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PHASE 2: GROUND INVESTIGATION REPORT

MD ONE LTD

PROPOSED RESIDENTIAL DEVELOPMENT

HINCHLIFFE MILL

WATER STREET

HOLMBRIDGE

WEST YORKSHIRE

Project No: 10-015

Prepared By:

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Date: 21st October 2011

Approved By:

Mark Berriman

Date: 21st October 2011

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APPENDICES

1.0 Introduction

October 2011

Following the results of a previous ground investigation (Card Geotechnics, May 2004) and Phase 1: Desk Top Study Report completed for this site (Ref. No. 10-015, July 2011), Arc Environmental Ltd. has been instructed by One17 SD, on behalf of MD One Ltd, to complete a programme of Phase 2 intrusive works within the grounds of Hinchliffe Mill, located on Water Street, within the West Yorkshire Town of Hinchliffe Mill. The redevelopment of the site will involve the construction of 12 no. new residential properties and the conversion of the original mill building into 7 no. properties with associated car parking & road infrastructure and areas of private gardens in the near future.

The intrusive investigation has been designed to provide an up to date and robust assessment of the potential ground contamination issues across the site as a whole for potential risks to human health and Controlled Waters, in addition to the potential geotechnical issues associated with the proposed development works, as highlighted from the results of the desk top study data and previous ground investigation data.

The following reports should be read in conjunction with this Phase 2 Ground Investigation report, with the investigation data contained within these reports utilised to aid the completion of these intrusive investigation works;

Phase 1: Desk Top Study, Project Ref. No. 10-015, August 2011.
Card Geotechnics Ltd, Geo-environmental Interpretative Report – Hinchliffe Mill, Holmbridge, West Yorkshire, Site Assessment Report, May 2004

The intrusive investigation works comprised the sinking of 17 no. mechanically excavated trial pits (TP's 01, 01A &B, 02, 02A, 03 – 05, 05A and 06 – 13) and 19 no. windowless sampling boreholes (BH's 01, 01A, 02, 02A, 03 – 06, 06A and 07 – 16), incorporating 8 no. combined gas and groundwater monitoring wells (BH's 01, 03, 05, 08, 09, 10 - 12). All the investigation positions put down can be seen on the Trial Pit & Borehole Location Plan, a copy of which can be seen in Appendix II. It should be noted that the plan should be used for orientating purposes only, as the location of the positions are approximate.

2.0 Site Details

Table 2.1

N = north, S = south, E = east, W = west

Site Name & Address:	Hinchliffe Mill, Off Water Street, Holmbridge, Holmfirth, West Yorkshire, HD9 2NX.
OS Grid Reference:	412700, 407060 (representative for the central part of the site).
Description of Location	The site is an area of derelict land, mill pond and former mill buildings located within the West Yorkshire town of Hinchliffe Mill.
Site Boundaries:	N = Water Street, E = Agricultural fields, S = Agricultural fields and residential properties, W = Dobb Lane.
Site Setting:	Predominantly residential setting to the north & west and rural setting to the east & south.

3.0 Scope of Works

Table 3.1

Client:	MD One Ltd.
Engineers:	One17 Design.
Project type:	The redevelopment of the site will involve the construction of 12 no. new residential properties and the conversion of the original mill building into 7 no. properties with associated car parking & road infrastructure and areas of private gardens in the near future.
Site Location plan:	See Appendix I.
Layout plans (existing):	See Appendix I.
Layout plans (proposed):	See Appendix I.

3.0 Scope of Works (Cont'd)

Table 3.1 (Cont'd)

Investigation Works:	17 no. mechanically excavated trial pits (TP's 01, 01A & B, 02, 02A, 03 – 05, 05A and 06 – 13), 19 no. windowless sampling boreholes (BH's 01, 01A, 02, 02A, 03 – 06, 06A and 07 – 16), accompanied by the installation of 8 no. combined gas and groundwater monitoring installations (BH's 01, 03, 05, 08, 09, 10 – 12).
Laboratory Testing:	Geotechnical & Ground Contamination.
CLEA End-Use Classification:	Level 1 GQRA - Residential.
Reporting:	Geotechnical - Factual & Interpretative Contamination - Interpretative including Level 1 Generic Quantitative Risk Assessments for Human Health, Controlled Waters and Hazardous Ground Gases.
Site History Summary:	According to a date stone on the original mill building, Hinchliffe Mill was constructed in c.1832 with the mill being expanded in c.1922. The OS plan of the site records a number of building structures and other features including tanks (now not present) and a mill pond. The presence of demolished structures, infilled pits, potential cemented asbestos sheeting and service pipes were identified during a site visit in May 2010. Several outfalls were also noted from the northeastern retaining wall adjacent to the River Holme. At the time of the ground investigation being undertaken the remaining mill buildings and concrete slabs had been demolished.
Other Comments:	The site is currently affected by the presence of Japanese Knotweed, and it is understood that a suitable herbicidal treatment scheme is underway.

The information contained in this report is limited to the area of the site, as indicated on the Existing & Proposed Site Layout Plans shown in Appendix I, and to those areas accessible during the ground investigation. When considering the full scope of the development any features and / or issues not specifically mentioned in this report cannot be assumed to have been covered.

4.0 Ground Conditions

For an accurate description of the ground conditions encountered at each investigation position, reference should be made to the trial pit & borehole record sheets in Appendix II, and the depths of strata on the record sheets are recorded from current ground levels.

4.1 Soil Profile:-

A summary of the soil profile for this site can be found in Table 4.1 on the following page, and a summary of specific site observations are described as follows:-

A number of investigation positions on the northern portion of the site targeted, an area of formerly identified elevated PAH & TPH contamination (Card Geotechnics 'TP06'). Including this location, generally there was no significant visual or olfactory evidence of any heavy or 'gross' fuel-derived contamination (i.e. diesels, fuel oils, etc.). However, an old drain or historical stone culvert was encountered in TP12 which appeared to contain 'oily' saturated sediments.

Ash and clinker was noted within the made ground encountered across isolated portions of the site and these deposits may represent a potential source of 'organic' contamination (PAH). A number of targeted samples were initially screened for speciated PAH's and following the initial assessment of these results, additional samples from across the whole of the site were further screened for PAH's.

4.0 Ground Conditions (Cont'd)

4.1 Soil Profile (Cont'd):-

Whilst no buried asbestos containing materials were noted within the made ground, it should be noted that potential cemented asbestos sheeting was observed on the surface at the general locations of BH01 and TP06. Taking into account the historical development of the site, it was deemed prudent to complete screening for potential asbestos, within a number of randomly selected soil samples.

Table 4.1

Type of Strata	Depths Recorded (BGL)	Description & General Comments
MADE GROUND:	From 0.00m up to c.0.30m to c.2.60m	The surfacing comprised demolition rubble, old building slabs, concrete hardstanding and sandstone gravel. Made ground comprised gravely sand with brick, concrete and sandstone, fine to coarse ash & clinker and reworked natural deposits of sandy gravely clay, very gravely sand and very sandy gravel. The deepest made ground deposits were recorded adjacent to the existing retaining walls. Grey sandy slightly organic silts were recorded adjacent to the mill pond, and it would appear that the northeastern extent of the mill pond has been infilled. Red sandy gravel of shale and sandstone blocks was recorded at the location of TP01A. Made ground was noted to be absent at the locations of TP05 & BH05
TOPSOIL:	From 0.00m up to c.0.10m to c.0.30m	Dark brown sandy clayey SOIL was recorded at the locations of TP05 & BH05.
DRIFT GEOLOGY:	From c.0.10m to c.2.60m up to c.0.80m to c.3.40m	The natural drift generally comprised gravelly SAND with cobbles and sandy CLAY. Drift was noted to be absent at the locations of TP's 08 - 10.
SOLID GEOLOGY: (Millstone Grit Series)	From c.0.20m to c.3.40m up to c.0.90m to c.3.50m	The bedrock comprised disintegrated becoming fresh medium & coarse grained SANDSTONE and fine grained SILTSTONE.

bgl = Below ground levels.

4.2 Groundwater:-

During the investigation period, generally no water seepages were observed within any of the investigation positions put down across the site. However standing water levels were noted within BH's 04 & 13 at depths of c.1.90m and c.2.60m bgl, and also at the base of TP04, upon completion.

Further groundwater monitoring has been undertaken within the combined gas and groundwater monitoring standpipes installed across the site. The results of the monitoring is discussed in Section 5.4.

5.0 Insitu Testing

5.1 Insitu Field Vane Tests:-

Insitu hand vane tests were carried out using a portable Controls Testing Equipment Limited (Upper limit 120kN/m^2) field hand vane tester on the more cohesive made ground materials and the natural clay deposits encountered in the trial pits and boreholes. The results obtained can be found adjacent to the appropriate sample level, on the graphic trial pit and borehole record sheets.

5.0 Insitu Testing (Cont'd)

5.1 Insitu Field Vane Tests (Cont'd):-

As can be seen from the results of the tests carried out on the cohesive made ground materials, shear strength values of between 10kN/m^2 up to 77kN/m^2 were recorded, equating to very low and medium strength deposits.

For the natural clay drift deposits, variable shear strengths of between 30kN/m^2 up to 95kN/m^2 were recorded, equating to low and high strength deposits.

From the testing undertaken it can be seen that the highly variable strength characteristics have been recorded for both the made ground and drift deposits.

5.2 Insitu Standard Penetration Tests:-

Insitu standard penetration tests were carried out within the boreholes with the use of a 60° solid cone penetrometer (CPT), in order to determine the relative density and strength of the materials present. The results are shown as uncorrected 'N' values on the graphic borehole record sheets, adjacent to the appropriate sample level, and also on the SPT summary sheet contained in Appendix III. A summary of the test results can be seen in Table 5.1 below.

Where the full penetration depth, including seating blows (450mm), could not be achieved, the bottom sampling depth is indicated as less than 0.45m from the top (start of test), with the actual depth of penetration and number of blows undertaken also being recorded.

Table 5.1

Type of strata	Range of SPT 'N' Values	Result details
MADE GROUND	0 - 11	Very loose, soft and firm materials
SAND	8, 28 & 46	Loose to Dense
CLAY	16, 49 & 57	'Stiff and Very Stiff'*
SANDSTONE/SILTSTONE	50, 56 & 64	Very Dense Strata

* - shear strength value estimated using a factor of 5 for Glacial Till (after Stroud)

As anticipated, due to the presence of cobbles and gravels within the natural sand deposits, relatively high blow counts for limited penetration were recorded. It is a possibility that towards the base of some of the boreholes that the high blow counts recorded may have been influenced by the presence of bedrock, although this could not be positively identified.

5.3 Insitu CBR Tests:-

Insitu CBR tests were carried out using a MEXE Cone Penetrometer, in accordance with the manufacturers instructions, in order to obtain the insitu CBR value of the made ground materials and natural sand & clay deposits noted within the trial pits. In each case a series of tests were carried out and an average of the results noted can be seen on the trial pit record sheets in Appendix II, adjacent to the appropriate sample depth.

The results of the insitu CBR tests undertaken within the made ground deposits recorded values of between 2.0% and 5.0%, whilst values of 1.0% and 12.0% was recorded for the natural sand and clay.

Therefore, based on the results of the intrusive investigation works and visual observations, for any new areas of hardstanding and ground bearing floor slabs constructed across the site, using the made ground as an undisturbed sub-grade it is felt that a characteristic design CBR value of 2.0% should not be exceeded. Similarly, where the natural deposits are utilised as an undisturbed sub-grade it is felt that a characteristic design CBR value of 2.0% should also be utilised.

5.0 Insitu Testing (Cont'd)

5.4 Insitu Ground Gas & Groundwater Monitoring:-

Combined ground gas & water monitoring standpipes were installed within BH's 01, 03, 05, 08, 09, 10 – 12, to check for the possible presence of a shallow groundwater beneath the site associated with the River Holme, as well as assessing the potential for hazardous ground gas generation from the made ground materials present on site and volatile vapours from potential hydrocarbon contamination, although this is generally considered very low risk.

A standard 50mm diameter HDPE standpipe, with gravel and geo-wrap surround, bentonite seal, gas valve cap and security cover, was installed within each borehole, and ground gas and water levels were allowed to reach equilibrium, prior to the first monitoring visit. The bentonite seal was taken to a depth of c.1.00m bgl, to try and prevent excessive surface water ingress or venting of soil gas, with the resulting response zone covering the remaining depths of the installations. Monitoring was undertaken using a Gas Data GFM series or LMS xi infra red gas analyser, with integral flow meter, and a Geotechnical Instruments electronic dipmeter.

5.4.1 Hazardous Ground Gas Risk Assessment:-

Based on the findings of the Phase 1: DTS report and intrusive works, and in accordance with CIRIA Report C665, November 2007 and BS8485:2007: Code of practice for the characterization and remediation from ground gas affected developments, it is felt that an adequate risk assessment can be undertaken based on the following limiting factors:

- The proposed residential development has been considered as *high* sensitivity (Tables 5.5a & 5.5b – Typical/Idealised frequency and period of monitoring, after Wilson et al, 2005).
- The risk associated with the generation potential of a source is considered as *very low* (assessment based on the results of the Phase 1: DTS report combined with findings of the intrusive works).
- Monitoring over a minimum of *three* months with *six* recorded readings (Tables 5.5a & 5.5b – Typical /idealised frequency and period of monitoring after Wilson et al, 2005).
- Currently, no detectable concentrations of Methane or Carbon Dioxide have been recorded, exceeding action trigger levels of 1% & 5% respectively. (Table 8.5 – Modified Wilson & Card classification).
- At this stage, *negligible* and *slightly negative* flow rates have been recorded during the monitoring period to date (Table 8.5 – Modified Wilson & Card classification).

A summary of the results for the visits undertaken are presented in Table 5.2 on the following page, with copies of the monitoring certificates contained in Appendix III. A further 4 no. visits have been scheduled, and these results along with final recommendations will be issued as an addendum Letter Report.

As can be seen from the results to date, no levels of Methane (CH_4) have been recorded. Concentrations of Carbon Dioxide (CO_2) have been recorded, up to a maximum level of 1.3% *v/v*, with slightly depleted oxygen (O_2) concentrations (minimum 15.5% *v/v)*. Negligible and slightly negative flow rates (<0.1 and -0.5 l/hr) have been recorded.

For the purposes of the proposed residential development the site is characterised based on the limiting borehole gas volume flow for methane and carbon dioxide known as the Gas Screening Value (GSV) which inturn determines the level of protection required.

Due to the lack of CH_4 recorded, there is no GSV value for methane. Therefore, in order to complete the risk assessment, the maximum GSV (Gas Screening Value) for the CO_2 levels recorded has been determined by multiplying the maximum concentration recorded (taken as 1.3%) by the maximum flow rate (taken as 0.5l/hr) which gives a GSV of 0.0065 l/hr (calculated from 1.3% (0.013) x 0.5l/hr maximum flow rate) for CO_2.

5.0 Insitu Testing (Cont'd)

5.4 Insitu Ground Gas & Groundwater Monitoring:-

5.4.1 Hazardous Ground Gas Risk Assessment (Cont'd):-

Table 5.2

Position	Date	Atmospheric Pressure (mbar)	Water (m bgl)	CH_4 (%v/v)	LEL (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Flow Rate (l/hr)
BH1	12/09/2011	975-976	Dry	0.0	0.0	0.3	19.9	<0.1
BH3			2.97	0.0	0.0	0.1	20.2	<0.1
BH5			Dry	0.0	0.0	0.3	20.2	<0.1
BH8			1.77	0.0	0.0	0.0	20.1	<0.1
BH9			Dry	0.0	0.0	1.3	15.5	<0.1
BH10			1.18	0.0	0.0	0.0	20.3	<0.1
BH11			0.48	0.0	0.0	0.4	19.3	<0.1
BH12			1.73	0.0	0.0	0.4	19.3	<0.1
BH1	29/09/2011	1000-1002	Dry	0.0	0.0	0.0	21.0	<0.1
BH3			2.96	0.0	0.0	0.2	20.5	<0.1
BH5			Dry	0.0	0.0	0.5	20.5	<0.1
BH8			1.75	0.0	0.0	0.0	21.0	-0.5
BH9			Dry	0.0	0.0	0.1	20.8	<0.1
BH10			1.18	0.0	0.0	0.1	20.8	<0.1
BH11			Dry	0.0	0.0	0.0	20.0	<0.1
BH12			2.00	0.0	0.0	0.6	20.2	<0.1
4 no. outstanding visits to be completed								

From the results it can be seen that the GSV value for CO_2 does not exceed the GSV assessment value of 0.07 l/hr (Characteristic Situation 1) or 0.78 l/hr (NHBC Green classification), indicating that no gas protection measures would be required for the proposed development. However this will have to be reassessed following the required 4 no. subsequent gas monitoring visits.

5.4.2 Groundwater

When considering the results of the groundwater monitoring, it can be seen that standing water levels of between c.0.48m and c.2.97m have been recorded, although these are generally towards the base of the monitoring standpipes.

When considering the lack of significant water ingresses/strikes encountered during the intrusive works, the water recorded is likely to be attributable to that of infiltration of surface drainage, rather than representing the presence of a continuous shallow groundwater surface (water table) below this site. Nonetheless, it would be prudent to allow for temporary pumping of water, especially during the wetter periods of the year, within any excavations undertaken.

6.0 Laboratory Testing

All geotechnical testing was carried out in accordance with BS1377:1990: Parts 1-9 by Professional Soils Laboratory Limited (PSL) of Doncaster, South Yorkshire (UKAS accredited). Ground contamination screening was undertaken by Chemtech Environmental of Consett, Co. Durham (UKAS & MCERTS accredited).

6.1 Determination of Liquid & Plastic Limits:-

Representative samples (7 no.) of the natural clay deposits encountered were tested in order to determine their liquid and plastic limits, so these materials could be classified.

6.0 Laboratory Testing (Cont'd)

6.1 Determination of Liquid & Plastic Limits (Cont'd):-

The results are summarised in Table 6.1 below and are also contained in the PSL Analytical Report (ref no.: PSL11/2204), a copy of which is contained in Appendix IV.

Table 6.1

Position	Depth(m)	M/C (%)	LL	PL	PI	Class	% Passing 425µm Sieve
TP01A (north)	1.45-2.70	27	41	23	18	CI	91
TP03	0.85-1.75	29	39	24	15	CI	93
TP13	1.60-2.20	39	43	24	19	CI	90
BH04	1.00	29	50	24	26	CI	93
BH07	1.00	34	49	24	25	CI	83
BH12	1.50	27	39	23	16	CI	80
BH15	2.60	9.2		NP			

M/C = Moisture Content, LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index, CI = Clay Intermediate, NP = Non-plastic.

From these results it can be seen that the samples tested are inorganic in nature, and when plotted on the plasticity chart fall within the low plasticity range, and from the resulting plasticity indices, display a low and moderate volume change (shrinkage or swelling) potential, when taking into account the amount passing the 425µm sieve. The remaining sample tested has been recorded to be non-plastic, confirming that this sample is more of a coarse soil and therefore can be considered as having a negligible swelling or shrinkage potential.

Therefore, it can be seen that these materials are likely to undergo significant changes in volume, if large changes in their natural moisture content were to occur due to seasonal variations or the like, and if new foundations were to be based within these materials, they would need to be taken down to a minimum depth of 0.90m below finished ground levels.

6.2 Determination of Particle Size Distribution (PSD):-

Representative samples of the natural sand drift deposits recovered from below the site were tested in order to determine their particle size distribution (PSD) so these materials might be classified, with two of the samples taken forward for sedimentary tests (silt & clay). The results of the tests are represented both numerically and graphically on the analytical result sheets (ref no.: PSL11/2204), a copy of which is contained in Appendix IV.

From the results it can be seen that the natural granular samples tested from TP's 01 & 02 generally equate to well and poorly graded soils, comprising of clayey/silty gravely fine to coarse grained sand to slightly clayey/silty sandy fine to coarse gravel with cobbles. For the soils taken from TP's 12 & 13, adjacent to the mill pond, the results have identified well graded soils, comprising slightly gravely sandy silty clay to slightly gravely clayey very sandy silt. The results of the PSD testing generally concur with the field descriptions of these soils.

6.3 Determination of Organic Content:-

Two samples of the soils identified within TP12 and BH13, which were noted as being 'slightly organic' and recovered from adjacent to the mill pond, were tested in order to determine there organic content, so that the potential for compressibility could be assessed. The results are shown in the Chemtech Environmental Limited Analytical Report (ref no.: ARC/43302(2)), a copy of which is contained in Appendix IV.

The results of the samples screened revealed organic contents of 1.71% *w/w* and 3.31% *w/w*, indicating low organic contents, comprising slightly organic and organic silt and clay, with these results generally concurring with the field descriptions. Therefore, based on these results it is felt that these materials are unlikely to be susceptible to significant consolidation through loss of water, or compressibility normally associated with high organic materials.

6.0 Laboratory Testing (Cont'd)

6.4 Determination of Chemical Attack on Buried Concrete:-

Representative samples of the made ground recovered during the investigation, were tested in order to determine their acidic (pH) and soluble sulphate (SO_4) levels. The results are shown in Table 6.2 below and are also contained within the Chemtech Environmental Limited Analytical Report (Ref no: ARC/43302(2)), a copy of which is contained in Appendix IV.

Table 6.2

Position	Depth (m)	Strata	SO_4(mg/l)	pH value	Design SO_4 Class	ACEC Class
BH 3	0.40	MG	66	8.5	DS-1	AC-1
BH 4	0.40	MG	96	8.5	DS-1	AC-1
BH 8	0.20	MG	136	8.4	DS-1	AC-1
BH 9	0.20-1.00	MG	108	5.4	DS-1	AC-3z
BH 11	0.20	MG	579	8.7	DS-2	AC-2
TP 1A	0.00-0.50	MG	126	8.4	DS-1	AC-1
TP 1B	0.00-0.35	MG	1361	8.2	DS-2	AC-2
TP 1B	0.35-0.60	MG	562	8.1	DS-1	AC-1
TP 1B	0.60-1.00	MG	48	6.8	DS-1	AC-1
TP 2A	0.00-1.00	MG	424	6.3	DS-1	AC-2z
TP 3	0.00-0.35	MG	1660	10.4	DS-3	AC-3
TP 6	0.00-0.65	MG	117	8.2	DS-1	AC-1
TP 7	0.00-0.40	MG	13	8.1	DS-1	AC-1
TP 9	0.00-0.60	MG	142	8.0	DS-1	AC-1
TP 11	0.00-0.80	MG	35	7.8	DS-1	AC-1
TP 12	0.00-0.80	MG	61	8.2	DS-1	AC-1
TP 13	0.10-0.40	MG	19	8.0	DS-1	AC-1

MG = Made Ground, ACEC = Aggressive Chemical Environment for Concrete site classification

From these results for the samples of soil tested, it can be seen that the amount of soluble sulphate present ranges between 13mg/l up to 1660mg/l, and the pH values range between 5.4 up to 10.4. Therefore, in accordance with BRE Special Digest 1: 2005, the site can be given a classification of Class DS-3. When considering the nature of the materials tested and assuming mobile groundwater the assessment of the Aggressive Chemical Environment for Concrete (ACEC) is AC-3z, due to the presence of some acidic ground conditions.

6.5 Contamination Screening:-

Representative samples of the made ground materials recovered from the trial pits and boreholes were passed onto Chemtech Environmental of Consett, Co. Durham, so that generic and targeted organic soil contamination screening could be carried out.

The samples were screened using a standard generic contamination suite (based on the current CLEA SGV listed analytes with historical additions), which is used to assess typical made ground (disturbed natural strata mixed with anthropogenic debris) of an unknown source.

Due to the presence of ash & clinker encountered across some isolated portions of the site, initially 8 no. soil samples were screened for speciated PAH's. However, following receipt of the preliminary laboratory results, a further 28 no. samples of the made ground were subjected to speciated PAH testing.

Generally, no significant evidence of hydrocarbon contamination was recorded across the whole of the site. However, 4 no. samples have been subjected to speciated TPH testing, primarily targeting the area previously identified by the Card Geotechnics investigation as well as some 'oily' sediments encountered within an old stone culvert/drain in TP12.

6.0 Laboratory Testing (Cont'd)

6.5 Contamination Screening (Cont'd):-

Whilst no potential buried asbestos containing materials were encountered during the investigation, there was evidence of potential cemented asbestos sheets noted on the surface near to the locations of BH01 & TP06. Therefore, taking into account the historical development of the site and the noted presence of asbestos containing materials, it was deemed prudent to screen randomly selected samples of the made ground from across the site to assess future potential risks from the potential presence of buried asbestos.

The catalogue of testing results can be found in the Chemtech Analytical Reports (ref nos.: ARC/43302(2) & 43439), copies of which are also contained in Appendix IV, and the total analysis carried out is summarised below:

- 17 no. Generic Soils Suites - based on the current CLEA SGV listed analytes with historical additions which are used to assess typical made ground, comprising disturbed natural strata mixed with anthropogenic debris, of an unknown source (suite comprises; Arsenic, Cadmium, Chromium (III & VI), Copper, Lead, Mercury, Nickel, Selenium, Zinc, pH, Soluble Sulphate, free Cyanide, and Total Organic Carbon (TOC)).
- 4 no. Total Phenols.
- 36 no. Speciated Poly-cyclic Aromatic Hydrocarbons (PAH's) – based on the current USEPA 16 PAH's + Benzo(j)fluoranthene.
- 4 no. Speciated Total Petroleum Hydrocarbons (TPH – Aliphatic & Aromatic Equivalent Carbon Bands) including BTEX.
- 9 no. Asbestos Fibre Screens.
- 8 no. Generic Leachate Suite – suite comprises; Arsenic, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Zinc, pH, Sulphate, Sulphide, and free Cyanide.
- 4 no. Total Phenols Leachate Suite.
- 8 no. Speciated Poly-cyclic Aromatic Hydrocarbons (PAH's) Leachate Suite.
- 4 no. Speciated Total Petroleum Hydrocarbons (TPH's – 8 Carbon Bands) Leachate Suite.

The generic and organic contamination results (soil and leachate) have been used to carryout Level 1 Generic Quantitative Risk Assessments for Human Health and Controlled Waters, for the ground contamination present, and these are discussed in Section 7.0 below and continued on the following pages.

7.0 Ground Contamination Risk Assessment

7.1 Methodology:-

Following completion of the contamination screening undertaken on various samples from this site, Level 1 quantitative ground contamination risk assessments have been undertaken, generally in accordance with CLR11: Model Procedures for the Management of Land Contamination. A detailed description of the Assessment Framework and Methodology used by ARC for these risk assessments can be found in Appendix V. This quantitative ground contamination risk assessment uses the current UK practice for assessing the risks from land contamination, which is based on the established *source-pathway-receptor* pollutant linkage methodology and 'suitable for use' approach (Part IIA, EPA 1990 - inserted through Section 57 EA 1995).

Based on the Conceptual Site Model (CSM) for this site (described further in the following Section 7.2), a site specific screening strategy for the site has been developed (see Section 7.3) and the risks from potential contaminants have been assessed for both human health and the water environment. The results of the risk assessments can be found in Sections 7.4 (Human Health) and 7.5 (Controlled Waters). Comments regarding off-site disposal can also be found in Appendix V.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.2 Revised Conceptual Site Model (CSM):-

Following the results of the intrusive investigation works, a revised Conceptual Site Model (CSM) has been developed, although this has not changed from the original CSM devised for the Phase 1: DTS. The investigation and this model has identified the potential for land contamination to exist on this site, comprising made ground materials, along with potential 'hot spots' of PAH, TPH and asbestos contamination.

Table 7.1 below summarises the *source(s)*, *pathways* and potentially sensitive *receptors* for this site, assuming no remediation, additional protection measures and/or removal of the sources contamination takes place, and this is graphically represented in the CSM drawing contained in Appendix V.

Table 7.1

	Sources (S)		Pathways (P)		Receptors (R)
S1	Generic made ground materials encountered across the whole of the site – Pervasive Arsenic & Lead	P1	Ingestion & Dermal Contact	R1	Human health (Residents)
S2	Hazardous ground gas/vapour generation from made ground	P2	Inhalation of indoor and outdoor air/vapours	R2	Groundwater within Drift and Bedrock (Secondary A Aquifer)
S3	Potential localised 'hot spot' PAH contamination	P3	Consumption of Home-grown produce & attached soil	R3	River Holme
S4	Potential localised 'hot spot' of TPH contamination	P4	Migration through existing services	R4	Adjacent sites
S5	Potential localised areas of Asbestos containing materials (ACM's)/fibres	P5	Direct contact with building materials	R5	Building materials*
		P6	Surface runoff & Infiltration	R6	Flora and fauna*

* = Not included in the Human Health & Controlled Waters Risk Assessment

7.2.1 Sources:-

The site is covered with variable thicknesses of made ground which represents the primary potential source of ground contamination for this site, recorded between c.0.30m up to c.2.60m and comprises the types of materials described in Section 5.1 of this report. The origin of these materials is most likely to be associated with the historic development of Hinchliffe Mill.

When considering the nature of the proposed development, the existing site and the ground conditions encountered, for the generic contamination present within the made ground, the site at this stage has been assessed as a single averaging area, and these materials have been assessed using a standard generic soil suite.

Generally, there was no significant visual or olfactory evidence of heavy or gross hydrocarbon contamination (fuel or oil) encountered across the whole of the site. In particular, no hydrocarbon contamination was encountered within the northern portion of the site, including the area around Card Geotechnics 'TP06'. Nonetheless samples from these investigation works (TP01B) have been targeted to determine the risk from any potential hydrocarbon contamination present. In addition, some 'oily' saturated sediments were encountered within an old stone culvert/drain within TP12.

During these investigation works there was visual evidence of ash and clinker within the made ground encountered across some isolated portions of the site. A number of targeted samples were initially screened for PAH's, and following the preliminary laboratory results, it was suspected that a potential 'hot spot' of PAH contamination may be present around the location of TP01B and Card Geotechnics 'TP06'.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.2 Revised Conceptual Site Model (CSM) (Cont'd):-

7.2.1 Sources (Cont'd):-

As such additional samples from across the remainder of the site have been screened to provide a representative sample population and determine the spatial distribution for any potential PAH's present across the site as a whole.

In addition, it was deemed prudent to complete screening for the presence of Asbestos, especially when taking into account the historical development of the site and also potential asbestos containing materials noted on the surface within the general vicinity of BH01 and TP06.

7.2.2 Pathways:-

When considering the proposed end use (*Residential*), and without considering treatment, removal or protection measures, there are some potential plausible pathways available for direct contact, dermal contact, ingestion, inhalation, wind (dust / particulate), volatilization, and vertical and lateral transportation below the site, both within the existing structure and externally, where there is no hard cover or vapour barriers present.

Within the CLEA Risk Assessment Model for Human Health, there are 3 exposure mediums considered for on site receptors, comprising ingestion of soil containing contaminants, inhalation of contaminated dust/vapours and dermal contact, with up to 10 no. exposure pathways considered, as show below.

1. Ingestion of soil and indoor dust 2. Consumption of home-grown produce and attached soil 3. Dermal contact (indoor) 4. Dermal contact (outdoor) 5. Inhalation of dust (indoor) 6. Inhalation of dust (outdoor) 7. Inhalation of vapour (indoor) 8. Inhalation of vapour (outdoor) 9. Oral background intake 10. Inhalation background intake.

Where the future site layout has hard cover and below the actual new structures, these pathways will not be available, except where building materials / structures and services come into direct contact with the made ground. It should be noted that pathway 2 has been retained in this model, to take into account the possibility of vegetables being grown on site and consumed by future residents.

In addition, when considering the potential pathways for leachate migration, where either hard cover and/or future surface water drainage systems are present, the potential effects of surface infiltration or contaminated surface water runoff will be greatly reduced.

Similarly, when considering the construction work force, exposure pathways through direct contact, ingestion and dust inhalation will be available during part of the construction process, and therefore adequate PPE should be provided to protect the work force during this period.

7.2.3 Receptors:-

Within the CLEA Risk Assessment Model for Human Health, the potential receptors are assessed initially on site end use, followed by a delineation of age category (i.e. child or adult), with default settings for *Residential* and *Allotment* end uses based on a child aged 0 to 6 years, whilst *Commercial* end uses are based upon an adult working exposure period of up to 49 years (i.e. 16 to 65). Key generic assumptions for *Residential* and *Commercial* end use are also based upon a typical residential property, consisting of a two-storey small terraced house, with private garden, and a typical commercial or light industrial property, consisting of a three-storey office building (pre-1970), respectively. No building is anticipated for *Allotment* end uses.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.2 Revised Conceptual Site Model (CSM) (Cont'd):-

7.2.3 Receptors (Cont'd):-

Within the recently published CLEA Risk Assessment Model for Human Health (Science Reports SC50021/SR2 & SC050021/SR3) there are 3 no. generic end use categories presently in use, as follows;

1) Residential, 2) Allotments, 3) Commercial

Therefore, for this Level 1 Risk Assessment the best fit end use category for this site has been taken as:

1) Residential

However, where the former CLEA model SGV's and other published GAC's are to be utilised, the former CLEA end use category of *Residential with Plant Uptake* will also be used.

For Controlled Waters and assuming a worst case scenario, the primary receptors for the Level 1 Risk Assessment is the River Holme, as well as potential groundwater at depth within the solid geology and adjacent sites.

7.3 Screening Strategy:-

The generic samples screened for the contamination suite were chosen randomly to reflect the more homogeneous nature of the potential contaminants within the general matrix of the materials tested across the site as a whole, taking into account the historical use(s) of the site.

A number of investigation positions were put down to determine the presence and potential extent of previously identified PAH & TPH contamination around the location of Card Geotechnics 'TP06'. Generally, there was no significant visual or olfactory evidence of hydrocarbon contamination encountered across the site, including the area around Card Geotechnics 'TP06'. Nonetheless, randomly selected samples from TP01B were selected for speciated TPH to determine any potential risks. A sample from TP12 was also screened for speciated TPH due to the presence of some limited 'oily' saturated sediments encountered within an old stone culvert/drain.

There was visual evidence of ash and clinker noted within the made ground across some isolated portions of the site. In addition, it was suspected that the previously identified PAH contamination at Card Geotechnics 'TP06' may represent a localised 'hot spot'. Initially samples were targeted based on the presence of ash and adjacent to the area of Card Geotechnics 'TP06'.

Following receipt of the laboratory results for these samples, elevated PAH's were identified but these were generally constrained to the area identified from the previous investigation. As such it was felt that in order to adequately assess all the risks from potential PAH contamination, additional samples from across the whole of the site should be screened, in order to determine the spatial distribution of PAH's across the site.

Whilst the previous Card Geotechnics investigation did not identified any significant levels of phenols across the site, some low concentrations were noted at the location of 'TP06'. It was therefore felt prudent to complete phenol screening on samples from adjacent to this location as well as the localised hydrocarbon contamination noted during the recent investigation at TP12.

