



Phase II Ground Investigation Report

at

**Rivermead Leisure Centre, Richfield Avenue,
Reading, Berkshire RG1 8EQ**

for

Reading Borough Council

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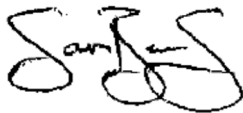
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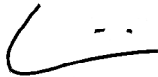
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Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.



Commission

Soils Limited was commissioned by Reading Borough Council to undertake a Phase II Ground Investigation on land at Rivermead Leisure Centre, Richfield Avenue, Reading, Berkshire RG1 8EQ. The scope of the investigation was outlined in the Soils Limited quotation reference Q16824 dated 7th September 2015.

This document comprises the Phase II Ground Investigation Report and incorporates the results, discussion and conclusions to this intrusive works.

This Phase II report must be read in conjunction with the Phase I Desk Study undertaken on the above site by Soils Limited, Report ref: 15225, dated October 2015.

Standards

The geotechnical laboratory testing was performed by GEO Site & Testing Services Ltd (GSTL) in accordance with the methods given in BS 1377:1990 Parts 1 to 8 and their UKAS accredited test methods.

For the preparation of this report, the relevant BS code of practice was adopted for the geotechnical laboratory testing technical specifications, in the absence of the relevant Eurocode specifications (ref: ISO TS 17892).

The chemical analyses were undertaken by QTS Environmental Limited in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce a trial hole.

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Section I Introduction

I.1 Objective of Investigation

Soils Limited was commissioned by Reading Borough Council to undertake a Phase II Ground Investigation to supply the client and their designers with information regarding ground conditions, to assist in preparing a foundation scheme for development that was appropriate to the settings present on the site.

The investigation was to be undertaken to provide comment on appropriate foundation options for the proposed residential development. The investigation was to be made by means of in-situ testing and geotechnical laboratory testing undertaken on soil samples taken from the trial holes.

Soil samples were taken for chemical laboratory testing to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any contamination identified as dictated by the Conceptual Site Model (CSM) in the Phase I Desk Study undertaken for the site by Soils Limited (Report ref: 15225/DS, October 2015) and any revision to the Conceptual Site Model discussed in Section 5.1 of this Phase II report.

I.2 Location

The site was located at Rivermead Leisure Centre, Richfield Avenue, Reading, Berkshire RG1 8EQ and had an approximate O.S. Land Ranger Grid Reference of SU 706 746.

The site location plan is given in Figure 1.

I.3 Site Description

At the time of the investigation, the site comprised open fields next to the existing leisure centre, with a water slide from the adjacent building protruding into the site area. The site was covered by grass with occasional young to mature trees noted to the boundaries. The site was bounded by open fields to the north, east and west, with the leisure centre immediately south. The surrounding area comprised open land to the north and west, with recreational land-use to the south and east. Residential land-use was noted further north, across the River Thames and commercial and industrial land-use noted further south. The site had a gentle down gradient from south to north, towards the River Thames.

An aerial photograph has been included in Figure 2.

I.4 Proposed Development

The proposed development comprised the construction of two indoor swimming pools at ground level, associated boiler room, storage and some redevelopment of current

facilities and changing areas.

In compiling this report reliance was placed on drawing number 15-132, dated June 2015 and was prepared by Clive Carruthers Architecture and Planning. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

The proposed development layout as provided by the client is included within Appendix F.

1.5 Anticipated Geology

The 1:50,000 BGS map showed the site to be situated on the bedrock of the Seaford Chalk Member with the superficial deposits of the Langley Silt Member overlying. The Kempton Park Gravel maybe present between the Seaford Chalk Member and the Langley Silt Member, and Alluvium is also recorded in close proximity to the site.

1.5.1 Alluvium (100m N)

Alluvium is the most recent river or estuarine deposit and generally comprises silty clays usually with an appreciable organic content. Lenses of sand and gravel are also commonly found, as are pockets of peat.

1.5.2 Langley Silt Member

The Langley Silt Member, formerly known as Brickearth, comprises a geologically recent deposit of brown structureless sandy clay of limited thickness that is usually associated with the underlying River Terrace Gravels. Its name is derived from its former use in the manufacture of bricks.

The name Langley Silt Member has been applied to sandy superficially deposited soils of differing origins covering soliflucted deposits, stratified estuarine deposits and colluvial sediments. The name Langley Silt has been applied to the deposits that are thought to be in their original position.

1.5.3 Kempton Park Gravel

The rivers of the south-east of England, including the River Thames and its tributaries, have been subject to at least three changes of level since Pleistocene times. One result has been the formation of a complex series of River Terrace Gravels. These terraces represent ancient floodplain deposits that became isolated as the river cut downwards to lower levels. The Kempton Park Gravel is found at an elevation below the current river. The composition of the River Terrace Gravel varies greatly, depending on the source material available in the river's catchment. Deposits generally consist of sands and gravels of roughly bedded flint or chert commonly in a matrix of silt or clay.

1.5.4 Seaford Chalk Formation

Seaford Chalk Formation can be described as firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are large to very large.

Occasional erosional features, such as pipes, swallow holes and solution cavities, usually in-filled with drift deposits, are found in the chalk. The features sometimes manifest themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse.

1.6 Limitations and Disclaimers

This Phase II Ground Investigation Report relates to the site located at Rivermead Leisure Centre, Richfield Avenue, Reading, Berkshire RG1 8EQ and was prepared for the sole benefit of Reading Borough Council (The “Client”). The report was prepared solely for the brief described in Section 1.1 of this report.

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given

remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot by plot basis prior to the construction of foundations. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data on any trees, bushes or shrubs removed prior to or following the site survey.

Where trees are mentioned in the text this means existing trees, substantial bushes or shrubs, recently removed trees (approximately 20 years to full recovery on cohesive soils) and those planned as part of the site landscaping).

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. "Contaminated Land" is defined in Section 57 of the Environment Act 1995 as:

"Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused".

The investigation, analysis or recommendations in respect of contamination are made solely in respect of the prevention of harm to vulnerable receptors, using where possible best practice at the date of preparation of the report. The investigation and report do not address, define or make recommendations in respect of environmental liabilities. A separate environmental audit and liaison with statutory authorities is required to address these issues.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets remains with Soils Limited. License is for the sole use of the client and may not be assigned, transferred or given to a third party.

Section 2 Site Works

2.1 Proposed Project Works

The proposed intrusive investigation was designed to provide information on the ground conditions and to aid the design of foundations for the proposed leisure centre development. The intended investigation, as outlined within the Soils Limited quotation (Q16824 dated 7th September 2015), was therefore to comprise the following items:

- 8No. windowless sampler boreholes and dynamic probes (DPSH);
- 2No. 15m deep cable percussive boreholes;
- Installation and monitoring of 3No. 5m Deep soil gas / groundwater monitoring wells;
- Groundwater sampling;
- Geotechnical laboratory testing;
- Contamination laboratory testing.

2.1.1 Actual Project Works

The actual project works were undertaken on 30th September and 1st October 2015 and comprised:

- 8No. windowless sampler boreholes (WS1 to WS8);
- 2No. 15m deep cable percussive boreholes (BH1 and BH2);
- 4No. dual purpose groundwater/gas monitoring wells (WS1, WS2, WS4 and WS6);
- 8No. dynamic probes (DPSH) (DP1 to DP8);
- Geotechnical laboratory testing;
- Contamination laboratory testing.

Four windowless sampler boreholes (WS1, WS2, WS4 and WS6) were backfilled with gravel and bentonite following the installation of monitoring wells, which comprised a 25mm HDPE pipe with slotted response zone, gas tap assembly and stopcock cover. Two cable percussive boreholes and four windowless sampler boreholes (WS3, WS5, WS7 to WS8) were backfilled with arising's. All trial hole locations have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub sampled so that samples could be sent to the laboratory for both contamination and geotechnical testing.

2.2 Ground Conditions

On 30th September and 1st October 2015 eight windowless sampler boreholes (WS1 to WS8) were drilled using a Premier Compact 110 windowless sampler and super heavy dynamic probe rig, to depths ranging between 3.00 and 5.00m below ground level (bgl) at locations selected by Soils Limited using a development plan provided by the client. Two boreholes (BH1 and BH2) were drilled using a Dando light cable percussive rig, to a depth of 15.45m below ground level (bgl) at locations selected by Soils Limited using a

development plan provided by the client. Eight dynamic probes, super heavy, (DP1 to DP8) were driven prior and adjacent to their corresponding windowless sampler borehole to a depth of 8.00m bgl. Four standpipes were installed within window sample borehole locations (WS1, WS2, WS4 and WS6) to allow for continued monitoring of both groundwater and soils gas, where present. The maximum depths of trial holes have been included in Table 2.1.

All trial holes were scanned with a Cable Avoidance Tool (C.A.T.) and GENNY prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Trial Holes

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
BH1	15.45	WS8	5.00
BH2	15.45	DPI	8.00
WS1 (w)	4.00	DP2	8.00
WS2 (w)	4.00	DP3	8.00
WS3	5.00	DP4	8.00
WS4 (w)	3.00	DP5	8.00
WS5	4.00	DP6	8.00
WS6 (w)	5.00	DP7	8.00
WS7	5.00	DP8	8.00

Note: w - well installation

The approximate trial hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the trial hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots, or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference should be made to the detailed records given within Appendix A, but for the purposes of discussion, the succession of conditions encountered in the trial holes in descending order can be summarised:

Made Ground/Topsoil (MG/TS)
Kempton Park Gravel (KPGR)
Seaford and Newhaven Chalk Formation (SNCK)

The ground conditions encountered in the trial holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Age	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
MG/TS	Recent	G.L.	3.8 – 4.80	4.00 (where proven)	TS: Grass over dark brown sandy SILT with frequent roots and rootlets. MG: Dark brown becoming bluish grey sandy gravelly SILT with occasional roots and rootlets. Locally organic and with fragments of glass, tiles, slate, carbonised material, brick and tarmacadam. Gravel is fine to coarse sub-angular flint and sandstone. Decomposing material (landfill waste) also noted in most locations.
KPGR	Devensian	3.80–4.80	4.00 ¹ –8.50	Not Proven ²	Dark greenish yellow clayey sandy fine to medium sub-angular flint GRAVEL. Sand is medium to coarse.
SNCK	Coniacian to Campanian	7.80–8.50	15.45 ¹	Not Proven ²	Off white moderately weak CHALK with occasional flints.
Note: ¹ Final depth of trial hole ² Base of strata not encountered					

2.3 Ground Conditions Encountered in Trial Holes

The ground conditions encountered in trial holes have been described below in descending order.

2.3.1 Made Ground and Topsoil

Soils described as Topsoil were encountered in three of the ten trial holes (BH1, BH2 and WS1) from ground level to depths ranging from 0.10 to 0.40m bgl. The Topsoil comprised grass over dark brown sandy SILT with frequent roots and rootlets. The depth of Topsoil has been included in Table 2.3.

Soils described as Made Ground were encountered in each of the ten trial holes, underlying the Topsoil (BH1, BH2 and WS1) and from ground level to depths ranging between 3.00 (base of WS4) and 4.80m bgl (WS7 and WS8). The Made Ground typically comprised dark brown becoming bluish grey sandy gravelly SILT with occasional roots and rootlets. Locally organic and with fragments of glass, tiles, slate, carbonised material, brick and tarmacadam. Gravel is fine to coarse sub-angular flint and sandstone. Decomposing material (landfill waste) also noted in most locations. Both WS4 and WS5 terminated within the Made Ground, so its depth was not established in these locations. The depths of Made Ground have been included in Table 2.3.

Table 2.3 Final Depth of Made Ground/Topsoil

Trial Hole	Strata	Depth (m bgl)
BH1	TS/MG	0.30 / 4.50
BH2	TS/MG	0.40 / 4.50
WS/DPI	TS/MG	0.10 / 3.80
WS/DP2	MG	3.80
WS/DP3	MG	4.70
WS/DP4	MG	3.00 ¹
WS/DP5	MG	4.00 ¹
WS/DP6	MG	4.40
WS/DP7	MG	4.80
WS/DP8	MG	4.80

Note: ¹ Final depth of trial hole

2.3.2 Kempton Park Gravel

Soils described as the Kempton Park Gravel were encountered in eight out of the ten trial holes directly below the Topsoil/Made Ground and persisted to depths ranging between 4.00 and 8.50m bgl. The Kempton Park Gravel typically comprised dark greenish yellow clayey sandy fine to medium sub-angular flint GRAVEL. Sand is medium to coarse. All of the windowless sampler boreholes, except WS4 and WS5, terminated within the Kempton Park Gravel, so its depth was not established in these locations. The depth of Kempton Park Gravel has been included in Table 2.4.

Table 2.4 Final Depth of Kempton Park Gravel

Trial Hole	Depth (m bgl)
BH1	7.80
BH2	8.50
WS/DPI	4.00 ¹
WS/DP2	4.00 ¹
WS/DP3	5.00 ¹
WS/DP4	Not encountered
WS/DP5	Not encountered
WS/DP6	5.00 ¹
WS/DP7	5.00 ¹
WS/DP8	5.00 ¹

Note: ¹ Final depth of trial hole

2.3.3 Seaford and Newhaven Chalk Formation

Soils described as Seaford and Newhaven Chalk Formation were encountered in two out of the ten trial holes from depths of 7.80 and 8.50m bgl, respectively. The Seaford and Newhaven Chalk Formation was observed to the full depth of investigation, when encountered. The Seaford and Newhaven Chalk Formation typically comprised off white moderately weak CHALK with occasional flints.

2.4 Roots

Roots were encountered in eight out of the ten trial holes at depths ranging between 0.50 and 3.00m bgl, the base of WS4. As such the final depth of roots in this location was not established. The depths of root penetration have been included in Table 2.5.

Table 2.5 Depth of Root Penetration

Trial Hole	Depth (m bgl)
BH1	Not Encountered
BH2	Not Encountered
WS1	2.00
WS2	2.60
WS3	2.70
WS4	3.00 ¹
WS5	1.00
WS6	0.50
WS7	0.80
WS8	1.30

Note: ¹ Final depth of trial hole

Mature trees were noted to the southeast of the site, and occasional semi-mature trees to the north and west. Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that may have been removed both within the site and its close environs.

2.5 Groundwater

Groundwater was encountered within five trial holes and was struck at a depths ranging between 2.00 and 3.00m bgl. Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in September and October (2015), when groundwater levels should be around their annual minimum (lowest) elevation.

Further groundwater monitoring was conducted within the standpipes installed on site following completion of site works and has been presented in Table 2.6.

Table 2.6 Groundwater Monitoring

Trial Hole	Depth to Water (m bgl)		
	15/10/15	29/10/15	4/11/15
WS1	2.00	1.94	1.92
WS2	2.23	2.18	2.15
WS4	Dry*	Dry*	Dry*
WS6	2.18	2.18	2.60

Note: *base of borehole recorded at 1.70m bgl

Water levels were fairly consistent where recorded, suggesting they do represent groundwater rather than perched water, which may be expected in significant thickness of Made Ground such as this.

Section 3 Discussion of Geotechnical In – Situ and Laboratory Testing

3.1 Standard Penetration Tests

Standard Penetration Tests (SPTs) were undertaken in BH1 and BH2 with an interpretation of the results presented in Table 3.3.

SPT tests involve the driving of a metal cone or split spoon sampler into the ground via a series of steel rods. These rods are driven from the surface by a hammer system that lifts and drops a 63.5kg weight onto the top of the rods through a set height, thus ensuring a consistent energy input. The test comprises the lowering of the SPT assembly and extension rods to the desired test depth within the exploratory hole. The drop weight is added to the string and activated, driving the SPT assembly into the ground. During the test, the number of blows for two increments of 75mm, or the penetration of the tool after 25 blows will be recorded as the "seating drive". After the seating drive, the number of blows required for each of four increments of 75mm penetration is recorded. The test will be terminated when a total penetration of 450mm has occurred or if a total of 50 blows are recorded.

The relative density of granular soils was classified based of the relationship given in Table 3.1 3.1.

Table 3.1 SPT "N" Blow Count Granular Classification

Classification	SPT "N" blow count (blows/300mm)
Very loose	0 to 4
Loose	4 to 10
Medium dense	10 to 30
Dense	30 to 50
Very dense	Greater than 50

(Ref: The Standard Penetration Test (SPT): Methods and Use, CIRIA Report 143, 1995)

The *UK National Annex to Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing*, NA 3.7 SPT test, BS EN 1997-2:2007, Annex F states "Relative density descriptions on borehole records should also be based on uncorrected SPT N values, unless significantly disturbed, using the density classification in BS 5930:1999+A1, Table 13.

It is difficult to assess an accurate chalk grade for the Seaford and Newhaven Chalk Formation in accordance with CIRIA C574 'Engineering in Chalk' as the chalk samples recovered are disturbed by the drilling process.

In the absence of a standardised correlation between SPT N values and chalk grade for the most recent chalk classification (CIRIA C574) a broad indication of the in-situ grade of the Seaford and Newhaven Chalk Formation can be assessed using a paper by T.R.M. Wakeling from a site in Mundford, Norfolk which compares SPT N values to the old Spink & Norbury chalk classification. From the Spink & Norbury classification it is

possible to infer a basic CIRIA Grade (structureless or structured). Table 3.2 provides this broad comparison.

Table 3.2 Interpretation of SPT N Blow Counts in Chalk

SPT N Value Range	Spink & Norbury Grade	Inferred CIRIA Grade
<8	VI	Structureless (Dm)
8 – 15	V	Structureless (Dc)
15 – 20	IV	Structured chalk (C5 – A1)
20 - 25	III	Structured chalk (C5 – A1)
25 - 35	II	Structured chalk (C5 – A1)
>35	I	Structured chalk (C5 – A1)

An interpretation of the SPT 'N' blow counts are given in Table 3.3.

Table 3.3 Interpretation of SPT Tests

BH	Strata	SPT N Blow Counts	Inferred Relative Density / Inferred CIRIA Grade
BH1	KPGR 4.50 – 7.80 Clayey sandy GRAVEL	15 – 24	Medium dense
	SNCK 7.80 – 12.00 CHALK with flints	4 – 6	Structureless (Dm)
	SNCK 12.00 – 15.45 CHALK with flints	17 – 34	Structured chalk
	KPGR 4.50 – 8.50 Clayey sandy GRAVEL	16 – 24	Medium dense
	SNCK 8.50 – 10.50 CHALK with flints	7	Structureless (Dm)
BH2	SNCK 10.50 – 15.00 CHALK with flints	9 – 14	Structureless (Dc)
	SNCK 15.00 – 15.45 CHALK with flints	22	Structured chalk

The results from SPT analysis inferred that the relative density of the granular soils of the Kempton Park Gravel was **medium dense**, which were inferred from the correlations explained in Table 3.1.

The results from SPT analysis inferred that the Seaford and Newhaven Chalk Formation ranged between **structureless (Dm) to structured (C5 – A1)**, becoming structured with depth, which was inferred from the correlations explained in Table 3.2.

3.2 Dynamic Probe Tests

Dynamic probing (DPSH) was undertaken at eight locations (DP1 to DP8) adjacent and prior to the drilling of the respective windowless sampler boreholes, to depths of 8.00m bgl.

Dynamic probing involves the driving of a metal cone into the ground via a series of steel rods. These rods are driven from the surface by a hammer system that lifts and drops a 63.5kg hammer onto the top of the rods through a set height, thus ensuring a consistent energy input. The number of hammer blows that are required to drive the cone down by each 100mm increment are recorded. These blow counts then provide a comparative assessment from which correlations have been published, based on dynamic energy, which permit engineering parameters to be generated.

The dynamic probe results were converted to equivalent SPT “N” values based on dynamic energy using in-house computer software (Geostru). The granular soils were classified using Table 3.1. For the purposes of this interpretation, Topsoil and Made Ground were not considered.

An interpretation of the equivalent SPT “N” are outlined in Table 3.4.

Table 3.4 Interpretation of Dynamic Probe Blow Counts (DPSH)

DP	Strata	Equivalent SPT N Blow Counts	Inferred Relative Density
DPI	KPGR 3.80 – 4.20 Clayey sandy GRAVEL	0	Very loose
	KPGR 4.20 – 8.00 ¹ Clayey sandy GRAVEL	10 – 22	Medium dense
DP2	KPGR 3.80 – 4.90 Clayey sandy GRAVEL	1 – 6	Very loose to loose
	KPGR 4.90 – 8.00 ¹ Clayey sandy GRAVEL	21 – 45	Medium dense to dense
DP3	KPGR 4.70 – 5.90 ¹ Clayey sandy GRAVEL	22 – 30	Medium dense
	KPGR 5.90 – 8.00 ¹ Clayey sandy GRAVEL	33 – 51	Dense to very dense
DP4	KPGR 4.00 – 4.60 Clayey sandy GRAVEL	10 – 13	Medium dense
	KPGR 4.60 – 8.00 ¹ Clayey sandy GRAVEL	22 – 42	Medium dense to dense

DP	Strata	Equivalent SPT N Blow Counts	Inferred Relative Density
DP5	KPGR 4.700 – 5.00 ¹ Clayey sandy GRAVEL	8 – 15	Loose to medium dense
	KPGR 5.00 – 8.00 ¹ Clayey sandy GRAVEL	30 – 48	Dense
DP6	KPGR 4.40 – 8.00 ¹ Clayey sandy GRAVEL	25 – 50	Medium dense to dense
DP7	KPGR 4.80 – 5.10 ¹ Clayey sandy GRAVEL	12	Medium dense
	KPGR 5.10 – 8.00 ¹ Clayey sandy GRAVEL	18 – 30	Medium dense
	KPGR 4.80 – 8.00 ¹ Clayey sandy GRAVEL	17 – 37	Medium dense to dense

Note: ¹ Ground conditions inferred past the base of windowless sampler boreholes.

The results from dynamic probing inferred that the relative density of the granular soils of the Kempton Park Gravel ranged from **very loose to very dense, generally medium dense and dense**, which were inferred from the correlations explained in Table 3.1.

The test results have been presented in Appendix A.

3.3 Atterberg Limit Tests

Atterberg limits tests were scheduled on two samples obtained from the Kempton Park Gravel, based on the field descriptions. However, the samples were not suitable for this analysis, being recorded as non-plastic.

3.4 Grading Analysis Tests

Grading analysis (Particle Size Distribution) was performed on two samples from the Kempton Park Gravel. An interpretation of the results is provided in Table 3.5.

Table 3.5 Grading Analyses Interpretation

Location	Depth (m bgl)	Soil Description	Volume Change Potential		Passing 63µm Sieve (%)
			BRE	NHBC	
BH1	4.50	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL	No	No	8
BH2	6.00	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL	No	No	3

Location	Depth (m bgl)	Soil Description	Volume Change Potential		Passing 63µm Sieve (%)
			BRE	NHBC	

Note: Volume Change Potential refers to BRE Digest 240 (based on Grading test results)

(The Particle Size Distribution Tests were undertaken in accordance with BS 1377: Part 2: 1990 clause 9)

Volume Change Potential – BRE 240 states that a soil has a volume change potential when the clay fraction **exceeds 15%**. Only the silt and clay combined fraction are determined by sieving therefore the volume change potential is estimated from the percentage passing the 63µm sieve. NHBC Standards Chapter 4.2 states that a soil is shrinkable if the percentage of silt and clay passing the 63µm sieve is greater than 35% and the Plasticity Index is greater than 10%.

The results from grading analysis proved that the granular soils of the Kempton Park Gravel had **no volume change potential** in accordance BRE Digest 240 or NHBC Standards Chapter 4.2.

The test results are given in Appendix B.

3.5 Saturation Moisture Content Tests

Determination of saturated moisture content tests were performed on six samples recovered from the Seaford and Newhaven Chalk Formation. The results have been presented in Table 3.6.

Table 3.6 Saturated Moisture Content Test Interpretation

Location	Depth (m bgl)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Moisture Content (%)	Saturation Moisture Content (%)	Density Classification (CIRIA)
BH1	8.00	1.84	1.59	16	26	Medium
BH1	11.00	1.77	1.44	23	32	Low
BH1	14.00	1.77	1.42	25	33	Low
BH2	9.00	1.74	1.36	28	37	Low
BH2	12.00	1.75	1.43	23	33	Low
BH2	15.00	1.67	1.34	25	38	Low

(The Determination of Saturation Moisture Content of Chalk Tests were made in accordance with BS1377:Part 2:1990 Clauses 3.3).

