of an event occurring and its consequence have been classified, a risk category can be assigned as in the following table.

Table 5.1 Risk Classification System (CIRA 552)

Probability		Consequence			
		Severe	Medium	Mild	Minor
	Highly likely	Very high	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

Risk Level	Action
Low to Very Low	None
Moderate to Moderate/Low	Undertake appropriate mitigation measures to reduce the risk level by appropriate on-site practice at little additional cost.
High to Very High	Designers should take such risks into account and avoid or reduce risk level to acceptable levels. Additional resources required.

Table 5.2 Potential Risks

Feature	Risks and Contaminants of Concern [#] (CoC)
On-Site	
Made ground - general.	Despite no tests in and around the proposed classroom revealing elevated contamination results, there is a slight risk that such still could be present (e.g. Heavy Metals, hydrocarbons (TPH, PAHs), asbestos).
Made ground - basement infill	As above
Off-Site	
Made ground being similar to that above.	As above

[#]: From industry profiles, etc.

The table that follows provides a summary of the data reference points, together with an indication of the hazards, probabilities, consequences and degrees of risk.

This assessment indicates the site and environs are considered as **Very Low to Moderate** risk with respect to contamination. Indicators above low risk comprise:

- Composition of made ground posing a potentially slight risk to groundworkers.

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Table 5.3 On-Site to On-Site Source – Pathway Receptor Model

Source		Pathway	Receptor	Probability	Consequence	Potential Risk?
General	Hazard					
Total soils concentrations (e.g. heavy metals and hydrocarbons): General impact (made ground) from former site usage	Contamination of groundwater	Migration of leachate through unsaturated zone; Then Migration through saturated zone/groundwater.	Groundwater and/or surface waters, and/or eco-system	Unlikely	Mild	Very Low
	Human health	Ingestion of and dermal contact with soil & household dust; Inhalation of dust (indoor household & outdoor fugitive).	Construction workers	Likely	Medium	Moderate
		Growing then eating food crops.	Site end-users	Unlikely #	Medium	Low
	Vegetation poisoning.	Plant root uptake	Plants	Unlikely	Mild	Very low
Gases from natural soils with organic content (e.g. peat, alluvium) Gases from made ground with organic content	Explosion (accumulation of methane and volatiles)	Preferential flow paths into buildings through unsaturated zone Inhalation of indoor vapours/gases and possible explosion.	Site end-users	Unlikely @	Medium	Low
	Asphyxiation (resulting from elevated levels of carbon dioxide, methane etc).	Preferential flow paths into buildings via piled foundations vibro columns , etc Inhalation of indoor vapours/gases and possible explosion.		Unlikely @	Medium	Low
		Inhalation of outdoor vapours/gases.		Unlikely @	Medium	Low

#: Furthermore, the presence of the school's 0.3-0.6m thick site-wide clean cover system (topsoil) **cuts the pathway** between the made ground and the site end-users.

@: none of the made ground or natural soils have been found to contain anything which could produce ground gas. Furthermore, the temporary (portacabin type) classroom will have a clear void under it, thereby cutting the pathway.

There are not considered to be any significant **on-site to off-site** pathways or risks.

There are not considered to be any significant **off-site to on-site** pathways or risks.

6 Strategy for Risk Reduction & Remediation

6.1.1 Introduction

There are two ways to reduce contamination/environmental type risks:

- “**remediation**” of soil and/or groundwater.
- Other **risk reduction measures** (that can only be completed post-commencement, such as clean cover in final garden areas, gas protection, or special water supply pipe materials).

No unacceptable risks have been found that require **pre-commencement** soil or groundwater remediation.

No long-term monitoring and maintenance of remediation is required.

Timescales for the construction and implementation of risk-reduction measures, are unknown.

6.1.2 Post-Commencement Risk Reduction Measures

Soil Risks to Humans

No risks have been found to site end-users (even if the clean cover system were removed).

