ROBERTS ENVIRONMENTAL LIMITED

23 Grey Street
Newcastle upon Tyne
NE1 6EE

Our Ref: 140906.R.001.MWH
17 October 2014

Mr David Topping and Mrs Liz Thompson,
Sharpe Topping Ltd,
Windsor House,
Cornwall Rd,
Harrogate
HG1 2PW

Dear David and Liz

RE: Ground Investigation Works, English Martyr's Church, Dalton Terrace, York.

Instruction

In accordance with the instruction received from Sharpe Topping on the 16th September 2014, on behalf of the client, Father John of English Martyr's Church, Roberts Environmental Ltd., have undertaken a programme of ground investigation works to provide information for a proposed residential development at the above mentioned site.

Background

It is understood the development is to take place in the near future and will comprise the construction of four residential flats, and will occupy 100% of the site area, with adjacent areas, within the demise of the English Martyr's Church comprising hardstanding.

The site is located approximately 1.1km to the southwest of the centre of York on Dalton Terrace, and is positioned within a mixed residential and commercial setting. The development area forms a portion of land at the eastern extent of the English Martyr's Church complex, which comprises the church, a residential property with garden areas and a church hall. The proposed development is to comprise a four storey town house structure containing four private residential flats. The structure is to be appended to the existing and adjacent terraced town houses that are present on Dalton Terrace.

The proposed development will not include any areas of private gardens. However, there may be scope to develop an access road to the rear of the development, around the eastern boundary of the English Marty's Church site.

A Phase 1: Environmental Assessment Report, has not been undertaken for this site, however a preliminary assessment of the available data sources has determined the following;

- According to the BGS, the geology at the site comprises drift deposits of the Vale of York Formation comprising silty sandy gravelly clay, sand and gravel. The bedrock is the Sherwood Sandstone Group, classified as a Principal Aquifer.
- Historically, the site has been recorded as a Church on the earliest available archive plans and no potentially contaminating activities have been identified on or in the immediate vicinity of the site.
- There are no watercourses or sensitive water abstractions within 500m of the site. The site is not deemed to be at significant risk from flooding, as it is situated within Flood Zone 1.
- There are no landfills recorded within 250m of the site and there are not deemed to be any sources of ground gas within a plausible migration distance of the site.
- The site is positioned within an area not deemed to be at risk from shallow coal mining activity.

The scope of the ground investigation works has been designed based upon the information obtained from the preliminary assessment.

Scope of Works

The ground investigation works were undertaken on the 17th September 2014 and were completed in a single day. The works comprised four window sampling boreholes put down to depths of up to 4.00m below current ground levels (bcgl's). The investigation works have been undertaken to provide information on the ground conditions to aid foundation design for the proposed development and have also included sampling for laboratory contamination screening so that a Human Health risk assessment can be undertaken.

The following supporting documents are included with this report;

- Site Location Plan.
- Borehole Location Plan on the existing Site Layout Plan.
- Window Sampling Borehole Record Sheets (BH01 – BH04).
- Laboratory results: Chemtech Results Sheets 52799 & PSL Results Sheets 14/4783.

The information contained in this report is limited to the boundaries of the site as indicated on the borehole location plan enclosed, and to those areas accessible during the ground investigation. The positions of the boreholes can be seen on the Borehole Location Plan, this

plan should be used for orientating purposes only, as the positions shown are approximate and the plan is not to a standard scale. The depths of strata on the record sheets are recorded from current ground levels.

Ground Conditions

BH's 01, 02 and 03 were positioned on the area of the proposed residential structure with BH04 located to the rear of the wider site, on the anticipated route of the proposed access road. From BH's 01, 02 and 03, the made ground has been recorded at each of these investigation positions, recorded to depths of between 0.70m and 1.50m below current ground levels (bcgl's). Generally, the made ground comprises deposits of sandy gravelly clay and clayey sand with brick, sandstone, occasional pottery and ash/clinker. A possible band of disturbed or reworked sandy clay / clayey sand was encountered within BH02 between 0.55m and 1.50m bcgl's.

The natural drift deposits comprise loose clayey sand over stiff brown sandy gravelly clay within BH01 and BH02. At BH03, stiff sandy gravelly clay was recorded between 0.70m and 2.30m bcgl's underlain by medium dense sandy gravel, recorded to the base of the borehole at 4.00m bcgl's.

The ground conditions at BH04 comprise made ground up to a depth of 0.75m bcgl's, comprising black clayey gravelly sand, with gravel of sandstone, concrete, brick and ash. The natural deposits comprise soft very gravelly sandy clay and loose fine sand.

Due to the historical and archaeological legacy associated with the City of York, a watching brief was maintained throughout the ground investigation for any evidence of anthropogenic debris or artefacts. In addition, Ben Reeves of York Archaeological Trust visited the site to inspect the investigations and spoil. Nothing of archaeological significance was encountered during these ground investigation works.

Groundwater

No water ingresses were encountered within BH01, BH03 and BH04, however a standing water level was recorded within BH02 at 3.96m bcgl's. Some of the natural granular deposits within BH02 and BH04 were noted as 'moist' below 2.50m.

Based upon the observations made during these investigation works, it is anticipated that the water encountered is representative of a perched water, present within the coarse deposits, as opposed to a continuous groundwater surface (water table) below the site.

Even though significant quantities of water are not anticipated below this site and any water present appears to be at depths below 2.50m bcgl's, it would be prudent to allow for the introduction of temporary groundwater control measures, i.e. pumping equipment, in order to take into account any groundwater or surface water ingresses and pockets of trapped surface drainage within the natural strata, particularly during the wetter periods of the year.

Insitu Testing

Insitu Hand Shear Vane Tests (HSV's)

Insitu hand vane tests were carried out using a Pilcon insitu hand vane tester on the natural clays recovered from the boreholes. The insitu hand vane tester takes a direct reading of shear strength of the cohesive deposits. The equipment allows for the direct determination of undrained shear strength of soft to stiff clays, with an upper limit of 140kN/m^2. The results are shown on the graphic borehole record sheets, relative to the appropriate sample depth.

