



Earth Environmental
& Geotechnical

Geo-Environmental Investigation & Assessment

Coch Road

Wrexham

December 2017

On behalf of



Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport, Cheshire, SK5 6DA

Tel : 0161 9756088

Email info@earthenvironmental.co.uk
www.earthenvironmental.co.uk

**GEO-ENVIRONMENTAL
INVESTIGATION**

COCH ROAD

WREXHAM

Report Ref: A2217/17

DECEMBER 2017

Prepared on Behalf of:

ALDI STORES UK LTD

By:

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
Stockport
SK5 6DA

DISTRIBUTION:

1 electronic copy SWF Consulting Ltd

GEO-ENVIRONMENTAL INVESTIGATION

COCH ROAD, WREXHAM

Report Reference: A2217/17

Version B.0

Date: 1st December 2017

Prepared for: ALDI Stores UK Ltd

Prepared by: Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
Stockport
SK5 6DA

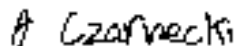
Definition of Version Code:

- D. Applied during initial drafting of the report before it has been reviewed.
- C. Applied after the report has been reviewed but before it has been approved by the Project Manager.
- B. Applied after the Project Manager has approved the report ready for issue to the client.
- A. Applied to reports after external/internal review.

The version number starts at "0" and is raised by "1" at each re-type.



Written by: **Nigel Ramsumair**
Senior Consultant



Approved by: **Adam Czarnecki**
Managing Director

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	BACKGROUND	1
1.2	TERMS OF REFERENCE.....	1
1.3	LIMITATIONS OF THE STUDY	2
2.0	SITE LOCATION & DESCRIPTION	3
2.1	SITE LOCATION & DESCRIPTION.....	3
2.2	PROPOSED DEVELOPMENT.....	8
3.0	SITE INVESTIGATION	9
3.1	EXPLORATORY FIELDWORK.....	9
3.2	LABORATORY TESTING PROGRAMME.....	10
3.2.1	<i>Environmental Testing</i>	10
4.0	GROUND CONDITIONS ENCOUNTERED	11
4.1	SOIL PROFILE ENCOUNTERED	11
4.2	OBSERVABLE INDICATIONS OF CONTAMINATION	11
4.3	OBSTRUCTIONS.....	11
4.4	GROUNDWATER.....	11
4.5	GROUND GAS/WATER MONITORING	11
5.0	ENGINEERING PROPERTIES OF SOILS ENCOUNTERED.....	12
5.1	DEVENSIAN TILL (SANDY CLAY).....	12
5.2	DEVENSIAN TILL (SANDY GRAVEL).....	13
6.0	GEOTECHNICAL ASSESSMENT.....	14
6.1	PROPOSED DEVELOPMENT.....	14
6.2	GROUND CONDITIONS ENCOUNTERED	14
6.3	FOUNDATION CONSIDERATIONS	14
6.3.1	<i>Strip/Pad Foundations</i>	14
6.4	SUITABILITY OF EXCAVATED MATERIALS	15
6.5	TEMPORARY WORKS	15
7.0	SOIL CONTAMINATION RISK ASSESSMENT.....	16
7.1	GENERAL	16
7.2	SOIL DISPOSAL WASTE ASSESSMENT	17
8.0	REVIEW OF CONCEPTUAL MODEL	18
9.0	CONCLUSIONS AND RECOMMENDATIONS	20
9.1	CONTAMINATION	20
9.2	SITE PERSONNEL	20
9.3	FOUNDATIONS	20

LIST OF FIGURES

Figure 1	Proposed Development
Figure 2	Site Location Plan
Figure 3	Image of site from the north west of site facing south east
Figure 4	Image of site from the west of site facing east
Figure 5	Image of site from the east of site facing south west
Figure 6	Image from the east of site facing north west
Figure 7	Photograph of samples recovered from WS1
Figure 8	Photograph of samples recovered from WS2
Figure 9	Photograph of samples recovered from WS3
Figure 10	Photograph of samples recovered from WS4
Figure 11	Photograph of rig used to carry out drilling
Figure 12	Exploratory Hole Location Plan
Figure 13	SPT v Depth Plot