As a precautionary approach, the exiting clean cover layer across the site must be kept in place. Foundations for the new classroom should be formed through the clean cover layer.

NOTE that on part of the new classroom footprint the existing ground appears to be mounded up above general ground levels. Such height difference will require removal in order to form a level area for the classroom. In order to maintain the clean cover system, the reduction in height of ground in that bund area must be achieved by **removal of the made ground from below the clean cover** and then replacement of the clean cover thickness afterwards, to get back up to the level area required.

Water Supply Pipe Risks

The local water supply company should accept the use of either PVC or PE water supply pipe materials on site.

No indications of petrol, diesel, oils etc have been found to date and if such are found during redevelopment works then they would be remediated such that PVC and PE pipe materials would still be acceptable.

Radon, Gas and Vapour Risks to End Users

No risks have been found from Radon, Ground/landfill gases or chemical vapours.

By design, the new classroom has protection against the above, due to it's design having a clear air void beneath the entire footprint. Although no significant gas risk appears to exist, we recommend that this air gap should not be bridged by any structural elements and should not be removed.

No Radon protection measures are required for new buildings or extensions on site.

AG Geo-Consultants Ltd

Remediation & Risk-Reduction Strategy
Dean Trust Academy, Ardwick, Manchester

Imported Soils Risks

Any recycled aggregates that are planned to be imported to site, should be assessed for asbestos content (and any other contaminants that might be present at the source site), prior to import.

All imported fill, topsoil and sub-soil shall be tested for a general suite of contaminants (e.g. AGGC's suite herein). Topsoil and subsoil can contain naturally occurring contamination such as arsenic and lead. The results shall be assessed for any exceedances of guidelines.

Materials shall be tested at a rate of 1no. sample per 100m³ (with a minimum of 2 samples per soil source).

General

A site investigation samples a very small portion of the overall site soils. Given the existence of made ground on the site, vigilance should be maintained during site clearance and construction, in case any areas of suspected **unforeseen contamination** are encountered. If areas are found then a suitably qualified person (e.g. AGGC) should undertake appropriate sampling, testing and further risk assessment.

Site, landscape and maintenance workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided.

Excavations or below ground voids should be checked for the presence of harmful gases and vapours prior to personnel entry.

