LABORATORY RESULTS - Particle Size Distribution

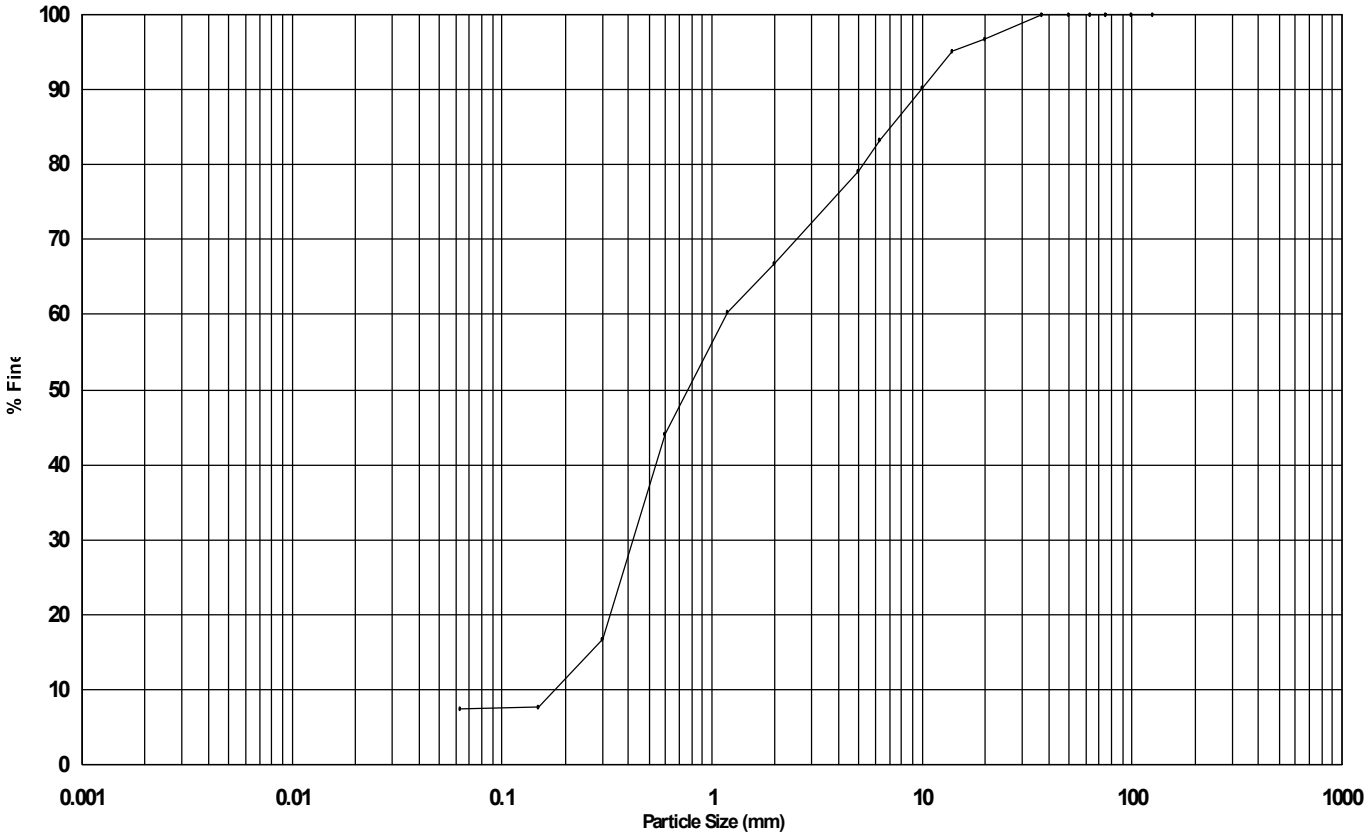
Project: HATFIELD PLOT 4100

Project No: PC176687

Hole	TP03
Sample Depth	1.60m
Sample Type	B
Sample Ref	C64002

Sample Description

Brown gravelly SAND.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	7
SAND	60
GRAVEL	33
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	97
14 mm	95
10 mm	90
6.3 mm	83
5 mm	79
2 mm	67
1.18 mm	60
600 µm	44
300 µm	17
150 µm	8

Size	% Finer
63 µm	7

Uniformity Coefficient
6.51
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks AGS Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

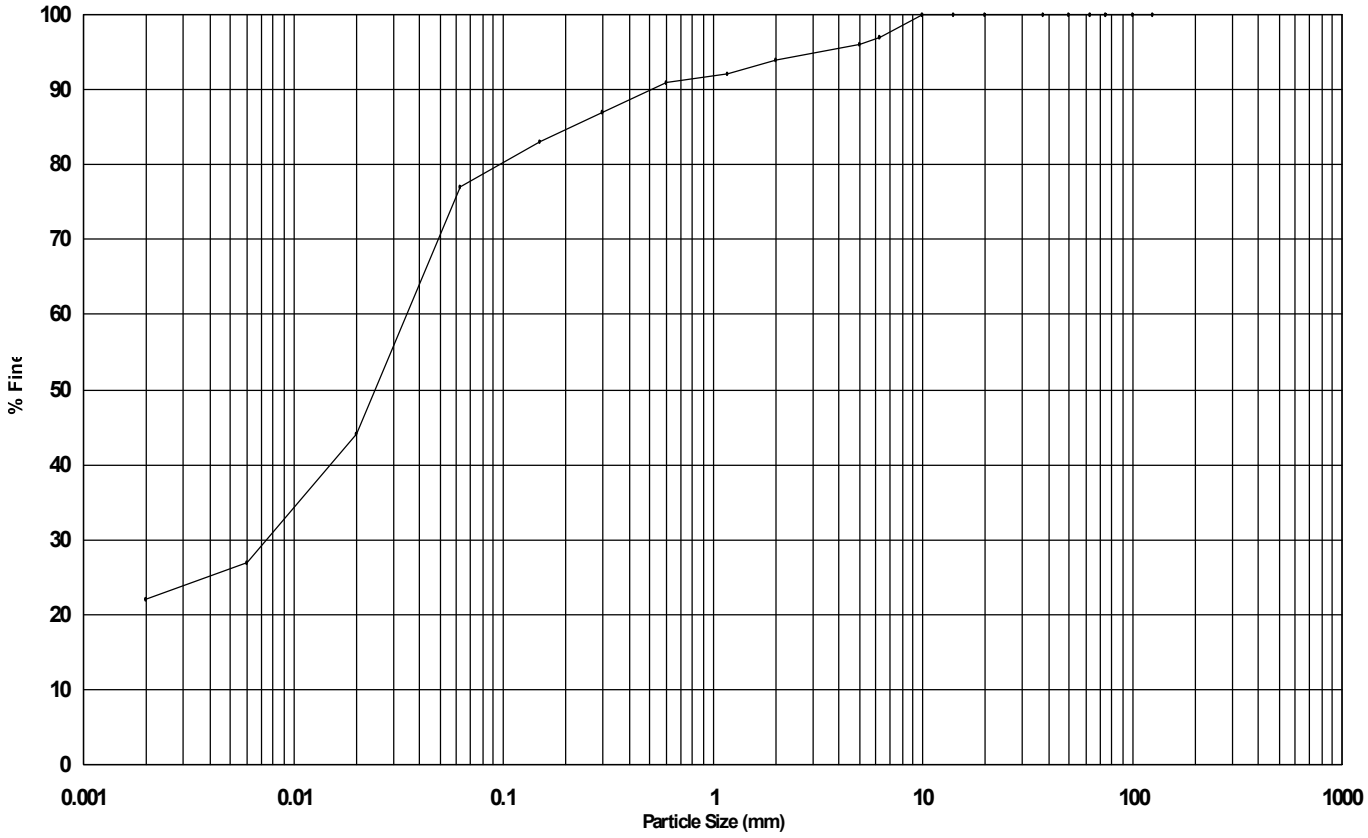
Project: HATFIELD PLOT 4100

Project No: PC176687

Hole	TP07
Sample Depth	0.80m
Sample Type	B
Sample Ref	C64005

Sample Description

Brown slightly gravelly sandy clayey SILT.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	22
SILT	55
SAND	17
GRAVEL	6
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	100
14 mm	100
10 mm	100
6.3 mm	97
5 mm	96
2 mm	94
1.18 mm	92
600 µm	91
300 µm	87
150 µm	83

Size	% Finer
63 µm	77
20 µm	44
6 µm	27
2 µm	22

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.12
Particle Density	2.65 (Assumed)