The results from the saturated moisture content tests on samples recovered from the soils of the Seaford and Newhaven Chalk Formation indicated that the chalk is generally of a **low density**, with five of six samples recorded as such, and one as medium. Dry density was recorded as ranging between 1.34Mg/m³ and 1.59Mg/m³ as defined by CIRIA Publication, Engineering in Chalk, C574, 2002.

3.6 Sulphate and pH Tests

Two samples were taken from the Kempton Park Gravel (BH1:5.00m and BH2:4.00m bgl) and two from the Seaford and Newhaven Chalk Formation (BH1:10.00m and BH2:12.50m bgl) for water soluble sulphate (2:1) and pH testing in accordance with Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive

Ground’.

The significance of the sulphate and pH Test results are discussed in Section 4.4 in this report.

A summary of the sulphate and pH Test results are presented in Table 3.7.

Table 3.7 Sulphate and pH Tests

Trial Hole	Depth (m bgl)	pH	Sulphate (2:1) (mg/l)	DS Class	ACEC Class
BH1	5.00	8.2	62	DS-I	AC-I
BH1	10.00	8.3	18	DS-I	AC-I
BH2	4.00	7.9	104	DS-I	AC-I
BH2	12.50	8.3	20	DS-I	AC-I

(The Sulphate and pH Tests were undertaken in accordance with Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground')

The sulphate and pH test results within the Made Ground may need to be considered in foundation design, given the thickness of Made Ground recorded on site.

The test results are given in Appendix B.

Section 4 Foundation Design

4.1 General

An engineering appraisal of the soil types encountered during the site investigation and likely to be encountered during the redevelopment of this site is presented. Soil descriptions are based on analysis of disturbed samples taken from the trial holes.

4.1.1 Made Ground and Topsoil

The terms *Fill* and *Made Ground* are used to describe material, which has been placed by man either for a particular purpose e.g. to form an embankment, or to dispose of unwanted material. For the former use, the Fill and/or Made Ground may well have been selected for the purpose and placed and compacted in a controlled manner. With the latter, great variations in material type, thickness and degree of compaction invariably occur and there can be deleterious or harmful matter, as well as potentially methanogenic organic material.

The BSI Code of Practice for Foundations, BS 8004:1986, Clause 2.2.2.3.5 Made Ground and Fill, includes the caveat that '*all Topsoil should be treated as suspect, because of the likelihood of extreme variability*'.

Soils described as Topsoil were encountered in three of the ten trial holes (BH1, BH2 and WS1) from ground level to depths ranging from 0.10 to 0.40m bgl. The Topsoil comprised grass over dark brown sandy SILT with frequent roots and rootlets. The depth of Topsoil has been included in Table 2.3.

Soils described as Made Ground were encountered in each of the ten trial holes, underlying the Topsoil (BH1, BH2 and WS1) and from ground level to depths ranging between 3.00 (base of WS4) and 4.80m bgl (WS7 and WS8). The Made Ground typically comprised dark brown becoming bluish grey sandy gravelly SILT with occasional roots and rootlets. Locally organic and with fragments of glass, tiles, slate, carbonised material, brick and tarmacadam. Gravel is fine to coarse sub-angular flint and sandstone. Decomposing material (landfill waste) also noted in most locations. Both WS4 and WS5 terminated within the Made Ground, so its depth was not established in these locations. The depths of Made Ground have been included in Table 2.3.

A result of the inherent variability, particularly of uncontrolled Topsoil, Fill and/or Made Ground is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should, therefore, be taken through any Topsoil and/or Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

4.1.2 Kempton Park Gravel

Soils described as the Kempton Park Gravel were encountered in eight out of the ten trial holes directly below the Topsoil/Made Ground and persisted to depths

ranging between 4.00 and 8.50m bgl. The Kempton Park Gravel typically comprised dark greenish yellow clayey sandy fine to medium sub-angular flint GRAVEL. Sand is medium to coarse. All of the windowless sampler boreholes, except WS4 and WS5, terminated within the Kempton Park Gravel, so its depth was not established in these locations. The depth of Kempton Park Gravel has been included in Table 2.4.

The results from SPT analysis inferred that the relative density of the granular soils of the Kempton Park Gravel was **medium dense**, which were inferred from the correlations explained in Table 3.1.

The results from dynamic probing inferred that the relative density of the granular soils of the Kempton Park Gravel ranged from **very loose to very dense, generally medium dense and dense**, which were inferred from the correlations explained in Table 3.1.

The results from grading analysis proved that the granular soils of the Kempton Park Gravel had **no volume change potential** in accordance BRE Digest 240 or NHBC Standards Chapter 4.2.

The soils of the Kempton Park Gravels are expected to display moderate to high bearing capacities with low to moderate settlement characteristics and were considered suitable as a bearing stratum for the proposed development.

4.1.3 Seaford and Newhaven Chalk Formation

Soils described as Seaford and Newhaven Chalk Formation were encountered in two out of the ten trial holes from depths of 7.80 and 8.50m bgl, respectively. The Seaford and Newhaven Chalk Formation was observed to the full depth of investigation, when encountered. The Seaford and Newhaven Chalk Formation typically comprised off white moderately weak CHALK with occasional flints.

The results from SPT analysis inferred that the Seaford and Newhaven Chalk Formation ranged between **structureless (Dm) to structured (C5 – A1)**, becoming structured with depth, which was inferred from the correlations explained in Table 3.2.

The results from the saturated moisture content tests on samples recovered from the soils of the Seaford and Newhaven Chalk Formation indicated that the chalk is generally of a **low density**, with dry density ranging between 1.34Mg/m³ and 1.59Mg/m³.

Chalk is a weak rock that, if not weathered, possesses high bearing potential with low settlement characteristics. The Seaford and Newhaven Chalk Formation would be a suitable bearing stratum as piled foundations will need to be adopted.

4.1.4 Roots

Roots were encountered in eight out of the ten trial holes at depths ranging between 0.50 and 3.00m bgl. Mature trees were noted to the southeast of the site, and occasional semi-mature trees to the north and west. Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs.

4.1.5 Groundwater

Groundwater was encountered within five trial holes and was struck at depths ranging between 2.00 and 3.00m bgl. Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in September and October (2015), when groundwater levels should be around their annual minimum (lowest) elevation.

Further groundwater monitoring recorded fairly consistent water levels to a maximum of 1.92m bgl, suggesting they do represent groundwater rather than perched water, which may be expected in significant thickness of Made Ground such as this.

4.2 Foundation Scheme

The proposed development comprised the construction of two indoor swimming pools at ground level, associated boiler room, storage and some redevelopment of current facilities and changing areas.

In compiling this report reliance was placed on drawing number 15-132, dated June 2015 and was prepared by Clive Carruthers Architecture and Planning. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

The proposed development layout as provided by the client is included within Appendix F.

4.2.1 Guidance on Shrinkable Soils

The Building Research Establishment (BRE) Digests 240, 241 and 242 provide guidance on 'best practice' for the design and construction of foundations on shrinkable soils.

The results from grading analysis proved that the granular soils of the Kempton Park Gravel had **no volume change potential** in accordance BRE Digest 240 or NHBC Standards Chapter 4.2.

4.3 Conclusions and Recommendations

Foundations **must not** be constructed within any Made Ground/Topsoil due to the likely variability and potential for large load induced settlements both total and differential.

Given that Made Ground was recorded to depths ranging between 3.80m and 4.80m, where proven, shallow foundations are not considered suitable for the proposed development and a piled foundation solution will be required.

4.3.1 Piled Foundations

It is understood that the proposed swimming pools will be constructed at ground level, with the base placed on a 400mm reinforced raft on piles.

Piled foundations must be taken through any Made Ground/Topsoil, below any live root zone and disturbed or desiccated soil and into the soils of the underlying Kempton Park Gravels and Seaford and Newhaven Chalk Formation, such that sufficient bearing capacity was achieved.

In Table 4.2 (Appendix B), preliminary load capacities calculated for varying diameters and lengths of vertically loaded piles taken into the soils of the Kempton Park Gravels and Seaford and Newhaven Chalk Formation are given. These values have been calculated for the ground conditions found in the boreholes and **must** be used for preliminary design purposes only as the actual working load is dependent on the type of pile and the method of installation. The upper five metres of the shaft of the pile have been ignored in the preliminary pile design given.

Temporary casing will be required where the upper portion of the pile passes through the Made Ground/Topsoil particularly below the groundwater table, if encountered, to prevent necking of the green concrete.

To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter.

The pile bearing values given in Figure 4 (Appendix B), are applicable to single piles. Where piles are to be constructed in groups the bearing value of each individual pile should be reduced by a factor of about 0.8 and a calculation made to check the factor of safety against block failure.

Guidance on the design of a working platform for piling rigs can be provided by Soils Limited in accordance with the BRE "Working platform for tracked plant, 2004" documentation.

4.4 Subsurface Concrete

Sulphate concentration measured in 2:1 water/soil extracts fell into Class **DS-1** of the BRE Special Digest 1 2005, '*Concrete in Aggressive Ground*'. Table C2 of the Digest indicated ACEC (Aggressive Chemical Environment for Concrete) site classifications of **AC-1**. The pH of the soils tested ranged between 7.9 and 8.3. The classification given was determined using the mobile groundwater case, in the view of groundwater being encountered and based on results from natural soils encountered.

However, given the thickness of Made Ground recorded, consideration of the sulphate and pH results within these materials should be given. These results fell into Class **DS-3** of the BRE Special Digest 1 2005, '*Concrete in Aggressive Ground*'. Table C2 of the Digest indicated ACEC (Aggressive Chemical Environment for Concrete) site classifications of **AC-3**. The pH of the soils tested ranged between 7.2 and 8.2. The classification given was determined using the mobile groundwater case, in the view of groundwater being encountered.

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, '*Concrete in Aggressive Ground*' taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

Section 5 Chemical Analysis of Soil Samples

5.1 Site Characterisation and Revised Conceptual Site Model

The Phase I Desk Study undertaken by Soils Limited (report ref: 15225/DS dated October 2015) identified a medium to high risk of ground contamination associated with the sites location on an historical landfill. Furthermore, the Phase I Desk Study identified a high risk of soil gas associated with the historical landfill onsite.

The Phase II Ground Investigation did not identify any other potential sources of contamination and therefore the Conceptual Site Model did not require revision.

5.2 Soil Sampling

A non-targeted sampling strategy is appropriate when there is:

- No adequate information available regarding the likely locations of contamination;
- No sensitive areas where there is a need for a high degree of confidence.

A targeted sampling strategy is appropriate when there is:

- Adequate information available regarding the likely locations of contamination
- Sensitive areas where there is a need for a high degree of confidence.

A targeted and non-targeted sampling strategy was generally adopted with sampling locations and sampling depths chosen to reflect both receptor and exposure scenarios of concern for the human health receptor (this being groundworkers and future maintenance workers), current and future buildings.

Table 5.1 Sampling Strategy

Sample	Strategy	Proposed Use
WS1	Non Targeted: Made Ground	Swimming pools and associated plant
WS1	Targeted: Groundwater	Swimming pools and associated plant
WS2	Non Targeted: Made Ground	Swimming pools and associated plant
WS2	Targeted: Groundwater	Swimming pools and associated plant
WS3	Non Targeted: Made Ground	Swimming pools and associated plant
WS4	Non Targeted: Made Ground	Swimming pools and associated plant
WS5	Non Targeted: Made Ground	Swimming pools and associated plant
WS6	Non Targeted: Made Ground	Swimming pools and associated plant
WS6	Targeted: Groundwater	Swimming pools and associated plant
WS7	Non Targeted: Made Ground	Swimming pools and associated plant
WS8	Non Targeted: Made Ground	Swimming pools and associated plant

5.3 Determination of Contaminants of Concern

The driver for the determination of the analysis suite was the information obtained from the Phase I Desk Study and Phase II intrusive investigation.

Table 5.2 Determination of Contaminants of Concern

Substance	Locations: Depths (m bgl)														
	WS1: 0.40 ^s	WS1: 2.80 ^s	WS1: 2.00 ^w	WS2: 0.50 ^s	WS2: 2.23 ^w	WS3: 0.50 ^s	WS4: 0.10 ^s	WS4: 0.70 ^s	WS5: 0.40 ^s	WS6: 0.30 ^s	WS6: 2-3.00 ^s	WS6: 2.18 ^w	WS7: 0.20 ^s	WS7: 0.90 ^s	WS8: 0.40 ^s
Asbestos Screen	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total Phenols	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total Cyanide	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Organic Matter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
pH	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Metals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Metalloids	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Organics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PAHs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TPH-CWG	✓		✓	✓	✓		✓				✓	✓		✓	✓
BTEX	✓		✓	✓	✓		✓				✓	✓		✓	✓
VOCs			✓		✓							✓			
SVOCs			✓		✓							✓			

Notes: **metals:** Cd, Cr, Pb, Hg, Ni, Se, CN, S, Cu, Zn, Bo, V. **metalloids:** As. **organics:** USEPA 16 speciated PAH, TPH-CWG (speciated TPH), BTEX. VOCs and SVOCs – Volatile and semi-volatile organic compounds. **Asbestos screening** was undertaken in accordance with HSG 248. ^s = Soil sample. ^w = Water sample.

Section 6 Qualitative Risk Assessment

6.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix E.

6.2 Representative Contamination Criteria - Soil

The proposed development comprised of two indoor swimming pools, associated boiler room, storage and some redevelopment of current facilities and changing areas.

The results of the comparison of the representative contaminants concentration for human health receptor to the Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) or Suitable 4 Use Level (S4UL) are presented in 6.1.

The guideline values are assessed against the "Commercial" land-use scenario, which was considered the most appropriate land-use scenario, given the type of the proposed redevelopment.

The assessment for lead was undertaken based on the Category 4 Screening Value (C4SL) for the "Commercial" land-use scenario.

Table 6.1 Summary of Chemical Analysis of Soils Samples

Substance	Sample location where SGV, C4SL or S4UL adopted were exceeded for the 'Commercial' land-use scenario
Arsenic	None
Beryllium	None
w/s Boron	None
Cadmium	None
Chromium	None
Copper	None
Lead	None
Mercury (inorganic)	None
Nickel	None
Selenium	None
Vanadium	None
Zinc	None
Total Cyanide	None
PAHs	None
TPH-CWG (speciated)	None
BTEX	None
Asbestos Screen*	None

Note: * Asbestos screening was carried out in accordance with HSG 248.

To assess the potential toxicity to the human health receptor from the concentrations of organic compounds tested for, Soil Organic Matter (SOM) tests were undertaken on the

samples submitted for chemical testing, which revealed SOM values of between 0.4% and 7.7%. For each soil sample tested, the Soil Organic Matter recorded was used to derive the appropriate guideline value for organic determinants.

In summary, none of the determinants tested recorded concentrations above the “Commercial” end-use screening values.

6.3 Risk to Groundwater

Three groundwater samples were recovered from the standpipes installed within WS1, WS2 and WS6 to establish whether groundwater on site had been impacted.

Table 6.2 Summary of Chemical Analysis for Groundwater Samples

Substance	Units	EQS Source	EQS Concentration	Sample where EQS Level was exceeded
Arsenic	µg/l	SPAL	50	None
Benzene	µg/l	DWS	1	None
Boron	µg/l	DWS	1000	WS1 - 1550µg/l WS2 - 1470µg/l WS6 - 2860µg/l
Cadmium	µg/l	SPAL/DWS	5	None
Chromium	µg/l	DWS	50	None
Copper	µg/l	DWS	2000	None
Nickel	µg/l	DWS	20	None
Lead	µg/l	DWS	10	None
Mercury	µg/l	DWS	1	None
Selenium	µg/l	DWS	10	None
Vanadium	µg/l	DWS	250000	None
Zinc	µg/l	DWS	5000	None
Sulphate	mg/l	SPAL	250	None
Sulphide	µg/l	SPAL	0.25	None
Toluene	µg/l	WHO	700	None
Ethylbenzene	µg/l	WHO	300	None
Xylenes	µg/l	WHO	50	None
MTBE	µg/l	WHO	15	None
Benzo (a) pyrene	µg/l	DWS/FW	0.01	None

Note: **DWS** = UK Drinking Water Standards. **SPAL** = EA Standard for Protection of Aquatic Life (Freshwater). **FW** = Freshwater standard. **EQS** = Environmental Quality Standards. **WHO** = World Health Organisation.

¹ The specified compounds are benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene and indeno[1,2,3-c,d]pyrene.

In summary, all three samples showed exceedances above the groundwater screening values, UK Drinking Water Standard (DWS) for Boron. In WS1, WS2 and WS6 concentrations of 1550µg/l, 1470µg/l and 2860µg/l were recorded, respectively, against the DWS for Boron of 1000µg/l.

The River Thames is likely to be the main groundwater receptor for the site, given its proximity to the site. As such, the Environmental Quality Standard (EQS) for Boron can be adopted as the screening value. When compared to the EQS of 2000µg/l, one

exceedance was recorded: a concentration of 2860µg/l in WS6.

None of the other determinants tested, recorded concentrations above the groundwater screening values.

6.4 Tier I Quantitative Risk Assessment

Soils: None of the determinants tested recorded concentrations above the “Commercial” end-use screening values.

The Tier 1 Quantitative risk assessment therefore established that there was **no risk to the human health receptors** of construction workers or future end-users.

Groundwater: The test results showed that the groundwater had been impacted by Boron in excess of its relevant Environmental Quality Standards (EQS) in one of three groundwater samples, taken from WS6.

The results of the contamination testing are presented in Appendix C.

6.5 Remedial Objective

This investigation has established that there is no risk to the human health receptor based on a “Commercial” end-use for the site. As such no remedial action is necessary in respect of soils at the site.

Groundwater was identified to have been impacted, with Boron recorded in excess of its relevant Environmental Quality Standards (EQS) in one of three groundwater samples.

It is likely that the boron levels in the groundwater can be attributed to the fact that the site is a former landfill, with various identified layers of Made Ground likely to contributing to the elevated concentrations noted. E.g. WS6: 2.00-3.00m recording 9mg/kg and WS7: 0.90m recording 7.3mg/kg Boron in the soils analysis. Given the likelihood that these layers are present across the site area at varying depths, any remedial works we undertake within the development area are unlikely to make a significant difference. I.e. there are likely to be issues with boron across the whole landfill site and the only effective way of remediating the issue would be to remediate the landfill, which isn't practical. The development may improve the situation as some shallow soils will be removed from site and hardstanding cover will reduce infiltration locally and therefore the leaching of shallower soils.

Any imported Topsoil used on this site shall be as defined in the British Standard BS3882:2007 Specification for Topsoil.

In addition any imported topsoil must be fit for purpose and must either be supplied with traceable chemical laboratory test certificates or be tested, either prior to placing or after placing, to ensure that the human receptor cannot come into contact with any

compounds that could be detrimental to human health.

In respect to the groundworkers and site operatives, it is understood that in order to minimise the effect of dust inhalation and dermal contact as exposure pathways, a good standard of personal hygiene must be adopted.

6.6 Soil-Gas Risk

The Phase I Desk Study identified a high risk of soil gas at the site given that it is located on a historical landfill site.

6.6.1 Soil Gas and Quantitative Risk Assessment

Four standpipes were installed within windowless sampler boreholes (WS1, WS2, WS4 and WS6) across the site area, following agreement with the client.

The monitoring well installations comprised 25mm ID HDPE pipework installed in boreholes WS1, WS2, WS4 and WS6 to depths ranging between 3.00m and 5.00m bgl. The response zone comprised a slotted pipe with non-calcareous gravel pack surround with a bentonite seal above.

The headworks comprised a single gas tap fitted into an end cap and placed on the end of the pipework just below ground level within a metal stopcock cover set in concrete.

Three gas monitoring cycles were undertaken as part of this feasibility investigation, and as agreed with the client. Monitoring with a GFM 435 Gas Analyser was undertaken in the wells to measure the concentrations of oxygen, methane, carbon dioxide, carbon monoxide and hydrogen sulphide as well as flow rates and atmospheric pressure. A Photo Ionisation Detector (PID) was also used to detect for any volatile organic compounds (VOCs) present in the ground.

Groundwater levels were also recorded in the monitoring wells, where present.

The results of the monitoring are provided within Table 6.2.

Table 6.3 Soil Gas Results

Date (Barometric Trend)	WS	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	H ₂ S (ppm)	CO (ppm)	LEL (%)	aP (mb)	Flow (l/h)	Dp	H ₂ O (m bgl)	Base Of Hole (m)	VOC (ppm)
15/10/15 (Rising)	ATM	0.0	0.2	20.0	0	0	0.0	1014	n/a	n/a	n/a	n/a	0.0
	1	0.0	0.1	20.5	0	0	0.0	1014	0.0	0	2.00	4.00	0.0
	2	0.0	0.1	20.7	0	0	0.0	1014	0.0	0	2.23	4.65	0.0
	4	0.0	0.1	20.4	0	0	0.0	1014	0.0	0	Dry	1.70	0.0
	6	0.0	0.2	20.0	0	0	0.0	1014	0.0	0	2.18	4.77	0.0
23/10/15 (Falling)	ATM	0.0	0.1	20.7	0	0	0.0	1014	n/a	n/a	n/a	n/a	0.0
	1	0.0	15.8	1.8	0	0	0.0	1014	0.0	0	1.94	4.00	0.0
	2	6.7	15.9	0.1	0	0	>>>	1014	0.0	0	2.18	4.65	0.0
	4	0.0	0.7	19.5	0	0	0.0	1014	0.0	0	Dry	1.70	0.0
	6	0.0	1.6	18.5	0	0	0.0	1014	0.0	0	2.20	4.77	0.0

04/11/15	ATM	0.0	0.0	21.0	0	0	0.0	1011	n/a	n/a	n/a	n/a	0.0
(Rising)	1	2.7	15.0	2.6	0	0	21.2	1011	0.01	0	1.92	4.10	0.0
	2	2.8	12.0	7.6	0	0	46.0	1011	0.01	0	2.15	4.32	0.0
	4	2.3	9.3	6.0	0	0	5.7	1011	-0.21	0	Dry	1.68	0.0
	6	0.2	11.0	6.2	0	0	2.2	1011	0.01	0	2.60	4.80	0.0

Note: >>> Above detection limit

General Note: Zero reading = below the equipment detection limit.

The **highest concentration of methane (CH₄)** was recorded in **WS2** at **6.7%** by volume on the 23/10/15.

The **highest concentration of carbon dioxide (CO₂)** was recorded in **WS2** at **15.9%** by volume on the 23/10/15.

The **lowest concentration of oxygen (O₂)** was recorded in **WS2** at **0.1%** by volume on the 23/10/15.

No concentrations of hydrogen sulphide (H₂S) or Carbon Monoxide (CO) were recorded above instrument detection limit.

The **highest gas flow recorded was 0.1l/hr in three boreholes** on 04/11/15.

Concentrations of **Volatile Organic Compounds (VOCs)** within the monitoring wells were measured using a Photo-Ionisation Detector (PID). Results showed **no concentrations** above instrument detection limit.

Based on the documentation presented in "BS 8485:2015, Code of practice for the characterization and remediation from ground gas in affected developments", the *hazardous gas flow rate (Q_{hg})* should be calculated using:

$$Q_{hg} = C_{hg} / 100 \times q$$

Where:

C_{hg} is the measured hazardous gas concentration (in percentage volume-by-volume);

q is the flow rate (in litres per hour) of combined gases found by direct measurement.

The *Site Characteristic hazardous gas flow rate (Q_{hgs})* was calculated as being 0.0159l/hr.

BS 8485:2015 stipulates that "individual gas measurements obtained from several monitoring locations over a number of visits should be considered collectively to establish a characteristic hazardous gas flow rate for the site as a whole". Attempts were made to target periods of falling, rising and steady atmospheric pressure.

Based on a *Site Characteristic hazardous gas flow rate* (Q_{hgs}) of 0.0159 l/hr, the site fell into a Characteristic Gas Situation 1. However, the maximum methane concentration of 6.7% and the maximum carbon dioxide concentration of 15.9% indicates that an increase to **Characteristic Gas Situation 2 should be adopted for the site.**

In accordance with CIRIA C665, the following typical scope of protective measures are required for a Characteristic Situation 2:

1. Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM2 and underfloor venting.
2. Beam and block or pre-cast concrete and 2000 g DPM/ reinforced gas membrane and underfloor venting.
3. All joints and penetrations sealed.

6.7 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust is generated as a result of construction activities. The site should be securely fenced at all times to prevent unauthorised access.

Washing facilities should be provided and eating restricted to mess huts.