For BH's 01 to 03, where the proposed residential structure is to be sited, all of the tests were carried out within the natural drift deposits; with test results ranging between 84kN/m^2 and >140kN/m^2, indicative of stiff (high strength) deposits. The tests results confirm that the cohesive deposits are capable of supporting light to moderate loadings.

Dynamic Penetration Test (DPT)

A dynamic penetration test was undertaken adjacent to BH03, where a band of gravel was encountered from 2.30m bcgl's. The test was carried out in order to determine the relative density of the granular materials. The test involves a solid cone attached to series of metal rods being driven down through the ground via a percussive weight, with the number of blows recorded over a fixed distance. The results are used to determine the penetration resistance and the relative density of the materials through which the cone passes.

The results have been interpreted to provide equivalent uncorrected 'N' values for the granular materials recorded between 2.30m and 3.40m bcgl's. The inferred results range from values of 10 up to 38, indicative of medium dense to dense deposits. The results generally increase with depth and from 2.70m bcgl's all of the results exceed an equivalent uncorrected 'N' value of 30, indicative of dense deposits.

Laboratory Testing

Geotechnical testing was carried out in accordance with BS1377:1990:Parts 1-9, by Professional Soils Laboratory Limited (PSL) of Doncaster, South Yorkshire and Chemtech Environmental Limited of Consett, Co. Durham.

Determination of pH and SO4

Sulphate is not considered hazardous to human health, but is potentially deleterious to the cement content in buried concrete structures.

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 the table below and are also contained within the Chemtech Environmental Limited Analytical Report ref: 52799, a copy of which is enclosed.

pH & SO_4 laboratory results

BH No.	Depth (m)	Strata Type	pH	SO_4 (mg/l)	Design SO4 Class	ACEC Class
BH01	0.50	MG	7.9	19	DS-1	AC-1
BH03	0.25	MG	8.3	24	DS-1	AC-1
BH04	0.25	MG	7.8	27	DS-1	AC-1

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

From these results it can be seen that the pH values for the samples of soil tested range from 7.8 up to 8.3, and the amount of soluble sulphate present falls within the negligible range (<500mg/l).

Therefore, in accordance with BRE Special Digest 1: 2005 (3rd Edition), the site can be given a classification of Class DS-1. When considering the nature of the materials tested and assuming mobile groundwater the assessment of the Aggressive Chemical Environment for Concrete (ACEC), is AC-1.

Determination of Liquid and Plastic Limits

Three representative samples of the natural clay deposits encountered within the boreholes were tested in order to determine their liquid and plastic limits, so these materials might be classified. The results can be seen in the table below and are also contained in the PSL Report no. PSL13/4783, a copy of which is included with this report.

BH No.	Depth (m)	M/C (%)	LL	PL	PI	Class	% Passing 425μm Sieve
BH01	2.00	19	40	19	21	CI	90
BH02	4.00	23	42	20	22	CI	97
BH03	2.00	25	59	25	34	CH	96

M/C = Moisture Content, LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index, NP= Non Plastic

From the results displayed, it can be seen that the samples tested are of an inorganic nature, and when plotted on the plasticity chart, fall within the intermediate and high ranges, and from the resulting plasticity indices, are of low to moderate shrinkage potential, when taking into account the amount passing the 425μm sieve.

Therefore, it can be seen that some of these materials may 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 are to be based within these materials, it is recommended that they are taken down to a minimum depth of 0.90m below finished ground levels.

Building near trees

A mature sycamore tree is currently positioned at the front of the site, directly adjacent to Dalton Terrace and within the extents of the proposed development. Guidance states that where a proposed development is within close proximity to existing or envisaged vegetation, then an increase in the minimum foundation depth may also be required, even if the trees are to be removed, in order to ensure no additional future shrinkage and swelling of these materials occurs.

It is understood that the sycamore tree is to be removed to make way for the development and reference has been made to the NHBC Standards, Chapter 4.2 'Building near trees' in order to determine the minimum acceptable foundation depth for the proposed development. According to the published data, the minimum acceptable foundation depth is calculated from the following factors;

- The type, mature height and water demand of the tree(s);
- the proximity of the proposed development in relation to the tree(s);
- and the shrinkability potential of the soils in which the foundations are to be based.

The tree in question is a sycamore, which is considered to have a moderate water demand and a maximum mature height of 22m. The proposed foundations are within 1m of the tree (despite its proposed removal), and the soils have a medium volume change potential.

In accordance with the tables presented NHBC Standards, Chapter 4.2 'Building near trees', Appendix 4.2-B, and when taking the site specific factors into account, the future foundations should be based at a minimum depth of 1.95m below ground levels to ensure an adequate allowance will have been made for the effect of trees on shrinkable soils.

It is also recommended that reference should be made to BS 5837:2012 'Trees in relation to design, demolition and construction'.

Determination of Particle Size Distribution

A single sample of the natural granular deposits encountered within BH03 was passed on to the laboratory and tested in order to determine its particle size distribution, so that the material might be classified. The result of the tests are represented both graphically and numerically on the results sheets within the PSL Report no. PSL14/4783.

As can be seen from the results, the granular natural deposits are determined to be poorly graded slightly clayey sandy gravel.

Chemical Ground Conditions

Assessment Criteria

In order to determine the potential risk to the future end users on this site, soil samples recovered from the boreholes have been sent to Chemtech Environmental Ltd Laboratories for chemical screening. The Chemtech laboratory test results sheets (refs 52799) for the three soil samples screened are enclosed with this report. Two soil samples were recovered from the area where the proposed flats are to be built with the third sample recovered from BH04, positioned at the rear of the site where the proposed road is to be based.

Controlled Waters were not deemed to be at risk and as such it has not been considered necessary to undertake a specific Controlled Waters risk assessment.

