Phase II Geo-Environmental Assessment Report

C2522 - St Mary's Way, Melton Mowbray

March 2017

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St Mary's Way
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Phase II Geo-Environmental Assessment Report

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Issue & Revision History

Revision	Status	Originated	Checked	Approved	Date
	FINAL	L. Bradley BSc (Hons) FGS	Johanne Bridgman BSc (Hons), CGeol, FGS	H.Pratt B.Eng (Hons), C.Eng, F.Cons.E, M.I.C.E, MI Mgt.	24.03.2017
Project Number : C2522				Document Reference :C2522/PII	

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Executive Summary

HSP Consulting has been commissioned by Gleeds Building Surveying Ltd to undertake an intrusive ground investigation at the site to investigate the existing ground conditions and provide information on likely constraints to the development, parameters for design and recommendations for any mitigation measures should they be required. The current development proposals indicate an accessible public convenience block.

The site is approximately rectangular in shape and is approximately 0.02Ha in area. At the time of the site investigation the majority of the site was occupied by an existing toilet block with car parking spaces to the south and north and roads around the car park to the east and west. The approximate National Grid Reference for the centre of the site is 475221,319288.

The physical methods of investigation employed were 3No. window sample boreholes to a maximum depth of 4.50m begl to provide information for foundation design and obtain representative disturbed soil samples to forward for geotechnical and geo-environmental analysis. The geology of the site comprises Made Ground to a maximum depth of 0.80m begl. Underlying the Made Ground are glaciolacustrine superficial deposits consisting of brown and orangish brown clayey gravelly SAND to a maximum proven depth of 4.50m begl and firm orangish brown sandy gravelly CLAY to a maximum depth of 4.00m begl. Orangish brown clayey sandy GRAVEL of mixed lithology was identified in WS1 between 3.40m and 3.95m begl.

The natural fine superficial deposits are considered to be suitable as a formation layer from a minimum depth of 1.10m. At the above depth HSP would recommend that an allowable bearing pressure of 115kN/m^2 should be readily achievable when utilising a 0.60m wide strip foundation in the fine and coarse soils with a reinforced strip foundation or a raft foundation to overcome differential settlement. Alternatively a deepened strip footing founding in the fine deposits at a minimum depth of 1.60m could be used.

It is considered appropriate to adopt a basic Design Sulphate Class of DS-2 together with an Aggressive Chemical Environment for Concrete (ACEC) of AC-2.

The development plans indicate a new accessible toilet block surrounded by hard standing. The development plans indicate that the area of the exceedances are to be located beneath hard standing or the building footprint then the hard cover effectively acts as capping and breaks the SPR linkage as the near surface soils will either be retained beneath hardstanding or removed from site to a suitably licensed waste management facility as there is no space to accommodate arisings within soft landscaped areas on site.

In addition to the contamination discussed above, asbestos screening was undertaken on three samples of Made Ground, with no asbestos identified in any of the samples.

Based on the chemical analysis report it is considered that specialist materials are likely to be required for water supply pipes at the site. However confirmation of supply pipes should be sought from utility providers.

The executive summary contains an overview of key findings and conclusions. However no reliance should be placed on the executive summary until the whole of the report has been read. Other sections of the report may contain information which puts into context the findings noted within the executive summary.

1. Introduction

1.1 Background

Melton Borough Council proposes to construct an accessible public convenience block in a car park of St Mary's Way, Melton Mowbray. The development proposals are included as Appendix I. Our Client requires an overview of the contamination and ground conditions at the site in order to inform the design of the building.

1.2 Client Brief & Scope

HSP Consulting has been commissioned by Gleeds Building Surveying Ltd on behalf of Melton Borough Council to undertake an intrusive ground investigation at the site to investigate the existing ground conditions and provide information on likely constraints to the development, parameters for design and recommendations for any mitigation measures should they be required.

The report presents the following information:

- details of the ground investigation undertaken and the ground conditions encountered,
- details and results of the geotechnical testing and contamination analysis,
- recommendations for mitigating constraints to the proposed development where appropriate and providing parameters for design in a geotechnical context.

Where applicable, the fieldwork was undertaken in accordance with BS5930:2015 Code of Practice for Site Investigations and BS10175:2011+A1:2013 Investigation of Potentially Contaminated Sites.

1.2 Report Objectives

The objectives of this report are to:

- establish the geological and hydrogeological conditions using existing available/published information;
- summarise available information and identify site specific geotechnical and environmental hazards which may place a constraint upon the proposed site use;
- produce an updated Conceptual Site Model identifying potential pollution linkages between sources of contamination, pathways and receptors;

1.3 Limitations

The recommendations made in this report are based on the findings of the intrusive ground investigation undertaken by HSP Consulting Ltd on the 1st March 2017.

1.4 Previous Reports

No previous reports for the site have been provided to HSP Consulting Engineers Ltd by the Client.

2. Review of Existing Information & Geoenvironmental Setting

2.1 The Site

2.1.1 Location

The site is located in a car park to the west of St Mary's Way, Melton Mowbray approximately 0.10km east of Melton Mowbray Town Centre. The approximate National Grid Reference for the centre of the site is (NGR) 475221,319288. A Site Location Plan is included in Appendix I.

2.1.2 Description

The site is approximately square in shape and is approximately 0.02Ha in area.

At the time of the site investigation the majority of the site was occupied by an existing toilet block with car parking spaces to the south and north and roads around the car park to the east and west.

The site is bound by the car park on all sides.

2.1.3 Surrounding Land Use

The main features of interest identified are:

North: Car park with offices and Norman Way (A607) beyond.
East: Car park and St Mary's Way with parkland and housing beyond.
South: Car park with shops beyond.
West: Car park with Melton Mowbray town centre beyond.

2.1.4 Site Access

The site is accessed off St Mary's Way in the south east.

2.1.5 Proposed End Use

It is proposed to construct a new accessible public convenience block and car parking spaces at the site.

2.2 Geology

2.2.1 Made Ground

No Made Ground deposits are recorded across the site on relevant BGS mapping.

2.2.2 Superficial Deposits

Superficial deposits comprising glaciolacustrine clay, silt and sand are expected across the site.

2.2.3 Bedrock Geology

BGS bedrock mapping indicates the site is underlain by the Blue Lias Formation described by the BGS as *'Thinly interbedded limestone (laminated, nodular, or massive and persistent)*

and calcareous mudstone or siltstone (locally laminated). Individual limestones are typically 0.10-0.30m thick. In some areas, intervening mudstone units with relatively few limestone beds.

2.2.4 Structural Geology

No faults were identified within 500m of the site on BGS mapping.

2.3 Pertinent Site Sensitivity Information

2.3.1 Mining

The site does not lie within a Coal Authority Referral Area or Standing Advice Area.

2.3.2 Hydrogeology

Aquifer Units

The Blue Lias Formation deposits have been classified as a Secondary Undifferentiad Aquifer, a designation given '*where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.'*

The glaciolacustrine deposits are recorded as unproductive strata.

Groundwater Vulnerability

The site is not located within a Source Protection Zone.

2.3.3 Hydrology

Nearest Surface Water Feature

The closest water feature is the River Wreake approximately 300m south west of the site and orientated north west to south east.

2.3.4 Flood Risk

The site is not located within an Environment Agency Zone 2 or Zone 3 floodplain.

The site does not lie within an area benefitting from flood defences or within an area used for flood storage.

Although the report provides information on flood risk this does not constitute a flood risk assessment for the site. The flood risk information provided only relates to flooding from Rivers or Seas and does not account for flooding from other sources such as groundwater, blockages in drainage systems, artificial water features and overland flow. A separate Flood Risk Assessment may be required for the site.

2.3.5 Radon

Mapping provided by the National Radon Protection Board indicates that the site does not lie within an area likely to require radon protection measures, however a radon report for the site should be obtained before development takes place.

2.3.6 Sensitive Land Uses, Ecological and Statutory Designations

The site is located within a surface water Nitrate Vulnerable Zone.

No other records of sensitive land use (SSSI, SAC, Nature Reserves, Environmentally Sensitive Areas, etc) have been identified within a 500m radius of the site.

3. Fieldwork & Factual Information

Site work was carried out on the 1st March 2017. Where applicable, the fieldwork was undertaken in accordance with BS5930:2015 Code of Practice for Site Investigations (Ref. 6) and BS10175:2011+A1:2013 Investigation of Potentially Contaminated Sites (Ref. 8).

3.1 Exploratory Methods

The physical methods of investigation employed were 3No. window sample boreholes to a maximum depth of 4.50m begl The exploratory holes were logged and sampled by an engineer from HSP Consulting Engineers Ltd and the exploratory hole logs are presented in Appendix II. The exploratory hole locations are shown on the Ground Investigation Layout Plan presented in Appendix III.

Fragmentary disturbed and undisturbed samples were recovered from materials revealed within all of the exploratory holes. Geo-environmental samples, placed in plastic tubs and glass jars supplied by the laboratory, were also obtained specifically for chemical analysis. The samples were taken to UKAS accredited laboratories for further examination and testing.

3.2 In-situ Testing

3.2.1 Standard Penetration Tests

Standard Penetration Tests (SPT's) were carried out at 1.00m intervals to refusal within the window sample boreholes The SPT's were undertaken in accordance with BS 1377:1990 (Part 9) and the results are included on the appended borehole logs (Appendix II).

3.3 Laboratory Testing

The laboratory testing schedules were prepared by HSP Consulting Engineers Ltd.

3.3.1 Geotechnical Testing

Geotechnical testing has been undertaken by a UKAS accredited laboratory as part of the works at the site:

- Atterburg Limits
- Natural Moisture Content
- Particle Size Distributions

The laboratory testing has been carried out by Professional Soil Laboratory (PSL) (UKAS accredited, laboratory No.4043) in accordance with BS1377:1990 using calibrated equipment specifically for the British Standard.