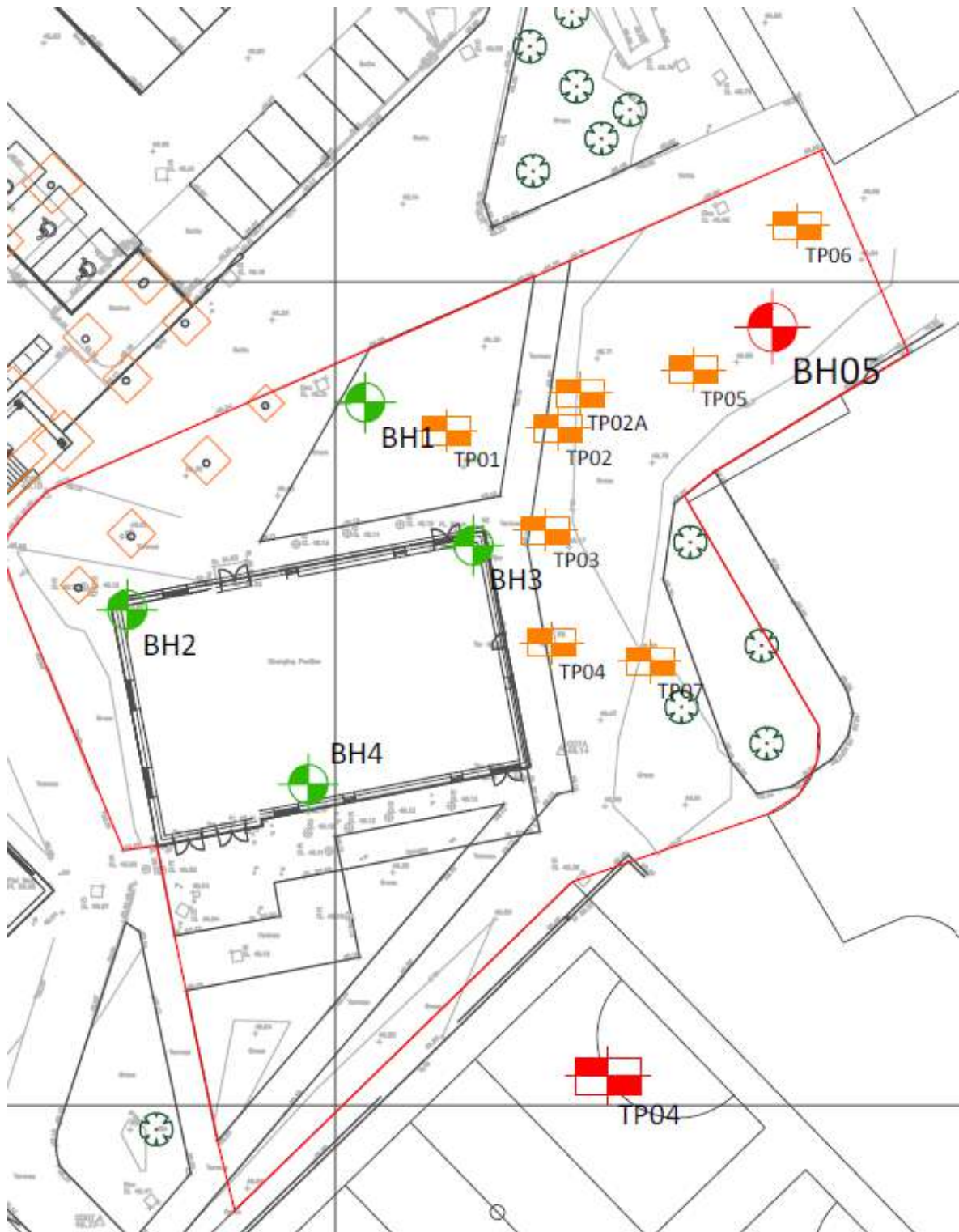
Appendices

- A. Proposed Development Plan
- B. Exploratory Hole Locations
- C. Exploratory Hole Logs