The soil samples were screened for a standard range of generic contaminants based upon 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. In addition, the samples were also subject to screening for poly aromatic hydrocarbons (PAH's) (based on current USEPA 16 PAH's), and asbestos fibres.

The soil results have been screened using a standard generic and PAH contamination suite based on;

- CLEA SGV Values (Version 1.06).
- LQM CIEH Generic Assessment Criteria Values, 2nd Edition (2009).
- CLEA SGV values (Version 1.0 beta).
- Atkins ATRISK SOIL SSV Values (2011).

Laboratory Screening Results

These results have been used to carry out a Level 1: Quantitative Human Health Risk Assessment for the ground contamination present against standards for the proposed residential use of the property. These results can also be used for a preliminary assessment for off-site disposal classification. The results are presented in the following tables.

Generic and PAH screening results

Analyte	No. of Samples Screened	Target Conc. (C_C) mg/kg	Max. Conc. (C_M) recorded mg/kg	No. of Samples > C_C
Arsenic	3	32[1]	13	0
Cadmium	3	10[1]	0.3	0
Chromium III	3	3000[3]	84	0
Chromium VI	3	4.3[3]	<1	0
Copper	3	2330[3]	52	0
Lead	3	276[4]	450	1 BH01
Mercury	3	170[1]	<0.5	0
Nickel	3	130[1]	22	0
Selenium	3	350[1]	1.3	0
Zinc	3	3750[3]	131	0
Cyanide	3	34[2]	<2	0
PAH's				
Acenaphthene	3	1000[3]	0.4	0
Acenaphthylene	3	850[3]	0.9	0
Anthracene	3	92000[3]	2.5	0
Benzo(a)anthracene	3	5.9[3]	14.2	0
Benzo(a)pyrene	3	1[3]	19.45	1 BH04
Benzo(b)fluoranthene	3	7.0[3]	23.6	1 BH04
Benzo(ghi)perylene	3	47[3]	11.0	0
Benzo(k)fluoranthene	3	10[3]	10.6	1 BH04
Chrysene	3	9.3[3]	13.8	1 BH04
Dibenz(ah)anthracene	3	0.9[3]	3.5	1 BH04
Fluoranthene	3	670[3]	21.9	0
Fluorene	3	780[3]	0.6	0
Indeno(123cd)pyrene	3	4.2[3]	13.3	1 BH04
Naphthalene	3	8.7[3]	0.2	0
Phenanthrene	3	380[3]	7.4	0
Pyrene	3	1600[3]	20.5	0

([1] = CLEA SGV Values (*Residential* – Version 1.06), [2] = ATRISK^{SOIL} SSV (2011), [3] = LQM CIEH Generic Assessment Criteria Values, 2nd Edition (2009) for *residential* site setting. [4] = CLEA SGV Values (*Residential* – Version 1.0)

Asbestos Screening Results

Position	Samples Depth	Asbestos Screening results
BH01	0.50	No Asbestos Detected
BH02	0.25	Chrysotile
BH03	0.25	No Asbestos Detected

The results of the laboratory screening have identified the following:

- The maximum value for lead, for the sample recovered from BH01, exceeds the chosen target concentration value.

- The maximum values for several PAH compounds, for the sample recovered from BH04, exceed the chosen target concentration values.

- None of the other maximum values for any of the other analytes exceed the chosen target concentrations for the site.

- Chrysotile fibres were recorded in the sample recovered from BH03. Chrysotile was commonly used in cemented asbestos products and is generally regarded as a lower risk, when in its cemented form, and compared to other asbestos fibres. Cemented asbestos materials can often be readily identified on site, and provided adequate PPE is utilised, can be separated from other soil materials, 'bagged' and removed from site to an appropriate waste site for safe disposal.

When considering these laboratory screening results, and without further evaluation there is the potential for the recorded concentrations to represent a risk to the future end users. As such a further assessment of the results is presented below.

Analysis of Laboratory Screening Results

The proposed development comprises a four storey residential town house incorporating four private apartments. The footprint of proposed structure occupies 100% of the subject site and adjacent areas will continue to comprise hardstanding across the surface. There is no provision for private or shared garden areas.

When considering the nature of the proposed residential development and the laboratory screening results, any deposits with elevated concentrations that might potentially represent a risk to the end users will be either removed from site as part of the development or will be below the footprint of the proposed structure. Therefore, potential *pathways* will be removed and there is not considered to be a risk to the end users.

Should there be a change to the layout of the proposed development then a further risk assessment should be carried out.

The elevated concentrations of PAH's, recorded in and limited to, the sample recovered from BH04 are considered to be attributable to the ash/tarmac gravels noted at this location. When considering that any future development on this portion of the site will be limited to the construction of an access road, the recorded concentrations are not considered to represent a risk to human health and these results can be used for the classification of materials for off-site disposal.

Based upon the assessment presented above, no future remediation works are deemed to be required for this site.

Foundation Options

Based upon the results of the insitu testing and the observations made during the ground investigation works it is considered that conventional strip foundations could be utilised across the site.

For normal shallow strip foundations a preliminary assessment of the overall allowable bearing pressure indicates that the future bearing pressure should be limited to 180kN/m^2, whilst future foundations should be based at a minimum depth of 0.90m below finished ground levels. However, conventional foundations at BH01 and BH02 will need to be extended to a greater depth (1.80m and 2.00m bcgl's respectively), through the upper bands of sand and gravel, to ensure a homogenous bearing strata is utilised within the sandy gravelly clay and to take account of the mature sycamore tree that is present at the front of the site.

In addition, care would need to be taken not to over excavate the foundation excavations at BH03, due to the presence of dense gravel recorded from a depth of 2.30m bcgl's.

Care should be taken not to "straddle" any conventional foundations between the sandy gravely clay and any deposits of sand and gravel, as this may result in differential settlements occurring.

