Proposed Aldi Store
High Street, Royston

Phase II Geo-Environmental Assessment

For

Aldi Stores Ltd.

Report Ref	Issue	Prepared by	Date	Reviewed by	Date
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Executive Summary

Site Investigation	The investigation has involved: • Inspection of a previous Phase I geo-environmental assessment. • 9 mini percussion boreholes to a maximum depth of 6.45m. • 13 trial pits to a maximum depth of 3.1m. • 3 rotary open hole boreholes to 30m depth. • Installation of ground gas monitoring wells. • Geotechnical and contamination related testing. • Preliminary ground gas and groundwater monitoring.
Current Use	The site is unoccupied following the demolition of a factory leaving rough rubble hardstanding and occasional patches of concrete slab. The north eastern part of the site is heavily overgrown with bushes. The eastern, western boundaries comprise mature and semi mature trees and either chain link or wooden fence. The south western portion of the site boundary is formed by a buttressed masonry retaining wall, approximately 2m high. Abutting the southern boundary fence is a modular concrete retaining structuring running the full length of the boundary within the rear gardens of the housing bounding the site. The site is secured by a large earthen bunded along the northern boundary. Overall the site falls steeply from the highest point in the north west at 74.6m AOD to the lowest point in the south east at 65.3m AOD.
Ground Conditions	The majority of the site has a relatively thin cover of made ground comprising mostly crushed brick, concrete and burnt shale material to a maximum of 1.7m deep. These materials are generally underlain by residual clays over weathered siltstone bedrock, which is present at between 0.8m in the north and 2.3m bgl in the southern part of the proposed store. In the extreme southern area of the site the depth of made ground varied between 1.3m and 3m deep, deepening towards the southern boundary retaining wall. Coal seams were encountered in all boreholes, however, there is no correlation of the depths between the boreholes, which is likely to be due to geological faulting. In view, there is not considered to be a significant risk of shallow mining beneath the site.
Groundwater	During the site works and subsequent monitoring, the exploratory holes were dry.
Gas Monitoring	Ground gas monitoring has been carried out on 1 occasion to date, with five further visits are planned. The preliminary gas monitoring results indicate that combustible ground gas (methane) is present low concentrations, however, carbon dioxide was recorded in excess of 5%. The results suggest a CIRIA C665 Characteristic Situation 2.
Contamination	Visual and olfactory evidence of contamination was not encountered during the intrusive works. Laboratory chemical analysis of made ground and natural soil samples indicates low concentrations with none of the determinands exceeding the generic assessment criteria for human health on a commercial development. The contamination assessment and revised conceptual site model indicates that there is a low risk to human health and a low to negligible risk to the wider environment from contamination on the site.

Appraisal	Remediation – With respect to human health, due to the predominant proposed hardcover, with the exception of the placement of 300mm of clean material in areas of landscaping. Mining – The site is considered to be stable with respect to mining. Foundations and Floor Slabs – In view of the variability in the thickness of fill beneath the proposed building and the very large total thickness at the southern end of the store, piled foundations and piled floor slab are recommended terminating in the underlying shallow bedrock. Retaining Structures - The site is bound to the south and southeast with retaining walls, these structures will need to be maintained and subsequent loadings on top to the retaining walls will need to be assessed to ensure no additional loading is applied to the structure. External Works – A CBR value of 2% should be adopted at this stage for design, subject to confirmation following site clearance. Gas precautions – Basic gas protection measures are considered necessary at this stage based on CIRIA 665 Characteristic Situation 2. Water Supply Pipes – UKWIR analysis has not been undertaken as part of this assessment. It is recommended that the results of the assessment are provided to the water supply company so that the correct pipe material can be selected. Our preliminary assessment indicates that no special precautions are required with respect to water supply pipes. Drainage - Based on the presence of shallow mudstone and siltstone bedrock across the majority of the proposed hardstanding areas, the use of soakaways for surface water disposal is not considered suitable. Sulphate attack on buried concrete – Buried concrete should be designed to BRE Special Digest 1:2005 Design Sulphate Class DS-2 with an ACEC site classification AC-2 for the made ground soils and Class DS-1 with an ACEC site classification AC-2z for the natural soils.

1 INTRODUCTION

1.1 3e Consulting Engineers Ltd (3e) were commissioned by Aldi Stores Ltd to carry out a Phase II geo-environmental assessment of land located off High Street in Royston. The proposed development includes both an Aldi store with associated car parking, details of which are provided in **Appendix A**.

1.2 A Phase I geo-environmental assessment of the site was completed by 3e Consulting Engineers in September 2013 (ref: 13690). It is recommended that the report is read in conjunction with this assessment.

1.3 The objectives of this assessment were:

- To investigate near surface soil and groundwater conditions.
- To determine the potential risks posed by any ground or groundwater contamination and provide recommendations on remedial measures to manage such risks.
- To assess the risk posed by hazardous ground gas.
- To provide advice relating to geotechnical issues associated with the site.
- To provide foundation recommendations.

1.4 Fieldwork was undertaken between the 18th and 19th June 2014 and comprised nine mini percussive boreholes, thirteen trial pits and three rotary open holed boreholes with associated sampling and testing.

1.5 This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the scope of works outlined above. It has been assumed in the production of this report that the site is to be redeveloped for a commercial end use.

1.6 The comments and opinions presented in this report are based on the findings of the intrusive investigation carried out by 3e and the results of laboratory analysis. Responsibility cannot be accepted for any conditions not revealed by this investigation and which have not been taken into account by this report. Any diagram or opinion relating to site geology, contamination or other spatially variable features between or beyond investigation positions is conjectural and provided for guidance only. Confirmation of ground conditions between

exploratory holes should be undertaken if deemed necessary. Evaluation of ground gas and groundwater is based on observations made at the time of the investigation and any monitoring visits, but it should be noted that levels and quality may vary due to seasonal and other effects.

1.7 This report has been prepared for the sole use of Aldi Stores Ltd. No other third party may rely upon or reproduce the contents of this report without the written approval of 3e. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk and 3e do not owe them any Duty of Care or Skill.

2 THE SITE

Location and Description

2.1 The site, centred on National Grid Reference 435890, 411370, is located approximately 300m west of Royston town centre. The site occupies an area of 1 Hectare, is approximately rectangular in shape and lies at an elevation of approximately 70m AOD.

2.2 Land uses in the vicinity of the site are summarised below:

- **North:** High Street with residential properties and Working Men's Club.
- **East:** Residential properties.
- **South:** Residential properties and public open space.
- **West:** Primary School and residential properties.

2.3 The site is unoccupied following the demolition of a factory leaving rough rubble hardstanding and occasional patches of concrete slab. The north eastern part of the site is heavily overgrown with bushes. The eastern, western boundaries comprise mature and semi mature trees and either chain link or wooden fence. The south western portion of the site boundary is formed by a buttressed masonry retaining wall, approximately 2m high. Abutting the southern boundary fence is a modular concrete retaining structuring running the full length of the boundary within the rear gardens of the housing bounding the site. The site is secured by a large earthen bunded along the northern boundary.

2.4 Overall the site falls steeply from the highest point in the north west at 74.6m AOD to the lowest point in the south east at 65.3m AOD.

3 PHASE I GEO-ENVIRONMENTAL ASSESSMENT

3.1 A Phase I geo-environmental assessment of the site was completed by 3e Consulting Engineers in September 2013 (ref: 13690). It is recommended that the report is read in conjunction with this assessment. Relevant information from the phase I geo-environmental assessment is summarised in the following section:

Site History

3.2 In summary, the site comprised a farm and open fields until 1956 after which the site was developed for a Spring factory, which has recently been demolished. The factory went through several phases of extension between 1962 and 2006 gradually developing southward across the site.

3.3 Within the surrounding area, land uses have included a quarry, residential properties, a farm and a primary school.

Geology and Mining

3.4 Geological information indicates the site is likely to be underlain by Mexborough Rock (sandstone). No superficial deposits are indicated

3.5 Six coal seams have been exploited beneath the site at depths between 240m and 540m, together potential that there are shallow coal seams which may have been worked in the past.

3.6 Unrecorded or recorded coal mining at shallow depth is not considered to represent a significant risk to the site and is considered to be stable with respect to mining.

Watercourses and Groundwater

3.7 The nearest recorded watercourse is some 139m south.

3.8 The underlying strata are classified as a Secondary A aquifer and there are no groundwater abstractions located with 1000m of the site.

3.9 The site does not lie within a fluvial flood plain considered to be at risk of flooding.

Landfill Sites, Pollution Controls and Industrial Land Use

3.10 There are no existing or historic landfill sites recorded within 250m of the site boundary.

3.11 There is one pollution prevention and control within 250m. There are no recorded petrol stations located within 250m of the site.

3.12 Other sensitive land uses or potentially contaminative activities are listed below. The entries relate to activities within approximately 250m of the site.

- Two inactive contemporary trade registered for the site L&P Springs and Chiltern Springs.
- Two active services garages registered within 250m.

Conceptual Site Model

3.13 Based on the information available, it was concluded that the main sources of contamination on the site are associated with imported made ground associated with the past development for a factory.

3.14 The assessment indicates that the risk to human health from the contamination can be largely mitigated by use of appropriate PPE during construction and by the use of hardstand or soil capping throughout the proposed development.

3.15 Overall the assessment indicates a low to medium environmental risk until proved otherwise.

Ground Gas Risk Assessment

3.16 Radon protection measures are not required in the construction of new dwellings.

3.17 The assessment indicates a low to medium risk of ground gas associated primarily with potential on site made ground and hydrocarbon contamination.

4 METHOD OF INVESTIGATION

Fieldwork

4.1 The intrusive works comprised nine mini percussive boreholes sunk to a maximum depth of 6.45m below existing ground level (bgl), thirteen trial pits to a maximum depth of 3.1m bgl and 3 rotary open hole boreholes to 30m bgl. The site works were carried out on the 18th and 19th June 2014. The exploratory holes were located across the site to provide general coverage making allowance for buried utilities, existing buildings and areas of restricted accessibility.

4.2 A copy of the exploratory hole records are included as **Appendix B** and the locations are shown on **Figure 2** (Exploratory Hole Location Plan).

4.3 The mini percussion boreholes were sunk in order to determine soil profile and to allow ground gas and groundwater monitoring wells to be installed. Disturbed samples and, where possible, undisturbed open drive tube samples were recovered for soil descriptions and laboratory testing. Cone penetration tests (CPT) were carried out to provide an assessment of the in situ strength of the cohesive strata and the relative density of the granular made ground and natural deposits.

4.4 Gas/groundwater monitoring wells, comprising slotted 19mm diameter HDPE pipe within a granular filter were installed in four of the boreholes (MP1, MP3, MP6 and MP8) to a maximum depth of approximately 5.0m below ground level (bgl). The wells were sealed using bentonite and a lockable cover was fitted at the surface. To date, the wells have been monitored on two occasions for methane, carbon dioxide and oxygen using a portable infra-red gas monitor. The rate of gas flow from the boreholes was also recorded using a portable flow meter and the groundwater levels were recorded using a portable dip meter. The results of the ground gas monitoring are presented in **Appendix C**.

4.5 Fieldwork and soil descriptions were carried out in general accordance with BS5930:1999, "Code of Practice for Site Investigations".

Laboratory Chemical Testing

4.6 The results of the chemical analysis are included as **Appendix D**. The analyses were carried out at an MCERTS registered and UKAS accredited laboratory.