TABLES

Table 1	Summary of Exploratory Holes Undertaken
Table 2	Summary of Ground Conditions Encountered
Table 3	Summary of Allowable Bearing Pressures
Table 4	Assessment of Soil Chemical Data
Table 5	Conceptual Model

APPENDICES

Appendix 1	Exploratory Hole Logs
Appendix 2	Chemical Testing Results
Appendix 3	Soil Waste Assessment
Appendix 4	Report Limitations

1.0 INTRODUCTION

1.1 Background

A Geo-Environmental Site Investigation has been commissioned by SWF Consulting on behalf of ALDI Stores UK Ltd (the Client) to examine ground conditions and retrieve soil samples for chemical and geotechnical testing for a proposed store extension.

1.2 Terms of Reference

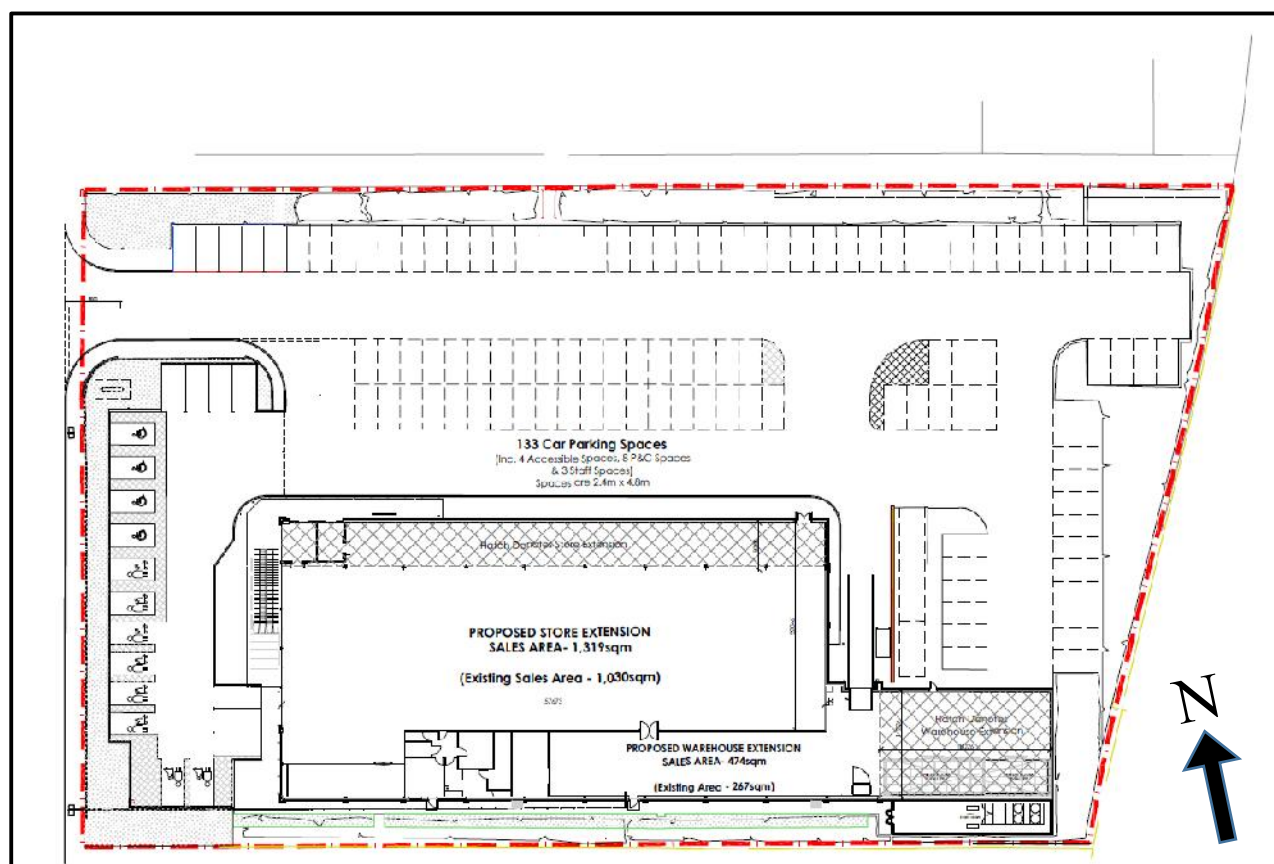
Earth Environmental and Geotechnical Ltd (EEG) was commissioned by the Client to undertake a Geo-Environmental Investigation of the site in accordance with a proposal A2217 dated 23rd August 2017.