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

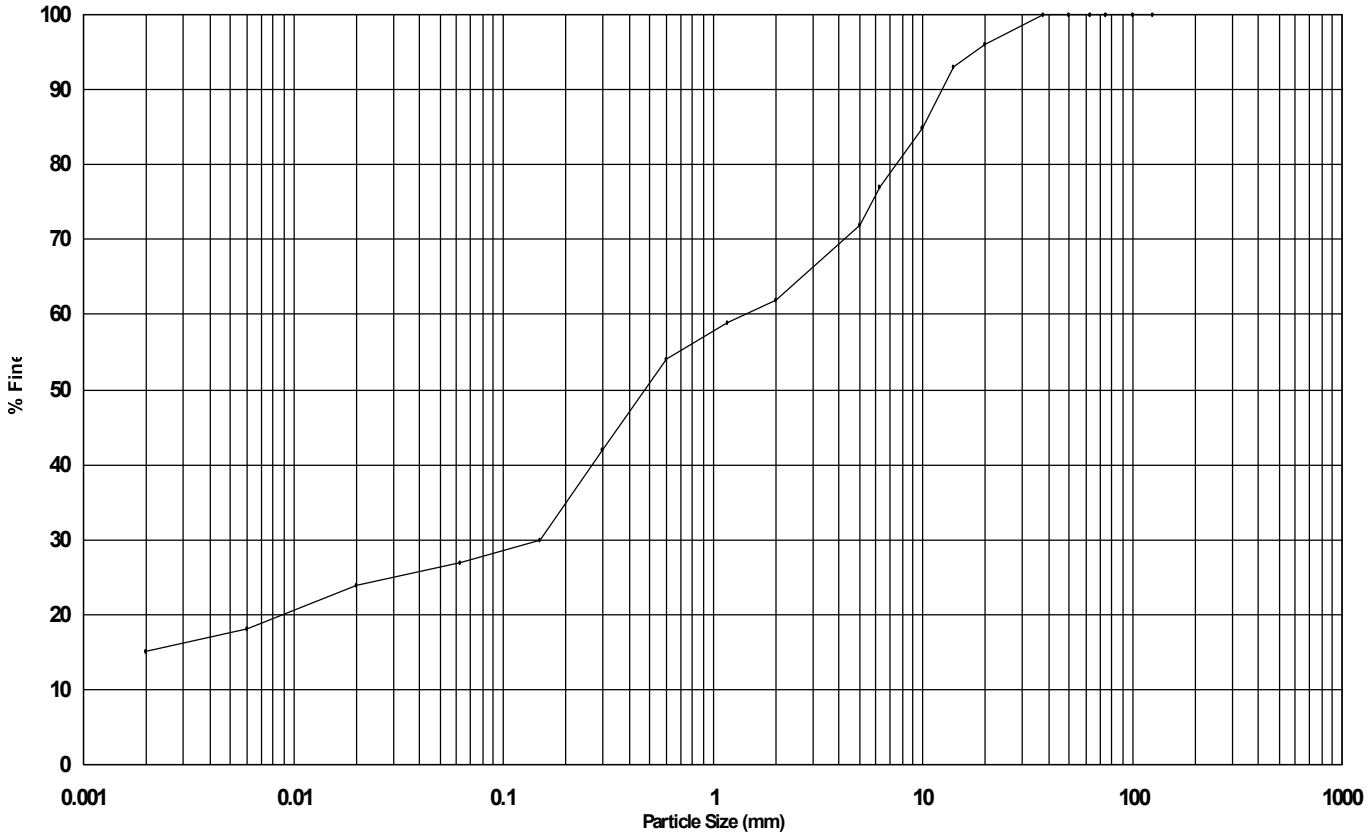
Project: HATFIELD PLOT 4100

Project No: PC176687

Hole	TP10
Sample Depth	0.90m
Sample Type	B
Sample Ref	C64000

Sample Description

Brown clayey very sandy GRAVEL with occasional roots.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	15
SILT	12
SAND	35
GRAVEL	38
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	96
14 mm	93
10 mm	85
6.3 mm	77
5 mm	72
2 mm	62
1.18 mm	59
600 µm	54
300 µm	42
150 µm	30

Size	% Finer
63 µm	27
20 µm	24
6 µm	18
2 µm	15

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.09
Particle Density	2.65 (Assumed)

Remarks AGS Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

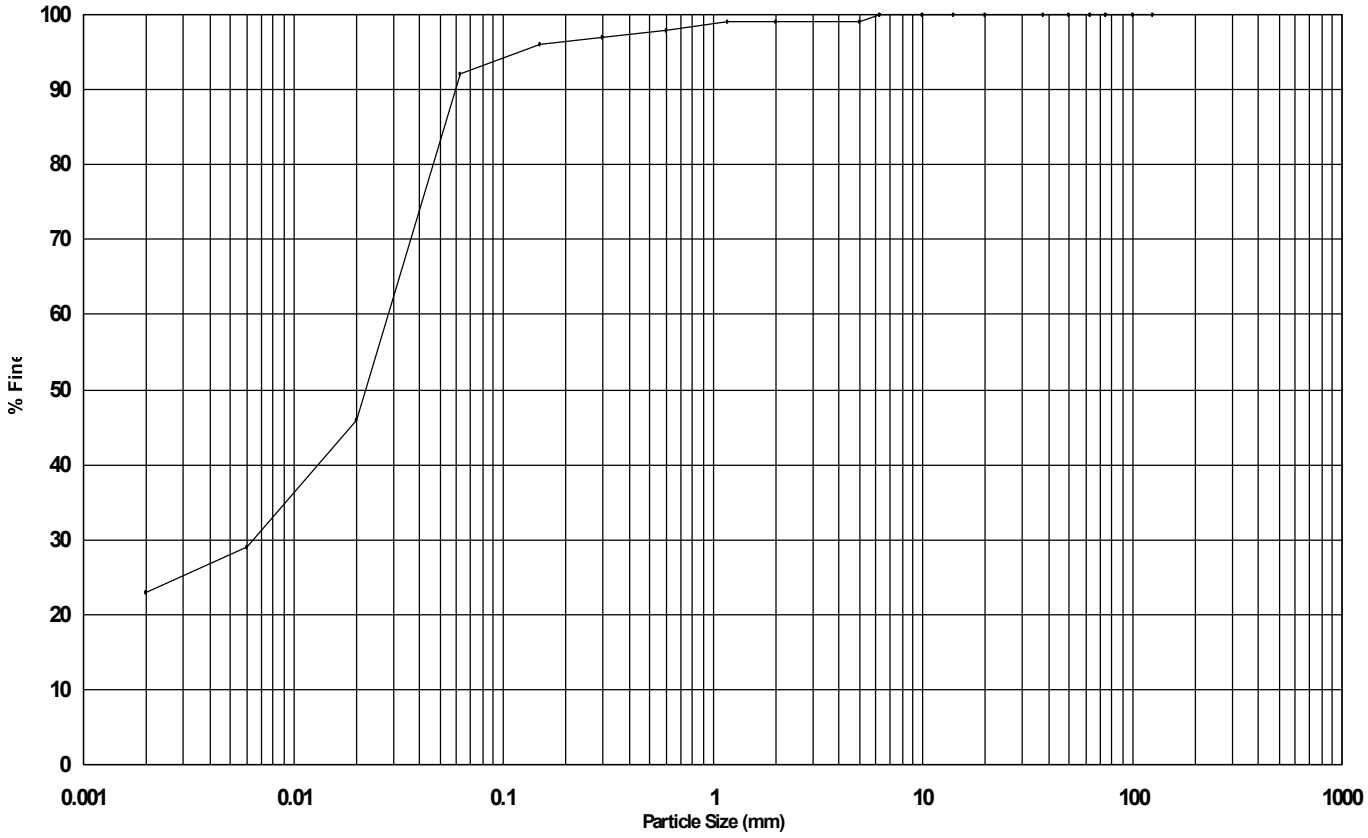
Project: HATFIELD PLOT 4100

Project No: PC176687

Hole	TP13
Sample Depth	0.80m
Sample Type	B
Sample Ref	C64004

Sample Description

Brown slightly gravelly slightly sandy SILT with occasional roots.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	23
SILT	69
SAND	7
GRAVEL	1
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	100
14 mm	100
10 mm	100
6.3 mm	100
5 mm	99
2 mm	99
1.18 mm	99
600 µm	98
300 µm	97
150 µm	96

Size	% Finer
63 µm	92
20 µm	46
6 µm	29
2 µm	23

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.19
Particle Density	2.65 (Assumed)

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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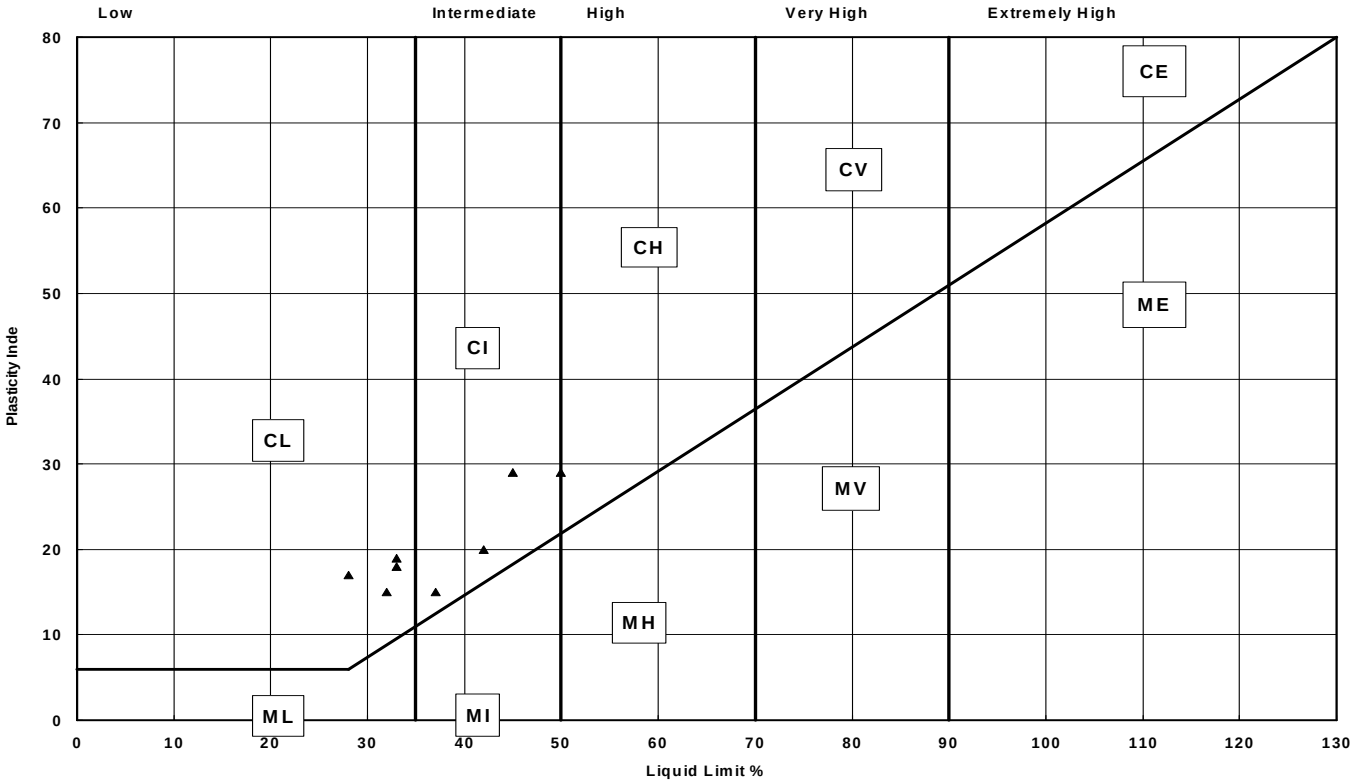
LABORATORY RESULTS - Classification Chart