Due to the historical nature of the previous mill development, and the potential presence of asbestos containing materials noted at surface across isolated portions of the site, asbestos fibre screening of randomly selected samples of the made ground has been undertaken.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.3 Screening Strategy (Cont'd):-

Samples of groundwater have not been obtained from the monitoring installations as there was insufficient water to provide an adequate sample for analysis.

When considering the historical site use(s), the findings of the investigation and assuming a moderate risk to controlled waters and adjacent sites, due to the presence of the River Holme & underlying Secondary A Aquifer, 8 no. soil samples have been screened for generic & speciated PAH, and 4 no. speciated TPH & Phenol leachate contamination, to determine if the made ground present on this site represents a potential risk to Controlled Waters and adjacent sites.

7.4 Level 1 Generic Quantitative Risk Assessment - Human Health:-

7.4.1 Generic Screening Suite:-

The generic soil screening results have been subjected to statistical analysis utilising the contaminated land statistical analysis sheets developed by CL:AIRE, and a copy of the calculation sheets and the statistical methodology can be found in Appendix V.

The results of the analysis and risk assessment have been summarised in Table 7.2 below, and the results obtained from these investigation works have also been combined with the 16 no. soil samples screened for as part of the previous ground investigation, such that the samples population is raised in order to provide a more accurate and representative assessment of the generic contaminants present across the whole of the site.

Table 7.2

Analyte	Critical Conc. (C_C)	No. of Samples Screened	Max. Conc. (C_M) Recorded	Statistical Upper Confidence Limit ($UCL_{0.95}$)	Has $UCL_{0.95}$ exceeded C_C	No. of Samples > C_C	Is C_M a statistical outlier
Arsenic	**32[1]**	**33**	**194**	**63.04**	**Yes**	**4**	**No**
Cadmium	10[1]	33	9.3	1.91	No	0	Yes
Chromium III	3,000[4]	33	570	134.48	No	0	Yes
Chromium VI	4.3[4]	27	4.6	1.45	No	0	Yes
Copper	2,330[4]	33	739	188.82	No	0	No
Lead	**450[2]**	**33**	**2659**	**565.60**	**Yes**	**2**	**No**
Mercury	170[1]	33	1.8	0.68	No	0	Yes
Nickel	130[1]	33	85	45.32	No	0	No
Selenium	350[1]	33	3	0.98	No	0	No
Zinc	3,750[4]	33	703	221.32	No	0	Yes
Cyanide	34[3]	33	3	1.33	No	0	No
Phenol	420[1]	20	0.71	0.39	No	0	Yes

[1] = CLEA SGV Values (*Residential* – Version 1.06), [2] = CLEA SGV values (*Residential with Plant Uptake* - Version 1.0 beta), [3] = ATRISK^{SOIL} SSV, [4] = LQM CIEH Generic Assessment Criteria Values, 2nd Edition (2009), **Bold** = result exceeds critical concentration, Note = All units are mg/kg.

The results have identified the following:

- The maximum concentration value (C_M) and statistical upper confidence limit value ($UCL_{0.95}$) for Arsenic & Lead exceed the chosen critical concentration values (C_C) for this site. The elevated Arsenic & Lead concentrations are not recorded as statistical 'hot spots', and therefore the $UCL_{0.95}$ values of 63.04mg/kg & 565.60mg/kg respectively can be considered as representative of the site as a whole.
- The C_M and $UCL_{0.95}$ values recorded for the remaining generic analytes do not exceed the critical concentrations for this site.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.4 Level 1 Generic Quantitative Risk Assessment - Human Health (Cont'd):-

7.4.1 Generic Screening Suite (Cont'd):-

- The C_M values recorded for Cadmium, Chromium III & VI, Mercury, Zinc & Phenol are recorded as statistical outliers and are potential 'hot spots'. However, since neither the C_M nor $UCL_{0.95}$ values exceed the critical concentration values, it is felt that these analytes do not represent a significant risk to human health.
- None of the C_M values recorded for any of the remaining analytes represent statistical 'hot spots'.
- The contamination screening has identified that levels of Arsenic & Lead are pervasive within the made ground across the site and represent a potential risk to human health. Whilst the majority of the proposed development will comprise the building footprints, road infrastructure and car parking, and therefore most of the made ground will effectively be covered, some areas of private gardens and soft landscaping could still provide plausible migration pathways.
- Therefore, there is a requirement for removal, treatment, protection measures and/or further risk assessment (DQRA), in order to protect the future end users (i.e. no risk to human health) from the made ground encountered.

7.4.2 Speciated PAH Screening:-

Analysis of Full Data Set:-

The results of the previous investigation by Card Geotechnics identified elevated levels of PAH's at the location of 'TP06', and it was felt that this may represent a localised 'hot spot' of PAH contamination. Consequently, as part of this investigation a number of positions were put down around the vicinity of 'TP06' to determine the presence and potential extent of the previously recorded PAH contamination.

Initially, 8 no. soil samples of made ground were targeted for PAH screening based on the visual presence of ash and clinker as well as targeting the area around Card Geotechnics 'TP06'. Following receipt of the preliminary laboratory results for these targeted samples, elevated levels of some of the PAH's were only present within one sample (TP01B), again suggesting a possible 'hot spot'. Therefore, a further additional samples of the made ground from across the whole of the site (28 no.) were screened to provide a site wide sample population and determine whether the PAH contamination is an isolated 'hot spot'.

The results of the 36 no. soil samples screened as part of this investigation have been combined with the previous results obtained from Card Geotechnics 'TP06'. Whilst additional samples were screened as part of the Card Geotechnics investigation, the detection limits for the speciated PAH's undertaken were not sufficiently low to meet current standards of risk assessment, and therefore these have not been included within this updated risk assessment.

The sample population has been subjected to statistical analysis utilising the contaminated land statistical analysis sheets developed by CL:AIRE, and a copy of the calculation and summary sheets are contained in Appendix V. The results of the analysis and risk assessment have been summarised in Table 7.3 on the following page and the results of the assessment have identified the following:

- The maximum concentration (C_M) values recorded for Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene and Indeno(123cd)pyrene are recorded to exceed the critical concentration values for this site. However, these values are only recorded within TP01B and Card Geotechnics 'TP06'.
- The C_M values for the remaining speciated PAH's do not exceed the critical concentration values for this site, and therefore are not considered to represent a potential risk to human health.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.4 Level 1 Generic Quantitative Risk Assessment - Human Health (Cont'd):-

7.4.2 Speciated PAH Screening (Cont'd):-

Analysis of Full Data Set (Cont'd):-

- The statistical upper confidence limit values ($UCL_{0.95}$) for Benzo(a)anthracene and Benzo(a)pyrene exceed the C_C values chosen for this site.
- The $UCL_{0.95}$ values for Benzo(b)fluoranthene, Benzo(k)fuoranthene, Chrysene and Indeno(123cd)pyrene do not exceed the C_C values chosen for this site.
- The $UCL_{0.95}$ values for the remaining speciated PAH's do not exceed the chosen C_C values for this site.
- The C_M values for Benzo(a)anthracene and Benzo(a)pyrene are not recorded as statistical outliers (i.e. potential 'hot spots'). Therefore the $UCL_{0.95}$ values for these analytes can be taken as representative for the whole of the site, and as such these analytes could pose a potential risk.
- The C_M values for Benzo(b)fluoranthene, Benzo(k)fuoranthene, Chrysene and Indeno(123cd)pyrene are not recorded as statistical outliers. Therefore, the $UCL_{0.95}$ values for these analytes can be taken as representative for the whole of the site, and consequently these analytes are not considered to represent a potential risk.
- The C_M value for Dibenzanthracene is recorded as a statistical outlier (i.e. potential 'hot spot'). However, since neither the C_M or $UCL_{0.95}$ values exceed the C_C value for this site, it is felt that this analyte does not represent a potential risk.
- The C_M values for the remaining PAH's are not recorded as statistical outliers, and since neither the C_M or $UCL_{0.95}$ values exceed the C_C values for this site, it is felt that these analytes do not represent a potential risk.
- From the results it can be seen that Benzo(a)anthracene and Benzo(a)pyrene are recorded as being potentially pervasive across the whole of the site, and therefore there is a requirement for removal, treatment, protection measures and/or further risk assessment (DQRA), in order to protect the future end users (i.e. no risk to human health).

Table 7.3

Analyte	Critical Conc. (C_C)	No. of Samples Screened	Max. Conc. (C_M) Recorded	Statistical Upper Confidence Limit ($UCL_{0.95}$)	Has $UCL_{0.95}$ exceeded C_C	No. of Samples > C_C	Is C_M a statistical outlier
Acenaphthene	1,000[1]	36	6.5	1.01	No	0	No
Acenaphthylene	850[1]	36	0.2	0.07	No	0	No
Anthracene	9,200[1]	37	14.9	2.81	No	0	No
Benzo(a)anthracene	**5.9[1]**	**37**	**32.2**	**5.99**	**Yes**	**2**	**No**
Benzo(a)pyrene	**1.0[1]**	**37**	**24.9**	**4.09**	**Yes**	**3**	**No**
Benzo(b)fluoranthene	7.0[1]	37	**38.2**	6.12	No	**2**	No
Benzo(ghi)perylene	47[1]	36	11.9	1.90	No	0	No
Benzo(k)fluoranthene	10[1]	37	**21.0**	3.97	No	**2**	No
Chrysene	9.3[1]	37	**28.3**	5.75	No	**2**	No
Dibenz(ah)anthracene	0.9[1]	36	0.2	0.07	No	0	Yes
Fluoranthene	670[1]	37	76.2	14.0	No	0	No
Fluorene	780[1]	36	3.8	0.66	No	0	No
Indeno(123cd)pyrene	4.2[1]	36	**10.8**	1.76	No	**1**	No
Naphthalene	8.7[1]	36	0.8	0.21	No	0	No
Phenanthrene	380[1]	37	42.3	7.49	No	0	No
Pyrene	1,600[1]	37	64.4	11.89	No	0	No

[1] - LQM CIEH Generic Assessment Criteria Values, 2nd Edition (2009). **Bold** – result exceeds critical concentration, Note = All units are mg/kg.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.4 Level 1 Generic Quantitative Risk Assessment - Human Health (Cont'd):-

7.4.2 Speciated PAH Screening (Cont'd):-

Analysis of Full Data Set (Cont'd):-

On closer examination of the results, although Benzo(a)anthracene and Benzo(a)pyrene are not statistically recorded as 'hot spots', it can be seen that the C_M values for Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene and Indeno(123cd)pyrene are spatially located within one specific sample area (TP01B and Card Geotechnics 'TP06'), generally located on the northern site area. Therefore, spatially, this area appears to represent a potential localised 'hot spot' of PAH contamination and consequently it is felt more appropriate to consider the elevated C_M values as such. Therefore, further analysis has been carried out as part of this Level 1 GQRA, which has considered the spatial distribution of the PAH's as two separate source areas.

Analysis Following 'Hot Spot' Removal:-

Following the removal of the potential 'hot spot' data (TP01B and Card Geotechnics 'TP06'), the results have been subjected to further statistical analysis. The results are contained in Appendix V and these have been summarised in Table 7.4 below.

Table 7.4

Analyte	Critical Conc. (C_C)	No. of Samples Screened	Max. Conc. (C_M) Recorded	Statistical Upper Confidence Limit ($UCL_{0.95}$)	Has $UCL_{0.95}$ exceeded C_C	No. of Samples > C_C	Is C_M a statistical outlier
Acenaphthene	1,000[1]	34	0.1	0.05	No	0	Yes
Acenaphthylene	850[1]	34	0.2	0.07	No	0	Yes
Anthracene	9,200[1]	34	1.4	0.46	No	0	No
Benzo(a)anthracene	5.9[1]	34	1.3	0.59	No	0	No
Benzo(a)pyrene	1.0[1]	34	0.9	0.33	No	6	No
Benzo(b)fluoranthene	7.0[1]	34	0.6	0.24	No	0	No
Benzo(ghi)perylene	47[1]	34	0.6	0.21	No	0	No
Benzo(k)fluoranthene	10[1]	34	0.4	0.15	No	0	No
Chrysene	9.3[1]	34	1.1	0.52	No	0	No
Dibenz(ah)anthracene	0.9[1]	34	0.2	0.07	No	1	Yes
Fluoranthene	670[1]	34	2.9	1.24	No	0	No
Fluorene	780[1]	34	0.7	0.20	No	0	Yes
Indeno(123cd)pyrene	4.2[1]	34	0.7	0.27	No	0	No
Naphthalene	8.7[1]	34	0.8	0.22	No	0	Yes
Phenanthrene	380[1]	34	3.1	1.16	No	0	No
Pyrene	1,600[1]	34	3.5	1.45	No	0	No

[1] - LQM CIEH Generic Assessment Criteria Values, 2nd Edition (2009). **Bold** – result exceeds target concentration, Note = All units are mg/kg.

The results of the further assessment have identified the following:

- It can be seen from the results, that all the C_M and $UCL_{0.95}$ values for all the speciated PAH's do not exceed the chosen critical concentration values for this site.
- Consequently, PAH contamination is not considered to represent a significant risk to human health across the remaining portions of the site outside the 'hot spot' location.
- Therefore with respect to the 'hot spot' location, there is a requirement for removal, treatment, protection measures and/or further risk assessment (DQRA), in order to protect the future end users (i.e. no risk to human health).

7.0 Ground Contamination Risk Assessment (Cont'd)

7.4 Level 1 Generic Quantitative Risk Assessment - Human Health (Cont'd):-

7.4.3 Speciated TPH Screening:-

Due to the presence of identified levels of TPH at the location of Card Geotechnics 'TP06', a number of samples adjacent to this location were targeted for speciated TPH analysis. In addition, some 'oily' saturated sediments were encountered within an old stone culvert or drain at the location of TP12, and therefore a total of 4 no. samples were screened for speciated TPH (aliphatic & aromatic equivalent carbon bands) including BTEX's.

The results of the TPH screening have been assessed as potential 'hot spots', and therefore the maximum values recorded for each speciated analyte has been compared to the critical concentration values chosen for this site. The results of the testing are contained in Appendix IV, and these have been summarised in Table 7.5 below.

Table 7.5

Analyte	Critical Conc. (C_C)	No. of Samples Screened	Max. Conc. (C_M) Recorded	No. of Samples > C_C
Speciated TPH's				
Aliphatic EC5-EC6	110[1]	4	<0.01	0
Aliphatic EC6-EC8	370[1]	4	<0.01	0
Aliphatic EC8-EC10	110[1]	4	<0.01	0
Aliphatic EC10-EC12	540[1]	4	5	0
Aliphatic EC12-EC16	3000[1]	4	37	0
Aliphatic EC16-EC35	76,000[1]	4	4539	0
Aliphatic EC35-EC44	76,000[1]	4	412	0
Aromatic EC5-EC7	280[1]	4	<0.1	0
Aromatic EC7-EC8	611[1]	4	<0.1	0
Aromatic EC8-EC10	151[1]	4	0.3	0
Aromatic EC10-EC12	346[1]	4	<1	0
Aromatic EC12-EC16	593[1]	4	10	0
Aromatic EC16-EC21	770[1]	4	210	0
Aromatic EC21-EC35	1,230[1]	4	162	0
Aromatic EC35-EC44	1,230[1]	4	15	0
Benzene	0.33[2]	4	<0.01	0
Toluene	610[2]	4	<0.01	0
Ethylbenzene	350[2]	4	<0.01	0
m & p-Xylene	230[2]	4	<0.01	0
o-Xylene	250[2]	4	<0.01	0

[1] = LQM CIEH Generic Assessment Criteria Values, 2nd Edition (2009), [2] = CLEA SGV Values (*Residential* – Version 1.06), [3] = EIC/AGS/CL:AIRE GAC (Residential), Note = All units are mg/kg.

The results of the testing have identified the following:

- None of the C_M values for any of the analytes screened exceed the C_C values chosen for this site.
- As such it can be seen that levels of hydrocarbon contamination encountered within the soils do not pose a significant risk to human health.

7.4.4 Asbestos Screening:-

Due to the historical development of the site, and the presence of potential cemented asbestos sheets on the surface at two locations, it was deemed prudent to complete asbestos screening on made ground samples to determine whether any unidentified asbestos were present across the site.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.4 Level 1 Generic Quantitative Risk Assessment - Human Health (Cont'd):-

7.4.4 Asbestos Screening (Cont'd):-

The results of the screening completed are contained in Table 7.6 below.

Table 7.6

Position	Depth (m)	Chrysotile (white)	Amosite (brown)	Crocidolite (blue)	Anthophyl-lite	Actinolite	Tremolite	Non asbestos fibres (NAF)
BH 1	0.50	ND	ND	ND	ND	ND	ND	Y
BH 3	0.40	ND	ND	ND	ND	ND	ND	Y
BH 4	0.40	Y	ND	ND	ND	ND	ND	Y
BH 7	0.10	ND	ND	ND	ND	ND	ND	~
TP 1A	0.00-0.50	ND	ND	ND	ND	ND	ND	Y
TP 3	0.00-0.35	ND	ND	ND	ND	ND	ND	Y
TP 6	0.00-0.65	ND	ND	ND	ND	ND	ND	Y
TP 7	0.00-0.40	ND	ND	ND	ND	ND	ND	Y
TP 12	0.00-0.80	ND	ND	ND	ND	ND	ND	Y

ND = None detected, Y = Fibres present

The results have identified the following:

- As can be seen from the samples collected from across the site, Chrysotile has only been identified within one of the nine samples screened (BH04).
- The remainder of the samples screened from across the site have not identified the presence of any ACM's or fibres.
- Further laboratory testing is currently being carried out (quantitative screening) to assess the level of risk posed to future end users from the asbestos recorded at BH04.
- It should be noted that possible Asbestos Containing Materials have been noted on the surface at the locations of BH01 and TP06, however asbestos fibres have not been recorded within the made ground samples, suggesting that potential asbestos contamination is restricted to surface debris at these locations.

7.5 Level 1 Generic Quantitative Risk Assessment – Controlled Waters:-

Based on the results of the soil screening carried out on the various samples chosen, leachate screening (generic, speciated PAH and speciated TPH screening) has been carried out on a total 12 no. soil samples. The results have been used to complete a Level 1 Risk Assessment for the potential impact on Controlled Waters and adjacent sites, and the results are summarised in Table 7.5 on the following page.

The results of the risk assessment have identified the following:

- The C_M values for the generic contaminants within the soil samples screened do not exceed the C_C values taken for this site.
- The C_M values for the majority of the speciated PAH's at the location of TP01B exceed the C_C values taken for this site.
- The C_M values for speciated PAH's within the 7 no. remaining soil samples screened do not exceed C_C values.
- The C_M values for TPH C21-C35 at two locations (TP01B & TP12) are recorded to exceed the C_C values taken for this site.

7.0 Ground Contamination Risk Assessment (Cont'd)

7.5 Level 1 Generic Quantitative Risk Assessment – Controlled Waters:-

- The C_M values for the remaining TPH carbon bands within the remaining samples screened do not exceed the C_C values taken for this site.
- As such it can be seen that there is a requirement for removal, treatment, protection measures and/or further risk assessment (DQRA), in order to protect Controlled Waters and adjacent site from potential leachable levels of PAH and TPH at the locations of TP01B and TP12 only.

Table 7.5

Analyte	Critical Conc. (C_C)	Site Data			Soil Remedial Targets	
		Max. Conc. (C_M) Recorded	Has max. C_C Value Been Exceeded	Number of samples >C_C	STC_1 (mg/kg)	LTC_1 (µg/l)
Arsenic	50(1)	20	No	0	~	50(1)
Boron	2000(1)	376	No	0	~	2000(1)
Cadmium	5(1)	<1	No	0	~	5(1)
Chromium	50(2)	31	No	0	~	50(2)
Copper	2000(2)	14	No	0	~	2000(2)
Lead	25(2)	12	No	0	~	25(2)
Mercury	1(2)	<1	No	0	~	1(2)
Nickel	20(2)	7	No	0	~	20(2)
Selenium	10(2)	4	No	0	~	10(2)
Zinc	5000(2)	<20	No	0	~	5000(2)
Sulphate	250mg/l(2)	176mg/l	No	0	~	250mg/l(2)
Sulphide	100(3)	<100	No	0	~	100(3)
Cyanide	50(2)	<20	No	0	~	50(2)
Phenol	30(1)	<10	No	0	~	30(1)
Speciated PAH's						
Acenaphthene	**0.1(2)**	**14.9**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Acenaphthylene	0.1(2)	<0.1	No	1 (TP01B)	~	0.1(2)
Anthracene	**0.1(2)**	**38.2**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Benzo(a)anthracene	**0.1(2)**	**28.3**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Benzo(a)pyrene	**0.1(2)**	**10.8**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Benzo(b)fluoranthene	**0.1(2)**	**76.2**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Benzo(ghi)perylene	**0.1(2)**	**64.4**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Benzo(k)fluoranthene	**0.1(2)**	**3.8**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Chrysene	0.1(2)	<0.1	No	1 (TP01B)	~	0.1(2)
Dibenz(ah)anthracene	**0.1(2)**	**42.3**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Fluoranthene	**0.1(2)**	**11.9**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Fluorene	**0.1(2)**	**32.2**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Indeno(123cd)pyrene	**0.1(2)**	**0.2**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Naphthalene	**0.1(2)**	**6.5**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Phenanthrene	**0.1(2)**	**24.9**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Pyrene	**0.1(2)**	**14.3**	**Yes**	**1 (TP01B)**	**~**	**0.1(2)**
Speciated TPH						
TPH (C5-C7)	10(2)	<1	No	0	~	10(2)
TPH (C7-C8)	10(2)	<1	No	0	~	10(2)
TPH (C8-C10)	10(2)	<1	No	0	~	10(2)
TPH (C10-C12)	10(2)	<1	No	0	~	10(2)
TPH (C12-C16)	10(2)	3	No	0	~	10(2)
TPH (C16-C21)	10(2)	10	No	0	~	10(2)
TPH (C21-C35)	10(2)	**142**	**Yes**	**2 (TP01B & TP12)**	**~**	**10(2)**
TPH (C35-C44)	10(2)	4	No	0	~	10(2)

(1) = EQS Freshwater, (2) = UK Drinking Standard, (2) = Detection limit, Note = All units are µg/l unless stated.

8.0 Conclusions & Recommendations

8.1 Ground Conditions:-

From the results of the investigation works carried out, the site surfacing generally comprised of demolition rubble, old building slabs, concrete hardstanding and sandstone gravel. Made ground was recorded to depths of c.0.30m up to c.2.60m and comprised gravely sand with brick, concrete and sandstone, ash & clinker, and reworked natural deposits of sandy gravely clay, very gravely sand and very sandy gravel. The deepest deposits of made ground were generally recorded adjacent to existing retaining walls and adjacent to the mill pond. Grey sandy slightly organic silts were recorded adjacent to the mill pond area, possibly associated with the construction and recent partial infilling. An area of red sandy gravel shale and sandstone blocks was recorded at the location of TP01A.

However, made ground was recorded to be absent from two locations (TP05 & BH05), with these initially noted to comprise topsoil to depths of between c.0.10m and c.0.30m.

Beneath the made ground and topsoil, the natural deposits comprised gravely sand with cobbles and sandy clay to depths of between c.0.80m and c.3.40m bgl.

The solid geology comprised disintegrated becoming fresh sandstone and siltstone.

The previous investigation completed by Card Geotechnics, identified elevated levels of PAH's at one particular location ('TP06'). In addition significant detectable concentrations of TPH's were recorded, although an adequate risk could not be completed for the screening carried out. Although a number of investigation positions were carried out within the vicinity of this location, generally, there was no significant evidence of hydrocarbon contamination encountered across any portion of the site, with the exception of 'oily' sediments encountered within an old stone culvert/drain at the location of TP12. Ash and clinker materials were noted within the made ground across some isolated portions of the site and therefore samples from across the whole of the site were screened for speciated PAH's in order to determine if potential 'hot spots' or pervasive PAH contamination existed across the site.

Whilst no buried asbestos containing materials were noted within the made ground encountered, some potential cemented asbestos sheeting was observed at surface at two locations. As such it was considered prudent to complete asbestos screening on randomly selected samples of made ground to assess if asbestos contamination could pose a potential risk to human health.

8.2 Groundwater:-

During the investigation period, generally no water seepages were observed within any of the investigation positions put down across the site. Although standing water levels were recorded in BH's 04 & 13, and also at the base of TP04 upon completion, between depths of c.1.90m and c.2.60m bgl.

Groundwater monitoring carried out within the standpipes installed across the site, have recorded standing levels between c.0.48m and c.2.97m bgl, although these levels are generally towards the base of the monitoring standpipes.

It is felt that the water encountered is likely to be a result of trapped surface drainage or perched water and as such a significant shallow groundwater surface (water table) is not anticipated below this site. However, it would be prudent to allow for the introduction of temporary groundwater control techniques (i.e. pumping equipment), in order to take care of any localised ingresses of groundwater during the construction period (particularly during the construction of the basement), and especially during the wetter periods of the year.

8.0 Conclusions & Recommendations (Cont'd)

8.3 Foundation Options:-

Based on the information gained from the intrusive investigation works, it can be seen that variable thicknesses and strengths/densities of made ground and natural drift deposits exist across the site. As such and following discussions with the design engineers it is felt that plot specific foundation solutions should be adopted:-

- For units 1 & 2 and 10 to 14, taking into account the variability of the made ground and natural deposits adjacent to the river and the mill pond, it is felt that the most suitable solution would be the installation of short or mini piles taken down into the underlying sandstone bedrock. However it should be noted that the presence of cobbles and boulder obstructions may influence the type of pile and method of installation utilised. It is therefore recommended that the information contained within this report is passed onto specialist contractors so that they can design and price a suitable scheme.

- For units 15 to 19 it is felt that conventional strip and pad foundations can be utilised based within the underlying sandstone bedrock, recorded between depths of c.0.50m up to c.2.10m below existing ground levels and where an allowable bearing pressure of 250kN/m^2 can be utilised. Alternatively, since a piling scheme would be required for the majority of the proposed plots, it may be the case that the remaining plots could also be piled, as this would reduce the volume of soils requiring potential off-site disposal, especially where deepened foundations are envisaged.

From the results of the pH and soluble sulphate testing, it can be seen that the ground conditions present are likely to represent a risk to future foundations and buried concrete, and therefore a concrete design class of DS-3 and ACEC class of AC-3z should be utilised for this site, due to the presence of acidic ground conditions.

At this stage and without taking into consideration any treatment of the ground i.e. proof rolling, where the made ground materials and/or the natural drift deposits are utilised as an undisturbed sub-grade for the design and construction of any new areas of hardstanding, car parking, access roads and/or ground bearing floor slabs it is felt that a characteristic design CBR value of 2.0% should be adopted.

8.4 Hazardous Ground Gas Risk Assessment:-

From the results of the gas monitoring visits completed to date, detectable concentrations of Methane (CH_4) have not been recorded. Concentrations of Carbon Dioxide (CO_2) have been recorded up to a maximum level of 1.3%, with negligible and slightly positive flow rates being recorded (<0.1l/hr and -0.5l/hr).

Based on the results obtained to date, it is felt that the site can initially be assessed as Characteristic Situation 1 (CS1) or NHBC Green classification indicating that no gas protection would be required for the proposed development, assuming that there are no significant changes in the gas concentrations or flow rates compared to those recorded to date. This characterisation will be reassessed following the completion of the remaining 4 no. gas monitoring visits.

8.5 Ground Contamination:-

From the results of the contamination screening carried out and the Level 1 Risk Assessments (Section 7.0) undertaken, pervasive Arsenic & Lead has been recorded within the made ground materials at levels which could represent a potential future risk to end users and therefore when considering the proposed development works, some form of remedial measures will be required (see Section 8.6 for further details). The remaining generic analytes screened for, do not pose a significant risk to human health.

8.0 Conclusions & Recommendations (Cont'd)

8.5 Ground Contamination (Cont'd):-

The results of the speciated PAH screening has identified that generally levels of speciated PAH's across the site as a whole do not represent a significant risk to human health. However, the screening has confirmed the presence of a potential isolated 'hot spot' of several speciated PAH's around the location of TP01B and Card Geotechnics 'TP06' (northern site area). Therefore, when considering the proposed development works, again additional remedial measures will be required in order to provide the level of protection necessary from the elevated PAH's recorded (see Section 8.6 for further details).

During the investigation works, significant hydrocarbon contamination was not noted across the site, with the exception of potential 'oily' sediments being encountered within an old stone culvert/drain at the location of TP12. However, the results of the TPH & BTEX soil screening has identified that levels of hydrocarbon contamination do not pose a significant risk to human health.

In addition, a potential isolated 'hot spot' of Asbestos contamination has been identified at the location of BH04. However additional laboratory testing is currently being undertaken to quantify the level of potential risk from the Asbestos recorded. The results of this testing will determine if remedial measures will be required.

From the results of the leachate screening carried out for risks posed to Controlled Waters and adjacent sites, generally it can be seen that the majority of generic and organic analytes screened from made ground samples across the whole of the site, do not appear to be sufficiently mobile to pose a risk to controlled waters or adjacent sites.

However, elevated levels of PAH's & TPH's at the location of TP01B (which also includes Card Geotechnics 'TP06'), and potential leachable levels of TPH's at the location of TP12, associated with a stone culvert/drain, have been recorded. Therefore, since these contaminants could be sufficiently mobile to pose a potential risk to Controlled Waters and adjacent sites, it is felt that additional remedial measures will be required to negate any future potential leaching from the made ground present on this site (see Section 8.6 for further details).

In conclusion, when considering the known history of the site, it can be seen that the levels of analytes present are not representative of heavily contaminated ground and at this stage there is no requirement for short term immediate treatment or removal. However, some remedial measures will be required as part of the redevelopment works and these are discussed in further detail in Section 8.6.

When considering the removal of any materials from this site as a waste to be disposed of at a landfill, especially as part of the reduction in ground levels for the construction of the proposed basement, it can be seen that where the uncontaminated natural strata (excluding any 'topsoil' or 'peat' materials) can be kept separate from the made ground, then these materials can be considered as 'inert' and taken to an Inert Landfill Site, however WAC testing will be required to confirm these can be classified as inert.

Where made ground and/or potentially contaminated materials are to be removed off site as a 'waste', it can be seen from the results of the contamination screening completed, that particularly due to elevated levels of Arsenic, Lead, PAH and TPH within the made ground, that some of these materials may be classified as hazardous waste and therefore would require disposal at a hazardous waste management facility. As such there may be a requirement for WAC testing to be carried out if the preliminary assessment by the waste management facility classes the made ground as hazardous.

Prior to disposal of these materials, however, it is recommended that the results of the contamination screening for this site, are passed on to landfill operators for their comments. Further reference should be made to the notes on off-site disposal within Appendix V.

8.0 Conclusions & Recommendations (Cont'd)

8.5 Ground Contamination (Cont'd):-

When considering the risks to any future maintenance or construction workforce, standard PPE should prove adequate protection against the levels of potential contaminants recorded during these investigation works. Similarly, the results can also be used by the Main Contractor / Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations. For further guidance reference should be made to the Health and Safety Executive (HSE) document EH40/2005 Workplace exposure limits.

8.6 Remediation Statement:-

During the investigation works, there was no significant evidence of any heavy, 'gross' or unforeseen ground contamination being present on this site, and therefore at this stage, there is no requirement to carryout additional Phase 2 intrusive ground investigation works or extend the range of analytes tested. However, taking into account the comments in Section 8.5, and in accordance with CLR11, there will be a requirement for the provision of a Remediation Strategy and subsequent Validation works, completed and supervised by Arc Environmental, as part of the proposed redevelopment works.

Whilst the majority of the proposed development comprises building footprints, road & car park infrastructure, the majority of the made ground will be effectively be covered, however private gardens and areas of soft landscaping are envisaged which would still provide plausible pathways.

Consequently when determining the remedial options available for this particular site, it is considered likely that from the nature of the contaminants present, as well as the nature of the made ground itself, either further Detailed Quantitative Risk Assessment (DQRA), or physical and/or chemical treatment of these materials will not provide a practical, suitable or cost effective remediation solution. With respect to each contaminant present and the locations of the contamination, it is felt that two options are available for this site;

1. Implementation of a clean cover barrier system in order to protect the future end users and Controlled Waters from the made ground and elevated contaminants present by removing the pathway element of the *source-pathway-receptor* pollutant linkage, and/or
2. Excavation and off-site disposal.

With respect to the pervasive levels of Arsenic and Lead recorded across the site, the option of excavation and removal is likely to be considered as impractical and not best environmental practise, when considering the volume of materials which would require transportation and disposal at a waste management facility, as well as the environmental and economic implication of importing replacement materials. Since the Arsenic & Lead is recorded to be pervasive across the whole of the site, and the representative values for these analytes are sufficiently low, it is felt that a simple clean cover system can be employed in accordance with BRE 465-Cover systems for land regeneration (2004).

Generally levels of PAH's & TPH's were not considered a significant risk across the whole of the site. However, a localised 'hot spot' of PAH contamination has been recorded around the location of TP01B & Card Geotechnics 'TP06'. The levels of PAH's at the 'hot spot' location are considered too high for a simple barrier system to be installed, and therefore consideration should be given to either removal or the implementation of a robust barrier system (generally in the order of c.600mm up to 1000mm).

In addition, since leachable levels of PAH's & TPH's were also recorded at this 'hot spot' location, if a robust barrier system were adopted, the proposed barrier should also incorporate a low permeability barrier (i.e. clay or a geo-composite integrated drainage membrane) to limit infiltration potential and subsequent leaching and migration to Controlled Waters.

8.0 Conclusions & Recommendations (Cont'd)

8.6 Remediation Statement (Cont'd):-

Dedicated land drainage will be required to deal with surface infiltration of water and to prevent surface ponding in areas of gardens/soft landscaping where this robust system is implemented.

Alternatively the 'hot spot' location can be excavated and removed from the site for off-site disposal, which would have some benefits on-site, such that the thicker robust system and the necessity for the addition of a low permeability barrier would no longer be required. However following removal, there would still be a requirement to implement a simple clean cover barrier, due to pervasive levels of Arsenic & Lead across the site as a whole.

From the investigation, an old stone culvert/drain was encountered containing 'oily' sediments at the location of TP12. Furthermore, these hydrocarbon contaminated materials are potentially leachable, therefore it is felt that the simplest remedial option will be to excavate and remove this relic feature and the hydrocarbon contaminated sediments from site.

With respect to Asbestos, it has been observed that some potential asbestos cemented sheets were present at surface within the general vicinity of BH01 and TP06. Whilst, the asbestos screening detected no potential asbestos fibres within the made ground at these locations, potential loose fibres have been recorded at the location of BH04. At this stage further additional quantitative screening is being carried out to assess the level of risk to future end users.