The objectives of this investigation are as follows:

- *Assess the presence and likely extent of any potential environmental hazards (soil contamination) associated within the areas of the site investigated.*
- *Assessment of ground conditions for design of foundations.*

The proposed development consists of an extension to an existing ALDI retail store and this can be seen below, Figure 1.

Figure 1 Proposed Development



1.3 Limitations of the Study

The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information, improved practices or changes in legislation may require a reinterpretation of the report in whole or in part. EEG reserve the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use by the client and is confidential to them.

Recommendations within this report are also based on exploratory records and examination of samples and, where applicable, laboratory tests. No liability can be accepted for conditions not revealed by the boreholes, particularly at intervening locations. Whilst every effort is made to ensure accuracy of data supplied, all opinions expressed as to the spatial distribution of strata between sampling locations is for guidance only and no responsibility is accepted as to its accuracy.

2.0 SITE LOCATION & DESCRIPTION

2.1 Site Location & Description

The site is located 1.50km north west of Wrexham city centre, 1.6km east of New Broughton. The site is generally rectangular 70m x 110m, approximately 1.90ha, National Grid Reference 332623, 351471.

At the time of the investigation the site was occupied by ALDI selling goods and produce. The site is located within a retail park and is bounded by Tesco to the west, Homebase to the north, a tennis club, B5101 and dense trees to the east and a restaurant to the south.

All open areas of the site are hardstanding comprising of asphalt and concrete slabs which are generally level. The location of the proposed extension is located north and east of the supermarket.

The site can be accessed via Coch Road.

The site location plan is shown in Figure 2.

Figure 2 Site Location Plan



Site photographs are presented in Figures 3 to 11 below.

Figure 3 Image of site from the north west of site facing south east



Figure 4 Image of site from the west of site facing east



Figure 5 Image of site from the east of site facing south west



Figure 6 Image from the east of site facing north west



Figure 7 Photograph of samples recovered from WS1



Figure 8 Photograph of samples recovered from WS2



Figure 9 Photograph of samples recovered from WS3



Figure 10 Photograph of samples recovered from WS4



Figure 11 Photograph of rig used to carry out drilling



2.2 Proposed Development

The current proposed development involves the partial demolition of the existing building in order to facilitate the new extension.