Appendix A

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Appendix B



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Appendix C

BOREHOLE RECORD - Cable Percussion

Project MANCHESTER SCHOOLS BASIC NEEDS
PROGRAMME - DAISY MILL

Engineer ATKINS

Borehole Project No BH05
PN143260

Client MANCHESTER CITY COUNCIL

National Grid Coordinates 386271.2 E
396348.0 N

Ground Level 48.81 m OD

Sampling			Properties			Strata			Scale 1:50					
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD					
0.20	ES					Grass over TOPSOIL: Brown slightly sandy silt with some rootlets.	G.L.		48.81					
0.20			PID=0.0				0.30		48.51					
0.50	D					Grey CONCRETE.								
0.50	ES		PID=0.0				0.70		48.11					
0.50														
1.00	B					MADE GROUND: Dark brown and black clayey gravelly fine to coarse sand with a medium cobble content of bricks. Gravel is fine to coarse angular including ash and brick fragments.								
1.00	ES		PID=0.0				1.30		47.51					
1.00														
1.20- 1.65	#	(DRY)			S16	Stiff to very stiff fissured brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of carbonaceous mudstone, siltstone and sandstone.								
1.20- 1.65	D													
1.50	D													
2.00- 2.45	B													
2.00- 2.45	D	2.00 (DRY)			S22									
2.00	ES		PID=0.0											
2.00														
2.50	D			12										
3.00	B													
3.00- 3.45	UT46	3.00 (DRY)	388	13		At 3.00m, extremely high strength								
3.50	D													
4.00- 4.45	B													
4.00- 4.45	D	4.00 (DRY)			S25									
4.50	D													
5.00	B													
5.00- 5.45	UT35	5.00 (DRY)												
5.50	D													
6.00- 6.45	B													
6.00- 6.45	D	6.00 (DRY)			S22									
6.50	D													
7.00	B													
7.50- 7.95	UT36	7.50 (DRY)												
8.00	B													
8.00	D													
8.50	D													
9.00- 9.45	B													
9.00- 9.45	D	9.00 (DRY)			S19									
9.50	D													
10.00	B													
Boring			Progress			Groundwater								
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.20	0.40	Inspection Pit	CC/AC	G.L.			28/10/14	08:00	19.00	19.00	17.00	20		Fast inflow.
21.00	0.15	Cable Percussion	CC/AC	12.50	12.00	DRY	28/10/14	18:00						
				12.50	12.00	DRY	29/10/14	08:00						
				21.45	21.45	17.00	29/10/14	18:00						
Remarks														
Inspection pit hand excavated to 1.20m depth. ES Sample = 1 x 1kg plastic tub, 1 x 258ml amber glass jar and 1 x 60ml VOC vial. PID = Photo-ionisation detector reading measuring Total Volatile Organic Compounds concentration in ppm. A 50mm gas monitoring pipe was installed to 21.00m with a geowrapped slotted section from 18.00m to 21.00m with flush lockable protective cover. Backfill details from base of hole: gravel filter up to 18.00m, bentonite seal up to 0.20m, concrete up to ground level.														
Symbols and abbreviations are explained on the accompanying key sheet.														
All dimensions are in metres.														
Logged in accordance with BS5930:1999 + A2:2010														
										Logged by LP Checked by JK Figure 1 of 3 11/12/2014				
geotechnics														

BOREHOLE RECORD - Cable Percussion

Project MANCHESTER SCHOOLS BASIC NEEDS
PROGRAMME - DAISY MILL

Engineer ATKINS

Borehole BH05
Project No PN143260

Client MANCHESTER CITY COUNCIL

National Grid Coordinates 386271.2 E
396348.0 N

Ground Level 48.81 m OD

Sampling			Properties		Strata		Scale 1:50	
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend
10.50-10.95	UT46	10.50 (DRY)						
11.00	D							
11.50	D					Between 11.50m and 18.30m; Fissures absent. Medium to widely spaced lenses of brown fine to coarse sand.		
12.00-12.45	B							
12.00-12.45	D	12.00 (DRY)			S35			
12.50	D							
13.00	B							
13.50-13.95	UT62	13.50 (DRY)						
14.00	D							
14.50	D							
15.00-15.45	B					Below 15.00m, Very stiff.		
15.00-15.45	D							
15.15-15.53	D	15.15 (DRY)			S52/225			
15.50	D							
16.00	B							
16.50-16.95	UT70	16.50 (DRY)						
17.00	B							
17.00	D							
18.00-18.45	B							
18.00-18.15	D	18.00 (DRY)			S50/75			
18.50	D					Medium dense to dense reddish brown gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded of sandstone and quartzite.	18.30	30.51
19.50-19.95	B							
19.50-19.95	D	19.50 (17.00)			C33			

Boring				Progress					Groundwater					
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks 