However, due to the archaeological sensitivity of the site and the desire to reduce the ground disturbance to a minimum, it is understood that the preferred foundation solution may incorporate a mini piled solution. Therefore, the ground investigation information should be passed on to the piling contractors so that they can design and price a suitable piled foundation scheme.

General Comments

Any materials removed from site should be undertaken in accordance with the Duty of Care Regulations 1991. There will also be a requirement to classify the waste in accordance with the European Waste Catalogue. The laboratory screening results provided with this report can also be used for a preliminary assessment for off-site disposal classification. However, there may be a requirement for Waste Acceptance Criteria (WAC) testing, it is recommended that discussion with landfill operators takes place at an early stage.

Development contractors should undertake a risk assessment before carrying out future ground works and excavations and would normally be expected to adopt precautionary measures such as the use of protective clothing to minimise contact and avoid soil ingestion. The general level of contamination encountered is unlikely to present a significant risk of harm to workers taking such precautions.

We trust that the contents of this report are to your satisfaction and if you require any further information or clarification, please do not hesitate to contact us.

Yours sincerely,

Mike Hay BSc (Hons), MSc FGS
Director
For and on behalf of Roberts Environmental Ltd

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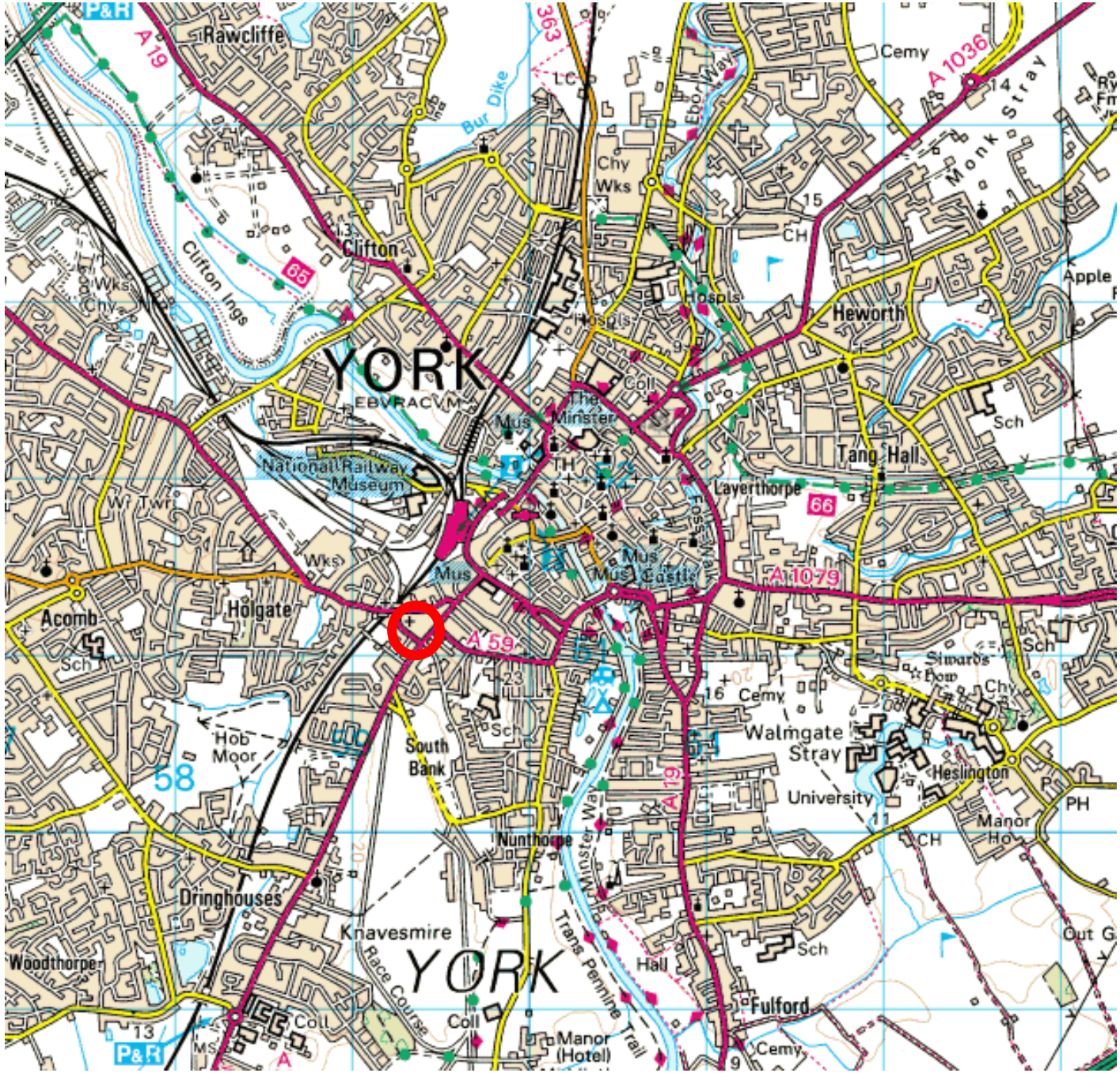
Mobile: 07557 511 292



DO NOT SCALE

Key

Site location

CLIENT:

Sharpe Topping Ltd

PROJECT:

English Martyr's Church,
Dalton Terrace, York

TITLE:

Location Plan

DESIGN / DRAWN:	DATE:
MWH	October 2014

PROJECT NO:	DRAWING NO:
140906	140906.02

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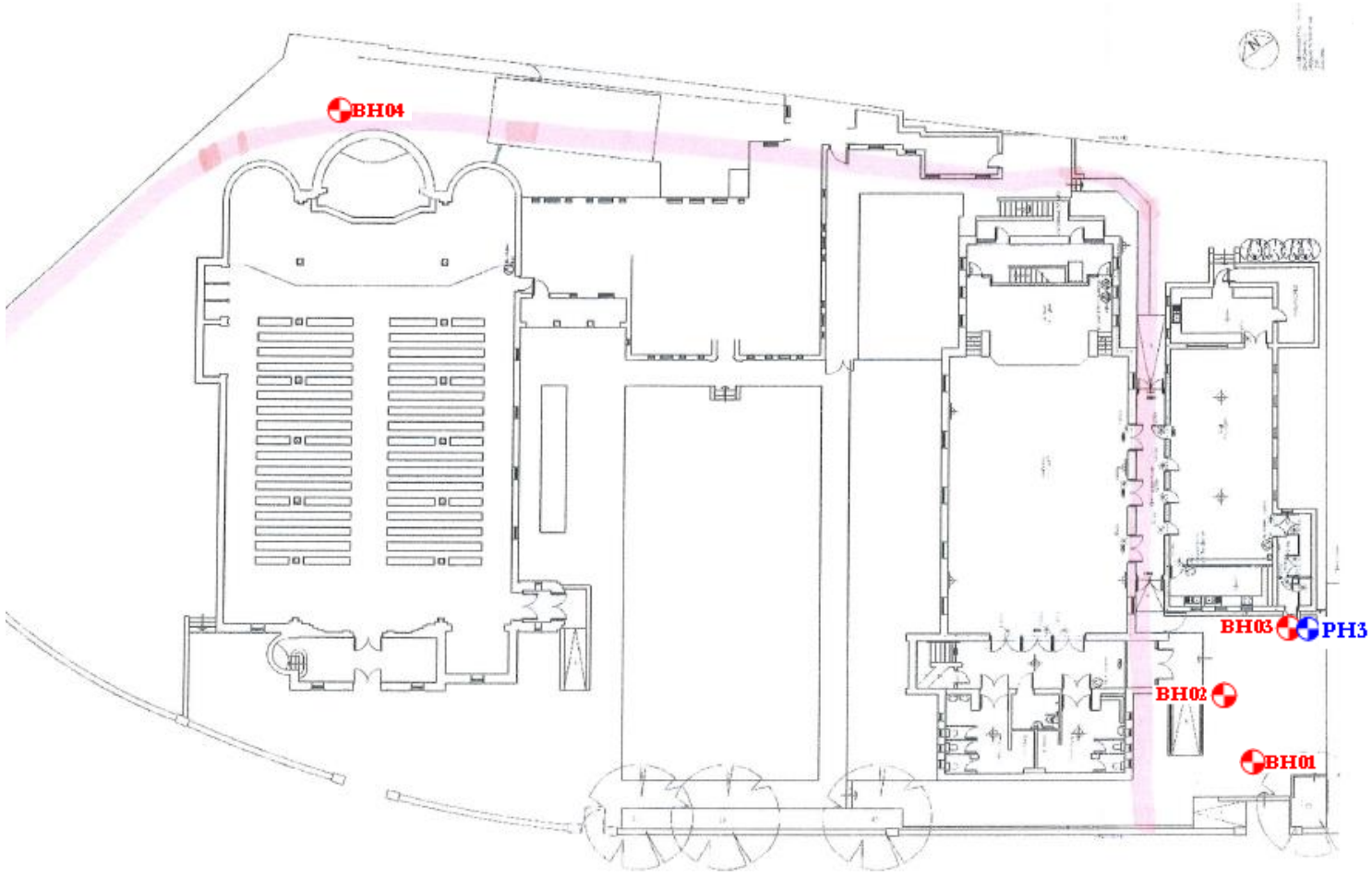

Key

BH Window Sampling Borehole

PH Penetration Hole

CLIENT:
Sharpe Topping Ltd

PROJECT:
English Martyr's Church,
Dalton Terrace, York

TITLE:
Borehole Location Plan

DESIGN / DRAWN:	DATE:
MWH	October 2014
PROJECT NO:	**DRAWING NO:**
140906	140906.01

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ROBERTS ENVIRONMENTAL LIMITED

BOREHOLE LOG

Project				BOREHOLE No
English Martyrs Church, Dalton Terrace, York				**BH01**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
140906	17-09-14			
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Paving slab underlain by bedding sand (MADE GROUND).		
						(0.55) 0.65	Firm brown very sandy gravelly clay. Gravel is fine to coarse of sandstone and brick, six inch nail noted (MADE GROUND).		
0.50	J					(0.35) 1.00	Firm reddish brown gravel of fine to coarse sandstone, slag and clinker (MADE GROUND).		
						(0.50) 1.50	Loose reddish brown mottled grey clayey SAND. Firm sandy clay inclusions and oocasional fine to coarse sandstone gravel (VALE OF YORK FORMATION).		
1.50	B					(0.30) 1.80	Loose pale brown fine SAND with occasional fine sandstone gravel (VALE OF YORK FORMATION).		
2.00	B						Stiff (high strength) brown occasionally mottled grey and sandy gravelly CLAY. Gravel is fine to coarse of sandstone and coal (VALE OF YORK FORMATION).		
2.00	V	112kN/m^2							
2.50	V	107kN/m^2				(2.20)			
3.00	B								
3.00	V	112kN/m^2							
3.50	V	122kN/m^2					Becoming reddish brown and brown with sand inclusions.		
						4.00			
4.00	V	>140kN/m^2					Borehole terminated at 4.00m		

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	Borehole remained dry on completion, hole closed below 3.70m bcgl's.