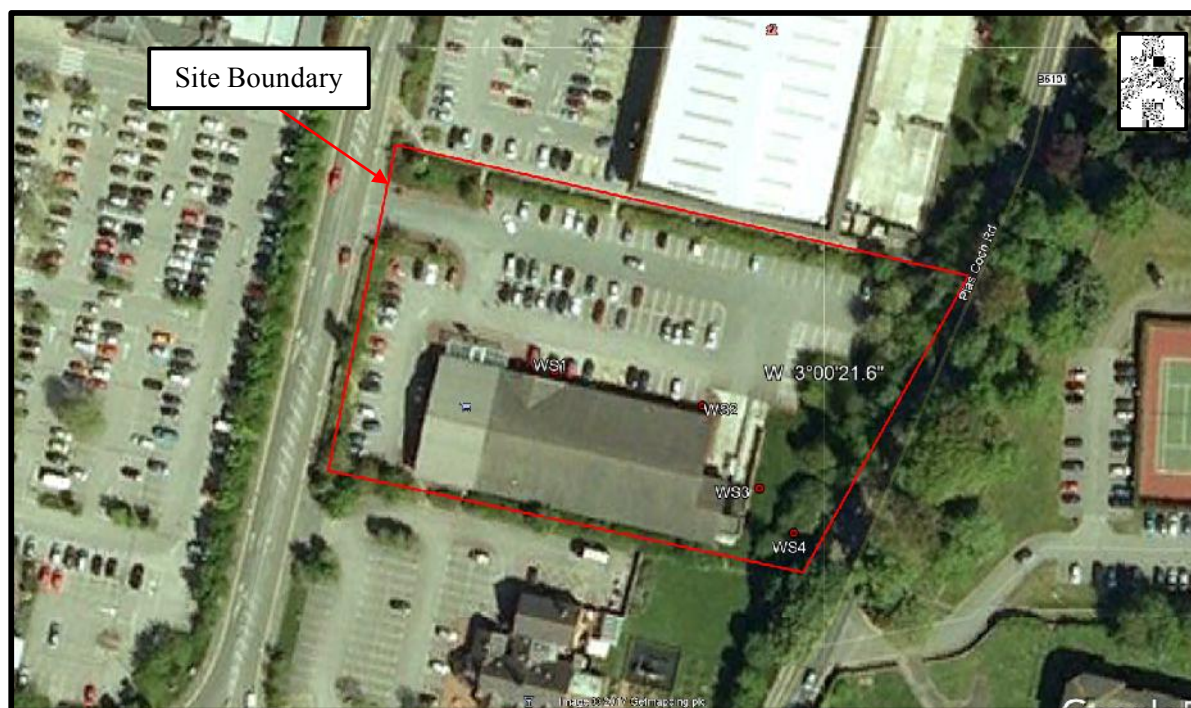
3.0 SITE INVESTIGATION

3.1 Exploratory Fieldwork

The fieldwork was carried out by EEG on the 30th August 2017 and comprised:

- Four window sample boreholes (designated WS1 to WS4 inclusive) were each sunk to depths of 3.00m below existing ground level. Window sampler boring is carried out with a small, track-mounted rig, which uses a chain-driven trip hammer to drive sampling tubes or penetrometers into the ground. These tools are coupled to the anvil of the hammer by solid drill rods. Sampling tubes comprise “windowless samplers”, which are plain sampler tubes in which a continuous disturbed sample is recovered within a semi-rigid plastic liner. In order to reduce friction within the borehole, sampling tubes of progressively smaller diameter are used as the borehole depth increases. Sampler diameters generally range from between approximately 90mm to 50mm. Standard Penetration Tests (SPTs) were undertaken in the boreholes in accordance with BS EN ISO 22476-3. Exploratory Hole logs are included in Appendix 1.

Figure 12 Exploratory Hole Location Plan



Each exploratory location was scanned using a Ground Probing Radar (GPR) and a Cable Avoidance Tool (CAT) in order to locate unrecorded underground services, and the exploratory locations were repositioned if necessary.

On completion, all samples recovered from the site were taken to a specialist laboratory for testing.

All site investigation work was supervised full time by a representative of EEG. The logging of soils and rocks has been carried out in accordance with BS5930⁽²⁰¹⁵⁾ except where superseded

by the soil and rock description methodology in BS EN14688-1⁽²⁰⁰²⁾, BS EN 14688-2⁽²⁰⁰⁴⁾ and BS EN 14689-1⁽²⁰⁰³⁾.

A summary of exploratory holes undertaken during the investigation is presented in Table 1.

Table 1 : Summary of Exploratory Holes Undertaken

Hole	Type*	Depth (m)	Date Started	Date Finished	Backfill Details**
WS1	WS	3.00	30/09/2017	30/09/2017	A
WS2	WS	3.00	30/09/2017	30/09/2017	A
WS3	WS	3.00	30/09/2017	30/09/2017	A
WS4	WS	3.00	30/09/2017	30/09/2017	A
*WS= Window Sample Borehole, A= Arising					

3.2 Laboratory Testing Programme

3.2.1 Environmental Testing

The environmental chemistry of the ground was investigated by specialist chemical analysis of selected samples, scheduled by EEG and carried out by QTSE.

Chemical analyses were carried out on four soil samples and were submitted for the following suite of determinants:

Asbestos Screen, Arsenic, Beryllium, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Cyanide, Thiocyanate, Phenol, Sulphate (SO₄), Sulphide, pH, Sulphur, Soil Organic Matter and speciated Polycyclic Aromatic Hydrocarbons (PAH) and Total petroleum Hydrocarbons (TPH) and Waste acceptance criteria (WAC) testing.

The results of the laboratory contamination tests are discussed in Section 7 and included in Appendix 2 & 3.

4.0 GROUND CONDITIONS ENCOUNTERED

4.1 Soil Profile Encountered

The sequence of strata encountered beneath the site was:

- Made Ground.
- Devensian Till

The depths of the various materials encountered in each of the exploratory holes are summarised in the following table.