6.8 Excavated Material

Excavated material must be classified with the Environment Agency for disposal at an appropriately licensed disposal facility. The requirements of Duty of Care and Health and Safety Guidance must be complied with.

Both Producers and Waste Management companies must ensure compliance with the new Waste Acceptance Criteria (WAC) prior to landfill in hazardous, stable non-reactive cells and inert sites. These regulations govern the operation of landfill in England and Wales. Basic characterisation is the responsibility of the waste producer and compliance checking is generally the responsibility of the landfill operator. Therefore landfill operators will be unlikely to accept waste that does not meet the Waste Acceptance Criteria for their class of site.

There is an obligation to 'treat' all soils destined for landfill, including non-hazardous waste. This treatment must now be documented and presented to the landfill operator or

waste may be refused entry. Note that all liquids are banned from landfill.

For the purposes of legal compliance, 'treatment' must comprise three things (the 'three-point test'):

1. It must be a physical, thermal, chemical or biological process.
2. It must change the characteristics of the waste.
3. It must do so in order to:
 - (a) reduce its volume, or
 - (b) reduce its hazardous nature, or
 - (c) facilitate its handling, or enhance its recovery.

WAC testing or risk-based assessment was not undertaken at this stage but may be necessary depending upon whether material is required to be taken off-site.

6.8.1 Risk Based Hazard Assessment of Waste

Software such as the HazWasteOnline produced **Hazardous Waste Classification Tool**, enables soils 'total' chemical testing data to be used to identify the classification of waste soils in accordance with Environment Agency guidance. The HazWasteOnline Hazardous Waste Classification Tool was designed primarily for the classification of soil wastes as identified by the European Waste Catalogue (EWC) Chapter 17 - Construction and demolition wastes (including contaminated soils).

The classification of waste as either **hazardous or non-hazardous** must be conducted in accordance with the 2003 Environment Agency publication Interpretation of the Definition and Classification of Hazardous Waste (Technical Guidance WM2). This establishes the regulatory framework and allows classification of wastes based on their various risk phrases. Additional guidance provided by the 2007 Environment Agency publication 'How To Find Out if Waste Oil and Wastes that Contain Oil are Hazardous' (HWR08) provides further clarification on the classification methodology for hydrocarbon contamination.

As part of the **Hazardous Waste Classification** process, contaminant compounds are selected based on historical and contemporary land-use. The inclusion of such data on the input form enables the correct waste classification to be determined. For example, in cases of land associated with former gasworks, the classification of coal-tar contaminated soils can be partially determined using total PAH concentrations as opposed to TPH concentrations as coal-tar may be deemed a "substance". Hazardous (HWR08) provides further clarification on the classification methodology for hydrocarbon contamination.

The analysis results of the chemical laboratory testing undertaken as part of report, prepared by QTS Environmental Ltd were used for the **Hazardous Waste Classification** process.

Full results of the laboratory analysis and hazardous waste classification tool are given in Appendix C with the samples classified as hazardous outlined in Table 6.4.

Table 6.4 Risk Based Hazard Assessment of Waste

Trial Hole	Depth (m bgl)	Certificate	Description (general)	Type/Waste Code	HazWasteOnline Classification Hazardous Waste
WS4	0.10	15-36325	Brown clayey gravel with vegetation	17 05 03	Hazardous
WS6	2.00-3.00	15-36325	Brown clayey gravel	17 05 03	Hazardous
WS7	0.90	15-36325	Brown clayey gravel with rubble	17 05 04 or 17 05 03	Potentially Hazardous*

Notes: 17 05 03 (Soil and stones containing hazardous substances)

17 05 04 (Soil and stones other than those mentioned in 17 05 03)

*Due to flammability given low levels of hydrocarbons recorded. Therefore, unlikely to be hazardous.

6.9 Re-use of Excavated Material On-site

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is accepted as an alternative regime to the EPR.

Under the EPR, material that is contaminated but otherwise suitable for re-use is also classified as waste and its re-use should be in accordance with the Environmental Permitting Regulations 2007 (EPR). Environmental Permit Exemptions (EPE) are for the re-use of non-hazardous or inert waste only; hazardous waste cannot be re-used under a permit exemption. EPE apply only to imported inert waste materials; inert material arising on site and recovered on site is not classified as waste and does not require an exemption. It is possible that materials arising on-site will be classified as inert and would not need an exemption.

Environmental Permit Exemptions are only allowed for certain activities, placing controls on the quantities that can be stored and re-used. The re-use of waste shall be within areas and levels defined in planning applications and permissions for the development. An EPE requires a site specific risk assessment for the receptor site to demonstrate that the materials are suitable for use, i.e. that they will not give rise to harm to human health or pollution of the environment.

Under the CL:AIRE voluntary code of practice (CoP) materials excavated on-site are not deemed contaminated if suitable for re-use at specified locations or generally within the site.

Material that may have been classified as hazardous waste under the EPR may be re-used. The CoP regime requires that a 'Qualified Person' as defined under the CoP

reviews the development of the Materials Management Plan, including review of Risk Assessments and Remediation Strategy/Design Statement together with documentation relating to Planning and Regulatory issues, and signs a Declaration which is forwarded to the Environment Agency and which confirms compliance with the CoP.

Should it be necessary to import materials from another site where materials are excavated and which is not material from a quarry or produced under a WRAP protocol, then an EPE would be necessary for the imported material whether the work was managed under the CoP or the EPR.

6.10 Imported Material

Any soil, which is to be imported onto the site, must undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it is suitable for the purpose for which it is intended.

6.11 Discovery Strategy

There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

Care should be taken during excavation works especially to investigate any soils, which appear by eye (e.g. such as fibrous materials, large amounts of ash and unusual discolouration), odour (e.g. fuel, oil and chemical type odours or unusual odours such as sweet odours or fishy odours) or wellbeing (e.g. light headedness and/or nausea, burning of nasal passages and blistering or reddening of skin due to contact with soil) to be contaminated or of unusual and/or different character to standard soils or those analysed.

In the event of any discovery of potentially contaminated soils or materials, this discovery should be quarantined and reported to the most senior member of site staff or the designated responsible person at the site for action. The location, type and quantity must be recorded and the Local Authority, and a competent and appropriate third party Engineer/Environmental consultant notified immediately. An approval from the Local authority must be sought prior to implementing any proposed mitigation action.

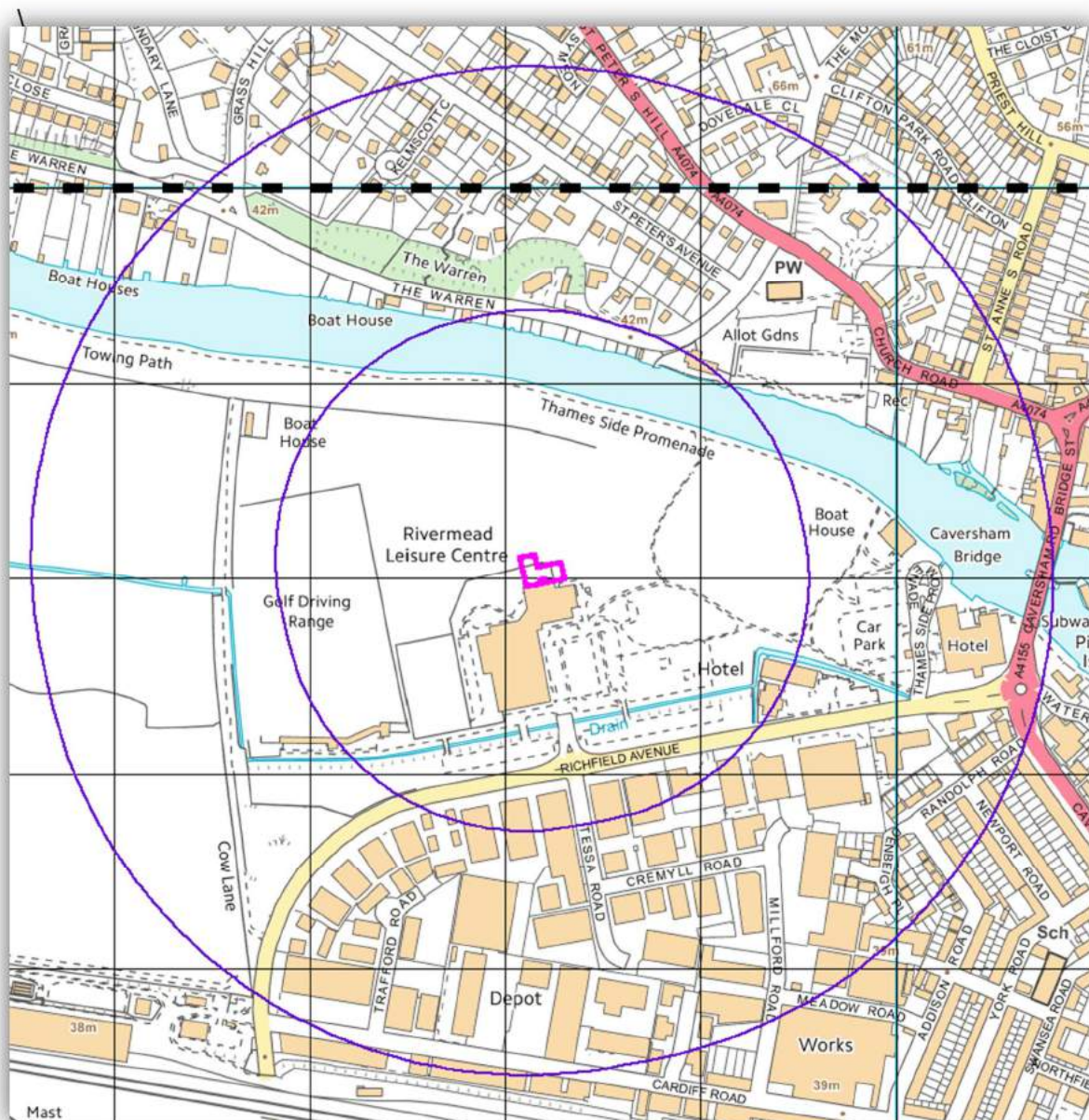
The discovery strategy must remain on site at all times and must demonstrate a clear allocation of responsibility for reporting and dealing with contamination. A copy of the strategy must be placed on the health and safety notice board and /or displayed in a prominent area where all site staff are able to take note of and consult the document at any time. Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the discovery strategy.

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Scale: NTS

Figure number

1

Title

Site Location Map

Project

Rivermead Leisure Centre, Richfield Avenue,
Reading, Berkshire RG1 8EQ

Date

November 2015

Client

Reading Borough Council

Job Number

15225



Figure number

2

Project

Rivermead Leisure Centre,
Richfield Avenue, Reading,
Berkshire RG1 8EQ

Client

Reading Borough Council

Title

Aerial Photograph

Date

November 2015

Job Number

15225

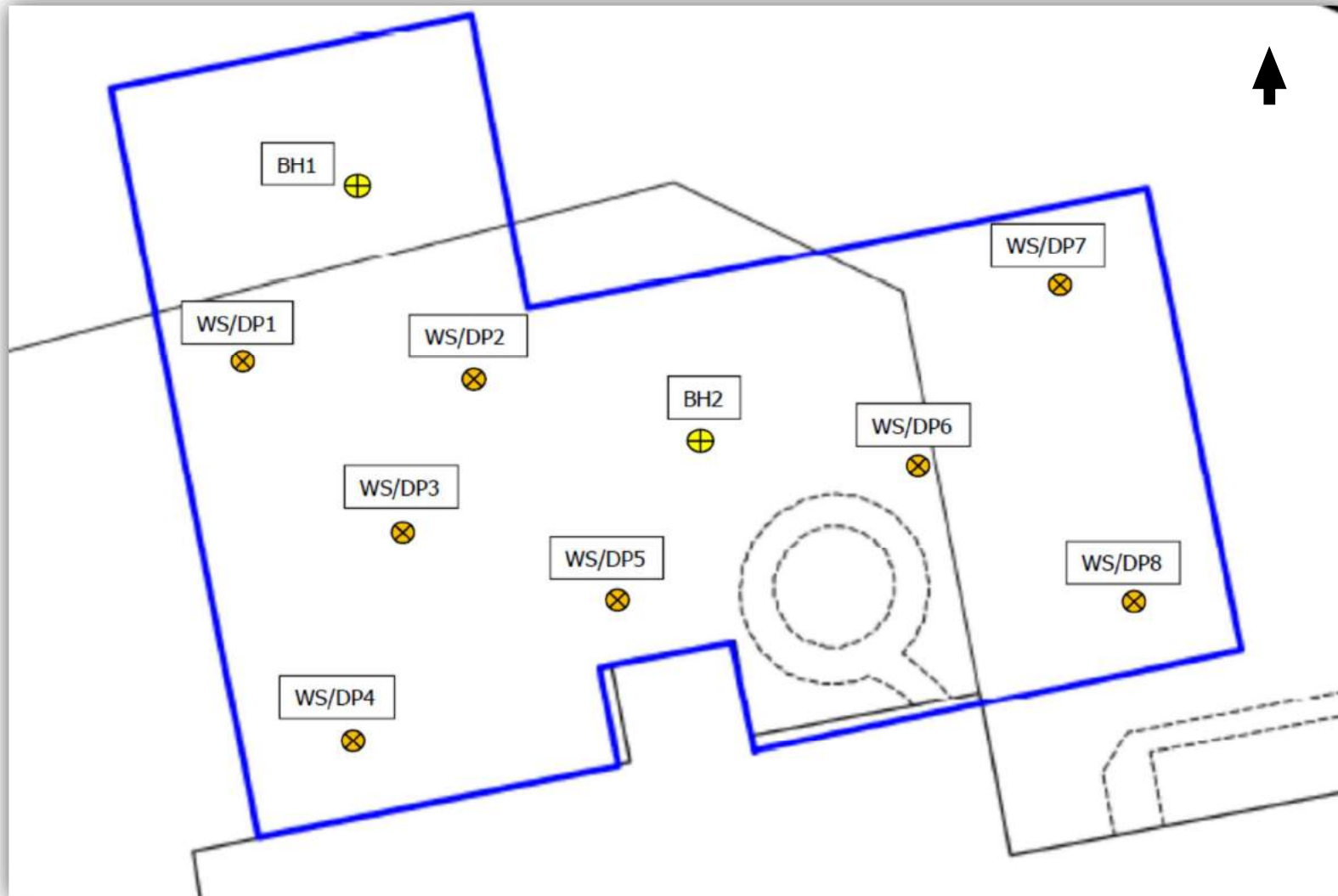


Figure number

3

Project

Rivermead Leisure Centre,
Richfield Avenue, Reading,
Berkshire RG1 8EQ

Client

Reading Borough Council

Title

Trial Hole Location Map

Date

November 2015

Job Number

I5225

Appendix A Field Work

Project Name: Rivermead Leisure Centre,	Project No.: 15225	Co-ords:	Hole Type CP
Location: Reading		Level:	Scale 1:50
Client:		Dates: 01/10/2015	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D		0.30			Grass over dark brown sandy SILT with frequent roots and rootlets. TOPSOIL	
		0.50 - 1.00	B					Brown clayey fine to coarse angular brick GRAVEL. MADE GROUND	
		1.00	D		1.00			Dark brown ash and rubbish fill. MADE GROUND	1
		1.50 - 1.90	SPT C	N=0 (1,0/0,0,0,0)					
		2.00	D						2
		2.50 - 2.95	SPT C B	N=5 (2,1/2,1,1,1)	2.70				
		2.50 - 3.00						Soft dark brown silty CLAY with rubbish fill. MADE GROUND	
		3.00	D						3
		3.50 - 3.95	SPT S	N=1 (1,0/0,1,0,0)					
		4.00	D						4
		4.50 - 4.95	SPT C B	N=19 (3,4/5,5,4,5)	4.50			Medium dense orangish brown clayey sandy fine to coarse angular and sub-angular flint GRAVEL. KEMPTON PARK GRAVEL	
		4.50 - 5.00							
		5.00	D						5
		6.00 - 6.45	SPT C B	N=24 (4,5/5,6,6,7)					6
		6.00 - 6.50							
		7.00	D						7
		7.50 - 7.95	SPT C B	N=15 (3,3/5,4,3,3)	7.80				
		7.50 - 8.00							
		8.00	D					Weak off-white CHALK with occasional flints. SEAFORD AND NEWHAVEN CHALK FORMATION	8
		9.00 - 9.45	SPT S	N=6 (1,1/1,2,1,2)					9
		10.00	D						10

Continued on Next Sheet

General Remarks: Drop and move rig to borehole 1. Setup on borehole 1 and dig pit to 1.20m bgl 1 hour.	Borehole Type CP: Cable Percussive WS: Windowless Sampler RC: Rotary Cored	Sample Types D: Disturbed B: Bulk J: Jar W: Water U: Undisturbed
	In-Situ Testing SPT: Split spoon - Standard Penetration Test CPT: Cone - Standard Penetration Test	

Groundwater Remarks:

**Soils Limited**Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk**Borehole Log**

Borehole No.

BH1

Sheet 2 of 2

Project Name: Rivermead Leisure Centre,

Project No.: 15225

Co-ords:

Hole Type
CP

Location: Reading

Level:

Scale
1:50

Client:

Dates: 01/10/2015

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50	SPT	N=4 (2,2/1,1,1,1)					
		10.50 - 10.95	S						
		10.50 - 11.00	B						
		11.00	D						11
		12.00	D						
		12.00	SPT	N=17 (3,2/2,3,7,5)					12
		12.00 - 12.45	S						
		13.00	D						13
		13.50	SPT	N=34 (3,5/8,8,9,9)					
		13.50 - 13.95	S						
		14.00	D						14
		15.00	D						15
		15.00	SPT	N=29 (4,4/5,7,8,9)					
		15.00 - 15.45	S						
					15.45			End of Borehole at 15.45m	
									16
									17
									18
									19
									20

General Remarks:

Drop and move rig to borehole 1. Setup on borehole 1 and dig pit to 1.20m bgl 1 hour.

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

Groundwater Remarks:

Project Name: Rivermead Leisure Centre,	Project No.: 15225	Co-ords:	Hole Type CP
Location: Reading		Level:	Scale 1:50
Client:		Dates: 30/09/2015	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D					Grass over dark brown sandy SILT with frequent roots and rootlets. TOPSOIL	
		0.50 - 1.00	B		0.40			Brown clayey fine to coarse angular brick GRAVEL. MADE GROUND	
		1.00	D		1.10			Dark brown ash and rubbish fill. MADE GROUND	1
		1.50	D						
		1.50	SPT	N=2 (1,0/0,1,0,1)					
		1.50 - 1.95	C						
		2.00	D						2
		2.50	SPT	N=11 (4,4/5,3,2,1)					
		2.50 - 2.95	C		2.80				
		2.50 - 3.00	B						
		3.00	D					Very soft light blue grey silty CLAY with rubbish fill. MADE GROUND	3
		3.50	SPT	N=1 (1,0/0,0,0,1)					
		3.50 - 3.95	S						
		3.50 - 4.00	B						
		4.00	D						4
		4.50	SPT	N=15 (1,2/2,3,5,5)	4.50				
		4.50 - 4.95	C						
		4.50 - 5.00	B					Medium dense orangish brown clayey sandy fine to coarse angular and sub-angular flint GRAVEL. KEMPTON PARK GRAVEL	5
		5.00	D						
		5.50	D						
		6.00	SPT	N=16 (5,5/2,4,5,5)					6
		6.00 - 6.45	C						
		6.00 - 6.50	B						
		6.50	D						
		7.00	D						7
		7.50	SPT	N=24 (4,5/5,6,6,7)					
		7.50 - 7.95	C						
		7.50 - 8.00	B						
		8.00	D						8
		8.50	D		8.50			Weak off-white CHALK with occasional flints. SEAFORD AND NEWHAVEN CHALK FORMATION	9
		9.00	D						
		9.00	SPT	N=7 (1,1/1,2,2,2)					
		9.00 - 9.45	S						
		9.00 - 9.50	B						
		9.50	D						
		10.00	D						10

Continued on Next Sheet

General Remarks:

Mobilise rig and 6" equipment to site. 30 Minutes day work sign permits and fine borehole locations. Set up on borehole 2 and dig pit to 1.20m bgl 1 hour.

Groundwater Remarks:

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

**Soils Limited**Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk**Borehole Log**

Borehole No.

BH2

Sheet 2 of 2

Project Name: Rivermead Leisure Centre,

Project No.: 15225

Co-ords:

Hole Type
CP

Location: Reading

Level:

Scale
1:50

Client:

Dates: 30/09/2015

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50 10.50 - 10.95	SPT S	N=9 (1,2/1,1,4,3)					
		11.00	D						11
		11.50	D						
		12.00 12.00 12.00 - 12.45	D SPT S	N=11 (3,2/3,2,3,3)					12
		12.50	D						
		13.00	D						13
		13.50 13.50 - 13.95	SPT S	N=14 (3,4/3,3,5,3)					
		14.00	D						14
		14.50	D						
		15.00 15.00 15.00 - 15.45	D SPT S	N=22 (8,9/8,6,5,3)	15.00				15
								End of Borehole at 15.45m	
									16
									17
									18
									19
									20

General Remarks:

Mobilise rig and 6" equipment to site. 30 Minutes day work sign permits and fine borehole locations. Set up on borehole 2 and dig pit to 1.20m bgl 1 hour.

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

Groundwater Remarks:

**Soils Limited**Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk**Borehole Log**

Borehole No.

WS1

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.: 15225

Co-ords:

Hole Type
WS

Location: Reading

Level:

Scale
1:50

Client:

Dates: 01/10/2015

Logged By
JH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05	J+D		0.10			Grass over dark brown sandy SILT. Sand is fine. Abundance of roots and rootlets. TOPSOIL	
		0.40	J+D					Brown mixed grey slightly sandy very silty fine to coarse sub-angular flint, brick and concrete GRAVEL. Sand is medium. Occasional glass and Porcelain. Occasional decomposing plant material. Occasional fine roots. MADE GROUND.	
		0.80	J+D						
		1.00 - 2.00	D					35% recovery.	1
					2.00			Soft bluish grey silty CLAY with brown slightly sandy gravelly SILT. Gravel is fine to coarse sub-angular flint, brick and concrete. Sand is medium. Rare organic material. MADE GROUND.	2
		2.30	D						
		2.80	J+D					25% recovery.	3
					3.80			Dark orange silty clayey gravelly medium to coarse SAND. Gravel is fine to medium sub-angular flint. KEMPTON PARK GRAVEL	4
		3.90	D		4.00			End of Borehole at 4.00m	
									5
									6
									7
									8
									9
									10

General Remarks:

Roots observed to 2.00m bgl. No groundwater encountered.

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

Groundwater Remarks:

**Soils Limited**Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk**Borehole Log**

Borehole No.

WS2

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.: 15225

Co-ords:

Hole Type
WS

Location: Reading

Level:

Scale
1:50

Client:

Dates: 01/10/2015

Logged By
JH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	J+D		0.25			Grass over dark brown sandy gravelly SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint. Occasional glass and tiles. Abundance of fine roots and rootlets. MADE GROUND.	
		0.50	J+D					Dark brown mixed grey and reddish brown sandy gravelly SILT with a singular brick cobble at 2.5m. Sand is fine to medium. Gravel is fine to medium sub-rounded flint. Occasional glass and tiles. Occasional fine roots and rootlets. MADE GROUND.	
		0.90	J+D					Frequent ash and burnt material	1
		1.00 - 2.00	B					Reduced recovery. Sample included loft installation material, bulk taken.	
									2
		2.70	D		2.60			Soft bluish grey silty CLAY with brown slightly sandy gravelly SILT. Gravel is fine to coarse sub-angular flint, brick and concrete. Sand is medium. Rare organic material. MADE GROUND.	3
		3.00 - 4.00	D						
		3.70	D		3.80				
		3.90	D					Dark yellow silty sandy fine to medium sub-angular flint GRAVEL. Sand is medium to coarse. KEMPTON PARK GRAVEL	4
					4.00			End of Borehole at 4.00m	
									5
									6
									7
									8
									9
									10

General Remarks:

Occasional fine roots and rootlets observed to 2.60m bgl. Ground wet from 3.00m bgl.