Project: HATFIELD PLOT 4100

Project No: PC176698

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT
for all items tested



Soil Type		Plasticity Characterisics	
C	Clay	L	Low
		I	Intermediate
M	Silt	H	High
		V	Very High
		E	Extremely High

Table of Soil Types and Plasticity Characteristics from BS 5930 : 1999

Remarks

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LABORATORY RESULTS - Test Remarks

Project HATFIELD PLOT 4100 **Project No:** PC176698

Sample				Laboratory Remark
Hole	Depth (Specimen Depth) m	Type	Sample Ref	
BH4	6.00 (6.00)	B	C64239	Atterberg Limit Test - 1-point cone

Remarks

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LABORATORY RESULTS - Classification and Strength

Project HATFIELD PLOT 4100 **Project No:** PC176698

Sample					Classification					Strength					
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Symbol	I_p (>425) %	w_L %	w_p %	w (p_d) %	Test	γ_b (γ_d) Mg/m^3	σ_3 kN/m^2	$\sigma_1-\sigma_3$ kN/m^2	c_u kN/m^2	c_{Avg} kN/m^2
BH1	2.30-3.00 (2.30)	B	C64232	Brown slightly gravelly very silty SAND.	CI	29 (40%)	45	16	21.5						
BH1	3.00-4.00 (3.00)	B	C64233	Brown very gravelly very silty SAND.	CI	15 (56%)	37	22	22.4						
BH3	2.50 (2.50)	B	C64238	Brown sandy CLAY.	CI	29 (29%)	50	21	30.2						
BH04	3.00 (3.00)	B	C64240	Brown gravelly clayey SAND.	CL	17 (37%)	28	11	24.7						
BH4	6.00 (6.00)	B	C64239	Brown clayey SAND. (See Test Remarks Sheet for further information)		(65%)	24	NP	12.6						
TP01A	1.30 (1.30)	D	C63800	Brown slightly gravelly sandy CLAY.	CL	15 (35%)	32	17	18.0						
TP01A	2.40 (2.40)	D	C63802	Brown slightly sandy CLAY.	CL	19 (28%)	33	14	13.4						
TP07	2.90 (2.90)	D	C63803	Brown slightly gravelly sandy CLAY.	CI	20 (2%)	42	22	27.3						
TP07	3.30 (3.30)	D	C63801	Brown slightly gravelly sandy CLAY.	CL	18 (10%)	33	15	24.3						

Remarks NST - Not suitable for Test
Water Content Test/Bulk Density Test/Particle Density Test performed in accordance with BS EN ISO 17892-1:2014/BS EN ISO 17892-2:2014/BS EN ISO 17892-3:2015
All other Tests performed in accordance with BS1377: 1990

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LABORATORY RESULTS - Particle Size Distribution

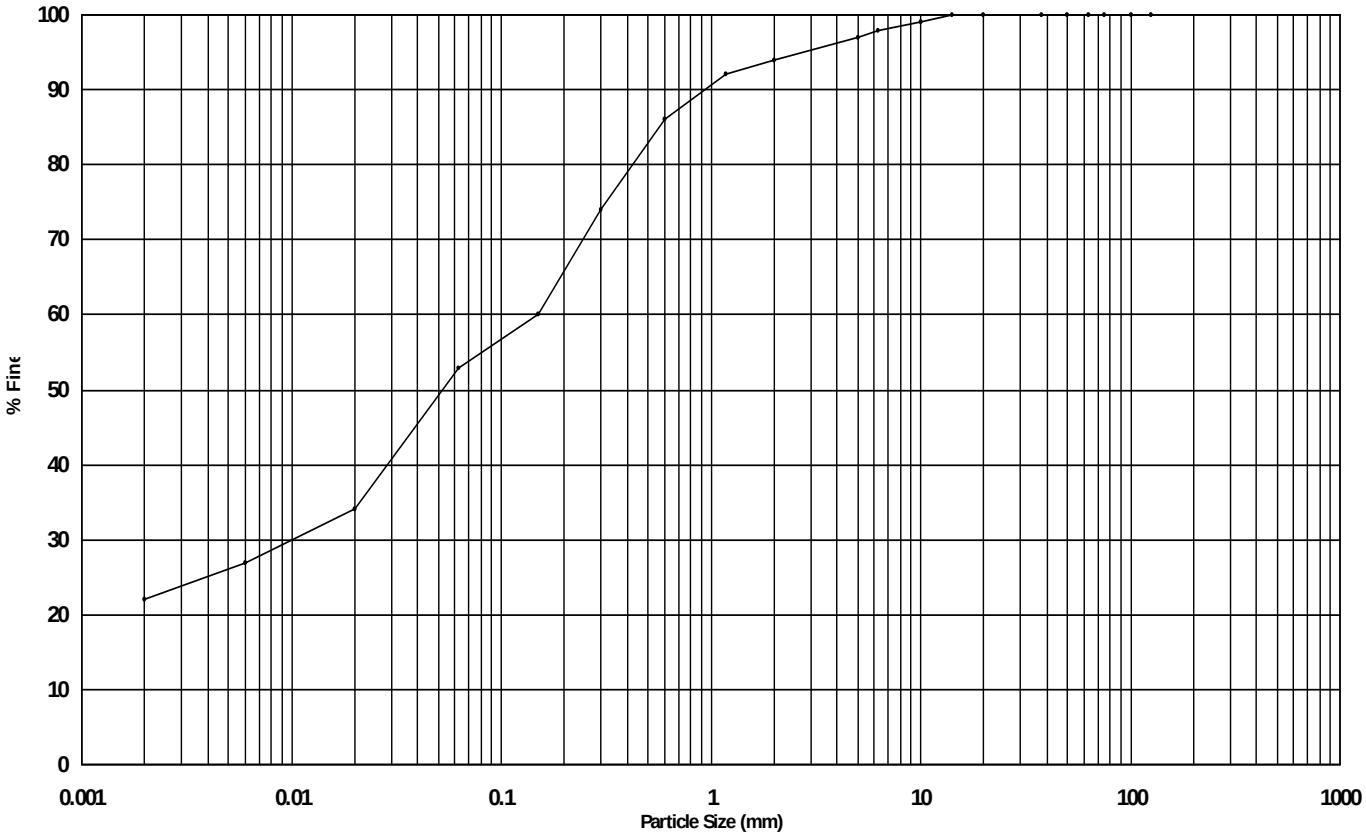
Project: HATFIELD PLOT 4100

Project No: PC176698

Hole BH1
Sample Depth 2.30-3.00m
Sample Type B
Sample Ref C64232

Sample Description

Brown slightly gravelly very silty SAND.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	22
SILT	31
SAND	41
GRAVEL	6
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	100
14 mm	100
10 mm	99
6.3 mm	98
5 mm	97
2 mm	94
1.18 mm	92
600 µm	86
300 µm	74
150 µm	60

Size	% Finer
63 µm	53
20 µm	34
6 µm	27
2 µm	22

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.20
Particle Density	2.65 (Assumed)