As a worse case scenario, if the risk can not be dismissed, then a robust barrier system would need to be implemented across the asbestos 'hot spot' location. Alternatively the 'hot spot' location can be excavated and removed from the site for off-site disposal, which would have some benefits on-site, such that the thicker robust system would no longer be required. However following removal, again there would still be a requirement to implement a simple clean cover barrier, due to pervasive levels of Arsenic & Lead across the site as a whole. It is felt that the potential asbestos cemented sheets noted at surface can easily be dealt with by means of an appropriate walkover survey and removal.

In addition, it has been observed that Japanese Knotweed is present on site, and whilst this is currently undergoing treatment, it may be prudent to incorporate the validation for the effective eradication of Japanese Knotweed within the Remediation Strategy and Validation Report required for this site.

It can be seen from the results of the hazardous ground gas monitoring undertaken to date, that at this stage there will not be a requirement for the introduction of gas protection measures within the proposed residential developments, and therefore there is currently no requirement for this to be included within the Remediation Strategy required for this site. However this will have to be reassessed following the required 4 no. subsequent gas monitoring visits.

Once the final scheme has been determined, a Remediation Strategy will need to be compiled and submitted to the local planning authority for their approval prior to undertaking any remedial works. All remediation works should be validated by a suitably qualified and experienced Geo-environmental Engineer from Arc Environmental to ensure all works are being completed in strict accordance with the agreed remediation strategy/statement, and once all the remediation works have been completed, the final Validation Report can be issued.

8.0 Conclusions & Recommendations (Cont'd)

8.7 General Comments:-

For future site works, adequate lateral trench support will be required for excavations, in order to prevent trench wall collapse or over excavations, as well as to create a safe working environment below a depth of 1.20m, and any excavations on this site should remain open for as short a period as possible, since some of these materials may be susceptible to deterioration, if left open to the natural elements for any significant period of time.

It is also recommended for any new developments, adequate surface drainage should be designed and installed by a competent contractor, in order to prevent surface water 'ponding' or collection, during and post construction, particularly where existing surface drainage systems are disrupted or damaged.

Furthermore, for deeper excavations, drainage, service runs or the like that may pass close to or beneath any proposed new foundations, these should be undertaken with care and completed prior to the preparation of any new foundations, so as not to allow any loose or granular material to move or 'flow', thus causing settlement to occur to any new foundations based at a higher level.

From the findings of the Phase 1: Desk Top Study Report, this site is not considered to be at risk from radon gas exposure or future instability issues associated with shallow coal mining activities.

An "observational technique" can be applied to the design and construction of this site, and where ground conditions seem to vary from that indicated from the conceptual ground model derived from works to date, then advice from a suitably qualified Engineering Geologist/Geotechnical Engineer should be sought.

END OF REPORT

GENERAL REFERENCES

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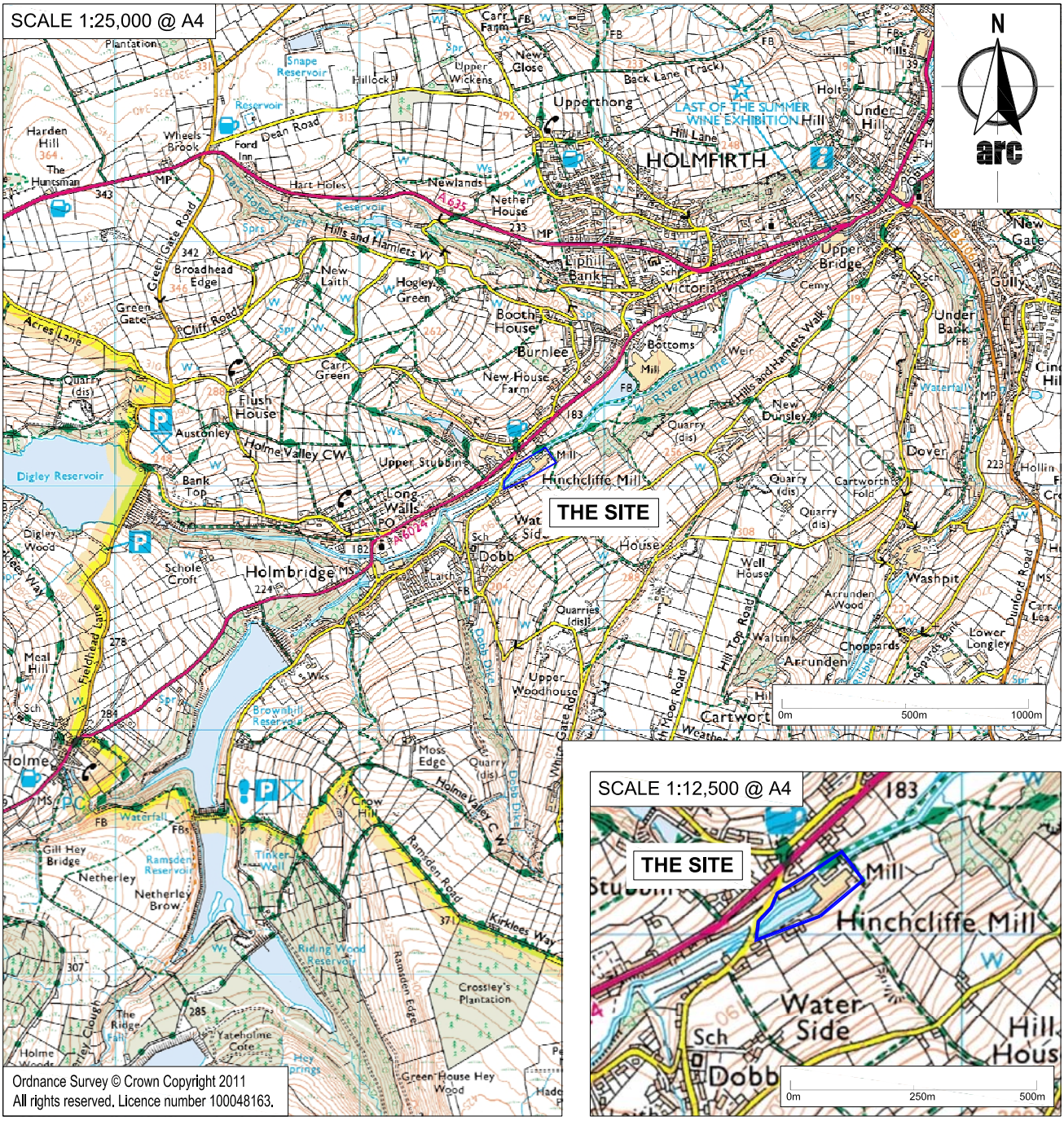
- BS EN ISO 22476-3: 2005: Geotechnical investigation and testing. Field testing. Standard penetration test. British Standards Institution
- NHBC Standards 2007: Chapter 4.2 – Building near trees
- BRE Special Digest 1 2005: Concrete in Aggressive Ground 3rd Edition
- Guidance on Investigation and Assessment for Contaminated Sites (CIRIA SP:103).
- BS10175: British Standard Code of Practice for the Investigation of Potentially Contaminated Sites, 2011
- Methane and Associated Hazards to Construction - CIRIA Reports 149,150,151 & 152
- Assessing Risks Posed by Hazardous Ground Gases to Buildings, CIRIA C665, 2007
- BS8483: Code of Practise for the Characterization and Remediation from Ground Gas in Affected Developments, 2007

APPENDIX I

Site Location Plan
Aerial Photographs
Existing & Proposed Site Layout Plans



Client:

MD ONE LTD

Project Title:	Drawing Title:
Proposed Residential Development Hinchliffe Mill, Water Street Holmbridge, West Yorkshire	Location Plan

rev.	date	amendments	drawn	chckd

Job Reference:	Drawing Number:	Revision:
10-015	-	-

Drawn by:	Date:	Scale at A4:
P.D	10.08.2011	As Shown @ A4

Checked by:	Approved by:	
R.S	R.S	The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing. © Copyright Reserved

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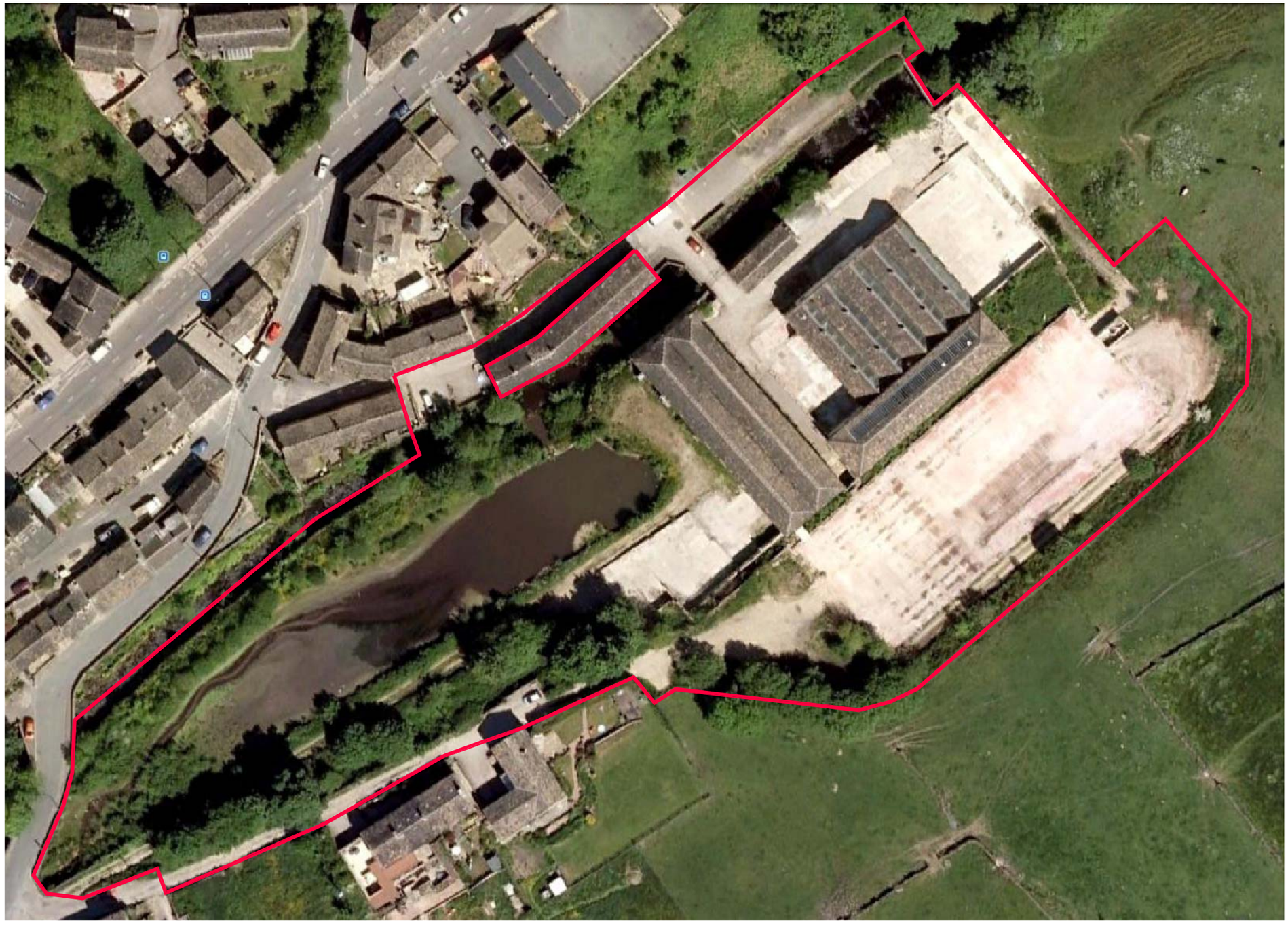

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rev.	date	amendments	drawn	chckd

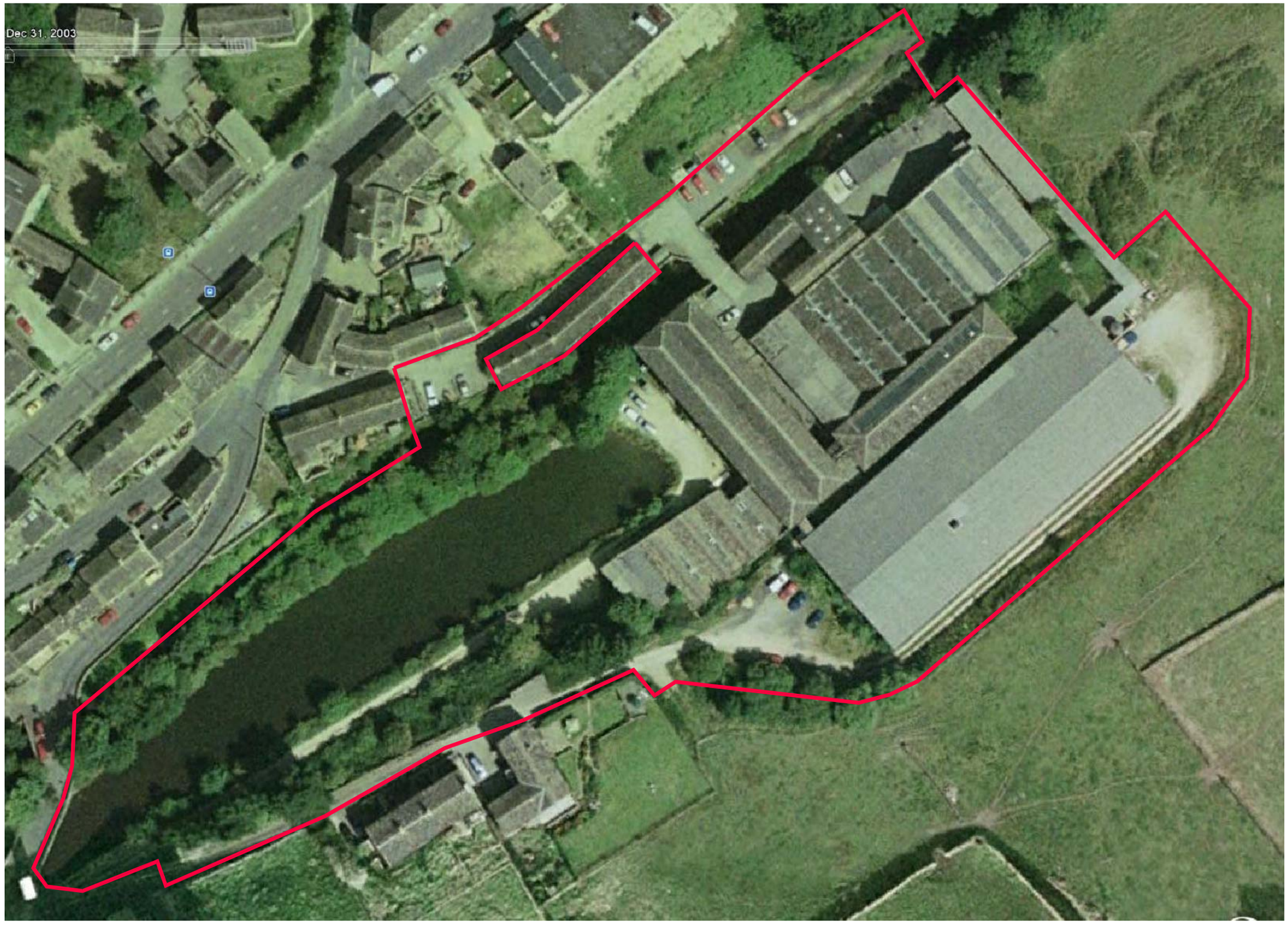
Client:
MD ONE LTD

Project Title:
Proposed Residential Development
Hinchliffe Mill, Water Street
Holmbridge, West Yorkshire

Drawing Title:
Aerial Photograph

Scale at A3:	Date:	Drawn by:	Approved by:
NTS	19.07.2010	R.S	R.S

Job Ref:	Drg no:	Rev:
10-015	-	-



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rev.	date	amendments	drawn	chckd

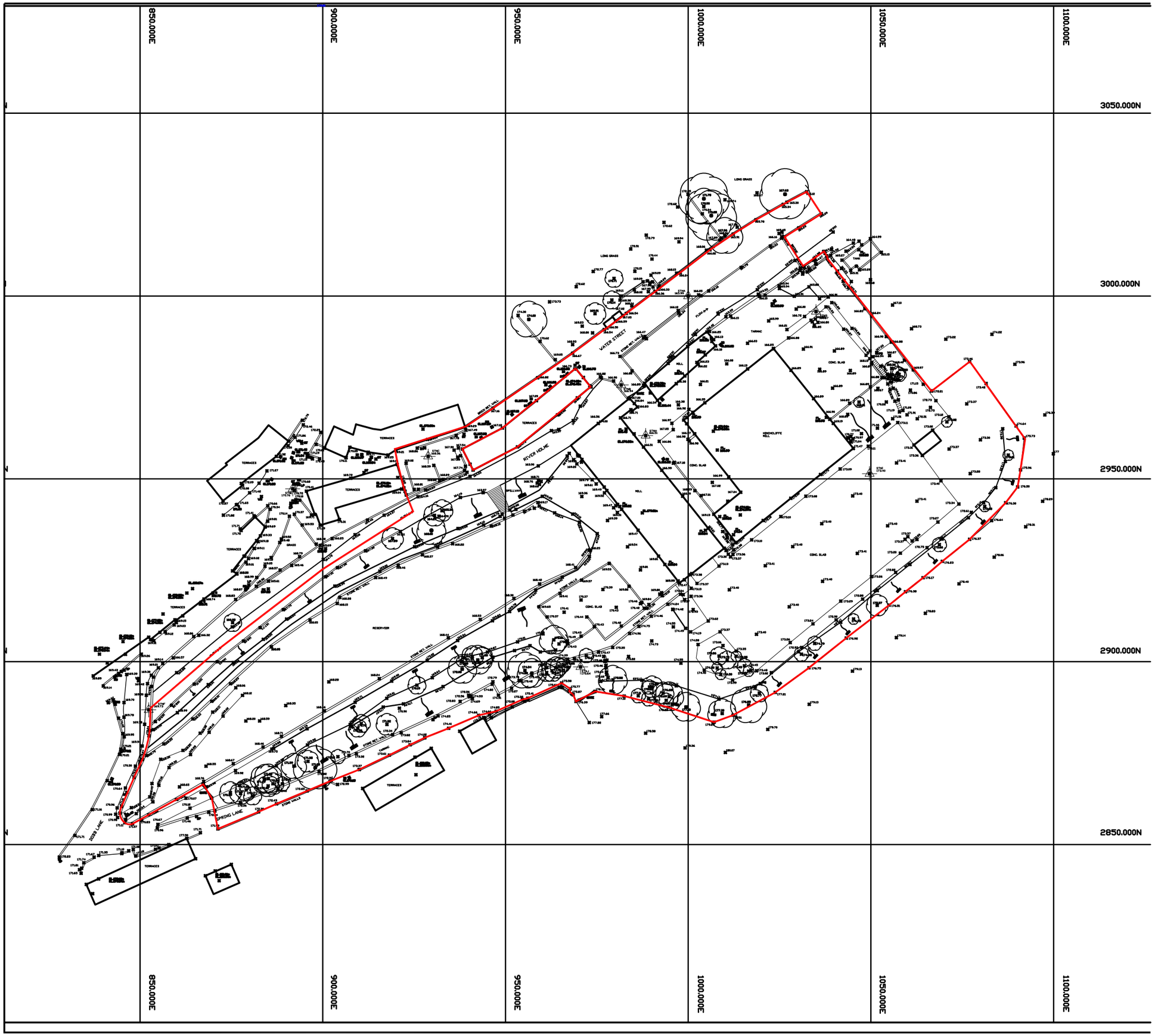
Client:
MD ONE LTD

Project Title:
Proposed Residential Development
Hinchliffe Mill, Water Street
Holmbridge, West Yorkshire

Drawing Title:
Historic Aerial Photograph (Pre-demolition)

Scale at A3:	Date:	Drawn by:	Approved by:
NTS	19.07.2010	R.S	R.S

Job Ref:	Drg no:	Rev:
10-015	-	-



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The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.

ABBREVIATIONS

AV	AIR VALVE/VENT	IC	INSPECT CHAMBER
BOL	BOLLARD	IL	INVERT LEVEL
BB	BELISHA BEACON	JKW	JAPANESE KNOTT WEED
BM	BENCH MARK	LH	LAMP HOLE
BL	BED LEVEL	LP	LAMP POST
BS	BUS STOP	NP	NAME PLATE
BT	BRITISH TELECOM	MH	MANHOLE
CL	COVER LEVEL	PS	POST/SIGN POST
Dil	DILAPIDATED	PB	POST BOX
Dis	DISUSED	PX	UNKNOWN SERVICE
EL	EAVES LEVEL	RE	RODDING EYE
ELE	ELEC JUNCT. BOX	RL	RIDGE LEVEL
EP	ELECTRICITY POLE	RS	ROAD SIGN
FH	FIRE HYDRANT	ST	STOP TAP
FL	FLOOR LEVEL	TH	TRIAL HOLE
FOS	FULL OF SEDIMENT	TL	TRAFFIC LIGHT
FP	FLAG POLE	TP	TELEGRAPH POLE
G	GULLY	TV	CABLE TV BOX
GM	GAS METER	Utl	UNABLE TO LIFT
GV	GAS VALVE	WM	WATER METER

SYMBOLS

- SURVEY STATION
- E — O/H ELEC CABLE
- T — O/H PHONE LINE
- CANOPY/HEDGE
- TREE
- BENCH MARK
- TRIAL PIT
- BOREHOLE

NOTES

1) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN
2) LOCAL GRID USED AND ORIENTATED TO MAGNETIC NORTH
3) LEVELS IN METRES RELATED TO O.S.B.M.
4) DRAINAGE INFORMATION TAKEN FROM LOCAL AUTHORITY RECORDS. INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING
5) SURVEY UNDERTAKEN IN HEAVY SNOW CONDITIONS

rev.	date	amendments	drawn	chckd

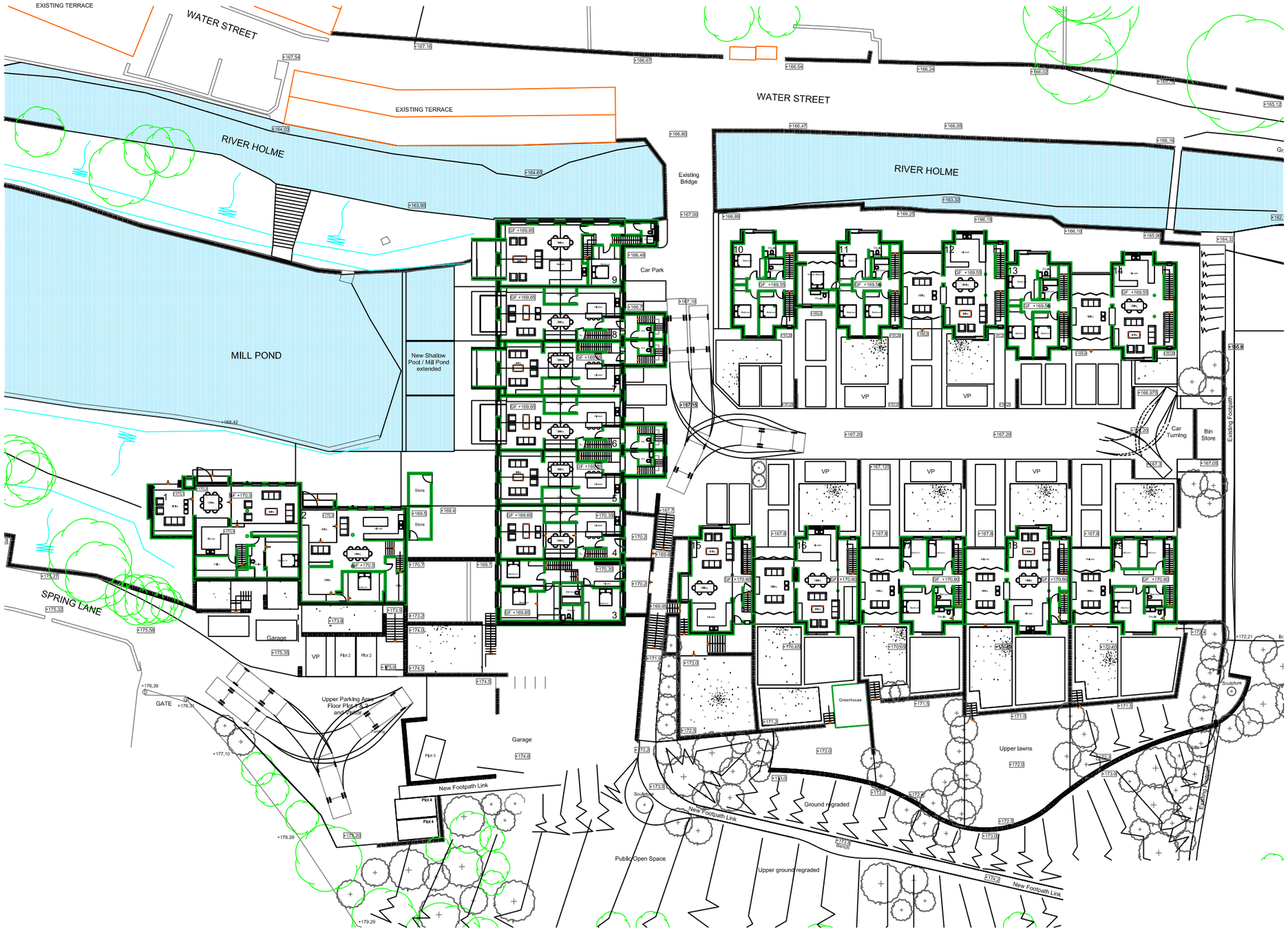
Client:
MD ONE LTD

Project Title:
Proposed Residential Development
Hinchliffe Mill, Water Street
Holmbridge, West Yorkshire

Drawing Title:
Existing Site Layout Plan (topographic)

Scale at A3:	Date:	Drawn by:	Approved by:
1:1000	19.07.2010	R.S	R.S

Job Ref:	Drg no:	Rev:
10-015	-	-



ARC ENVIRONMENTAL LTD
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web: www.arc-environmental.com

rev.	date	amendments	drawn	chckd

Client:
MD One Ltd

Project Title:
Proposed Residential Development
Hinchliffe Mill, Water Street
Holmbridge, West Yorkshire

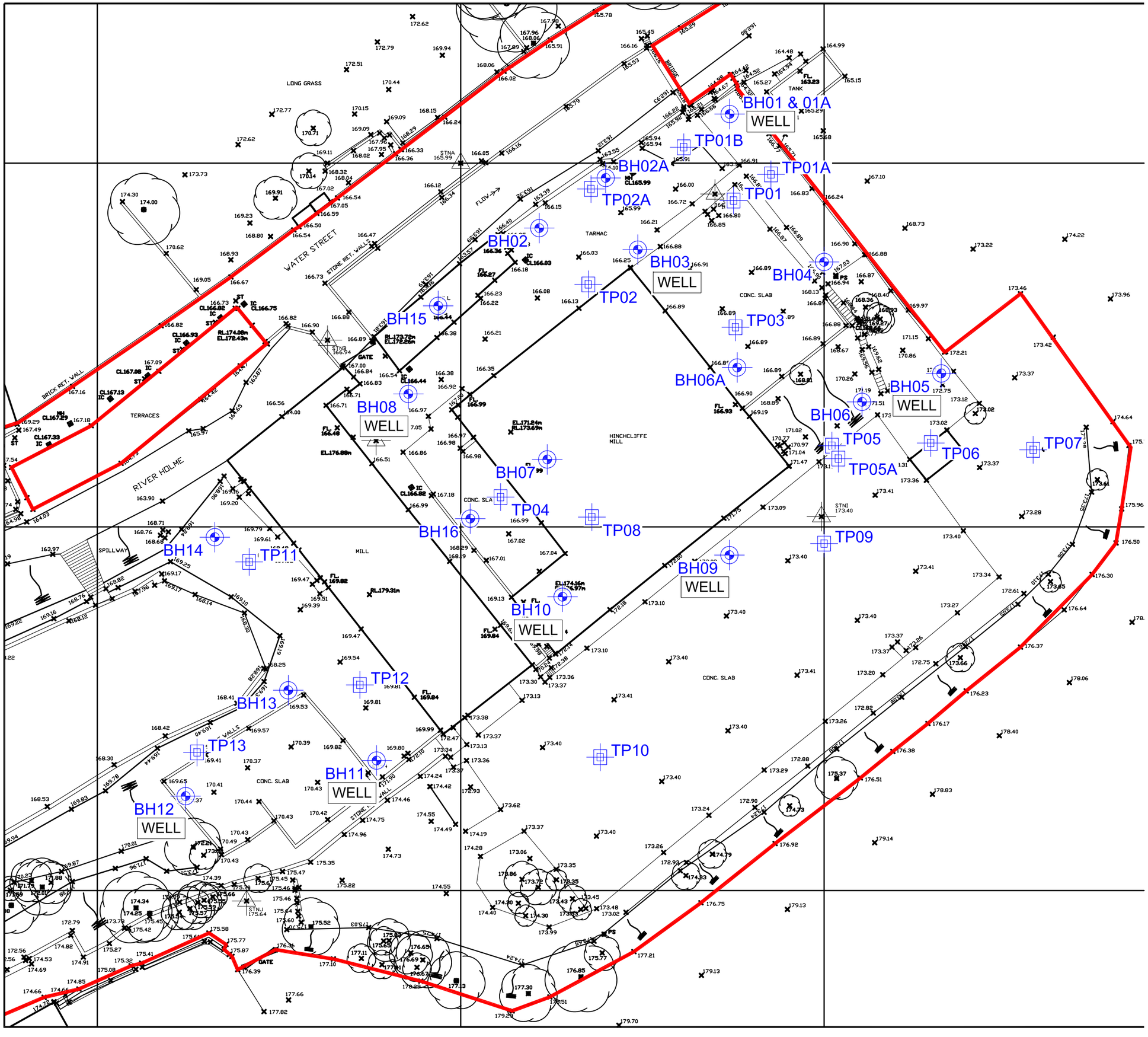
Drawing Title:
Proposed Site Layout Plan

Scale at A3:	Date:	Drawn by:	Approved by:
1:500	14.10.2011	R.S	

Job Ref:	Drg no:	Rev:
10-015	-	-

APPENDIX II

Trial Pit & Borehole Location Plan and
Trial Pit & Borehole Record Sheets



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LEGEND	
	APPROXIMATE SITE BOUNDARY
	PROPOSED WINDOWLESS SAMPLING BOREHOLE LOCATION
	PROPOSED MECHANICALLY EXCAVATED TRIAL PIT POSITION
WELL	COMBINED GAS & GROUNDWATER MONITORING INSTALLATION

rev.	date	amendments	drawn	chckd

Client:
MD ONE LTD

Project Title:
Proposed Residential Development
Hinchliffe Mill, Holmbridge
Holmfirth, West Yorkshire