3.3.2 Chemical Analysis

The geo-environmental samples retained specifically for chemical analysis were stored in cooled containers until delivery to the laboratory by courier.

Chemical analysis was scheduled on three soil samples for the presence of a selected suite of potential contaminants as outlined in the tables below:

Exploratory Hole Location & Depth	Sample Description
WS1 0.60m	Made Ground [1,4]
WS2 0.30m	Made Ground [1,3,4]
WS3 0.40m	Made Ground [1,3,4]

[1] Geo-environmental Analysis, [2] SD1 Basic Sulphate Suite, [3] Total Organic Matter, [4] Asbestos Screen.

Metals	Cadmium	Chromium (III & VI)	Copper
	Lead	Mercury	Nickel
	Zinc		
Semi Metals and Non-metals	Arsenic	Boron	Selenium
Others	pH	Asbestos	
Inorganic Chemicals	Cyanide	Sulphate	Sulphide
Organic Chemicals	PAH (US EPA 16)	TPH (CWG)	Phenol

The contamination analysis was carried out by Chemtech Ltd (UKAS accredited, laboratory No. 032) during the period 6th to 13th March 2017. The results are presented in Appendix V.

3.4 Ground Conditions

3.4.1 Published Geology

The published geology indicates the site is underlain by glaciolacustrine superficial deposits comprising clay sand and silt and Blue Lias Formation bedrock deposits as described in section 2.2.3 above.

3.4.2 Ground Conditions on site or General Geology & Revealed Strata

The exploratory holes confirm the published information, although the base of the glaciolacustrine deposits was not penetrated. The strata generally comprises:

Table 1 – Encountered Ground Conditions

Strata		Depth (m begl)	Thickness (m)	Description
Anthropogenic	MADE GROUND	G.L – 0.10	0.10m	MADE GROUND comprising angular COBBLES of brick
	MADE GROUND	0.10 – 0.15	0.05m	MADE GROUND comprising SAND
	MADE GROUND	0.15 – 0.30	0.15m	MADE GROUND comprising asphalt concrete
	MADE GROUND	0.15 – 0.70	0.40m	MADE GROUND comprising sandy GRAVEL of concrete, brick, ash, clinker and mixed lithology
	MADE GROUND	0.40 – 0.70	0.20m	MADE GROUND comprising sandy GRAVEL of limestone
	MADE GROUND	0.40 – 0.80	0.25m	MADE GROUND comprising sandy gravelly CLAY with gravel of brick, limestone, flint and mixed lithology
Bedrock	GLACIOLACUSTRINE DEPOSITS	0.80 – 4.00	1.10m	Brown and orangish brown clayey gravelly SAND with gravel of flint and limestone.
	GLACIOLACUSTRINE DEPOSITS	0.65 – 4.00	3.10m	Firm orangish brown sandy gravelly CLAY with gravel of flint, limestone and mixed lithology.
	GLACIOLACUSTRINE DEPOSITS	3.40 – 3.95	0.55m	Orangish brown clayey sandy GRAVEL of mixed lithology.

3.5 Groundwater Levels

Groundwater was not encountered during the ground investigation.

3.6 Ground Gas Monitoring

Ground gas monitoring was not undertaken as part of the intrusive investigation. No plausible sources of ground gas have been identified in the site vicinity.

4. Geotechnical Assessment

4.1 Detailed Ground Model

For the purposes of this assessment the window sample borehole information has been utilised. The exploratory hole logs are presented in Appendix II.

4.1.1 Made Ground

Made Ground was encountered in all locations. The surface covering comprised brick block paving in all locations to a depth of 0.10m underlain by yellowish brown fine to coarse SAND to a maximum depth of 0.15m begl. This was generally underlain by a layer of asphalt concrete to a maximum depth of 0.30m, in turn underlain by brown and black clayey sandy GRAVEL of brick, ash, clinker, concrete and mixed lithology to a maximum depth of 0.70m begl. Firm orangish brown and brown sandy gravelly CLAY with gravel of brick, concrete, ash, flint, limestone and mixed lithology was encountered in all locations to a maximum depth of 0.80m begl.

Yellowish brown sandy GRAVEL of limestone was encountered in WS1 and 2 between 0.40m and 0.70m begl.

4.1.2 Glaciolacustrine Deposits

The Made Ground was underlain by superficial glaciolacustrine deposits variously comprising brown and orangish brown gravelly SAND with gravel of flint and limestone and firm orangish brown sandy gravelly CLAY with gravel of flint, limestone and mixed lithology to a maximum proven depth of 4.00m begl.

Orangish brown clayey sandy fine to coarse angular to rounded GRAVEL of mixed lithology was encountered in WS1 between 3.40m and 3.95m begl.

4.1.3 In-situ Testing and Assessment

A series of Standard Penetration Tests (SPT's) undertaken within the window sample boreholes have returned SPT 'N' values in the range of 11 – 12 at 1.00m depth within the natural deposits. The following table summarises the N values at depth across the likely proposed building footprints.

Table 2 – SPT N Values

Depth (m)	Range of 'N' Values	Mean 'N' Value	Description
1.00	11 - 12	11.6	SAND/CLAY
2.00	7 – 18	11.6	SAND/CLAY
3.00	5 – 50	28.6	SAND/CLAY
4.00	41 – 50	45.5	SAND
4.5	50	50	SAND

Two particle size distribution (P.S.D.) tests have been undertaken to confirm the visual description and engineering behaviour of the superficial deposits.

Four plasticity index and moisture content tests have been undertaken in the laboratory on disturbed samples of the fine deposits. The plasticity index of the fine deposits is in the range 12 to 15%. The modified plasticity index of the fine soils are in the range 7% to 12.6% indicating soils of low plasticity (CL) after the classification system of BS5930: 2015. These

soils are generally considered to be of low Volume Change Potential in accordance with the National House Building Council (NHBC) Standards, Chapter 4.2: 2007.

Sample Ref:	Laboratory Material Descriptions	LL (%)	PL (%)	PI (%)	% passing 425µm	Modified PI (%)*	Soil Class	MC (%)
WS1 @ 2.50m	*Brown very sandy very gravelly CLAY*	29	15	14	50	7	CL	17
WS2 @ 1.50m	*Brown very sandy very gravelly CLAY*	25	13	12	43	5.16	CL	13
WS3 @ 0.90m	*Brown very sandy gravelly CLAY*	32	17	15	84	12.6	CL	17
WS3 @ 1.50m	*Brown very sandy gravelly CLAY*	29	16	13	71	9.23	CL	14

4.2 Earthworks

At this time we envisage that significant earthworks will not be required given the current ground levels and proposed development plan.

4.3 Excavations

Variable soil strengths were recorded across the site and therefore instability of excavations through natural soils should be anticipated across the site, instability of any Made Ground encountered should be allowed for. All excavations should be carried out in accordance with CIRIA Report 97 'Trenching Practice'.

It is recommended that all support systems are continually assessed by fully trained or experienced personnel.

Groundwater was recorded during the ground investigation. It should be noted that groundwater levels may vary due to seasonal variations or other effects. Should shallow groundwater entries be encountered at the site during groundwork operations, traditional sump and pump dewatering may not be sufficient if required.

4.4 Foundations

The current development proposals indicate an accessible public convenience block.

For the purpose of this foundation assessment, the information gained from all the window sample boreholes has been utilised.

The Made Ground encountered is not considered to be suitable as a formation layer.

The tables below indicate the indicative allowable bearing pressure (ABP) that could be achieved using strip or pad foundations across the building footprint. An ABP has been calculated using the mean of the corrected SPT $(N_1)_{60}$ values for the borehole group at 1m intervals from the existing ground level.

Table 3 – Indicative Allowable Bearing Pressures

Depth (m)	Mean SPT 'N_{160}' Value	Eurocode 7 Soil Strength Description	Consistency (BS5930) Description	Approximate ABP (kN/m^2) – 0.60m wide strip footing	Approximate ABP (kN/m^2) – 2x2m pad footing
1.00	14	Medium Strength	Firm/Medium Dense	115	120
2.00	14	Medium Strength	Firm/Medium Dense	95	100
3.00	33	High Strength	Stiff/Dense	55	60

Required loads for the proposed toilet block are not known at this stage. The natural glaciolacustrine superficial deposits are considered to be suitable as a formation layer from a minimum depth of 1.10m.

At the above depth HSP would recommend that an allowable bearing pressure of 115kN/m^2 should be readily achievable when utilising a 0.60m wide strip foundation in the fine and coarse soils with a reinforced strip foundation or a raft foundation to overcome differential settlement.

Alternatively a deepened strip footing founding in the fine deposits at a minimum depth of 1.60m could be used, but the ABP would need to consider the decrease in strength observed within the soils.

4.5 Ground Floor Slab

Suspended floor slabs will be required due to the depth of Made Ground. Alternatively the Made Ground could be partially removed to reduce cover to 600m depth and replaced with suitably compacted aggregate to allow the use of a ground bearing floor slab.

4.6 Concrete Classification

The results of sulphate and pH testing carried out on selected soil samples taken during this investigation have been compared with the recommendations outlined in BRE Special Digest 1, Part 1: 2005.

The guidelines given in BRE Special Digest 1 are based upon a site classification relating to its previous usage. It is considered appropriate to define this site as a ‘brownfield site’ for the purposes of concrete classification.

On the basis of the above, it is considered appropriate to adopt a basic Design Sulphate Class of DS-2 together with and Aggressive Chemical Environment for Concrete (ACEC) of AC-2.