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

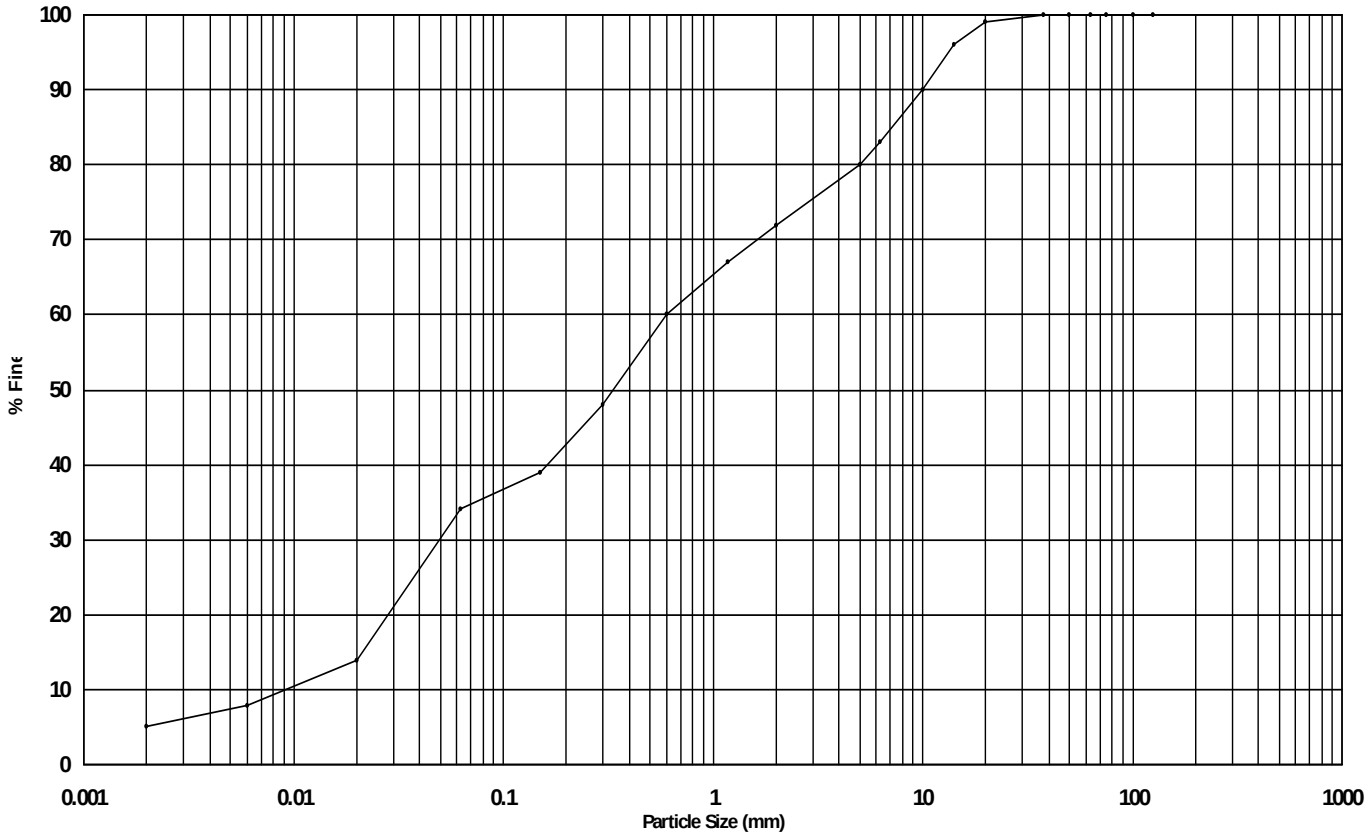
Project: HATFIELD PLOT 4100

Project No: PC176698

Hole BH1
Sample Depth 3.00-4.00m
Sample Type B
Sample Ref C64233

Sample Description

Brown very gravelly very silty SAND.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	5
SILT	29
SAND	38
GRAVEL	28
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	99
14 mm	96
10 mm	90
6.3 mm	83
5 mm	80
2 mm	72
1.18 mm	67
600 µm	60
300 µm	48
150 µm	39

Size	% Finer
63 µm	34
20 µm	14
6 µm	8
2 µm	5

Uniformity Coefficient
67.27

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.23
Particle Density	2.65 (Assumed)

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

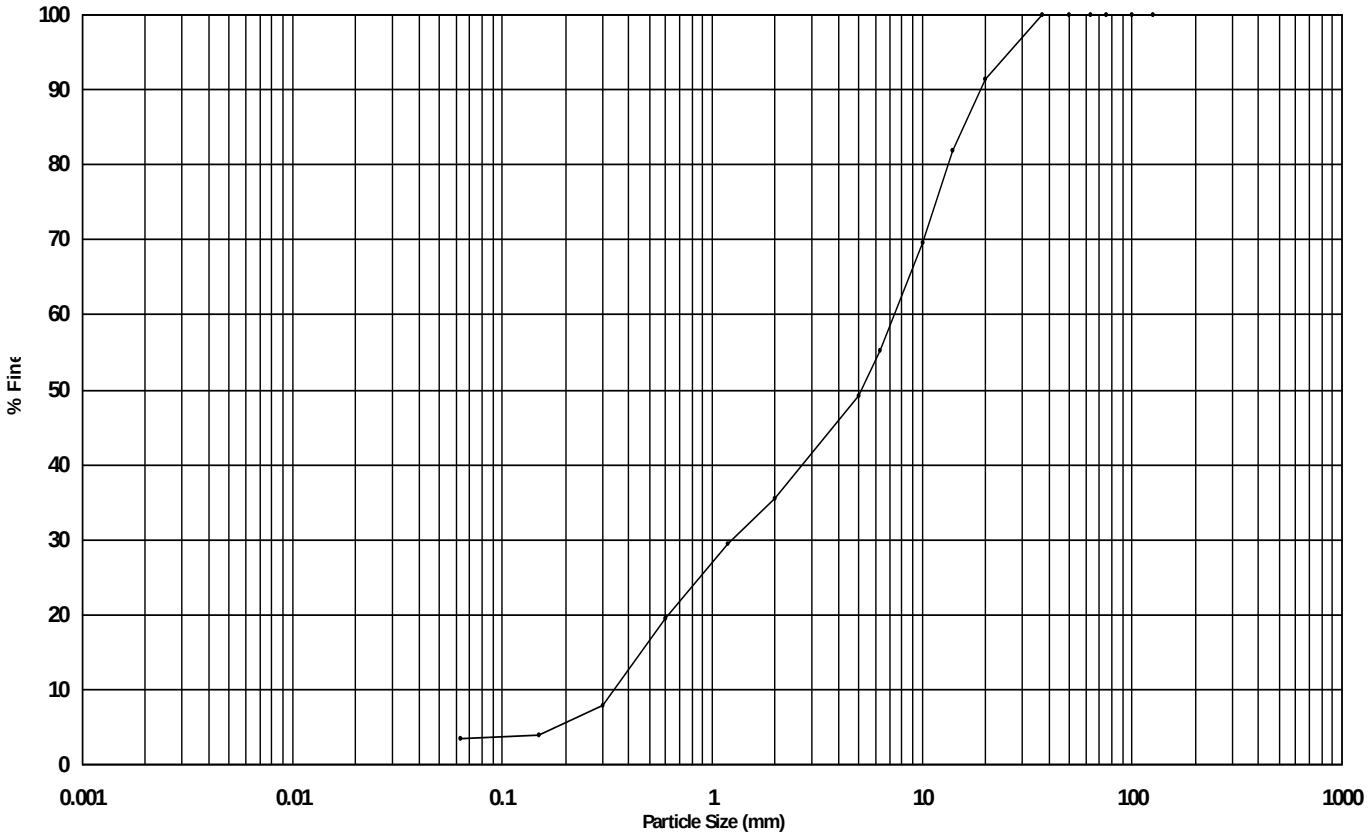
Project: HATFIELD PLOT 4100

Project No: PC176698

Hole	BH1
Sample Depth	4.00m
Sample Type	B
Sample Ref	C64236

Sample Description

Brown slightly silty very sandy GRAVEL.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	4
SAND	31
GRAVEL	65
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	92
14 mm	82
10 mm	70
6.3 mm	55
5 mm	49
2 mm	35
1.18 mm	30
600 µm	20
300 µm	8
150 µm	4

Size	% Finer
63 µm	4

Uniformity Coefficient
21.65
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