Drawing Title:
Trial Pit & Borehole Location Plan

Scale at A3:	Date:	Drawn by:	Approved by:
1:500	11.08.2011	R.S	R.S

Job Ref:	Drg no:	Rev:
10-015	-	-

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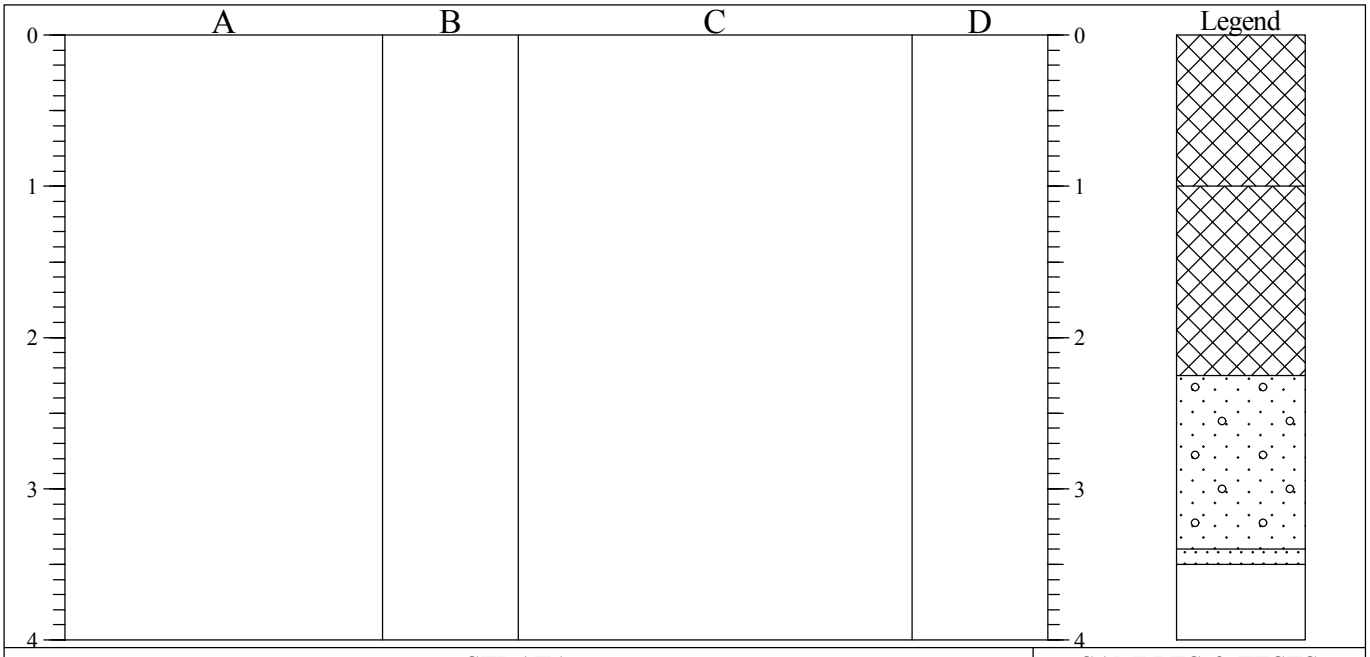
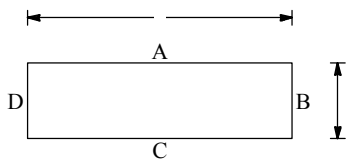
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.00		Black gravelly sand with brick and sandstone blocks. Relic walls and footings encountered within excavation to c.1.20m bgl. Soft brown very sandy clay/very clayey sand backfilled adjacent to relic walls and footings (MADE GROUND)	0.00-1.00	B	
1.00-2.25		Brown clayey gravelly fine to coarse grained SAND with cobbles and boulders (MADE GROUND?).	1.00-2.25	B	
2.25-3.40		Yellow brown gravelly coarse grained SAND with cobbles.	2.25-3.40	B	
3.40-3.50		Strong yellow and brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).			
3.50		Trial pit terminated at c.3.50m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Adjacent to sub-surface pit.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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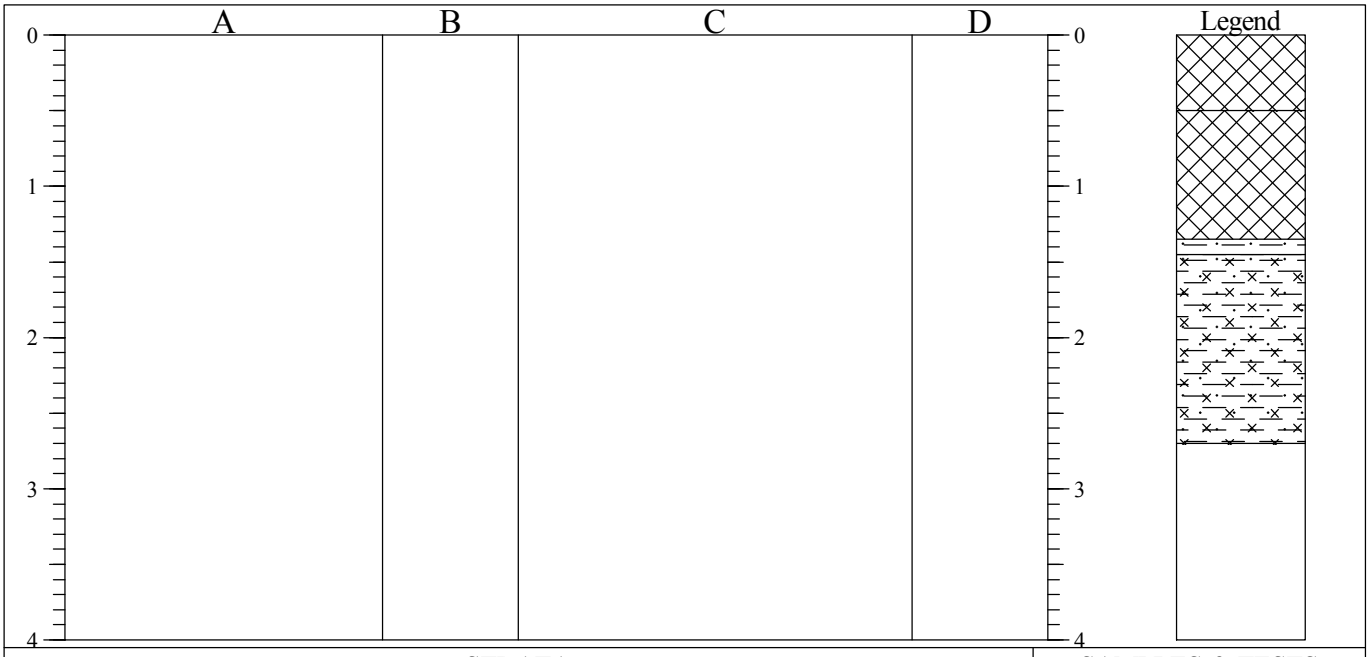
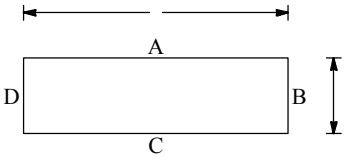
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP01A**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.50		Red sandy gravel of shale with sandstone blocks (MADE GROUND).	0.00-0.50	B	
0.50-1.35		Black sandy fine to coarse gravel of ash and clinker (MADE GROUND).	0.50-1.35	B	
1.35-1.45		Brown sandy CLAY.	1.35-1.45	B	
1.45-2.70		North end of trial pit:- Brown very sandy silty CLAY. South end of trial pit:- Brown very gravelly SAND with cobbles.	1.45-2.70 1.45-2.70 B 1.45-2.70 B	B North South	
2.70		Trial pit terminated at c.2.70m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Area of red shale.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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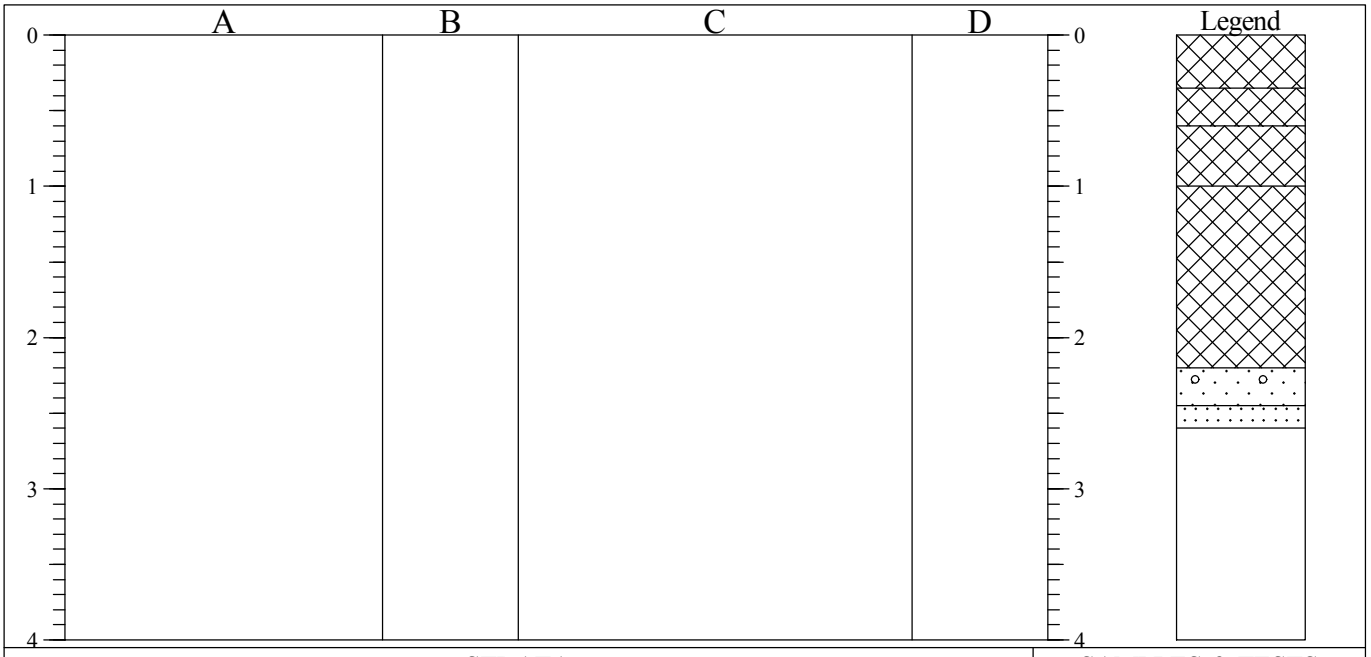
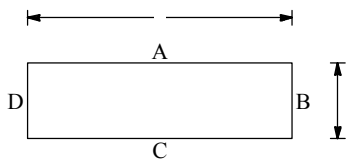
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP01B**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		Grey gravelly sand with brick and bitumous gravels (MADE GROUND).	0.00-0.35	B	
0.35-0.60		Black sandy fine to coarse gravel of ash and clinker (MADE GROUND).	0.35-0.60	B	
0.60-1.00		Brown firm to stiff (high strength) silty very sandy clay (MADE GROUND).	0.60-1.00 0.75 0.75	B CBR V	 2% 77kN/m^2
1.00-2.20		Brown soil with roots and boulders interbedded with sandy clay and gravelly sand (MADE GROUND).	1.00-2.20	B	
2.20-2.45		Yellow brown gravelly coarse grained SAND with cobbles.	2.20-2.45	B	
2.45-2.60		Strong yellow and brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).			
2.60		Trial pit terminated at c.2.60m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Adjacent to TP06, area of previously identified contamination (Card Geotechnics).

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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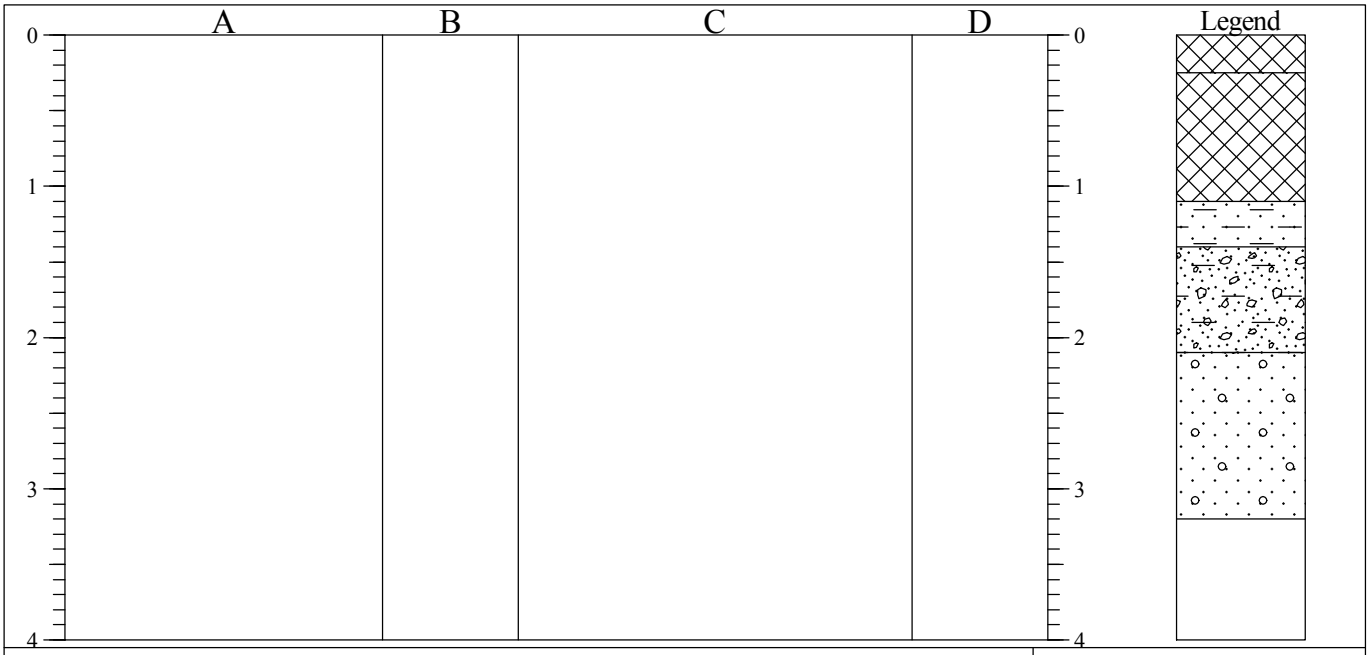
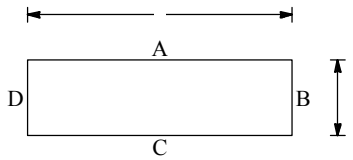
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP02
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.25		Grey gravelly sand with brick and concrete rubble (MADE GROUND).	0.00-0.25	B	
0.25-1.10		Brown very clayey sand with a small pocket of brown clayey soil (MADE GROUND).			
1.10-1.40		Brown very clayey SAND.	1.10-1.40	B	
1.40-2.10		Brown clayey gravelly fine to coarse grained SAND with cobbles and boulders.	1.40-2.10	B	
2.10-3.20		Brown gravelly medium to coarse grained SAND with cobbles and boulders.	2.10-3.20	B	
3.20 3.30		Strong yellow and brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES). Trial pit terminated at c.3.20m bgl. Trial pit terminated at c.3.20m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Historic above ground tank location.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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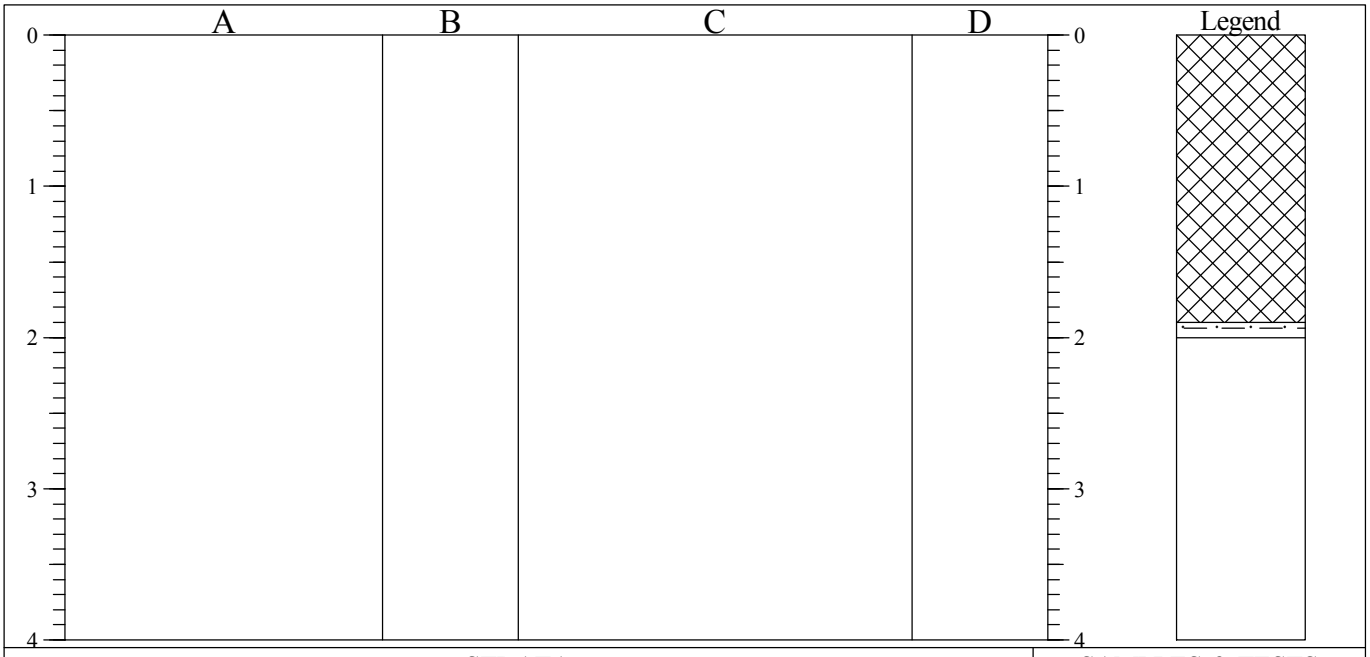
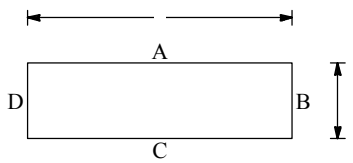
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP02A
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.90		Black sandy fine to coarse gravel of ash and clinker (MADE GROUND).	0.00-1.00	B	
			0.00	CBR	2%
			1.00-1.90	B	
1.90-2.00		Brown sandy CLAY with relic concrete footing encountered.			
2.00		Unable to advance further, trial pit terminated at c.2.00m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Area of clinker and slag.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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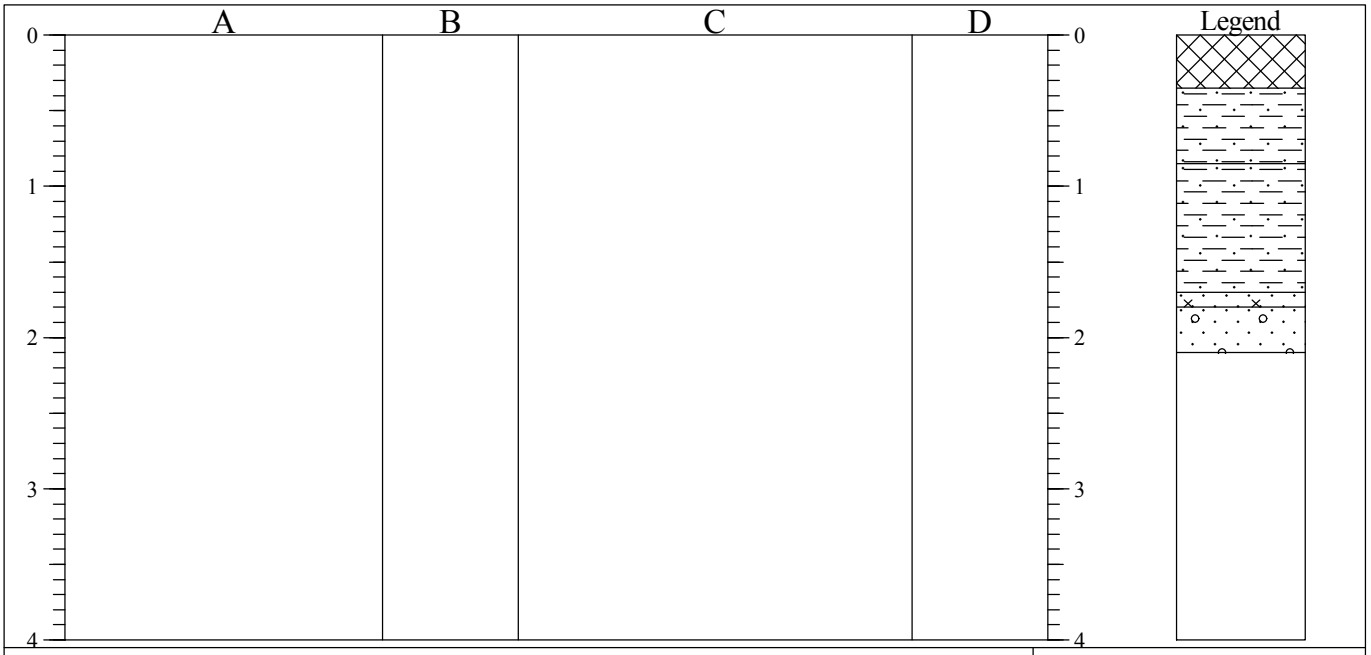
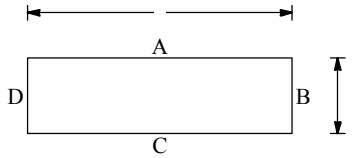
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP03
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		Black clayey sand with brick, sandstone, metal, nails and occasional fine to coarse ash and clinker (MADE GROUND).	0.00-0.35	B	
0.35-0.85		Stiff brown very sandy CLAY.	0.35-0.85	B	
			0.55	CBR	2.5%
			0.55	V	95kN/m^2
0.85-1.70		Firm (medium strength) brown and orange mottled slightly sandy CLAY.	0.85-1.70	B	
			1.10	CBR	1%
			1.10	V	47kN/m^2
1.70-1.80		Grey silty fine to coarse grained SAND.			
1.80-2.10		Brown and orange very gravelly coarse grained SAND.	1.80-2.10	B	
2.10		Strong yellow and brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).			
2.20		Trial pit terminated at c.2.10m bgl. Trial pit terminated at c.2.20m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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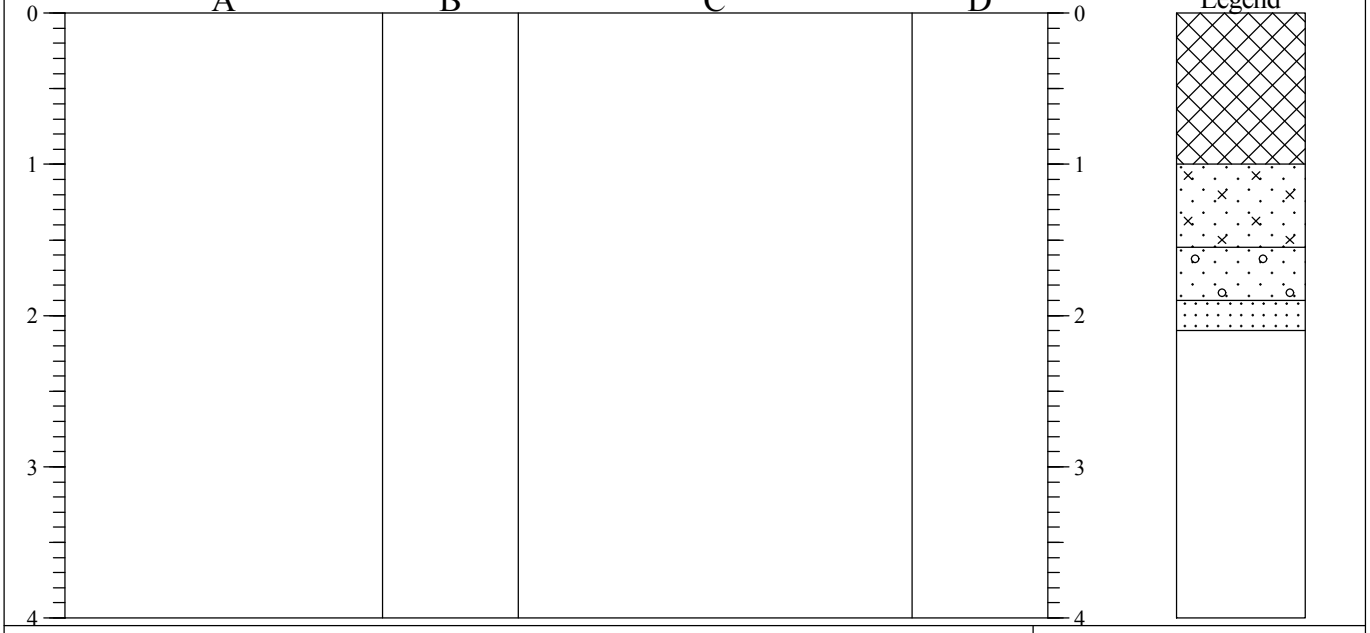
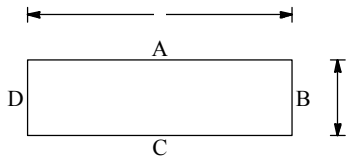
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP04**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.00		Grey very gravelly sand with brick and concrete with pockets of brown clay. 4 inch iron pipe, drainage pipe and concrete footing encountered within excavation (MADE GROUND).	0.00-1.00 0.00	B CBR	 5%
1.00-1.55		Grey mottled brown silty fine to medium grained SAND.	1.00-1.55	B	
1.55-1.90		Grey and brown gravelly fine to coarse grained SAND with cobbles. Boulders noted with depth.	1.50	CBR	12%
1.90-2.10		Strong yellow and brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).			
2.10		Some minor standing water noted at base of trial pit excavation. Trial pit terminated at c.2.10m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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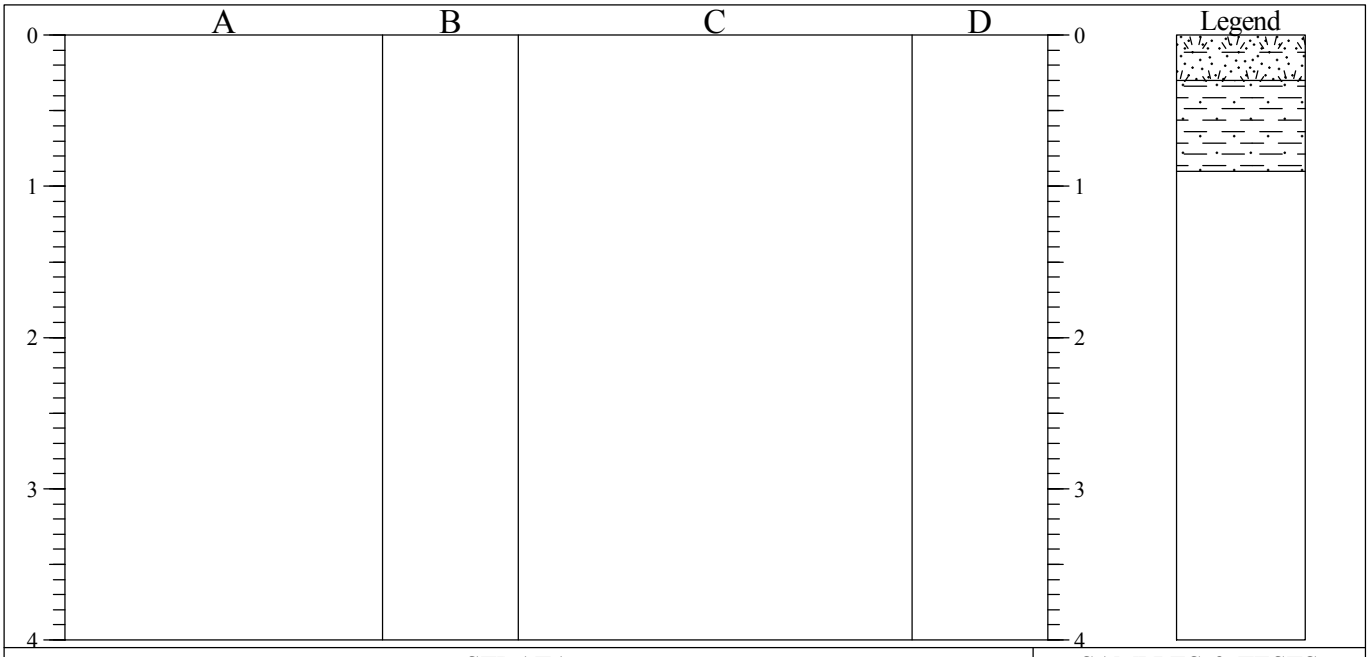
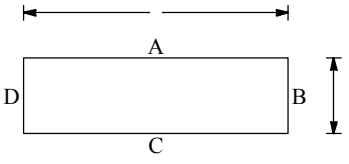
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP05
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Dark brown sandy clayey SOIL.	0.00-0.30	B	
0.30-0.90		Orange brown sandy CLAY.	0.30-0.90	B	
0.90		Trial pit terminated at c.0.90m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Adjacent to downpipes.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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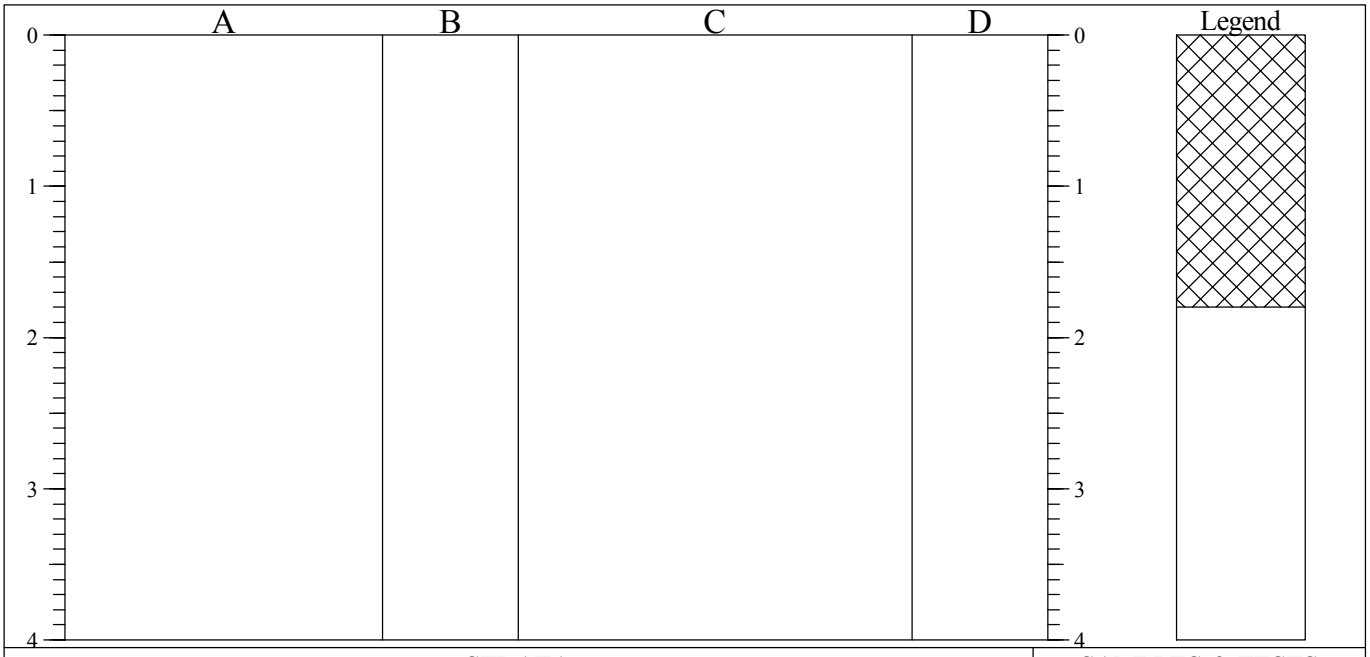
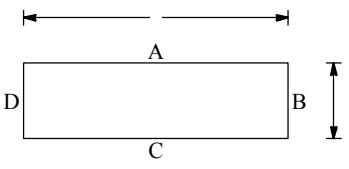
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP05A**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.80		Brown clayey very sandy gravel of sandstone. Backfill associated with adjacent retaining wall (5ft wide) (MADE GROUND).	0.00-0.80	B	
			0.80-2.00	B	
1.80		Trial pit terminated at c.1.80m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Adjacent to pipes and sub-surface pit.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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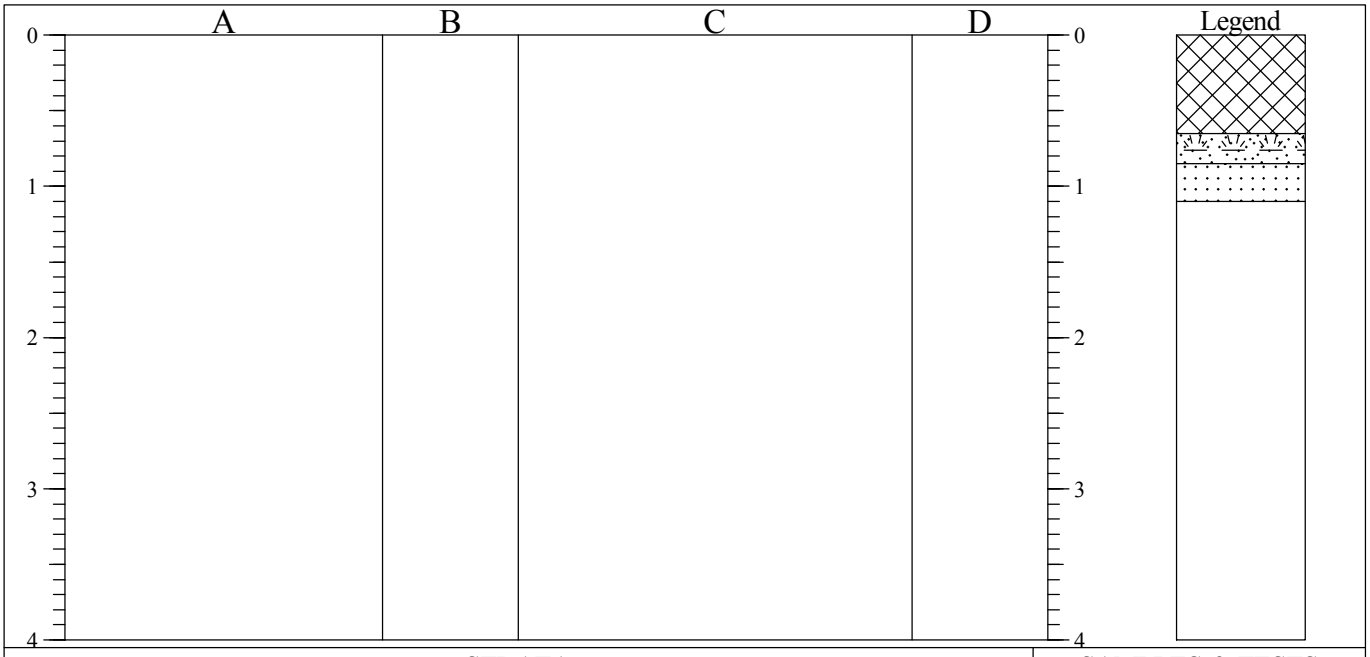
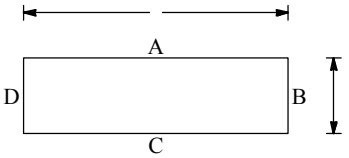
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP06**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.65		Brown very sandy gravelly clay with sandstone (MADE GROUND).	0.00-0.65	B	
0.65-0.85		Black clayey SOIL (relic topsoil).			
0.85-1.10		Strong orange brown medium grained SANDSTONE (MILLSTONE GRIT SERIES).			
1.10		Trial pit terminated at c.1.10m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

Targeted position:- Adjacent to historic tank/silo and asbestos.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