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

Groundwater Remarks:

Project Name: Rivermead Leisure Centre,	Project No.: 15225	Co-ords:	Hole Type WS
Location: Reading		Level:	Scale 1:50
Client:		Dates: 01/10/2015	Logged By JH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	J+D		0.25			Grass over dark brown gravelly very sandy SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint. Occasional glass and tiles. Abundance of fine roots and rootlets. MADE GROUND	
		0.50	J+D					Dark brown sandy gravelly SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint, brick and chalk. Occasional glass and carbonised material. Occasional fine roots and rootlets. MADE GROUND	
		0.80	J+D		1.00				1
		1.30	D					Dark bluish grey sandy very gravelly SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint, brick and chalk. Occasional glass, slate and carbonised material. MADE GROUND	
		1.80	D						2
		2.50	D		2.40			Soft bluish grey mixed light brown slightly sandy silty CLAY with rare brick and tarmacadam gravel. Sand is medium. Frequent glass and organic material. Rare roots. MADE GROUND	
		2.80	D						3
		3.70	D						4
		4.40	D		4.70				
		4.90	D		5.00			Dark yellow silty sandy fine to medium sub-angular flint GRAVEL. Sand is medium to coarse. KEMPTON PARK GRAVEL	5
								End of Borehole at 5.00m	
									6
									7
									8
									9
									10

General Remarks: Occasional fine roots and rootlets observed to 2.70m bgl. Ground wet from 3.00m bgl.	Borehole Type CP: Cable Percussive WS: Windowless Sampler RC: Rotary Cored	Sample Types D: Disturbed B: Bulk J: Jar W: Water U: Undisturbed
	In-Situ Testing SPT: Split spoon - Standard Penetration Test CPT: Cone - Standard Penetration Test	
Groundwater Remarks:		

**Soils Limited**Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk**Borehole Log**

Borehole No.

WS4

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.: 15225

Co-ords:

Hole Type
WS

Location: Reading

Level:

Scale
1:50

Client:

Dates: 01/10/2015

Logged By
JH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	J+D		0.25			Grass over brown gravelly sandy SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint and rare brick. Abundance of fine roots and rootlets. MADE GROUND	
		0.50	J+D					Dark brown and dark grey sandy very clayey fine to coarse sub-angular flint, tarmacadam and sandstone GRAVEL. Sand is medium to coarse. Rare roots and decomposing material. MADE GROUND	1
		0.70	J+D						
		1.30	D		1.50			Dark grey sandy fine to coarse sub-angular flint, tarmacadam and sandstone GRAVEL. Sand is medium to coarse. MADE GROUND	2
		1.80	D						
		2.30	D		2.60			Soft bluish grey and light brown slightly sandy silty CLAY with rare brick and tarmacadam gravel. Sand is medium. Rare glass and organic material. Occasional fine roots and rootlets. MADE GROUND	3
		2.80	D		3.00			End of Borehole at 3.00m	
									4
									5
									6
									7
									8
									9
									10

General Remarks:

Occasional fine roots decomposing material observed to 3.0m bgl. No groundwater encountered.

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

Groundwater Remarks:

**Soils Limited**Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk**Borehole Log**

Borehole No.

WS5

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.: 15225

Co-ords:

Hole Type
WS

Location: Reading

Level:

Scale
1:50

Client:

Dates: 01/10/2015

Logged By
JH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	J+D		0.15			Grass over brown gravelly sandy SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint and brick. Abundance of fine roots and rootlets. MADE GROUND	
		0.40	J+D					Dark brown and dark grey sandy very clayey fine to coarse sub-angular flint, tarmacadam and sandstone GRAVEL. Sand is medium to coarse. Rare roots and decomposing material. MADE GROUND	
		0.80	J+D						
		1.20	D		1.00			Dark grey sandy fine to coarse sub-angular flint, tarmacadam and sandstone GRAVEL. Sand is medium to coarse. MADE GROUND	1
		1.80	D		1.30			Dark grey sandy clayey fine to coarse sub-angular flints, tarmacadam and sandstone GRAVEL with pockets of brown very gravelly clay. Sand is medium to coarse. decomposing plant material at 3.5 to 4.0m. MADE GROUND	
								No recovery	2
		2.60	D						
								No recovery	3
		3.60	D					Sample is saturated.	
					4.00			End of Borehole at 4.00m	4
									5
									6
									7
									8
									9
									10

General Remarks:

Occasional fine roots observed 1.00m bgl. No groundwater encountered.

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

Groundwater Remarks:

Project Name: Rivermead Leisure Centre,	Project No.: 15225	Co-ords:	Hole Type WS
Location: Reading		Level:	Scale 1:50
Client:		Dates: 01/10/2015	Logged By JH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	J+D		0.20			Grass over brown gravelly sandy SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint and brick. Abundance of fine roots and rootlets. MADE GROUND	
		0.30	J+D		0.50			Dark reddish brown sandy gravelly cobbled SILT. Gravel is fine to coarse sub-angular flint and sandstone. Sand is medium to coarse. Rare roots and rootlets. MADE GROUND	
		0.70	J+D		1.00			Dark brown and black sandy gravelly SILT with a layer of grey silty CLAY at 0.7 to 0.8. Sand is fine to medium. Gravel is fine to medium sub-rounded flint and brick. Occasional decomposing material. MADE GROUND	1
		1.00 - 2.00	D					Brown and grey slightly sandy very silty fine to coarse sub-angular flint, brick and concrete GRAVEL. Sand is medium. Occasional glass and porcelain. Occasional decomposing plant material. MADE GROUND.	
		2.00 - 3.00	D					Samples in small disturbed bags.	2
		3.00 - 4.00	D		3.00			Soft bluish grey sandy gravelly CLAY. Gravel is fine sub-angular brick and concrete. Sand is medium. Frequent organic material and glass. MADE GROUND.	3
					4.40				4
		4.80	D		5.00			Dark greenish yellow clayey sandy fine to medium sub-angular flint GRAVEL. Sand is medium to coarse. KEMPTON PARK GRAVEL	5
								End of Borehole at 5.00m	6
									7
									8
									9
									10

General Remarks:

Occasional fine roots observed to 0.50m bgl. Ground wet from 3.00m bgl.

Borehole Type

CP: Cable Percussive
WS: Windowless Sampler
RC: Rotary Cored

Sample Types

D: Disturbed
B: Bulk
J: Jar
W: Water
U: Undisturbed

In-Situ Testing

SPT: Split spoon - Standard Penetration Test
CPT: Cone - Standard Penetration Test

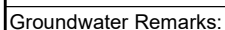
Groundwater Remarks:

Project Name: Rivermead Leisure Centre,	Project No.: 15225	Co-ords:	Hole Type WS
Location: Reading		Level:	Scale 1:50
Client:		Dates: 01/10/2015	Logged By JH

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	J+D					Turf over dark brown sandy gravelly SILT. Sand is fine to medium. Gravel is fine to medium sub-rounded flint and brick. Occasional glass and tiles. Abundance of roots and rootlets. MADE GROUND	
		0.70	J+D		0.60			Yellowish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse sub-rounded flint and brick. Occasional glass. Abundance of roots and rootlets. MADE GROUND	
		0.90	J+D		0.80			Dark brown and black sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse sub-rounded flint and brick. Occasional glass and paper. Frequent decomposing and burnt material. MADE GROUND	1
		1.00 - 2.00	D						
	▼								
		2.20	D		2.40			Soft bluish grey silty CLAY with brown slightly sandy gravelly SILT. Gravel is fine sub-angular flint, brick and concrete. Sand is medium. Rare organic material and glass. MADE GROUND.	2
		2.80	D					20% recovery	3
		3.80	D		3.80			Very soft black and blueish grey silty CLAY with an abundance of decomposing material. MADE GROUND.	4
		4.30	D						
		4.90	D		4.80			Dark greenish yellow clayey sandy fine to medium sub-angular flint GRAVEL. Sand is medium to coarse. KEMPTON PARK GRAVEL	5
					5.00			End of Borehole at 5.00m	
									6
									7
									8
									9
									10

General Remarks: Occasional fine roots observed to 0.80m bgl. Groundwater standing at 2.00m bgl.	Borehole Type CP: Cable Percussive WS: Windowless Sampler RC: Rotary Cored	Sample Types D: Disturbed B: Bulk J: Jar W: Water U: Undisturbed
	In-Situ Testing SPT: Split spoon - Standard Penetration Test CPT: Cone - Standard Penetration Test	

Groundwater Remarks:



Probe Log

Borehole No.

DP1

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.
15225

Co-ords: -

Hole Type
DP

Location: Reading

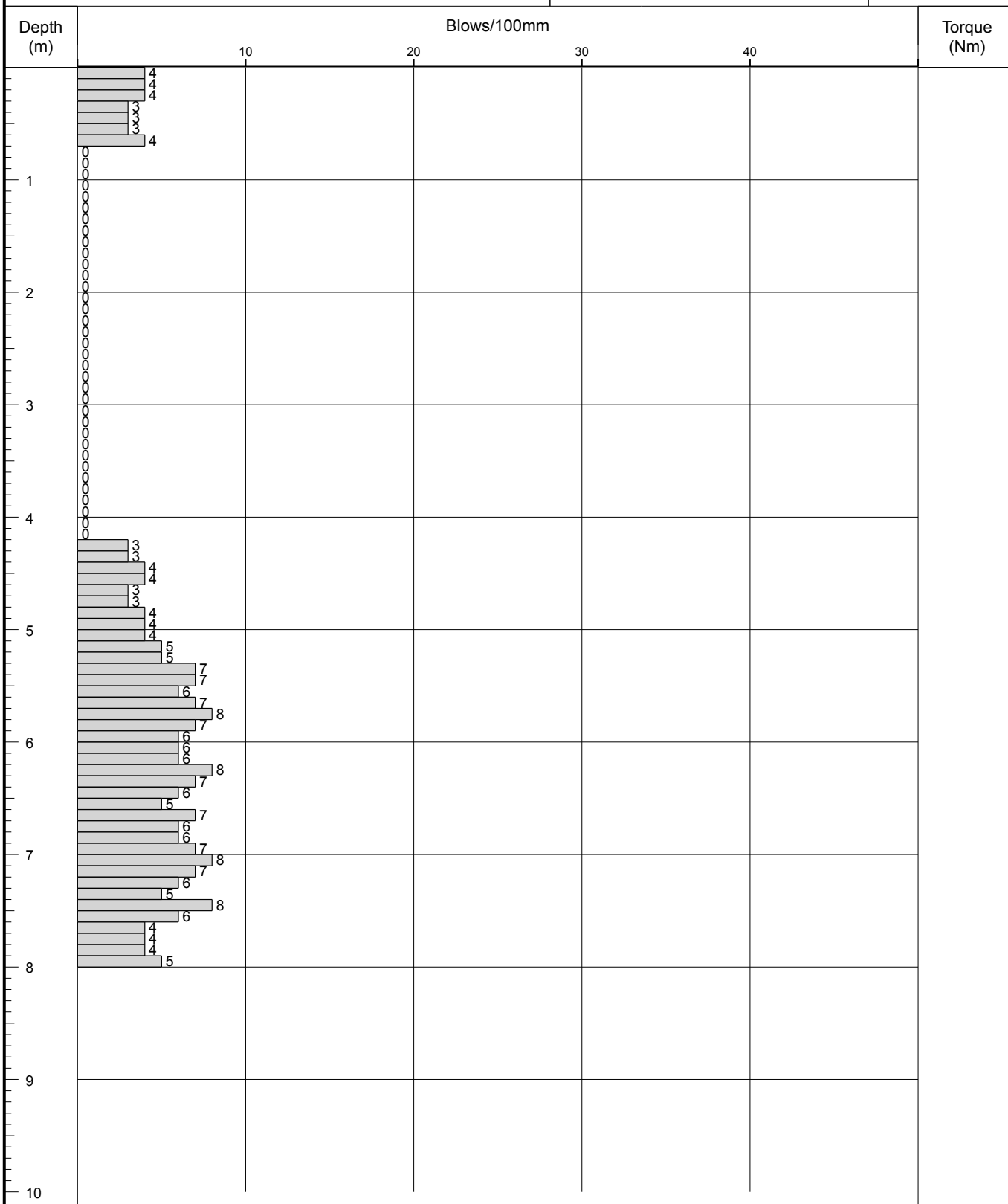
Level:

Scale
1:50

Client:

Dates: 30/09/2015 - 30/09/2015

Logged By



Remarks

Fall Height

Cone Base Diameter

Hammer Wt

Final Depth 7.90

Probe Type

Log Scale 1:50

Probe Log

Borehole No.

DP2

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.
15225

Co-ords: -

Hole Type
DP

Location: Reading

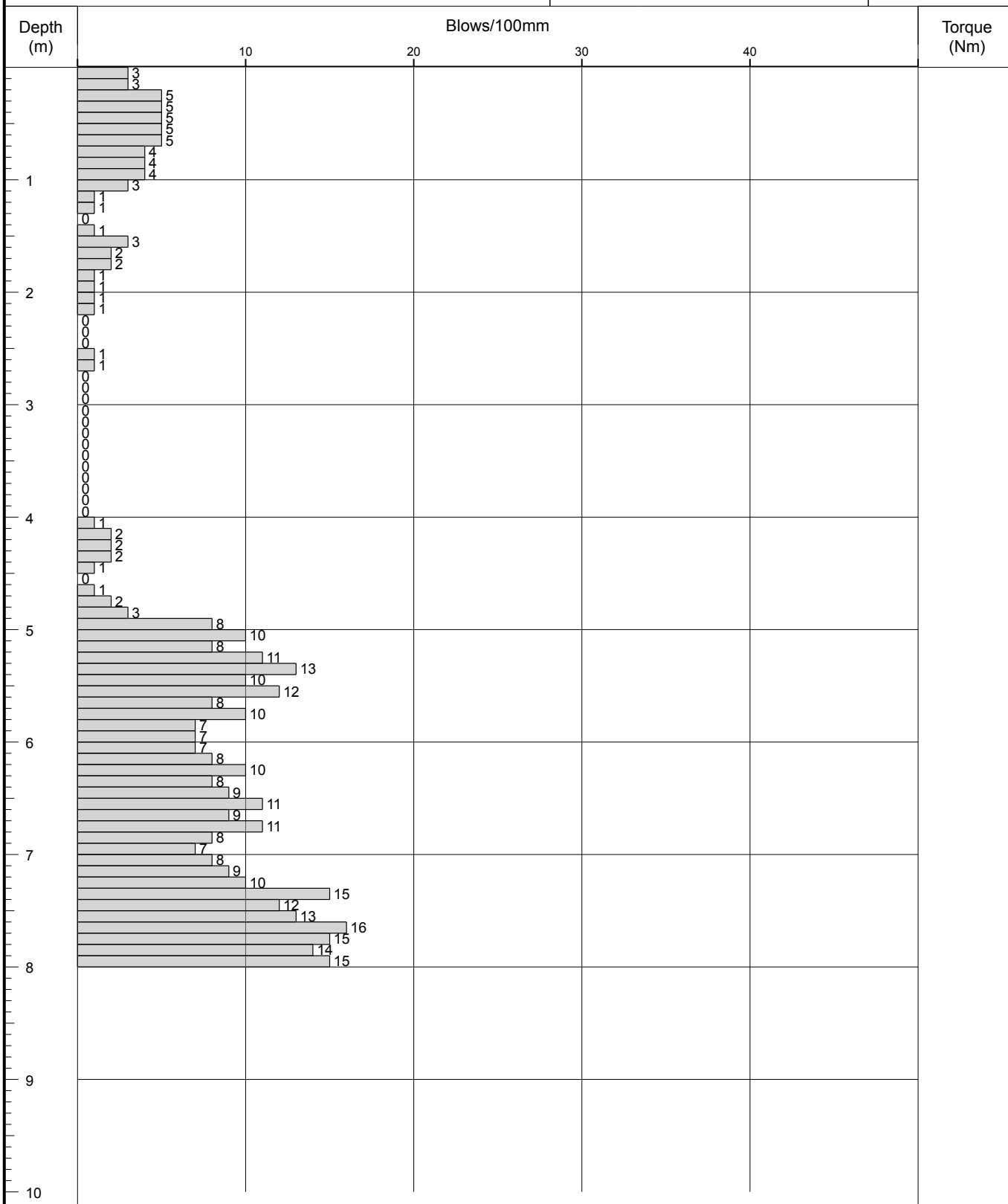
Level:

Scale
1:50

Client:

Dates: 30/09/2015 - 30/09/2015

Logged By



Remarks

Fall Height

Cone Base Diameter

Hammer Wt

Final Depth 7.90

Probe Type

Log Scale 1:50



Probe Log

Borehole No.

DP4

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.
15225

Co-ords: -

Hole Type
DP

Location: Reading

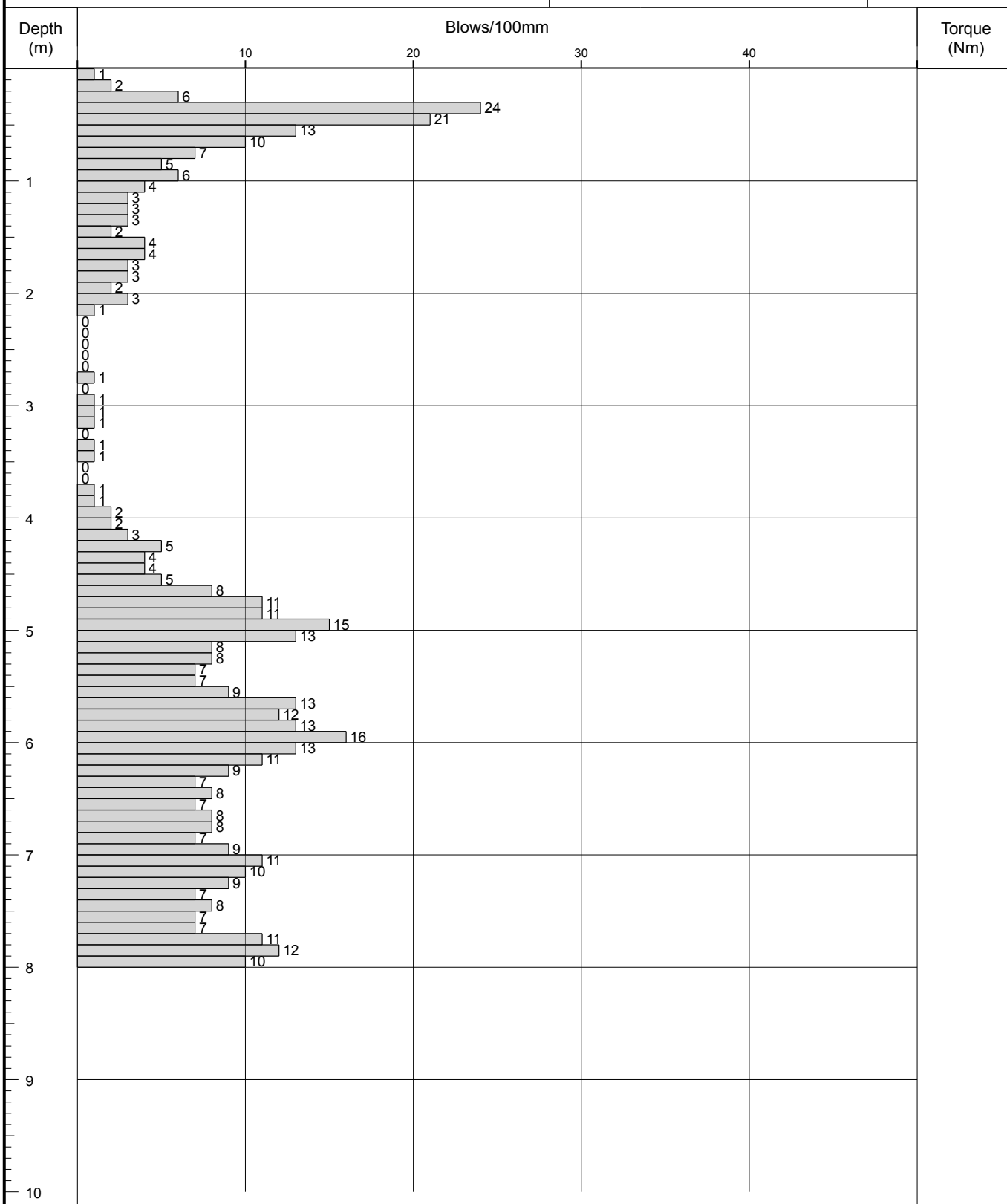
Level:

Scale
1:50

Client:

Dates: 30/09/2015 - 30/09/2015

Logged By



Remarks

Fall Height

Cone Base Diameter

Hammer Wt

Final Depth 7.90

Probe Type

Log Scale 1:50

Probe Log

Borehole No.

DP5

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.
15225

Co-ords: -

Hole Type
DP

Location: Reading

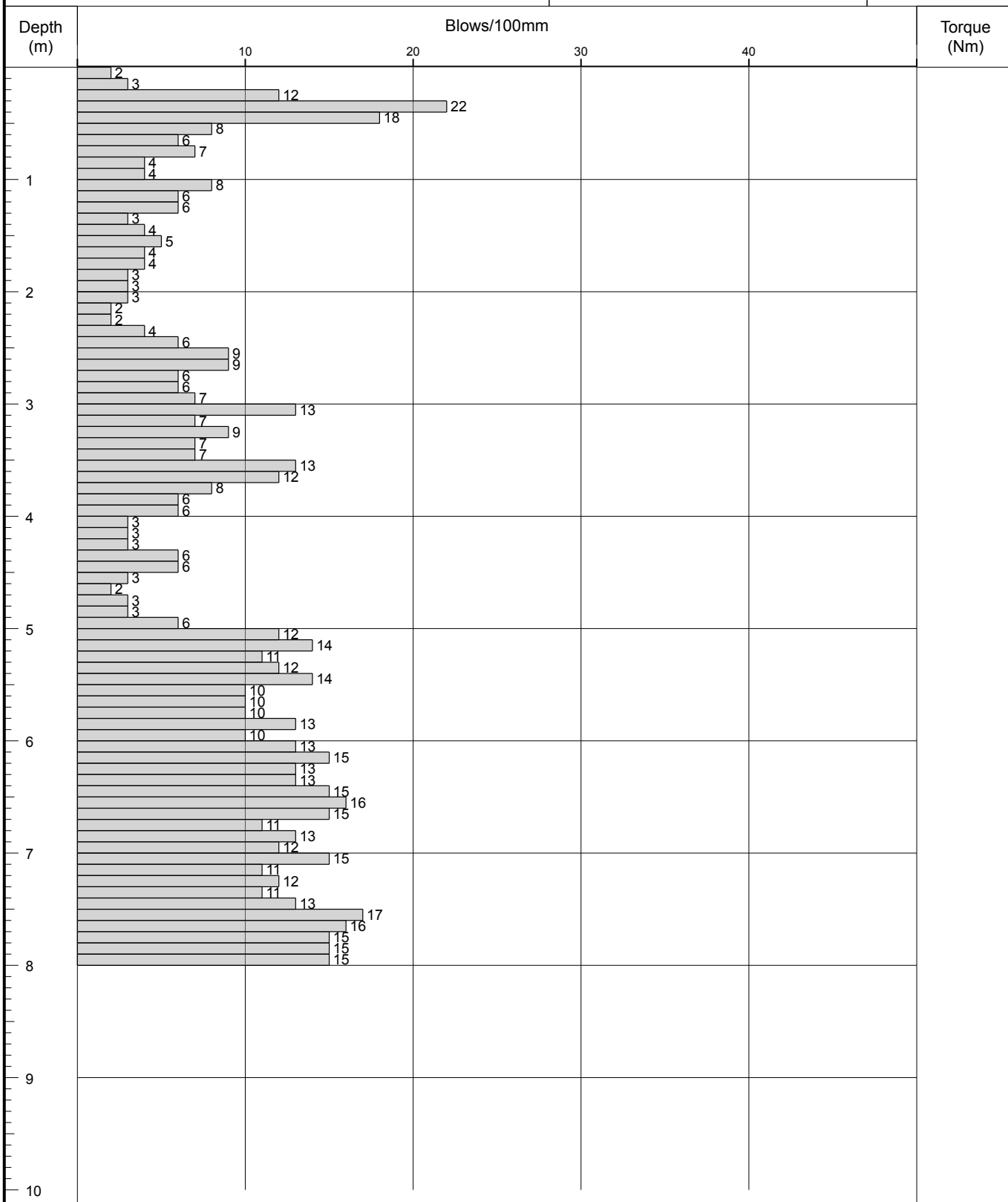
Level:

Scale
1:50

Client:

Dates: 30/09/2015 - 30/09/2015

Logged By



Remarks

Fall Height

Cone Base Diameter

Hammer Wt

Final Depth 7.90

Probe Type

Log Scale 1:50



Probe Log

Borehole No.