4.7 Drainage

No soakaway or permeability testing was carried out on the underlying soils at the site at the time of this site investigation. Due to the fine nature of the underlying soils it is unlikely that soakaway drainage will be feasible at the site.

5. Environmental Assessment

5.1 Introduction

The approach to the human health risk assessment reported here follows the principals given in CRL 11, i.e. application of the following assessment hierarchy:

- Tier 1 risk screening by establishment of potential pollutant linkages, i.e. the preliminary conceptual site model (PCSM), or
- Tier 2 generic quantitative assessment using generic assessment criteria (GACs) that represent 'acceptably low' risk, or
- Tier 3 quantitative risk assessment using site specific assessment criteria (SSACs) that represent 'unacceptable risk', or where generic assessment criteria are not available or they are not applicable to the CSM.

The results of laboratory analysis have been screened against GACs including the DEFRA Category 4 Screening Levels (C4SL) and LQM and CIEH S4ULs for Human Health Risk Assessment (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3180. All rights reserved). (Refs 10 and 11).

The standard scenarios of commercial and public open space (park) have been used to identify potential exposure pathways for human health receptors (to cover site users and site workers). Controlled water, flora and fauna and property receptors have also been included within the CSM.

It should be noted that organic contamination (PAH, TPH and BTEX) have been screened against the GAC for 1% Soil Organic Matter (SOM).

The assessment of PAHs is undertaken using the surrogate marker approach; recommended by Health Protection Agency (2010) guidance, providing the PAH profile is sufficient similar to the coal tars tested by Culp et al (1998). Where PAH profile is not sufficiently coal tar like the TEF method is adopted using the LQM and CIEH S4ULs.

5.2 Assessment of Soil Analysis Results

Three samples, as detailed in section 3.3.2, were scheduled for analysis from the development area. These provide a basis for characterising the soils to outline the potential impacts on human health and any environmental receptors from any contamination found.

The screening process for on-site human health receptors show that the Generic Assessment Criteria (GACs), representative of minimal risk for a commercial or public open space (park) setting were exceeded for PAHs in WS2, detailed in Table 1. All other determinands were below the relevant GACs using Benzo(a)pyrene as a surrogate marker for polyaromatic hydrocarbons.

Table 5 – GAC Exceedances

Contaminant	GAC (mg/kg)	No. of exceedances	Concentration (mg/kg), sampling location and depth (m)
Benzo(a)pyrene (Surrogate marker)	21[1] (POS^{PARK})	1	123.56 – WS2 0.30m

[1] C4SL, [2] SGV, [3] LQM & CIEH GAC, [4] SSAC.

This investigation has identified that the ground conditions in WS2 comprised Made Ground. In WS2 the Made Ground comprised black sandy gravel of ash, clinker, brick and sandstone to a depth of 0.40m begl.

Three of the soil samples derived of Made Ground were submitted for asbestos screen and identification. No asbestos was identified.

We therefore consider that there is a potential risk associated with the interaction between the near surface soils and end users of the site including construction workers. Mitigation measures and recommendations are made in Section 5.3 below.

5.3 Human Health Mitigation

The concentrations of PAHs recorded at the site are considered to pose a potential risk to the proposed end users and construction workers.

The development plans indicate a new accessible toilet block surrounded by hard standing. The development plans indicate that the area of the exceedances is to be located beneath hard standing or the building footprint then the hard cover effectively acts as capping and breaks the SPR linkage as the near surface soils will either be retained beneath hardstanding or removed from site to a suitably licensed waste management facility as there is no space to accommodate arisings within soft landscaped areas on site.

Should any obvious evidence of unexpected contamination be encountered during the redevelopment works it should be reported to HSP so that an inspection can be made and appropriate sampling and assessment work be carried out.

All construction and maintenance workers operating at the site should be advised of the potential for contact with high concentrations of PAHs within the Made Ground Materials. Appropriate health and safety precautions should be adopted during any excavation works to avoid exposure to contaminated soils and dust. Reference to the HSE document HSG 66 ‘Protection of workers and the General Public during Redevelopment of Contaminated Land’.

The approval of the local Environmental Health Officer should be sought with respect to the soil contamination assessment and mitigation proposals.

5.4 Water Supply

The environmental testing for the site has been compared to the following document in order to assess the most appropriate pipe material that should be used upon the site for mains water supply:

‘Guidance for the selection of water supply pipes to be used in Brownfield sites – UK Water Industry Research – Ref: 10/WM/03/21.’

Based on the chemical analysis report it is considered that specialist materials are likely to be required for water supply pipes at the site. However confirmation of supply pipes should be sought from utility providers.

5.5 Waste Classification

The results of the chemical testing have been assessed using web-based software for classifying hazardous waste, using HazWasteOnline[tm]. The levels of PAHs, TPHs and pH in samples tested from WS2 and WS3 indicate the Made Ground material found across the site is likely to be classified as Hazardous Waste. The levels of TPHs in the sample from WS1 indicate the Made Ground in this area is likely to be classified as Potentially Hazardous Waste. The results are included in Appendix VI.

5.6 Conceptual Site Model

Based on the findings of this investigation a conceptual site model has been produced and is present below:

Table 6 - Updated Conceptual Site Model.

Source	Pathway	Receptor	Consequence	Probability	Risk	Comments
On site **S1: Made Ground associated with the development of the site**	**P1:** Human uptake pathways • direct contact, • ingestion of soils and dust, • inhalation of fugitive dust.	**R1:** End Users **R2:** Construction and maintenance workers	Mild	Unlikely	Very Low	Elevated concentrations of PAHs have been identified within the Made Ground material on site which pose an unacceptable level of risk to construction if no mitigation measures are taken. All construction and maintenance workers operating at the site should be advised of the potential for contact with high concentrations of PAHs within the Made Ground materials in all development areas. Appropriate health and safety precautions should be adopted during any excavation works to avoid exposure to contaminated soils and dust. Reference to the HSE document HSG 66 'Protection of workers and the General Public during Redevelopment of Contaminated Land'. Elevated concentrations of PAHs have been identified within the Made Ground material on site which pose an unacceptable level of risk to end users if no mitigation measures are taken. Any risk will be mitigated during construction either by removal from site or by provision of capping in the form of hard cover (Building or hard landscaping). Should these mitigations measures be provided the risk is considered to be VERY LOW.
	P2: Horizontal and vertical migration of contaminants through potentially permeable soils and rocks. **P3:** Migration of contaminants along preferential pathways (man- made). **P4:** Surface runoff.	**R3:** Controlled Water: Groundwater & Surface Water	Mild	Unlikely	Very Low	The underlying geology comprises glaciolacustrine superficial deposits which are classified as unproductive strata and Blue Lias Formation bedrock deposits which are classified as a Secondary Undifferentiated Aquifer. Elevated concentrations of PAHs have been identified within the made ground material on site, however as the glaciolacustrine deposits overlying the Secondary Undifferentiated Aquifer are impermeable no pathway exists. Based on the information available, the risk to surface water and groundwater is considered to be VERY LOW.
Off Site (within 250m) **S2: Made Ground associated with development in the area**	**P2:** Horizontal and vertical migration of contaminants through potentially permeable soils and rocks. **P3:** Migration of contaminants along preferential pathways (man- made).	**R1:** End Users **R2:** Construction and maintenance workers	Mild	Unlikely	Very Low	No plausible sources of ground gas have been identified in the site vicinity, therefore it is considered that the risk is VERY LOW.

S3: Historical & Contemporary Land Use: commercial areas	**P4:** Surface runoff. **P5:** Vertical and lateral migration of ground gases and/or vapour.					
	P2: Horizontal and vertical migration of contaminants through potentially permeable soils and rocks. **P3:** Migration of contaminants along preferential pathways (man- made). **P4:** Surface runoff. **P5:** Vertical and lateral migration of ground gases and/or vapour.	**R4:** Property, services and substructures **R5:** Adjacent Residential Properties	Mild	Unlikely	Very Low	The made ground and natural deposits may contain sulphates that present a risk to buried concrete. Testing indicates the soils are unlikely to be aggressive to concrete and it is considered appropriate to adopt a basic Design Sulphate Class of DS-2 together with and Aggressive Chemical Environment for Concrete (ACEC) of AC-2. The chemical analysis of the soils indicates specialist materials are likely to be required for water supply pipes at the site.
	P6: Root uptake.	**R6:** Proposed Flora and fauna	Mild	Unlikely	Very Low	No planting is proposed at the site, therefore the risk of uptake to proposed flora and fauna is VERY LOW.