AGS3 UK TP LOGS.GPJ AGS3_ALL.GDT 14/10/11

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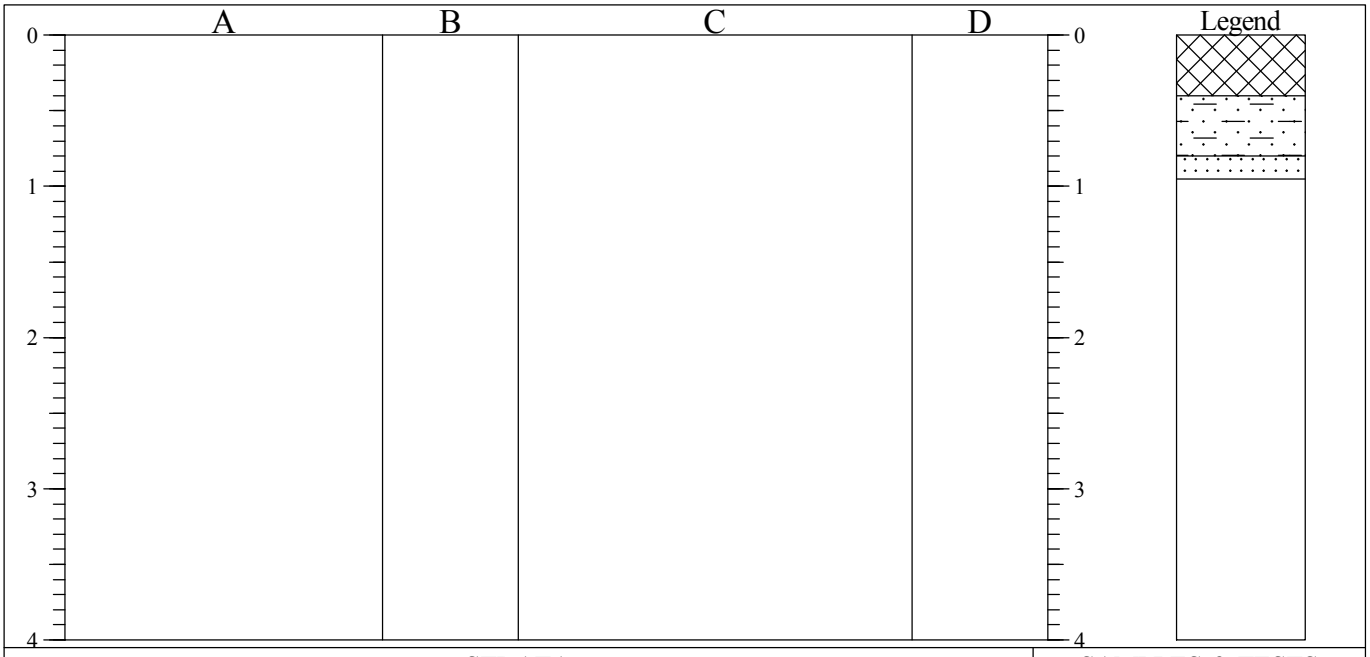
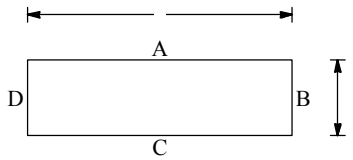
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP07**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		Brown very gravelly sand overlying white geotextile (MADE GROUND).	0.00-0.40	B	
0.40-0.80		Brown clayey fine to medium grained SAND.			
0.80-0.95		Strong yellow and brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).			
0.95		Trial pit terminated at c.0.95m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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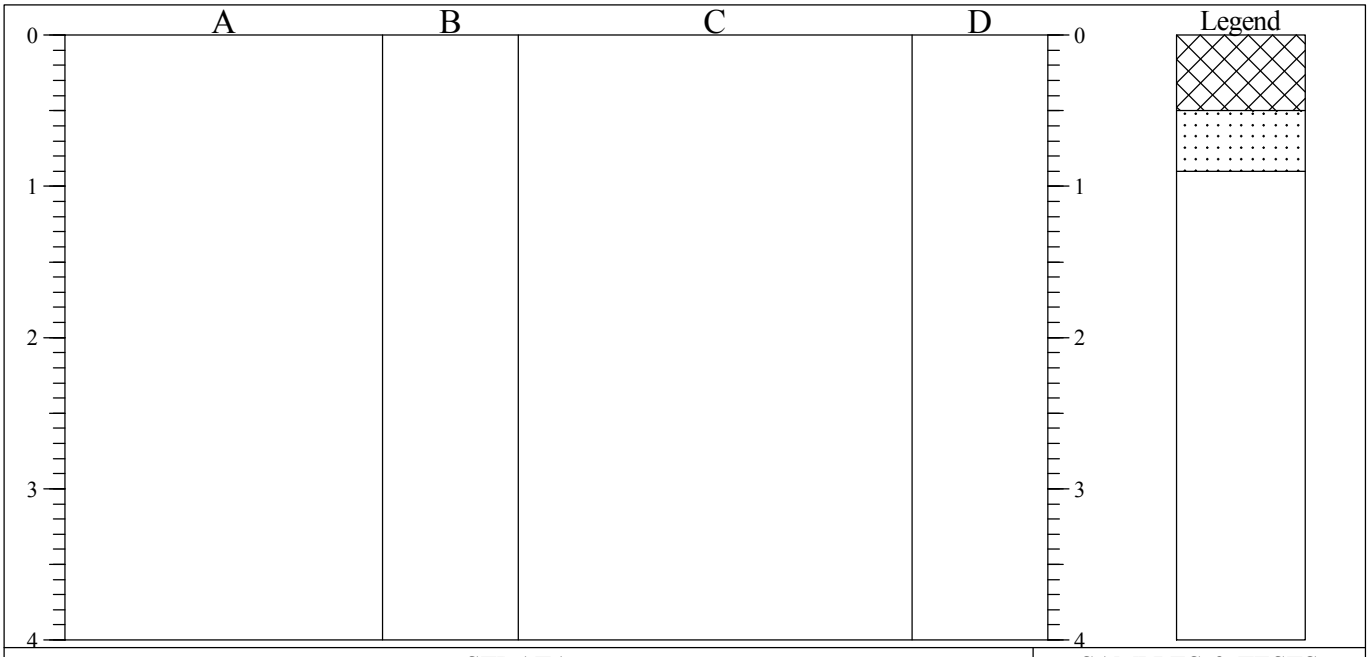
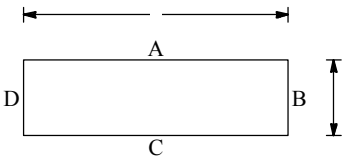
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP08**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.50		Dark brown clayey gravelly sand with brick and concrete (MADE GROUND).	0.00-0.50	B	
0.50-0.90		Strong yellow and brown coarse grained SANDSTONE, recovered as large boulders (c.1.20m x c.1.30m x c.0.40m & c.1.40 x c.0.80m x c.0.30m) (MILLSTONE GRIT SERIES).			
0.90		Trial pit terminated at c.0.90m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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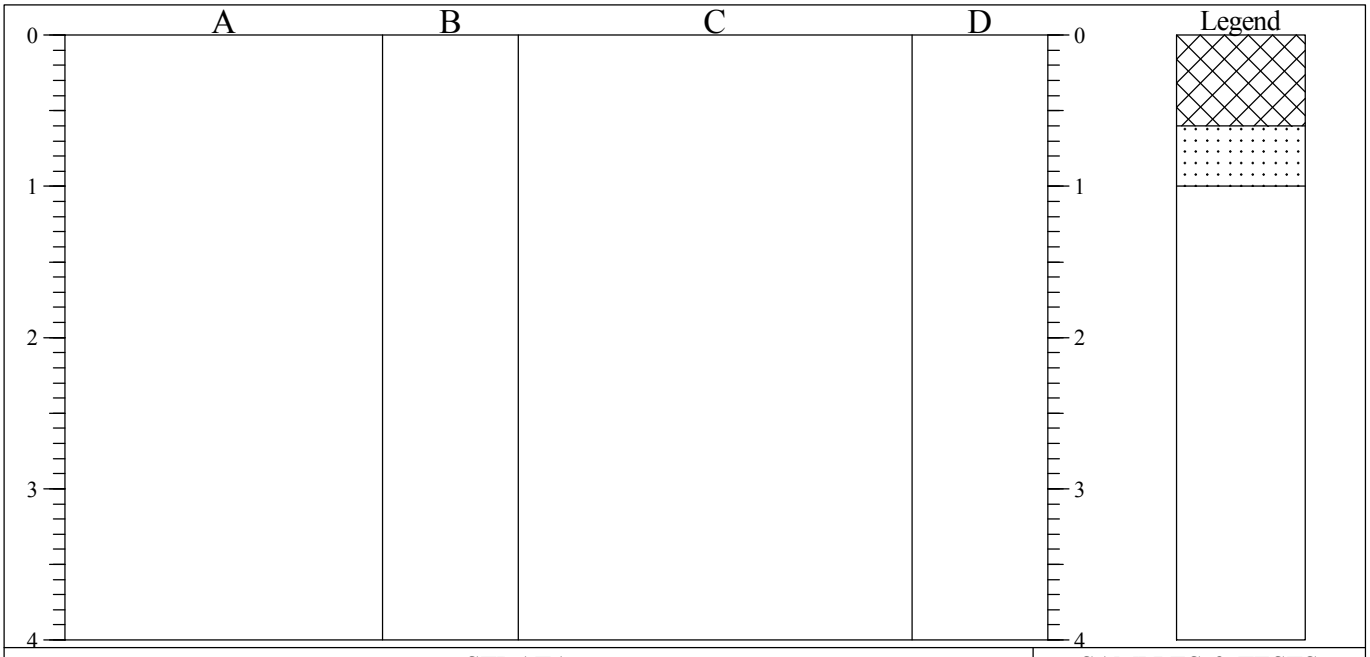
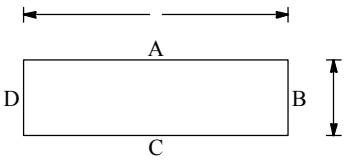
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP09**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.60		Brown very gravelly sand with cobbles. Thickness of made ground noted to be increasing with depth at north end of trial pit, possibly associated with backfill adjacent to retaining wall (MADE GROUND).	0.00-0.60	B	
0.60-1.00		Strong yellow and brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).			
1.00		Trial pit terminated at c.1.00m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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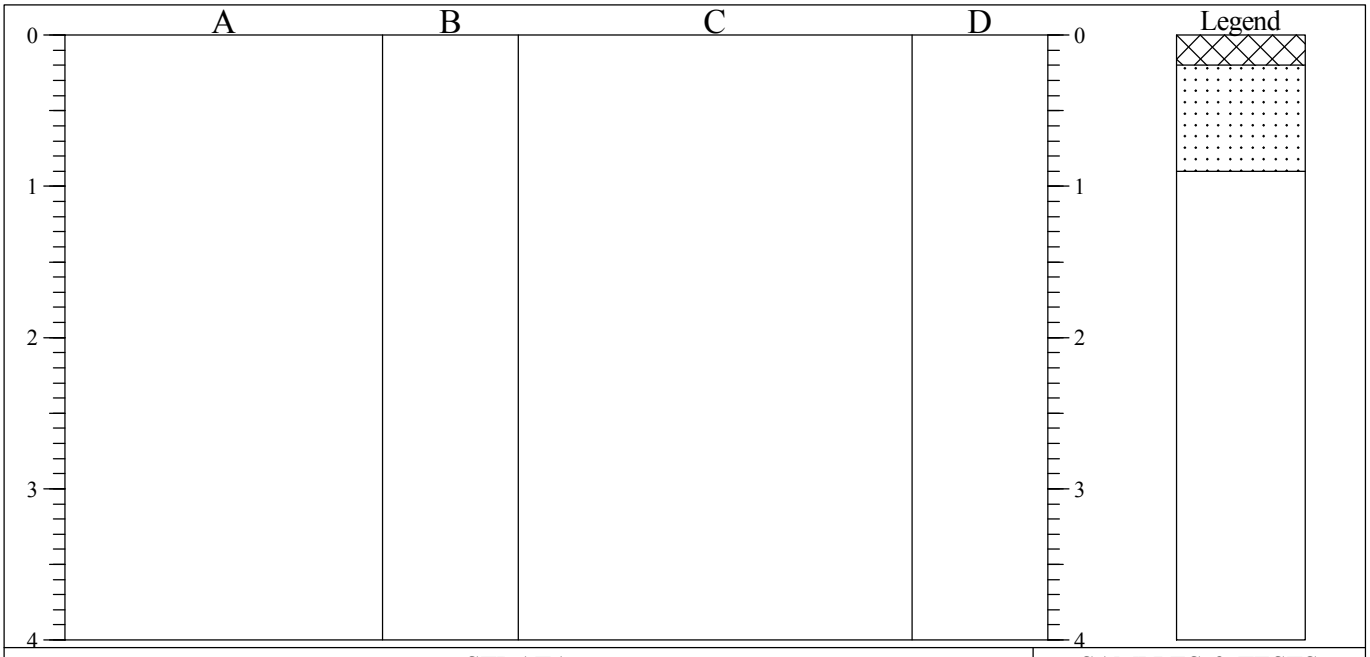
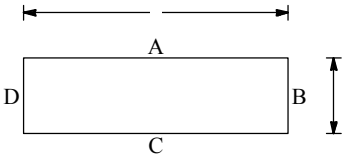
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				**TP10**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		Brown very sandy gravel of sandstone (MADE GROUND).	0.00-0.20	B	
0.20-0.90		Initially disintergrated brown medium strong fine grained SILTSTONE tending strong orange brown medium grained SANDSTONE (MILLSTONE GRIT SERIES).			
0.90		Trial pit terminated at c.0.90m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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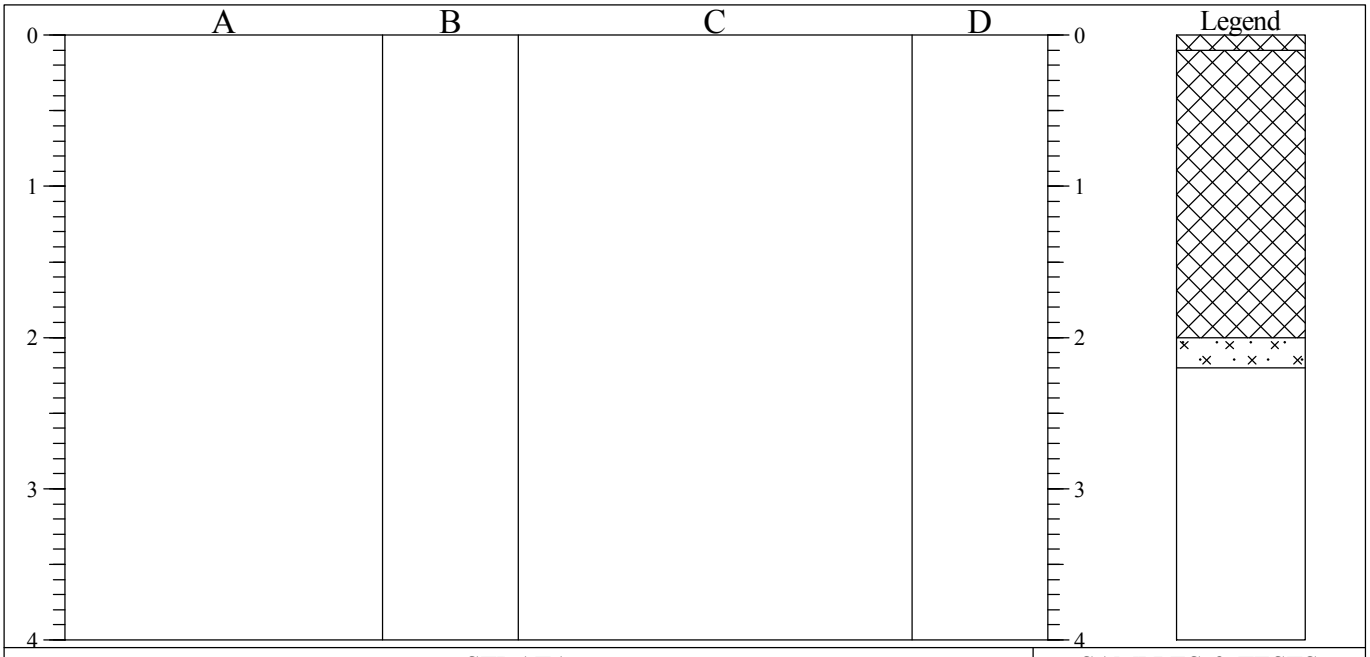
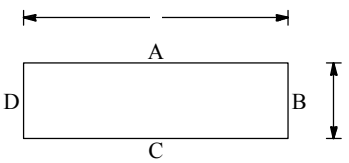
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP11
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		Yellow sandy gravel of sandstone (MADE GROUND).	0.00-0.80	B	
0.10-2.00		Brown, grey and black slightly sandy clay (MADE GROUND).	0.80-2.00	B	
2.00-2.20		Very soft dark grey sandy slightly organic SILT (MADE GROUND).	2.00-2.20	B	
2.20		Trial pit terminated at c.2.20m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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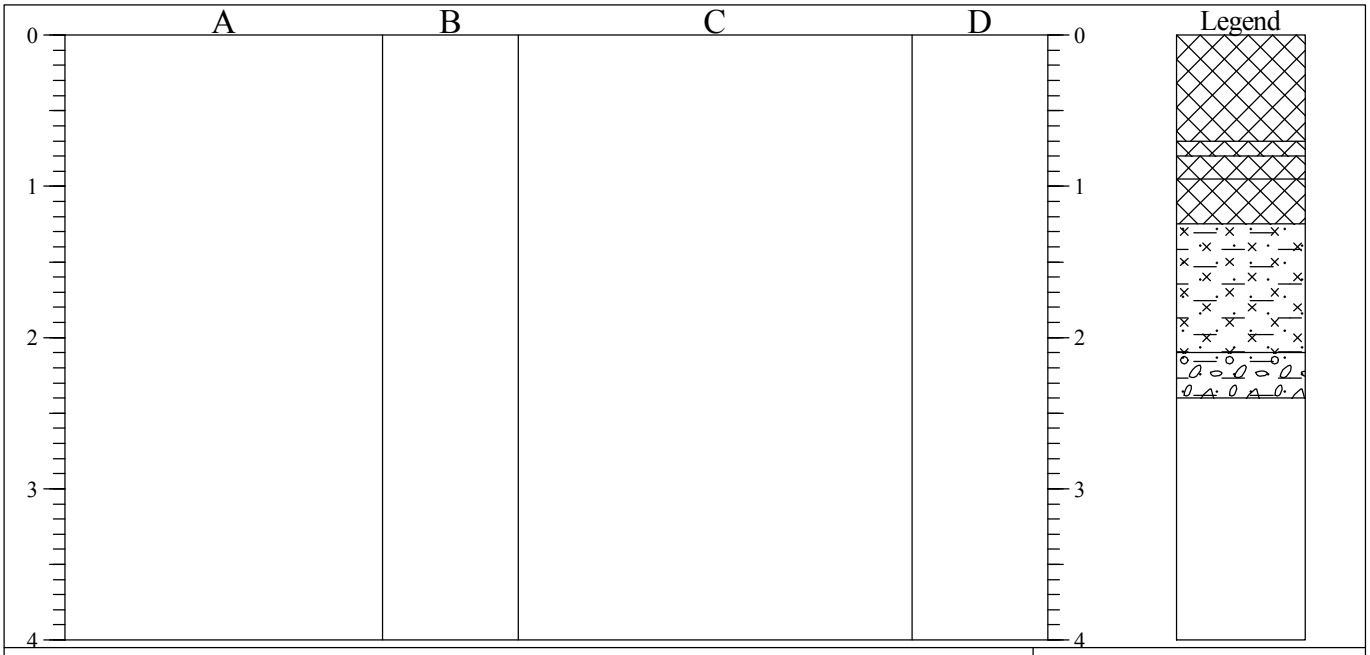
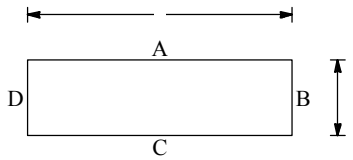
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP12
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.70		Black gravellly sand with fine to coarse ash, clinker, brick, concrete, sandstone blocks, metal, plastic, ceramic pipe, glass, and occasional coal briquettes (MADE GROUND).	0.00-0.80	B	
0.70-0.80		Brown clay (MADE GROUND).			
0.80-0.95 0.95-1.25		Grey and black very sandy clay with 'oily' contamination, excavated from a relic culvert or drain (MADE GROUND).	0.80-0.95	B	
1.25-2.10		Brown gravelly sand (MADE GROUND). Very soft (extremely low strength) grey slightly sandy clayey slightly organic silt (MADE GROUND).	1.25-2.10	B	
2.10-2.40		Grey and orange brown clayey sandy GRAVEL of sandstone.			
2.40		Unable to advance further, trial pit terminated at c.2.40m bgl.			

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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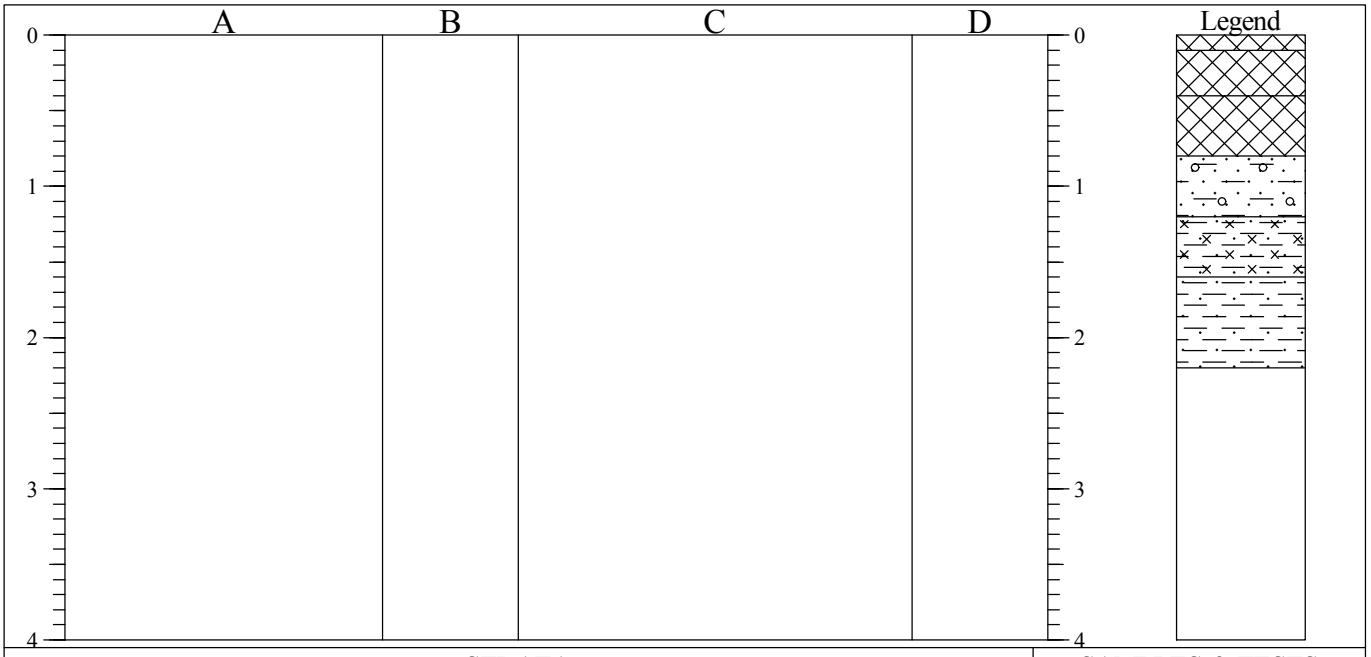
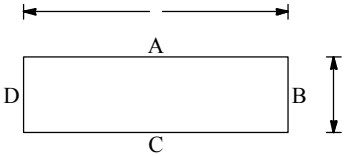
TRIAL PIT LOG

Project				TRIAL PIT No
Hinchliffe Mill, Water Street				TP13
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10 0.10-0.40		Yellow sandy gravel of sandstone (MADE GROUND). Black gravelly sand with fine to coarse ash and clinker (MADE GROUND).	0.10-0.40	B	
0.40-0.80		Dark brown sandy clay (MADE GROUND).			
0.80-1.20		Brown clayey gravelly fine to coarse grained SAND.	0.80-1.20	B	
1.20-1.60		Very soft brown and grey gravelly silty very sandy CLAY.	1.20-1.60	B	
1.60-2.20		Very soft brown very sandy CLAY.	1.60-2.20	B	
2.20		Unable to advance further as sides of trial pit collapsing, possible gravelly sandstone at base. Trial pit terminated at c.2.20m bgl.			

Shoring/Support:
Stability: Collapsing below c.1.20m bgl.



GENERAL REMARKS

Targeted position:- Adjacent to sub-surface pit.

All dimensions in metres Scale 1:50	Client MD One Ltd	Method/ Plant Used JCB 3CX	Logged By RS

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH01**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50	B					(1.20)	Black slightly clayey gravelly sand with fine to coarse ash, clinker and sandstone (MADE GROUND).		
1.00	B								
1.00-1.34	CPT	51 Blows				1.20			
1.50	B					(1.00)	Very dense yellow and brown very gravelly SAND with cobbles of sandstone.		
2.00	B								
2.00-2.20	CPT	50 Blows				2.20			
							Borehole terminated at c.2.20m bgl due to refusal of sampling equipment and SPT - Possible Sandstone bedrock(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-08-11	00.00	2.20	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH01A**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.40) 0.40	Firm dark brown very sandy gravelly clay with bricks, ash, clinker and sandstone with cobbles and boulders (MADE GROUND).		
0.50	B					(0.70) 1.10	Orange brown sandy gravel and cobbles of sandstone and brick (MADE GROUND).		
1.00	B								
1.00-1.45	CPT	N=8					Initially loose becoming very dense yellow and brown very gravelly SAND with cobbles of sandstone.		
1.50	B					(1.24)			
2.00	B								
2.00-2.34	CPT	69 Blows				2.34			
							Borehole terminated at c.2.34m bgl due to refusal of sampling equipment and SPT - Possible Sandstone bedrock(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-08-11	00.00	2.34	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH02**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	B					(0.40) 0.40	Grey, yellow and brown slightly clayey very gravelly sand with concrete and brick with occasional clinker and sandstone (MADE GROUND).		
0.50	B					(0.50) 0.90	Black sandy gravel of clinker and slag (MADE GROUND).		
1.00 1.00-1.45	B CPT	N=6				(0.62) 1.52	Loose grey and brown very clayey gravelly sand with cobbles of sandstone (MADE GROUND?)		
1.50 1.50-1.52	B CPT	50 Blows					Borehole terminated at c.1.52m bgl due to refusal of sampling equipment and SPT - Possible sandstone cobble/boulder obstruction(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-08-11	00.00	1.52	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH02A**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.45	CPT	N=1					Very loose black sandy fine to coarse gravel of ash and clinker (MADE GROUND).		
0.20	B								
0.50	B					(1.35)			
1.00	B								
1.00-1.45	CPT	N=11				1.35			
						(0.25)	Very dense orange brown very gravelly SAND with cobbles.		
1.50	B					1.60			
1.50-1.60	CPT	50 Blows					Borehole terminated at c.1.60m bgl due to refuusal of sampling equipment and SPT - Possible sandstone cobble/boulder obstruction(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-08-11	00.00	1.60	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH03
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.40	B					(0.70)	Red, grey and black very sandy gravel of brick and concrete (MADE GROUND).		
0.50	B					0.70			
1.00	B						Soft (low strength) dark brown sandy gravelly clay with occasional clinker and brick (MADE GROUND).		
1.00	V	35kN/m^2				(0.90)			
1.50	B					1.60			
1.50	V	30kN/m^2					Medium dense orange brown gravelly SAND with cobbles of sandstone.		
2.00	B					(0.80)			
2.00-2.45	CPT	N=28				2.40			
2.50	B						Dark orange brown clayey gravelly SAND with coarse gravels of sandstone.		
						(0.50)			
						2.90			
3.00	B						Weak becoming strong orange brown, initially wholly disintergrated and slightly decomposed becoming fresh coarse grained SANDSTONE (MILLSTONE GRIT SERIES).		
3.00-3.28	CPT	64 Blows				(0.38)			
						3.28			
							Borehole terminated at c.3.28m bgl.		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
17-08-11	00.00	3.28	1.00	115	Dry

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH04
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.60)	Orange, brown and grey very sandy gravel of sandstone, brick and clinker (MADE GROUND).		
0.40	B					0.60			
							Soft (low strength) orange brown and grey mottled slightly sandy CLAY.		
1.00	B								
1.00	V	30kN/m^2				(1.30)			
1.50	B								
1.50	V	32kN/m^2							
			▼			1.90			
						(0.20)	Grey slightly clayey gravelly SAND with coarse gravels of sandstone.		
2.00	B					2.10			
2.00-2.25	CPT	56 Blows					Strong orange brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).		
						2.25			
							Borehole terminated at c.2.25m bgl.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-08-11	00.00	2.25	1.00	115	1.9						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH05
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	18-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Grass overlying sandy clayey SOIL.		
0.20	B						Firm orange brown sandy gravelly CLAY with coarse gravels of sandstone.		
0.50	B								
						(1.60)			
1.00	B								
1.00-1.45	CPT	N=49							
1.50	B								
						1.70			
						(0.47)	Weak becoming strong orange brown, initially wholly disintergrated and slightly decomposed becoming fresh coarse grained SANDSTONE (MILLSTONE GRIT SERIES).		
2.00	B								
2.00-2.17	CPT	56 Blows				2.17			
							Borehole terminated at c.2.17m bgl.		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
18-08-11	00.00	2.17	1.00	115	Dry

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH06**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	18-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Brown sandy clayey soil (MADE GROUND).		
0.20	B					(0.30) 0.40	Concrete (MADE GROUND).		
0.50	B					(0.40) 0.80	Firm orange brown sandy gravelly CLAY with coarse gravels of sandstone.		
0.90	B					(0.19) 0.99	Strong orange brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).		
0.90-0.99	CPT	50 Blows					Borehole terminated at c.0.99m bgl.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-08-11	00.00	0.99			Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH06A**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	18-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	B					(0.30) 0.30	Yellow, black and grey very sandy gravel of sandstone and brick (MADE GROUND).		
0.50	B					(0.60) 0.90	Firm orange brown sandy gravelly CLAY with coarse gravels of sandstone.		
1.00-1.02	CPT	50 Blows				1.02	Strong orange brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).		
1.02	B						Borehole terminated at c.1.02m bgl.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-08-11	00.00	1.02			Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH07**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.10	B					0.15	Grey and dark brown sandy gravel of concrete and brick (MADE GROUND).		
							Soft and firm orange brown sandy gravelly CLAY with coarse gravels of sandstone.		
0.50	B					(1.15)			
1.00	B								
1.00-1.42	CPT	64 Blows				1.30			
						(0.30)	Yellow brown BOULDER/COBBLE of sandstone.		
1.50	B					1.60			
							Borehole terminated at c.1.60m bgl due to refusal of sampling equipment and SPT - Possible sandstone cobble/boulder obstruction(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-08-11	00.00	1.60	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH08
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	17-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	B					(0.40) 0.40	Black sandy fine to coarse gravel of ash, clinker, coal and shale (MADE GROUND).		
0.50	B						Dark brown clayey gravelly sand with brick, clinker, slag and coal (MADE GROUND).		
1.00	B					(1.50)			
1.50	B					1.90			
2.00	B					(0.27)	Yellow brown BOULDER/COBBLE of sandstone.		
2.00-2.17	CPT	50 Blows				2.17	Borehole terminated at c.2.17m bgl due to refusal of sampling equipment and SPT - Possible sandstone cobble/boulder obstruction(?).		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
17-08-11	00.00	2.17	1.00	115	Dry

Chiselling			Water Added		GENERAL REMARKS
From	To	Hours	From	To	

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				**BH09**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	18-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.20) 0.20	Grey and dark brown sandy gravel of concrete and brick (MADE GROUND).		
0.20	B						Firm orange brown sandy gravelly clay with cobbles of sandstone (MADE GROUND).		
0.50	B								
1.00 1.00-1.45	B CPT	N=10				(2.05)			
1.50	B								
2.00 2.00-2.23	B CPT	58 Blows				2.25			
							Borehole terminated at c.2.25m bgl due to refusal of sampling equipment and SPT - Possible Sandstone bedrock(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-08-11	00.00	2.25	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH10
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	18-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Grey and dark brown sandy gravel of concrete and brick (MADE GROUND).		
0.20	B					(0.20) 0.30	Orange brown sandy gravelly clay (MADE GROUND).		
0.50	B						Firm orange brown sandy gravelly CLAY with cobbles of sandstone.		
0.50-0.95	CPT	N=57				(0.80)			
1.00	B					1.10			
1.25	B						Strong orange brown coarse grained SANDSTONE (MILLSTONE GRIT SERIES).		
1.30-1.45	CPT	50 Blows				(0.35) 1.45			
							Borehole terminated at c.1.45m bgl.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-08-11	00.00	1.45	0.50	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH11
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	18-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.03	Concrete (MADE GROUND).		
0.20	B					(0.58)	Firm black and brown very sandy gravelly clay with sandstone, brick, concrete and clinker (MADE GROUND).		
0.50	B					0.61			
0.50-0.61	CPT	50 Blows					Borehole terminated at c.0.61m bgl due to refusal of sampling equipment and SPT - Possible sandstone cobble/boulder obstruction(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-08-11	00.00	0.61	0.50	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH12
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	18-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.05	Concrete (MADE GROUND).		
0.20	B					(0.25) 0.30	Yellow sandy gravel of dolomite (MADE GROUND).		
0.40	B					(0.20) 0.50	Black and brown sandy fine to coarse gravel of brick, ash and clinker (MADE GROUND).		
0.50	B					(0.30) 0.80	Soft orange brown gravelly very sandy clay (MADE GROUND).		
1.00	B						Soft orange brown gravelly very sandy CLAY with cobbles of sandstone.		
1.00-1.45	CPT	N=16							
1.50	B					(1.39)			
2.00	B								
2.00-2.19	CPT	50 Blows				2.19			
							Borehole terminated at c.2.19m bgl due to refusal of sampling equipment and SPT - Possible sandstone cobble/boulder obstruction(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-08-11	00.00	2.19	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH13
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	19-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Yellow sandy gravel of sandstone (MADE GROUND).		
0.20	B						Very loose dark brown and black sandy gravelly clay with brick, concrete and sandstone (MADE GROUND).		
0.50	B					(1.10)			
1.00 1.00-1.45	B CPT	N=0				1.20			
							Very loose black and grey organic sand (MADE GROUND).		
1.50	B								
						(1.40)			
2.00 2.00-2.45	B CPT	N=0							
2.50	B		▼			2.60			
							Soft grey very sandy CLAY interbedded with sand lenses.		
						(0.50)			
3.00 3.00-3.45	B CPT	N=0				3.10			
							Orange and brown GRAVEL and COBBLES of sandstone.		
						(0.30)			
3.40	B					3.40			
							Dense grey SAND.		
						(0.29)			
3.60 3.60-3.69	B CPT	50 Blows				3.69			
							Borehole terminated at c.3.69m bgl due to refusal of sampling equipment and SPT - Possible Sandstone bedrock(?).		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
19-08-11	00.00	3.69	1.00	115	2.6

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH14
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	19-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Grass overlying sandy clayey soil (MADE GROUND).		
0.20	B						Firm becoming very soft dark brown mottled orange sandy gravelly slightly organic clay (MADE GROUND).		
0.50	B								
0.50	V	54kN/m^2							
1.00	B					(1.90)			
1.00	V	40kN/m^2							
1.50	B								
1.50	V	10kN/m^2							
						2.00			
2.00	B						No sample recovery - pushing cobble.		
2.00	V	10kN/m^2				(1.00)			
						3.00			
							Soft black, brown and green very sandy gravelly CLAY.		
						(0.70)			
3.50	B								
						3.70			
						(0.30)	Yellow brown BOULDER/COBBLE of sandstone.		
						4.00			
4.00	B						Borehole terminated at c.4.00m bgl due to refusal and breakage of sampling equipment - extended to c.5.16m bgl by continuous CPT.		
4.00-4.30	CPT	N=37							
4.30-4.60	CPT	N=31							
4.60-4.90	CPT	N=27							
4.90-5.16	CPT	64 Blows							

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt
19-08-11	00.00	5.16	1.00	115	Dry

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

All dimensions in metres Scale 1:37.5	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH15
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	19-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	B					(0.30) 0.30	Black sandy fine to coarse gravel of ash, clinker, brick, concrete and sandstone (MADE GROUND).		
0.50	B						Loose orange brown gravelly sand with cobbles of sandstone (MADE GROUND).		
1.00 1.00-1.45	B CPT	N=7				(1.90)			
2.00	B					2.20			
						(0.41) 2.61	Stiff orange brown sandy gravelly CLAY with coarse gravels of sandstone.		
2.60 2.60-2.61	B CPT	50 Blows					Borehole terminated at c.2.61m bgl due to refusal of sampling equipment and SPT - Possible Sandstone bedrock(?).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19-08-11	00.00	2.61	1.00	115	Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