All dimensions in metres Scale 1:31.25	Client Sharpe Topping	Method/ Plant Used Hand Held Percusion Window Sampling Equipment	Logged By MWH

AGS3 UK BH ENGLISH MARTYRS CHURCH, YORK.GPJ GINT STD AGS 3_1.GDT 19/9/14

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ROBERTS ENVIRONMENTAL LIMITED

BOREHOLE LOG

Project				BOREHOLE No
English Martyrs Church, Dalton Terrace, York				**BH02**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
140906	17-09-14			
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION			
						0.10	Paving slab underlain by bedding sand (MADE GROUND).			
0.25	B					(0.45)	Firm dark greyish brown very sandy gravelly clay. Gravel is fine to coarse and cobbles of sandstone, brick, coal and occasional clinker (MADE GROUND).			
						0.55				
						(0.95)	Firm reddish brown with occasional grey mottling very sandy clay / clayey sand - with the appearence of disturbed or reworked natural deposits.			
						1.50				
1.75	B					(0.50)	Loose pale brown fine SAND with occasional silty clay inclusions between 1.70m and 1.75m, noted as slightly moist (VALE OF YORK FORMATION).			
						2.00				
2.00	B						Stiff (high strength) brown sandy gravelly CLAY, gravel is fine to coarse of sandstone and coal, occasional sand and gravel inclusions (VALE OF YORK FORMATION).			
2.00	V	101kN/m^2								
2.50	V	105kN/m^2								
						(2.00)				
3.00	B									
3.00	V	84kN/m^2								
3.50	V	86kN/m^2								
			▼1			4.00				
4.00	B						Borehole terminated at 4.00m			
4.00	V	130kN/m^2								

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To

GENERAL REMARKS

Borehole remained open standing water level recorded at 3.96m bcgl's.

All dimensions in metres Scale 1:31.25	Client Sharpe Topping	Method/ Plant Used Hand Held Percusion Window Sampling Equipment	Logged By MWH

AGS3 UK BH ENGLISH MARTYRS CHURCH, YORK.GPJ GINT STD AGS 3_1.GDT 19/9/14

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BOREHOLE LOG

Project				BOREHOLE No
English Martyrs Church, Dalton Terrace, York				**BH03**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
140906	17-09-14			
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.10	Paving slab underlain by bedding sand (MADE GROUND).		
0.25	B					(0.60)	Soft to firm / loose dark brown very sandy gravelly clay / very clayey gravelly sand. Gravel is fine to coarse of sandstone, brick, coal and pottery, with occasional slag noted (MADE GROUND).		
						0.70			
1.00	V	>140kN/m^2					Stiff (high strength) reddish brown very sandy gravelly CLAY. Gravel is fine to coarse of sandstone (VALE OF YORK FORMATION).		
1.50	V	116kN/m^2				(1.60)			
2.00	B								
2.00	V	132kN/m^2							
2.25	V	114kN/m^2				2.30			
3.00	B					(1.70)	Medium dense becoming dense brown and orangeish brown sandy GRAVEL. Gravel is fine to caoarse and cobbles of sandstone and occasional limestone (VALE OF YORK FORMATION).		
						4.00			
4.00	B						Borehole terminated at 4.00m		

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To

GENERAL REMARKS

Borehole remained open and dry on completion

All dimensions in metres Scale 1:31.25	Client Sharpe Topping	Method/ Plant Used Hand Held Percusion Window Sampling Equipment	Logged By MWH

AGS3 UK BH ENGLISH MARTYRS CHURCH, YORK.GPJ GINT STD AGS 3_1.GDT 19/9/14

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BOREHOLE LOG

Project				BOREHOLE No
English Martyrs Church, Dalton Terrace, York				**BH04**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
140906	17-09-14			
Contractor				Sheet
				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.05	Decorative gravel (MADEGROUND)		
0.25	B						Soft / "loose" dark brown and black clayey gravelly sand. Gravel is fine to coarse of sandstone, concrete, brick and occasional slag/ash and coal fragments. Clayey in places (MADE GROUND).		
0.25	V	30kN/m^2				(0.70)			
						0.75			
							Soft to firm (low strength) very gravelly sandy CLAY. Gravel is fine to coarse and occasional cobbles of sandstone (VALE OF YORK OF FORMATION)		
1.00	V	32kN/m^2				(0.75)			
1.25	V	34kN/m^2							
						1.50			
							"Loose" fine pale brown SAND, noted as slightly moist (VALE OF YORK FORMATION).		
						(0.50)			
						2.00			
							Borehole terminated at 2.50m		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Borehole remained open and dry on completion

All dimensions in metres Scale 1:31.25	Client Sharpe Topping	Method/ Plant Used Hand Held Percusion Window Sampling Equipment	Logged By MWH

AGS3 UK BH ENGLISH MARTYRS CHURCH, YORK.GPJ GINT STD AGS 3_1.GDT 19/9/14

2531

CHEMTECH environmental

ANALYTICAL TEST REPORT

Contract no: 52799

Contract name: English Martyr's Church, Dalton Terrace, York

Client reference: -

Clients name: Roberts Environmental Limited

Clients address: 23 Grey Street
Newcastle upon Tyne
NE1 6EE

Samples received: 18 September 2014

Analysis started: 19 September 2014

Analysis completed 26 September 2014

Report issued: 26 September 2014

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, withour prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

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

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

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

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

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
52799-1	BH 01	0.50	Sandy Clay with Stones & Gravel	-	-	12.5
52799-2	BH 03	0.25	Sandy Clay with Stones & Gravel	-	-	17.4
52799-3	BH 04	0.25	Sandy Clay with Stones & Gravel	-	-	21.2