Table 2 : Summary of Ground Conditions Encountered

Hole	Depth to Stratum (m)				GROUNDWATER
	Made Ground		Devensian Till		
	Asphalt	Sandy GRAVEL	Gravelly CLAY	Sandy GRAVEL	
WS1	GL-0.15	0.15-0.30	0.30-2.10	2.10-3.00	None
WS2	GL-0.08	0.08-0.60	0.60-1.50	1.50-3.00	None
WS3	GL-0.11	0.11-0.80	0.80-1.90	1.90-3.00	None
WS4	GL-0.07	0.07-0.95	0.95-1.50	1.50-3.00	None

4.2 Observable Indications of Contamination

No visual or olfactory evidence of contamination was identified during the investigation.

4.3 Obstructions

Underground man-made obstructions were not encountered during the fieldwork.

4.4 Groundwater

No groundwater was encountered during the ground investigation.

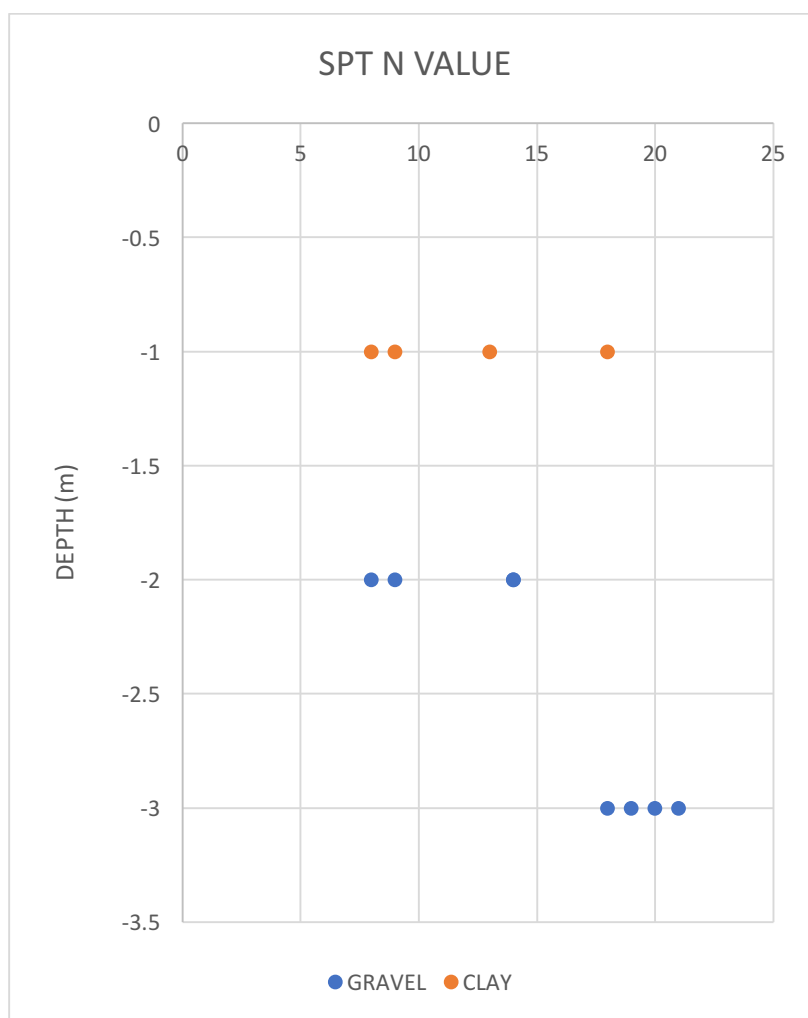
4.5 Ground Gas/Water Monitoring

Ground gas/water monitoring was not required during this site investigation.

5.0 ENGINEERING PROPERTIES OF SOILS ENCOUNTERED

The following sections discuss the engineering properties of the strata encountered, based on results of in situ testing and laboratory testing obtained during this investigation.

Figure 13 SPT v Depth Plot



5.1 Devensian Till (Sandy CLAY)

SPT N values range from 8 to 18 as can be seen in Figure 13 above. These results suggest the clay is firm to stiff. For the purposes of this report, the engineering properties of the firm to stiff clay will be considered, as the shallow depth N value is high suggesting the firm to stiff material is suitable for placing foundations in.