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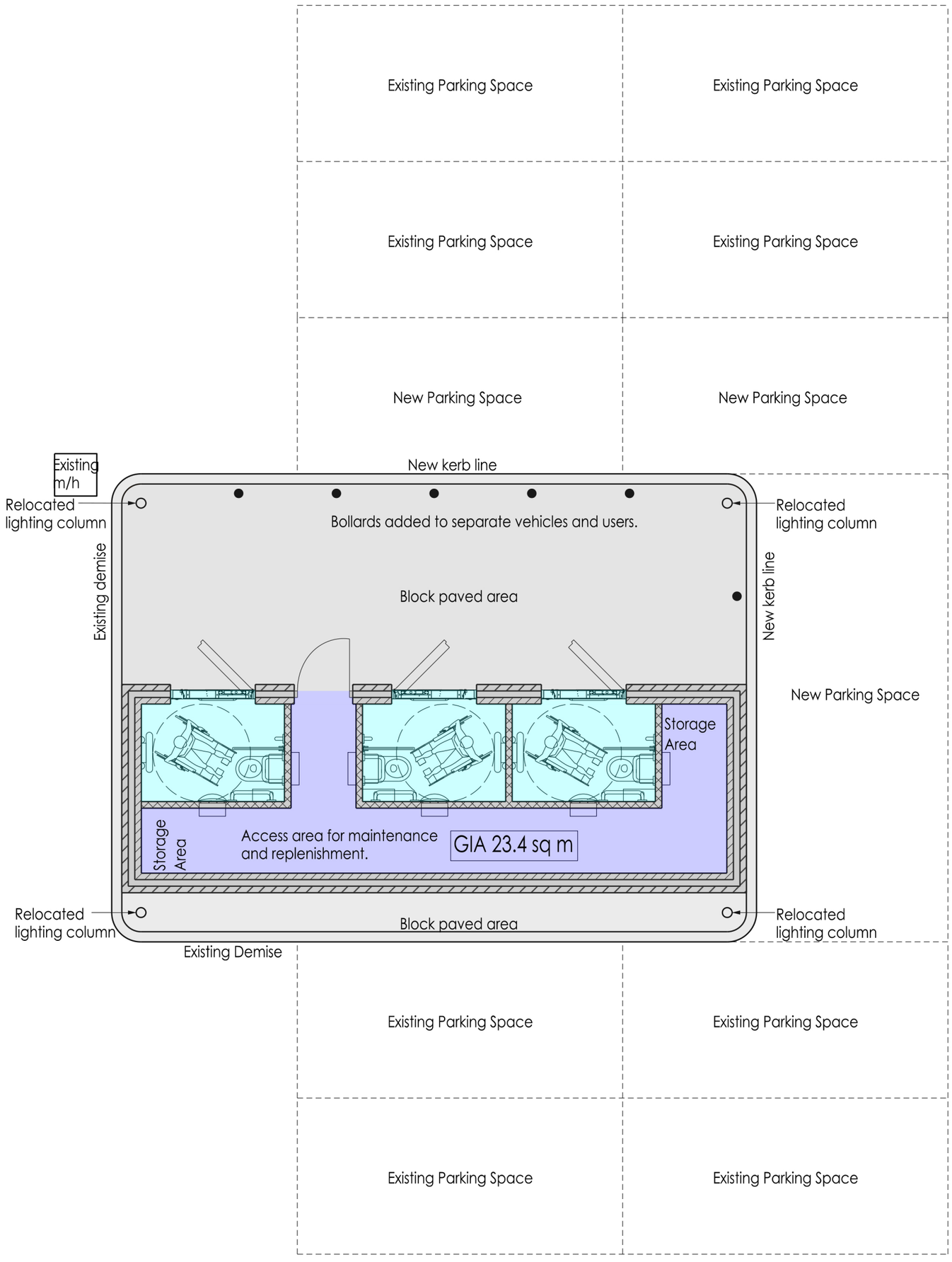
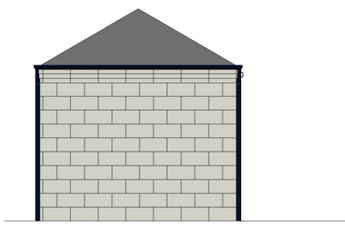
12. BRE Special Digest 1:Concrete in Aggressive Ground, 2005, Building Research Establishment.
13. CL:AIRE The definition of Waste: Development Industry Code of Practice, 2008.
14. NHBC & RSK Group Plc, March 2007. Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present. Ed 4.
15. CIRIA C665 ‘Assessing Risks Posed by Hazardous Ground Gases to Buildings’

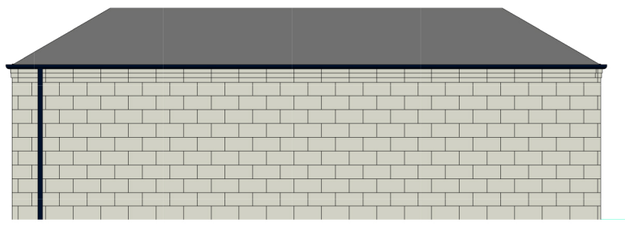
Appendix I

Melton Borough Council

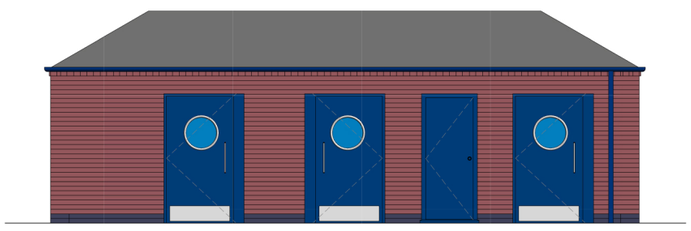


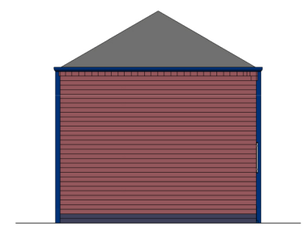
Layout Plan.

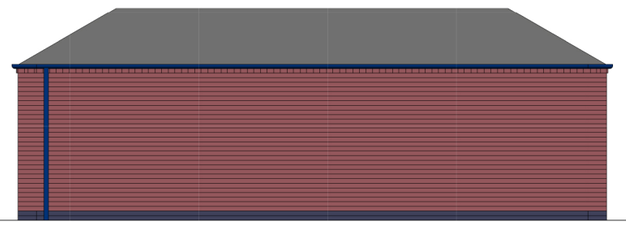




Architectural Blockwork Option.







Brick Option.

williamsaunders
architecture : engineering : building consultancy

Appendix II

Borehole Log

Borehole No. **WS1**

Sheet 1 of 1

Project Name: St Mary's Way	Project No. C2522	Co-ords: -	Hole Type WS
Location: Melton Mowbray		Level:	Scale 1:50
Client: Gleeds Building Surveying Ltd		Dates: 01/03/2017 - 01/03/2017	Logged By LB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			MADE GROUND - Reddish brown cobbles. Cobbles are of brick.
		0.40	J		0.15			MADE GROUND - Yellowish brown SAND. Sand is fine to coarse.
		0.60	J		0.25			MADE GROUND - Asphalt concrete.
		0.80	D		0.40			MADE GROUND - Brown clayey sandy gravel. Gravel is fine to coarse angular of brick and mixed lithologies.
		1.00		N=12 (2,2/2,3,3,4)	0.60			MADE GROUND Yellowish brown sandy gravel. Gravel is coarse sub angular of limestone.
		1.50	D		0.80			MADE GROUND - Brown slightly gravelly sandy clay. Low plasticity. Gravel is fine to coarse sub angular to rounded of brick and mixed lithologies.
		2.00		N=7 (3,2/2,1,2,2)	1.90			Brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular to rounded of flint. Low sub rounded cobble content of flint.
		2.50	D					Firm orangish brown sandy gravelly CLAY. High plasticity. Gravel is fine to coarse angular to rounded of mixed lithologies.
		3.00		N=31 (1,1/4,7,9,11)				
		3.50	D		3.40			Orangish brown clayey sandy gravel. Gravel is fine to coarse angular to rounded of mixed lithologies.
		4.00		N=50 (9,12/50 for 290mm)	3.95			Orangish brown SAND. Sand is fine to coarse.
					4.00			End of borehole at 4.00 m

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 4.00m depth due to refusal and backfilled with arisings.

Borehole Log

Borehole No. **WS2**

Sheet 1 of 1

Project Name: St Mary's Way	Project No. C2522	Co-ords: -	Hole Type WS
Location: Melton Mowbray		Level:	Scale 1:50
Client: Gleeds Building Surveying Ltd		Dates: 01/03/2017 - 01/03/2017	Logged By LB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	J		0.10			MADE GROUND - Reddish brown cobbles. Cobbles are of brick.
		0.50	D		0.15			MADE GROUND - Yellowish brown sand. Sand is fine to coarse.
		0.60	J		0.40			MADE GROUND - Black sandy gravel. Gravel is fine to coarse of ash, clinker, brick and sandstone.
		1.00		N=11 (4,3/3,3,3,2)	0.65			MADE GROUND - orangish brown sandy gravelly clay. High plasticity. Gravel is fine to coarse angular to sub rounded of limestone and flint.
		1.50	D		0.70			MADE GROUND - Yellowish brown sandy gravel. Gravel is fine to coarse angular to rounded of limestone.
		2.00		N=18 (3,3/4,5,5,4)	2.10			Firm orangish brown sandy gravelly CLAY. Low plasticity. Gravel is fine to medium angular to rounded of flint and limestone.
		2.50	D					Orangish brown clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular to rounded of flint and limestone.
		3.00		N=50 (11,11/12,12,13,13)	3.00			End of borehole at 3.00 m

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 3.00m depth due to refusal and backfilled with arisings.

Borehole Log

Borehole No. **WS3**

Sheet 1 of 1

Project Name: St Mary's Way	Project No. C2522	Co-ords: -	Hole Type WS
Location: Melton Mowbray		Level:	Scale 1:50
Client: Gleeds Building Surveying Ltd		Dates: 01/03/2017 - 01/03/2017	Logged By LB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			MADE GROUND - Reddish brown cobbles. Cobbles are of brick.
		0.40	J		0.15 0.30			MADE GROUND - Yellowish brown sand. Sand is fine to coarse.
		0.70	J		0.70			MADE GROUND - Asphalt concrete.
		0.90 1.00	D	N=12 (3,3/3,3,3,3)	0.90			MADE GROUND - Greryish brown sandy gravel. Gravel is fine to coarse angular to rounded of concrete and mixed lithologies.
		1.50	D					MADE GROUND - Dark grey sandy gravelly clay. High plasticity. Gravel is fine to coarse angular to rounded of brick, concrete, ash and mixed lithologies.
		2.00		N=10 (4,3/3,2,2,3)				Firm orangish brown slightly gravelly sandy CLAY. High plasticity. Gravel is fine to coarse angular to rounded of flint and limestone.
		2.50	D					
		3.00		N=5 (3,2/2,1,1,1)				
		4.00		N=41 (9,7/10,10,11,10)	4.00			Orangish brown slightly clayey very gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular to rounded of flint.
		4.50 4.50	D	50 (25 for 105mm/17,15,18,)	4.50			End of borehole at 4.50 m

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 4.50m depth due to refusal and backfilled with arisings.