4.7 In order to provide a preliminary assessment of contamination, ten samples of made ground and two samples of the underlying natural soil were screened for the following determinands:

- Arsenic
- Boron
- Cadmium
- Chromium
- Lead
- Mercury
- Nickel
- Selenium
- Asbestos
- Copper
- Zinc
- Speciated polyaromatic hydrocarbons (PAH)
- Water soluble sulphate
- pH
- Total organic carbon (TOC)
- Organic Matter Content
- TPH by CWG (including BTEX)

4.8 In addition, 8 samples of the underlying natural soil were scheduled for water soluble sulphate and pH determinations to assess the potential for sulphate attack on buried concrete.

Laboratory Geotechnical Testing

4.9 Geotechnical related testing was carried out to determine the physical characteristics of the soils and comprised the following:

- Eight Atterberg limits determinations to confirm field descriptions and classify cohesive soils.

4.10 The results of the geotechnical test results are included as **Appendix E**.

5 RESULTS OF THE INVESTIGATION

Soil Profile

5.1 Detailed descriptions of the materials encountered together with observations of groundwater behaviour, visible contamination, the results of in situ testing and sampling information are given on the exploratory hole records included as **Appendix B**, together with a **Figure 3** which provides sketch cross sections through the proposed store footprint to highlight ground conditions and existing site levels. A summary of the ground conditions encountered is presented below:

Made Ground

5.2 The majority of the site has a relatively thin cover of made ground comprising mostly crushed brick, concrete and burnt shale material to a maximum of 1.7m deep. However, in the extreme southern area of the site the depth of made ground varied between 1.3m and 3m deep, deepening towards the southern boundary retaining wall.

5.3 A potential buried structure was encountered in WS05A at a depth of 0.40m.

Natural Deposits

5.4 The made ground is generally underlain by residual clays over weathered siltstone bedrock, which is present at between 0.8m in the north and 2.3m bgl in the southern part of the proposed store.

5.5 Both within and within close proximity the proposed building footprint, the gravelly clay and sandy cobbles had SPT 'N' values between N6 and N18, with the SPT 'N' values in the weathered mudstone/siltstone between N60 and N73, with the exception of one test within MP06 at 1.0m depth, which recorded a value of N18 in carbonaceous mudstone.

5.6 Exploratory holes were terminated within bedrock or on obstructions.

Coal Seams and Mineworkings

5.7 All 3 boreholes drilled within the vicinity of the proposed store encountered intact coal seams between 0.6m and 1.5m in thickness with numerous coal flashes up to 0.1m, however, there was no correlation between the thicknesses and depths of the seams encountered. This suggests that the seam could either have been displaced or the area has multiple seams.

5.8 Based on the variations in the coal seam depths, thicknesses and the close proximity of the boreholes to each other, we do not consider the seams to be viable to have been worked in the past. It should also be noted that the seams encountered with BH1 and BH2 are greater than 10 times seam thickness and, therefore, if they had been worked they would not pose a risk to development.

Groundwater

5.9 No groundwater was encountered with exploratory holes for the limited time they were open.

5.10 During the preliminary monitoring of the wells installed in the mini percussion boreholes, the wells were noted to be dry at the time of monitoring. The results of the groundwater monitoring are presented in **Appendix C**.

5.11 It should be noted that groundwater levels vary seasonally and that a higher water table than recorded could occur.

Physical Evidence of Contamination

5.12 No visual and olfactory evidence of significant contamination was encountered within the made ground or the natural deposits.

Gas Monitoring

5.13 The results of the preliminary ground gas monitoring carried out on 24th June and 11th July 2014 are summarised in the following table:

Location	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Maximum Flow (l/hr)	Barometric Pressure (mb)	Maximum GSV*	
						CO_2	CH_4
MP1	0.2	0.5-3.8	13.6-19.3	0.0	1013	<0.07	<0.07
MP3	0.1	5.1-6.8	10.0-11.4	0.0		<0.07	<0.07
MP6	0.1	1.0-1.5	16.3-17.0	0.0		<0.07	<0.07
MP8	0.2	8.2-8.6	10.6-12.9	0.0		<0.07	<0.07

* CIRIA 665 Gas Screening Value

5.14 With Carbon Dioxide present in excess of 5% and zero flow being recorded during the monitoring giving CIRIA Gas Screening Value (GSV) were less than <0.07l/hr. The results to date indicate a CIRIA 665 site Characteristic Situation 2, which requires basic gas protection measures.

Contamination Related Testing

5.15 The results of the contamination related testing undertaken on ten samples of made ground and two natural soils, are included as **Appendix D**.

5.16 Generally, the results have been assessed using guidelines introduced by DEFRA in 2002 and 2009 (where applicable) and by the joint Land Quality Management Ltd (LQM) and Chartered Institute of Environmental Health (CIEH), 2009.

5.17 The CLEA guidelines include Soil Guidelines Values (SGVs) appropriate to standard land uses. SGVs are currently available for a limited number of metalloid and organic contaminants and provide generic assessment criteria for assessing the risk to human health. The LQM/CIEH guidelines include Generic Assessment Criteria (GAC) appropriate to standard land uses and applicable to a wider range of both inorganic and organic contaminants. The proposed development is for both commercial and residential end use, therefore, the most appropriate values are considered to be the SGVs and LQM/CIEH GACs given for a residential end use. An SOM of 1% has been used in the assessment.

5.18 A summary of the contamination related testing undertaken in samples of made ground and the natural soil are presented below.

MADE GROUND AND NATURAL SOILS					
Determinand	Maximum conc. mg/kg	Minimum conc. mg/kg	No of Samples Tested	Generic Assessment Criteria (GAC) mg/kg	No of Samples Exceeding GAC
Arsenic	31	6.9	12	640(1)	0
Boron	3.9	0.6	12	192000(2)	0
Cadmium	13.6	<0.2	12	230(1)	0
Chromium	317	49	12	30,400(1)	0
Lead	638	12	12	750(1)	0
Mercury	2.5	<0.5	12	3600(1)	0
Selenium	18.7	0.6	12	13000(1)	0
Copper	163	16	12	71,700(2)	0
Nickel	46	12	12	1800(1)	0
Zinc	382	68	12	665,000(2)	0
Aromatic TPH C_5-C_7	<0.01	-	6	50(3)	0
Aromatic TPH C_7-C_8	<0.01	-	6	110000(3)	0
Aromatic TPH C_8-C_{10}	<0.01	-	6	8600(3)	0
Aromatic TPH C_{10}-C_{12}	<1	-	6	29000(3)	0
Aromatic TPH C_{12}-C_{16}	<1	-	6	37000(3)	0
Aromatic TPH C_{16}-C_{21}	16	<1	6	28000(3)	0
Aromatic TPH C_{21}-C_{35}	13	<1	6	28000(3)	0
Aromatic TPH C_{35}-C_{44}	2	<1	6	28000(3)	0
Aliphatic TPH C_5-C_6	<0.1	-	6	6200(3)	0
Aliphatic TPH C_6-C_8	0.2	<0.1	6	18000(3)	0
Aliphatic TPH C_8-C_{10}	0.1	<0.1	6	5100(3)	0
Aliphatic TPH C_{10}-C_{12}	7	2	6	24000(3)	0
Aliphatic TPH C_{12}-C_{16}	37	<1	6	83000(3)	0
Aliphatic TPH C_{16}-C_{35}	1096	<1	6	1800000(3)	0
Aliphatic TPH C_{35}-C_{44}	403	<1	6	1800000(3)	0
Benzene	<0.01	-	6	50(4)	0
Toluene	<0.01	-	6	4400(4)	0
Ethylbenzene	<0.01	-	6	2800(4)	0
m & p-Xylene	<0.01	-	6	2600(4)	0
o-Xylene	<0.01	-	6	2600(4)	0
Total PAH					
Naphthalene	0.53	-	12	480(2)	0
Flourene	0.36	-	12	69000(2)	0
Benzo(a)pyrene	2.67	-	12	14(2)	0
Dibenz(ah)anthracene	0.38	-	12	13(2)	0

Notes:
(1) CLEA soil guidance value for commercial/industrial end use
(2) LQM/CIEH GAC for commercial/industrial end use
(3) Aliphatic/aromatic LQM/CIEH GAC for commercial/industrial end use
(4) Derived from CLEA v1.06

5.19 Of the determinands tested none were recorded to be elevated above the generic assessment criteria for a commercial/industrial end use.

Asbestos

5.20 None of the six samples of made ground screened for asbestos detected any fibres.

Sulphate and pH Determinations

5.21 Eight samples of made ground and twelve samples of natural soil were scheduled for water soluble sulphate and pH determinations to assess the potential for sulphate attack on buried concrete.

5.22 Within the made ground, water soluble sulphate concentrations varied between 986mg/l and <10mg/l with pH values between 7.7 and 8.7. These results indicate a BRE Special Digest 1:2005 Design Sulphate Class DS-2 with an ACEC site classification AC-2 is adopted on the site. Within the natural soils, water soluble sulphate concentrations varied between 175mg/l and <10mg/l with pH values between 5.7 and 9.0. These results indicate a BRE Special Digest 1:2005 Design Sulphate Class DS-1 with an ACEC site classification AC-2z is adopted on the site.

Modified Site Conceptual Model

5.23 From the information gathered during the desk study, it was concluded that potential contamination sources include imported made ground on the site from the previous site use as a factory.

5.24 The intrusive works identified made ground up to 2.90m thick, generally comprising limestone hardcore overlying reworked sandy gravel and cobbles of sandstone, clay, bricks, clinker, coal and pieces of metal, plastic and timber. Physical evidence of contamination was not encountered.

5.25 The results of the laboratory chemical analysis on samples of made ground and natural soils indicated that no determinands exceed the generic assessment criteria for human health on a commercial/industrial development.

5.26 The results of the preliminary ground gas monitoring indicate that methane is low with carbon dioxide present at levels in excess of 5%. Gas screening values are less than 0.07l/hr but elevated carbon dioxide indicates CIRIA C665 Characteristic Situation 2. Further gas monitoring is planned and the final set of results will be issued as an addendum to this report.

Pathways and receptors

5.27 Based on the results of the laboratory chemical analysis, the risk to human health from contamination on the site is considered to be low.

5.28 With respect to potential environmental receptors, the following pathways are considered:

- Vertical migration to Secondary A Aquifer – Given the results of the chemical analysis the risk to adjacent property is considered to be low to negligible.
- Adjacent property – Given the results of the chemical analysis the risk to adjacent property is considered to be low to negligible.

Pollutant Linkage Assessment

5.29 In view of the low determinand concentrations, the underlying residual coal measures clay and the distance to any surface water receptors, the pollutant linkage assessment indicates that the site poses a low risk to humans and a low to negligible risk to the wider environment.

Geotechnical Related Testing

5.30 The results of the geotechnical testing are presented in **Appendix E**.

Classification Tests

5.31 Eight Atterberg limits determinations were made on the shallow natural gravelly cohesive deposits and highly weathered mudstone/siltstone bedrock at depths of between 1.4m and 3.1m.

5.32 The sample of mudstone from MP6 at 1.50m was classed as non plastic and the sample of highly weathered mudstone from MP8 at 1.40m (14%) was classified as low plasticity. The remainder of the samples however recorded plasticity indices between 22% and 47% which indicates medium to high volume change potential within the clays across the site.

6 DISCUSSION

6.1 Development proposals include both an Aldi store with associated car parking with areas of landscaping. This investigation was carried out to provide geotechnical information with respect to foundations for the proposed development and contamination related testing to outline potential constraints.

Contamination Assessment

6.2 Information obtained during the desk study indicated a low risk of contamination. However, no physical evidence of contamination was encountered during the intrusive works and the results of the laboratory chemical analysis indicates low determinand concentrations which do not exceed the generic assessment criteria for human health.

6.3 Given the results of the laboratory analysis, the risk to the wider environment is considered to be low to negligible.