It is recommended that for assessing ultimate bearing capacities, where the lower values are critical, the average of N values is used. For assessing settlements average ground conditions will give a more realistic value of settlements, and the average of N values should be used (i.e. $N = 12$).

For design purposes, a value of $N = 12$ seems reasonable based on the average value of results.

Based on the correlation by Peck, Hanson and Thornburg (1974), this gives an undrained shear strength of 54kN/m^2 .

5.2 Devensian Till (Sandy GRAVEL)

SPT N values range from 8 to 21 as can be seen in Figure 13 above. These results suggest the gravel is loose becoming medium dense. For the purposes of this report, the engineering properties of the loose to medium dense gravel will be considered, as the shallow depth N value is high suggesting the medium dense material is suitable for placing foundations in.

It is recommended that for assessing ultimate bearing capacities, where the lower values are critical, the lower quartile of N values is used. For assessing settlements average ground conditions will give a more realistic value of settlements, and the average of N values should be used (i.e. $N = 15$).

For design purposes, a value of $N = 15$ seems reasonable based on the average value of results up to between 2.0m and 3.0m depth. Based on the correlation by Peck, Hanson and Thornburn⁽¹⁹⁷⁴⁾, this gives an **angle of shearing resistance** of $\phi=31^\circ$.

6.0 GEOTECHNICAL ASSESSMENT

6.1 Proposed Development

At the time of writing this report there was a proposed development plan available illustrating the extension of an ALDI retail store. At the time of writing this report anticipated structural loadings were not known.

6.2 Ground Conditions Encountered

The exploratory holes have encountered asphalt (0.07m-0.15m in thickness), made ground (0.15m-0.88m in thickness) followed by the Devensian Till.

6.3 Foundation Considerations

Conventional strip foundations are suitable at this site, depending on anticipated structural loadings and tolerance of structures to settlement.

For the purposes of this report the following foundation option is discussed:

- a) Conventional Strip Footings.
- b) Pad Foundations

The above is discussed in the following section.

6.3.1 Strip/Pad Foundations

Conventional shallow depth strip/pad foundations could be suitable at this site taken down into the natural clay. It is important foundations are placed in materials of similar bearing and consolidation characteristics to avoid differential settlement of foundations.

Foundations should be taken down a minimum 1m and placed in the natural clay. If any Made Ground, particularly loose material is encountered at foundation level this should be excavated and replaced with suitable granular fill or the foundation extended to suitable strata.

The following table summarises anticipated allowable bearing pressures for strip and pad foundations placed at different depths in the natural clay.

The bearing capacities are calculated based on Hansen's ⁽¹⁹⁷⁸⁾ method and assuming a factor of safety against bearing capacity failure of 3.

Groundwater is assumed to be at 5m below existing ground level.

Table 3 : Summary of Allowable Bearing Pressures

Foundation Depth	Design Value (Section 5)	Foundation Type	Foundation Size	Allowable Bearing Pressure
1.0m	Cu=54kN/m ²	Strip	0.4m	209kN/m ²
			0.75m	165kN/m ²
		Pad	1.0mx1.0m	178kN/m ²
			1.5mx1.5m	164kN/m ²
			2.0mx2.0m	156kN/m ²

All foundation excavations should be inspected by a suitable qualified engineer to prove that the founding strata is suitable and uniform along the length of the foundation, and capable of taking the anticipated structural loadings.

6.4 Suitability of Excavated Materials

Acceptability criteria and testing, and methods of compaction/placement will depend on the type of contract and specification used for the construction of the proposed development and it is recommended that earthworks specifications are reviewed by a suitably qualified engineer, once these have been prepared by the relevant parties.

The clay is likely to be suitable as structural fill, depending on additional compliance testing and provided it is not contaminated.

6.5 Temporary Works

Formations in clay will be susceptible to damage both by weather and trafficking, and should be protected immediately on exposure, particularly in areas where construction plant will access the site.

Excavations in the made ground and clay are likely to be unstable and should be battered back to an angle of 1 in 2, or a system of close sheeting and shoring adopted to ensure stability, and in particular where personnel are required to enter excavations.