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:1999 + A2:2010

Logged by LP
Checked by JK
Figure 2 of 3
11/12/2014



BOREHOLE RECORD - Cable Percussion

Project MANCHESTER SCHOOLS BASIC NEEDS
PROGRAMME - DAISY MILL

Engineer ATKINS

Borehole BH05
Project No PN143260

Client MANCHESTER CITY COUNCIL

National Grid Coordinates 386271.2 E
396348.0 N

Ground Level 48.81 m OD

Sampling			Properties			Strata		Scale 1:50																																														
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD																																													
21.00-21.45 21.00-21.45	B	21.00 (17.00)			C26																																																	
						End of Borehole	21.45		27.36																																													
<table border="1"> <thead> <tr> <th colspan="4">Boring</th> <th colspan="5">Progress</th> <th colspan="6">Groundwater</th> </tr> <tr> <th>Depth</th> <th>Hole Dia</th> <th>Technique</th> <th>Crew</th> <th>Depth of Hole</th> <th>Depth Cased</th> <th>Depth to Water</th> <th>Date</th> <th>Time</th> <th>Depth Struck</th> <th>Depth Cased</th> <th>Rose to</th> <th>in Mins</th> <th>Depth Sealed</th> <th>Remarks on Groundwater</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>										Boring				Progress					Groundwater						Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater															
Boring				Progress					Groundwater																																													
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater																																								

Remarks 

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:1999 + A2:2010

Logged by LP
Checked by JK
Figure 3 of 3
11/12/2014





Borehole Log

Scale 1:50 Sheet 1 of 1

BH1

Contract no: S160937

Site: Dean Trust Ardwick Academy

Driller: Bainbridge Brothers Ltd

Plant used: Mini Rig

Started: 11/10/2016

Ended: 11/10/2016

Backfilled: 11/10/2016

GL (AOD):

Easting:

Northing:

Logged: IN

Status: FINAL

Client: Dean Trust Ardwick

Method: Small percussive

[illegible]



Borehole Log

Scale 1:50 Sheet 1 of 1

BH2

Contract no: S160937

Site: Dean Trust Ardwick Academy

Driller: Bainbridge Brothers Ltd

Plant used: Mini Rig

Started: 11/10/2016

Ended: 11/10/2016

Backfilled: 11/10/2016

GL (AOD):

Easting:

Northing:

Logged: IN

Status: FINAL

Client: Dean Trust Ardwick

Method: Small percussive

[illegible]



Borehole Log

Scale 1:50 Sheet 1 of 1

BH3

Contract no: S160937

Site: Dean Trust Ardwick Academy

Driller: Bainbridge Brothers Ltd

Plant used: Mini Rig

Started: 11/10/2016

Ended: 11/10/2016

Backfilled: 11/10/2016

GL (AOD):

Easting:

Northing:

Logged: IN

Status: FINAL

Client: Dean Trust Ardwick

Method: Small percussive

[illegible]



Borehole Log

Scale 1:50 Sheet 1 of 1

BH4

Contract no: S160937

Site: Dean Trust Ardwick Academy

Driller: Bainbridge Brothers Ltd

Plant used: Mini Rig

Started: 11/10/2016

Ended: 11/10/2016

Backfilled: 11/10/2016

GL (AOD):

Easting:

Northing:

Logged: IN

Status: FINAL

Client: Dean Trust Ardwick

Method: Small percussive

[illegible]

				Trial Pit Log			FINAL		Trial Pit No. TP01 Sheet 1 of 1		
Project Name: Ardwick Academy, Proposed Temporary Classroom				Project No. H18186		Co-ords: Level (m AOD):		Date 25/10/2018			
Location: Longsight, Manchester						Final Depth (m): 2.10		Pit Length (m): 2.30 Pit Width (m): 0.70		Scale 1:25 Logged By ACV	
Client: The Dean Trust											
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description				
	Depth (m bgl)	Type	Results								
				0.30			TOPSOIL: Dark brown organic slightly clayey sand with rootlets. (Geotextile encountered at base)				
				0.50				MADE GROUND: Topsoil mixed with light grey slightly clayey sandy gravel. Gravel is angular fine to coarse of brick and sandstone. Contains firm clay pockets.			
				1.60				MADE GROUND: Compact brown mottled grey slightly clayey sandy slightly cobbly gravel. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of brick, concrete, sandstone and mudstone. Cobbles angular of brick and concrete. Contains fragments of metal and firm to stiff clay pockets.			
	1.70	HSV	120kPa						Stiff to very stiff grey and orange mottled slightly silty slightly sandy CLAY. Sand is fine.		
	1.80	HSV	106kPa			End of Pit at 2.10m					
	2.00	HSV	120kPa	2.10							
Remarks: No groundwater encountered. Trial Pit backfilled with arisings to ground level upon completion.											
Pit Stability: Stable											