Appendix III

Client: Gleeds Building Surveying Ltd	Scale: NTS	Rev.	By	Date	Details	Chkd
	Date: Mar 2017	Drawing Status			INFORMATION	
Project: St Mary's Way, Melton Mowbray	Drawn By: LEB					
	Checked By: LEB					
Title: Site Investigation Layout Plan	HSP Drg. No.: C2522–SK3a	Rev.				

hsp consulting
Lawrence House, Meadowbank Way, Eastwood, Nottingham, NG16 3SB
Tel: 0870 600 6090 www.hspconsulting.com

Appendix IV

LABORATORY REPORT

4043

Contract Number: PSL17/0962

Report Date: 08 March 2017

Client's Reference: C2522

Client Name: HSP Consulting
Lawrence House
4 Meadowbank Way
Eastwood
Nottingham
NG16 3SB

For the attention of: Luke Bradley

Contract Title: St Mary's Way, Melton Mowbray

Date Received: 3/3/2017
Date Commenced: 3/3/2017
Date Completed: 8/3/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson (Director)
A Watkins (Director)
R Berriman (Quality Manager)

L Knight (Senior Technician)
S Royle (Senior Technician)
A Fry (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
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	Top Depth m	Base Depth m	Description of Sample
WS1		D	0.80		Brown very clayey SAND & GRAVEL.
WS1		D	2.50		Brown very gravelly very sandy CLAY.
WS2		D	1.50		Brown very gravelly very sandy CLAY.
WS2		D	2.50		Brown very clayey SAND & GRAVEL.
WS3		D	0.90		Brown gravelly very sandy CLAY.
WS3		D	1.50		Brown gravelly very sandy CLAY.

UKAS TESTING 4043

PSL Professional Soils Laboratory

C2522 - St Mary's Way, Melton Mowbray

Contract No: PSL17/0962

Client Ref:

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS1		D	2.50		17			29	15	14	50	Low plasticity CL.
WS2		D	1.50		13			25	13	12	43	Low plasticity CL.
WS3		D	0.90		17			32	17	15	84	Low plasticity CL.
WS3		D	1.50		14			29	16	13	71	Low plasticity CL.

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

UKAS TESTING 4043

PSL Professional Soils Laboratory

C2522 - St Mary's Way, Melton Mowbray

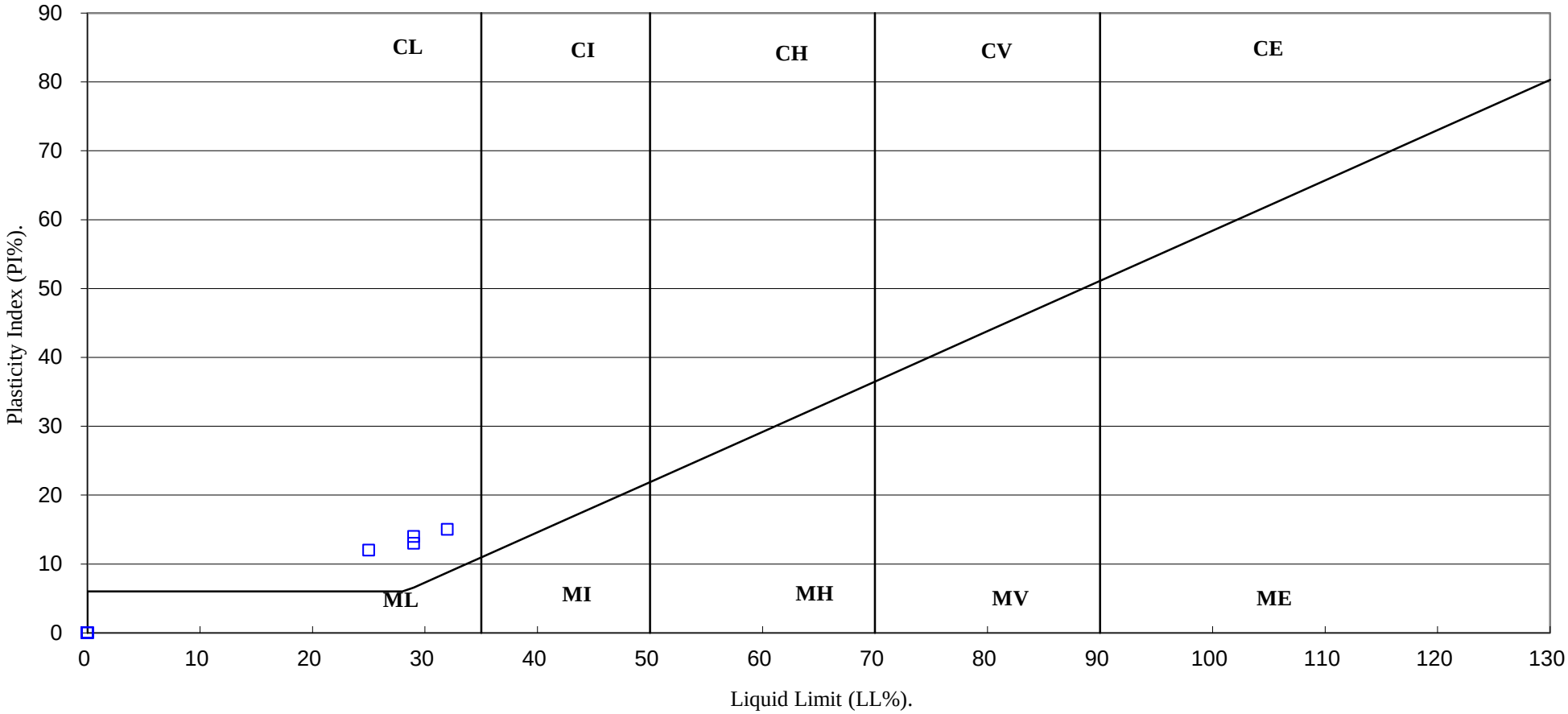
Contract No:

PSL17/0962

Client Ref:

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	C2522 - St Mary's Way, Melton Mowbray	**Contract No:** PSL17/0962
			Client Ref:

PARTICLE SIZE DISTRIBUTION TEST

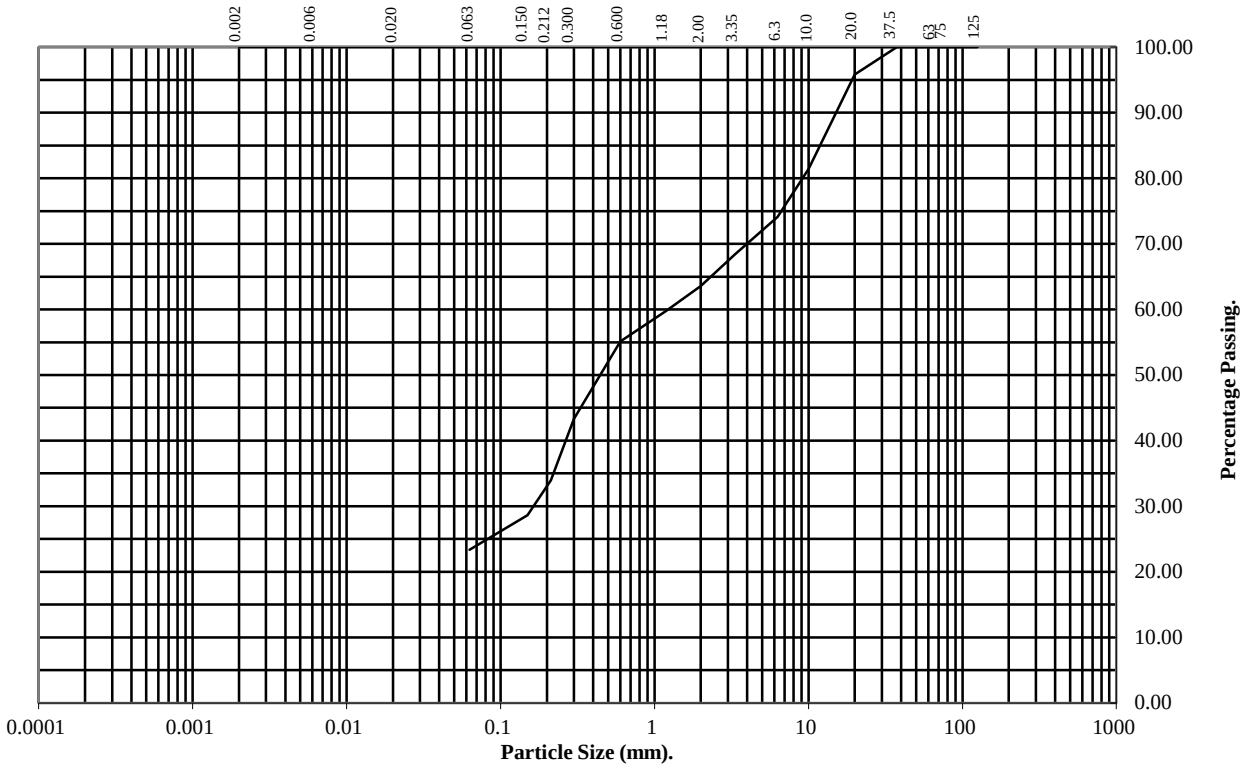
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS1** **Top Depth (m):** **0.80**