All excavations should be adequately supported where personnel are required to enter.

It is unlikely groundwater seepages will be encountered in excavations. However, if required pumping of excavations from a suitable located sump should be adequate to keep excavations dry.

All natural materials on site should be capable of being excavated using conventional excavating machinery.

7.0 SOIL CONTAMINATION RISK ASSESSMENT

7.1 General

The following sections provide a Human Health Soil Assessment for groundworkers during development and future site users.

At a Tier I stage the long term (chronic) human health toxicity of the soil has been assessed with reference to DEFRA/Environment Agency Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values (SGV) for generic site land uses, soils and exposure. Where Environment Agency generic guidance is absent, reference has been made to the Chartered Institute of Environmental Health (CIEH) S4ULs for human health risk assessment.

In the case of arsenic, cadmium, hexavalent chromium, lead and benzo(a)pyrene DEFRA Category 4 Screening levels have been adopted.

The soil chemical testing results are presented in Appendix 2 and summarised in Table 4.

Table 4 : Assessment of Soil Chemical Data

Parameter	WS1	WS2	WS3	WS4	Assessment Criteria (mg/kg)
	0.70m	0.50m	0.50m	0.50m	
	CLAY	Made Ground	Made Ground	Made Ground	
Arsenic	9	6	6	6	640
Boron	< 1	< 1	< 1	< 1	240000
Barium	112	129	21	21	24900
Beryllium	< 0.5	< 0.5	< 0.5	< 0.5	12
Cadmium	5.7	1.8	0.9	1.1	410
Chromium	9	8	6	6	8600
Hexavalent Chromium	< 2	< 2	< 2	< 2	33
Copper	129	43	29	26	68000
Lead	168	63	32	27	2330
Mercury	< 1	< 1	< 1	< 1	1100
Nickel	9	8	14	12	980
Selenium	< 3	< 3	< 3	< 3	12000
Vanadium	11	9	6	5	9000
Zinc	99	89	33	39	730000
pH	7.7	8.3	8.4	8.2	N/A
Naphthalene	< 0.1	< 0.1	< 0.1	< 0.1	190
Fluorene	< 0.1	< 0.1	< 0.1	< 0.1	63000
Benzo(a)pyrene	< 0.1	< 0.1	< 0.1	< 0.1	35
Phenol	< 2	< 2	< 2	< 2	760
Asbestos	Not Detected	Not Detected	Not Detected	Not Detected	0.001%

Notes for Table 4

Concentrations in **red** above assessment criteria

Sandy soil with 1% Soil Organic Matter assumed

N/D = None detected

No elevated potential contaminants of concern have been identified based upon the long term protection of human health for a commercial end use.

7.2 Soil Disposal Waste Assessment

Technical Guidance WM3: Hazardous Waste; “Guidance on the classification and assessment of waste”, May 2015, published by Environment Agency of England and Wales, SEPA, NIEA and Natural Resources Wales has been used to characterise soil materials.

HazWasteOnlineTM a cloud-based software application for the management, analysis and reporting of hazardous waste materials has been used to make the assessment.

In accordance with WM3 all samples have been classified as Non-Hazardous with Waste Acceptance Criteria Testing confirming that excess material could be taken to an Inert Waste facility.

The soil disposal waste assessment results are presented in Appendix 3.

8.0 REVIEW OF CONCEPTUAL MODEL

Table 5 (below) provides a Conceptual Model based on the findings of the intrusive investigation.

The table considers whether a pollution linkage is potentially present and provides a preliminary qualitative assessment of risk based on the information currently available. Where a possible linkage is identified, it does not necessarily mean that a significant risk exists, but indicates that further information is required through appropriate site investigation to substantiate the conceptual model.

The Conceptual Model is based on a continued commercial end use.