DP6

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.
15225

Co-ords: -

Hole Type
DP

Location: Reading

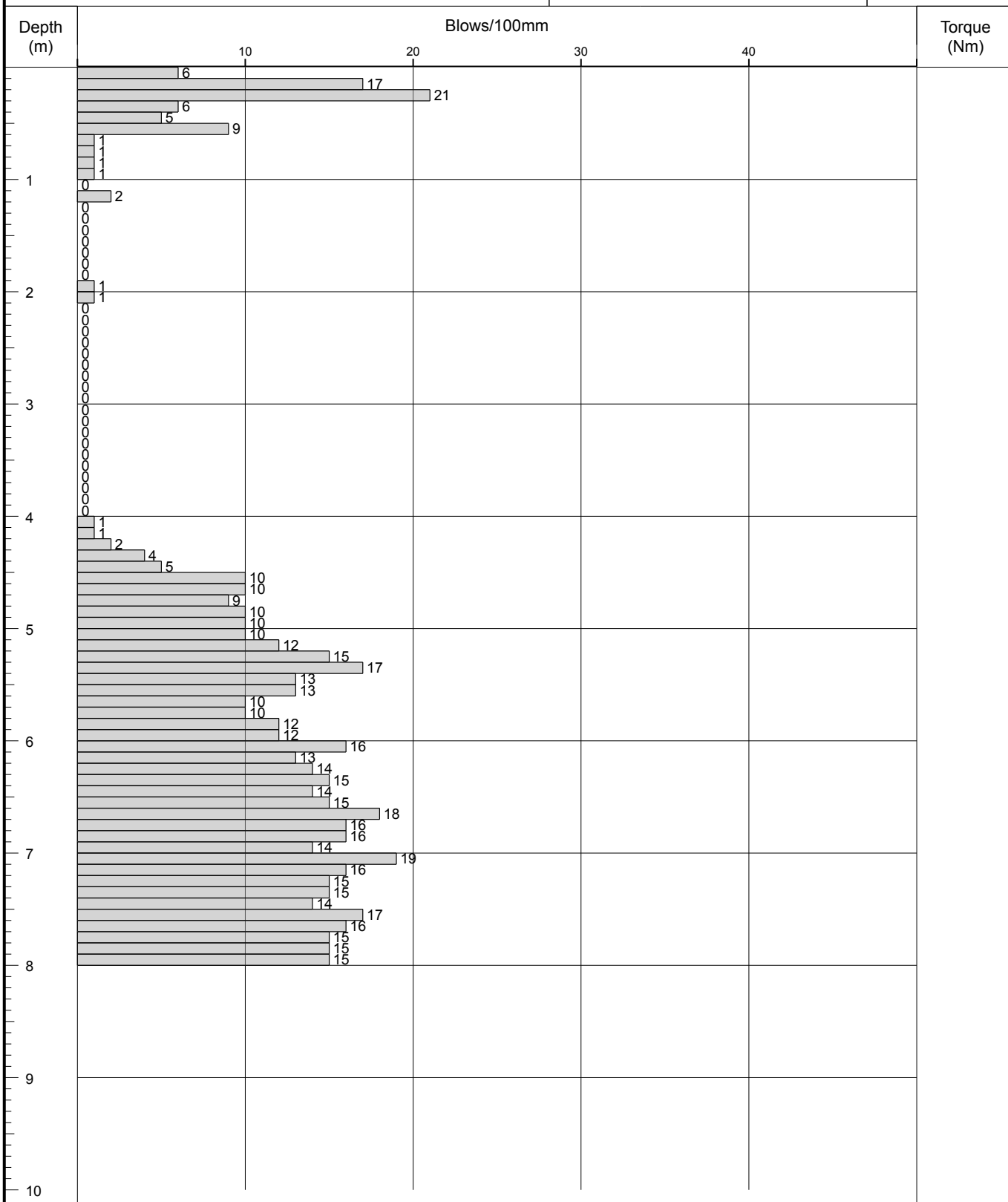
Level:

Scale
1:50

Client:

Dates: 30/09/2015 - 30/09/2015

Logged By



Remarks

Fall Height

Cone Base Diameter

Hammer Wt

Final Depth 7.90

Probe Type

Log Scale 1:50



Probe Log

Borehole No.

DP7

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.
15225

Co-ords: -

Hole Type
DP

Location: Reading

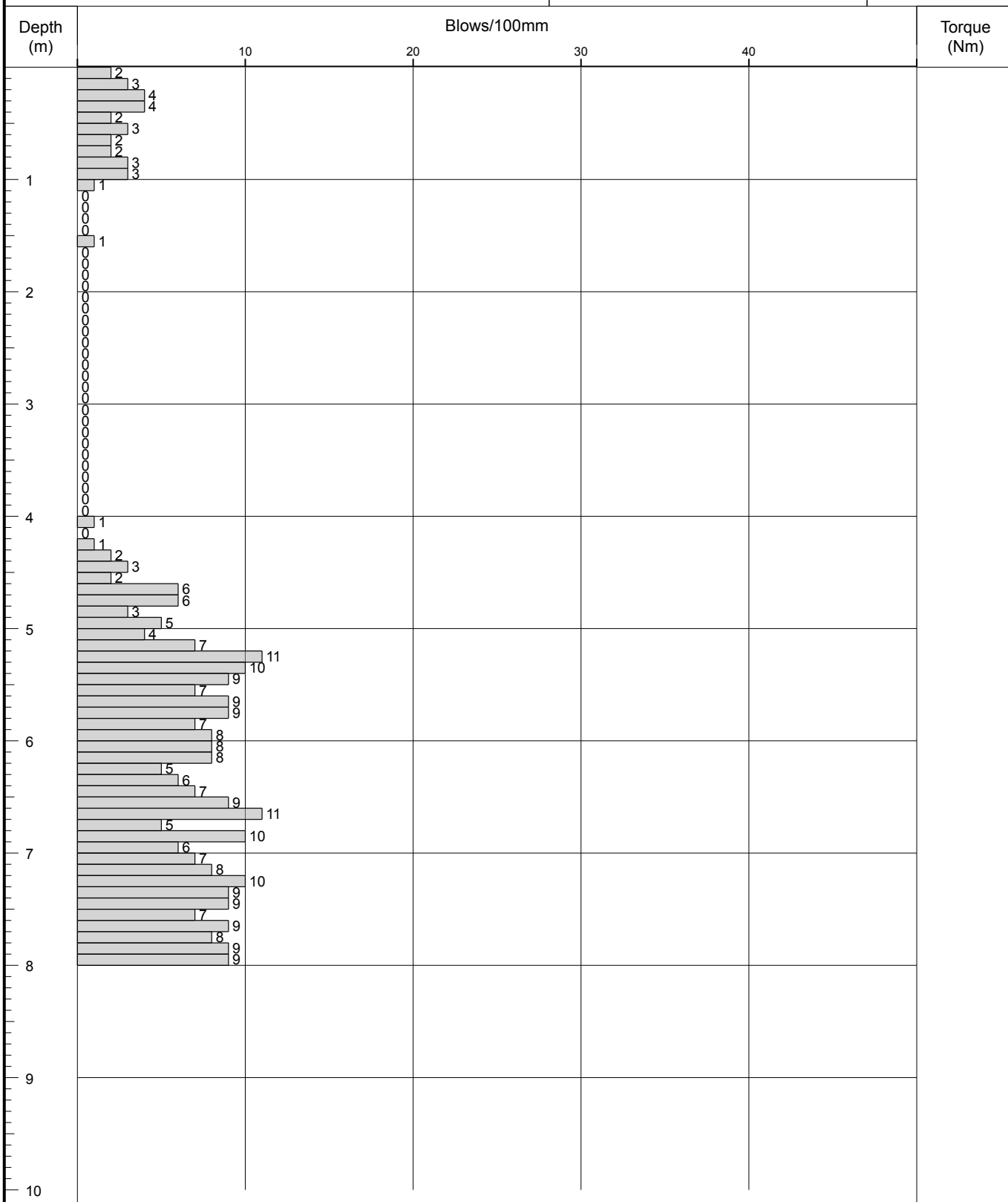
Level:

Scale
1:50

Client:

Dates: 30/09/2015 - 30/09/2015

Logged By



Remarks

Fall Height

Cone Base Diameter

Hammer Wt

Final Depth 7.90

Probe Type

Log Scale 1:50

Probe Log

Borehole No.

DP8

Sheet 1 of 1

Project Name: Rivermead Leisure Centre,

Project No.
15225

Co-ords: -

Hole Type
DP

Location: Reading

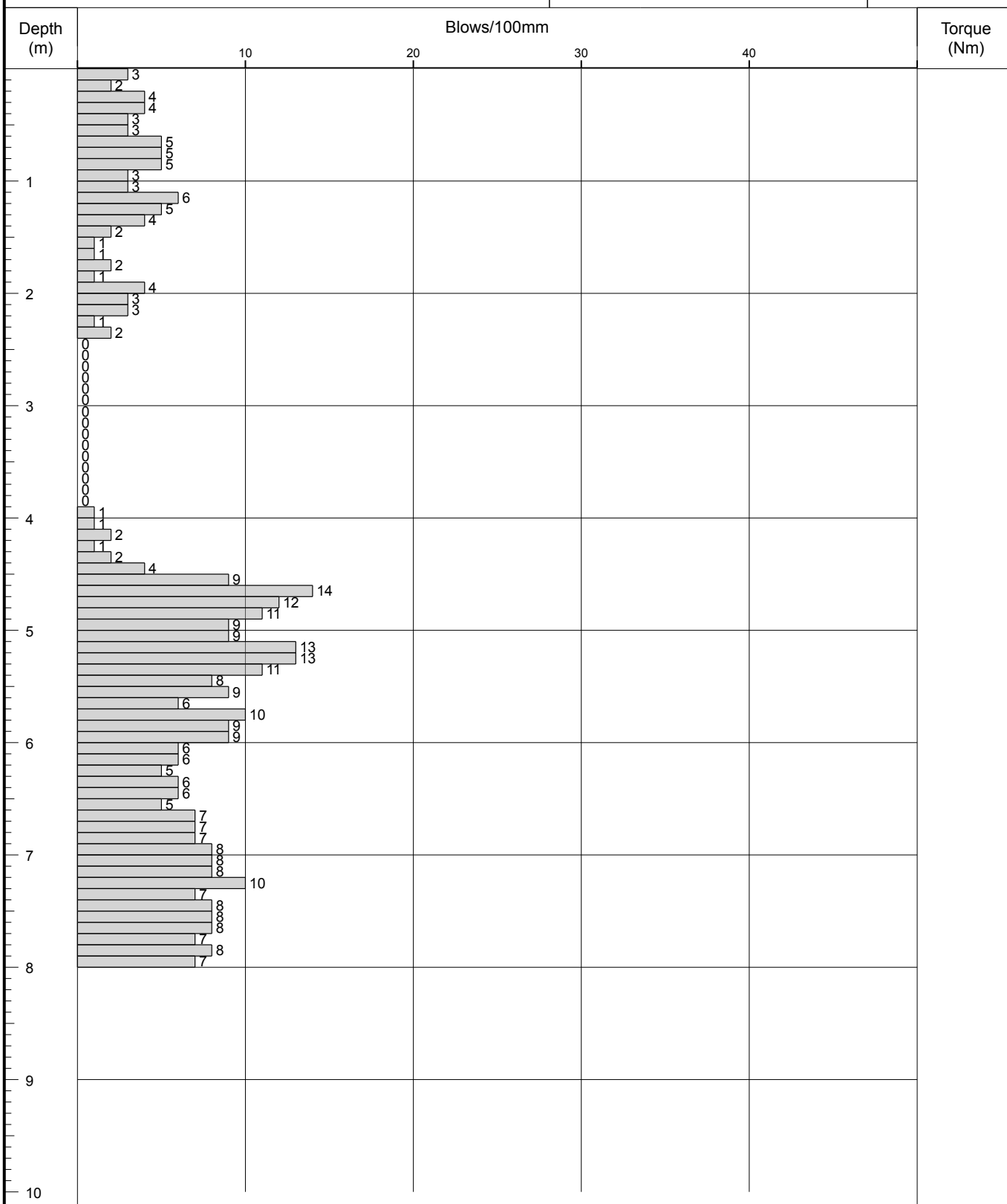
Level:

Scale
1:50

Client:

Dates: 30/09/2015 - 30/09/2015

Logged By



Remarks

Fall Height

Cone Base Diameter

Hammer Wt

Final Depth 7.90

Probe Type

Log Scale 1:50

Appendix B Geotechnical Laboratory Results



Contract Number: 28701

Client's Reference: **15225**

Report Date: **23-10-2015**

Client **Soils Limited**
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

Contract Title: **Rivermead Leisure Centre**
For the attention of: **Sam Bevins**

Date Received: **16-10-2015**
Date Commenced: **16-10-2015**
Date Completed: **23-10-2015**

Test Description	Qty
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	2
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	2
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	2
(SMC) Saturated Moisture Content 1377 : 1990 Part 2 : 3.3 & 7.3 - @ Non Accredited Test	6
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:

Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - D V Edwards (Managing Director)
Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager)

Client ref: 15225
Location: Rivermead Leisure Centre
Contract Number: 28701

[illegible]

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory



For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)

Date: 22.10.15

[Signature]

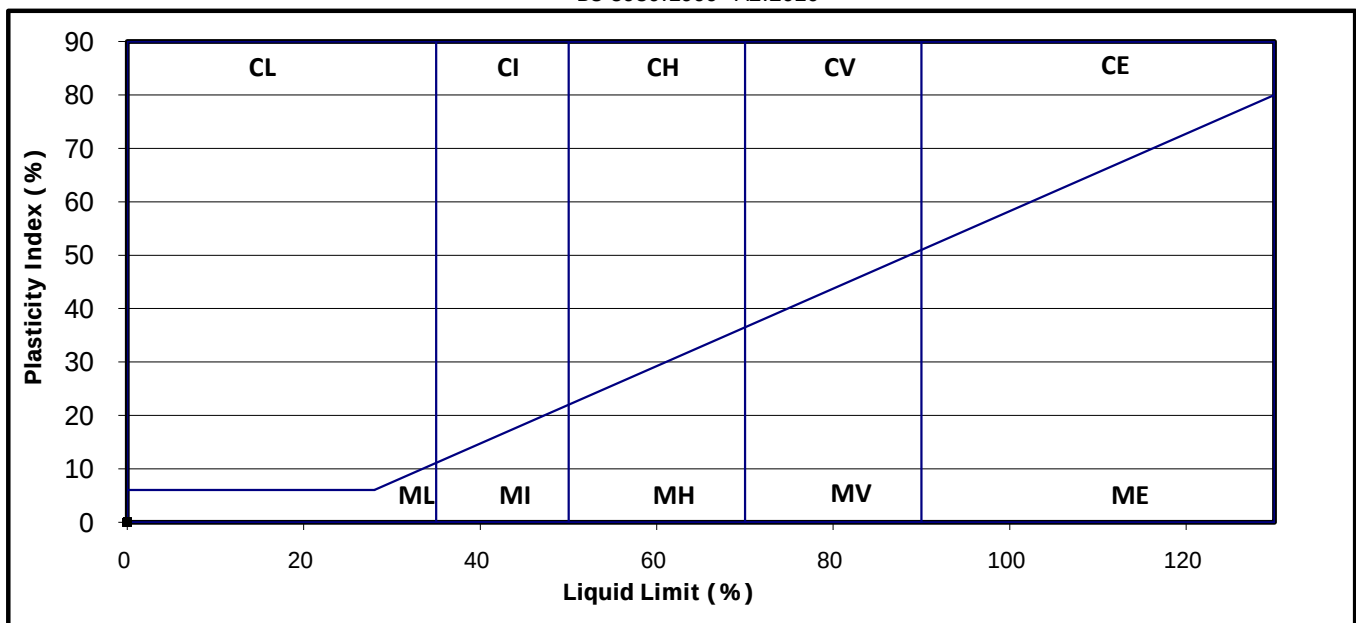


**Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5**

Client ref: 15225
Location: Rivermead Leisure Centre
Contract Number: 28701

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
BH2	D	3.00	9.9		NP		5	
BH2	D	5.00	3.9		NP		6	

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



Test Report:

Particle Size Distribution Test BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

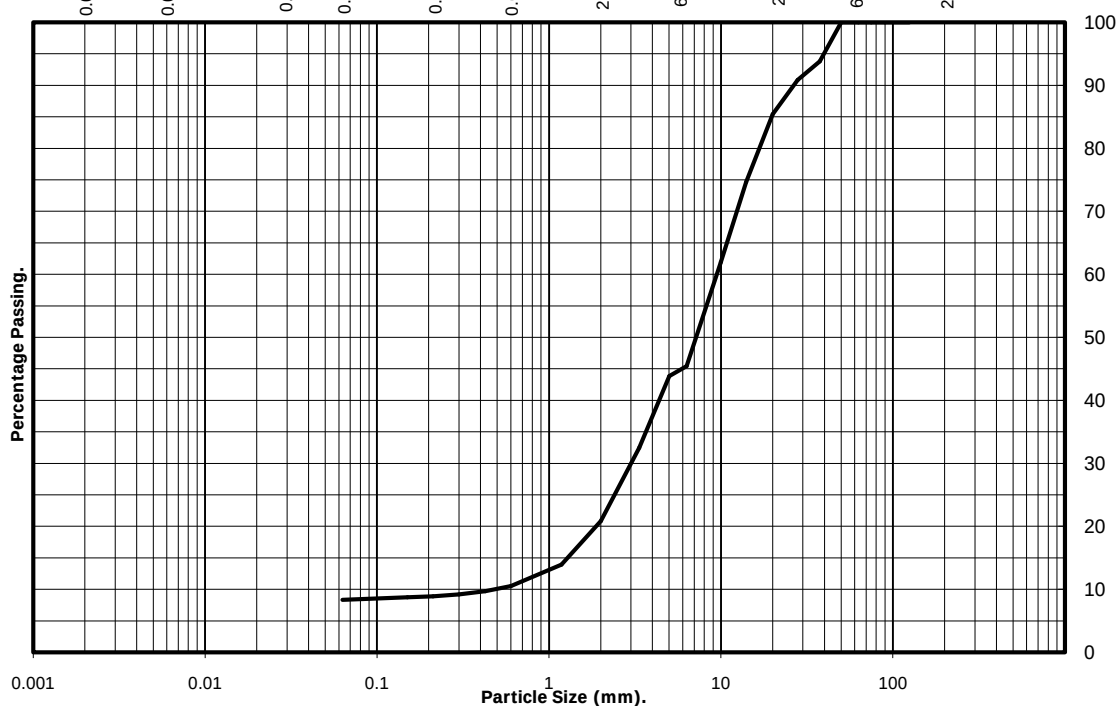
Client ref: 15225
Contract Number: 28701
Hole Number: BH1

Sample Number:
Depth from (m): 4.50
Depth to (m):
Sample Type: D

Location: Rivermead Leisure Centre
Description: Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL.

	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
CLAY	SILT			SAND			GRAVEL			COBBLES

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	94
28	91
20	85
14	75
10	62
6.3	45
5.0	44
3.35	32
2.00	21
1.18	14
0.60	11
0.425	10
0.300	9
0.212	9
0.150	9
0.063	8



Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

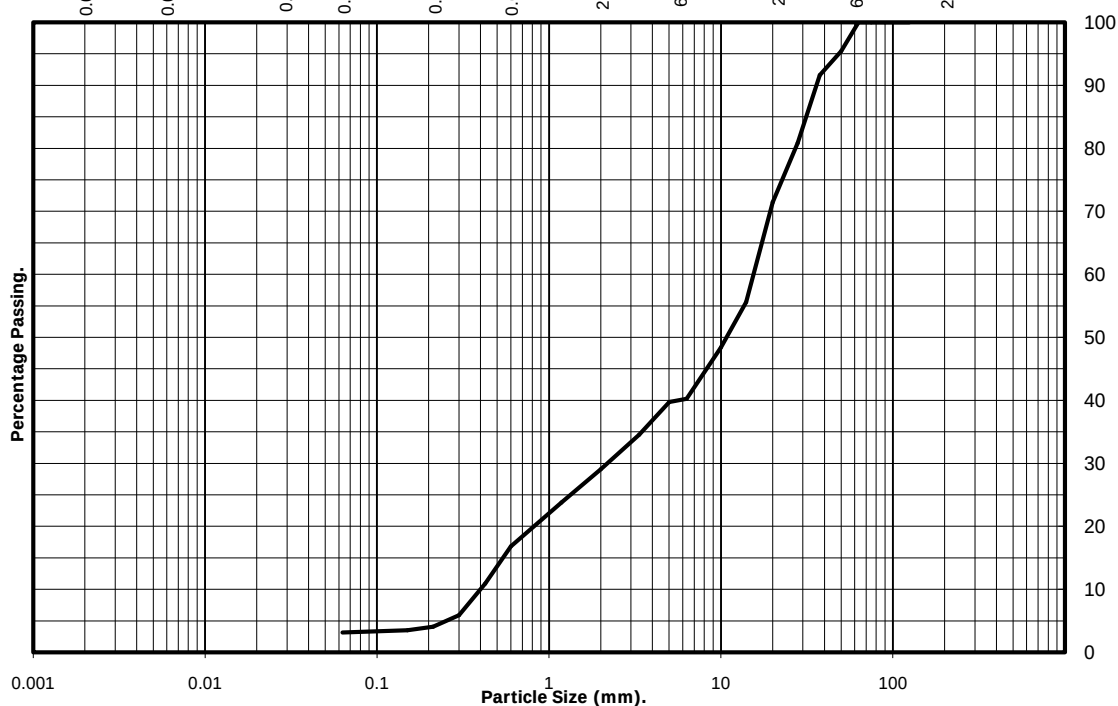
Client ref: 15225
Contract Number: 28701
Hole Number: BH6

Sample Number:
Depth from (m): 6.00
Depth to (m):
Sample Type: D

Location: Rivermead Leisure Centre
Description: Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL.

	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
CLAY	SILT			SAND			GRAVEL			COBBLES

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	95
37.5	92
28	81
20	71
14	56
10	48
6.3	40
5.0	40
3.35	35
2.00	29
1.18	24
0.60	17
0.425	11
0.300	6
0.212	4
0.150	4
0.063	3



Particle Diameter	% Passing
0.02	#
0.006	#
0.002	#

	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	3	26	71	0	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)

Date: 22.10.15



Client Ref: 15225
Location : Rivermead Leisure Centre
Contract Number: 28701

[illegible]

End

Checked By



Approved By



Sam Bevins
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR



QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 15-36545

Site Reference: Rivermead Leisure Centre

Project / Job Ref: 15225

Order No: 15225/SB

Sample Receipt Date: 15/10/2015

Sample Scheduled Date: 15/10/2015

Report Issue Number: 1

Reporting Date: 20/10/2015

Authorised by:

Russell Jarvis
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'R Jarvis'.

Authorised by:

Kevin Old
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'Kevin Old'.



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
QTS Environmental Report No: 15-36545	Date Sampled	01/10/15	01/10/15	30/09/15	30/09/15	
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Rivermead Leisure Centre	TP / BH No	BH1	BH1	BH2	BH2	
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 15225/SB	Depth (m)	5.00	10.00	4.00	12.50	
Reporting Date: 20/10/2015	QTSE Sample No	172411	172412	172413	172414	

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	8.2	8.3	7.9	8.3	
Total Sulphate as SO ₄	mg/kg	< 200	NONE	966	465	515	500	
Total Sulphate as SO ₄	%	< 0.02	NONE	0.10	0.05	0.05	0.05	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	62	18	104	20	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.06	0.02	0.10	0.02	
Total Sulphur	%	< 0.02	NONE	0.03	< 0.02	0.04	< 0.02	
Ammonium as NH ₄	mg/kg	< 0.5	NONE	11.3	9	12	7	
Ammonium as NH ₄	mg/l	< 0.05	NONE	1.13	0.90	1.20	0.70	
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	17	10	7	9	
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	8.4	5.1	3.5	4.7	
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	< 3	MCERTS	103	11	< 3	6	
Water Soluble Nitrate (2:1) as NO ₃	mg/l	< 1.5	MCERTS	51.7	5.7	< 1.5	3.2	
W/S Magnesium	mg/l	< 0.1	NONE	1.4	1.3	1.5	1.3	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

Subcontracted analysis ^(S)



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-36545	
Soils Ltd	
Site Reference: Rivermead Leisure Centre	
Project / Job Ref: 15225	
Order No: 15225/SB	
Reporting Date: 20/10/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
\$ 172411	BH1	None Supplied	5.00	7.3	Light brown sandy gravel with stones
\$ 172412	BH1	None Supplied	10.00	18.5	White clay with chalk
\$ 172413	BH2	None Supplied	4.00	8.7	Grey clayey gravel with rubble
\$ 172414	BH2	None Supplied	12.50	16.5	White clay with chalk

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{U/5}

\$ samples exceeded recommended holding times



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Methodology & Miscellaneous Information				
QTS Environmental Report No: 15-36545				
Soils Ltd				
Site Reference: Rivermead Leisure Centre				
Project / Job Ref: 15225				
Order No: 15225/SB				
Reporting Date: 20/10/2015				

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Appendix C Chemical Laboratory Analysis



Sam Bevins
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR



QTS Environmental Ltd
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Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 15-36325

Site Reference: Rivermead Leisure Centre

Project / Job Ref: 15225

Order No: 15225/SB

Sample Receipt Date: 09/10/2015

Sample Scheduled Date: 09/10/2015

Report Issue Number: 1

Reporting Date: 15/10/2015

Authorised by:

Russell Jarvis
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'R Jarvis'.