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BOREHOLE LOG

Project				BOREHOLE No
Hinchliffe Mill, Water Street				BH16
Job No	Date	Ground Level (m)	Co-Ordinates ()	
10-015	19-08-11			
Contractor				Sheet
Arc Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.20) 0.20	Grey and dark brown sandy gravel of concrete and brick (MADE GROUND).		
0.30	B					(0.90) 1.10	Firm orange brown sandy gravelly CLAY with coarse gravels of sandstone.		
0.50	B								
1.00	B								
1.00-1.45	CPT	N=46				(0.41) 1.51	Initially very loose becoming very dense orange brown very gravelly SAND with cobbles of sandstone.		
1.50	B						Borehole terminated at c.1.51m bgl due to refusal of sampling equipment and SPT - Possible sandstone cobble/boulder obstruction(?).		
1.50-1.51	CPT	50 Blows							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19-08-11	00.00	1.51			Dry						

All dimensions in metres Scale 1:25	Client MD One Ltd	Method/ Plant Used Windowless Sampling	Logged By JH

AGS3 UK BH LOGS.GPJ AGS3_ALL.GDT 14/10/11

Arc Environmental Ltd.: SPT Summary Sheet

BH Number	Top (m)	Seating Blows	Main Blows	Total Pen (mm)	N Value	Reported Result	Depth Casing	Depth Water	Type	Blows 1st	Blows 2nd	Blows 3rd	Blows 4th	Blows 5th	Blows 6th	Pen 1st (mm)	Pen 2nd (mm)	Pen 3rd (mm)	Pen 4th (mm)	Pen 5th (mm)	Pen 6th (mm)
1	1.00	3	50	340	~	51 blows	1.00	Dry	C	2	1	2	22	26		75	75	75	75	40	
1	2.00	32	18	200	~	50 blows	1.00	Dry	C	14	18	18				75	75	50			
1A	1.00	2	8	450	8	8	1.00	Dry	C	1	1	2	1	3	2	75	75	75	75	75	75
1A	2.00	19	50	340	~	69 blows	1.00	Dry	C	7	12	13	14	23		75	75	75	75	40	
2	1.00	2	6	450	6	6	1.00	Dry	C	1	1	1	1	1	3	75	75	75	75	75	75
2	1.50	50	0	20	~	50 blows	1.00	Dry	C	50						20					
2A	0.00	0	1	450	1	1	1.00	Dry	C	0	0	0	0	0	1	75	75	75	75	75	75
2A	1.00	0	11	450	11	11	1.00	Dry	C	0	0	0	0	0	11	75	75	75	75	75	75
2A	1.50	50	0	100	~	50 blows	1.00	Dry	C	33	17					75	25				
3	2.00	10	28	450	28	28	1.00	Dry	C	5	5	7	7	7	7	75	75	75	75	75	75
3	3.00	14	50	280	~	64 blows	1.00	Dry	C	6	8	24	26			75	75	75	55		
4	2.00	6	50	250	~	56 blows	1.00	1.90	C	1	5	9	41			75	75	75	25		
5	1.00	4	49	450	49	49	1.00	Dry	C	1	3	5	14	14	16	75	75	75	75	75	75
5	2.00	34	22	170	~	56 blows	1.00	Dry	C	6	28	22				75	75	20			
6	0.90	50	0	95	~	50 blows	~	Dry	C	29	21					75	20				
6A	1.00	50	0	20	~	50 blows	~	Dry	C	50						20					
7	1.00	14	50	420	~	64 blows	1.00	Dry	C	6	8	14	12	10	14	75	75	75	75	75	45
8	2.00	37	13	170	~	50 blows	1.00	Dry	C	11	26	13				75	75	20			
9	1.00	5	10	450	10	10	1.00	Dry	C	2	3	2	3	3	2	75	75	75	75	75	75
9	2.00	28	30	225	~	58 blows	1.00	Dry	C	14	14	30				75	75	75			
10	0.50	17	57	450	57	57	0.50	Dry	C	8	9	9	12	14	22	75	75	75	75	75	75
10	1.30	50	0	150	~	50 blows	0.50	Dry	C	28	22					75	75				
11	0.50	50	0	110	~	50 blows	0.50	Dry	C	38	12					75	35				
12	1.00	0	16	450	16	16	1.00	Dry	C	0	0	6	2	4	4	75	75	75	75	75	75
12	2.00	16	35	190	~	50 blows	1.00	Dry	C	1	15	35				75	75	40			
13	1.00	0	0	450	0	0	1.00	Dry	C	0	0	0	0	0	0	75	75	75	75	75	75
13	2.00	0	0	450	0	0	1.00	Dry	C	0	0	0	0	0	0	75	75	75	75	75	75
13	3.00	0	0	450	0	0	1.00	2.60	C	0	0	0	0	0	0	75	75	75	75	75	75
13	3.60	50	0	85	~	50 blows	1.00	2.60	C	32	18					75	10				
14	4.00		37	300	37	37	1.00	Dry	C			10	10	10	7			75	75	75	75
14	4.30		31	300	31	31	1.00	Dry	C			7	7	8	9			75	75	75	75
14	4.60		27	300	27	27	1.00	Dry	C			7	7	9	4			75	75	75	75
14	4.90		64	255	~	64 blows	1.00	Dry	C			4	10	9	41			75	75	75	30
15	1.00	2	7	450	7	7	1.00	Dry	C	1	1	1	2	2	2	75	75	75	75	75	75
15	2.60	50	0	10	0	50 blows	1.00	Dry	C	50						10					
16	1.00	4	46	450	46	46	~	Dry	C	1	3	0	0	1	45	75	75	75	75	75	75
16	1.50	50	0	5	0	50 blows	~	Dry	C	50						5					

APPENDIX III

Insitu Testing (Gas & Groundwater Monitoring Certificates)

Arc Environmental Ground Gas & Groundwater Monitoring Certificate

Site: Hinchliffe Mill, Water Street **Ref:** 10-015

Date: 12 September 2011 **Time:** 2.30pm

Visit by: Geoff Heron **Equip:** LMS xi

Weather: Sunny, very windy

Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mb)	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 435 only)		Other Gases (PPM)			Depth to Water (m bgl)
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H_2S	CO	
BH1	<0.1	976	~	0.0	~	0.0	~	0.3	~	19.9						Dry
BH3	<0.1	976	~	0.0	~	0.0	~	0.1	~	20.2						2.97
BH5	<0.1	976	~	0.0	~	0.0	~	0.3	~	20.2						Dry
BH8	<0.1	976	~	0.0	~	0.0	~	0.0	~	20.1						1.77
BH9	<0.1	975	~	0.0	~	0.0	~	1.3	~	15.5						Dry
BH10	<0.1	976	~	0.0	~	0.0	~	0.0	~	20.3						1.18
BH11	<0.1	976	~	0.0	~	0.0	~	0.4	~	19.3						0.48
BH12	<0.1	975	~	0.0	~	0.0	~	0.4	~	19.3						1.73

Notes:
Detection limits - Methane = 0.0%, Carbon Dioxide = 0.0%, LEL = 0.0%, Oxygen = 0.0%, Flow = 0.0l/hr
Monitoring order is from **Left to Right** across table
Monitoring should be for **Not Less** than 3 minutes However, if high concentrations of gasses initially recorded, monitoring should be for up to 10 minutes
N/A = Not applicable >>> = Off the scale

Cf = PID compensation Factor (1-10) - Must be used to multiply the PID reading to give an accuate measure of the total hydrocarbons in the borehole when methane is present
Hex = Hexane (Valid and in range up to 2.000%) - Recorded when abnormally high methane is present.
PID = Photo Ionisation Detector (Calibrated to Isobutylene)

Arc Environmental Ground Gas & Groundwater Monitoring Certificate

Site: Hinchliffe Mill, Water Street **Ref:** 10-015

Date: 29 September 2011 **Time:** 01.45pm

Visit by: Andrew Hampson **Equip:** GFM 430

Weather: Sunny

Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mb)	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 435 only)		Other Gases (PPM)			Depth to Water (m bgl)
			Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H_2S	CO	
BH1	<0.1	1002	~	0.0	~	0.0	~	0.0	~	21.0						Dry
BH3	<0.1	1002	~	0.0	~	0.0	~	0.2	~	20.5						2.96
BH5	<0.1	1000	~	0.0	~	0.0	~	0.5	~	20.5						Dry
BH8	-0.5	1002	~	0.0	~	0.0	~	0.0	~	21.0						1.75
BH9	<0.1	1000	~	0.0	~	0.0	~	0.1	~	20.8						Dry
BH10	<0.1	1002	~	0.0	~	0.0	~	0.1	~	20.8						1.18
BH11	<0.1	1000	~	0.0	~	0.0	~	0.0	~	20.0						Dry
BH12	<0.1	1000	~	0.0	~	0.0	~	0.6	~	20.2						2.00

Notes:
Detection limits - Methane = 0.0%, Carbon Dioxide = 0.0%, LEL = 0.0%, Oxygen = 0.0%, Flow = 0.0l/hr
Monitoring order is from **Left to Right** across table
Monitoring should be for **Not Less** than 3 minutes However, if high concentrations of gasses initially recorded, monitoring should be for up to 10 minutes
N/A = Not applicable >>> = Off the scale

Cf = PID compensation Factor (1-10) - Must be used to multiply the PID reading to give an accuate measure of the total hydrocarbons in the borehole when methane is present
Hex = Hexane (Valid and in range up to 2.000%) - Recorded when abnormally high methane is present.
PID = Photo Ionisation Detector (Calibrated to Isobutylene)

APPENDIX IV

Laboratory Results (Geotechnical and Ground Contamination)

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL11/2204

Client's Reference: Report Date: 19 September 2011

Client Name: Arc Environmental
The Rivergreen Centre
Aykley Heads

Durham
DH1 5TS

For the attention of: Richard Stripp

Contract Title: Hinchcliffe Mill, Water street

Date Received: 06-September-11
Date Commenced: 06-September-11
Date Completed: 19-September-11

Notes: **Observations 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	A Watkins	M Beastall
(Director)	(Director)	(Laboratory Manager)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP01		B	1.00-2.20	Brown very gravelly clayey silty SAND.
TP01A		B	1.45-2.70	Brown slightly gravelly sandy silty CLAY.
TP02		B	2.10-3.20	Brown sandy slightly silty GRAVEL with cobbles.
TP03		B	0.85-1.75	Brown slightly gravelly sandy very silty CLAY.
TP12		B	1.25-2.10	Brown gravelly very sandy very silty CLAY.
TP13		B	1.60-2.20	Brown slightly gravelly sandy very silty CLAY.
BH04		B	1.00	Brown slightly gravelly slightly sandy silty CLAY.
BH07		B	1.00	Brown gravelly slightly sandy silty CLAY.
BH12		B	1.50	Brown gravelly sandy silty CLAY.
BH13		B	2.50	Dark grey slightly gravelly sandy very silty CLAY.
BH15		B	2.60	Brown very sandy GRAVEL.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	19/09/11		19/09/11		19/09/11

HINCHLIFFE MILL, WATER STREET.

Contract No: PSL11/2204

Client Ref: 10-015

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.	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.	Plasticity Index % Clause 6.	% Passing .425mm	Remarks
TP01A	North	B	1.45-2.70	27				41	23	18	91	Intermediate plasticity CI.
TP03		B	0.85-1.75	29				39	24	15	93	Intermediate plasticity CI.
TP13		B	1.60-2.20	39				43	24	19	90	Intermediate plasticity CI.
BH04		B	1.00	29				50	24	26	93	Intermediate plasticity CI.
BH07		B	1.00	34				49	24	25	83	Intermediate plasticity CI.
BH12		B	1.50	27				39	23	16	80	Intermediate plasticity CI.
BH15		B	2.60	9.2					NP			

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

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	19/09/11		19/09/11		19/09/11

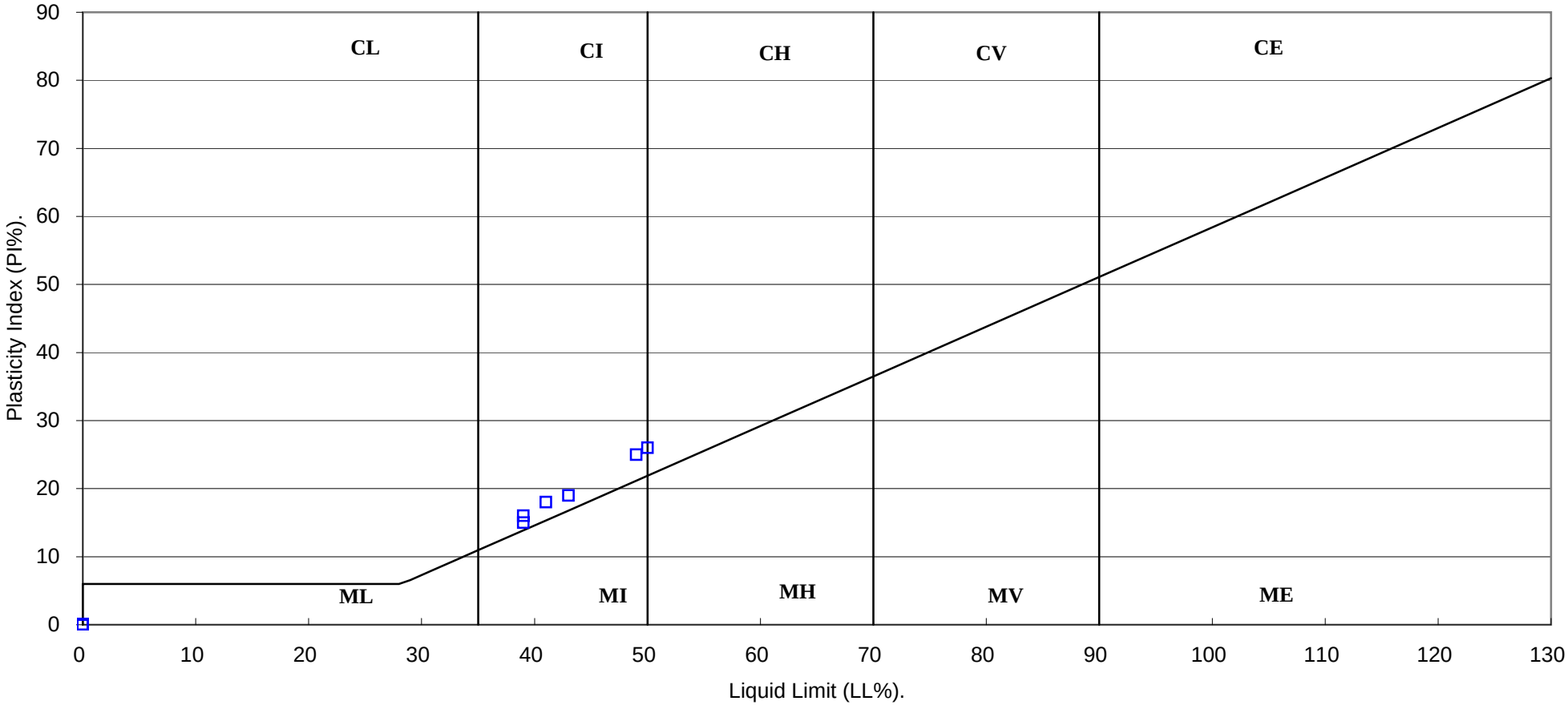
HINCHLIFFE MILL, WATER STREET.

Contract No: **PSL11/2204**

Client Ref: **10-015**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		19/09/11		19/09/11		19/09/11
	HINCHLIFFE MILL, WATER STREET.				Contract No:	PSL11/2204
					Client Ref:	10-015

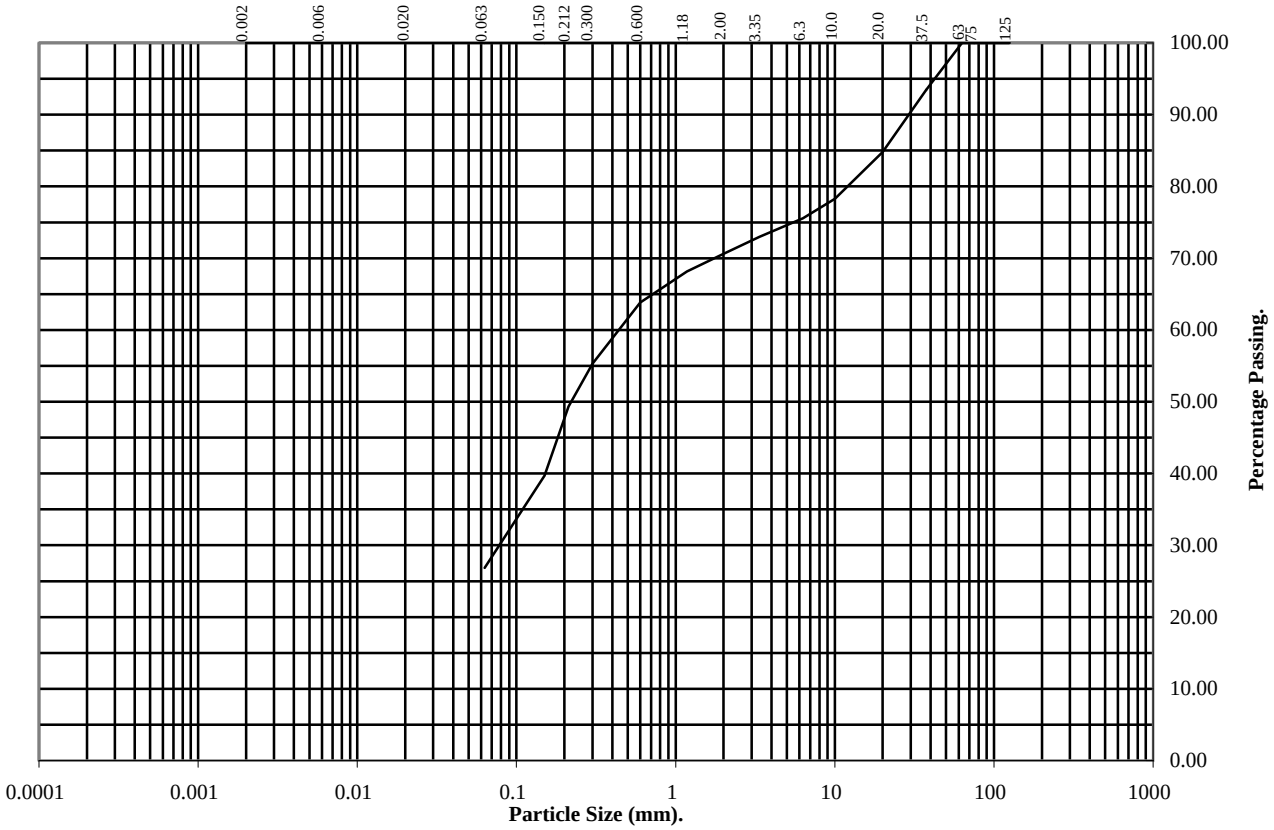
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP01** **Depth (m):** **1.00-2.20**

Sample Number: **Sample Type:** **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	93
20	85
10	78
6.3	76
3.35	73
2	71
1.18	68
0.6	64
0.3	55
0.212	49
0.15	40
0.063	27

Soil Fraction	Total Percentage
Cobbles	0
Gravel	29
Sand	44
Silt / Clay	27

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	19/09/11		19/09/11

PSL Professional Soils Laboratory	**HINCHCLIFFE MILL, WATER STREET.**	**Contract No.: PSL11/2204**

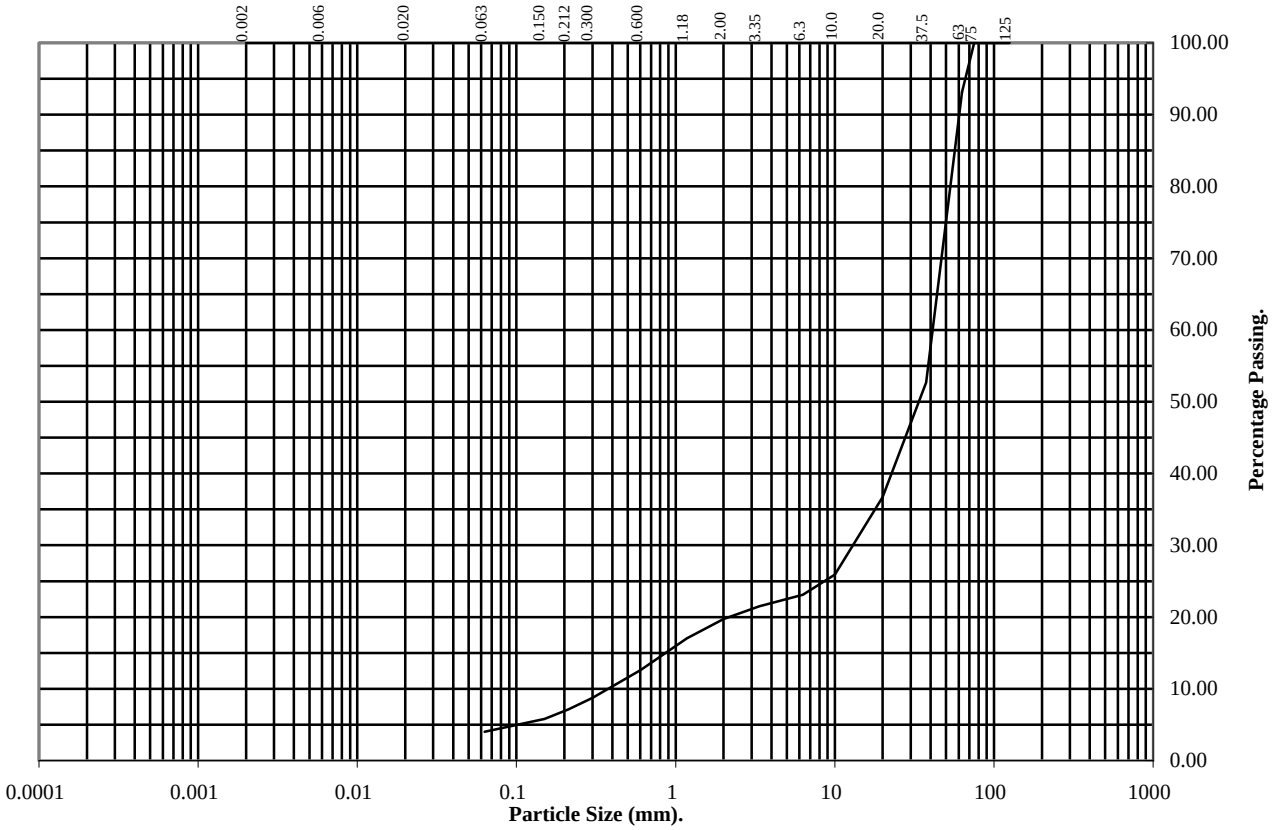
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP02** **Depth (m):** **2.10-3.20**

Sample Number: **Sample Type:** **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	93
37.5	53
20	37
10	26
6.3	23
3.35	21
2	20
1.18	17
0.6	13
0.3	9
0.212	7
0.15	6
0.063	4

Soil Fraction	Total Percentage
Cobbles	7
Gravel	73
Sand	16
Silt / Clay	4

Remarks:

See summary of soil descriptions.

Checked By	Date	Approved By	Date
	19/09/11		19/09/11

PSL Professional Soils Laboratory	**HINCHCLIFFE MILL, WATER STREET.**	**Contract No.: PSL11/2204**

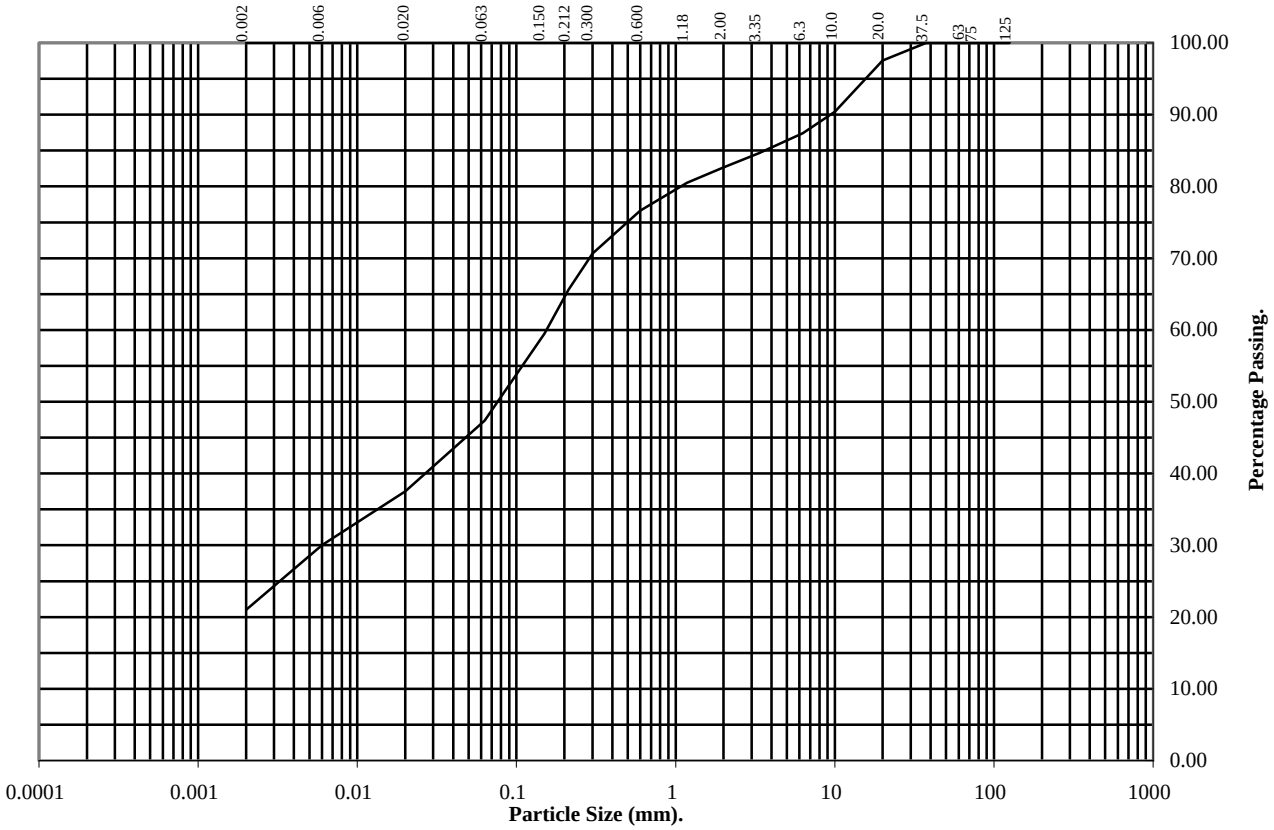
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP12** **Depth (m):** **1.25-2.10**

Sample Number: **Sample Type:** **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	90
6.3	87
3.35	85
2	83
1.18	81
0.6	77
0.3	71
0.212	66
0.15	59
0.063	47

Particle Diameter	Percentage Passing
0.02	38
0.006	30
0.002	21

Soil Fraction	Total Percentage
Cobbles	0
Gravel	17
Sand	36
Silt	26
Clay	21

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	19/09/11		19/09/11

PSL Professional Soils Laboratory	**HINCHCLIFFE MILL, WATER STREET.**	**Contract No.: PSL11/2204**

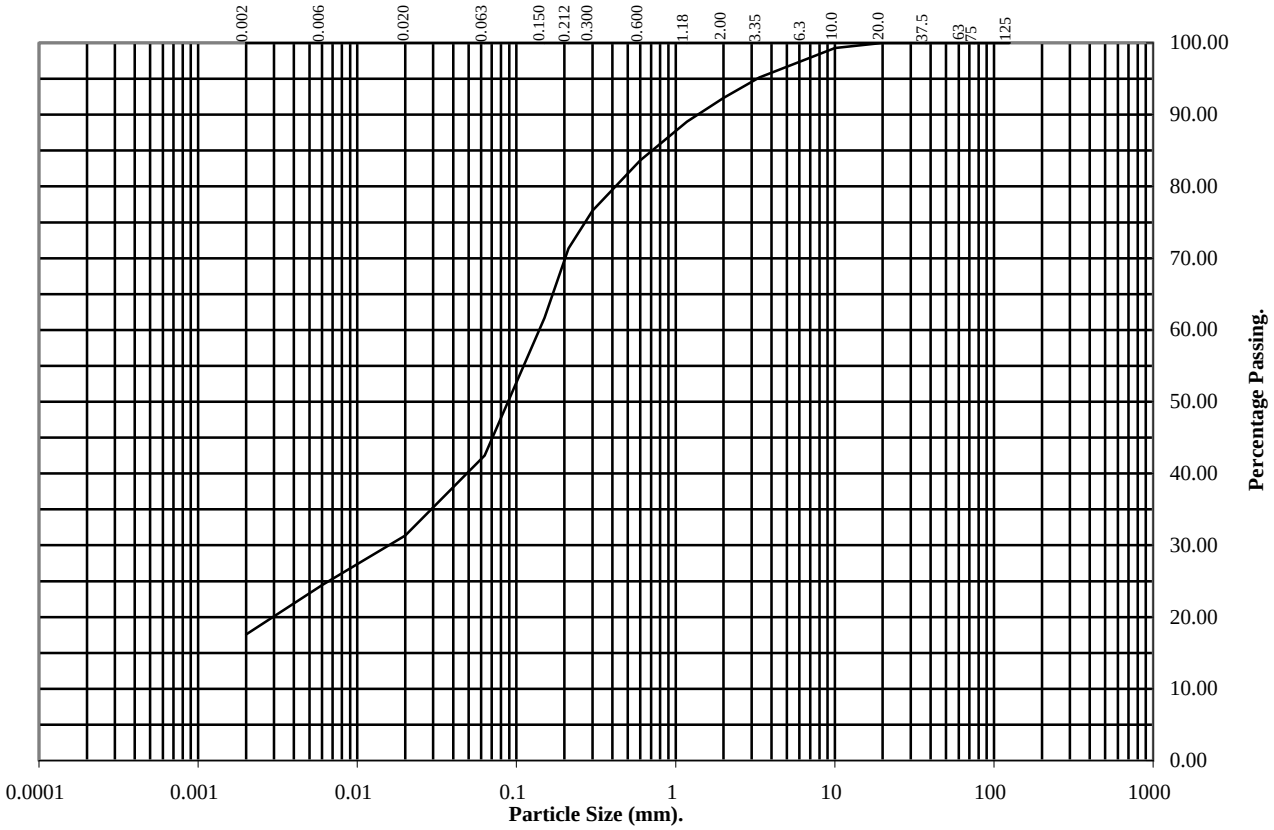
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **BH13** **Depth (m):** **2.50**

Sample Number: **Sample Type:** **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	98
3.35	95
2	92
1.18	89
0.6	84
0.3	77
0.212	71
0.15	62
0.063	43

Particle Diameter	Percentage Passing
0.02	31
0.006	24
0.002	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	8
Sand	49
Silt	25
Clay	18

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	19/09/11		19/09/11

PSL Professional Soils Laboratory	**HINCHCLIFFE MILL, WATER STREET.**	**Contract No.: PSL11/2204**

2531

ANALYTICAL TEST REPORT

Contract no: 43302(2)

Contract name: Hinchliffe Mill, Water Street

Client reference: 10-015

Clients name: ARC Environmental

Clients address: The Rivergreen Centre
Aykley Heads
Durham
DH1 5TS

Samples received: 02 September 2011

Analysis started: 02 September 2011

Analysis completed: 27 September 2011

Report issued: 28 September 2011

This is a supplementary report to report number 43302 issued 20 September 2011.

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
NAF Non-Asbestos Fibre

Approved by:

Karan Campbell — Director
John Campbell — Director

Unit 25a-25b Number One Industrial Estate, Medomsley Road, Consett, County Durham, DH8 6TJ
Tel 01207 581260 Fax 01207 581582 Email info@chemtech-env.co.uk

Vat Reg No. 772 5703 18 Registered in England number 4284013

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 exclusive of stones.