				Trial Pit Log			FINAL		Trial Pit No. TP02 Sheet 1 of 1		
Project Name: Ardwick Academy, Proposed Temporary Classroom				Project No. H18186		Co-ords: Level (m AOD):		Date 25/10/2018			
Location: Longsight, Manchester						Final Depth (m): 1.00		Pit Length (m): 2.20 Pit Width (m): 0.70		Scale 1:25 Logged By ACV	
Client: The Dean Trust											
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description				
	Depth (m bgl)	Type	Results								
				0.40			TOPSOIL: Dark brown organic slightly clayey sand with rootlets. (Geotextile encountered at base)				
				1.00			MADE GROUND: Compact brown mottled grey slightly clayey sandy slightly cobbly gravel. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of brick, concrete, sandstone and mudstone. Cobbles angular of brick and concrete. Contains firm clay pockets.				
							End of Pit at 1.00m				
Remarks: No groundwater encountered. Trial Pit backfilled with arisings to ground level upon completion. Trial Pit terminated at 1.0m bgl due to encountering warning tape indicating presence of underground services.											
Pit Stability: Stable											

				Trial Pit Log			FINAL		Trial Pit No. TP02A Sheet 1 of 1	
Project Name: Ardwick Academy, Proposed Temporary Classroom				Project No. H18186		Co-ords: Level (m AOD):		Date 25/10/2018		
Location: Longsight, Manchester						Final Depth (m): 3.30		Pit Length (m): 2.80 Pit Width (m): 0.70		Scale 1:25 Logged By ACV
Client: The Dean Trust										
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
				0.50			TOPSOIL: Dark brown organic slightly clayey sand with rootlets. (Geotextile encountered at base)			
				1.50			MADE GROUND: Stiff brown mottled grey slightly sandy gravelly slightly cobbly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of brick, concrete, sandstone and mudstone. Cobbles angular of brick and concrete. Contains firm clay pockets.			
				2.60			MADE GROUND: Compact brown mottled red slightly clayey, slightly sandy, gravelly cobbles. Sand is fine to coarse. Gravel is angular fine to coarse of brick, concrete and sandstone. Cobbles angular of brick and concrete.			
	2.60	HSV	100kPa	2.60			Stiff grey and orange mottled slightly sandy CLAY. Sand is fine.			
	2.80	HSV	114kPa				Concrete floor slab encountered			
	3.00	HSV	120kPa	3.30			End of Pit at 3.30m			
Remarks: No groundwater encountered. Former basement wall encountered between 1.5 and 3.1m bgl with a concrete floor slab (underside not proved). Trial Pit backfilled with arisings to ground level upon completion.										
Pit Stability: Stable										



				Trial Pit Log			FINAL		Trial Pit No. TP03 Sheet 1 of 1	
Project Name: Ardwick Academy, Proposed Temporary Classroom				Project No. H18186		Co-ords: Level (m AOD):		Date 25/10/2018		
Location: Longsight, Manchester						Final Depth (m): 1.70		Pit Length (m): 2.60 Pit Width (m): 0.70		Scale 1:25 Logged By ACV
Client: The Dean Trust										
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
				0.40			TOPSOIL: Dark brown organic slightly clayey sand with rootlets. (Geotextile encountered at base)			
							MADE GROUND: Compact light grey slightly clayey sandy gravel. Sand is fine to coarse. Gravel angular fine to coarse of brick, concrete, sanstone and mudstone. Contains firm to stiff clay pockets.			
	1.20	HSV	80kPa	1.20			<i>Pocket of reworked firm slightly organic clay.</i>			
	1.30	HSV	84kPa				Firm to stiff orangy brown mottled grey CLAY.			
	1.50	HSV	90kPa							
				1.70			End of Pit at 1.70m			
Remarks: No groundwater encountered. Trial Pit backfilled with arisings to ground level upon completion.										
Pit Stability: Stable										