Remediation

6.4 Should landscaping be required a remedial capping layer in landscaped areas will be sufficient to break the latent pollutant pathway between the made ground and end users, with hardcover providing a pollutant break elsewhere. It is usual to use a capping layer 300mm, however, this will need to be agreed with the local authority.

6.5 In order to prevent the generation of dust, made ground should be dampened to allow suitable handling as precaution to prevent generation of dust and covered when stockpiled to prevent drying. In addition, if areas of made ground are trafficked by plant during construction then suitable precautions will be required to prevent dust generation.

Disposal of Materials

6.6 Waste classification testing has not been carried out, however, the results of the chemical analyses allow an initial assessment and suggest that generally, the made ground is considered to be suitable for disposal as stable non-reactive hazardous waste.

6.7 It is recommended that the results of the investigation are made available to the waste carrier/receiver in order to determine the waste classification and costs for offsite disposal.

Water Supply Pipes

6.8 UKWIR analysis has not been undertaken as part of this assessment. It is recommended that the results of the assessment are provided to the water supply company so that the correct pipe material can be selected. Our preliminary assessment indicates that no special precautions are required with respect to water supply pipes.

Mining Assessment

6.9 The site is within the likely zone of influence from workings in 3 seams of coal at 480m to 740m depth, last worked in 1983. No mine entries are recorded on site or within 20m of the boundary.

6.10 Coal seams were identified at shallow depth during the intrusive investigation, however, due to the thickness and potential faulted nature of the seams these are not considered to have been worked in the past.

6.11 No further investigation is considered necessary to assess the mineworkings.

Foundations and Floor Slabs

6.12 The proposed development includes an Aldi supermarket with associated car parking.

6.13 The foundation and floor slab solution will depend greatly on the solution to filling the site as the proposed store slab level is some 4m above existing ground level, as highlighted in **Figure 3**. In view of the variability in the thickness of fill beneath the building and the very large total thickness at the southern end of the store, piled foundations and piled floor slab are recommended terminating in the underlying shallow bedrock. Heave precautions will be required for foundations within influencing distance of trees, where clay is present in the vicinity of the foundations.

Gas Protection Measures

6.14 Radon protection measures are not required for the proposed development.

6.15 The results of the preliminary ground gas monitoring indicate carbon dioxide levels greater than 5% with a gas screening value (GSV) of less than 0.07l/hr throughout. CIRIA C665 Characteristic Situation 2 is considered suitable and basic gas protection measures are considered necessary. This recommendation is subject to revision following completion of the gas monitoring and issue of the gas monitoring addendum report.

Retaining Structures

6.16 The site is bound to the south and southeast with retaining walls, these structures will need to be maintained and subsequent loadings on top to the retaining walls will need to be assessed to ensure no additional loading is applied to the structure.

Excavations and Dewatering

6.17 If man entry is proposed into excavations, the use of support to excavation sides is recommended, in line with health and safety guidelines.

6.18 Significant groundwater ingress into shallow excavations is not anticipated. In light of the relatively shallow depth of bedrock, hydraulic breakers maybe required in excavations, particularly for deeper drainage.

External Works

6.19 A CBR value of 2% should be adopted at this stage for design on the made ground soils subject to confirmation following site clearance.

6.20 It is recommended that in-situ plate load tests are carried out to verify the CBR at formation level.

Surface Water Disposal

6.21 At this stage, based on the presence of shallow mudstone and siltstone bedrock across the majority of the proposed hardstanding areas, the use of soakaways for surface water disposal is not considered suitable.

Sulphate Attack on Buried Concrete

6.22 These results of the chemical analysis indicate a BRE Special Digest 1:2005 Design Sulphate Class DS-2 with an ACEC site classification AC-2 is adopted on the site for the made ground soils and Class DS-1 with an ACEC site classification AC-2z for the natural soils; buried concrete should be designed accordingly.

Figures



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Project	Land off High Street, Royston For Aldi Stores Ltd.		
Title	Site Location Plan		
Scale 1:25000	Drawn AHC	Checked ACV	Date Sept '13
Job No. 13690	Drawing No. Figure 1		Rev 0

SITE NORTH

Proposed store footprint

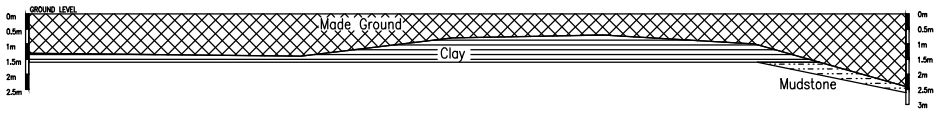
Masonry retaining wall

Modular concrete retaining system

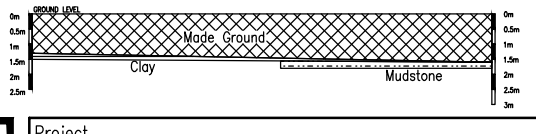
KEY:

- TP — TRIAL PIT LOCATION
- BH — ROTARY BOREHOLE LOCATION
- MP — MINI PERCUSSION BOREHOLE LOCATION
- MP(I) — BOREHOLE WITH GAS/WATER MONITORING INSTALLATION

TP12 — TP12A



TP13 — TP13A



3E consulting engineers

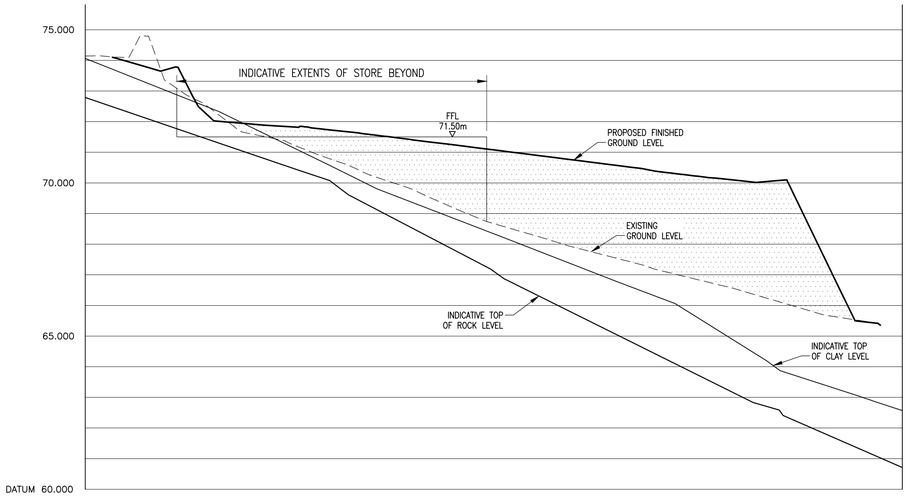
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Calder Park,
Wakefield
WF4 3BA

tel: 01924 240420
fax: 01924 240421

www.3econsult.com

Project: High Street, Royston, Barnsley For Aldi Stores Ltd.			
Title: Exploratory Hole Location Plan			
Scale: 1:500	Drawn: AHC	Checked: ACV	Date: June '14
Job No.: 13690	Drawing No.: Figure 2		Rev: 0

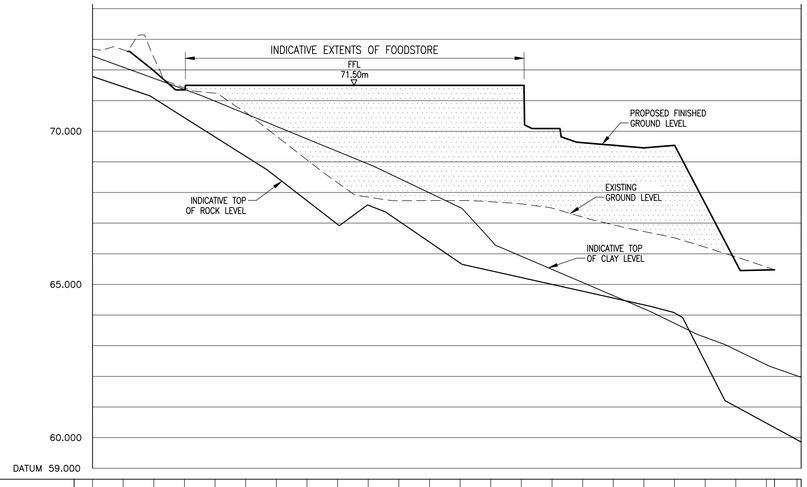
A1



CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000	75.000	80.000	85.000	90.000	95.000	100.000	105.000	110.000	115.000	120.000	125.000	130.000	133.384
EXISTING SURVEY LEVEL	74.141	74.107	74.794	73.079	72.494	71.732	71.481	71.156	70.780	70.388	70.020	69.638	69.198	68.782	68.478	68.186	67.887	67.629	67.371	67.083	66.841	66.598	66.311	66.017	65.724	65.552	65.353	
PROPOSED GROUND LEVEL	74.123	74.071	73.785	73.779	72.208	71.957	71.876	71.839	71.727	71.619	71.496	71.365	71.246	71.120	70.994	70.869	70.743	70.616	70.490	70.334	70.218	70.113	70.024	69.901	67.833	65.777	65.353	
TOP OF CLAY LEVEL	74.062	73.665	73.267	72.870	72.472	72.019	71.534	71.048	70.563	70.067	69.624	69.239	68.854	68.469	68.083	67.694	67.305	66.916	66.536	66.160	65.599	64.972	64.345	63.770	63.448	63.125	62.790	62.570
TOP OF ROCK LEVEL	72.788	72.448	72.107	71.767	71.426	71.086	70.745	70.404	70.059	69.401	68.878	68.356	67.833	67.310	66.711	66.214	65.717	65.220	64.722	64.225	63.728	63.231	62.774	62.316	61.879	61.442	61.006	60.712

SECTION A–A

(SCALE: H=1:500, V=1:100)

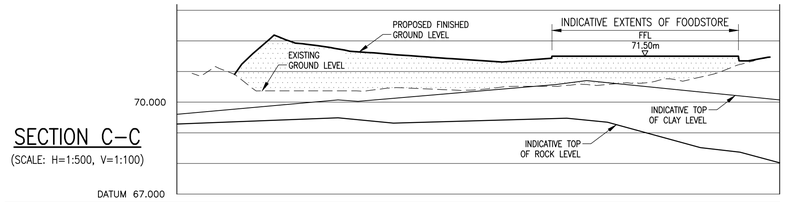


CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000	75.000	80.000	85.000	90.000	95.000	100.000	105.000	110.000	111.325	115.000
EXISTING SURVEY LEVEL	72.679	72.659	72.410	71.418	71.243	70.619	69.843	69.067	68.319	67.850	67.736	67.737	67.738	67.698	67.627	67.491	67.198	66.947	66.727	66.520	66.216	65.903	65.566	65.476	
PROPOSED GROUND LEVEL	72.678	72.650	71.972	71.350	71.500	71.500	71.500	71.500	71.500	71.500	71.500	71.500	71.500	71.500	71.500	70.089	69.628	69.542	69.457	69.541	67.637	65.730	65.470	65.476	
TOP OF CLAY LEVEL	72.455	72.092	71.729	71.366	70.983	70.572	70.162	69.752	69.342	68.932	68.466	67.988	67.510	66.457	65.920	65.492	65.063	64.635	64.206	63.731	63.274	62.866	62.379		62.015
TOP OF ROCK LEVEL	71.785	71.450	71.077	70.445	69.813	69.181	68.506	67.732	66.958	67.586	67.070	66.384	65.698	65.446	65.223	65.001	64.778	64.555	64.332	64.071	62.477	61.018	60.473		59.929

SECTION B–B

(SCALE: H=1:500, V=1:100)

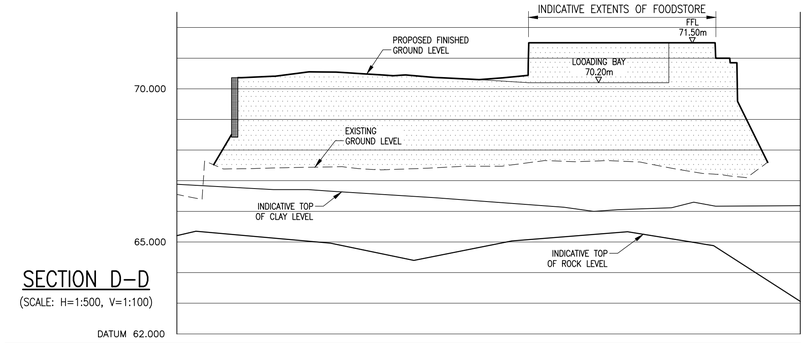
DO NOT SCALE.