Sample Number: **Base Depth(m):**

Sample Type: **D**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	81
6.3	74
3.35	68
2	64
1.18	60
0.6	55
0.3	43
0.212	34
0.15	29
0.063	23

Soil Fraction	Total Percentage
Cobbles	0
Gravel	36
Sand	41
Silt/Clay	23

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

C2522 - St Mary's Way, Melton Mowbray

Contract No:
PSL17/0962
Client Ref:

PARTICLE SIZE DISTRIBUTION TEST

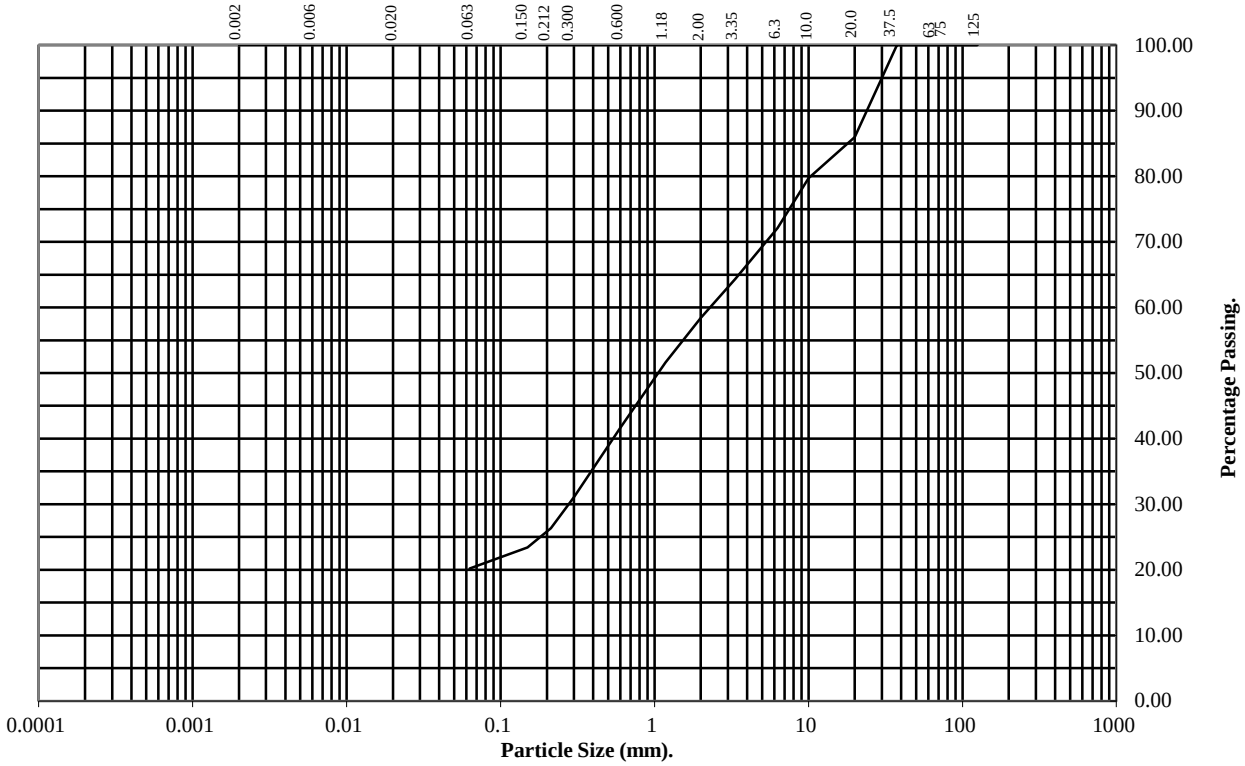
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS1** **Top Depth (m):** **2.50**

Sample Number: **Base Depth(m):**

Sample Type: **D**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	86
10	80
6.3	72
3.35	64
2	58
1.18	52
0.6	42
0.3	31
0.212	26
0.15	23
0.063	20

Soil Fraction	Total Percentage
Cobbles	0
Gravel	42
Sand	38
Silt/Clay	20

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

C2522 - St Mary's Way, Melton Mowbray

Contract No: **PSL17/0962**

Client Ref:

Certificate of Analysis

Certificate Number 17-93578

14-Mar-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-93578

Client Reference PSL17/0962

Order No (not supplied)

Contract Title C2522-ST MARYS WAY, MELTON MOWBRAY

Description 2 Soil samples.

Date Received 07-Mar-17

Date Started 07-Mar-17

Date Completed 14-Mar-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 17-93578
Client Ref PSL17/0962
Contract Title C2522-ST MARYS WAY, MELTON MOWBRAY

			Lab No	1139408	1139409
			Sample ID	WS1	WS2
			Depth	0.80	0.50
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	03/03/17	03/03/17
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10
Inorganics					
pH	DETSC 2008#			9.3	7.9
Chloride Aqueous Extract	DETSC 2055	1	mg/l	13	45
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	540	26
Sulphur as S, Total	DETSC 2320	0.01	%	0.09	0.02
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.27	0.05

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 17-93578
Client Ref PSL17/0962
Contract C2522-ST MARYS WAY, MELTON MOWBRAY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1139408	WS1 0.80 SOIL	03/03/17	PT 500ml		
1139409	WS2 0.50 SOIL	03/03/17	PT 500ml		

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix V

2531

ANALYTICAL TEST REPORT

Contract no:	63670
Contract name:	St Mary's Way
Client reference:	C2522
Clients name:	HSP Consulting
Clients address:	Lawrence House Meadowbank Way Eastwood, Nottingham NG16 3SB
Samples received:	06 March 2017
Analysis started:	06 March 2017
Analysis completed	13 March 2017
Report issued:	13 March 2017

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, without 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:

James Spittle
Customer Services Team Leader

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
63670-1	WS1	0.60	Sandy Clay with Gravel	-	-	12.4
63670-2	WS2	0.30	Sand with Slag & Coal	-	-	6.9
63670-3	WS3	0.40	Sand with Gravel	-	-	7.8

Chemtech Environmental Limited

SOILS

Lab number			63670-1	63670-2	63670-3
Sample id			WS1	WS2	WS3
Depth (m)			0.60	0.30	0.40
Date sampled			01/03/2017	01/03/2017	01/03/2017
Test	Method	Units			
Arsenic (total)	CE127 M	mg/kg As	31	6.9	26
Boron (water soluble)	CE063 M	mg/kg B	1.0	0.6	0.8
Cadmium (total)	CE127 M	mg/kg Cd	<0.2	1.3	<0.2
Chromium (total)	CE127 M	mg/kg Cr	66	27	63
Copper (total)	CE127 M	mg/kg Cu	19	24	17
Lead (total)	CE127 M	mg/kg Pb	42	44	21
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	27	23	24
Selenium (total)	CE127 M	mg/kg Se	0.7	0.6	0.6
Zinc (total)	CE127 M	mg/kg Zn	85	63	66
pH	CE004 M	units	7.9	8.1	11.6
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	27	148	23
Sulphur (free)	CE034 M	mg/kg S	22	35	<10
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1
Cyanide (total)	CE077 M	mg/kg CN	<1	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	0.63	5.20	-
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	1.09	8.97	-
PAH					
Naphthalene	CE087 M	mg/kg	0.07	0.55	0.09
Acenaphthylene	CE087 M	mg/kg	0.06	0.28	0.05
Acenaphthene	CE087 M	mg/kg	0.38	16.98	3.66
Fluorene	CE087 U	mg/kg	0.46	25.52	3.69
Phenanthrene	CE087 M	mg/kg	3.17	148.51	19.28
Anthracene	CE087 U	mg/kg	0.66	140.23	5.12
Fluoranthene	CE087 M	mg/kg	2.99	186.00	20.98
Pyrene	CE087 M	mg/kg	2.33	159.30	16.59
Benzo(a)anthracene	CE087 U	mg/kg	1.35	59.28	10.17
Chrysene	CE087 M	mg/kg	0.84	32.37	6.26
Benzo(b)fluoranthene	CE087 M	mg/kg	0.82	84.44	8.73
Benzo(k)fluoranthene	CE087 M	mg/kg	0.64	65.06	4.12
Benzo(a)pyrene	CE087 U	mg/kg	0.85	123.56	8.88
Indeno(123cd)pyrene	CE087 M	mg/kg	0.37	78.18	6.92
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	27.44	1.79
Benzo(ghi)perylene	CE087 M	mg/kg	0.35	42.00	8.25
PAH (total of USEPA 16)	CE087	mg/kg	15.3	1190	125
TPH					
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01

Chemtech Environmental Limited

SOILS

Lab number			63670-1	63670-2	63670-3
Sample id			WS1	WS2	WS3
Depth (m)			0.60	0.30	0.40
Date sampled			01/03/2017	01/03/2017	01/03/2017
Test	Method	Units			
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	17	4
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	10	660	66
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	5	470	47
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	42	8
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	20	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	9	226	31
EPH Aliphatic (>C16-C35)	CE068	mg/kg	95	3645	290
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	492	67
Subcontracted analysis					
Asbestos (qualitative)	$	-	NAD	NAD	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
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE034	Sulphur (free)	Solvent extraction, HPLC	Dry	M	10	mg/kg S
CE079	Sulphide	Extraction, Continuous Flow Colorimetry	Wet		10	mg/kg S^{2-}
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		1	mg/kg CN
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	Wet	M	1	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
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	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	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.