				Trial Pit Log			FINAL		Trial Pit No. TP04 Sheet 1 of 1	
Project Name: Ardwick Academy, Proposed Temporary Classroom				Project No. H18186		Co-ords: Level (m AOD):		Date 25/10/2018		
Location: Longsight, Manchester						Final Depth (m): 1.50		Pit Length (m): 2.60 Pit Width (m): 0.70		Scale 1:25 Logged By ACV
Client: The Dean Trust										
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
				0.10			TOPSOIL: Dark brown organic slightly clayey sand with rootlets. MADE GROUND: Compact dark grey mottled brown slightly clayey sand. Sand is fine to coarse. Gravel angular fine to coarse of brick, concrete, sandstone and mudstone. Contains firm to stiff clay pockets. (Geotextile encountered at 0.5m bgl) MADE GROUND: Stiff dark grey organic slightly gravelly clay. Gravel is angular to subrounded of brick, concrete, sandstone and mudstone. Firm to stiff grey mottled orange silty CLAY.			
				0.90						
	1.20	HSV	82kPa	1.10						
	1.40	HSV	85kPa							
	1.50	HSV	80kPa	1.50			End of Pit at 1.50m			
Remarks: No groundwater encountered. Trial Pit backfilled with arisings to ground level upon completion.										
Pit Stability: Stable										

				Trial Pit Log			FINAL		Trial Pit No. TP05 Sheet 1 of 1	
Project Name: Ardwick Academy, Proposed Temporary Classroom				Project No. H18186		Co-ords: Level (m AOD):		Date 25/10/2018		
Location: Longsight, Manchester				Final Depth (m): 1.50		Pit Length (m): 2.60 Pit Width (m): 0.70		Scale 1:25 Logged By ACV		
Client: The Dean Trust										
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
				0.80			TOPSOIL: Dark brown organic slightly clayey sand with rootlets. (Geotextile encountered at base)			
				1.50			MADE GROUND: Compact brown mottled light grey clayey slightly gravelly slightly cobbly sand. Sand is fine to coarse. Gravel is angular fine to coarse of brick, concrete, sandstone and mudstone. Contains firm to stiff slightly organic, silty clay pockets. Rare boulder of concrete.			
							End of Pit at 1.50m			
Remarks: No groundwater encountered. Trial Pit backfilled with arisings to ground level upon completion. Trial Pit terminated at 1.5m begl due to concrete obstruction.										
Pit Stability: Stable										





				Trial Pit Log			FINAL		Trial Pit No. TP07 Sheet 1 of 1		
Project Name: Ardwick Academy, Proposed Temporary Classroom				Project No. H18186		Co-ords: Level (m AOD):		Date 25/10/2018			
Location: Longsight, Manchester						Final Depth (m): 1.40		Pit Length (m): 2.60 Pit Width (m): 0.70		Scale 1:25 Logged By ACV	
Client: The Dean Trust											
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description				
	Depth (m bgl)	Type	Results								
				0.30			TOPSOIL: Dark brown organic slightly clayey sand with rootlets. (Geotextile encountered at base) MADE GROUND: Well compacted light grey and brown mottled slightly clayey sandy slightly cobbly gravel. Gravel is angular to subrounded of brick, concrete, sandstone and mudstone. Cobbles angular of concrete. Contains rare boulders of concrete and firm clay pockets. Stiff grey and orange mottled CLAY.				
				0.55							
	0.70	HSV	70kPa								
	0.90	HSV	82kPa								
	1.10	HSV	89kPa								
	1.30	HSV	95kPa								
				1.40			End of Pit at 1.40m				
											1
											2
											3
											4
											5
Remarks: No groundwater encountered. Made Ground extended to 1.4m bgl on west side of pit. Trial Pit backfilled with arisings to ground level upon completion.											
Pit Stability: Stable											