Table 5 : Conceptual Model

Source	Pathway	Receptor	Linkage	Comment
The likelihood of significant ground contamination sources being present at the site is considered LOW .	Direct contact, ingestion of soil, dermal contact, dust exposure pathways.	Current Site Users	Unlikely	The risk to current site users via direct exposure is considered to be LOW . Site is covered in hardstanding.
		Adjacent land users	Unlikely	The risk is considered LOW , although usual dust control measures should be implemented as part of good site working practices during construction.
		Future land users	Unlikely	There are no proposed garden areas, therefore the risk to future site users via direct exposure is considered to be LOW .
		Construction Workers	Unlikely	Assuming appropriate Health and Safety measures are adopted during the works, a LOW preliminary risk to construction workers is identified.
Considering the use of the site and immediate surrounding area, the likelihood of significant sources of soluble and/or liquid and therefore mobile contaminants occurring at the site is considered LOW	Direct downward migration through leaching and/or mobile liquids.	Groundwater	Unlikely	No significant sources of mobile contamination are identified on the site. The perceived risk to groundwater is considered LOW .
	Off-site migration in groundwater or surface water flow.	Surface water	Unlikely	No significant sources of mobile contamination are identified on the site. There are no surface water features in the area. The perceived risk to surface water is considered LOW .
		Groundwater / surface water abstractions	Unlikely	No significant sources of mobile contamination are identified on the site. The perceived risk to water abstractions is considered NEGLECTABLE .
		Adjacent Properties	Unlikely	No significant sources of mobile contaminants associated with the site, the preliminary risk to adjacent properties is considered LOW .

Source	Pathway	Receptor	Linkage	Comment
		Ecology	Unlikely	No significant sources of mobile contaminants associated with the site, yet the absence of sensitive ecological receptors in the vicinity, the risk to ecology is LOW .
The likelihood of significant volatile contaminants occurring at the site is considered LOW .	Inhalation of harmful vapours (indoor and outdoor airspaces)	Current Site Users	Unlikely	Recognising the nature of the site, it is unlikely that there will be a build-up of any harmful gases or vapours. The risk associated with current site users is considered to be LOW .
		Future site Users	Unlikely	No significant sources of volatile contamination are identified on the site. Modern construction practices will provide a barrier and ventilation. The risk associated with future site users is considered to be LOW .
		Adjacent Properties	Unlikely	The potential risk to adjoining site users is considered NEGLIGIBLE .
The likelihood of degradable materials with the potential to generate hazardous ground gas is LOW .	Emissions from the ground collecting in confined spaces and excavations	Construction/ services maintenance workers	Unlikely	Considering the potential for exposure the preliminary risk is LOW .
	Migration of gases on/off site and collecting in confined spaces on/off site.	Adjoining site users	Unlikely	The potential risk to adjoining site users associated with the site is considered LOW .
		Current/future site users	Unlikely	The proposed residential end use represents sensitive receptors. The potential risk is considered LOW .
Chemicals which could prove aggressive to construction materials may be present on site. LOW	Direct contact	Construction concrete, plastic water pipes.	Unlikely	Risks to construction materials can be identified via site investigation prior to the proposed construction works. The perceived risk is considered LOW .

9.0 CONCLUSIONS AND RECOMMENDATIONS

The following section provides a summary of the conclusions and recommendations based on the findings of the contamination and in-situ geotechnical testing.

9.1 Contamination

Based on available soil contamination test results there is a low potential risk from soil contamination to construction workers, ground workers and members of the public, and appropriate measures, such as PPE, site health plans, appropriate disposal of material arisings will mitigate this risk. The groundworks contractor must provide a soil management plan including methods of dealing with known areas of contamination and any unanticipated soil contamination encountered during groundworks.

As discussed in the above sections, the contamination tests indicate generally low concentrations of potential contaminants compared to commercial end use criteria.

In accordance with WM3 all samples have been classified as Non-Hazardous with Waste Acceptance Criteria Testing confirming that excess material could be taken to an Inert Waste facility.

9.2 Site Personnel

As with all construction sites, personnel working on the site during the construction period should be encouraged to maintain a high standard of personal hygiene and on site washing facilities should be available.

9.3 Foundations

Shallow foundations are considered to be suitable for building of the extension, with the loadings transferred to a natural clay horizon that was found at a depth range of 0.3m to 0.95m below ground level.

APPENDIX 1

EXPLORATORY HOLE LOGS

APPENDIX 2

CHEMICAL TESTING RESULTS

APPENDIX 3

SOIL WASTE ASSESSMENT

APPENDIX 4

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget and staff resources allocated to the project.

Other than that expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2017 and should be read in light of any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth

Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.