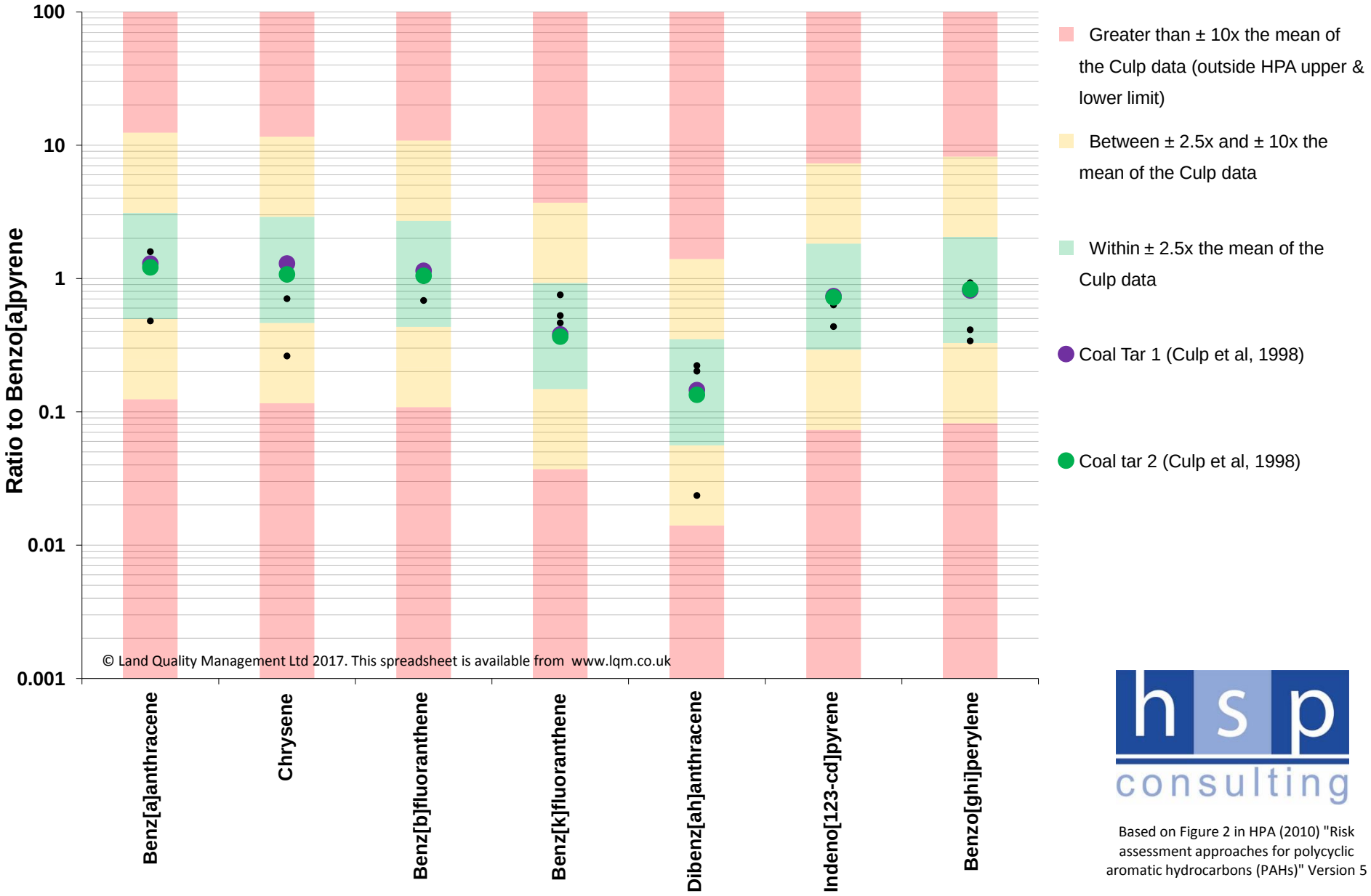
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
63670-1	WS1	0.60	N	
63670-2	WS2	0.30	N	
63670-3	WS3	0.40	N	

Z:\Environmental and Geotech\TECHNICAL LIBARY\Contaminated Land Refs\LQM PAH Profiling Tool 30.06.15\HSP PAH profiling v1.3 FULL



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hsp consulting

Based on Figure 2 in HPA (2010) "Risk assessment approaches for polycyclic aromatic hydrocarbons (PAHs)" Version 5

Appendix VI

HazWasteOnline™

Waste Classification Report

ZAKGN-SEJCK-LXCR7

Job name

C2522 - St Mary's Way

Description/Comments

Project

Site

Waste Stream Template

Contaminated Soils Chemtest Determinand Order

Classified by

Name:
Luke Bradley
Date:
3/14/2017 3:02:31 PM UTC
Telephone:
01773 535555

Company:
HSP Consulting
Lawrence House
4 Meadowbank Way, Eastwood
Nottingham
NG16 3SB

Report

Created by: Luke Bradley
Created date: 3/14/2017 15:02 UTC

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	WS1 0.60m		Potentially Hazardous	HP 3(i)	2
2	WS2 0.30m		Hazardous	HP 3(i), HP 7, HP 11, HP 14	4
3	WS3 0.40m		Hazardous	HP 3(i), HP 8	7

Classification of sample: WS1 0.60m

Potentially Hazardous Waste
Classified as **17 05 04** or **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
WS1 0.60m
Sample Depth:
0 m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 or 17 05 03 * (Soil and stones other than those mentioned in 17 05 03 or Soil and stones containing hazardous substances)

Hazard properties (substances considered hazardous until shown otherwise)

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0119%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	pH			PH		7.9	pH		7.9	pH	7.9 pH		
2	boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		1	mg/kg	13.43	13.43	mg/kg	0.00134 %		
3	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		31	mg/kg	1.32	40.93	mg/kg	0.00409 %		
4	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		66	mg/kg	1.46	96.463	mg/kg	0.00965 %		
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		19	mg/kg	1.13	21.392	mg/kg	0.00214 %		
6	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]		27	mg/kg	1.58	42.646	mg/kg	0.00426 %		
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	42	mg/kg	1.56	65.512	mg/kg	0.0042 %		
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.7	mg/kg	2.55	1.788	mg/kg	0.000179 %		
9	zinc { zinc chromate }	024-007-00-3				85	mg/kg	2.77	235.802	mg/kg	0.0236 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
10		TPH (C6 to C40) petroleum group		TPH		119	mg/kg		119	mg/kg	0.0119 %		
11		naphthalene				0.07	mg/kg		0.07	mg/kg	0.000007 %		
		601-052-00-2	202-049-5	91-20-3									
12		acenaphthylene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
			205-917-1	208-96-8									
13		acenaphthene				0.38	mg/kg		0.38	mg/kg	0.000038 %		
			201-469-6	83-32-9									
14		fluorene				0.46	mg/kg		0.46	mg/kg	0.000046 %		
			201-695-5	86-73-7									
15		phenanthrene				3.17	mg/kg		3.17	mg/kg	0.000317 %		
			201-581-5	85-01-8									
16		anthracene				0.66	mg/kg		0.66	mg/kg	0.000066 %		
			204-371-1	120-12-7									
17		fluoranthene				2.99	mg/kg		2.99	mg/kg	0.000299 %		
			205-912-4	206-44-0									
18		pyrene				2.33	mg/kg		2.33	mg/kg	0.000233 %		
			204-927-3	129-00-0									
19		benzo[a]anthracene				1.35	mg/kg		1.35	mg/kg	0.000135 %		
		601-033-00-9	200-280-6	56-55-3									
20		chrysene				0.84	mg/kg		0.84	mg/kg	0.000084 %		
		601-048-00-0	205-923-4	218-01-9									
21		benzo[b]fluoranthene				0.82	mg/kg		0.82	mg/kg	0.000082 %		
		601-034-00-4	205-911-9	205-99-2									
22		benzo[k]fluoranthene				0.64	mg/kg		0.64	mg/kg	0.000064 %		
		601-036-00-5	205-916-6	207-08-9									
23		benzo[a]pyrene; benzo[def]chrysene				0.85	mg/kg		0.85	mg/kg	0.000085 %		
		601-032-00-3	200-028-5	50-32-8									
24		indeno[123-cd]pyrene				0.37	mg/kg		0.37	mg/kg	0.000037 %		
			205-893-2	193-39-5									
25		benzo[ghi]perylene				0.35	mg/kg		0.35	mg/kg	0.000035 %		
			205-883-8	191-24-2									
										Total:	0.0629 %		

Key

	User supplied data
	Potentially Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS2 0.30m

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS2 0.30m	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	
0 m	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
Moisture content:	
0% (no correction)	

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.557%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.557%)

HP 14: Ecotoxic "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Risk phrases hit:

R52/53 "Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment"

Because of determinands:

benzo[a]anthracene: (conc.: 0.00593%)
dibenz[a,h]anthracene: (conc.: 0.00274%)

Hazard properties (substances considered hazardous until shown otherwise)