Authorised by:

Kevin Old
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'Kevin Old'.



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
QTS Environmental Report No: 15-36325	Date Sampled	30/09/15	30/09/15	30/09/15	30/09/15	01/10/15
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS1	WS2	WS3	WS4
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15225/SB	Depth (m)	0.40	2.80	0.50	0.50	0.10
Reporting Date: 15/10/2015	QTSE Sample No	171497	171498	171499	171500	171501

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	8.2	7.4	7.6	7.6	7.5
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	44	290	112	32	14
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.04	0.29	0.11	0.03	0.01
Sulphide	mg/kg	< 5	NONE	< 5	24	< 5	< 5	< 5
Organic Matter	%	< 0.1	MCERTS	2.5	4.1	3.3	0.7	3.5
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	1.4	2.4	1.9	0.4	2
Arsenic (As)	mg/kg	< 2	MCERTS	18	16	28	14	17
Beryllium (Be)	mg/kg	< 0.5	NONE	0.9	2.3	1.3	0.9	0.9
W/S Boron	mg/kg	< 1	NONE	1.1	1.4	2.7	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	0.5
Chromium (Cr)	mg/kg	< 2	MCERTS	39	54	34	21	24
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	50	45	30	19	41
Lead (Pb)	mg/kg	< 3	MCERTS	121	64	59	34	84
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	20	37	27	12	21
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	37	84	67	40	35
Zinc (Zn)	mg/kg	< 3	MCERTS	132	259	95	41	375
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Marcus Jones

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽⁵⁾



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Soil Analysis Certificate						
QTS Environmental Report No: 15-36325	Date Sampled	01/10/15	01/10/15	01/10/15	01/10/15	30/09/15
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rivermead Leisure Centre	TP / BH No	WS4	WS5	WS6	WS6	WS7
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15225/SB	Depth (m)	0.70	0.40	0.30	2.00 - 3.00	0.20
Reporting Date: 15/10/2015	QTSE Sample No	171502	171503	171504	171505	171506

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.5	7.6	7.6	7.2	7.5
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	6	< 2
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	491	99	78	2020	119
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.49	0.10	0.08	2.02	0.12
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	197	< 5
Organic Matter	%	< 0.1	MCERTS	0.4	1.6	1.5	7.4	5.4
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	0.2	0.9	0.9	4.3	3.1
Arsenic (As)	mg/kg	< 2	MCERTS	21	38	13	43	24
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5	< 0.5	1.1	5.1	1.7
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	1.3	9	2.2
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	1	1.4	< 0.2	4.7	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	9	12	40	67	27
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	16	18	39	348	62
Lead (Pb)	mg/kg	< 3	MCERTS	81	146	81	448	136
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	11	12	33	65	35
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	11	18	60	49	46
Zinc (Zn)	mg/kg	< 3	MCERTS	192	269	143	1160	239
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

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Asbestos Analyst: Marcus Jones

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽⁵⁾



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Soil Analysis Certificate						
QTS Environmental Report No: 15-36325	Date Sampled	30/09/15	30/09/15			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Rivermead Leisure Centre	TP / BH No	WS7	WS8			
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied			
Order No: 15225/SB	Depth (m)	0.90	0.40			
Reporting Date: 15/10/2015	QTSE Sample No	171507	171508			

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected			
pH	pH Units	N/a	MCERTS	7.5	7.6			
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	320	68			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.32	0.07			
Sulphide	mg/kg	< 5	NONE	< 5	< 5			
Organic Matter	%	< 0.1	MCERTS	7.7	0.8			
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	4.5	0.4			
Arsenic (As)	mg/kg	< 2	MCERTS	37	7			
Beryllium (Be)	mg/kg	< 0.5	NONE	5.4	< 0.5			
W/S Boron	mg/kg	< 1	NONE	7.3	< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	2.1	< 0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	28	15			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	146	13			
Lead (Pb)	mg/kg	< 3	MCERTS	327	26			
Mercury (Hg)	mg/kg	< 1	NONE	2.2	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	47	7			
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3			
Vanadium (V)	mg/kg	< 2	NONE	55	19			
Zinc (Zn)	mg/kg	< 3	MCERTS	282	49			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

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Asbestos Analyst: Marcus Jones

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽⁵⁾



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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 15-36325	Date Sampled	30/09/15	30/09/15	30/09/15	30/09/15	01/10/15
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS1	WS2	WS3	WS4
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15225/SB	Depth (m)	0.40	2.80	0.50	0.50	0.10
Reporting Date: 15/10/2015	QTSE Sample No	171497	171498	171499	171500	171501

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.35	0.21	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.85	0.48	0.13	< 0.1	0.21
Pyrene	mg/kg	< 0.1	MCERTS	0.70	0.41	< 0.1	< 0.1	0.18
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.46	0.23	< 0.1	< 0.1	0.15
Chrysene	mg/kg	< 0.1	MCERTS	0.38	0.22	< 0.1	< 0.1	0.12
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.56	0.28	0.11	< 0.1	0.19
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.21	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.42	0.21	< 0.1	< 0.1	0.15
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.31	0.14	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.27	0.12	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	4.5	2.3	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 15-36325	Date Sampled	01/10/15	01/10/15	01/10/15	01/10/15	30/09/15
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rivermead Leisure Centre	TP / BH No	WS4	WS5	WS6	WS6	WS7
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15225/SB	Depth (m)	0.70	0.40	0.30	2.00 - 3.00	0.20
Reporting Date: 15/10/2015	QTSE Sample No	171502	171503	171504	171505	171506

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.11	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.28	< 0.1	0.20
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.22	< 0.1	0.18
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.15	< 0.1	0.11
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.13	< 0.1	0.12
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.19	< 0.1	0.19
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.17	< 0.1	0.14
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Lenham Heath
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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 15-36325	Date Sampled	30/09/15	30/09/15			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Rivermead Leisure Centre	TP / BH No	WS7	WS8			
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied			
Order No: 15225/SB	Depth (m)	0.90	0.40			
Reporting Date: 15/10/2015	QTSE Sample No	171507	171508			

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	0.59	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	0.24	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	1.73	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	1.53	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	1.02	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	1.01	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	1.92	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.61	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	1.41	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	1.33	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	0.17	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	1.16	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	12.7	< 1.6			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - TPH LQM Banded

QTS Environmental Report No: 15-36325	Date Sampled	30/09/15	30/09/15	01/10/15	01/10/15	30/09/15
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS4	WS6	WS7
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15225/SB	Depth (m)	0.40	0.50	0.10	2.00 - 3.00	0.90
Reporting Date: 15/10/2015	QTSE Sample No	171497	171499	171501	171505	171507

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	4	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	80
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	80
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	10
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	105
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	115
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60	< 60	195

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - TPH LQM Banded						
QTS Environmental Report No: 15-36325	Date Sampled	30/09/15				
Soils Ltd	Time Sampled	None Supplied				
Site Reference: Rivermead Leisure Centre	TP / BH No	WS8				
Project / Job Ref: 15225	Additional Refs	None Supplied				
Order No: 15225/SB	Depth (m)	0.40				
Reporting Date: 15/10/2015	QTSE Sample No	171508				

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01			
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	< 10			
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10			
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30			
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01			
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2			
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2			
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2			
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3			
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10			
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10			
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30			
Total >C5 - C44	mg/kg	< 60	NONE	< 60			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 15-36325	Date Sampled	30/09/15	30/09/15	01/10/15	01/10/15	30/09/15
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS4	WS6	WS7
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 15225/SB	Depth (m)	0.40	0.50	0.10	2.00 - 3.00	0.90
Reporting Date: 15/10/2015	QTSE Sample No	171497	171499	171501	171505	171507

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 15-36325	Date Sampled	30/09/15				
Soils Ltd	Time Sampled	None Supplied				
Site Reference: Rivermead Leisure Centre	TP / BH No	WS8				
Project / Job Ref: 15225	Additional Refs	None Supplied				
Order No: 15225/SB	Depth (m)	0.40				
Reporting Date: 15/10/2015	QTSE Sample No	171508				

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2				
Toluene	ug/kg	< 5	MCERTS	< 5				
Ethylbenzene	ug/kg	< 2	MCERTS	< 2				
p & m-xylene	ug/kg	< 2	MCERTS	< 2				
o-xylene	ug/kg	< 2	MCERTS	< 2				
MTBE	ug/kg	< 5	MCERTS	< 5				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-36325	
Soils Ltd	
Site Reference: Rivermead Leisure Centre	
Project / Job Ref: 15225	
Order No: 15225/SB	
Reporting Date: 15/10/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
171497	WS1	None Supplied	0.40	8.6	Brown clayey gravel and vegetation
171498	WS1	None Supplied	2.80	20.6	Brown clayey gravel
171499	WS2	None Supplied	0.50	12.1	Brown clayey gravel
171500	WS3	None Supplied	0.50	11.5	Brown clayey gravel with stones
171501	WS4	None Supplied	0.10	12	Brown clayey gravel with vegetation
171502	WS4	None Supplied	0.70	6.9	Brown clayey gravel with rubble
171503	WS5	None Supplied	0.40	7.8	Brown clayey gravel with rubble
171504	WS6	None Supplied	0.30	6.1	Brown clayey gravel with rubble
171505	WS6	None Supplied	2.00 - 3.00	22.4	Brown clayey gravel
171506	WS7	None Supplied	0.20	11	Brown clayey gravel with vegetation
171507	WS7	None Supplied	0.90	15.6	Brown clayey gravel with rubble and rubble
171508	WS8	None Supplied	0.40	5.4	Light brown gravelly clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/S}

Unsuitable Sample ^{U/S}



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Soil Analysis Certificate - Methodology & Miscellaneous Information				
QTS Environmental Report No: 15-36325				
Soils Ltd				
Site Reference: Rivermead Leisure Centre				
Project / Job Ref: 15225				
Order No: 15225/SB				
Reporting Date: 15/10/2015				

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 15-36628

Site Reference: Rivermead Leisure Centre

Project / Job Ref: 15225

Order No: 15225/SB

Sample Receipt Date: 15/10/2015

Sample Scheduled Date: 16/10/2015

Report Issue Number: 1

Reporting Date: 22/10/2015

Authorised by:

Russell Jarvis
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'R Jarvis'.

Authorised by:

Kevin Old
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'K Old'.



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Water Analysis Certificate						
QTS Environmental Report No: 15-36628	Date Sampled	15/10/15	15/10/15	15/10/15		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS6		
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 15225/SB	Depth (m)	None Supplied	None Supplied	None Supplied		
Reporting Date: 22/10/2015	QTSE Sample No	172802	172803	172804		

Determinand	Unit	RL	Accreditation				
pH	pH Units	N/a	ISO17025	7.0	6.9	6.9	
Total Cyanide	ug/l	< 5	NONE	< 5	< 5	< 5	
Sulphate as SO ₄	mg/l	< 1	ISO17025	39	4	4	
Sulphide	mg/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1	
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	18.1	10.6	11.4	
Arsenic (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	6	
Beryllium (dissolved)	ug/l	< 3	ISO17025	< 3	< 3	< 3	
Boron (dissolved)	ug/l	< 5	ISO17025	1550	1470	2860	
Cadmium (dissolved)	ug/l	< 0.4	ISO17025	< 0.4	< 0.4	< 0.4	
Chromium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Chromium (hexavalent)	ug/l	< 5	NONE	< 5	< 5	< 5	
Copper (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Lead (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Mercury (dissolved)	ug/l	< 0.05	ISO17025	< 0.05	< 0.05	< 0.05	
Nickel (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Selenium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Vanadium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Zinc (dissolved)	ug/l	< 2	ISO17025	4	3	< 2	
Total Phenols (monohydric)	ug/l	< 10	NONE	< 10	< 10	< 10	

Subcontracted analysis ^(S)
Insufficient sample ^{I/S}
Unsuitable Sample ^{U/S}



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Water Analysis Certificate - Speciated PAH						
QTS Environmental Report No: 15-36628	Date Sampled	15/10/15	15/10/15	15/10/15		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS6		
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 15225/SB	Depth (m)	None Supplied	None Supplied	None Supplied		
Reporting Date: 22/10/2015	QTSE Sample No	172802	172803	172804		

Determinand	Unit	RL	Accreditation					
Naphthalene	ug/l	< 0.01	NONE	0.15	< 0.01	< 0.01		
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Acenaphthene	ug/l	< 0.01	NONE	0.41	0.10	< 0.01		
Fluorene	ug/l	< 0.01	NONE	0.20	0.06	< 0.01		
Phenanthrene	ug/l	< 0.01	NONE	0.30	0.18	< 0.01		
Anthracene	ug/l	< 0.01	NONE	0.04	0.04	< 0.01		
Fluoranthene	ug/l	< 0.01	NONE	0.10	0.15	< 0.01		
Pyrene	ug/l	< 0.01	NONE	0.06	0.10	< 0.01		
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Chrysene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(ghi)perylene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Total EPA-16 PAHs	ug/l	< 0.01	NONE	1.26	0.63	< 0.01		



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Water Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 15-36628	Date Sampled	15/10/15	15/10/15	15/10/15		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS6		
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 15225/SB	Depth (m)	None Supplied	None Supplied	None Supplied		
Reporting Date: 22/10/2015	QTSE Sample No	172802	172803	172804		

Determinand	Unit	RL	Accreditation						
Aliphatic >C5 - C6	ug/l	< 10	NONE	< 10	< 10	< 10			
Aliphatic >C6 - C8	ug/l	< 10	NONE	< 10	< 10	< 10			
Aliphatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10	< 10			
Aliphatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10	< 10			
Aliphatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10	< 10			
Aliphatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10	< 10			
Aliphatic >C21 - C34	ug/l	< 10	NONE	< 10	< 10	< 10			
Aliphatic (C5 - C34)	ug/l	< 70	NONE	< 70	< 70	< 70			
Aromatic >C5 - C7	ug/l	< 10	NONE	< 10	< 10	< 10			
Aromatic >C7 - C8	ug/l	< 10	NONE	< 10	< 10	< 10			
Aromatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10	< 10			
Aromatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10	< 10			
Aromatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10	< 10			
Aromatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10	< 10			
Aromatic >C21 - C35	ug/l	< 10	NONE	< 10	< 10	< 10			
Aromatic (C5 - C35)	ug/l	< 70	NONE	< 70	< 70	< 70			
Total >C5 - C35	ug/l	< 140	NONE	< 140	< 140	< 140			



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Water Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 15-36628	Date Sampled	15/10/15	15/10/15	15/10/15		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS6		
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 15225/SB	Depth (m)	None Supplied	None Supplied	None Supplied		
Reporting Date: 22/10/2015	QTSE Sample No	172802	172803	172804		

Determinand	Unit	RL	Accreditation					
Benzene	ug/l	< 1	ISO17025	< 1	< 1	< 1		
Toluene	ug/l	< 5	ISO17025	< 5	< 5	< 5		
Ethylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5		
p & m-xylene	ug/l	< 10	ISO17025	< 10	< 10	< 10		
o-xylene	ug/l	< 5	ISO17025	< 5	< 5	< 5		
MTBE	ug/l	< 10	ISO17025	< 10	< 10	< 10		



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Water Analysis Certificate - Volatile Organic Compounds (VOC)

QTS Environmental Report No: 15-36628	Date Sampled	15/10/15	15/10/15	15/10/15		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS6		
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 15225/SB	Depth (m)	None Supplied	None Supplied	None Supplied		
Reporting Date: 22/10/2015	QTSE Sample No	172802	172803	172804		

Determinand	Unit	RL	Accreditation				
Dichlorodifluoromethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Vinyl Chloride	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Chloromethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Chloroethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Bromomethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Trichlorofluoromethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,1-Dichloroethene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
MTBE	ug/l	< 10	ISO17025	< 10	< 10	< 10	
trans-1,2-Dichloroethene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,1-Dichloroethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
cis-1,2-Dichloroethene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
2,2-Dichloropropane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Chloroform	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Bromochloromethane	ug/l	< 10	ISO17025	< 10	< 10	< 10	
1,1,1-Trichloroethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,1-Dichloropropene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Carbon Tetrachloride	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,2-Dichloroethane	ug/l	< 10	ISO17025	< 10	< 10	< 10	
Benzene	ug/l	< 1	ISO17025	< 1	< 1	< 1	
1,2-Dichloropropane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Trichloroethene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Bromodichloromethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Dibromomethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
TAME	ug/l	< 5	ISO17025	< 5	< 5	< 5	
cis-1,3-Dichloropropene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Toluene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
trans-1,3-Dichloropropene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,1,2-Trichloroethane	ug/l	< 10	ISO17025	< 10	< 10	< 10	
1,3-Dichloropropane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Tetrachloroethene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Dibromochloromethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,2-Dibromoethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Chlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,1,1,2-Tetrachloroethane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Ethyl Benzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
m,p-Xylene	ug/l	< 10	ISO17025	< 10	< 10	< 10	
o-Xylene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Styrene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Bromoform	ug/l	< 10	ISO17025	< 10	< 10	< 10	
Isopropylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,1,2,2-Tetrachloroethane	ug/l	< 10	ISO17025	< 10	< 10	< 10	
1,2,3-Trichloropropane	ug/l	< 5	ISO17025	< 5	< 5	< 5	
n-Propylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
Bromobenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
2-Chlorotoluene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,3,5-Trimethylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
4-Chlorotoluene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
tert-Butylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,2,4-Trimethylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
sec-Butylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
p-Isopropyltoluene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,3-Dichlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,4-Dichlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
n-Butylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,2-Dichlorobenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	
1,2-Dibromo-3-chloropropane	ug/l	< 10	ISO17025	< 10	< 10	< 10	
Hexachlorobutadiene	ug/l	< 5	ISO17025	< 5	< 5	< 5	



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Water Analysis Certificate - Semi Volatile Organic Compounds (SVOC)						
QTS Environmental Report No: 15-36628	Date Sampled	15/10/15	15/10/15	15/10/15		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Rivermead Leisure Centre	TP / BH No	WS1	WS2	WS6		
Project / Job Ref: 15225	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 15225/SB	Depth (m)	None Supplied	None Supplied	None Supplied		
Reporting Date: 22/10/2015	QTSE Sample No	172802	172803	172804		

Determinand	Unit	RL	Accreditation					
Phenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
1,2,4-Trichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2-Nitrophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Nitrobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
0-Cresol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
bis(2-chloroethoxy)methane	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
bis(2-chloroethyl)ether	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2,4-Dichlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2-Chlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
1,3-Dichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
1,4-Dichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
1,2-Dichlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2,4-Dimethylphenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Isophorone	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Hexachloroethane	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
p-Cresol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2,4,6-Trichlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2,4,5-Trichlorophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2-Nitroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Chloro-3-methylphenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2-Methylnaphthalene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Hexachlorocyclopentadiene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Hexachlorobutadiene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2,6-Dinitrotoluene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Dimethyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2-Chloronaphthalene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Chloroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Nitrophenol	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Chlorophenyl phenyl ether	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
3-Nitroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Nitroaniline	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Bromophenyl phenyl ether	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Hexachlorobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2,4-Dinitrotoluene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Diethyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Dibenzofuran	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Azobenzene	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Dibutyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Carbazole	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
bis(2-ethylhexyl)phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Benzyl butyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Di-n-octyl phthalate	ug/l	< 0.1	NONE	< 0.1	< 0.1	< 0.1		



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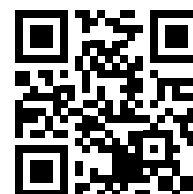
Soil Analysis Certificate - Methodology & Miscellaneous Information	
QTS Environmental Report No: 15-36628	
Soils Ltd	
Site Reference: Rivermead Leisure Centre	
Project / Job Ref: 15225	
Order No: 15225/SB	
Reporting Date: 22/10/2015	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Waste Classification Report



78MKP-HKRTN-NTWWY

Job name

15225 - Rivermead Leisure Centre, Richfield Avenue, Reading, West Berkshire RG1 8EQ

Waste Stream

Default Contaminated Land

Comments

Project

15225

Site

Rivermead Leisure Centre, Richfield Avenue, Reading, West Berkshire RG1 8EQ

Classified by

Name:
Wilkinson, Luke
Date:
12/11/2015 09:03 UTC
Telephone:
01737 814221

Company:
Soils Ltd
Newton House
Cross Road
KT20 5SR

Report

Created by: Wilkinson, Luke
Created date: 12/11/2015 09:03 UTC

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazardous properties	Page
1	WS1/0.40		Non Hazardous		3
2	WS1/2.80		Non Hazardous		5
3	WS2/0.50		Non Hazardous		7
4	WS3/0.50		Non Hazardous		9
5	WS4/0.10		Hazardous	HP 7	11
6	WS4/0.70		Non Hazardous		13
7	WS5/0.40		Non Hazardous		15
8	WS6/0.30		Non Hazardous		17
9	WS6/2.00 - 3.00		Hazardous	HP 7, HP 12, HP 14	19
10	WS7/0.20		Non Hazardous		22
11	WS7/0.90		Potentially Hazardous	HP 3(i)	24
12	WS8/0.40		Non Hazardous		27

Appendices

[Appendix A: Classifier defined and non CLP determinands](#)
[Appendix B: Notes](#)

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Appendices	Page
Appendix C: Version	31

Classification of sample: WS1/0.40

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS1/0.40	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 18 mg/kg, converted to compound conc.:23.766 mg/kg or 0.00238%)
 benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 benzo[a]anthracene: (Whole conc. entered as: 0.46 mg/kg or 0.000046%)
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.42 mg/kg or 0.000042%)
 benzo[b]fluoranthene: (Whole conc. entered as: 0.56 mg/kg or 0.000056%)
 benzo[ghi]perylene: (Whole conc. entered as: 0.27 mg/kg or 0.000027%)
 benzo[k]fluoranthene: (Whole conc. entered as: 0.21 mg/kg or 0.000021%)
 beryllium oxide: (Cation conc. entered: 0.9 mg/kg, converted to compound conc.:2.498 mg/kg or 0.00025%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: 1.1 mg/kg, converted to compound conc.:14.773 mg/kg or 0.00148%)
 cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) **IGNORED Because: "<LOD"**
 chromium(III) oxide: (Cation conc. entered: 39 mg/kg, converted to compound conc.:57.001 mg/kg or 0.0057%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: 0.38 mg/kg or 0.000038%)
 copper (I) oxide: (Cation conc. entered: 50 mg/kg, converted to compound conc.:56.294 mg/kg or 0.00563%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: 0.85 mg/kg or 0.000085%)
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: 0.31 mg/kg or 0.000031%)
 lead chromate: (Cation conc. entered: 121 mg/kg, converted to compound conc.:188.738 mg/kg or 0.0189%, Note 1 conc.: 0.0121%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 20 mg/kg, converted to compound conc.:31.59 mg/kg or 0.00316%)
 pH: (Whole conc. entered as: 8.2 pH, converted to conc.:8.2 pH or 8.2 pH)
 phenanthrene: (Whole conc. entered as: 0.35 mg/kg or 0.000035%)
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**

pyrene: (Whole conc. entered as: 0.7 mg/kg or 0.00007%)
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.: <7.661 mg/kg or <0.000766%) **IGNORED Because: "<LOD"**
toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) **IGNORED Because: "<LOD"**
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <60 mg/kg or <0.006%) **IGNORED Because: "<LOD"**
xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
zinc chromate: (Cation conc. entered: 132 mg/kg, converted to compound conc.: 366.187 mg/kg or 0.0366%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[a]anthracene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[ghi]perylene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[k]fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "chromium(III) oxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "chrysene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "phenanthrene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "pyrene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "zinc chromate"