SECTION C–C

(SCALE: H=1:500, V=1:100)

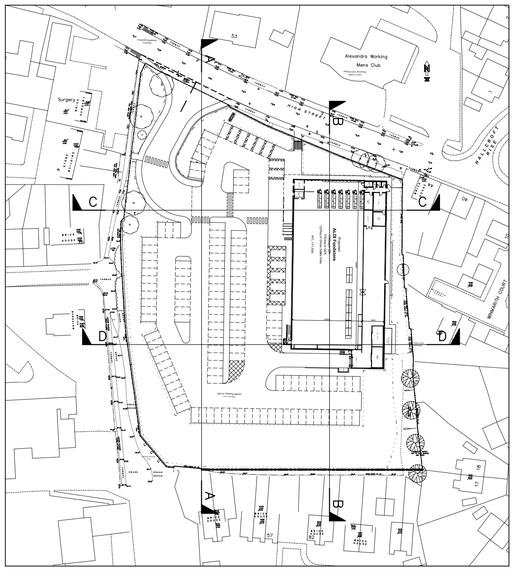
CHAINAGE	0.000	2.476	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000	75.000	80.000	85.000	90.000	95.000	96.806	98.396
EXISTING SURVEY LEVEL		70.942	70.992	70.817	70.372	70.372	70.370	70.360	70.466	70.441	70.397	70.421	70.516	70.518	70.572	70.572	70.613	70.761	70.796	71.091	71.403	71.471	
PROPOSED GROUND LEVEL		70.942	70.992	71.071	72.032	71.917	71.784	71.635	71.562	71.490	71.418	71.352	71.339	71.416	71.500	71.500	71.500	71.500	71.500	71.500	71.412	71.471	
TOP OF CLAY LEVEL	69.603		69.693	69.783	69.872	69.962	70.052	70.036	70.121	70.206	70.291	70.376	70.461	70.546	70.656	70.641	70.541	70.441	70.341	70.241	70.141	70.073	
TOP OF ROCK LEVEL	69.287		69.325	69.363	69.402	69.440	69.478	69.418	69.324	69.344	69.372	69.399	69.427	69.455	69.449	69.352	69.089	68.816	68.543	68.411	68.201	68.019	



SECTION D–D

(SCALE: H=1:500, V=1:100)

CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000	75.000	80.000	85.000	90.000	95.000	96.445	100.000	101.769
EXISTING SURVEY LEVEL	66.553	67.602	67.389	67.410	67.434	67.450	67.390	67.366	67.402	67.453	67.471	67.524	67.656	67.620	67.655	67.615	67.435	67.264	67.164	67.389	67.598		
PROPOSED GROUND LEVEL	66.553	67.608	70.304	70.402	70.514	70.547	70.495	70.432	70.406	70.342	70.311	70.392	71.500	71.500	71.500	71.500	71.500	71.500	71.000	68.181	67.598		
TOP OF CLAY LEVEL	66.884	66.828	66.773	66.717	66.709	66.658	66.596	66.534	66.472	66.402	66.329	66.255	66.181	66.083	66.026	66.077	66.112	66.275	66.171	66.177		66.184	66.186
TOP OF ROCK LEVEL	65.206	65.319	65.229	65.140	65.051	64.961	64.757	64.550	64.450	64.649	64.848	65.039	65.119	65.198	65.278	65.290	65.128	64.965	64.572	63.930		63.288	63.287



SECTION LOCATION PLAN

(SCALE 1:1,00)

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Contractors should refer to the residual risks contained in the CDM Pre Construction Information before carrying out any site operations and should not issue parts of this drawing without including the CDM notes and references. This information will include details of the SIGNIFICANT risks which 3E have considered beyond that which a competent contractor should be aware.

Date	Revisions	Drawn	Rev.
11.07.14	INITIAL ISSUE	JM	P1

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www.3econsult.com

Client: Aldi Stores Ltd [South]

Project: High Street, Royston, Barnsley

Title: Typical Site Sections

Scale	Drawn	Checked	Date
1:500	JM	AP	JUN 14

Drawing Status: Preliminary

Job No.	Drawing No.	Revision
13690W	Figure 3	P1

Appendix A

Proposed Development Plan

Proposed Pedestrian Crossing

STONE WALL HT1.5M

TARMAC

53

Alexandra Working Mens Club

Alexandra Working Mens Club

INDICATIVE TRUE NORTH

Improved access subject to LA highway approval

HIGH STREET

STONE WALL HT1.2M

TARMAC

Proposed retaining wall

0.7m RW

0.2m RW

Aldi Signage subject to seperate application

1 in 3 embankment

1 in 20 access road

Tree to be removed

Pedestrian priority crossings

1 in 40

1 in 60

Proposed stepped access (subject to land owner)

Proposed retaining wall

0.0m RW

CONC HOST AND WOOD PANEL FENCE H1.8M

METAL POST AND CHAINLINK FENCE H1.2M

DILAPIDATED STONE WALL

LITTER BIN

LOCHRIN PALISADE FENCE H1.85M

ROUGH GRASS

GRASS

Existing retaining wall

STONE NET WALL

LEVEL ON TOP OF WALL

Proposed

ALDI Foodstore

1705sq.m GIA

1763sq.m GEA

1254sq.m Gross Sales Area

FFL +71.500

55000

22800

7000

ENTRANCE LOBBY

EXIT LOBBY

SALES AREA

CHECK OUT

CASHIER

PAY POINT

TROLLEY

LOBBY

MANAGERS OFFICE

STAFF ROOM

KITCHEN

MEETING ROOM

PLANT ROOM

LOADING BAY

FREEZER STORE

CHILLER

BIN STORE

5 no. Cycle Hoops

130 no. Parking spaces

(2.5m x 5m Bays)

Gated security fence to rear of store

LEVEL ON TOP OF WALL

Landscape buffer

0.80 RW

WOOD FENCE HT 1.8

CONC POST + WOOD PANEL FENCE HT 1.8

Site Boundary

FOODSTORE SITE

approx **2.57** ACRES

(1.04 HA)

EAVES LEVEL

BRICK HOUSE

44

WINMARTH COURT

Trees to be removed

UNABLE TO SURVEY DUE TO THICK BUSHES AND TREES

BUSHES AND SMALL TREES

WOOD FENCE HT 1.3

WOOD FENCE HT 1.8

Existing retaining wall

LOCHRIN PALISADE FENCE HT1.85M

TARMAC

GRASS

ROUGH GRASS

1 in 3 embankment

SCALE 1:200

0 2 4 6 8 10m

CAD file reference

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Rev	Date	Description	Rev By	Chk'd
A	00.00.00	------	xxx	xxx

Project Title	Proposed Development High Street Royston
Client	Aldi Stores Ltd
Status	Feasibility
Scale	1:200
Drawing Size	A1
Drawn By	LH
Checked By	JDB
Date	06/14

Drawing Title	Proposed Site Plan
Job-Dwg No	1124-08
Rev	-

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ARCHITECTS
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Appendix B

Exploratory Hole Records

consulting engineers
4 Calder Close
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Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP01

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
0.15	D				(0.30) 0.30	MADE GROUND: Brown gravelly SAND of ash. Gravel is angular brick and concrete.			
0.60	D				(1.80) 2.10	Firm to stiff grey/brown sandy, slightly gravelly CLAY. Gravel is subangular mudstone. 0.80 becoming yellow mottled brown	1.0 2.0		
1.50	D				(0.50) 2.60	Completely weathered to very weak grey interbedded MUDSTONE and SILTSTONE.			
						End of Exploratory Hole at 2.6m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	2.0m
Width:	0.7m
Orientation:	180°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP02

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					(0.20) 0.20	Ashphalt.			
					(0.20) 0.40	MADE GROUND: Hardcore.			
0.60	D				(0.30) 0.70	MADE GROUND: Black gravelly SAND of ash. Gravel is clinker and burnt shale.			
1.20	D				(1.10) 1.80	MADE GROUND: Firm grey/brown slightly gravelly reworked CLAY with pockets of dark brown topsoil.	1.0		
2.00	D	2.00	90		(1.00) 2.80	Firm to stiff high strength yellow mottled brown slighlty gravelly CLAY. Gravel is subangular mudstone. 2.50 becoming grey	2.0		
		2.50	84			*End of Exploratory Hole at 2.8m*			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	2.0m
Width:	0.7m
Orientation:	000°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP03

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					0.10	Ashphalt.			
					0.20	MADE GROUND: Hardcore.			
0.50	D				(0.90)	MADE GROUND: Firm yellow/brown slightly gravelly reworked CLAY with pockets of dark brown topsoil.	1.0		
1.20	D				1.10	MADE GROUND: Brown clayey GRAVEL with occasional cobbles and boulders of sandstone. Gravel is angular sandstone.			
					(1.70)		2.0		
					2.80				
					2.90	Grey/brown relict TOPSOIL.			
3.00	D				(0.20)	Firm to stiff yellow mottled brown slighlty gravelly CLAY. Gravel is subangular mudstone.	3.0		
					3.10	*End of Exploratory Hole at 3.1m*			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	1.8m
Width:	0.7m
Orientation:	090°

General Remarks
1. Pit terminated on rock.
2. Backfilled with arisings.

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP04

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
0.50	D				(0.80) 0.80	Firm to stiff friable brown gravelly CLAY. Gravel is subangular mudstone and sandstone.			
					(0.30) 1.10	Very weak grey/brown flaggy SANDSTONE.	1.0		
1.20	D				(0.90) 2.00	Very weak thinly laminated brown SILTSTONE recovered as angular tabular gravel.			
						End of Exploratory Hole at 2m	2.0		

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	1.6m
Width:	0.7m
Orientation:	090°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP05

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
0.50	D				(2.40)	MADE GROUND: Dark brown gravelly SAND with wire, wood, plastic and pockets of organic clay. Gravel is brick and sandstone.	1.0		
2.00	D				2.40		2.0		
2.60	D	2.60	75		(0.60)	Firm brown medium to high strength slightly gravelly CLAY. Gravel is subangular mudstone.			
					3.00	*End of Exploratory Hole at 3m*	3.0		

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	2.2m
Width:	0.7m
Orientation:	180°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP06

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					(0.60) 0.60	MADE GROUND: Hardcore.			
0.70	D				(0.15) 0.75	Grey/brown relict TOPSOIL.			
1.00	D					Firm brown medium to high strength friable sandy CLAY.	1.0		
1.60	D	1.50	75		(1.45)	1.40 becoming yellow mottled brown			
					2.20		2.0		
						End of Exploratory Hole at 2.2m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	2.0m
Width:	0.7m
Orientation:	180°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP07

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
0.10	D				(0.25) 0.25	MADE GROUND: Black gravelly SAND of ash. Gravel is angular brick and burnt shale.			
0.60	D					Firm to stiff high strength brown mottled grey slightly gravelly CLAY. Gravel is subangular mudstone.			
		1.00	85				1.0		
					(1.95)	1.10 becoming friable			
1.70	D	1.70	105			1.60 becoming stiff			
					2.20		2.0		
					(0.30) 2.50	Very weak dark grey MUDSTONE with coal laminations.			
						End of Exploratory Hole at 2.5m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	2.0m
Width:	0.7m
Orientation:	000°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Trial Pit Log

TP08

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AJB

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					(0.25) 0.25	MADE GROUND: GRAVEL of limestone hardcore and burnt red shale.			
0.40	D				(0.45) 0.70	Brown very gravelly sandy CLAY. Gravel of subangular mudstone.			
0.80	D				(0.50) 1.20	Grey mottled brown clayey tabular GRAVEL of mudstone.	1.0		
					1.30	Grey weak thinly bedded flaggy SILTSTONE.			
						End of Exploratory Hole at 1.3m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	1.6m
Width:	0.7m
Orientation:	100°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

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Trial Pit Log

TP09

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 18/06/2014
Logged By: AJB

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					(0.20) 0.20	MADE GROUND: Limestone Hardcore.			
0.30	D				(0.20) 0.40	MADE GROUND: Gravelly COBBLES of bricks and reworked topsoil.			
		0.70	>130			Very stiff friable grey mottled brown gravelly CLAY. Gravel of tabular mudstone and flaggy siltstone.			
0.90	D				(1.10)		1.0		
		1.20	85			1.20 becoming stiff			
					1.50				
1.60	D				(0.20) 1.70	Very weak grey SILTSTONE.			
						End of Exploratory Hole at 1.7m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	1.6m
Width:	0.7m
Orientation:	350°

General Remarks
1. Pit terminated on rock.
2. Backfilled with arisings.