Lab ref	Sample id	Depth (m)	Soil description passing 2mm sieve	Description of material retained on 2mm sieve	% Retained on 2mm sieve	Moisture (%)
43302-2	BH 3	0.40	Sand	Stones, Brick & Tar	85.8	7.7
43302-3	BH 4	0.40	Sand	Stones & Gravel	76.4	7.5
43302-5	BH 8	0.20	Ashy Sand	Stones, Clinker & Gravel	71.6	8.2
43302-6	BH 9	0.20-1.00	Silty Sandy Clay	Stones & Gravel	54.0	10.3
43302-7	BH 11	0.20	Ashy Sand	Stones & Clinker	75.2	12.6
43302-8	BH 13	1.50	Sandy Clay	N/A	<1	37.5
43302-9	TP 1A	0.00-0.50	Sand	Shale	80.0	9.2
43302-10	TP 1B	0.00-0.35	Ashy Sand	Stones, Clinker & Gravel	66.1	11.7
43302-11	TP 1B	0.35-0.60	Ashy Sand	Stones & Clinker	68.3	15.2
43302-12	TP 1B	0.60-1.00	Loamy Clay	N/A	<1	19.5
43302-13	TP 2A	0.00-1.00	Ashy Sand	Stones, Clinker & Shale	56.6	16.8
43302-14	TP 3	0.00-0.35	Ashy Clayey Sand	Stones, Metal, Clinker & Gravel	73.7	12.7
43302-15	TP 6	0.00-0.65	Sand	Stones & Gravel	71.8	9.0
43302-16	TP 7	0.00-0.40	Sand	Stones & Gravel	69.6	6.4
43302-17	TP 9	0.00-0.60	Clayey Sand	Stones & Gravel	48.5	10.2
43302-18	TP 11	0.00-0.80	Clay	Stones & Gravel	21.4	17.7
43302-19	TP 12	0.00-0.80	Ashy Sand	Clinker	71.5	17.1
43302-20	TP 12	0.80-0.95	Ashy Sandy Clay	Gravel & Clinker	20.9	23.2
43302-21	TP 12	1.25-2.10	Sandy Clay	Gravel	7.7	21.4
43302-22	TP 13	0.10-0.40	Ashy Sand	Stones & Clinker	78.0	11.2

Chemtech Environmental Limited

SOILS

Lab number			43302-1	43302-2	43302-3	43302-4	43302-5	43302-6
Sample id			BH 1	BH 3	BH 4	BH 7	BH 8	BH 9
Depth (m)			0.50	0.40	0.40	0.10	0.20	0.20-1.00
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	-	3.1	21	-	20	5.2
Cadmium (total)	CE054 M	mg/kg Cd	-	0.3	0.6	-	0.8	0.6
Chromium (total)	CE054 M	mg/kg Cr	-	12	39	-	22	31
Chromium (III)	-	mg/kg CrIII	-	12	39	-	22	31
Chromium (VI)	CE050 U	mg/kg CrVI	-	<1	<1	-	<1	<1
Copper (total)	CE054 M	mg/kg Cu	-	24	67	-	83	26
Lead (total)	CE054 M	mg/kg Pb	-	20	63	-	241	25
Mercury (total)	CE054	mg/kg Hg	-	<0.5	<0.5	-	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg Ni	-	9.1	30	-	36	20
Selenium (total)	CE054 M	mg/kg Se	-	<0.3	<0.3	-	<0.3	<0.3
Zinc (total)	CE054 M	mg/kg Zn	-	89	55	-	75	66
pH	CE004 M	units	-	8.5	8.5	-	8.4	5.4
Sulphate (2:1 water soluble)	CE049 U	mg/l SO_4	-	66	96	-	136	108
Cyanide (free)	CE077	mg/kg CN	-	<2	<2	-	<2	<2
Phenols (total)	CE078	mg/kg PhOH	-	-	-	-	-	-
Total Organic Carbon	CE005 M	% w/w C	-	1.31	0.63	-	1.38	0.96
Organic matter content	CE005 M	% w/w	-	-	-	-	-	-
PAH								
Acenaphthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8	<0.1
Benzo(a)pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.9	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.9	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	<0.1	<0.1	0.1	<0.1	2.1	<0.1
Fluorene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6	<0.1
Naphthalene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.5	<0.1
Pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	2.5	<0.1
PAH (total of USEPA 16)	CE087	mg/kg	<5	<5	<5	<5	8.9	<5
Benzo(j)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH (total of OIL 8)	CE087	mg/kg	<5	<5	<5	<5	<5	<5

Chemtech Environmental Limited

SOILS

Lab number			43302-1	43302-2	43302-3	43302-4	43302-5	43302-6
Sample id			BH 1	BH 3	BH 4	BH 7	BH 8	BH 9
Depth (m)			0.50	0.40	0.40	0.10	0.20	0.20-1.00
Test	**Method**	**Units**						
BTEX & TPH								
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 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	-	-	-	-	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-
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	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	NAF	NAF	Chrysotile	NAF	-	-

Chemtech Environmental Limited

SOILS

Lab number			43302-7	43302-8	43302-9	43302-10	43302-11	43302-12
Sample id			BH 11	BH 13	TP 1A	TP 1B	TP 1B	TP 1B
Depth (m)			0.20	1.50	0.00-0.50	0.00-0.35	0.35-0.60	0.60-1.00
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	19	-	18	35	194	8.2
Cadmium (total)	CE054 M	mg/kg Cd	0.5	-	0.9	0.7	0.6	0.5
Chromium (total)	CE054 M	mg/kg Cr	21	-	31	80	267	41
Chromium (III)	-	mg/kg CrIII	21	-	31	80	267	41
Chromium (VI)	CE050 U	mg/kg CrVI	<1	-	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	59	-	46	66	134	28
Lead (total)	CE054 M	mg/kg Pb	41	-	33	179	341	42
Mercury (total)	CE054	mg/kg Hg	<0.5	-	<0.5	<0.5	1.3	<0.5
Nickel (total)	CE054 M	mg/kg Ni	24	-	27	24	43	20
Selenium (total)	CE054 M	mg/kg Se	<0.3	-	<0.3	0.4	1.2	0.3
Zinc (total)	CE054 M	mg/kg Zn	56	-	66	104	67	97
pH	CE004 M	units	8.7	-	8.4	8.2	8.1	6.8
Sulphate (2:1 water soluble)	CE049 U	mg/l SO_4	579	-	126	1361	562.0	48
Cyanide (free)	CE077	mg/kg CN	<2	-	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	-	-	-	<0.5	<0.5	<0.5
Total Organic Carbon	CE005 M	% w/w C	0.94	-	0.45	2.53	2.94	1.34
Organic matter content	CE005 M	% w/w	-	3.31	-	-	-	-
PAH								
Acenaphthene	CE087	mg/kg	<0.1	-	-	6.5	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	-	-	<0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	<0.1	-	-	14.9	0.5	0.1
Benzo(a)anthracene	CE087	mg/kg	<0.1	-	-	32.2	1.2	0.2
Benzo(a)pyrene	CE087	mg/kg	<0.1	-	-	24.9	1.1	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	-	-	38.2	1.9	<0.1
Benzo(ghi)perylene	CE087	mg/kg	<0.1	-	-	11.9	1.3	0.3
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	-	-	14.3	<0.1	<0.1
Chrysene	CE087	mg/kg	<0.1	-	-	28.3	1.1	0.2
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	-	-	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	0.1	-	-	76.2	2.7	0.3
Fluorene	CE087	mg/kg	<0.1	-	-	3.8	<0.1	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	-	-	10.8	1.2	0.2
Naphthalene	CE087	mg/kg	<0.1	-	-	0.2	<0.1	<0.1
Phenanthrene	CE087	mg/kg	<0.1	-	-	42.3	0.9	0.1
Pyrene	CE087	mg/kg	<0.1	-	-	64.4	2.4	0.3
PAH (total of USEPA 16)	CE087	mg/kg	<5	-	-	369	14	<5
Benzo(j)fluoranthene	CE087	mg/kg	<0.1	-	-	4.2	<0.1	<0.1
PAH (total of OIL 8)	CE087	mg/kg	<5	-	-	153	6.5	<5

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SOILS

Lab number			43302-7	43302-8	43302-9	43302-10	43302-11	43302-12
Sample id			BH 11	BH 13	TP 1A	TP 1B	TP 1B	TP 1B
Depth (m)			0.20	1.50	0.00-0.50	0.00-0.35	0.35-0.60	0.60-1.00
Test	**Method**	**Units**						
BTEX & TPH								
Benzene	CE057 U	mg/kg	-	-	-	<0.01	<0.01	<0.01
Toluene	CE057 U	mg/kg	-	-	-	<0.01	<0.01	<0.01
Ethylbenzene	CE057 U	mg/kg	-	-	-	<0.01	<0.01	<0.01
m & p-Xylene	CE057 U	mg/kg	-	-	-	<0.01	<0.01	<0.01
o-Xylene	CE057 U	mg/kg	-	-	-	<0.01	<0.01	<0.01
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	<0.01	<0.01	<0.01
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	<0.01	<0.01	<0.01
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	<0.01	<0.01	<0.01
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	5	3	<1
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	37	14	3
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	-	-	3346	625	49
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	-	-	412	43	<1
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	<0.1	<0.1	<0.1
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	<0.1	<0.1	<0.1
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	0.3	0.1	0.1
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	<1	<1	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	10	<1	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	210	8	1.0
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	162	10	1.0
TPH Aromatic EC35-EC44	CE068	mg/kg	-	-	-	15	2	<1
Subcontracted analysis								
Asbestos	$	-	-	-	NAF	-	-	-

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SOILS

Lab number			43302-13	43302-14	43302-15	43302-16	43302-17	43302-18
Sample id			TP 2A	TP 3	TP 6	TP 7	TP 9	TP 11
Depth (m)			0.00-1.00	0.00-0.35	0.00-0.65	0.00-0.40	0.00-0.60	0.00-0.80
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg As	181	32	6.1	1.8	2.8	10
Cadmium (total)	CE054 M	mg/kg Cd	0.5	1.7	0.7	0.5	0.5	0.6
Chromium (total)	CE054 M	mg/kg Cr	31	80	23	16	24	36
Chromium (III)	-	mg/kg CrIII	31	80	23	16	24	36
Chromium (VI)	CE050 U	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE054 M	mg/kg Cu	210	292	39	13	18	29
Lead (total)	CE054 M	mg/kg Pb	61	2659	46	8.7	13	22
Mercury (total)	CE054	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3
Nickel (total)	CE054 M	mg/kg Ni	70	23	23	15	20	19
Selenium (total)	CE054 M	mg/kg Se	3.0	<0.3	<0.3	<0.3	<0.3	0.7
Zinc (total)	CE054 M	mg/kg Zn	53	703	100	50	52	45
pH	CE004 M	units	6.3	10.4	8.2	8.1	8.0	7.8
Sulphate (2:1 water soluble)	CE049 U	mg/l SO_4	424	1660	117	13	142	35
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg PhOH	-	-	-	-	-	-
Total Organic Carbon	CE005 M	% w/w C	1.15	1.36	0.24	0.49	1.52	1.84
Organic matter content	CE005 M	% w/w	-	-	-	-	-	-
PAH								
Acenaphthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Fluorene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	<0.1	0.2	<0.1	0.1	0.1
Naphthalene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH (total of USEPA 16)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
Benzo(j)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH (total of OIL 8)	CE087	mg/kg	<5	<5	<5	<5	<5	<5

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SOILS

Lab number			43302-13	43302-14	43302-15	43302-16	43302-17	43302-18
Sample id			TP 2A	TP 3	TP 6	TP 7	TP 9	TP 11
Depth (m)			0.00-1.00	0.00-0.35	0.00-0.65	0.00-0.40	0.00-0.60	0.00-0.80
Test	**Method**	**Units**						
BTEX & TPH								
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 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	-	-	-	-	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-
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	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	-	NAF	NAF	NAF	-	-

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SOILS

Lab number			43302-19	43302-20	43302-21	43302-22
Sample id			TP 12	TP 12	TP 12	TP 13
Depth (m)			0.00-0.80	0.80-0.95	1.25-2.10	0.10-0.40
Test	**Method**	**Units**				
Arsenic (total)	CE054 M	mg/kg As	17	-	-	21
Cadmium (total)	CE054 M	mg/kg Cd	9.3	-	-	0.5
Chromium (total)	CE054 M	mg/kg Cr	74	-	-	56
Chromium (III)	-	mg/kg CrIII	74	-	-	56
Chromium (VI)	CE050 U	mg/kg CrVI	<1	-	-	<1
Copper (total)	CE054 M	mg/kg Cu	739	-	-	107
Lead (total)	CE054 M	mg/kg Pb	1232	-	-	82
Mercury (total)	CE054	mg/kg Hg	<0.5	-	-	<0.5
Nickel (total)	CE054 M	mg/kg Ni	49	-	-	47
Selenium (total)	CE054 M	mg/kg Se	<0.3	-	-	<0.3
Zinc (total)	CE054 M	mg/kg Zn	663	-	-	62
pH	CE004 M	units	8.2	-	-	8.0
Sulphate (2:1 water soluble)	CE049 U	mg/l SO_4	61	-	-	19
Cyanide (free)	CE077	mg/kg CN	<2	-	-	
Phenols (total)	CE078	mg/kg PhOH	-	<0.5	-	-
Total Organic Carbon	CE005 M	% w/w C	2.58	-	-	2.08
Organic matter content	CE005 M	% w/w	-	-	1.71	-
PAH						
Acenaphthene	CE087	mg/kg	<0.1	<0.1	-	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	-	<0.1
Anthracene	CE087	mg/kg	0.1	0.6	-	<0.1
Benzo(a)anthracene	CE087	mg/kg	0.7	1.2	-	<0.1
Benzo(a)pyrene	CE087	mg/kg	0.8	<0.1	-	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	<0.1	-	<0.1
Benzo(ghi)perylene	CE087	mg/kg	0.6	<0.1	-	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	<0.1	-	<0.1
Chrysene	CE087	mg/kg	0.7	1.1	-	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	-	<0.1
Fluoranthene	CE087	mg/kg	1.2	1.6	-	0.1
Fluorene	CE087	mg/kg	<0.1	<0.1	-	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	0.5	0.1	-	0.1
Naphthalene	CE087	mg/kg	0.1	<0.1	-	0.1
Phenanthrene	CE087	mg/kg	0.7	1.1	-	0.2
Pyrene	CE087	mg/kg	1.1	2.2	-	0.2
PAH (total of USEPA 16)	CE087	mg/kg	6.5	7.9	-	<5
Benzo(j)fluoranthene	CE087	mg/kg	<0.1	<0.1	-	<0.1
PAH (total of OIL 8)	CE087	mg/kg	<5	<5	-	<5

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SOILS

Lab number			43302-19	43302-20	43302-21	43302-22
Sample id			TP 12	TP 12	TP 12	TP 13
Depth (m)			0.00-0.80	0.80-0.95	1.25-2.10	0.10-0.40
Test	**Method**	**Units**				
BTEX & TPH						
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 Aliphatic EC5-EC6	CE068	mg/kg	-	<0.01	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	<0.01	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	<0.01	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	2	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	11	-	-
TPH Aliphatic EC16-EC35	CE068	mg/kg	-	4539	-	-
TPH Aliphatic EC35-EC44	CE068	mg/kg	-	<1	-	-
TPH Aromatic EC5-EC7	CE068	mg/kg	-	<0.1	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	<0.1	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	0.1	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	<1	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	<1	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	6	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	4	-	-
TPH Aromatic EC35-EC44	CE068	mg/kg	-	<1	-	-
Subcontracted analysis						
Asbestos	$	-	NAF	-	-	-

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LEACHATES

Lab number			43302-5L	43302-6L	43302-10L	43302-11L	43302-12L	43302-13L	43302-14L
Sample id			BH 8	BH 9	TP 1B	TP 1B	TP 1B	TP 2A	TP 3
Depth (m)			0.20	0.20-1.00	0.00-0.35	0.35-0.60	0.60-1.00	0.00-1.00	0.00-0.35
Test	**Method**	**Units**							
Arsenic (dissolved)	CE055	µg/l As	20	<1	11	11	-	<1	3
Boron (dissolved)	CE063	µg/l B	376	40	30	<30	-	31	111
Cadmium (dissolved)	CE055 U	µg/l Cd	<1	<1	<1	<1	-	<1	<1
Chromium (dissolved)	CE055 U	µg/l Cr	6	<3	4	6	-	<3	31
Copper (dissolved)	CE055 U	µg/l Cu	<4	<4	<4	4	-	<4	7
Lead (dissolved)	CE055 U	µg/l Pb	<9	<9	<9	<9	-	<9	<9
Mercury (dissolved)	CE055	µg/l Hg	<1	<1	<1	<1	-	<1	<1
Nickel (dissolved)	CE055 U	µg/l Ni	7	<3	<3	<3	-	<3	<3
Selenium (dissolved)	CE055	µg/l Se	4	<1	<1	1	-	<1	1
Zinc (dissolved)	CE055 U	µg/l Zn	<20	<20	<20	<20	-	<20	<20
pH	CE004	units	9.3	5.9	9.1	8.7	-	6.7	11.2
Sulphate	CE049 U	mg/l SO_4	13	18	176	44	-	42	117
Sulphide	CE079	µg/l S^{2-}	<100	<100	<100	<100	-	<100	<100
Cyanide (free)	CE077	µg/l CN	<20	<20	<20	<20	-	<20	<20
Phenols (total)	CE078	µg/l PhOH	-	-	<10	<10	<10	-	-
PAHs									
Acenaphthene	CE087	µg/l	<0.1	-	14.9	<0.1	<0.1	-	-
Acenaphthylene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1	-	-
Anthracene	CE087	µg/l	<0.1	-	38.2	<0.1	<0.1	-	-
Benzo(a)anthracene	CE087	µg/l	<0.1	-	28.3	<0.1	<0.1	-	-
Benzo(a)pyrene	CE087	µg/l	<0.1	-	10.8	<0.1	<0.1	-	-
Benzo(b)fluoranthene	CE087	µg/l	<0.1	-	76.2	<0.1	<0.1	-	-
Benzo(ghi)perylene	CE087	µg/l	<0.1	-	64.4	<0.1	<0.1	-	-
Benzo(k)fluoranthene	CE087	µg/l	<0.1	-	3.8	<0.1	<0.1	-	-
Chrysene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1	-	-
Dibenz(ah)anthracene	CE087	µg/l	<0.1	-	42.3	<0.1	<0.1	-	-
Fluoranthene	CE087	µg/l	<0.1	-	11.9	<0.1	<0.1	-	-
Fluorene	CE087	µg/l	<0.1	-	32.2	<0.1	<0.1	-	-
Indeno(123cd)pyrene	CE087	µg/l	<0.1	-	0.2	<0.1	<0.1	-	-
Naphthalene	CE087	µg/l	<0.1	-	6.5	<0.1	<0.1	-	-
Phenanthrene	CE087	µg/l	<0.1	-	24.9	<0.1	<0.1	-	-
Pyrene	CE087	µg/l	<0.1	-	14.3	<0.1	<0.1	-	-
PAH (total of USEPA 16)	CE087	µg/l	<0.1	-	369	<0.1	<0.1	-	-
Benzo(j)fluoranthene	CE087	µg/l	<0.1	-	4.2	<0.1	<0.1	-	-
PAH (total of OIL 8)	CE087	µg/l	<0.1	-	153	<0.1	<0.1	-	-

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LEACHATES

Lab number			43302-5L	43302-6L	43302-10L	43302-11L	43302-12L	43302-13L	43302-14L
Sample id			BH 8	BH 9	TP 1B	TP 1B	TP 1B	TP 2A	TP 3
Depth (m)			0.20	0.20-1.00	0.00-0.35	0.35-0.60	0.60-1.00	0.00-1.00	0.00-0.35
Test	**Method**	**Units**							
TPH									
TPH (C5-C7)	CE067	µg/l	-	-	<1	<1	<1	-	-
TPH (C7-C8)	CE067	µg/l	-	-	<1	<1	<1	-	-
TPH (C8-C10)	CE067	µg/l	-	-	<1	<1	<1	-	-
TPH (C10-C12)	CE052	µg/l	-	-	<1	<1	<1	-	-
TPH (C12-C16)	CE052	µg/l	-	-	3	<1	<1	-	-
TPH (C16-C21)	CE052	µg/l	-	-	10	<1	<1	-	-
TPH (C21-C35)	CE052	µg/l	-	-	116	21	<1	-	-
TPH (C35-C44)	CE052	µg/l	-	-	4	<1	<1	-	-

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LEACHATES

Lab number			43302-15L	43302-18L	43302-19L	43302-20L	43302-22L
Sample id			TP 6	TP 11	TP 12	TP 12	TP 13
Depth (m)			0.00-0.65	0.00-0.80	0.00-0.80	0.80-0.95	0.10-0.40
Test	**Method**	**Units**					
Arsenic (dissolved)	CE055	µg/l As	-	1	8	-	-
Boron (dissolved)	CE063	µg/l B	-	<30	<30	-	-
Cadmium (dissolved)	CE055 U	µg/l Cd	-	<1	<1	-	-
Chromium (dissolved)	CE055 U	µg/l Cr	-	<3	6	-	-
Copper (dissolved)	CE055 U	µg/l Cu	-	4	14	-	-
Lead (dissolved)	CE055 U	µg/l Pb	-	<9	12	-	-
Mercury (dissolved)	CE055	µg/l Hg	-	<1	<1	-	-
Nickel (dissolved)	CE055 U	µg/l Ni	-	<3	<3	-	-
Selenium (dissolved)	CE055	µg/l Se	-	<1	<1	-	-
Zinc (dissolved)	CE055 U	µg/l Zn	-	<20	<20	-	-
pH	CE004	units	-	7.9	8.5	-	-
Sulphate	CE049 U	mg/l SO_4	-	13	<10	-	-
Sulphide	CE079	µg/l S^{2-}	-	<100	<100	-	-
Cyanide (free)	CE077	µg/l CN	-	<20	<20	-	-
Phenols (total)	CE078	µg/l PhOH	-	-	-	<10	-
PAHs							
Acenaphthene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Acenaphthylene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Anthracene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Benzo(a)anthracene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Benzo(a)pyrene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Chrysene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Dibenz(ah)anthracene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Fluoranthene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Fluorene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Naphthalene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Phenanthrene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Pyrene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
PAH (total of USEPA 16)	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
Benzo(j)fluoranthene	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1
PAH (total of OIL 8)	CE087	µg/l	<0.1	-	<0.1	<0.1	<0.1

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LEACHATES

Lab number			43302-15L	43302-18L	43302-19L	43302-20L	43302-22L
Sample id			TP 6	TP 11	TP 12	TP 12	TP 13
Depth (m)			0.00-0.65	0.00-0.80	0.00-0.80	0.80-0.95	0.10-0.40
Test	**Method**	**Units**					
TPH							
TPH (C5-C7)	CE067	µg/l	-	-	-	<1	-
TPH (C7-C8)	CE067	µg/l	-	-	-	<1	-
TPH (C8-C10)	CE067	µg/l	-	-	-	<1	-
TPH (C10-C12)	CE052	µg/l	-	-	-	<1	-
TPH (C12-C16)	CE052	µg/l	-	-	-	<1	-
TPH (C16-C21)	CE052	µg/l	-	-	-	5	-
TPH (C21-C35)	CE052	µg/l	-	-	-	142	-
TPH (C35-C44)	CE052	µg/l	-	-	-	<1	-

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	M	1	mg/kg As
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	M	0.2	mg/kg Cd
CE054	Chromium (total)	Aqua regia digest, ICP-OES	M	1	mg/kg Cr
-	Chromium (III)	Calculation: Cr (total) - Cr (VI)		1	mg/kg CrIII
CE050	Chromium (VI)	Acid extraction, Colorimetry	U	1	mg/kg CrVI
CE054	Copper (total)	Aqua regia digest, ICP-OES	M	1	mg/kg Cu
CE054	Lead (total)	Aqua regia digest, ICP-OES	M	1	mg/kg Pb
CE054	Mercury (total)	Aqua regia digest, ICP-OES		0.5	mg/kg Hg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	M	1	mg/kg Ni
CE054	Selenium (total)	Aqua regia digest, ICP-OES	M	0.3	mg/kg Se
CE054	Zinc (total)	Aqua regia digest, ICP-OES	M	3	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	M	-	units
CE049	Sulphate (2:1 water soluble)	Aqueous extraction, IC-COND	U	10	mg/l SO_4
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry		2	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry		0.5	mg/kg PhOH
CE005	Total Organic Carbon	Based on BS 1377, Colorimetry	M	0.01	% w/w C
CE005	Organic matter content	Based on BS 1377, Colorimetry	M	0.01	% w/w
CE087	PAH (speciated)	Solvent extraction, GC-MS		0.1	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS		5	mg/kg
CE057	BTEX	Headspace GC-FID	U	0.01	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44)	Solvent extraction, GC-FID		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	U	-	-

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METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic (dissolved)	ICP-OES		1	µg/l As
CE063	Boron (dissolved)	ICP-OES		30	µg/l B
CE055	Cadmium (dissolved)	ICP-OES	U	1	µg/l Cd
CE055	Chromium (dissolved)	ICP-OES	U	3	µg/l Cr
CE055	Copper (dissolved)	ICP-OES	U	4	µg/l Cu
CE055	Lead (dissolved)	ICP-OES	U	9	µg/l Pb
CE055	Mercury (dissolved)	ICP-OES		1	µg/l Hg
CE055	Nickel (dissolved)	ICP-OES	U	3	µg/l Ni
CE055	Selenium (dissolved)	ICP-OES		1	µg/l Se
CE055	Zinc (dissolved)	ICP-OES	U	20	µg/l Zn
CE004	pH	Based on BS 1377, pH Meter		-	units
CE049	Sulphate	Ion Chromatography	U	10	mg/l SO_4
CE079	Sulphide	Continuous Flow Colorimetry		100	µg/l S^{2-}
CE077	Cyanide (free)	Distillation, Colorimetry		20	µg/l CN
CE078	Phenols (total)	Continuous Flow Colorimetry		10	µg/l PhOH
CE087	PAH (speciated)	Solvent extraction, GC-MS		0.1	µg/l
CE087	PAH (total)	Solvent extraction, GC-MS		0.1	µg/l
CE067	TPH (C5-C10) speciation	Headspace GC-FID		1	µg/l
CE052	TPH (C10-C40) speciation	Solvent extraction, GC-FID		1	µg/l

ANALYTICAL TEST REPORT

Contract no: 43439

Contract name: Hinchcliffe Mill, Water Street

Client reference: 10-015

Clients name: ARC Environmental

Clients address: The Rivergreen Centre
Aykley Heads
Durham
DH1 5TS

Samples received: 21 September 2011

Analysis started: 21 September 2011

Analysis completed: 29 September 2011

Report issued: 29 September 2011

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.
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

Approved by:

Karan Campbell — Director
John Campbell — Director

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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 exclusive of stones.

Lab ref	Sample id	Depth (m)	Soil description passing 2mm sieve	Description of material retained on 2mm sieve	% Retained on 2mm sieve	Moisture (%)
43439-1	BH01A	0.20	Sandy Clay	Stones & Gravel	18.2	16.3
43439-2	BH02	0.50	Ashy Sand	Clinker	81.3	10.7
43439-3	BH02A	0.50	Ashy Sand	Clinker	70.0	14.4
43439-4	BH06	0.50	Sandy Clay	N/A	<1	20.1
43439-5	BH06A	0.50	Sandy Clay	Gravel	5.0	19.9
43439-6	BH10	0.20	Clayey Sand	Stones & Gravel	72.2	12.0
43439-7	BH12	0.40	Ashy Sand	Stones & Clinker	80.4	11.4
43439-8	BH13	0.20	Ashy Sand	Stones & Clinker	53.7	12.9
43439-9	BH14	0.20	Clay	Stones	61.2	10.5
43439-10	BH15	0.20	Ashy Sand	Concrete & Clinker	77.6	7.5
43439-11	TP01A	0.50-1.35	Ashy Sand	Stones & Clinker	82.3	13.4
43439-12	TP02	0.00-0.25	Sand	Stones	82.6	10.7
43439-13	TP02A	1.00-1.90	Ashy Sand	Clinker	87.3	14.5
43439-14	TP04	0.00-1.00	Sandy Clay	Stones, Clinker & Gravel	54.0	14.2
43439-15	TP05	0.00-0.30	Clay Loam	Stones, Gravel & Roots	13.1	23.7
43439-16	TP08	0.00-0.50	Loamy Clay	Stones & Gravel	45.1	14.7
43439-17	TP10	0.00-0.20	Sand	Stones, Clinker & Gravel	82.3	7.4

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SOILS

Lab number			43439-1	43439-2	43439-3	43439-4	43439-5	43439-6
Sample id			BH01A	BH02	BH02A	BH06	BH06A	BH10
Depth (m)			0.20	0.50	0.50	0.50	0.50	0.20
Test	**Method**	**Units**						
PAH								
Acenaphthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	<0.1	1.4	0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	CE087	mg/kg	<0.1	1.3	0.2	<0.1	<0.1	<0.1
Benzo(a)pyrene	CE087	mg/kg	<0.1	0.6	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	<0.1	0.6	0.2	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1	<0.1
Chrysene	CE087	mg/kg	<0.1	1.1	0.2	<0.1	<0.1	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	<0.1	2.9	0.2	<0.1	<0.1	<0.1
Fluorene	CE087	mg/kg	<0.1	0.7	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1	<0.1
Naphthalene	CE087	mg/kg	<0.1	0.5	<0.1	<0.1	<0.1	<0.1
Phenanthrene	CE087	mg/kg	<0.1	3.1	0.1	<0.1	<0.1	<0.1
Pyrene	CE087	mg/kg	<0.1	3.5	0.4	<0.1	<0.1	<0.1
PAH (total of USEPA 16)	CE087	mg/kg	<5	17	<5	<5	<5	<5
Benzo(j)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH (total of OIL 8)	CE087	mg/kg	<5	<5	<5	<5	<5	<5

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SOILS

Lab number			43439-7	43439-8	43439-9	43439-10	43439-11	43439-12
Sample id			BH12	BH13	BH14	BH15	TP01A	TP02
Depth (m)			0.40	0.20	0.20	0.20	0.50-1.35	0.00-0.25
Test	**Method**	**Units**						
PAH								
Acenaphthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Acenaphthylene	CE087	mg/kg	0.1	<0.1	<0.1	0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	0.7	0.1	<0.1	0.7	0.7	<0.1
Benzo(a)anthracene	CE087	mg/kg	1.0	0.3	<0.1	0.7	1.1	<0.1
Benzo(a)pyrene	CE087	mg/kg	0.4	<0.1	<0.1	0.3	0.5	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	0.4	0.3	<0.1	0.3	0.4	<0.1
Benzo(ghi)perylene	CE087	mg/kg	0.2	<0.1	<0.1	0.2	0.2	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	0.2	0.1	<0.1	0.3	0.3	<0.1
Chrysene	CE087	mg/kg	0.8	0.2	<0.1	0.6	0.9	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2	<0.1
Fluoranthene	CE087	mg/kg	1.9	0.4	<0.1	2.4	2.6	<0.1
Fluorene	CE087	mg/kg	0.2	<0.1	<0.1	0.2	0.6	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	0.3	<0.1	<0.1	0.2	0.7	<0.1
Naphthalene	CE087	mg/kg	0.3	<0.1	<0.1	0.3	0.8	<0.1
Phenanthrene	CE087	mg/kg	2.2	<0.1	<0.1	2.2	2.5	<0.1
Pyrene	CE087	mg/kg	2.6	0.5	<0.1	2.4	2.8	<0.1
PAH (total of USEPA 16)	CE087	mg/kg	11	<5	<5	11	14	<5
Benzo(j)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH (total of OIL 8)	CE087	mg/kg	<5	<5	<5	6.2	<5	<5

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SOILS

Lab number			43439-13	43439-14	43439-15	43439-16	43439-17
Sample id			TP02A	TP04	TP05	TP08	TP10
Depth (m)			1.00-1.90	0.00-1.00	0.00-0.30	0.00-0.50	0.00-0.20
Test	**Method**	**Units**					
PAH							
Acenaphthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	CE087	mg/kg	1.2	0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	CE087	mg/kg	1.0	0.2	<0.1	<0.1	<0.1
Benzo(a)pyrene	CE087	mg/kg	0.5	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	CE087	mg/kg	0.6	0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	CE087	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	CE087	mg/kg	0.4	<0.1	<0.1	<0.1	<0.1
Chrysene	CE087	mg/kg	0.9	0.2	<0.1	<0.1	<0.1
Dibenz(ah)anthracene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	CE087	mg/kg	2.1	0.3	<0.1	<0.1	<0.1
Fluorene	CE087	mg/kg	0.2	0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	CE087	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Naphthalene	CE087	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Phenanthrene	CE087	mg/kg	2.7	0.2	<0.1	<0.1	<0.1
Pyrene	CE087	mg/kg	2.6	0.4	<0.1	<0.1	<0.1
PAH (total of USEPA 16)	CE087	mg/kg	13	<5	<5	<5	<5
Benzo(j)fluoranthene	CE087	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PAH (total of OIL 8)	CE087	mg/kg	<5	<5	<5	<5	<5

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	STATUS	LOD	UNITS
CE087	PAH (speciated)	Solvent extraction, GC-MS		0.1	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS		5	mg/kg

APPENDIX V

Ground Contamination Risk Assessment Data:
Methodology & Notes for Off-site Disposal

CLEA Risk Assessment Data:

Screening Results Summary Sheets - Soils
CL:AIRE Statistical Analysis Sheets

Revised Conceptual Site Model (CSM)

Ground Contamination Risk Assessment

Assessment Framework:-

Ground contamination risk assessments are undertaken to identify potential risks from historical and recent land contamination on a given site and enable appropriate risk management actions to be undertaken in accordance with the regulatory context of the site and any future development. There are a range of technical approaches to the assessment of chemical contaminants in the UK, all of which broadly fit within a tiered/phased approach and the current UK approach is set out in the Defra and Environment Agency Publication: CLR 11: Model Procedures for the Management of Land Contamination (*Defra/EA 2004*).

ARC's approach to undertaking ground contamination risk assessments is based on the tiered/phased framework in accordance with CLR11, and for Human Health, the recently updated CLEA (Contaminated Land Exposure Assessment) framework and model for assessing potentially contaminated land in the UK. This framework and model is based primarily on the following publications and software: Science Reports SC050021/SR2 (EA 2008b Human Health toxicological assessment of contaminants in soil) and SC050021/SR3 (Updated technical background to CLEA model – replaces the previous guidance documents CLR9, CLR10 and Briefing notes 1 – 4); Science Report SC050021/SR4 (CLEA Software (version 1.06 beta) handbook) and the new CLEA software (replaces Science Report SC050021/H CLEA UK Handbook (draft) and the CLEA UK Software version 1.0 beta), along with the publication of a review of body weight and height data used within the Contaminated Land Exposure Assessment model (CLEA), Project no. SC050021/Technical Review 1.

At present, the SGV's (Soil Guidance Values) published as part of the previous CLEA UK Handbook (draft) and software (version 1.0 beta), have been withdrawn along with guidance documents CLR7 and CLR8, and replacement of the SGV values, using the updated model and software (version 1.06), is currently ongoing, and the new guidance documents for CLR7 & CLR8 have yet to be published. Currently, Defra and the EA have published TOX and SGV reports for the following select substances: Benzene, Toluene, Ethylbenzene, Xylenes, Arsenic, Cadmium, Mercury, Nickel, Selenium and Phenol. Although updated SGV values have been calculated for the aforementioned analytes, at present for the majority of the potential contaminants, relevant data is yet to be made available for the new model. According to Defra and the EA, the schedule for publication of the remaining reports will depend on various factors, and they anticipate publishing the remaining TOX and SGV reports for Cyanide, Lead, Dioxins, Dioxin-like Polychlorinated Biphenyls and Polycyclic Aromatic Hydrocarbons during the remainder of 2010.

When considering ground contamination risk assessments for Controlled Waters (groundwater and surface waters), ARC follows the EA guidance on Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination, 2006.

Methodology:-

During this transitional period, prior to the publication of all the new SGV values for the above mentioned analytes, ARC consider that the most appropriate methodology for completing a ground contamination risk assessment for soils on this site will be to utilise the recently published SGV values (Benzene, Toluene, Ethylbenzene, Xylenes, Arsenic, Cadmium, Chromium (III & VI), Mercury, Nickel, Selenium and Phenol), combined with the former CLEA model SGV's based on the CLEA UK software and other newly published and recognised GAC's (generic assessment criteria) for the remaining analytes. It is widely recognised by ground contamination risk assessment practitioners that the new CLEA model will generally result in higher SGV and GAC (generic assessment criteria) values for the standard end uses, and consequently continued use of the former CLEA model will result in a slightly more conservative assessment.

For general soil surface contamination, the new SGV value for inorganic Mercury can be compared with chemical analysis for total mercury content, as the concentrations of elemental and methylmercury compounds are likely to be very low, in accordance with Science Report SC050021 / Mercury SGV. In addition, the updated SGV values are based upon a Soil Organic Matter (SOM) content of 6%, in line with the most recent Defra and EA guidance. Once all the relevant data is available, a reassessment of the ground contamination present on this site can be carried out, if felt necessary, as this may result in a reduction in the scope of remediation works (if required). It should be noted that guidance document CLR11: Model Procedures for the Management of Land Contamination has not been withdrawn.