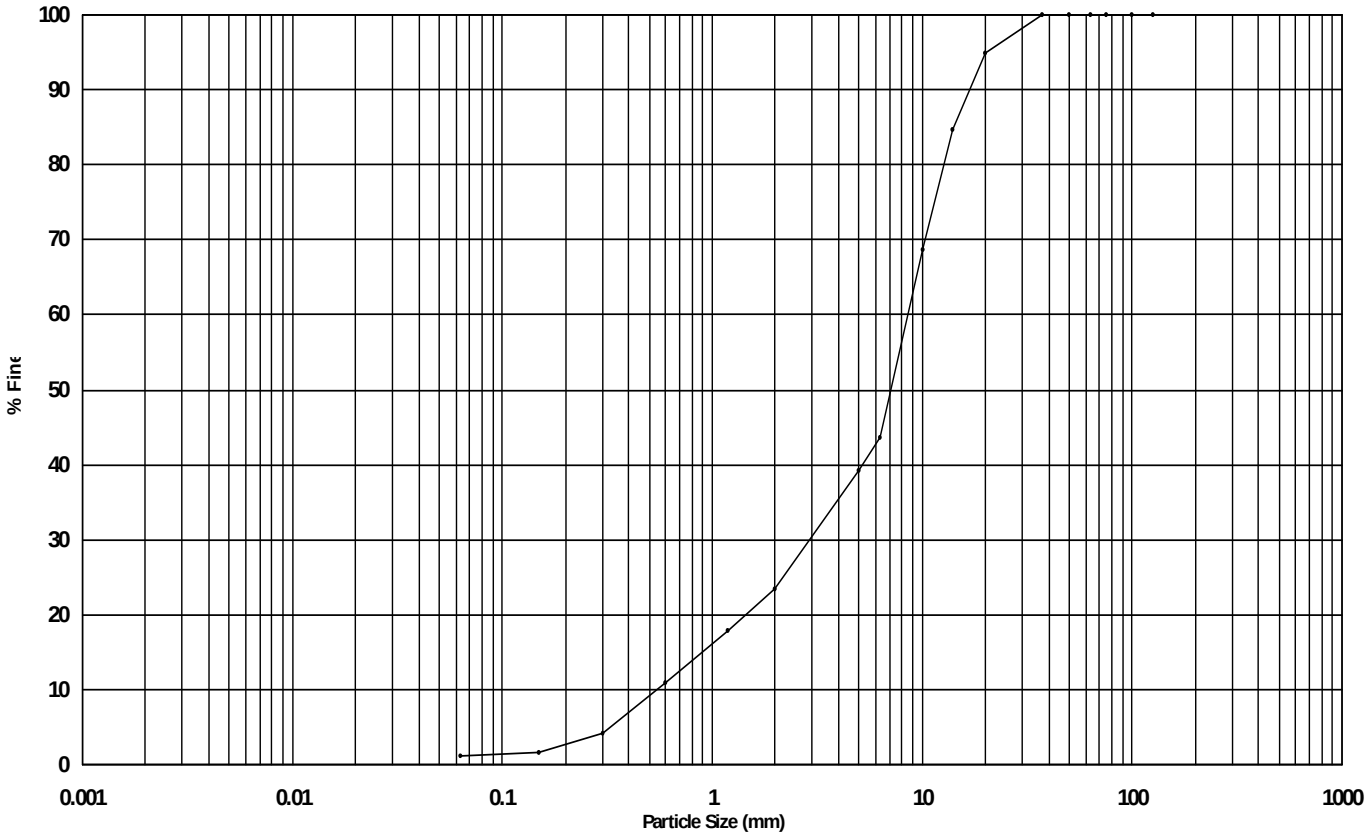
Project: HATFIELD PLOT 4100

Project No: PC176698

Hole	BH1
Sample Depth	5.00m
Sample Type	B
Sample Ref	C64235

Sample Description

Brown slightly silty very sandy GRAVEL.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	1
SAND	22
GRAVEL	77
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	95
14 mm	85
10 mm	69
6.3 mm	44
5 mm	39
2 mm	23
1.18 mm	18
600 µm	11
300 µm	4
150 µm	2

Size	% Finer
63 µm	1

Uniformity Coefficient
15.61
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

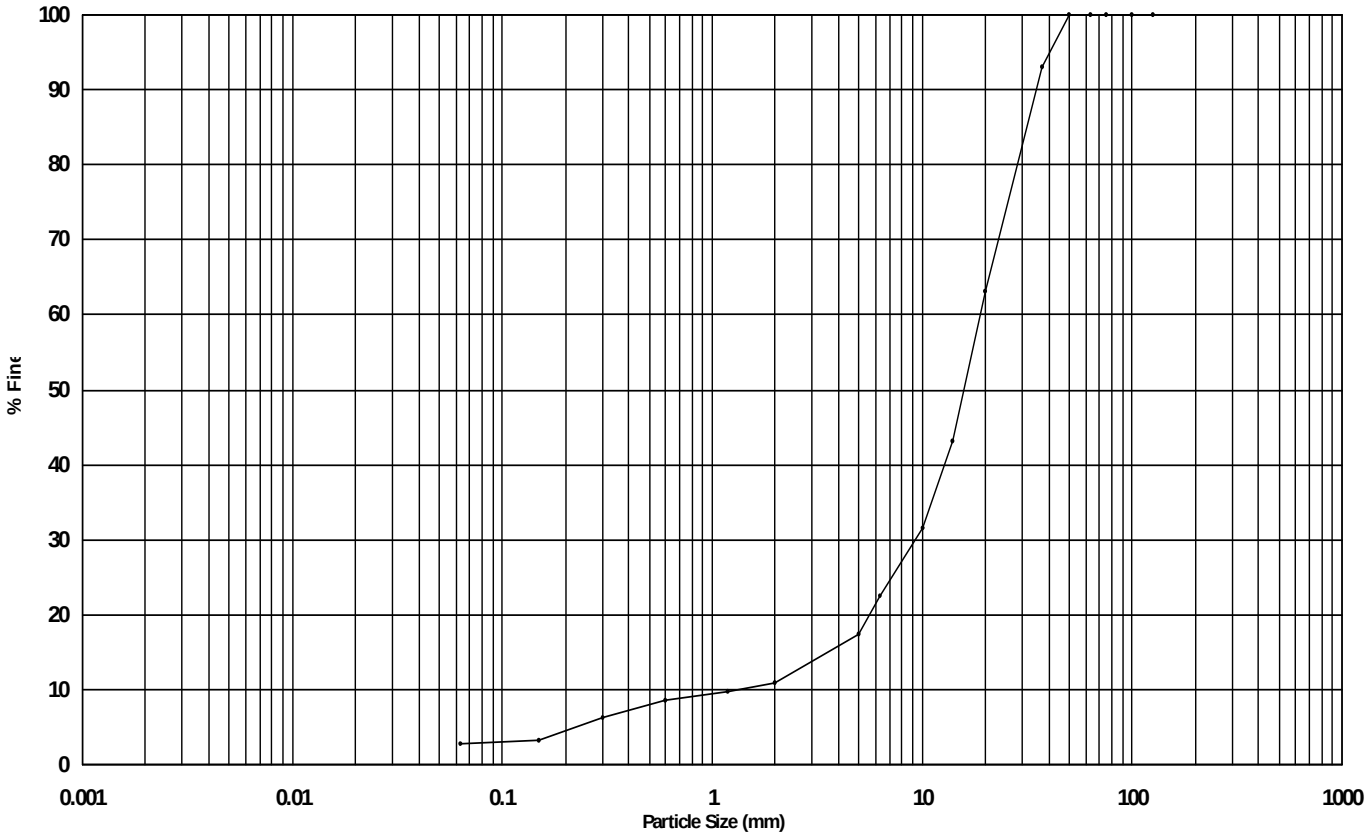
Project: HATFIELD PLOT 4100

Project No: PC176698

Hole BH1
Sample Depth 6.00m
Sample Type B
Sample Ref C64234

Sample Description

Brown slightly silty slightly sandy GRAVEL.



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	3
SAND	8
GRAVEL	89
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	93
20 mm	63
14 mm	43
10 mm	32
6.3 mm	22
5 mm	17
2 mm	11
1.18 mm	10
600 µm	9
300 µm	6
150 µm	3

Size	% Finer
63 µm	3

Uniformity Coefficient
14.86

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks AGS Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

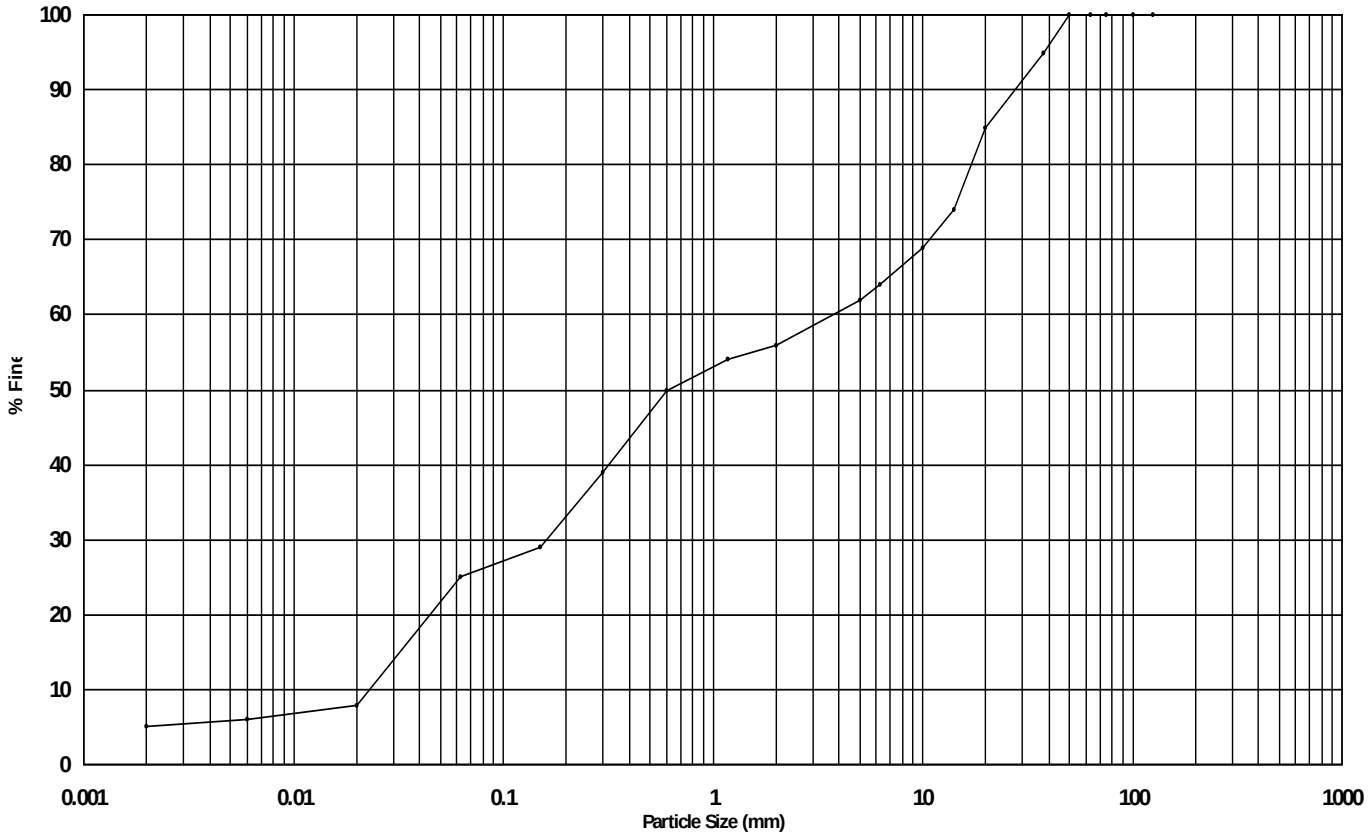
Project: HATFIELD PLOT 4100

Project No: PC176698

Hole BH3
Sample Depth 4.20m
Sample Type B
Sample Ref C64237

Sample Description

Brown silty very sandy GRAVEL.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	5
SILT	20
SAND	31
GRAVEL	44
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	95
20 mm	85
14 mm	74
10 mm	69
6.3 mm	64
5 mm	62
2 mm	56
1.18 mm	54
600 µm	50
300 µm	39
150 µm	29