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Trial Pit Log

TP10

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 19/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
0.50	D				(1.70)	MADE GROUND: Brown very gravelly SAND. Gravel is angular sandstone, brick and concrete.	1.0		
1.20	D				1.70	1.50 Remnant foundations encountered			
1.80	D				(0.40) 2.10	Completely weathered thinly laminated SILSTONE recovered as angular tabular gravel.	2.0		
						End of Exploratory Hole at 2.1m			

Groundwater Observations		
No.	Struck (m)	Remarks
1	1.7	moderate seepage

Stability / Dimensions	
Stability:	Sides unstable
Length:	1.7m
Width:	0.7m
Orientation:	000°

General Remarks
1. Pit terminated on rock.
2. Backfilled with arisings.

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Trial Pit Log

TP11

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 19/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
0.50	D				(1.00) 1.00	MADE GROUND: Brown very gravelly SAND. Gravel is angular sandstone, brick and concrete.	1.0		
1.20	D				(0.40) 1.40	Completely weathered MUDSTONE recovered as angular tabular gravel.			
						End of Exploratory Hole at 1.4m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides unstable
Length:	1.7m
Width:	0.7m
Orientation:	000°

General Remarks
1. Pit terminated on rock.
2. Backfilled with arisings.

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Trial Pit Log

TP12

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 19/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
0.80	D				(1.30) 1.30	MADE GROUND: Brown gravelly SAND with occasional cobbles and boulders of sandstone. Gravel is angular brick, sandstone, burnt shale.	1.0		
1.50	D	1.50	95		(0.30) 1.60	Firm to stiff high strength yellow mottled brown slightly gravelly CLAY.			
						End of Exploratory Hole at 1.6m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	29.0m
Width:	0.7m
Orientation:	180°

General Remarks
1. Pit terminated on rock.
2. Backfilled with arisings.

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Trial Pit Log

TP12A

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 19/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					(2.40)	MADE GROUND: Brown gravelly SAND with occasional cobbles and boulders of sandstone. Gravel is angular brick, sandstone, burnt shale.	1.0 2.0		
					2.40 (0.20) 2.60	Completely weathered MUDSTONE recovered as angular tabular gravel.			
						End of Exploratory Hole at 2.6m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	29.0m
Width:	0.7m
Orientation:	180°

General Remarks
1. Pit terminated on rock.
2. Backfilled with arisings.

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Trial Pit Log

TP13

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key:
B = Large Disturbed Sample
D = Small Disturbed Sample
W = Water Sample
HSV = Hand Shear Vane
CBR = Mexecone
ES = Environmental Sample

Plant: CAT 432
Date: 19/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					(1.30) 1.30	MADE GROUND: Brown slightly gravelly reworked CLAY. Gravel is angular brick and burnt shale.	1.0		
					(0.20) 1.50	Firm yellow mottled grey slightly gravelly CLAY. Gravel is subangular mudstone.			
						End of Exploratory Hole at 1.5m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	15.0m
Width:	0.7m
Orientation:	000°

General Remarks
1. Pit terminated on rock.
2. Backfilled with arisings.

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Trial Pit Log

TP13A

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Key: B = Large Disturbed Sample; D = Small Disturbed Sample; W = Water Sample; HSV = Hand Shear Vane; CBR = Mexecone; ES = Environmental Sample

Plant: CAT 432
Date: 19/06/2014
Logged By: AHC

Samples		Tests			Strata Details				
Depth (m)	Type	Depth (m)	HSV (kPa)	CBR (%)	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend
					(0.30) 0.30	MADE GROUND: Hardcore.			
					(1.30) 1.60	MADE GROUND: Brown slightly gravelly reworked CLAY. Gravel is angular brick. 1.10 Remnant foundations encountered	1.0		
					(0.20) 1.80	Very weak thinly laminated brown SILTSTONE recovered as angular tabular gravel.			
						End of Exploratory Hole at 1.8m			

Groundwater Observations		
No.	Struck (m)	Remarks
		No Groundwater Encountered

Stability / Dimensions	
Stability:	Sides stable
Length:	15.0m
Width:	0.7m
Orientation:	000°

General Remarks
1. Pit terminated on rock. 2. Backfilled with arisings.

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Mini-Percussive Log

MP01

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: ⏬ = Water Strike Depth & No.
⏬ = Resting Water Depth & No.
D = Small Disturbed Sample
B = Large Disturbed Sample
ES = Environmental Sample
W = Water Sample
HSV = Hand Shear Vane (kPa)
S / C = Split Spoon / Cone
N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
			(0.25) 0.25	MADE GROUND: Reworked topsoil, SAND and GRAVEL with rare cobbles. Gravel and cobbles of brick and concrete.					
			0.40	MADE GROUND: Limestone Hardcore.					
0.60	D			MADE GROUND: Reworked soft to firm sandy CLAY with gravel and cobbles of brick, concrete, red shale, mudstone and sandstone.					
1.00	C	N7 (1/1/2/1/2/2)			1.0				
			(1.80)						
1.50	D								
2.00	C	N12 (2/2/3/3/3/3)			2.0				
			2.20						
2.40	D		(0.40)	Grey mottled brown firm slightly sandy CLAY.					
			2.60	2.50 - 2.60 Coal partings.					
3.00	D			Grey partially mottled brown stiff CLAY with rare coal gravel and iron stained veining.					
3.00	C	N24 (2/3/4/6/6/8)	(1.00)		3.0				
			3.60						
3.80	C	N50 (9/10/9/10/15/16)	(0.65)	Very weak brown and grey interbedded MUDSTONE and SILTSTONE.					
			4.25		4.0				
				End of Exploratory Hole at 4.25m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Monitoring well installed.
		No Groundwater Encountered					

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Mini-Percussive Log

MP02

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: = Water Strike Depth & No.; = Resting Water Depth & No.; D = Small Disturbed Sample; B = Large Disturbed Sample; ES = Environmental Sample; W = Water Sample; HSV = Hand Shear Vane (kPa); S / C = Split Spoon / Cone; N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
			0.15	MADE GROUND: Brown ashy SAND and GRAVEL with some cobbles. Gravel and cobbles of subangular mudstone, brick, concrete and clinker.					
0.50	D			MADE GROUND: Reworked soft sandy CLAY with gravel and cobbles of limestone, sandstone, brick and very rare metal bearings.					
1.00	C	N8 (2/1/1/2/2/3)			1.0				
1.50	D		(2.75)						
2.00	C	N8 (1/1/2/1/2/3)			2.0				
			2.90						
3.00	C	N12 (2/3/2/3/3/4)	3.00	Relict TOPSOIL.	3.0				
3.10	D			Grey mottled brown firm slightly sandy CLAY with rare mudstone gravel and ironstained veining.					
			(0.80)						
			3.80						
4.00	C	N9 (2/2/2/2/2/3)		Grey firm slightly sandy CLAY with rare mudstone gravels and ironstained veining.	4.0				
			(1.05)						
			4.85						
5.00	C	N43 (8/8/9/10/12/12)		Grey very weak thinly laminated MUDSTONE.	5.0				
			(1.60)						
6.00	C	N50/230mm (8/10/12/14/19/5)			6.0				
			6.45						
				End of Exploratory Hole at 6.45m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Backfilled with arisings
		No Groundwater Encountered					

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Mini-Percussive Log

MP03

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: = Water Strike Depth & No. = Resting Water Depth & No.
D = Small Disturbed Sample
B = Large Disturbed Sample
ES = Environmental Sample
W = Water Sample
HSV = Hand Shear Vane (kPa)
S / C = Split Spoon / Cone
N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
			0.10	MADE GROUND: Bituminous bound GRAVEL hardcore.					
			(0.35)						
			0.45	MADE GROUND: Limestone Hardcore.					
0.60	D			MADE GROUND: Reworked soft sandy CLAY with gravel and cobbles of limestone, sandstone, brick and metal bed spring framents (Poor recovery due to obstruction).					
1.00	C	N9 (2/2/2/2/2/3)			1.0				
1.70	D		(2.55)						
2.00	C	N7 (1/1/1/2/2/2)			2.0				
			3.00						
3.00	C	N12 (2/2/3/3/3/3)		Brown firm sandy CLAY (Poor recovery due to obstruction).	3.0				
			(1.80)						
4.00	C	N21 (4/4/4/5/6/6)		4.00 becoming stiff	4.0				
			4.80						
5.00	C	N50/75mm (25/-/49/1/-/-)	(0.35)	Very weak interbedded grey MUDSTONE and brown SILTSTONE (Poor Recovery due to obstruction).	5.0				
			5.15						
				End of Exploratory Hole at 5.15m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Monitoring well installed.
		No Groundwater Encountered					

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Mini-Percussive Log

MP04

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: = Water Strike Depth & No. = Resting Water Depth & No.
D = Small Disturbed Sample
B = Large Disturbed Sample
ES = Environmental Sample
W = Water Sample
HSV = Hand Shear Vane (kPa)
S / C = Split Spoon / Cone
N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
0.10	D		(0.40) 0.40	MADE GROUND: Ashy SAND and GRAVEL of brick and concrete.					
			0.50						
			(0.55)	MADE GROUND: GRAVEL and COBBLES of burnt red shale and brick.					
1.00	C	N6 (1/1/1/1/2/2)	1.05	MADE GROUND: Reworked sandy gravelly CLAY. Gravel and rare cobbles of sandstone, mudstone and coal.	1.0				
1.20	D		1.15	Relict TOPSOIL.					
			(0.45) 1.60	Grey soft very slightly sandy CLAY with rare gravel of coal.					
1.80	D			Brown mottled grey firm slightly sandy CLAY with ironstained veining.					
2.00	C	N13 (2/2/3/3/3/4)	(0.75) 2.35		2.0				
2.50	D			Very weak grey MUDSTONE with ironstone nodules and banding.					
2.80	C	N60 (7/11/12/14/16/18)	(0.90) 3.25		3.0				
				End of Exploratory Hole at 3.25m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Backfilled with arisings
		No Groundwater Encountered					

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Mini-Percussive Log

MP05

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: = Water Strike Depth & No.
= Resting Water Depth & No.
D = Small Disturbed Sample
B = Large Disturbed Sample
ES = Environmental Sample
W = Water Sample
HSV = Hand Shear Vane (kPa)
S / C = Split Spoon / Cone
N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
			(0.20) 0.20	MADE GROUND: GRAVEL of brick and concrete in a sandy matrix.					
			(0.60) 0.80	MADE GROUND: COBBLES of brick with some clay.					
0.80	C	N8 (6/5/4/1/2/1)			1.0				
				End of Exploratory Hole at 1.25m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Monitoring well installed.
		No Groundwater Encountered					

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Mini-Percussive Log

MP05A

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
= Resting Water Depth & No.
D = Small Disturbed Sample
B = Large Disturbed Sample
ES = Environmental Sample
W = Water Sample
HSV = Hand Shear Vane (kPa)
S / C = Split Spoon / Cone
N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
			(0.20) 0.20	MADE GROUND: GRAVEL of brick and concrete in a sandy matrix.					
			(0.20) 0.40	MADE GROUND: COBBLES of brick with some clay.					
			0.42	CONCRETE.					
				End of Exploratory Hole at 0.42m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	
		No Groundwater Encountered					1. Borehole terminated upon refusal. 2. Monitoring well installed.