Ground Contamination Risk Assessment (Cont'd)

Methodology (Cont'd):-

ARC ground contamination risk assessments, in accordance with CLR11, are based on the established *source-pathway-receptor* pollutant linkage methodology and 'suitable for use' approach (Part IIA, EPA 1990 - inserted through Section 57 EA 1995), and adopts the tiered/phased approach beginning with a preliminary assessment (also referred to a desk top study). If potential pollutant linkages are identified from the preliminary assessment, for both Human Health and/or Controlled Waters, then Level 1 Quantitative Risk Assessments are appropriate guideline values. For soils these typically comprise soil guideline values (SGV's), generic assessment criteria (GAC) or site specific assessment criteria (SSAC) and for controlled waters, Environmental Quality Standards (EQS) or UK Drinking Water Standards.

Where any Level 1 criteria have been exceeded, various courses of action are available for recommendation, in order to try and 'break' the pollutant linkage by designing into the proposed development works and/or by recommending appropriate remediation works, i.e. removal of source, treatment of contaminants, installation of permanent barriers, etc. and/or by carrying out more detailed site specific quantitative risk assessment (DQRA, i.e. Level 2 or above). Completing further DQRA for any contaminants present, can take into account factors such as the introduction of physical barrier and the actual availability of plausible contaminant migration pathways, as well as site specific data such as the type, properties and characteristics (permeability, porosity, density, etc.) of the soil present on site, groundwater depth and flow, site specific exposure criteria and values, and contaminant retardation, attenuation, dilution and degradation. Similarly, when considering potential risks to off-site receptors, these are considered by assessing the potential risks to on-site receptors, as well as the potential mobility of any contaminants present within either the soils or water/groundwater below this site.

For the purpose of this report, preliminary and level 1 risk assessments consider two main categories of receptor, and these are as follows:

- On site Human Health – (CLEA Model).
- Controlled Waters – (groundwater) – (EA Remedial Targets Methodology).

When considering the risk to construction workforce, the results of the screening can be used by the Main Contractor/Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations, and when assessing the level of PPE required on site. Similarly, when considering the risks to building materials, again the results of the contamination screening can be used to determine the level of protection that may be required, and reference should be made to the utilities suppliers for their comments.

Level 1 - Human Health:-

Level 1 human health related assessments are based upon the current CLEA Model, with site values assessed against published Soil Guidance Values (SGV's), and where these values are not available against the published CIEM (Chartered Institute of Environmental Health)/LQM Generic Assessment Criteria (GAC), Atkins ATRISKsoil© SSV values and USEPA Region 9 Screening Values (2009). For statistical analysis, the site is assessed to delineate any potentially differing areas of contamination (averaging areas), based on the results of the preliminary investigation as well as the result of any visual, olfactory or analytical evidence following completion of the intrusive investigation works. Following this geographical delineation of the site, where generic or pervasive contaminants are anticipated, for each 'averaging area' under consideration, the results are assessed using the established methods of statistical analysis given in the CL:AIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration (C_C), May 2008. In this case, the results of the sample population are assessed to determine whether they represent a normal or non-normal distribution and the statistical upper confidence limit is (95% percentile – $UCL_{0.95}$) is calculated and then compared with the chosen Level 1 Critical Concentration (C_C) value for the site (i.e. the appropriate SGV, GAC or SSV).

In addition, further statistical analysis is undertaken to determine whether the maximum concentration(s) recorded represent statistical outliers, i.e. potential 'hot spots', and where necessary these are removed from the sampling populations and a reassessment of the averaging areas/potential hot spot areas identified.

Ground Contamination Risk Assessment (Cont'd)

Methodology (Cont'd):-

Level 1 - Human Health (Cont'd):-

Where targeted screening is undertaken, i.e. speciated PAH's for 'ashy' type materials, screening for suspected organic contamination, etc., the maximum site values recorded (C_M) at each location have been compared to the chosen Level 1 Critical Concentration (C_C), with no requirement for statistical analysis to be undertaken on for these samples.

Level 1 – Controlled Waters:-

The Level 1 controlled waters risk assessment has been carried out (in accordance with the guidance; Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination, Environment Agency, 2006) by comparing samples of leachate, with the chosen Level 1 Critical Concentration (C_C) value, based on an appropriate water quality standard (EQS, UK Drinking Water, etc.), and which is also taken as the Level 1 Leachate Remedial Target (LTC_1).

The number of samples chosen for screening is determined by assessing the potential risk of contamination reaching a sensitive receptor, i.e. shallow groundwater, nearby surface water feature, etc., based on the results of the preliminary investigation, as well as olfactory, visual, anecdotal and analytical evidence collected during the intrusive investigation works.

Where the potential risk is considered to be low between 0% and c.25% of the samples are targeted for screening, c.25% to c.50% where the risk is considered to be moderate and c.75% to 100% where the risk is considered to be high. This is to ensure that the potential risk is adequately assessed without carrying out unnecessary testing. When considering any 'hot spots' identified, samples are specifically targeted for screening on a sample by sample and analyte by analyte basis.

Notes for Off-Site Disposal

When considering the removal of any materials from this site as a waste, to be disposed of at a landfill, it can be seen that where the uncontaminated natural strata (excluding any 'topsoil' or 'peat' materials) can be kept separate from any made ground or contaminated natural strata, then these materials can be considered as 'inert' and taken to an Inert Landfill Site. Prior to disposal of these 'inert' materials, full WAC screening will need to be undertaken, with the number of samples to be screened dependant upon the volume of material to be disposed of.

Where made ground or contaminated natural strata is to be removed off site as a 'waste', a preliminary classification assessment, regarding off-site disposal, can be made utilising the contamination soils screening undertaken as part of the Level 1 Risk Assessment for Human Health. If there is sufficient screening to classify these materials as Non-Hazardous, then they can be disposed of at a Non-Hazardous Landfill. If insufficient preliminary screening has been undertaken to carryout the classification assessment, then further preliminary soils screening should be undertaken, where required.

If the results of the preliminary classification assessment indicate that the materials to be removed from site as a 'waste' should be classified as Hazardous Waste, then prior to disposal, full WAC screening should be completed so that these materials can be classified as either Stable Non-Reactive Hazardous Waste or Hazardous Waste, and disposed of at a suitable waste disposal facility.

If possible, removal of materials from site as a 'waste' should be kept to a minimum, however, if materials have to be removed to accommodate finished ground levels etc., it is recommended that the volume to be disposed of is calculated, as the amount of additional screening required, including any full WAC screening, will be dependant upon the volume of material to be disposed of.

Arc Environmental Ltd.: Level 1 GQRA Summary Sheet - Generic Contaminants

		ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC
	SAMPLE	BH 3	BH 4	BH 8	BH 9	BH 11	TP 1A	TP 1B	TP 1B	TP 1B	TP 2A	TP 3	TP 6	TP 7	TP 9	TP 11	TP 12	TP 13
	DEPTH	0.40	0.40	0.20	0.20-1.00	0.20	0.00-0.50	0.00-0.35	0.35-0.60	0.60-1.00	0.00-1.00	0.00-0.35	0.00-0.65	0.00-0.40	0.00-0.60	0.00-0.80	0.00-0.80	0.10-0.40
Arsenic (total)	mg/kg	3.1	21	20	5.2	19	18	35	194	8.2	181	32	6.1	1.8	2.8	10	17	21
Cadmium (total)	mg/kg	0.3	0.6	0.8	0.6	0.5	0.9	0.7	0.6	0.5	0.5	1.7	0.7	0.5	0.5	0.6	9.3	0.5
Chromium (III)	mg/kg	12	39	22	31	21	31	80	267	41	31	80	23	16	24	36	74	56
Chromium (VI)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper (total)	mg/kg	24	67	83	26	59	46	66	134	28	210	292	39	13	18	29	739	107
Lead (total)	mg/kg	20	63	241	25	41	33	179	341	42	61	2659	46	8.7	13	22	1232	82
Mercury (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5
Nickel (total)	mg/kg	9.1	30	36	20	24	27	24	43	20	70	23	23	15	20	19	49	47
Selenium (total)	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	1.2	0.3	3	<0.3	<0.3	<0.3	<0.3	0.7	<0.3	<0.3
Zinc (total)	mg/kg	89	55	75	66	56	66	104	67	97	53	703	100	50	52	45	663	62
Cyanide (free)	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Phenol (total)	mg/kg							<0.5	<0.5	<0.5							<0.5	

		CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD	CARD
	SAMPLE	TP1	TP2	TP4	TP5	TP6	TP6	WS1	WS2	WS3	WS4	WS5	WS7	WS8	HP1	HP2	HP3
	DEPTH	0.5	0.3	0.5	0.7	0.3	0.9	0.3	0.15-0.70	0.5	0.7	0.3	0.5	0.5	0.3	0.15	0.3
Arsenic (total)	mg/kg	3.2	2.2	23	19	140	33	13	3	2.2	2.7	2.3	10	12	11	2.3	1.7
Cadmium (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.53	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium (III)	mg/kg	22	13	56	32	570	37	26	27	16	28	7.6	47	36	42	17	14
Chromium (VI)	mg/kg			1.6	0.67	4.6	0.98	0.63	1.4		0.28		1.2	0.53	0.28		
Copper (total)	mg/kg	28	17	200	170	100	67	37	24	<10	26	<10	40	42	52	10	58
Lead (total)	mg/kg	18	22	67	66	400	170	120	26	7.4	13	5.7	57	110	41	13	7
Mercury (total)	mg/kg	<1	<1	<1	<1	1.8	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel (total)	mg/kg	27	17	85	76	69	33	19	23	12	25	4.5	28	29	31	16	13
Selenium (total)	mg/kg	<1	<1	1.2	<1	1.4	1.6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc (total)	mg/kg	45	48	64	62	170	110	170	53	36	41	8	73	79	48	42	19
Cyanide (free)	mg/kg	<1	<1	1.8	1.2	<1	2	<1	<1	<1	<1	<1	<1	<1	3	<1	<1
Phenol (total)	mg/kg	0.5	<0.5	<0.5	<0.5	0.71	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

		Max. value recorded	Critical Conc. (C_C) Value	Reference for (C_C) value
Arsenic (total)	mg/kg	194	32	CLEA - Residential (version 1.06)
Cadmium (total)	mg/kg	9.3	10	CLEA - Residential (version 1.06)
Chromium (III)	mg/kg	570	3000	CLEA - Residential (version 1.06)
Chromium (VI)	mg/kg	4.6	4.3	CLEA - Residential (version 1.06)
Copper (total)	mg/kg	739	2330	LQM CIEH Value, 2nd Ed (2009)
Lead (total)	mg/kg	2659	450	CLEA - Residential with plant uptake (version 1.0 beta)
Mercury (total)	mg/kg	1.8	170	CLEA - Residential (version 1.06)
Nickel (total)	mg/kg	85	130	CLEA - Residential (version 1.06)
Selenium (total)	mg/kg	3	350	CLEA - Residential (version 1.06)
Zinc (total)	mg/kg	703	3750	LQM CIEH Value, 2nd Ed (2009)
Cyanide (free)	mg/kg	3	34	ATRISKSOIL SSV (2009)
Phenol (total)	mg/kg	0.71	420	CLEA - Residential (version 1.06)

Individual result exceeds the C_C value

Report Type: Phase 2 Ground Investigation Report
Project: 10-015 - Hinchliffe Mill, Water Street, Holmbridge
Client: MD One Ltd

Arc Environmental Ltd.: CL:AIRE Statistical Analysis Calculation Sheet - Level 1 GQRA for Generic Contaminants

Client/client ref: MD One Ltd
Project ref: Hinchliffe Mill
Site ref: 10-015
Data description: Contamination Results - Combined
Contaminant(s): Generic Soils - Residential
Test scenario: Planning

	Arsenic (total) (mg/kg)	Cadmium (total) (mg/kg)	Chromium (III) (mg/kg)	Chromium (VI) (mg/kg)	Copper (total) (mg/kg)	Lead (total) (mg/kg)	Mercury (total) (mg/kg)	Nickel (total) (mg/kg)	Selenium (total) (mg/kg)	Zinc (total) (mg/kg)	Cyanide (free) (mg/kg)	Phenol (total) (mg/kg)
Critical concentration, C_c	**32**	**10**	**3000**	**4.3**	**2330**	**450**	**170**	**130**	**350**	**3750**	**34**	**420**
Notes	SGV	SGV	LQM - 2009	LQM - 2009	LQM - 2009	SGV (old)	SGV	SGV	SGV	LQM - 2009	ATRISK(SOIL) SSV - 2008	SGV
Sample size, n	33	33	33	27	33	33	33	33	33	33	33	20
Sample mean, $\bar{X}$	26.5393939	0.72969697	56.8060606	0.76555556	86.6969697	189.448485	0.43939394	30.5030303	0.54848485	105.181818	0.93939394	0.2855
Standard deviation, s	48.1123876	1.56611878	102.372195	0.82717933	134.59859	495.733828	0.31960854	19.5397909	0.57912715	153.06503	0.5171674	0.11445408
Number of non-detects	0	**15**	0	**17**	**2**	0	**31**	0	**25**	0	**29**	**18**
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	No	Yes	Yes	Yes	No	No	Yes	No	No	Yes	No	Yes
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev
Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Log-Normal distribution to test for outliers				
t statistic, t_0 (or k_0)	-0.651989959	-34.00370216	-165.1558027	-22.2025762	-95.74242076	-3.019270457	-3047.639192	-29.25141721	-3466.330521	-136.79079	-367.2287195	-16399.76728
Upper confidence limit (on true mean concentration, μ)	63.0464439	1.9180474	134.484742	1.45945189	188.828618	565.604825	0.68190872	45.3295679	0.98791895	221.325559	1.33181379	0.39705604
Evidence level	**30%**	**100%**	**100%**	**100%**	**100%**	**90%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	**μ ≥ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ ≈≥ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**
Select dataset	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Arc Environmental Ltd.: Level 1 GQRA Summary Sheet - Speciated PAH's

		Card	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC
	SAMPLE	TP06	TP 1B	TP 1B	TP 1B	TP02	TP 2A	TP02A	TP 3	TP04	TP05	TP 6	TP 7	TP08	TP 9	TP10	TP 11	TP 12	TP 12	TP 13
	DEPTH	0.30	0.00-0.35	0.35-0.60	0.60-1.00	0.00-0.25	0.00-1.00	1.00-1.90	0.00-0.35	0.00-1.00	0.00-0.30	0.00-0.65	0.00-0.40	0.00-0.50	0.00-0.60	0.00-0.20	0.00-0.80	0.00-0.80	0.80-0.95	0.10-0.40
Acenaphthene	mg/kg		6.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	8.5	14.9	0.5	0.1	<0.1	<0.1	1.2	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.6	<0.1
Benzo(a)anthracene	mg/kg	19	32.2	1.2	0.2	<0.1	<0.1	1.0	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	1.2	<0.1
Benzo(a)pyrene	mg/kg	7.9	24.9	1.1	<0.1	<0.1	<0.1	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	11	38.2	1.9	<0.1	<0.1	<0.1	0.6	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg		11.9	1.3	0.3	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	21	14.3	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	22	28.3	1.1	0.2	<0.1	<0.1	0.9	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	1.1	<0.1
Dibenz(ah)anthracene	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	44	76.2	2.7	0.3	<0.1	<0.1	2.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	1.2	1.6	0.1
Fluorene	mg/kg		3.8	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg		10.8	1.2	0.2	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.1	<0.1	0.1	0.5	0.1	0.1
Naphthalene	mg/kg		0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1
Phenanthrene	mg/kg	19	42.3	0.9	0.1	<0.1	<0.1	2.7	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	1.1	0.2
Pyrene	mg/kg	36	64.4	2.4	0.3	<0.1	<0.1	2.6	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	2.2	0.2

		ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC	ARC
	SAMPLE	BH 1	BH01A	BH02	BH02A	BH 3	BH 4	BH06	BH06A	BH 7	BH 8	BH 9	BH10	BH 11	BH12	BH13	BH14	BH15	TP01A
	DEPTH	0.50	0.2	0.5	0.5	0.40	0.40	0.5	0.5	0.10	0.20	0.20-1.00	0.2	0.20	0.4	0.2	0.2	0.2	0.50-1.35
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Acenaphthylene	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	1.4	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	0.1	<0.1	0.7	0.7
Benzo(a)anthracene	mg/kg	<0.1	<0.1	1.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	<0.1	<0.1	1.0	0.3	<0.1	0.7	1.1
Benzo(a)pyrene	mg/kg	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	0.3	0.5
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	0.6	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.3	<0.1	0.3	0.4
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.2	0.2
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1	0.3	0.3
Chrysene	mg/kg	<0.1	<0.1	1.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	<0.1	<0.1	0.8	0.2	<0.1	0.6	0.9
Dibenz(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	<0.1	<0.1	2.9	0.2	<0.1	0.1	<0.1	<0.1	<0.1	2.1	<0.1	<0.1	0.1	1.9	0.4	<0.1	2.4	2.6
Fluorene	mg/kg	<0.1	<0.1	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	0.2	0.6
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	0.2	0.7
Naphthalene	mg/kg	<0.1	<0.1	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	0.3	0.8
Phenanthrene	mg/kg	<0.1	<0.1	3.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	<0.1	<0.1	<0.1	2.2	<0.1	<0.1	2.2	2.5
Pyrene	mg/kg	<0.1	<0.1	3.5	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	2.5	<0.1	<0.1	<0.1	2.6	0.5	<0.1	2.4	2.8

		Maxx. Value Recorded	Critical Conc. (C_C) Value	Reference for (C_C) value
Acenaphthene	mg/kg	6.5	1000	LQM CIEH Value, 2nd Ed (2009)
Acenaphthylene	mg/kg	0.2	850	LQM CIEH Value, 2nd Ed (2009)
Anthracene	mg/kg	14.9	9200	LQM CIEH Value, 2nd Ed (2009)
Benzo(a)anthracene	mg/kg	32.2	5.9	LQM CIEH Value, 2nd Ed (2009)
Benzo(a)pyrene	mg/kg	24.9	1	LQM CIEH Value, 2nd Ed (2009)
Benzo(b)fluoranthene	mg/kg	38.2	7	LQM CIEH Value, 2nd Ed (2009)
Benzo(ghi)perylene	mg/kg	11.9	47	LQM CIEH Value, 2nd Ed (2009)
Benzo(k)fluoranthene	mg/kg	21	10	LQM CIEH Value, 2nd Ed (2009)
Chrysene	mg/kg	28.3	9.3	LQM CIEH Value, 2nd Ed (2009)
Dibenz(ah)anthracene	mg/kg	0.2	0.9	LQM CIEH Value, 2nd Ed (2009)
Fluoranthene	mg/kg	76.2	670	LQM CIEH Value, 2nd Ed (2009)
Fluorene	mg/kg	3.8	780	LQM CIEH Value, 2nd Ed (2009)
Indeno(123cd)pyrene	mg/kg	10.8	4.2	LQM CIEH Value, 2nd Ed (2009)
Naphthalene	mg/kg	0.8	8.7	LQM CIEH Value, 2nd Ed (2009)
Phenanthrene	mg/kg	42.3	380	LQM CIEH Value, 2nd Ed (2009)
Pyrene	mg/kg	64.4	1600	LQM CIEH Value, 2nd Ed (2009)

Individual result exceeds the C_C value

Report Type: Phase 2 Ground Investigation Report
Project: 10-015 - Hinchliffe Mill, Water Street, Holmbridge
Client: MD One Ltd

Arc Environmental Ltd.: CL:AIRE Statistical Calculation Sheet - Level 1 GQRA for Speciated PAH's (Combined Arc Results and Card 'TP06')

Client/client ref: MD One Ltd
Project ref: Hinchliffle Mill
Site ref: 10-015
Data description: Contamination Results - ARC
Contaminant(s): Speciated PAH (USEPA 16) - Residential
Test scenario: Planning

	Acenaphthene (mg/kg)	Acenaphthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(ghi)perylene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenz(ah)anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(123cd)pyrene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
Critical concentration, C_c	**1000**	**850**	**9200**	**5.9**	**1**	**7**	**47**	**10**	**9.3**	**0.9**	**670**	**780**	**4.2**	**8.7**	**380**	**1600**
Notes	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009
Sample size, n	36	36	37	37	37	37	36	37	37	36	37	36	36	36	37	37
Sample mean, $\bar{x}$	0.23055556	0.05694444	0.83378378	1.68108108	1.06081081	1.49459459	0.47083333	1.03648649	1.62972973	0.05416667	3.84324324	0.20138889	0.46805556	0.10833333	2.13243243	3.38783784
Standard deviation, s	1.07479418	0.02713137	2.75945481	6.01604742	4.23156353	6.46042207	1.97391471	4.1038371	5.75997275	0.025	14.1823891	0.63318764	1.78762223	0.15283044	7.48662897	11.8753679
Number of non-detects	**34**	**33**	**23**	**22**	**27**	**26**	**25**	**29**	**22**	**35**	**18**	**29**	**21**	**28**	**22**	**21**
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev
Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**	**95%**	Use Log-Normal distribution to test for outliers									
t statistic, t_0 (or k_0)	-5581.177077	-187961.7127	-20278.04311	-4.265704726	0.087413959	-5.183573667	-141.4321493	-13.28584024	-8.10011343	-203	-285.711619	-7389.265633	-12.52594996	-337.3019183	-307.0111648	-817.8115195
Upper confidence limit (on true mean concentration, μ)	1.01137543	0.07665493	2.81120516	5.99217207	4.09314319	6.12412382	1.90484912	3.9772903	5.75731797	0.07232875	14.006323	0.66138904	1.766733	0.21936207	7.49734006	11.8977095
Evidence level	**100%**	**100%**	**100%**	**95%**	**0%**	**96%**	**100%**	**99%**	**98%**	**100%**	**100%**	**100%**	**99%**	**100%**	**100%**	**100%**
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ ≈≥ Cc**	**μ ≥ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**
Select dataset	○ Y	○ Y	○ Y	○ Y	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Arc Environmental Ltd.: CL:AIRE Statistical Calculation Sheet - Level 1 GQRA for Speciated PAH's ('Hot Spot' Removed)

Client/client ref: MD One Ltd
Project ref: Hinchliffe Mill
Site ref: 10-015
Data description: Contamination Results - ARC
Contaminant(s): Speciated PAH (USEPA 16) - Residential
Test scenario: Planning

	Acenaphthene (mg/kg)	Acenaphthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(ghi)perylene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenz(ah)anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(123cd)pyrene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
Critical concentration, C_c	**1000**	**850**	**9200**	**5.9**	**1**	**7**	**47**	**10**	**9.3**	**0.9**	**670**	**780**	**4.2**	**8.7**	**380**	**1600**
Notes	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009	LQM - 2009
Sample size, n	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Sample mean, $\bar{x}$	0.05147059	0.05735294	0.20441176	0.28823529	0.15735294	0.12352941	0.11029412	0.08823529	0.26176471	0.05441176	0.56764706	0.1	0.14264706	0.10735294	0.49117647	0.66323529
Standard deviation, s	0.00857493	0.027886	0.34451715	0.40453093	0.23261763	0.15726608	0.13914207	0.09297998	0.35782568	0.02572479	0.90234395	0.14668044	0.17061935	0.15624978	0.90003961	1.06552795
Number of non-detects	**33**	**31**	**23**	**22**	**27**	**26**	**25**	**28**	**22**	**33**	**18**	**28**	**21**	**27**	**22**	**21**
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	Yes	Yes	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	No	No
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev
Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**	**95%**	Use Log-Normal distribution to test for outliers									
t statistic, t_0 (or k_0)	-679965	-177722.6541	-155706.5164	-80.88857321	-21.12236475	-254.9587863	-1964.981621	-621.5856843	-147.2826532	-191.6666667	-4325.875803	-31003.17519	-138.6608836	-320.6616518	-2458.667004	-8752.145544
Upper confidence limit (on true mean concentration, μ)	0.05788073	0.07819898	0.46195384	0.59064037	0.33124509	0.24109288	0.21430908	0.15774201	0.5292555	0.0736422	1.24218977	0.20965023	0.2701927	0.22415668	1.16399658	1.45976539
Evidence level	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**
Select dataset	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	○	○

STRATA DETAILS

MADE GROUND:
FROM 0.00M UP TO C.0.30M TO C.2.60M. THE SURFACING COMPRISED DEMOLITION RUBBLE, OLD BUILDING SLABS, CONCRETE HARDSTANDING AND SANDSTONE GRAVEL.MADE GROUND COMPRISED GRAVELY SAND WITH BRICK, CONCRETE AND SANDSTONE, FINE TO COARSE ASH & CLINKER AND REWORKED NATURAL DEPOSITS OF SANDY GRAVELY CLAY, VERY GRAVELY SAND AND VERY SANDY GRAVEL. THE DEEPEST MADE GROUND DEPOSITS WERE RECORDED ADJACENT TO THE EXISTING RETAINING WALLS.GREY SANDY SLIGHTLY ORGANIC SILTS WERE RECORDED ADJACENT TO THE MILL POND, AND IT WOULD APPEAR THAT THE NORTHEASTERN EXTENT OF THE MILL POND HAS BEEN INFILLED.
RED SANDY GRAVEL OF SHALE AND SANDSTONE BLOCKS WAS RECORDED AT THE LOCATION OF TP01A.MADE GROUND WAS NOTED TO BE ABSENT AT THE LOCATIONS OF TP05 & BH05

TOPSOIL:
FROM 0.00M UP TO C.0.10M TO C.0.30M. DARK BROWN SANDY CLAYEY SOIL WAS RECORDED AT THE LOCATIONS OF TP05 & BH05.

DRIFT DEPOSITS:
FROM C.0.10M TO C.2.60M UP TO C.0.80M TO C.3.40M.
THE NATURAL DRIFT GENERALLY COMPRISED GRAVELLY SAND WITH COBBLES AND SANDY CLAY. DRIFT WAS NOTED TO BE ABSENT AT THE LOCATIONS OF TP'S 08 – 10.

SOLID GEOLOGY:
FROM C.0.20M TO C.3.40M UP TO C.0.90M TO C.3.50M.
THE BEDROCK COMPRISED DISINTEGRATED BECOMING FRESH MEDIUM & COARSE GRAINED SANDSTONE AND FINE GRAINED SILTSTONE.

CSM SYMBOLS & EXPLANATIONS

GROUNDWATER ANTICIPATED TO BE PRESENT AT DEPTH WITHIN THE SOLID GEOLOGY (SECONDARY A AQUIFER)

TRAPPED / PERCHED SURFACE WATER

LEACHATE MIGRATION

GROUND GAS MIGRATION

UNDERGROUND SERVICES
(GAS, ELECTRIC, WATER ETC)

SITE SURFACING:
WILL COMPRISE NEW RESIDENTIAL HOUSING AND AREAS OF SOFT LANDSCAPING AND HARDSTANDING TYPICALLY ASSOCIATED WITH THIS TYPE OF DEVELOPMENT

CRITICAL POLLUTANT LINKAGES

SOURCE — S

1. GENERIC MADE GROUND MATERIALS ENCOUNTERED ACROSS THE WHOLE OF THE SITE – PERVASIVE ARSENIC & LEAD
2. HAZARDOUS GROUND GAS/VAPOUR GENERATION FROM MADE GROUND
3. POTENTIAL LOCALISED 'HOT SPOT' PAH CONTAMINATION
4. POTENTIAL LOCALISED 'HOT SPOT' OF TPH CONTAMINATION
5. POTENTIAL LOCALISED AREAS OF ASBESTOS CONTAINING MATERIALS (ACM'S)/FIBRES

RECEPTOR — R

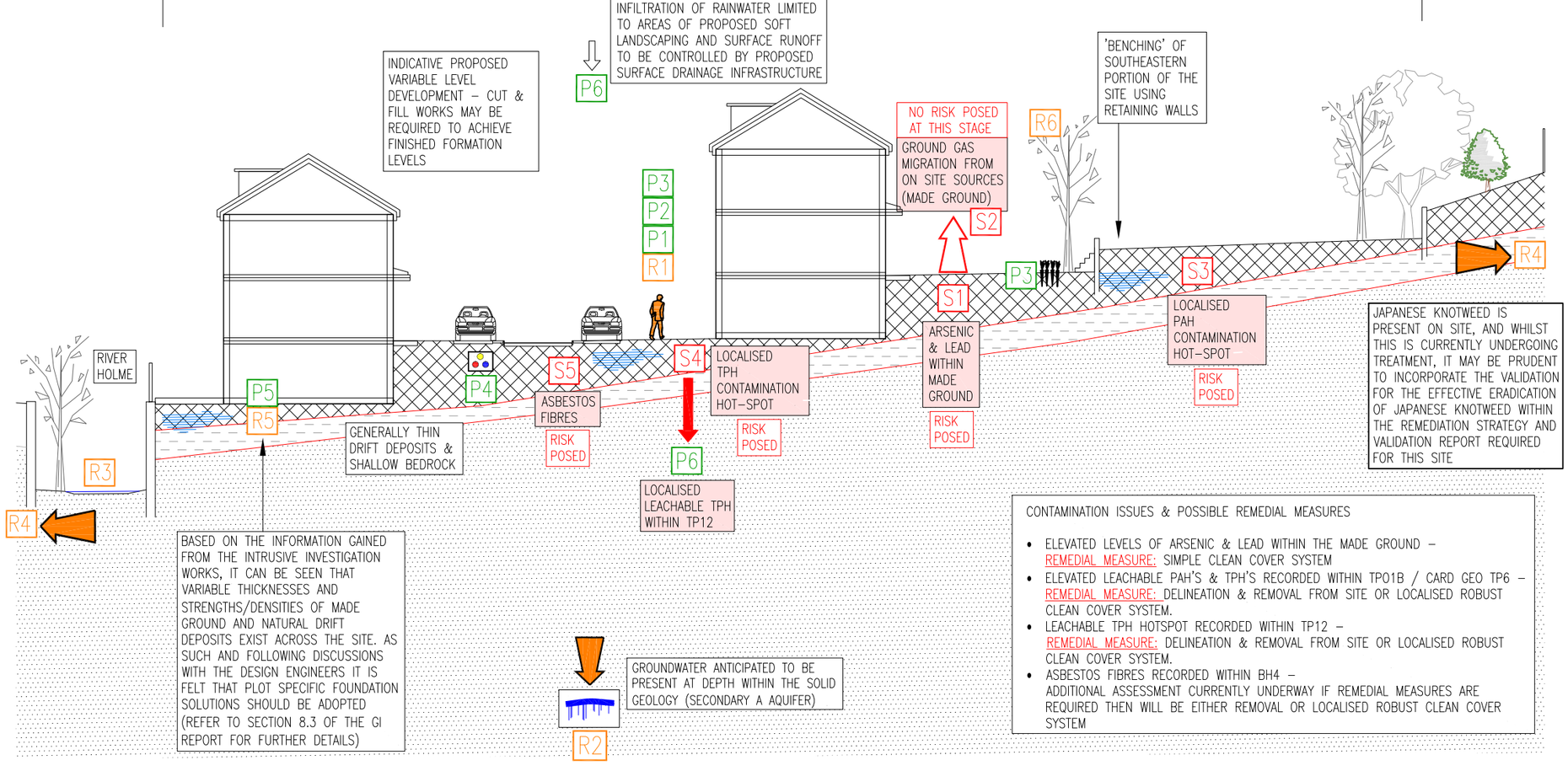
1. HUMAN HEALTH (RESIDENTS)
2. GROUNDWATER WITHIN DRIFT AND BEDROCK (SECONDARY A AQUIFER)
3. RIVER HOLME
4. ADJACENT SITES
5. BUILDING MATERIALS*
6. FLORA AND FAUNA*

* = Not included in the Human Health & Controlled Waters Risk Assessment

PATHWAY — P

1. INGESTION & DERMAL CONTACT
2. INHALATION OF INDOOR AND OUTDOOR AIR/VAPOURS
3. CONSUMPTION OF HOME-GROWN PRODUCE & ATTACHED SOIL
4. MIGRATION THROUGH EXISTING SERVICES
5. DIRECT CONTACT WITH BUILDING MATERIALS
6. SURFACE RUNOFF & INFILTRATION

SECTION THROUGH SITE USING AN APPROXIMATE NORTH WEST THROUGH SOUTH EAST ORIENTATION



CONTAMINATION ISSUES & POSSIBLE REMEDIAL MEASURES

- ELEVATED LEVELS OF ARSENIC & LEAD WITHIN THE MADE GROUND – REMEDIAL MEASURE: SIMPLE CLEAN COVER SYSTEM
- ELEVATED LEACHABLE PAH'S & TPH'S RECORDED WITHIN TP01B / CARD GEO TP6 – REMEDIAL MEASURE: DELINEATION & REMOVAL FROM SITE OR LOCALISED ROBUST CLEAN COVER SYSTEM.
- LEACHABLE TPH HOTSPOT RECORDED WITHIN TP12 – REMEDIAL MEASURE: DELINEATION & REMOVAL FROM SITE OR LOCALISED ROBUST CLEAN COVER SYSTEM.
- ASBESTOS FIBRES RECORDED WITHIN BH4 – ADDITIONAL ASSESSMENT CURRENTLY UNDERWAY IF REMEDIAL MEASURES ARE REQUIRED THEN WILL BE EITHER REMOVAL OR LOCALISED ROBUST CLEAN COVER SYSTEM

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NOTE:

1. CONTAMINATION SCREENING CARRIED OUT ON SAMPLES RECOVERED FROM THE MADE GROUND UNDERLYING THE SITE HAS IDENTIFIED CONTAMINATION ISSUES WHICH WILL REQUIRE REMEDIATION TO NEGATE THE RISK TO HUMAN HEALTH (END USERS). REFER TO THE ADJACENT CSM SECTION & SECTION 8.5 'GROUND CONTAMINATION' & SECTION 8.6 'REMEDIATION STATEMENT' FOR FURTHER DETAILS.
2. BASED ON THE GAS MONITORING RESULTS OBTAINED TO DATE, IT IS FELT THAT THE SITE CAN INITIALLY BE ASSESSED AS CHARACTERISTIC SITUATION 1 (CS1) OR NHBC GREEN CLASSIFICATION INDICATING THAT NO GAS PROTECTION WOULD BE REQUIRED FOR THE PROPOSED DEVELOPMENT, ASSUMING THAT THERE ARE NO SIGNIFICANT CHANGES IN THE GAS CONCENTRATIONS OR FLOW RATES COMPARED TO THOSE RECORDED TO DATE. THIS CHARACTERISATION WILL BE REASSESSED FOLLOWING THE COMPLETION OF THE REMAINING 4 NO. GAS MONITORING VISITS.

rev.	date	amendments	drawn	chckd

Client: MD ONE LTD

Project Title:
Proposed Residential Development
Hinchliffe Mill, Water Street
Holmbridge, West Yorkshire

Drawing Title:
Revised Conceptual Site Model

Scale at A3:	Date:	Drawn by:	Approved by:
NTS @ A3	21.10.11	P.D	R.S

Job Ref:	Drg no:	Rev:
10-015	–	–