Size	% Finer
63 µm	25
20 µm	8
6 µm	6
2 µm	5

Uniformity Coefficient
160.20

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.27
Particle Density	2.65 (Assumed)

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

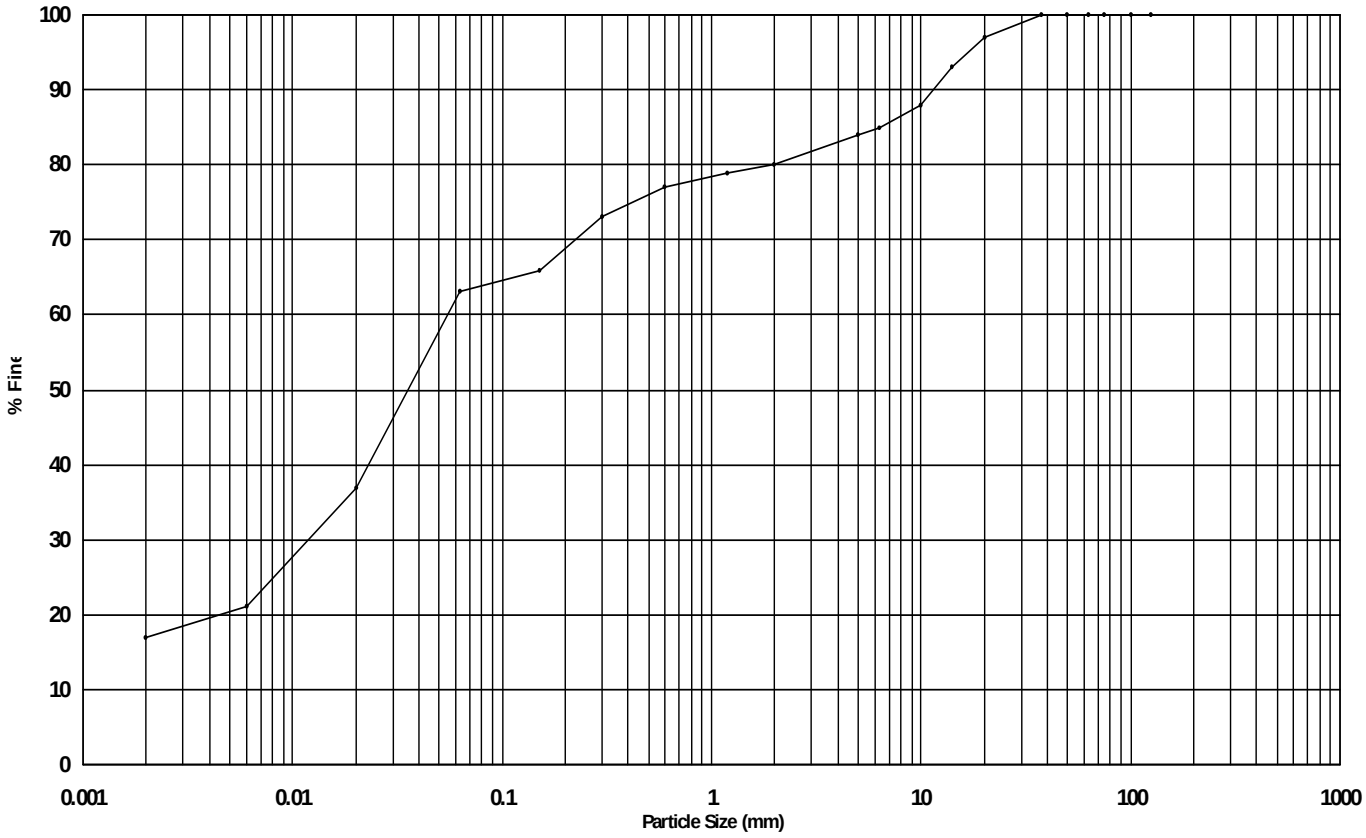
Project: HATFIELD PLOT 4100

Project No: PC176698

Hole	TP01A
Sample Depth	1.10m
Sample Type	B
Sample Ref	C64241

Sample Description

Brown sandy gravelly clayey SILT.



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
CLAY	17
SILT	46
SAND	17
GRAVEL	20
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	97
14 mm	93
10 mm	88
6.3 mm	85
5 mm	84
2 mm	80
1.18 mm	79
600 µm	77
300 µm	73
150 µm	66

Size	% Finer
63 µm	63
20 µm	37
6 µm	21
2 µm	17

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.37
Particle Density	2.65 (Assumed)

Remarks Test performed in accordance with BS EN ISO 17892-4:2016

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APPENDIX G
HUMAN HEALTH GENERIC RISK ASSESSMENT CRITERIA

Generic assessment criteria for human health: commercial scenario

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009[1]. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009[2]. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC: 2015

In 2014, the publication of Category 4 Screening Levels (C4SL)[3,4], as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)[5] used in the generation of SGVs.

C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010[3]). Where a C4SL has been published, the RSK GAC duplicates the C4SL published values using all input parameters within the SP1010 final project report[3] and associated appendices[6], and adopts them as GAC for these six substances.

For all other substances the only C4SL exposure modification relevant to a commercial end use are daily inhalation rates.

The RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015[7], where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the Contaminated Land Exposure Assessment (CLEA) tool v1.06, supporting EA guidance[5,8,9] and revised exposure scenarios published for the C4SL[3]. Groundwater assessment criteria (GrAC) protective of human health via the inhalation pathway were derived using the RBCA 1.3b model. RSK has updated the inputs within RBCA to reflect EA guidance[1,5,8,9]. The SAC and GrAC collectively are termed GAC.

Pathway selection

In accordance with SR3[5] the commercial scenario considers risks to a female worker who works from the age of 16 to 65 years. It should be noted that this end use is not suitable for a workplace nursery but may be appropriate for a sports centre or shopping centre where children are present. In accordance with Box 3.5, SR3[5] the pathways considered for production of the SAC in the commercial scenario are

- direct soil and dust ingestion
- dermal contact with soil both indoors and outdoors

- indoor air inhalation from soil and vapour and outdoor inhalation of soil and vapour.

The pathway considered in production of the GrAC is the volatilisation of compounds from groundwater and subsequent vapour inhalation by residents while indoors. Figure 2 illustrates this linkage. Although the outdoor air inhalation pathway is also valid, this contributes little to the overall risks owing to the dilution in outdoor air. Within RBCA, the solubility limit of the chemical restricts the extent of volatilisation, which in turn drives the indoor air inhalation pathway. While the same restriction is not built into the CLEA model, the CLEA model output cells are flagged red where the soil saturation limit has been exceeded.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase[9]. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached[9]. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required[9]:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway contribution is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, the vapour pathway exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook[9], this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook[9], which explains how to calculate an effective assessment criterion manually.

SR3[5] states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface to indoor air correction factor of 10 into the CLEA model chemical database for all petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the

polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7[10], the EA TOX[1] reports, the C4SL SP1010 project report and associated appendices[3,6] or the 2015 LQM/CIEH report[7]. Where a C4SL has been published, the RSK GAC have duplicated the C4SL published values using all input parameters within the SP1010 final project report[3] and associated appendices[6], and has adopted them as GAC for these six substances. Toxicological and specific chemical parameters for aromatic hydrocarbon C_8–C_9 (styrene), 1,2,4-trimethylbenzene and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report[11].

For TPH, aromatic hydrocarbons C_5–C_8 were not modelled, as this range comprises benzene and toluene, which are modelled separately. The aromatic C_8–C_9 hydrocarbon fraction comprises ethylbenzene, xylene and styrene. As ethylbenzene and xylene are being modelled separately, the physical, chemical and toxicological data for aromatic C_8–C_9 have been taken from styrene.

Owing to the lack of UK-specific data, default information in the RBCA model was used to evaluate MTBE. No published UK data was available for 1,3,5-trimethylbenzene, so information was obtained from the RBCA model. RBCA uses toxicity data for the inhalation pathway in different units to the CLEA model and cannot consider separately the mean daily intake (MDI), occupancy periods or breathing rates. Therefore, the HCV in RBCA was amended to take account of

- amendments to the MDI using Table 3.4 of SR2[8]
- an adult weighing 70kg and breathing 14.8m^3 air per day in accordance with the UK TOX reports[12] and SR3[5]. Inhalation rates used in the derivation of the GrAC have not been updated in line with the 2011 USEPA published values[12]; these will be updated in subsequent revisions of the RSK GAC.
- the 50% rule (for petroleum hydrocarbons, trimethylbenzenes and MTBE)[8,9] where MDI data is not available but background exposure is considered important in the overall exposure.