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Mini-Percussive Log

MP06

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: = Water Strike Depth & No.
= Resting Water Depth & No.
D = Small Disturbed Sample
B = Large Disturbed Sample
ES = Environmental Sample
W = Water Sample
HSV = Hand Shear Vane (kPa)
S / C = Split Spoon / Cone
N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
			0.10						
			0.15	MADE GROUND: Reworked clay and GRAVEL of bricks and concrete.					
0.40	D		(0.65)	MADE GROUND: GRAVEL of burnt red shale and ash.					
			0.80	Very weak grey and brown MUDSTONE, recovered as thinly bedded clayey gravel with rare ironstone bands.					
1.00	C	N18 (3/5/5/5/6/2)	(0.30) 1.10	Very weak grey thinly bedded MUDSTONE.	1.0				
1.50	D		(1.25)	Very weak black and grey carbonaceous thinly laminated MUDSTONE, with ironstone nodules and banding.					
1.90	C	N73 (9/11/11/14/22/26)	2.35		2.0				
				End of Exploratory Hole at 2.35m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Monitoring well installed.
		No Groundwater Encountered					

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Mini-Percussive Log

MP07

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: = Water Strike Depth & No.; = Resting Water Depth & No.; D = Small Disturbed Sample; B = Large Disturbed Sample; ES = Environmental Sample; W = Water Sample; HSV = Hand Shear Vane (kPa); S / C = Split Spoon / Cone; N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
0.20	D		(0.40) 0.40	MADE GROUND: Brick and concrete COBBLES in a sandy clay matrix.					
0.60	D		(0.90) 1.30	Soft to firm brown slightly sandy CLAY with pockets of ironstone nodules.	1.0				
1.00	C	N12 (2/2/2/2/3/5)							
1.50	D		(0.30) 1.60	Light grey firm very gravelly CLAY (Highly weathered mudstone).					
2.00	C	N54 (6/7/9/11/14/20)	(0.85) 2.45	Light brown very weak MUDSTONE, with thin bands of ironstone and siltstone.	2.0				
				End of Exploratory Hole at 2.45m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Backfilled with arisings
		No Groundwater Encountered					

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Mini-Percussive Log

MP08

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key: = Water Strike Depth & No. = Resting Water Depth & No.
D = Small Disturbed Sample
B = Large Disturbed Sample
ES = Environmental Sample
W = Water Sample
HSV = Hand Shear Vane (kPa)
S / C = Split Spoon / Cone
N = SPT N Value

Plant: Mini Percussive Rig
Date: 19/06/2014
Logged By: AJB

Samples/Tests			Strata Details					Well	
Depth (m)	Type	Results	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
			0.10						
0.20	D		(0.30)	TOPSOIL with rare gravel of coal and brick with fragments of pottery.					
			0.40	Brown dessicated CLAY.					
0.60	D		(0.40)	Light brown very sandy very gravelly CLAY. Gravel of sandstone.					
			0.80						
1.00	C	N13 (3/4/3/3/3/4)	(0.40)	Grey and brown sandy GRAVEL and COBBLES of sandstone.	1.0				
			1.20						
1.40	D		(0.70)	Brown firm very sandy dessicated CLAY, with bands of very weak brown siltstone (Highly weathered mudstone).					
			1.90						
1.90	D								
2.00	C	N67 (7/10/12/14/17/24)	(0.55)	Brown very weak thinly bedded SILTSTONE.	2.0				
			2.45						
				End of Exploratory Hole at 2.45m					

Groundwater Observations			Window Sample Run				General Remarks
No.	Struck (m)	Remarks	From (m)	To (m)	Dia. (mm)	Recovery (%)	1. Borehole terminated upon refusal. 2. Monitoring well installed.
		No Groundwater Encountered					

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH01

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
					(2.50) 2.50	CLAY (Driller's description).	1.0 2.0				
					(1.00) 3.50	SANDSTONE/MUDSTONE (Driller's description).	3.0				
					3.60	COAL (Driller's description).					
					(13.00)	MUDSTONE with sandstone bands (Driller's description).	4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0				

Continued next page...

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

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4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH01

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
						MUDSTONE with sandstone bands (Driller's description). *(continued)*	12.0				
							13.0				
							14.0				
							15.0				
							16.0				
					16.60						
					(0.60)	COAL (Driller's description).	17.0				
					17.20						
						MUDSTONE/SANDSTONE (Driller's description).	18.0				
							19.0				
							20.0				
							21.0				
							22.0				

Continued next page...

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

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4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH01

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
						MUDSTONE/SANDSTONE (Driller's description). *(continued)*					
					(12.80)		23.0				
							24.0				
							25.0				
							26.0				
							27.0				
							28.0				
							29.0				
					30.00		30.0				
						End of Exploratory Hole at 30m					

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH02

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
					(1.50) 1.50	CLAY (Driller's description).	1.0				
					(1.30) 2.80	Dark MUDSTONE with coal traces (Driller's description).	2.0				
					(6.20) 9.00	MUDSTONE (Driller's description).	3.0 4.0 5.0 6.0 7.0 8.0				
					9.10	COAL (Driller's description).	9.0				
					(1.50) 10.60	MUDSTONE (Driller's description).	10.0				
					10.70	COAL (Driller's description).	11.0				

Continued next page...

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH02

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
					(1.50)	MUDSTONE (Driller's description). *(continued)*	12.0				
					12.20						
					12.30	COAL (Driller's description).					
						MUDSTONE (Driller's description).	13.0				
							14.0				
							15.0				
							16.0				
					(8.90)		17.0				
							18.0				
							19.0				
							20.0				
							21.0				
					21.20						
						COAL (Driller's description).					
						Continued next page...	22.0				

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH02

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
					(1.50)	COAL (Driller's description). *(continued)*					
					22.70	MUDSTONE (Driller's description).	23.0				
							24.0				
							25.0				
							26.0				
					(7.30)		27.0				
							28.0				
							29.0				
					30.00		30.0				
						End of Exploratory Hole at 30m					

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH03

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
					(1.00) 1.00	OVERBURDEN / FILL (Driller's description).	1.0				
					(7.10) 8.10	MUDSTONE (Driller's description).	2.0 3.0 4.0 5.0 6.0 7.0 8.0				
					(0.90) 9.00	COAL (Driller's description).	9.0				
						MUDSTONE (Driller's description).	10.0 11.0				

Continued next page...

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH03

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
						MUDSTONE (Driller's description). *(continued)*					
					(6.50)		12.0				
							13.0				
							14.0				
							15.0				
					15.50						
					15.60	COAL (Driller's description).					
						MUDSTONE/SANDSTONE (Driller's description).	16.0				
							17.0				
							18.0				
							19.0				
							20.0				
							21.0				
							22.0				

Continued next page...

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

consulting engineers
4 Calder Close
Calder Park
Wakefield
WF4 3BA

Tel. 01924 240420

Rotary Borehole Log

BH03

Site Name: High Street, Royston
Client: Aldi Stores Limited
Project No: 13690

Ground Level:
Easting:
Northing:

Contractor:

Key:
= Water Strike Depth & No.
TCR = Total Core Recovery
SCR = Solid Core Recovery
RQD = Rock Quality Designation
FI = Fracture Index

Plant: Casagrande C6
Dates: 18/06/2014
Logged By: DE

Method: Rotary Open Hole
Flush: Water

Core Data			Fractures		Strata Details					Well	
Core Run (m)	TCR (%)	SCR (%)	RQD (%)	F.I.	Depth (m) (Thickness)	Strata Description	Depth (m)	Level (AOD)	Legend	Strike	Log
						MUDSTONE/SANDSTONE (Driller's description). *(continued)*					
					(14.40)		23.0				
							24.0				
							25.0				
							26.0				
							27.0				
							28.0				
							29.0				
					30.00		30.0				
						End of Exploratory Hole at 30m					

Groundwater Observations				Flush Returns			General Remarks
No.	Struck (m)	20min Level (m)	Remarks	From	To	Returns (%)	1. Borehole backfilled with grout.
			No Groundwater Encountered				

Appendix C

Gas and Groundwater Monitoring Records

Gas monitoring record

3e Consulting Engineers Ltd
4, Calder Close
Calder Park
Wakefield
WF4 3BA

Job no: 13690
Site: High Street, Royston
Date: 25-Jun-14
Weather: Sunny with some clouds
Pressure Trend: Falling

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
MP1	0.2	3.8	13.6	1013	0.0	3.28	
MP3	0.1	5.1	11.4		0.0	4.44	
MP6	0.1	1.5	16.3		0.0	Dry	
MP8	0.2	8.6	10.6		0.0	Dry	

Date: 11-Jul-14
Weather: Sunny with some clouds
Pressure Trend: Falling

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
MP1	0.2	0.5	19.3	1013	0.0	Dry	
MP3	0.2	6.8	10.0		0.0	Dry	
MP6	0.2	1.0	17.0		0.0	Dry	
MP8	0.1	8.2	12.9		0.0	Dry	

Appendix D

Laboratory Chemical Results

2531

ANALYTICAL TEST REPORT

Contract no: 51822

Contract name: High Street, Royston

Client reference: 13690

Clients name: 3E Consulting Engineers Ltd

Clients address: 4 Calder Close
Calder Park
Wakefield
WF4 3BA

Samples received: 23 June 2014

Analysis started: 23 June 2014

Analysis completed 27 June 2014

Report issued: 30 June 2014

Notes:

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

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

This report shall not be reproduced except in full, withour prior written approval.

Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test

M MCERTS & UKAS accredited test

$ Test carried out by an approved subcontractor

I/S Insufficient sample to carry out test

N/S Sample not suitable for testing

NAD No Asbestos Detected

Approved by:

Karan Campbell	John Campbell	Dave Bowerbank
Director	Director	Customer Services Co-ordinator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
51822-1	MP 01	0.60	Clay	-	-	14.2
51822-2	MP 01	2.40	Clay	-	-	18.9
51822-3	MP 02	0.50	Clay	-	-	7.8
51822-4	MP 04	0.10	Sandy Clay with Stones	-	-	10.0
51822-5	MP 04	1.20	Clay	-	-	25.4
51822-6	MP 06	0.40	Clay	-	-	14.6
51822-7	MP 08	0.60	Clay	-	-	13.0
51822-8	TP 01	0.15	Sandy Clay with Shale & Stones	-	-	16.2
51822-9	TP 01	0.60	Clay	-	-	19.0
51822-10	TP 02	0.60	Sandy Clay with Shale & Stones	-	-	8.8
51822-11	TP 02	1.20	Clay	-	-	14.6
51822-12	TP 03	0.50	Clay	-	-	21.3
51822-13	TP 04	0.50	Clay	-	-	12.5
51822-14	TP 05	0.50	Sandy Clay with Shale & Stones	-	-	14.7
51822-15	TP 06	0.70	Sandy Clay with Shale & Stones	-	-	13.2
51822-16	TP 09	0.30	Sandy Clay with Shale & Stones	-	-	9.0
51822-17	TP 10	0.50	Sandy Clay with Shale & Stones	-	-	13.2
51822-18	TP 10	1.20	Sandy Clay with Shale & Stones	-	-	14.5
51822-19	TP 11	0.60	Sandy Clay with Shale & Stones	-	-	17.3
51822-20	TP 12	1.50	Clay	-	-	19.8

Chemtech Environmental Limited

SOILS

Lab number			51822-1	51822-2	51822-3	51822-4	51822-5	51822-6
Sample id			MP 01	MP 01	MP 02	MP 04	MP 04	MP 06
Depth (m)			0.60	2.40	0.50	0.10	1.20	0.40
Date sampled			18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	7.8	-	6.9	9.5	-	-
Boron (water soluble)	CE063 M	mg/kg B	2.0	-	3.9	1.6	-	-
Cadmium (total)	CE127 M	mg/kg Cd	0.3	-	0.2	<0.2	-	-
Chromium (total)	CE127 M	mg/kg Cr	66	-	77	70	-	-
Copper (total)	CE127 M	mg/kg Cu	16	-	18	60	-	-
Lead (total)	CE127 M	mg/kg Pb	28	-	27	12	-	-
Mercury (total)	CE127 M	mg/kg Hg	<0.5	-	<0.5	<0.5	-	-
Nickel (total)	CE127 M	mg/kg Ni	12	-	17	40	-	-
Selenium (total)	CE127 M	mg/kg Se	4.9	-	0.6	1.2	-	-
Zinc (total)	CE127 M	mg/kg Zn	113	-	81	39	-	-
pH	CE004 M	units	8.1	7.3	8.6	10.1	7.2	6.3
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	48	52	986	365	102	175.0
Total Organic Carbon (TOC)	CE072 M	% w/w C	2.33	-	0.70	1.17	-	-
Estimate of OMC (calculated from TOC)	CE072	% w/w	4.02	-	1.21	2.02	-	-
PAH								
Naphthalene	CE087	mg/kg	0.07	-	0.03	0.06	-	-
Acenaphthylene	CE087	mg/kg	<0.01	-	<0.01	<0.01	-	-
Acenaphthene	CE087	mg/kg	0.12	-	<0.01	0.05	-	-
Fluorene	CE087	mg/kg	0.11	-	<0.01	0.03	-	-
Phenanthrene	CE087	mg/kg	0.95	-	0.11	0.46	-	-
Anthracene	CE087	mg/kg	0.28	-	0.02	0.16	-	-
Fluoranthene	CE087	mg/kg	1.32	-	0.31	1.99	-	-
Pyrene	CE087	mg/kg	1.18	-	0.29	1.74	-	-
Benzo(a)anthracene	CE087	mg/kg	0.59	-	0.17	0.86	-	-
Chrysene	CE087	mg/kg	0.66	-	0.19	1.03	-	-
Benzo(b)fluoranthene	CE087	mg/kg	0.79	-	0.26	1.14	-	-
Benzo(k)fluoranthene	CE087	mg/kg	0.33	-	0.09	0.43	-	-
Benzo(a)pyrene	CE087	mg/kg	0.69	-	0.19	0.98	-	-
Indeno(123cd)pyrene	CE087	mg/kg	0.42	-	0.16	0.67	-	-
Dibenz(ah)anthracene	CE087	mg/kg	0.11	-	0.03	0.14	-	-
Benzo(ghi)perylene	CE087	mg/kg	0.39	-	0.13	0.67	-	-
PAH (total of USEPA 16)	CE087	mg/kg	8.01	-	1.99	10.4	-	-
BTEX & TPH								
MTBE	CE057 U	mg/kg	-	-	-	-	-	-
Benzene	CE057 U	mg/kg	-	-	-	-	-	-
Toluene	CE057 U	mg/kg	-	-	-	-	-	-
Ethylbenzene	CE057 U	mg/kg	-	-	-	-	-	-
m & p-Xylene	CE057 U	mg/kg	-	-	-	-	-	-
o-Xylene	CE057 U	mg/kg	-	-	-	-	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-

Chemtech Environmental Limited

SOILS

Lab number			51822-1	51822-2	51822-3	51822-4	51822-5	51822-6
Sample id			MP 01	MP 01	MP 02	MP 04	MP 04	MP 06
Depth (m)			0.60	2.40	0.50	0.10	1.20	0.40
Date sampled			18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014
Test	**Method**	**Units**						
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	-	-	-	-	-	-

Chemtech Environmental Limited

SOILS

Lab number			51822-7	51822-8	51822-9	51822-10	51822-11	51822-12
Sample id			MP 08	TP 01	TP 01	TP 02	TP 02	TP 03
Depth (m)			0.60	0.15	0.60	0.60	1.20	0.50
Date sampled			18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	-	11	-	11	-	12
Boron (water soluble)	CE063 M	mg/kg B	-	1.3	-	1.3	-	2.2
Cadmium (total)	CE127 M	mg/kg Cd	-	<0.2	-	<0.2	-	<0.2
Chromium (total)	CE127 M	mg/kg Cr	-	73	-	49	-	50
Copper (total)	CE127 M	mg/kg Cu	-	38	-	52	-	25
Lead (total)	CE127 M	mg/kg Pb	-	16	-	41	-	22
Mercury (total)	CE127 M	mg/kg Hg	-	<0.5	-	<0.5	-	<0.5
Nickel (total)	CE127 M	mg/kg Ni	-	28	-	33	-	35
Selenium (total)	CE127 M	mg/kg Se	-	0.9	-	2.2	-	1.2
Zinc (total)	CE127 M	mg/kg Zn	-	89	-	96	-	127
pH	CE004 M	units	7.3	8.7	7.2	8.4	7.7	7.7
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	40	123	146	159	27	<10
Total Organic Carbon (TOC)	CE072 M	% w/w C	-	7.88	-	1.54	-	2.04
Estimate of OMC (calculated from TOC)	CE072	% w/w	-	13.59	-	2.66	-	3.52
PAH								
Naphthalene	CE087	mg/kg	-	0.09	-	0.05	-	<0.01
Acenaphthylene	CE087	mg/kg	-	<0.01	-	0.01	-	<0.01
Acenaphthene	CE087	mg/kg	-	<0.01	-	0.13	-	<0.01
Fluorene	CE087	mg/kg	-	<0.01	-	0.07	-	<0.01
Phenanthrene	CE087	mg/kg	-	0.03	-	1.31	-	<0.01
Anthracene	CE087	mg/kg	-	<0.01	-	0.46	-	<0.01
Fluoranthene	CE087	mg/kg	-	0.06	-	4.02	-	0.01
Pyrene	CE087	mg/kg	-	0.06	-	3.80	-	<0.01
Benzo(a)anthracene	CE087	mg/kg	-	0.04	-	1.82	-	0.02
Chrysene	CE087	mg/kg	-	0.05	-	2.21	-	<0.01
Benzo(b)fluoranthene	CE087	mg/kg	-	0.05	-	2.71	-	<0.01
Benzo(k)fluoranthene	CE087	mg/kg	-	0.02	-	1.15	-	<0.01
Benzo(a)pyrene	CE087	mg/kg	-	0.03	-	2.48	-	<0.01
Indeno(123cd)pyrene	CE087	mg/kg	-	0.02	-	1.76	-	<0.01
Dibenz(ah)anthracene	CE087	mg/kg	-	<0.01	-	0.38	-	<0.01
Benzo(ghi)perylene	CE087	mg/kg	-	0.02	-	1.52	-	<0.01
PAH (total of USEPA 16)	CE087	mg/kg	-	0.47	-	23.9	-	<0.16
BTEX & TPH								
MTBE	CE057 U	mg/kg	-	-	-	0.01	-	-
Benzene	CE057 U	mg/kg	-	-	-	<0.01	-	-
Toluene	CE057 U	mg/kg	-	-	-	<0.01	-	-
Ethylbenzene	CE057 U	mg/kg	-	-	-	<0.01	-	-
m & p-Xylene	CE057 U	mg/kg	-	-	-	<0.01	-	-
o-Xylene	CE057 U	mg/kg	-	-	-	<0.01	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	<0.01	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	<0.01	-	-

Chemtech Environmental Limited

SOILS

Lab number			51822-7	51822-8	51822-9	51822-10	51822-11	51822-12
Sample id			MP 08	TP 01	TP 01	TP 02	TP 02	TP 03
Depth (m)			0.60	0.15	0.60	0.60	1.20	0.50
Date sampled			18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014
Test	**Method**	**Units**						
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	<0.01	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	<1	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	<1	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	10	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	13	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	-	-	-	2	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	<0.1	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	0.2	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	0.1	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	4	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	3	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	-	-	259	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	-	-	136	-	-
Subcontracted analysis								
Asbestos	$	-	-	NAD	-	NAD	-	NAD

Chemtech Environmental Limited

SOILS

Lab number			51822-13	51822-14	51822-15	51822-16	51822-17	51822-18
Sample id			TP 04	TP 05	TP 06	TP 09	TP 10	TP 10
Depth (m)			0.50	0.50	0.70	0.30	0.50	1.20
Date sampled			18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	31	14	16	10	13	-
Boron (water soluble)	CE063 M	mg/kg B	0.6	2.7	1.3	0.9	1.1	-
Cadmium (total)	CE127 M	mg/kg Cd	13.6	0.5	0.3	<0.2	0.2	-
Chromium (total)	CE127 M	mg/kg Cr	194	317	78	74	92	-
Copper (total)	CE127 M	mg/kg Cu	142	49	163	22	29	-
Lead (total)	CE127 M	mg/kg Pb	300	125	36	638	70	-
Mercury (total)	CE127 M	mg/kg Hg	2.5	<0.5	<0.5	<0.5	<0.5	-
Nickel (total)	CE127 M	mg/kg Ni	46	36	34	25	20	-
Selenium (total)	CE127 M	mg/kg Se	18.7	1.3	0.9	0.8	1.0	-
Zinc (total)	CE127 M	mg/kg Zn	382	202	214	68	96	-
pH	CE004 M	units	5.7	7.9	7.7	8.5	8.0	9.0
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	<10	<10	<10	17	96	120
Total Organic Carbon (TOC)	CE072 M	% w/w C	0.33	3.38	1.33	0.50	3.07	-
Estimate of OMC (calculated from TOC)	CE072	% w/w	0.57	5.83	2.29	0.86	5.29	-
PAH								
Naphthalene	CE087	mg/kg	<0.01	0.53	0.05	0.06	0.23	-
Acenaphthylene	CE087	mg/kg	<0.01	0.03	<0.01	<0.01	0.01	-
Acenaphthene	CE087	mg/kg	<0.01	0.31	0.02	0.01	0.04	-
Fluorene	CE087	mg/kg	<0.01	0.36	0.02	0.01	0.02	-
Phenanthrene	CE087	mg/kg	<0.01	3.68	0.35	0.25	0.56	-
Anthracene	CE087	mg/kg	<0.01	0.98	0.11	0.06	0.18	-
Fluoranthene	CE087	mg/kg	<0.01	5.63	1.28	0.74	2.60	-
Pyrene	CE087	mg/kg	<0.01	4.93	1.25	0.64	2.50	-
Benzo(a)anthracene	CE087	mg/kg	0.01	2.17	0.80	0.38	1.45	-
Chrysene	CE087	mg/kg	<0.01	2.31	0.91	0.44	1.71	-
Benzo(b)fluoranthene	CE087	mg/kg	<0.01	2.79	1.13	0.50	2.15	-
Benzo(k)fluoranthene	CE087	mg/kg	<0.01	1.14	0.49	0.22	0.87	-
Benzo(a)pyrene	CE087	mg/kg	<0.01	2.67	1.00	0.44	1.82	-
Indeno(123cd)pyrene	CE087	mg/kg	<0.01	1.84	0.77	0.33	1.41	-
Dibenz(ah)anthracene	CE087	mg/kg	<0.01	0.35	0.15	0.07	0.29	-
Benzo(ghi)perylene	CE087	mg/kg	<0.01	1.63	0.68	0.28	1.23	-
PAH (total of USEPA 16)	CE087	mg/kg	<0.16	31.3	9.01	4.42	17.1	-
BTEX & TPH								
MTBE	CE057 U	mg/kg	0.02	0.02	0.01	0.02	0.02	-
Benzene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-
Toluene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-
Ethylbenzene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-
m & p-Xylene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-
o-Xylene	CE057 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-