Note 1 , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead chromate"
Test: "HP 7 on Carc. 1B; H350, Carc. 1A; H350, Carc. 1B; H350i, Carc. 1A; H350i" for determinand: "lead chromate"
Test: "HP 10 on Repr. 1A; H360, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1B; H360Fd, Repr. 1B; H360Df, Repr. 1A; H360Df" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS1/2.80

 **Non Hazardous Waste**
 Classified as **17 05 04**
 in the List of Waste

Sample details

Sample Name:	LoW Code:
WS1/2.80	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 16 mg/kg, converted to compound conc.:21.125 mg/kg or 0.00211%)
 benzo[a]anthracene: (Whole conc. entered as: 0.23 mg/kg or 0.000023%)
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.21 mg/kg or 0.000021%)
 benzo[b]fluoranthene: (Whole conc. entered as: 0.28 mg/kg or 0.000028%)
 benzo[ghi]perylene: (Whole conc. entered as: 0.12 mg/kg or 0.000012%)
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: 2.3 mg/kg, converted to compound conc.:6.383 mg/kg or 0.000638%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: 1.4 mg/kg, converted to compound conc.:18.802 mg/kg or 0.00188%)
 cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) **IGNORED Because: "<LOD"**
 chromium(III) oxide: (Cation conc. entered: 54 mg/kg, converted to compound conc.:78.924 mg/kg or 0.00789%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: 0.22 mg/kg or 0.000022%)
 copper (I) oxide: (Cation conc. entered: 45 mg/kg, converted to compound conc.:50.665 mg/kg or 0.00507%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: 0.48 mg/kg or 0.000048%)
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: 0.14 mg/kg or 0.000014%)
 lead chromate: (Cation conc. entered: 64 mg/kg, converted to compound conc.:99.828 mg/kg or 0.00998%, Note 1 conc.: 0.0064%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 37 mg/kg, converted to compound conc.:58.441 mg/kg or 0.00584%)
 pH: (Whole conc. entered as: 7.4 pH, converted to conc.:7.4 pH or 7.4 pH)
 phenanthrene: (Whole conc. entered as: 0.21 mg/kg or 0.000021%)
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 pyrene: (Whole conc. entered as: 0.41 mg/kg or 0.000041%)

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.: <7.661 mg/kg or <0.000766%) **IGNORED Because:** "<LOD"

zinc chromate: (Cation conc. entered: 259 mg/kg, converted to compound conc.: 718.504 mg/kg or 0.0719%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[a]anthracene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[ghi]perylene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "chromium(III) oxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "chrysene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "phenanthrene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "pyrene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "zinc chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS2/0.50

Non Hazardous Waste

 Classified as **17 05 04**
 in the List of Waste

Sample details

Sample Name:	LoW Code:
WS2/0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 28 mg/kg, converted to compound conc.: 36.969 mg/kg or 0.0037%)
 benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[b]fluoranthene: (Whole conc. entered as: 0.11 mg/kg or 0.000011%)
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: 1.3 mg/kg, converted to compound conc.: 3.608 mg/kg or 0.000361%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: 2.7 mg/kg, converted to compound conc.: 36.261 mg/kg or 0.00363%)
 cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.: <0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) **IGNORED Because: "<LOD"**
 chromium(III) oxide: (Cation conc. entered: 34 mg/kg, converted to compound conc.: 49.693 mg/kg or 0.00497%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.: <3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 copper (I) oxide: (Cation conc. entered: 30 mg/kg, converted to compound conc.: 33.777 mg/kg or 0.00338%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.: <3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: 0.13 mg/kg or 0.000013%)
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 59 mg/kg, converted to compound conc.: 92.029 mg/kg or 0.0092%, Note 1 conc.: 0.0059%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.: <1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 27 mg/kg, converted to compound conc.: 42.646 mg/kg or 0.00426%)
 pH: (Whole conc. entered as: 7.6 pH, converted to conc.: 7.6 pH or 7.6 pH)
 phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**

pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.: <7.661 mg/kg or <0.000766%) **IGNORED Because: "<LOD"**
toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) **IGNORED Because: "<LOD"**
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <60 mg/kg or <0.006%) **IGNORED Because: "<LOD"**
xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
zinc chromate: (Cation conc. entered: 95 mg/kg, converted to compound conc.: 263.544 mg/kg or 0.0264%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Note 1 , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead chromate"
Test: "HP 7 on Carc. 1A; H350, Carc. 1A; H350i, Carc. 1B; H350, Carc. 1B; H350i" for determinand: "lead chromate"
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1A; H360Df, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1B; H360Fd, Repr. 1B; H360Df" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS3/0.50

 **Non Hazardous Waste**
 Classified as **17 05 04**
 in the List of Waste

Sample details

Sample Name:	LoW Code:
WS3/0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 14 mg/kg, converted to compound conc.:18.485 mg/kg or 0.00185%)
 benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: 0.9 mg/kg, converted to compound conc.:2.498 mg/kg or 0.00025%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) **IGNORED Because: "<LOD"**
 cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) **IGNORED Because: "<LOD"**
 chromium(III) oxide: (Cation conc. entered: 21 mg/kg, converted to compound conc.:30.693 mg/kg or 0.00307%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 copper (I) oxide: (Cation conc. entered: 19 mg/kg, converted to compound conc.:21.392 mg/kg or 0.00214%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 34 mg/kg, converted to compound conc.:53.034 mg/kg or 0.0053%, Note 1 conc.: 0.0034%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 12 mg/kg, converted to compound conc.:18.954 mg/kg or 0.0019%)
 pH: (Whole conc. entered as: 7.6 pH, converted to conc.:7.6 pH or 7.6 pH)
 phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.:<7.661 mg/kg or <0.000766%) **IGNORED Because:** "<LOD"

zinc chromate: (Cation conc. entered: 41 mg/kg, converted to compound conc.:113.74 mg/kg or 0.0114%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS4/0.10

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

Sample details

Sample Name:	LoW Code:
WS4/0.10	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

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

Hazard Statements hit:

Carc. 1A; 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:

zinc chromate: (compound conc.: 0.104%)

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 17 mg/kg, converted to compound conc.:22.446 mg/kg or 0.00224%)
 benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 benzo[a]anthracene: (Whole conc. entered as: 0.15 mg/kg or 0.000015%)
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.15 mg/kg or 0.000015%)
 benzo[b]fluoranthene: (Whole conc. entered as: 0.19 mg/kg or 0.000019%)
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: 0.9 mg/kg, converted to compound conc.:2.498 mg/kg or 0.00025%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) **IGNORED Because: "<LOD"**
 cadmium sulfide: (Cation conc. entered: 0.5 mg/kg, converted to compound conc.:0.643 mg/kg or 0.0000643%, Note 1 conc.: 0.00005%)
 chromium(III) oxide: (Cation conc. entered: 24 mg/kg, converted to compound conc.:35.077 mg/kg or 0.00351%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: 0.12 mg/kg or 0.000012%)
 copper (I) oxide: (Cation conc. entered: 41 mg/kg, converted to compound conc.:46.161 mg/kg or 0.00462%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: 0.21 mg/kg or 0.000021%)
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 84 mg/kg, converted to compound conc.:131.024 mg/kg or 0.0131%, Note 1 conc.: 0.0084%)

mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)

IGNORED Because: "<LOD"

naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

nickel dihydroxide: (Cation conc. entered: 21 mg/kg, converted to compound conc.:33.169 mg/kg or 0.00332%)

pH: (Whole conc. entered as: 7.5 pH, converted to conc.:7.5 pH or 7.5 pH)

phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**

pyrene: (Whole conc. entered as: 0.18 mg/kg or 0.000018%)

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (

Cation conc. entered: <3 mg/kg, converted to compound conc.:<7.661 mg/kg or <0.000766%) **IGNORED Because: "<LOD"**

toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) **IGNORED Because: "<LOD"**

TPH (C6 to C40) petroleum group: (Whole conc. entered as: <60 mg/kg or <0.006%) **IGNORED Because: "<LOD"**

xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**

zinc chromate: (Cation conc. entered: 375 mg/kg, converted to compound conc.:1040.305 mg/kg or 0.104%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]anthracene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chrysene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "pyrene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "cadmium sulfide"

Note 1 , used on:

Test: "HP 5 on STOT SE 1; H370, STOT RE 1; H372" for determinand: "cadmium sulfide"

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "cadmium sulfide"

Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cadmium sulfide"

Test: "HP 7 on Carc. 1A; H350, Carc. 1A; H350i, Carc. 1B; H350, Carc. 1B; H350i" for determinand: "cadmium sulfide"

Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1A; H360Df, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1B; H360Fd, Repr. 1B; H360Df" for determinand: "lead chromate"

Test: "HP 10 on Repr. 2; H361, Repr. 2; H361f, Repr. 2; H361d, Repr. 2; H361fd" for determinand: "cadmium sulfide"

Test: "HP 11 on Muta. 2; H341" for determinand: "cadmium sulfide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS4/0.70

Non Hazardous Waste

Classified as **17 05 04**
 in the List of Waste

Sample details

Sample Name:	LoW Code:
WS4/0.70	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0 m	Entry:
Moisture content: 0%	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
(no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

arsenic trioxide: (Cation conc. entered: 21 mg/kg, converted to compound conc.:27.727 mg/kg or 0.00277%)

benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.388 mg/kg or <0.000139%) **IGNORED Because: "<LOD"**

boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) **IGNORED Because: "<LOD"**

cadmium sulfide: (Cation conc. entered: 1 mg/kg, converted to compound conc.:1.285 mg/kg or 0.000129%, Note 1 conc.: 0.0001%)

chromium(III) oxide: (Cation conc. entered: 9 mg/kg, converted to compound conc.:13.154 mg/kg or 0.00132%)

chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%) **IGNORED Because: "<LOD"**

chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

copper (I) oxide: (Cation conc. entered: 16 mg/kg, converted to compound conc.:18.014 mg/kg or 0.0018%)

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**

fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

lead chromate: (Cation conc. entered: 81 mg/kg, converted to compound conc.:126.345 mg/kg or 0.0126%, Note 1 conc.: 0.0081%)

mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%) **IGNORED Because: "<LOD"**

naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

nickel dihydroxide: (Cation conc. entered: 11 mg/kg, converted to compound conc.:17.374 mg/kg or 0.00174%)

pH: (Whole conc. entered as: 7.5 pH, converted to conc.:7.5 pH or 7.5 pH)

phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**

pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.:<7.661 mg/kg or <0.000766%) **IGNORED Because:** "<LOD"

zinc chromate: (Cation conc. entered: 192 mg/kg, converted to compound conc.:532.636 mg/kg or 0.0533%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "cadmium sulfide"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS5/0.40

 **Non Hazardous Waste**
 Classified as **17 05 04**
 in the List of Waste

Sample details

Sample Name:	LoW Code:
WS5/0.40	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 38 mg/kg, converted to compound conc.:50.172 mg/kg or 0.00502%)
 benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.388 mg/kg or <0.000139%)
IGNORED Because: "<LOD"
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) **IGNORED Because: "<LOD"**
 cadmium sulfide: (Cation conc. entered: 1.4 mg/kg, converted to compound conc.:1.799 mg/kg or 0.00018%, Note 1 conc.: 0.00014%)
 chromium(III) oxide: (Cation conc. entered: 12 mg/kg, converted to compound conc.:17.539 mg/kg or 0.00175%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 copper (I) oxide: (Cation conc. entered: 18 mg/kg, converted to compound conc.:20.266 mg/kg or 0.00203%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 146 mg/kg, converted to compound conc.:227.733 mg/kg or 0.0228%, Note 1 conc.: 0.0146%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 12 mg/kg, converted to compound conc.:18.954 mg/kg or 0.0019%)
 pH: (Whole conc. entered as: 7.6 pH, converted to conc.:7.6 pH or 7.6 pH)
 phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.: <7.661 mg/kg or <0.000766%) **IGNORED Because:** "<LOD"

zinc chromate: (Cation conc. entered: 269 mg/kg, converted to compound conc.: 746.245 mg/kg or 0.0746%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ...", used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "cadmium sulfide"

Note 1, used on:

Test: "HP 5 on STOT SE 1; H370, STOT RE 1; H372" for determinand: "cadmium sulfide"

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "cadmium sulfide"

Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cadmium sulfide"

Test: "HP 7 on Carc. 1A; H350, Carc. 1A; H350i, Carc. 1B; H350, Carc. 1B; H350i" for determinand: "cadmium sulfide"

Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1A; H360Df, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1B; H360Fd, Repr. 1B; H360Df" for determinand: "lead chromate"

Test: "HP 10 on Repr. 2; H361, Repr. 2; H361f, Repr. 2; H361d, Repr. 2; H361fd" for determinand: "cadmium sulfide"

Test: "HP 11 on Muta. 2; H341" for determinand: "cadmium sulfide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1, used on:

determinand: "cadmium sulfide"

determinand: "lead chromate"

Note A, used on:

determinand: "zinc chromate"

Classification of sample: WS6/0.30


Non Hazardous Waste
 Classified as **17 05 04**
 in the List of Waste

Sample details

Sample Name:	LoW Code:
WS6/0.30	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 13 mg/kg, converted to compound conc.:17.164 mg/kg or 0.00172%)
 benzo[a]anthracene: (Whole conc. entered as: 0.15 mg/kg or 0.000015%)
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.17 mg/kg or 0.000017%)
 benzo[b]fluoranthene: (Whole conc. entered as: 0.19 mg/kg or 0.000019%)
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: 1.1 mg/kg, converted to compound conc.:3.053 mg/kg or 0.000305%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: 1.3 mg/kg, converted to compound conc.:17.459 mg/kg or 0.00175%)
 cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) **IGNORED Because: "<LOD"**
 chromium(III) oxide: (Cation conc. entered: 40 mg/kg, converted to compound conc.:58.462 mg/kg or 0.00585%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: 0.13 mg/kg or 0.000013%)
 copper (I) oxide: (Cation conc. entered: 39 mg/kg, converted to compound conc.:43.91 mg/kg or 0.00439%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: 0.28 mg/kg or 0.000028%)
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 81 mg/kg, converted to compound conc.:126.345 mg/kg or 0.0126%, Note 1 conc.: 0.0081%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 33 mg/kg, converted to compound conc.:52.123 mg/kg or 0.00521%)
 pH: (Whole conc. entered as: 7.6 pH, converted to conc.:7.6 pH or 7.6 pH)
 phenanthrene: (Whole conc. entered as: 0.11 mg/kg or 0.000011%)
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 pyrene: (Whole conc. entered as: 0.22 mg/kg or 0.000022%)

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.: <7.661 mg/kg or <0.000766%) **IGNORED Because:** "<LOD"

zinc chromate: (Cation conc. entered: 143 mg/kg, converted to compound conc.: 396.703 mg/kg or 0.0397%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]anthracene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chrysene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "phenanthrene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "pyrene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS6/2.00 - 3.00

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

Sample details

Sample Name:	LoW Code:
WS6/2.00 - 3.00	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0 m	Entry:
Moisture content: 0% (no correction)	17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

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

Hazard Statements hit:

Carc. 1A; 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:

zinc chromate: (compound conc.: 0.322%)

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

Risk phrases hit:

R50/53 "Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment"

Because of determinand:

zinc chromate: (compound conc.: 0.322%)

Hazard properties (substances considered hazardous until shown otherwise)

HP 12: Release of an acute toxic gas "waste which releases acute toxic gases (Acute Tox. 1, 2 or 3) in contact with water or an acid"

Hazard Statements hit:

EUH032 "Contact with acids liberates very toxic gas"

Because of determinand:

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (compound conc.: 0.00113%)

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 43 mg/kg, converted to compound conc.: 56.774 mg/kg or 0.00568%)
 benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

beryllium oxide: (Cation conc. entered: 5.1 mg/kg, converted to compound conc.:14.154 mg/kg or 0.00142%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: 9 mg/kg, converted to compound conc.:120.87 mg/kg or 0.0121%)
 cadmium sulfide: (Cation conc. entered: 4.7 mg/kg, converted to compound conc.:6.041 mg/kg or 0.000604%, Note 1 conc.: 0.00047%)
 chromium(III) oxide: (Cation conc. entered: 67 mg/kg, converted to compound conc.:97.924 mg/kg or 0.00979%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 copper (I) oxide: (Cation conc. entered: 348 mg/kg, converted to compound conc.:391.809 mg/kg or 0.0392%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: 6 mg/kg, converted to compound conc.:11.304 mg/kg or 0.00113%)
 ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 448 mg/kg, converted to compound conc.:698.797 mg/kg or 0.0699%, Note 1 conc.: 0.0448%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 65 mg/kg, converted to compound conc.:102.667 mg/kg or 0.0103%)
 pH: (Whole conc. entered as: 7.2 pH, converted to conc.:7.2 pH or 7.2 pH)
 phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.:<7.661 mg/kg or <0.000766%) **IGNORED Because: "<LOD"**
 toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) **IGNORED Because: "<LOD"**
 TPH (C6 to C40) petroleum group: (Whole conc. entered as: <60 mg/kg or <0.006%) **IGNORED Because: "<LOD"**
 xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 zinc chromate: (Cation conc. entered: 1160 mg/kg, converted to compound conc.:3218.01 mg/kg or 0.322%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ...", used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "cadmium sulfide"

C14: Step 6, Equation 1

"use the equations given in Table C14.3 to decide if the waste is hazardous by HP 14", used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Note 1, used on:

Test: "HP 5 on STOT SE 1; H370, STOT RE 1; H372" for determinand: "cadmium sulfide"
 Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "cadmium sulfide"
 Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cadmium sulfide"
 Test: "HP 7 on Carc. 1A; H350, Carc. 1A; H350i, Carc. 1B; H350, Carc. 1B; H350i" for determinand: "cadmium sulfide"

Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1A; H360Df, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1B; H360Fd, Repr. 1B; H360Df"

for determinand: "lead chromate"

Test: "HP 10 on Repr. 2; H361, Repr. 2; H361f, Repr. 2; H361d, Repr. 2; H361fd" for determinand: "cadmium sulfide"

Test: "HP 11 on Muta. 2; H341" for determinand: "cadmium sulfide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"

determinand: "lead chromate"

Note A , used on:

determinand: "salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex"

determinand: "zinc chromate"

Classification of sample: WS7/0.20



Non Hazardous Waste

Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
WS7/0.20	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0 m	
Moisture content: 0% (no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 24 mg/kg, converted to compound conc.:31.688 mg/kg or 0.00317%)
 benzo[a]anthracene: (Whole conc. entered as: 0.11 mg/kg or 0.000011%)
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.14 mg/kg or 0.000014%)
 benzo[b]fluoranthene: (Whole conc. entered as: 0.19 mg/kg or 0.000019%)
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: 1.7 mg/kg, converted to compound conc.:4.718 mg/kg or 0.000472%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: 2.2 mg/kg, converted to compound conc.:29.546 mg/kg or 0.00295%)
 cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) **IGNORED Because: "<LOD"**
 chromium(III) oxide: (Cation conc. entered: 27 mg/kg, converted to compound conc.:39.462 mg/kg or 0.00395%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: 0.12 mg/kg or 0.000012%)
 copper (I) oxide: (Cation conc. entered: 62 mg/kg, converted to compound conc.:69.805 mg/kg or 0.00698%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: 0.2 mg/kg or 0.00002%)
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 136 mg/kg, converted to compound conc.:212.135 mg/kg or 0.0212%, Note 1 conc.: 0.0136%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 35 mg/kg, converted to compound conc.:55.282 mg/kg or 0.00553%)
 pH: (Whole conc. entered as: 7.5 pH, converted to conc.:7.5 pH or 7.5 pH)
 phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 pyrene: (Whole conc. entered as: 0.18 mg/kg or 0.000018%)

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.:<7.661 mg/kg or <0.000766%) **IGNORED Because: "<LOD"**

zinc chromate: (Cation conc. entered: 239 mg/kg, converted to compound conc.:663.021 mg/kg or 0.0663%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]anthracene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chrysene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "pyrene"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS7/0.90

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

Sample details

Sample Name:	LoW Code:
WS7/0.90	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	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)
0 m	
Moisture content: 0% (no correction)	

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.: 0.0195%)

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: 0.24 mg/kg or 0.000024%)
 arsenic trioxide: (Cation conc. entered: 37 mg/kg, converted to compound conc.:48.852 mg/kg or 0.00489%)
 benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 benzo[a]anthracene: (Whole conc. entered as: 1.02 mg/kg or 0.000102%)
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 1.41 mg/kg or 0.000141%)
 benzo[b]fluoranthene: (Whole conc. entered as: 1.92 mg/kg or 0.000192%)
 benzo[ghi]perylene: (Whole conc. entered as: 1.16 mg/kg or 0.000116%)
 benzo[k]fluoranthene: (Whole conc. entered as: 0.61 mg/kg or 0.000061%)
 beryllium oxide: (Cation conc. entered: 5.4 mg/kg, converted to compound conc.:14.987 mg/kg or 0.0015%)
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: 7.3 mg/kg, converted to compound conc.:98.039 mg/kg or 0.0098%)
 cadmium sulfide: (Cation conc. entered: 2.1 mg/kg, converted to compound conc.:2.699 mg/kg or 0.00027%, Note 1 conc.: 0.00021%)
 chromium(III) oxide: (Cation conc. entered: 28 mg/kg, converted to compound conc.:40.924 mg/kg or 0.00409%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: 1.01 mg/kg or 0.000101%)
 copper (I) oxide: (Cation conc. entered: 146 mg/kg, converted to compound conc.:164.38 mg/kg or 0.0164%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: 1.73 mg/kg or 0.000173%)
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: 1.33 mg/kg or 0.000133%)
 lead chromate: (Cation conc. entered: 327 mg/kg, converted to compound conc.:510.06 mg/kg or 0.051%, Note 1 conc.: 0.0327%)

mercury dichloride: (Cation conc. entered: 2.2 mg/kg, converted to compound conc.: 2.978 mg/kg or 0.000298%)
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 47 mg/kg, converted to compound conc.: 74.236 mg/kg or 0.00742%)
 pH: (Whole conc. entered as: 7.5 pH, converted to conc.: 7.5 pH or 7.5 pH)
 phenanthrene: (Whole conc. entered as: 0.59 mg/kg or 0.000059%)
 phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 pyrene: (Whole conc. entered as: 1.53 mg/kg or 0.000153%)
 selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.: <7.661 mg/kg or <0.000766%) **IGNORED Because: "<LOD"**
 toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) **IGNORED Because: "<LOD"**
 TPH (C6 to C40) petroleum group: (Whole conc. entered as: 195 mg/kg or 0.0195%)
 xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 zinc chromate: (Cation conc. entered: 282 mg/kg, converted to compound conc.: 782.309 mg/kg or 0.0782%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "anthracene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]anthracene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[ghi]perylene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[k]fluoranthene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chrysene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "mercury dichloride"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "phenanthrene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "pyrene"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "TPH (C6 to C40) petroleum group"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "cadmium sulfide"

Note 1 , used on:

Test: "HP 5 on STOT SE 1; H370, STOT RE 1; H372" for determinand: "cadmium sulfide"
 Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "cadmium sulfide"
 Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cadmium sulfide"
 Test: "HP 7 on Carc. 1A; H350, Carc. 1A; H350i, Carc. 1B; H350, Carc. 1B; H350i" for determinand: "cadmium sulfide"
 Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1A; H360FD, Repr. 1A; H360F, Repr. 1A; H360Df, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1B; H360F, Repr. 1B; H360Df" for determinand: "lead chromate"
 Test: "HP 10 on Repr. 2; H361, Repr. 2; H361f, Repr. 2; H361d, Repr. 2; H361fd" for determinand: "cadmium sulfide"
 Test: "HP 11 on Muta. 2; H341" for determinand: "cadmium sulfide"
 Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"
 determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

WM3: Unknown oil , used on:

determinand: "TPH (C6 to C40) petroleum group"

Classification of sample: WS8/0.40

Non Hazardous Waste

 Classified as **17 05 04**
 in the List of Waste

Sample details

Sample Name:	LoW Code:
WS8/0.40	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0 m	Entry:
Moisture content: 0%	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
(no correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 arsenic trioxide: (Cation conc. entered: 7 mg/kg, converted to compound conc.: 9.242 mg/kg or 0.000924%)
 benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.: <1.388 mg/kg or <0.000139%)
IGNORED Because: "<LOD"
 boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.: <13.43 mg/kg or <0.00134%) **IGNORED Because: "<LOD"**
 cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.: <0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) **IGNORED Because: "<LOD"**
 chromium(III) oxide: (Cation conc. entered: 15 mg/kg, converted to compound conc.: 21.923 mg/kg or 0.00219%)
 chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.: <3.846 mg/kg or <0.000385%)
IGNORED Because: "<LOD"
 chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 copper (I) oxide: (Cation conc. entered: 13 mg/kg, converted to compound conc.: 14.637 mg/kg or 0.00146%)
 salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex: (Cation conc. entered: <2 mg/kg, converted to compound conc.: <3.768 mg/kg or <0.000377%) **IGNORED Because: "<LOD"**
 ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
 fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 lead chromate: (Cation conc. entered: 26 mg/kg, converted to compound conc.: 40.555 mg/kg or 0.00406%, Note 1 conc.: 0.0026%)
 mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.: <1.353 mg/kg or <0.000135%)
IGNORED Because: "<LOD"
 naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
 nickel dihydroxide: (Cation conc. entered: 7 mg/kg, converted to compound conc.: 11.056 mg/kg or 0.00111%)
 pH: (Whole conc. entered as: 7.6 pH, converted to conc.: 7.6 pH or 7.6 pH)
 phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**

phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <3 mg/kg, converted to compound conc.: <7.661 mg/kg or <0.000766%) **IGNORED Because: "<LOD"**
toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) **IGNORED Because: "<LOD"**
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <60 mg/kg or <0.006%) **IGNORED Because: "<LOD"**
xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) **IGNORED Because: "<LOD"**
zinc chromate: (Cation conc. entered: 49 mg/kg, converted to compound conc.: 135.933 mg/kg or 0.0136%)

Notes utilised in assessment

C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chromium(III) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Appendix A: Classifier defined and non CLP determinands

acenaphthene (CAS Number: 83-32-9)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

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

acenaphthylene (CAS Number: 208-96-8)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

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

anthracene (CAS Number: 120-12-7)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

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

benzo[ghi]perylene (CAS Number: 191-24-2)

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: 23/07/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

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

Conversion factor: 13.43

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: 06/08/2015

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 (CAS Number: 1308-38-9)

Conversion factor: 1.462

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

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

ethylbenzene (CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Risk Phrases: None.