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SOILS

Lab number			52799-1	52799-2	52799-3
Sample id			BH 01	BH 03	BH 04
Depth (m)			0.50	0.25	0.25
Date sampled			18/09/2014	18/09/2014	18/09/2014
Test	**Method**	**Units**			
Arsenic (total)	CE127 M	mg/kg As	7.1	13	12
Cadmium (total)	CE127 M	mg/kg Cd	0.2	0.3	0.3
Chromium (total)	CE127 M	mg/kg Cr	84	73	80
Chromium (III)	-	mg/kg CrIII	84	73	80
Chromium (VI)	CE050	mg/kg CrVI	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	27	40	52
Lead (total)	CE127 M	mg/kg Pb	450	78	104
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	18	21	22
Selenium (total)	CE127 M	mg/kg Se	1.2	1.2	1.3
Zinc (total)	CE127 M	mg/kg Zn	57	131	96
pH	CE004 M	units	7.9	8.3	7.8
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	19	24	27
Cyanide (free)	CE077	mg/kg CN	<2	<2	<2
Total Organic Carbon (TOC)	CE072 M	% w/w C	0.62	6.82	2.90
Estimate of OMC (calculated from TOC)	CE072	% w/w	1.07	11.76	5.00
PAH					
Acenaphthene	CE087	mg/kg	<0.01	0.06	0.38
Acenaphthylene	CE087	mg/kg	<0.01	<0.01	0.85
Anthracene	CE087	mg/kg	<0.01	0.14	2.53
Benzo(a)anthracene	CE087	mg/kg	<0.01	0.46	14.20
Benzo(a)pyrene	CE087	mg/kg	<0.01	0.47	19.45
Benzo(b)fluoranthene	CE087	mg/kg	<0.01	0.66	23.60
Benzo(ghi)perylene	CE087	mg/kg	<0.01	0.28	10.98
Benzo(k)fluoranthene	CE087	mg/kg	<0.01	0.29	10.61
Chrysene	CE087	mg/kg	<0.01	0.47	13.80
Dibenz(ah)anthracene	CE087	mg/kg	<0.01	0.04	3.49
Fluoranthene	CE087	mg/kg	<0.01	1.29	21.86
Fluorene	CE087	mg/kg	<0.01	0.03	0.59
Indeno(123cd)pyrene	CE087	mg/kg	<0.01	0.33	13.31
Naphthalene	CE087	mg/kg	<0.01	0.25	0.22
Phenanthrene	CE087	mg/kg	<0.01	1.04	7.42
Pyrene	CE087	mg/kg	<0.01	1.03	20.5
PAH (total of USEPA 16)	CE087	mg/kg	<0.16	6.84	164
Benzo(j)fluoranthene	CE087	mg/kg	<0.01	0.03	6.23
PAH (total of OIL 8)	CE087	mg/kg	<0.08	2.74	105
Subcontracted analysis					
Asbestos	$	-	NAD	Chrysotile	NAD

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
-	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE050	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		2	mg/kg CN
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	PAH (speciated)	Solvent extraction, GC-MS	Wet		0.01	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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DEVIATING SAMPLE INFORMATION

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

Key

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

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
52799-1	BH 01	0.50	N	
52799-2	BH 03	0.25	N	
52799-3	BH 04	0.25	N	

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL14/4783

Client's Reference: 140906 Report Date: 02 October 2014

Client Name: Roberts Environmental Limited
23 Grey Street
Newcastle Upon Tyne

NE1 6EE

For the attention of: Mike Hay

Contract Title: English Matyr's Church, Dalton Terrace, York

Date Received: 19/09/2014
Date Commenced: 19/09/2014
Date Completed: 02/10/2014

Notes: Observations and Interpretations are outside the UKAS Accreditation

Checked and Approved Signatories:

R Gunson (Director)
A Watkins (Director)
M Beastall (Laboratory Manager)

D Lambe (Senior Technician)
S Royle (Senior Technician)

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fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
BH01		B	2.00	Brown slightly gravelly sandy silty CLAY.
BH02		B	4.00	Brown sandy silty CLAY.
BH03		B	2.00	Brown slightly gravelly slightly sandy silty CLAY.
BH03		B	3.00	Brown very sandy slightly silty GRAVEL.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	02/10/14		02/10/14		02/10/14

ENGLISH MARTYR'S CHURCH, DALTON TERRACE, YORK.

Contract No: PSL14/4783

Client Ref: 140906

SUMMARY OF SOIL CLASSIFICATION TESTS

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

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	% Passing .425mm	Remarks
BH01		B	2.00	19				40	19	21	90	Intermediate plasticity CI.
BH02		B	4.00	23				42	20	22	97	Intermediate plasticity CI.
BH03		B	2.00	25				59	25	34	96	High plasticity CH.

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

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	02/10/14		02/10/14		02/10/14

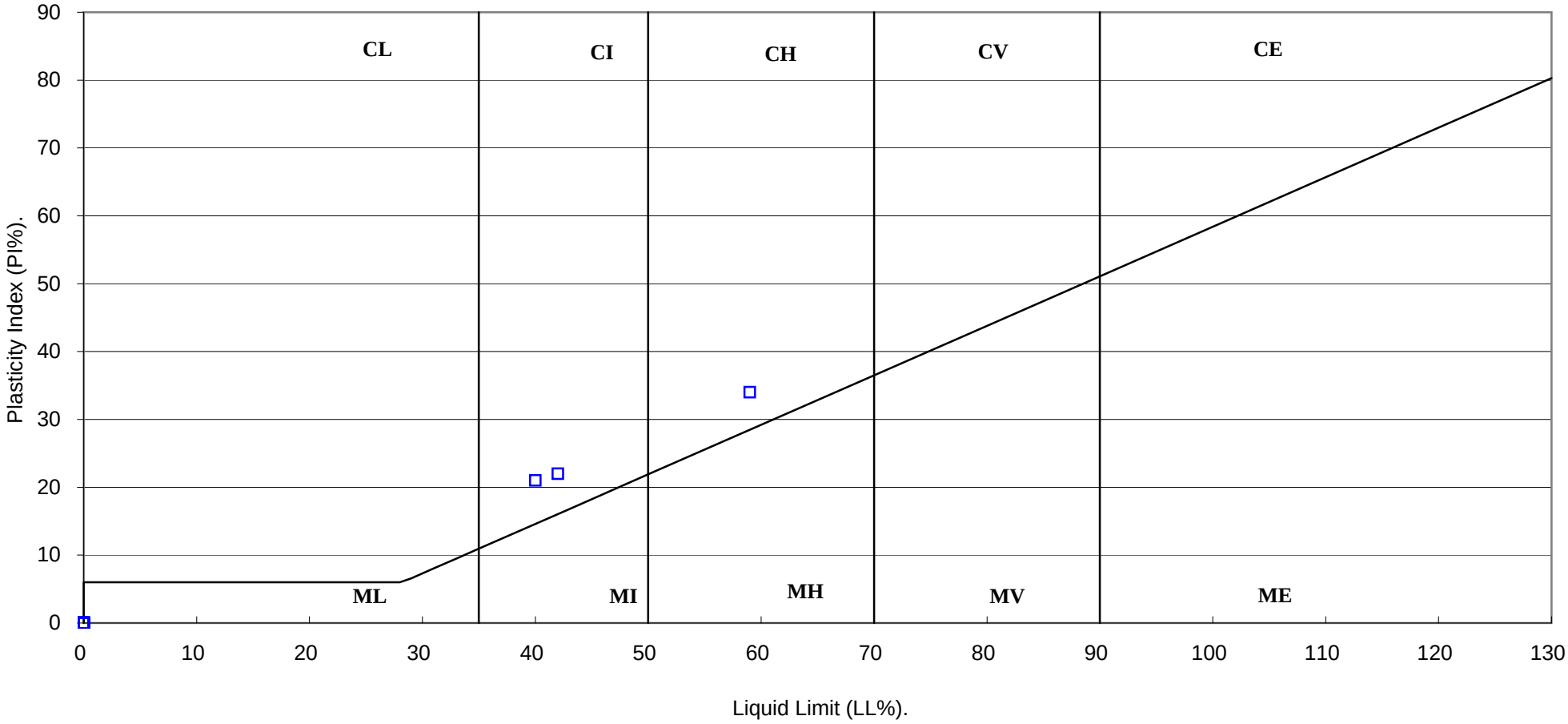
ENGLISH MARTYR'S CHURCH, DALTON TERRACE, YORK.