Physical parameters

For the commercial end use, the CLEA default pre-1970s three-storey office building was used. SR3[5] notes this commercial building type to be the most conservative in terms of protection from vapour intrusion. The default input building parameters presented in Table 3.10 of SR3[5] have been used.

The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3[5]. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

For the GrAC, the depth to groundwater was taken as 2.5m based on RSK's experience of assessing the volatilisation pathway from groundwater. The GrAC were produced using the input parameters in Table 3. Inhalation rates have not been updated.

Summary of modifications to the default CLEA 1.06/SR3[5] input parameters for a commercial land use

In summary, the RSK commercial GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3[5]. Modifications to the default SR3[5] exposure scenarios based on the C4SL exposure scenarios[3] are presented in Table 2 below. The sole modification to the default commercial input parameters is the updated inhalation rate.

The final selected GAC are presented by pathway in Table 4 with the combined GAC in Table 5.

Figure 1: Conceptual model for CLEA commercial scenario

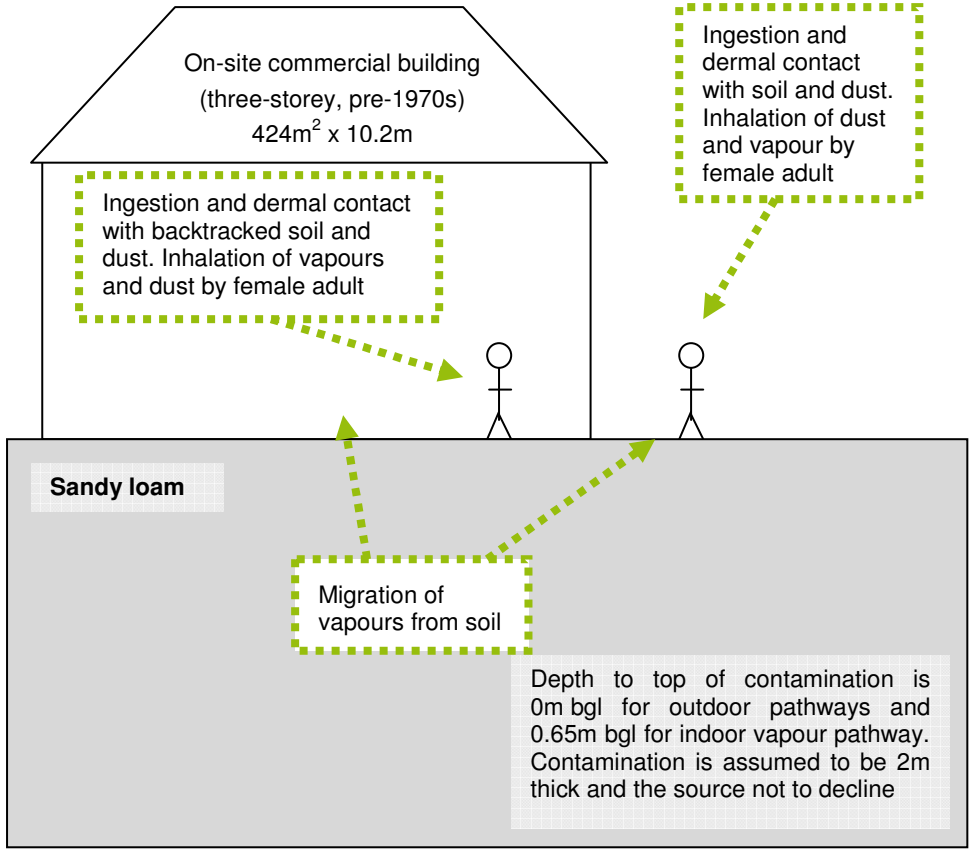

Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

Parameter	Value	Justification
Land use	Commercial	Chosen land use
Receptor	Female worker	Taken as female adult exposed over 49 years from age 16 to 65 years, Box 3.5, SR3[5]
Building	Office (pre-1970)	Key generic assumption given in Box 3.5, SR3[5]. Pre-1970s three-storey office building chosen as it is the most conservative in terms of protection from vapour intrusion (Section 3.4.6, SR3[5])
Soil type	Sandy loam	Most common UK soil type (Section 4.3.1, Table 4.4, SR3[5])
Start age class (AC)	17	AC corresponding to key generic assumption that the critical receptor is a working female adult exposed over a 49-year period from age 16 to 65 years. Assumption given in Box 3.5, SR3[5]
End AC	17	
SOM (%)	6	Representative of sandy loam according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents'[13]
	1	To provide SAC for sites where SOM < 6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Commercial – modified receptor inputs

Parameter	Unit	Value	Justification
Inhalation rate (AC17)	m^3 day^{-1}	15.7	Mean value USEPA, 2011[12]; Table 3.2, SP1010[3]

Figure 2: GrAC conceptual model for RBCA commercial scenario

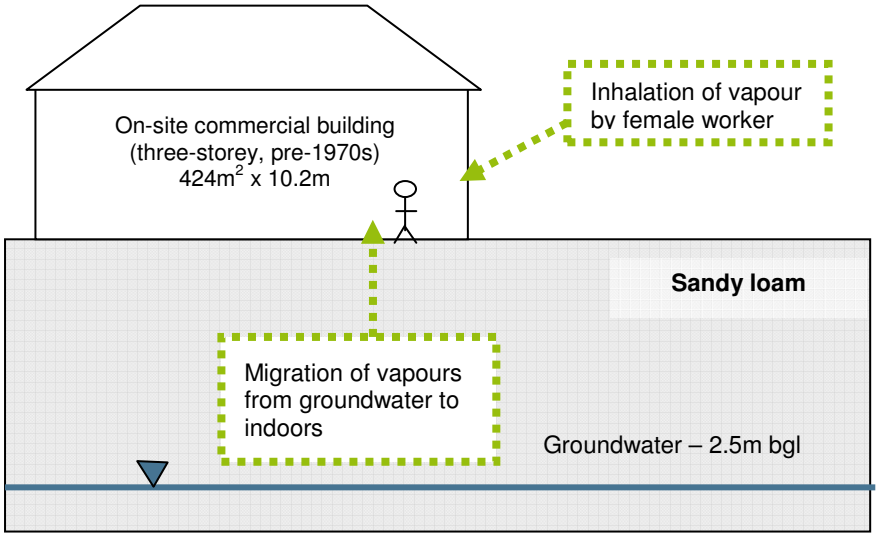

Table 3: Commercial – RBCA inputs

Parameter	Unit	Value	Justification
Receptor			
Averaging time	Years	49	From Box 3.5, SR3[5]
Receptor weight	kg	70	Female adult, Table 4.6, SR3[5]
Exposure duration	Years	49	From Box 3.5, SR3[5]
Exposure frequency	Days/yr	86.25	Weighted using occupancy period of 9 hours per day for 230 days of the year ((9hours x 230 days)/24 hours)
Soil type – sandy loam			
Total porosity	-	0.53	CLEA value for sandy loam. Parameters for sandy loam from Table 4.4, SR3[5]
Volumetric water content	-	0.33	
Volumetric air content	-	0.20	

Parameter	Unit	Value	Justification
Dry bulk density	g cm^{-3}	1.21	
Vertical hydraulic conductivity	cm s^{-1}	3.56E-3	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3[5]
Vapour permeability	m^2	3.05E-12	Calculated for sandy loam using equations in Appendix 1, SR3[5]
Capillary zone thickness	m	0.1	Professional judgement
Building			
Building volume/area ratio	m	9.6	Table 3.10, SR3[5]
Foundation area	m^2	424	Table 3.10, SR3[5]
Foundation perimeter	m	82.40	Based on square root of building area being 20.59m
Building air exchange rate	d^{-1}	24	Table 3.10, SR3[5]
Depth to bottom of foundation slab	m	0.15	
Foundation thickness	m	0.15	Table 3.10, SR3[5]
Foundation crack fraction	-	3.89E-04	Calculated from floor crack area of 0.165m^2 and building footprint of 424m^2 in Table 4.21, SR3[5]
Volumetric water content of cracks	-	0.33	Assumed equal to underlying soil type in assumption that cracks become filled with soil over time. Parameters for sandy loam from Table 4.4, SR3[5]
Volumetric air content of cracks	-	0.2	
Indoor/outdoor differential pressure	Pa	4.4	From Table 3.10, SR3[5]