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.557%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		pH				8.1	pH		8.1	pH	8.1 pH		
				PH									
2		boron { boron tribromide/trichloride/trifluoride (combined) }				0.6	mg/kg	13.43	8.058	mg/kg	0.000806 %		
				10294-33-4, 10294-34-5, 7637-07-2									
3		arsenic { arsenic trioxide }				6.9	mg/kg	1.32	9.11	mg/kg	0.000911 %		
		033-003-00-0	215-481-4	1327-53-3									
4		cadmium { cadmium sulfide }			1	1.3	mg/kg	1.29	1.671	mg/kg	0.00013 %		
		048-010-00-4	215-147-8	1306-23-6									
5		chromium in chromium(III) compounds { chromium(III) oxide }				27	mg/kg	1.46	39.462	mg/kg	0.00395 %		
			215-160-9	1308-38-9									
6		copper { dicopper oxide; copper (I) oxide }				24	mg/kg	1.13	27.021	mg/kg	0.0027 %		
		029-002-00-X	215-270-7	1317-39-1									
7		nickel { nickel dihydroxide }				23	mg/kg	1.58	36.328	mg/kg	0.00363 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
8		lead { lead chromate }			1	44	mg/kg	1.56	68.632	mg/kg	0.0044 %		
		082-004-00-2	231-846-0	7758-97-6									
9		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.6	mg/kg	2.55	1.532	mg/kg	0.000153 %		
		034-002-00-8											
10		zinc { zinc chromate }				63	mg/kg	2.77	174.771	mg/kg	0.0175 %		
		024-007-00-3											
11		TPH (C6 to C40) petroleum group				5572	mg/kg		5572	mg/kg	0.557 %		
				TPH									
12		naphthalene				0.55	mg/kg		0.55	mg/kg	0.000055 %		
		601-052-00-2	202-049-5	91-20-3									
13		acenaphthylene				0.28	mg/kg		0.28	mg/kg	0.000028 %		
			205-917-1	208-96-8									
14		acenaphthene				16.98	mg/kg		16.98	mg/kg	0.0017 %		
			201-469-6	83-32-9									
15		fluorene				25.52	mg/kg		25.52	mg/kg	0.00255 %		
			201-695-5	86-73-7									
16		phenanthrene				148.51	mg/kg		148.51	mg/kg	0.0149 %		
			201-581-5	85-01-8									
17		anthracene				140.23	mg/kg		140.23	mg/kg	0.014 %		
			204-371-1	120-12-7									
18		fluoranthene				186	mg/kg		186	mg/kg	0.0186 %		
			205-912-4	206-44-0									
19		pyrene				159.3	mg/kg		159.3	mg/kg	0.0159 %		
			204-927-3	129-00-0									
20		benzo[a]anthracene				59.28	mg/kg		59.28	mg/kg	0.00593 %		
		601-033-00-9	200-280-6	56-55-3									
21		chrysene				32.37	mg/kg		32.37	mg/kg	0.00324 %		
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene				84.44	mg/kg		84.44	mg/kg	0.00844 %		
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene				65.06	mg/kg		65.06	mg/kg	0.00651 %		
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene				123.56	mg/kg		123.56	mg/kg	0.0124 %		
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene				78.18	mg/kg		78.18	mg/kg	0.00782 %		
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene				27.44	mg/kg		27.44	mg/kg	0.00274 %		
		601-041-00-2	200-181-8	53-70-3									

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
27		benzo[ghi]perylene				42 mg/kg		42 mg/kg	0.0042 %		
			205-883-8	191-24-2							
								Total:	0.71 %		

Key

	User supplied data
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS3 0.40m

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
WS3 0.40m
Sample Depth:
0 m
Moisture content:
0%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 8: Corrosive "waste which on application can cause skin corrosion"

Risk phrases hit:

pH; pH "Assumed to be irritant/corrosive because of pH value"

Because of determinand:

pH: (conc.: 11.6 pH)

Hazard properties (substances considered hazardous until shown otherwise)

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0513%)

Determinands

Moisture content: 0% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	pH			PH		11.6 pH		11.6 pH	11.6 pH		
2	boron { boron tribromide/trichloride/trifluoride (combined) }			10294-33-4, 10294-34-5, 7637-07-2		0.8 mg/kg	13.43	10.744 mg/kg	0.00107 %		
3	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		26 mg/kg	1.32	34.328 mg/kg	0.00343 %		
4	chromium in chromium(III) compounds { chromium(III) oxide }		215-160-9	1308-38-9		63 mg/kg	1.46	92.078 mg/kg	0.00921 %		
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17 mg/kg	1.13	19.14 mg/kg	0.00191 %		

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
6		nickel { nickel dihydroxide }				24	mg/kg	1.58	37.908	mg/kg	0.00379 %		
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
7		lead { lead chromate }			1	21	mg/kg	1.56	32.756	mg/kg	0.0021 %		
		082-004-00-2	231-846-0	7758-97-6									
8		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.6	mg/kg	2.55	1.532	mg/kg	0.000153 %		
		034-002-00-8											
9		zinc { zinc chromate }				66	mg/kg	2.77	183.094	mg/kg	0.0183 %		
		024-007-00-3											
10		TPH (C6 to C40) petroleum group				513	mg/kg		513	mg/kg	0.0513 %		
				TPH									
11		naphthalene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
		601-052-00-2	202-049-5	91-20-3									
12		acenaphthylene				0.05	mg/kg		0.05	mg/kg	0.000005 %		
			205-917-1	208-96-8									
13		acenaphthene				3.66	mg/kg		3.66	mg/kg	0.000366 %		
			201-469-6	83-32-9									
14		fluorene				3.69	mg/kg		3.69	mg/kg	0.000369 %		
			201-695-5	86-73-7									
15		phenanthrene				19.28	mg/kg		19.28	mg/kg	0.00193 %		
			201-581-5	85-01-8									
16		anthracene				5.12	mg/kg		5.12	mg/kg	0.000512 %		
			204-371-1	120-12-7									
17		fluoranthene				20.98	mg/kg		20.98	mg/kg	0.0021 %		
			205-912-4	206-44-0									
18		pyrene				16.59	mg/kg		16.59	mg/kg	0.00166 %		
			204-927-3	129-00-0									
19		benzo[a]anthracene				10.1	mg/kg		10.1	mg/kg	0.00101 %		
		601-033-00-9	200-280-6	56-55-3									
20		chrysene				6.26	mg/kg		6.26	mg/kg	0.000626 %		
		601-048-00-0	205-923-4	218-01-9									
21		benzo[b]fluoranthene				8.73	mg/kg		8.73	mg/kg	0.000873 %		
		601-034-00-4	205-911-9	205-99-2									
22		benzo[k]fluoranthene				4.12	mg/kg		4.12	mg/kg	0.000412 %		
		601-036-00-5	205-916-6	207-08-9									
23		benzo[a]pyrene; benzo[def]chrysene				8.88	mg/kg		8.88	mg/kg	0.000888 %		
		601-032-00-3	200-028-5	50-32-8									
24		indeno[123-cd]pyrene				6.92	mg/kg		6.92	mg/kg	0.000692 %		
			205-893-2	193-39-5									
25		dibenz[a,h]anthracene				1.79	mg/kg		1.79	mg/kg	0.000179 %		
		601-041-00-2	200-181-8	53-70-3									
26		benzo[ghi]perylene				8.25	mg/kg		8.25	mg/kg	0.000825 %		
			205-883-8	191-24-2									
										Total:	0.104 %		

Key

	User supplied data
	Hazardous result
	Potentially Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 5/25/2015
Risk Phrases: None.
Hazard Statements: None.

boron tribromide/trichloride/trifluoride (combined) (CAS Number: 10294-33-4, 10294-34-5, 7637-07-2)

Conversion factor: 13.43
Description/Comments: Combines the hazard statements and the average of the conversion factors for boron tribromide, boron trichloride and boron trifluoride
Data source: N/A
Data source date: 8/6/2015
Risk Phrases: R14 , T+ R26/28 , C R34 , C R35
Hazard Statements: EUH014 , Acute Tox. 2 H330 , Acute Tox. 2 H300 , Skin Corr. 1A H314 , Skin Corr. 1B H314

chromium(III) oxide (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462
Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R20 , R22 , R36 , R37 , R38 , R42 , R43 , R50/53 , R60 , R61
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

dicopper oxide; copper (I) oxide (EC Number: 215-270-7, CAS Number: 1317-39-1)

CLP index number: 029-002-00-X
Data source: Regulation (EU) 2016/1179 of 19 July 2016 (ATP9)
Additional Risk Phrases: N R50/53 , N R50/53 >= 0.25 %
Additional Hazard Statement(s): None.
Reason for additional Hazards Statement(s)/Risk Phrase(s):
10/10/2016 - N R50/53 risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases
10/10/2016 - N R50/53 >= 0.25 % risk phrase sourced from: WM3 v1 still uses ecotoxic risk phrases

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 5/25/2015
Risk Phrases: R10 , R45 , R46 , R51/53 , R63 , R65
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R22 , R26 , R27 , R36 , R37 , R38
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R36 , R37 , R38 , N R50/53 , N R51/53
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/6/2015
Risk Phrases: N R50/53
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/6/2015
Risk Phrases: R22 , R36 , R37 , R38 , R40 , R43 , N R50/53
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/17/2015
Risk Phrases: R36 , R37 , R38 , R43 , N R50/53
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/21/2015
Risk Phrases: Xn R22 , N R50/53
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/21/2015
Risk Phrases: Xi R36/37/38 , N R50/53
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 8/6/2015
Risk Phrases: R40
Hazard Statements: Carc. 2 H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 7/23/2015
Risk Phrases: N R50/53
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

Appendix B: Rationale for selection of metal species

boron {boron tribromide/trichloride/trifluoride (combined)}

Worst case species based on hazard statements

arsenic {arsenic trioxide}

Worst case species based on hazard statements

chromium in chromium(III) compounds {chromium(III) oxide}

Worst case species based on hazard statements

copper {dicopper oxide; copper (I) oxide}

Most likely common species

nickel {nickel dihydroxide}

Worst case species based on hazard statements

lead {lead chromate}

Worst case species based on hazard statements

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on hazard statements

zinc {zinc chromate}

Worst case species based on hazard statements

cadmium {cadmium sulfide}

Worst case species based on hazard statements

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition, May 2015
HazWasteOnline Classification Engine Version: 2017.55.3206.6376 (24 Feb 2017)
HazWasteOnline Database: 2017.55.3206.6376 (24 Feb 2017)

This classification utilises the following guidance and legislation:
WM3 - Waste Classification - May 2015
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010