Contract No: **PSL14/4783**

Client Ref: **140906**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		02/10/14		02/10/14		02/10/14
	ENGLISH MARTYR'S CHURCH, DALTON TERRACE, YORK.				Contract No:	PSL14/4783
					Client Ref:	140906

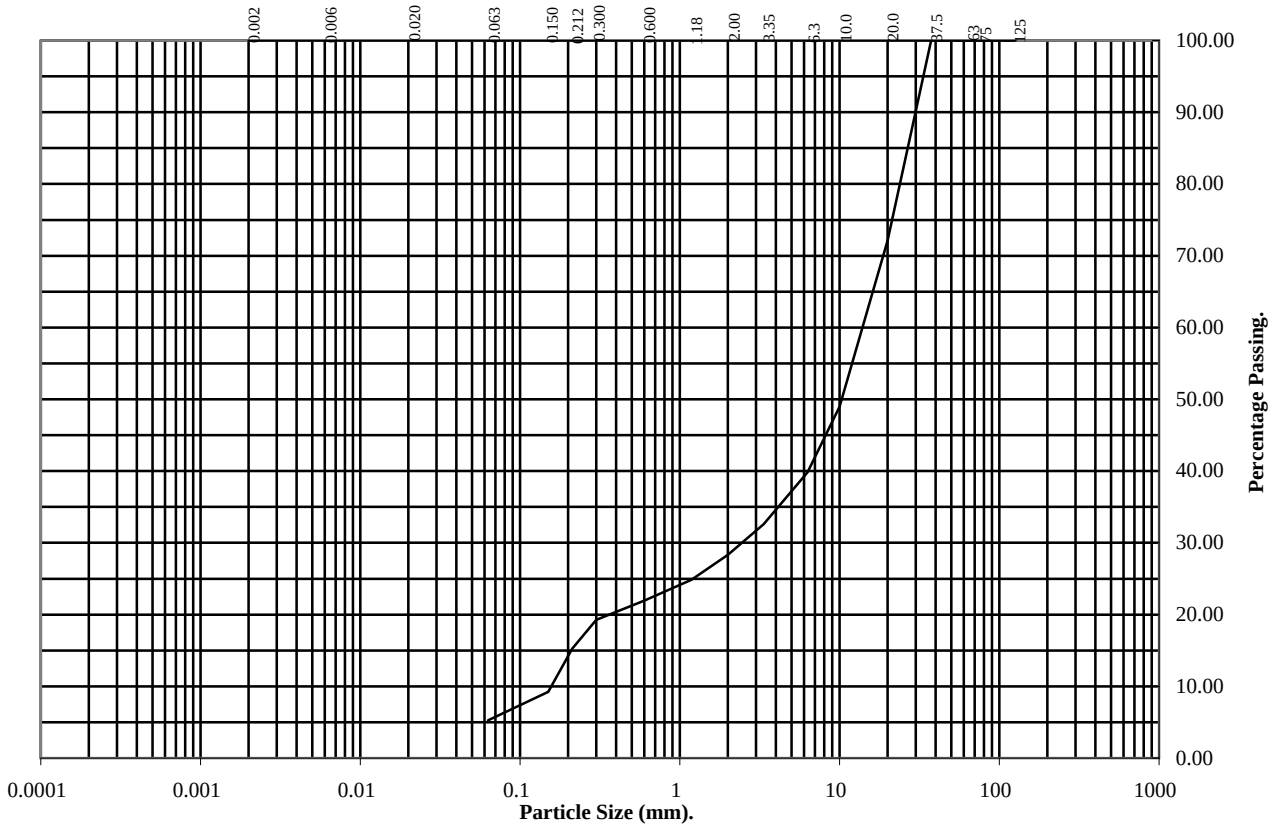
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH03** **Depth (m):** **3.00**

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



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	72
10	49
6.3	40
3.35	33
2	28
1.18	25
0.6	22
0.3	19
0.212	15
0.15	9
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	72
Sand	23
Silt / Clay	5

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	02/10/14		02/10/14

PSL Professional Soils Laboratory	**ENGLISH MARTYR'S CHURCH, DALTON TERRACE, YORK.**	**Contract No.: PSL14/4783**