Additional Hazard Statements: Carc. 2; H351

Reason:

03/06/2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

fluoranthene (CAS Number: 206-44-0)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21/08/2015

Risk Phrases: Xn; R22, N; R50/53

Hazard Statements: Acute Tox. 4; H302, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

fluorene (CAS Number: 86-73-7)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

indeno[123-cd]pyrene (CAS Number: 193-39-5)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: R40

Hazard Statements: Carc. 2; H351

pH

Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25/05/2015

Risk Phrases: None.

Hazard Statements: None.

phenanthrene (CAS Number: 85-01-8)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

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

pyrene (CAS Number: 129-00-0)

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: 21/08/2015

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

TPH (C6 to C40) petroleum group

Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25/05/2015

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

Appendix B: Notes

C14: Step 5

from section: WM3: C14 in the document: "[WM3 - Waste Classification](#)"

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..."

C14: Step 6, Equation 1

from section: WM3: C14 in the document: "[WM3 - Waste Classification](#)"

"use the equations given in Table C14.3 to decide if the waste is hazardous by HP 14"

Note 1

from section: 1.1.3.2, Annex VI in the document: "[CLP Regulations](#)"

"The concentration stated or, in the absence of such concentrations, the generic concentrations of this Regulation (Table 3.1) or the generic concentrations of Directive 1999/45/EC (Table 3.2), are the percentages by weight of the metallic element calculated with reference to the total weight of the mixture."

Note A

from section: 1.1.3.1, Annex VI in the document: "[CLP Regulations](#)"

"Without prejudice to Article 17(2), the name of the substance must appear on the label in the form of one of the designations given in Part 3. In Part 3, use is sometimes made of a general description such as '... compounds' or '... salts'. In this case, the supplier is required to state on the label the correct name, due account being taken of section 1.1.1.4."

WM3: Unknown oil

from section: Chapter 3: 4. Waste oils and other wastes containing or contaminated with oil in the document: "[WM3 - Waste Classification](#)"

"If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic due to the presence of oil if all three of the following criteria are met:

- the waste contains **benzo[a]pyrene (BaP)** at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.2 of the CLP for BaP)
- this has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D, and
- the analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel

"

Appendix C: Version

Classification utilises the following:

- CLP Regulations - 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
- WM3 - Waste Classification - May 2015
- 7th ATP - Regulation 2015/1221/EU of 24 July 2015
- 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

HazWasteOnline Engine: WM3 1st Edition, May 2015

HazWasteOnline Engine Version: 2015.308.2983.5979 (04 Nov 2015)

HazWasteOnline Database: 2015.308.2983.5979 (04 Nov 2015)

Appendix D Conceptual Site Model

Linkage No	Potential Contaminants Identified	Pathway	Receptor	Risk Assessment Methodology (plus anticipated quantitative risk assessment methods)	Site specific settings	Risk Classification: Based on SI	Pollutant Linkage & Action Required
1	None	e.g. Uptake (root and stomata), ingestion, inhalation and dermal absorption by animal)	Ecological features (i.e. Flora and Fauna)	Presence of SSSI, Museum, Natural reserves and others within 0- 250m to the site. Use EA Science Report	No sensitive land uses on site except an NVZ.	None	No action required.
2	None	e.g. Chemical attack	Building structures/services	Soil testing & use BRE 2005 for risk assessment. Water UK (2014) for pipes. Use Anglian Water trigger for services risk assessment	Proposed foundations and services to be used.	None	No action required
3	None	e.g. Inhalation	Human health Site residents	Use CLEA for human risk assessment	Recreational development	None	No action required
		ingestion and dermal contact	Human Health Workers	Assessment not within the scope of this Desk study (responsibility of building contractor). Ground workers should follow regulations on health and safety during development (HSE, 1991)	Workers and the general public should follow regulation on health and safety during development (HSE, 1991)	Low	Follow HSE guidance
4	Boron	e.g. Leaching (direct precipitation, overland flow and through flow)	Shallow groundwater/ Surface Water	Assess distance from watercourse and direction of flow – Consider use of R&D 20 publication and EA remediation target for risk assessment	Nearest surface water is 143m S. Low permeability superficial strata, surface water anticipated.	Low	No action required
5	Boron	e.g. Leaching (direct precipitation, overland flow, through and groundwater flow)	Deep groundwater	Undertake groundwater or leachate testing depending on site specific ground conditions. – Consider use of R&D 20 publication and EA remediation target for risk assessment if contamination is identified.	Seaford chalk has Principal Aquifer designation. The overall vulnerability was soils of high leaching potential.	Low	No action required
6	PI3	e.g. Through fissures, shafts, high permeability strata and inhalation by human	Human and Building Structures	Current or former Landfill sites within 0-250m to the site. Assess nature/age/size of site for Risk Assessment. Use CIRIA 149 & 665 to assess need for gas protection measures where necessary following ground gas testing	Source of soil gas identified onsite.	Low	Further action: Gas protection measures required

Note: HSE = Health and Safety Executive.

Appendix E General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

1.1 Introduction

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC).

GAC are conservative values adopted to ensure that they are applicable to the majority of possible contaminated site. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC derived by a third party or the Environment Agency/ DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC to ensure that they are used appropriately. Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific values for relevant soil contaminants based on the site specific conditions.

1.2 General Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'.

1.2.1 Contaminated Land Exposure Assessment Model (CLEA)

Current United Kingdom risk assessment practice is based on the Contaminated Land Exposure Assessment Model (CLEA).

The CLEA Guidance comprises the following documents:

- EA Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
 - EA Science Report SC050021/SR3: Updated technical background to the CLEA model.
 - EA CLEA Bulletin (2009).
 - CLEA software version 1.04 (2009)
 - Toxicological reports and SGV technical notes.
-

The CLEA guidance and tools:

1. do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures.
 2. do not cover risks to the environment, such as groundwater, ecosystems or buildings.
 3. do not provide a definitive test for telling when human health risks are significant.
 4. are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.
-

1.3 Soil Guideline Values (2009)

The EA are publishing a series of SGV reports for a selection of common contaminants relevant to the assessment of land contamination.

SGV's are generic assessment criteria based on CLEA standard land-uses and can be used to simplify the assessment of human health risks from long-term exposure to

chemical contamination in soil. They do not cover short-term exposure (i.e. construction and maintenance workers), acute exposure or other risks such as fire, suffocation or explosion, as might arise from an accumulation of gases such as methane and carbon dioxide, or either odour or aesthetic issues.

SGV's represent 'trigger values', indicators that soil concentrations above the SGV level may pose a possibility of *significant harm* to human health. The converse, where soil concentrations are less than the SGV, is that the long-term human health risks are considered to be tolerable or minimal.

The CLEA guidance derives soil concentrations of contaminants above which (in the opinion of the EA) there may be a concern that warrants further investigation. It does not provide a definitive test for establishing that the risk is significant.

1.4 Ongoing development of CLEA based guidance

The EA is involved in a programme of publishing SGV's and related toxicity data (the TOX reports). As at July 2009 ten SGV's and matching TOX reports had been published. Soil Assessment Criteria (SAC's) may be derived using toxicity data from the updated TOX reports, where these are published, or from the original TOX reports. SGV reports also take account of recent updates for plant uptake and other factors.

-
- GAC's developed by CLEA guidance and given in this report will need to be assessed against updated TOX reports and SGV's when these are published.
 - SGV reports may give values that differ from the GAC's used in this report.
 - These variations may materially alter the remediation requirement for the site, requiring either an increase or decrease in the extent, type and cost of remediation.
-

1.5 Phytotoxicity

CLEA guidance only addresses human health toxicity; assessment of plant toxicity (phytotoxicity) is based on threshold trigger values obtained from the following source:

ICRCL 70/90: *Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing.*

1.6 Other Generic Assessment Criteria

If an SGV is not available for a substance identified in the soil then the range of Generic Assessment Criteria published from a collaborative research by Land Quality Management Limited (LQM) and the Chartered Institute of Environmental Health (CIEH) are used for example. In the case of Lead, Category 4 screening levels (C4SLs) have replaced the AtRisk Soil SSV.

1.6.1 CL: AIRE Category 4 screening levels (C4SLs) (2014)

A new statutory DEFRA guidance recently (i.e. August 2014) published some GACs with a more pragmatic (but still strongly precautionary) approach in their derivation called the Category 4 screening levels (C4SLs). These values provide a higher simple test for deciding that land is suitable for use and definitely not

contaminated land. They are intended as generic screening values, (ii) they describe a level of risk that whilst above 'minimal' is still 'low' and (iii) they provide a 'higher simple test' for deciding that land is suitable for use and definitely not contaminated. These values were derived for four generic land uses: residential, commercial, allotments, and public open space.

1.6.2 LQM/CIEH Suitable 4 Use Level (S4UL) (2015)

The new S4UL's ((Nathanail *et al*, 2015), was developed for around 85 substances and are intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants. The S4ULs were:

- based on Health Criteria Values, updated to reflect changes since 2009
- derived for the standard CLEA land uses and the two public open space scenarios developed by Defra SP1010
- developed for ca 85 substances (those previously covered by the LQM/CIEH GAC and the SGV substances);
- Compliant with SR2 and the long standing principle of 'suitable for use' and reflecting changes to exposure parameters produced by Defra SP1010.

For derivation of these Generic Assessment Criteria reference must be made to: Nathanail, P., McCaffrey, C., Ashmore, M., Cheng, Y., Gillet, A., Ogden, R., Scott, D. *The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (3rd edition)*. **Land Quality Press**. 2015.

1.7 Standard Land-use Scenarios

The standard land-use scenarios used to develop conceptual exposure models are presented in the following sections:

1.7.1 Residential

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

-
- Critical receptor is a young female child (zero to six years old)
-
- Exposure duration is six years.
-
- Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
-
- Building type is a two-storey small terraced house.
-

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur.

1.7.2 Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption.

Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

-
- Critical receptor is a young female child (zero to six years old)
 - Exposure duration is six years.
 - Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
 - There is no building.
-

1.7.3 Commercial/Industrial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

-
- Critical receptor is a working female adult (aged 16 to 65 years old).
 - Exposure duration is a working lifetime of 49 years.
 - Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
 - Building type is a three-storey office (pre 1970).
-

1.7.4 Public Open Space within Residential Area

The generic scenario refers to any grassed area 0.05 ha and that is close to Housing.

-
- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil
 - Predominantly used by children for playing and may be used for activities such as a football kick about
 - Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
 - older children as the critical receptor on basis that they will use site most frequently (Age class 4-9)
 - ingestion rate 75 mg.day⁻¹
-

1.7.5 Public Open Space Park

This generic scenario refers to any public park that is more than 0.5ha in area:

-
- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% cover)
-

• Female child age classes 1-6
• Soil ingestion rate of 50 mg.day ⁻¹
• Occupancy period outdoors = 2 hours.day ⁻¹
• Exposure frequency of 170 days.year ⁻¹ for age classes 2-18 and 85
• days.year ⁻¹ for age class 1
• Outdoor exposure pathways only (no tracking back).

1.8 Detailed Quantitative Risk Assessments (DQRA)

Where the adoption of an SGV/GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a DQRA may be undertaken to develop site specific values for relevant soil contaminants.

• Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation.
• Developing more accurate parameters using site data.

1.9 Current Criteria

Table 1 presents the current Generic Assessment Criteria and reference should be made to the original publications if needed.

1.10 Statistical Tests

DEFRA R&D Publication CLR 7 (DOE 1994) and CL: AIRE Category 4 screening levels (C4SLs) (2014) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

Consideration must be given to the appropriate area of land to be considered termed the critical averaging area.

For a communal open space or commercial land-use, the critical averaging area will depend on the proposed layout. For a residential use with private gardens the averaging area is the individual plot.

It may be appropriate to compare the upper 95th percentile concentration with the Soil Guideline Value, subject to applying a statistical test to establish that the range of concentrations are reasonably consistent and belonging to the same underlying distribution of data.

The DEFRA discussion paper Assessing risks from land contamination – a proportionate approach ('the way forward') (CLAN06/2006) aimed to increase understanding of the role that statistics can play in quantifying the uncertainty attached to the estimates of the mean concentration of contaminants in soil. In direct response CLAIRE/CIEH published a joint report, *Guidance in comparing soil contamination data with a critical concentration* (CLAIRE/CIEH 2008). A software implementation of the statistical techniques given in the report was published by ESI International (2008).

Treatment of Hot-Spots

- A statistical test is applied to establish whether the data is a part of a single set, or whether data outliers are present.
 - Provided that the data is based on random sampling and no distinct contamination source was present at the sampling location, the hot-spot(s) may be excluded and the mean of the remaining data assessed.
-

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date		
			With			Without			Allotments			Commercial			Residential			Park							
			home-grown produce	home-grown produce	home-grown produce																				
Type	Contaminants	Species	SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6				
Metals	Arsenic		2014			37			40				49			640			79			168	C4SL	DEFRA	2014
			2015			37			40			40			640			79			170	S4UL	LQM/CIEH	2015	
	Beryllium		2015			1.7			1.7			35			12			2.2			63	S4UL	LQM/CIEH	2015	
	Boron		2015			290			11000			45			240000			21000			46000	S4UL	LQM/CIEH	2015	
	Cadmium		2015			11			85			1.9			190			120			532	S4UL	LQM/CIEH	2015	
			2014			26			149			4.9			410			220			880	C4SL	DEFRA	2014	
	Chromium	III	2015			910			910			18000			8600			1500			33000	S4UL	LQM/CIEH	2015	
			IV	2014			21			21			170			49			23			250	C4SL	DEFRA	2014
			IV	2015			6			6			1.8			33			7.7			220	S4UL	LQM/CIEH	2015
	Copper		2015			2400			7100			520			68000			12000			44000	S4UL	LQM/CIEH	2015	
	Lead					200			310			80			2330			630			1300	C4SL	DEFRA	2014	
	Mercury	Elemental	2012			1.0			1.0			26			26								SGV	DEFRA	2012
			2015			1.2			1.2			21			58			16			30	S4UL	LQM/CIEH	2015	
		Inorganic	2012			170			170			80			36000								SGV	DEFRA	2012
			2015			40			56			19			1100			120			240	S4UL	LQM/CIEH	2015	
		Methyl	2012			11			11			8			410								SGV	DEFRA	2012
			2015			11			15			6			320			40			68	S4UL	LQM/CIEH	2015	
	Nickel		2012			130			130			230			1800								SGV	DEFRA	2012
			2015			130			180			53			980			230			800	S4UL	LQM/CIEH	2015	
	Selenium		2012			350			350			120			13000								SGV	DEFRA	2012
			2015			250			430			88			12000			1100			1800	S4UL	LQM/CIEH	2015	
	Vanadium		2015			410			1200			91			9000			2000			5000	S4UL	LQM/CIEH	2015	
	Zinc		2015			3700			40000			620			730000			81000			170000	S4UL	LQM/CIEH	2015	
BTEX & MTBE	Benzene		2012			0.33			0.33			0.07			95							SGV	DEFRA	2012	
			2014			0.87			3.3			0.18			98			140			230	C4SL	DEFRA	2014	
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015	
	Toluene		2012			610			610			120			4400							SGV	DEFRA	2012	
			2015	130	290	660	880	1900	3900	22	51	120	65000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015	
	Ethylbenzene		2012			350			350			90			2800							SGV	DEFRA	2012	
			2015	47	110	260	83	190	440	16	39	91	4700	13000	27000	24000	24000	25000	17000	22000	27000	S4UL	LQM/CIEH	2015	
	Xylenes	o-xylene	2012			250			250			160			2600								SGV	DEFRA	2012
			2015	60	140	330	88	210	480	28	67	160	6600	15000	33000	41000	42000	43000	17000	24000	33000	S4UL	LQM/CIEH	2015	
		m-xylene	2012			240			240			180			3500								SGV	DEFRA	2012
			2015	59	140	320	82	190	450	31	74	170	6200	14000	31000	41000	42000	43000	17000	24000	32000	S4UL	LQM/CIEH	2015	
		p-xylene	2012			230			230			160			3200								SGV	DEFRA	2012
			2015	56	130	310	79	180	310	29	69	160	5900	14000	30000	41000	42000	43000	17000	23000	31000	S4UL	LQM/CIEH	2015	
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	3200	5900	12000	570000	590000	600000	95000	130000	180000	S4UL	LQM/CIEH	2015	
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	7800	17000	40000	600000	610000	620000	150000	220000	320000	S4UL	LQM/CIEH	2015	
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	2000	4800	11000	13000	13000	13000	14000	18000	21000	S4UL	LQM/CIEH	2015	
	Aliphatic >C10 - C12		2015	130	330	760	130	330	770	2200	4400	7300	9700	23000	47000	13000	13000	13000	21000	23000	24000	S4UL	LQM/CIEH	2015	
	Aliphatic >C12 - C16		2015	1100	2400	4300	1100	2400	4400	11000	13000	13000	59000	82000	90000	13000	13000	13000	25000	25000	26000	S4UL	LQM/CIEH	2015	
	Aliphatic >C16 - C35		2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015	
	Aliphatic >C35 - C44		2015	65000	92000	140000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015	
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	26000	46000	86000	56000	56000	56000	76000	84000	92000	S4UL	LQM/CIEH	2015	
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015	
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	3500	8100	17000	5000	5000	5000	7200	8500	9300	S4UL	LQM/CIEH	2015	
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	16000	28000	34000	5000	5000	5000	9200	9700	10000	S4UL	LQM/CIEH	2015	
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	36000	37000	38000	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015	
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015	
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015	
Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015		

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential			Park						
			SOM	1.0	2.5	6	1	2.5																6
Type	Contaminants	Species	Year	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
	Aliphatic + Aromatic >C44 - C70			1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
Polycyclic Aromatic Hydrocarbons (PAH's) (mg/kg)	Acenaphthene		2015	210	510	1100	3000	4700	6000	34	85	200	84000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Acenaphthylene		2015	170	420	920	2900	4600	6000	28	69	160	83000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Anthracene		2015	2400	5400	11000	31000	35000	37000	380	950	2200	520000	54000	540000	74000	74000	74000	150000	150000	150000	S4UL	LQM/CIEH	2015
	Benzo(a)anthracene		2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015
	Benzo(a)pyrene		2014			5			5.3			5.7			76			10			21	C4SL	DEFRA	2014
			2015	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015
	Benzo(b)fluoranthene		2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015
	Benzo(ghi)perylene		2015	320	340	250	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015
	Benzo(k)fluoranthene		2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015
	Chrysene		2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015
	Dibenz(a,h)anthracene		2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015
	Fluoranthene		2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015
	Fluorene		2015	170	400	860	2800	3800	4500	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015
	Indeno(1,2,3-cd)pyrene		2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015
	Naphthalene		2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190	460	1100	4900	4900	4900	1200	1900	3000	S4UL	LQM/CIEH	2015
	Phenanthrene		2015	95	220	440	1300	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015
	Pyrene		2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54	54000	7400	7400	4700	15000	15000	15000	S4UL	LQM/CIEH	2015
	Coal Tar(Bap as surrogate matter)		2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015
Chloroalkanes & alkenes	1,2 Dichloroethane		2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015
	1,1,1 Trichloroethane		2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000	76000	100000	S4UL	LQM/CIEH	2015
	1,1,2,2 Tetrachloroethane		2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015
	1,1,1,2 Tetrachloroethane		2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015
	Tetrachloroethene		2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	810	1100	1500	S4UL	LQM/CIEH	2015
	Tetrachloromethane (Carbon Tetrachloride)		2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015
	Trichloroethene		2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015
	Trichloromethane		2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015
	Vinyl Chloride (chloroethene)		2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015
Explosives	2,4,6 Trinitrotoluene		2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)		2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)		2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000	23000	24000	S4UL	LQM/CIEH	2015
Pesticides	Aldrin		2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015
	Dieldrin		2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	S4UL	LQM/CIEH	2015
	Atrazine		2015	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	S4UL	LQM/CIEH	2015
	Dichlorvos		2015	0.032	0.066	0.14	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	S4UL	LQM/CIEH	2015
	Alpha - Endosulfan		2015	7.4	18	41	160	280	410	1.2	2.9	6.8	5600	7400	8400	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Beta - Endosulfan		2015	7	17	39	190	320	440	1.1	2.7	6.4	6300	7800	8700	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Alpha -Hexachlorocyclohexanes		2015	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	S4UL	LQM/CIEH	2015
	Beta -Hexachlorocyclohexanes		2015	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	S4UL	LQM/CIEH	2015
	Gamma -Hexachlorocyclohexanes		2015	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	S4UL	LQM/CIEH	2015
Chlorobenzenes	Chlorobenzene		2015	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300	2000	2900	S4UL	LQM/CIEH	2015
	1,2-Dichlorobenzene		2015	23	55	130	24	57	130	94	230	540	2000	4800	11000	90000	95000	98000	24000	36000	51000	S4UL		

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With home-grown produce			Without home-grown produce			Allotments			Commercial			Residential			Park						
Type	Contaminants	Species	SOM Year	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Phenols & Chlorophenols	Pentachlorobenzene		2015	5.8	12	22	19	30	38	1.2	3.1	7	640	770	830	100	100	100	190	190	190	S4UL	LQM/CIEH	2015
	Hexachlorobenzene		2015	1.8	3.3	4.9	4.1	5.7	6.7	0.47	1.1	2.5	110	120	120	16	16	16	30	30	30	S4UL	LQM/CIEH	2015
	Phenols		2012			420		420			280			3200								SGV	DEFRA	2012
			2015	120	200	380	440	690	1200	23	42	83	440	690	1300	440	690	1300	440	690	1300	S4UL	LQM/CIEH	2015
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015
Others	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015
	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012			8		8			8			240								SGV	DEFRA	2012
NOTE																								
	Priority	Guideline (mg kg ⁻¹)																						
	1	Site Specific Assessment Criteria (SSAC) (Soils Limited)																						
	2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014)																						
	3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)																						
	4	2015: Suitable 4 Use Level (S4UL) (Nathanail et al, 2015)																						
	For Generic Risk Assessment, the values in Bold have priority																							

Appendix F Information Provided by the Client

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