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SOILS

Lab number			51822-13	51822-14	51822-15	51822-16	51822-17	51822-18
Sample id			TP 04	TP 05	TP 06	TP 09	TP 10	TP 10
Depth (m)			0.50	0.50	0.70	0.30	0.50	1.20
Date sampled			18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014	18/06/2014
Test	**Method**	**Units**						
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	-
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	<1	<1	<1	<1	-
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	<1	<1	<1	<1	-
TPH Aromatic EC16-EC21	CE068	mg/kg	<1	16	3	2	6	-
TPH Aromatic EC21-EC35	CE068	mg/kg	<1	13	5	2	10	-
TPH Aromatic EC35-EC44	CE068	mg/kg	<1	<1	2	<1	1	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	<0.1	0.2	<0.1	0.2	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	4	7	4	2	4	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	<1	37	2	<1	3	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	<1	1096	611	10	132	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	<1	403	396	2	19	-
Subcontracted analysis								
Asbestos	$	-	-	NAD	-	NAD	NAD	-

Chemtech Environmental Limited

SOILS

Lab number			51822-19	51822-20
Sample id			TP 11	TP 12
Depth (m)			0.60	1.50
Date sampled			18/06/2014	18/06/2014
Test	**Method**	**Units**		
Arsenic (total)	CE127 M	mg/kg As	17	-
Boron (water soluble)	CE063 M	mg/kg B	1.5	-
Cadmium (total)	CE127 M	mg/kg Cd	<0.2	-
Chromium (total)	CE127 M	mg/kg Cr	83	-
Copper (total)	CE127 M	mg/kg Cu	34	-
Lead (total)	CE127 M	mg/kg Pb	64	-
Mercury (total)	CE127 M	mg/kg Hg	<0.5	-
Nickel (total)	CE127 M	mg/kg Ni	33	-
Selenium (total)	CE127 M	mg/kg Se	1.2	-
Zinc (total)	CE127 M	mg/kg Zn	99	-
pH	CE004 M	units	8.0	7.5
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	155	146
Total Organic Carbon (TOC)	CE072 M	% w/w C	2.60	-
Estimate of OMC (calculated from TOC)	CE072	% w/w	4.48	-
PAH				
Naphthalene	CE087	mg/kg	0.05	-
Acenaphthylene	CE087	mg/kg	<0.01	-
Acenaphthene	CE087	mg/kg	0.02	-
Fluorene	CE087	mg/kg	0.01	-
Phenanthrene	CE087	mg/kg	0.30	-
Anthracene	CE087	mg/kg	0.08	-
Fluoranthene	CE087	mg/kg	0.96	-
Pyrene	CE087	mg/kg	0.89	-
Benzo(a)anthracene	CE087	mg/kg	0.51	-
Chrysene	CE087	mg/kg	0.56	-
Benzo(b)fluoranthene	CE087	mg/kg	0.71	-
Benzo(k)fluoranthene	CE087	mg/kg	0.28	-
Benzo(a)pyrene	CE087	mg/kg	0.61	-
Indeno(123cd)pyrene	CE087	mg/kg	0.42	-
Dibenz(ah)anthracene	CE087	mg/kg	0.08	-
Benzo(ghi)perylene	CE087	mg/kg	0.37	-
PAH (total of USEPA 16)	CE087	mg/kg	5.86	-
BTEX & TPH				
MTBE	CE057 U	mg/kg	-	-
Benzene	CE057 U	mg/kg	-	-
Toluene	CE057 U	mg/kg	-	-
Ethylbenzene	CE057 U	mg/kg	-	-
m & p-Xylene	CE057 U	mg/kg	-	-
o-Xylene	CE057 U	mg/kg	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-

Chemtech Environmental Limited

SOILS

Lab number			51822-19	51822-20
Sample id			TP 11	TP 12
Depth (m)			0.60	1.50
Date sampled			18/06/2014	18/06/2014
Test	**Method**	**Units**		
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	-
Subcontracted analysis				
Asbestos	$	-	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	PAH (speciated)	Solvent extraction, GC-MS	Wet		0.01	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID	Wet		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44	Solvent extraction, GC-FID	Wet		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
A	Sampling date not provided
B	Sampling time not provided (waters only)
C	Sample exceeded holding time(s)
D	Sample not received in appropriate containers
E	Headspace present in sample container
F	Sample not chemically fixed (where appropriate)
G	Sample not cooled
H	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
51822-1	MP 01	0.60	N	
51822-2	MP 01	2.40	N	
51822-3	MP 02	0.50	N	
51822-4	MP 04	0.10	N	
51822-5	MP 04	1.20	N	
51822-6	MP 06	0.40	N	
51822-7	MP 08	0.60	N	
51822-8	TP 01	0.15	N	
51822-9	TP 01	0.60	N	
51822-10	TP 02	0.60	N	
51822-11	TP 02	1.20	N	
51822-12	TP 03	0.50	N	
51822-13	TP 04	0.50	N	
51822-14	TP 05	0.50	N	
51822-15	TP 06	0.70	N	
51822-16	TP 09	0.30	N	
51822-17	TP 10	0.50	N	
51822-18	TP 10	1.20	N	
51822-19	TP 11	0.60	N	
51822-20	TP 12	1.50	N	

Appendix E

Laboratory Geotechnical Results

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL14/3164

Client's Reference: Report Date: 09 July 2014

Client Name: 3E Consulting Engineers Ltd
4 Calder Close
Calder Park
Wakefield

WF4 3BA

For the attention of: Alex Bradley

Contract Title: High Street, Royston

Date Received: 25/6/2014
Date Commenced: 25/6/2014
Date Completed: 9/7/2014

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	M Beastall (Laboratory Manager)
D Lambe (Senior Technician)	S Royle (Senior Technician)	

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP01			1.50	Brown mottled grey sandy CLAY.
TP02			2.00	Brown CLAY.
TP06			1.60	Brown mottled grey CLAY.
MP01			3.00	Brown CLAY.
MP02			3.10	Brown CLAY.
MP04			1.80	Brown CLAY.
MP06			1.50	Dark grey MUDSTONE.
MP08			1.40	Brown sandy very silty CLAY.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	08/07/14		08/07/14		08/07/14

HIGH STREET, ROYSTON.

Contract No: PSL14/3164

Client Ref: 13690

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	% Passing .425mm	Remarks
TP01			1.50	16				43	21	22	100	Intermediate plasticity CI.
TP02			2.00	30				56	28	28	100	High plasticity CH.
TP06			1.60	44				81	34	47	100	Very high plasticity CV.
MP01			3.00	21				49	25	24	100	Intermediate plasticity CI.
MP02			3.10	30				72	27	45	100	Very high plasticity CV.
MP04			1.80	35				73	30	43	100	Very high plasticity CV.
MP06			1.50	13					NP			
MP08			1.40	18				35	21	14	100	Intermediate plasticity CI.

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	08/07/14		08/07/14		08/07/14

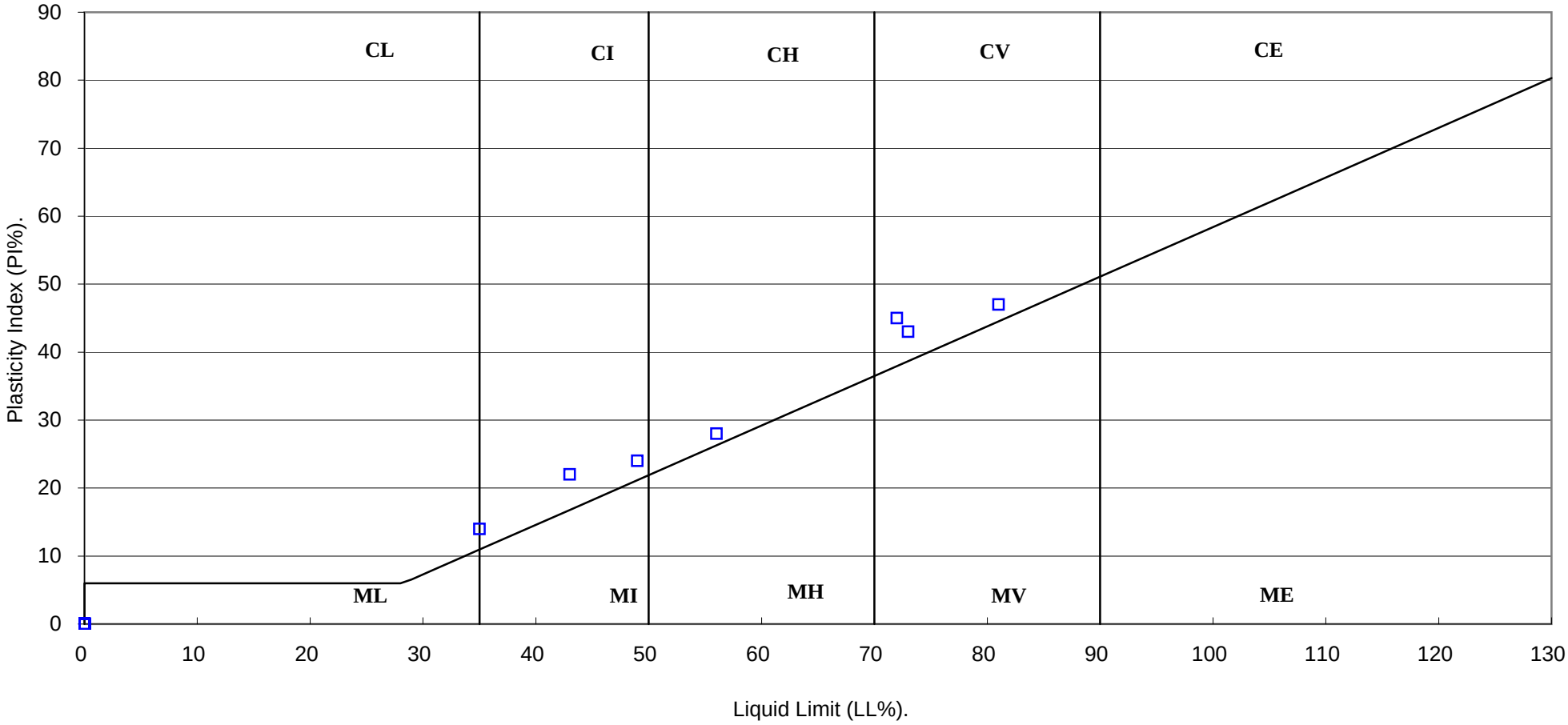
HIGH STREET, ROYSTON.

Contract No: **PSL14/3164**

Client Ref: **13690**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



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