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 4

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	GrAC (mg/l)	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals														
Arsenic	(a,b)	-	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR
Cadmium	(a)	-	NR	NR	4.10E+02	NR	NR	NR	4.10E+02	NR	NR	NR	4.10E+02	NR
Chromium (III) - trivalent	(c)	-	3.31E+05	8.57E+03	8.35E+03	NR	3.31E+05	8.57E+03	8.35E+03	NR	3.31E+05	8.57E+03	8.35E+03	NR
Chromium (VI) - hexavalent	(a,d)	-	7.52E+02	4.91E+01	NR	NR	7.52E+02	4.91E+01	NR	NR	7.52E+02	4.91E+01	NR	NR
Copper		-	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR
Lead	(a)	-	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR
Elemental Mercury (Hg^0)	(d)	5.60E-02	NR	1.54E+01	NR	4.31E+00	NR	3.26E+01	NR	1.07E+01	NR	5.80E+01	NR	2.58E+01
Inorganic Mercury (Hg^{2+})		-	1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR
Methyl Mercury (Hg^{4+})		1.00E+02	3.38E+02	2.13E+03	2.92E+02	7.33E+01	3.38E+02	3.87E+03	3.11E+02	1.42E+02	3.38E+02	7.33E+03	3.23E+02	3.04E+02
Nickel	(d)	-	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR
Selenium	(b)	-	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR
Zinc	(b)	-	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR
Cyanide		-	1.69E+04	1.95E+03	1.81E+03	NR	1.69E+04	1.95E+03	1.81E+03	NR	1.69E+04	1.95E+03	1.81E+03	NR
Volatile Organic Compounds														
Benzene	(a)	1.40E+02	1.09E+03	2.79E+01	2.72E+01	1.22E+03	1.09E+03	5.19E+01	4.96E+01	2.26E+03	1.09E+03	1.08E+02	9.80E+01	4.71E+03
Toluene		5.90E+02	4.24E+05	6.49E+04	5.63E+04	8.69E+02	4.24E+05	1.43E+05	1.07E+05	1.92E+03	4.24E+05	3.24E+05	1.84E+05	4.36E+03
Ethylbenzene		1.80E+02	1.91E+05	5.89E+03	5.71E+03	5.18E+02	1.91E+05	1.38E+04	1.28E+04	1.22E+03	1.91E+05	3.21E+04	2.75E+04	2.84E+03
Xylene - m		2.00E+02	3.43E+05	6.26E+03	6.15E+03	6.25E+02	3.43E+05	1.47E+04	1.41E+04	1.47E+03	3.43E+05	3.44E+04	3.12E+04	3.46E+03
Xylene - o		1.70E+02	3.43E+05	6.73E+03	6.60E+03	4.78E+02	3.43E+05	1.57E+04	1.50E+04	1.12E+03	3.43E+05	3.65E+04	3.30E+04	2.62E+03
Xylene - p		2.00E+02	3.43E+05	6.03E+03	5.92E+03	5.76E+02	3.43E+05	1.41E+04	1.36E+04	1.35E+03	3.43E+05	3.28E+04	3.00E+04	3.17E+03
Total xylene		2.00E+02	3.43E+05	6.03E+03	5.92E+03	6.25E+02	3.43E+05	1.41E+04	1.36E+04	1.47E+03	3.43E+05	3.28E+04	3.00E+04	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		4.80E+04	5.72E+05	7.54E+04	6.66E+04	2.04E+04	5.72E+05	1.22E+05	1.01E+05	3.31E+04	5.72E+05	2.31E+05	1.65E+05	6.27E+04
Trichloroethene		3.60E+01	9.53E+02	1.23E+00	1.23E+00	1.54E+03	9.53E+02	2.58E+00	2.57E+00	3.22E+03	9.53E+02	5.72E+00	5.69E+00	7.14E+03
Tetrachloroethene		2.30E+02	1.12E+04	1.86E+01	1.86E+01	4.24E+02	1.12E+04	4.17E+01	4.16E+01	9.51E+02	1.12E+04	9.57E+01	9.49E+01	2.18E+03
1,1,1-Trichloroethane		1.30E+03	1.14E+06	6.60E+02	6.60E+02	1.43E+03	1.14E+06	1.35E+03	1.35E+03	2.92E+03	1.14E+06	2.96E+03	2.95E+03	6.39E+03
1,1,1,2 Tetrachloroethane		1.10E+03	1.10E+04	1.09E+02	1.08E+02	2.60E+03	1.10E+04	2.53E+02	2.47E+02	6.02E+03	1.10E+04	5.88E+02	5.59E+02	1.40E+04
1,1,2,2-Tetrachloroethane		1.10E+03	1.10E+04	2.81E+02	2.74E+02	2.67E+03	1.10E+04	5.75E+02	5.46E+02	5.46E+03	1.10E+04	1.26E+03	1.13E+03	1.20E+04
Carbon Tetrachloride		5.70E+00	7.62E+03	2.87E+00	2.87E+00	1.52E+03	7.62E+03	6.29E+00	6.28E+00	3.32E+03	7.62E+03	1.43E+01	1.42E+01	7.54E+03
1,2-Dichloroethane		6.10E+00	2.29E+02	6.73E-01	6.71E-01	3.41E+03	2.29E+02	9.71E-01	9.67E-01	4.91E+03	2.29E+02	1.67E+00	1.65E+00	8.43E+03
Vinyl Chloride		4.10E-01	2.67E+01	5.95E-02	5.94E-02	1.36E+03	2.67E+01	7.70E-02	7.67E-02	1.76E+03	2.67E+01	1.18E-01	1.17E-01	2.69E+03
1,2,4-Trimethylbenzene		5.70E+01	NR	3.29E+02	NR	4.74E+02	NR	6.41E+02	NR	1.16E+03	NR	1.04E+03	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	3.80E+01	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
Semi-Volatile Organic Compounds														
Acenaphthene		3.20E+00	1.10E+05	2.75E+06	1.06E+05	5.70E+01	1.10E+05	5.36E+06	1.08E+05	1.41E+02	1.10E+05	8.83E+06	1.08E+05	3.36E+02
Acenaphthylene		1.61E+01	1.10E+05	2.68E+06	1.05E+05	8.61E+01	1.10E+05	5.23E+06	1.07E+05	2.12E+02	1.10E+05	8.65E+06	1.08E+05	5.06E+02
Anthracene		2.10E-02	5.49E+05	1.13E+07	5.23E+05	1.17E+00	5.49E+05	2.35E+07	5.36E+05	2.91E+00	5.49E+05	4.13E+07	5.42E+05	6.96E+00
Benzo(a)anthracene		3.80E-03	2.84E+02	4.08E+02	1.67E+02	1.71E+00	2.84E+02	4.47E+02	1.74E+02	4.28E+00	2.84E+02	4.67E+02	1.76E+02	1.03E+01
Benzo(b)fluoranthene		2.00E-03	7.13E+01	1.17E+02	4.43E+01	1.22E+00	7.13E+01	1.20E+02	4.47E+01	3.04E+00	7.13E+01	1.21E+02	4.49E+01	7.29E+00
Benzo(g,h,i)perylene		2.60E-04	6.29E+03	1.05E+04	3.93E+03	1.54E-02	6.29E+03	1.06E+04	3.95E+03	3.85E-02	6.29E+03	1.07E+04	3.96E+03	9.23E-02
Benzo(k)fluoranthene		8.00E-04	1.88E+03	3.11E+03	1.17E+03	6.87E-01	1.88E+03	3.17E+03	1.18E+03	1.72E+00	1.88E+03	3.21E+03	1.19E+03	4.12E+00
Chrysene		2.00E-03	5.67E+02	8.89E+02	3.46E+02	4.40E-01	5.67E+02	9.25E+02	3.52E+02	1.10E+00	5.67E+02	9.47E+02	3.55E+02	2.64E+00
Dibenzo(a,h)anthracene		6.00E-04	5.67E+00	9.32E+00	3.53E+00	3.93E-03	5.67E+00	9.52E+00	3.55E+00	9.82E-03	5.67E+00	9.64E+00	3.57E+00	2.36E-02
Fluoranthene		2.30E-01	2.29E+04	1.89E+06	2.26E+04	1.89E+01	2.29E+04	2.72E+06	2.27E+04	4.73E+01	2.29E+04	3.32E+06	2.27E+04	1.13E+02
Fluorene		1.90E+00	7.31E+04	4.55E+05	6.30E+04	3.09E+01	7.31E+04	1.06E+06	6.84E+04	7.65E+01	7.31E+04	2.24E+06	7.08E+04	1.83E+02
Indeno(1,2,3-cd)pyrene		2.00E-04	8.10E+02	1.31E+03	5.01E+02	6.13E-02	8.10E+02	1.35E+03	5.06E+02	1.53E-01	8.10E+02	1.37E+03	5.09E+02	3.68E-01
Phenanthrene		5.30E-01	2.28E+04	5.35E+05	2.19E+04	3.60E+01	2.28E+04	1.09E+06	2.24E+04	8.96E+01	2.28E+04	1.86E+06	2.25E+04	2.14E+02
Pyrene		1.30E-01	5.49E+04	4.47E+06	5.42E+04	2.20E+00	5.49E+04	6.46E+06	5.44E+04	5.49E+00	5.49E+04	7.91E+06	5.45E+04	1.32E+01
Benzo(a)pyrene	(a)	3.80E-03	7.68E+01	2.04E+02	5.58E+01	9.11E-01	7.68E+01	2.09E+02	5.61E+01	2.28E+00	7.68E+01	2.11E+02	5.63E+01	5.46E+00
Naphthalene		1.90E+01	3.64E+04	1.87E+03	1.78E+03	7.64E+01	3.64E+04	4.39E+03	3.92E+03	1.83E+02	3.64E+04	9.94E+03	7.81E+03	4.32E+02
Phenol		-	1.10E+06	2.65E+04	2.59E+04	2.42E+04	1.10E+06	3.04E+04	2.96E+04	3.81E+04	1.10E+06	3.46E+04	3.35E+04	7.03E+04

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 4

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	GrAC (mg/l)	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Total petroleum hydrocarbons														
Aliphatic hydrocarbons EC5-EC6		3.60E+01	4.77E+06	3.19E+03	3.19E+03	3.04E+02	4.77E+06	5.86E+03	5.86E+03	5.58E+02	4.77E+06	1.21E+04	1.21E+04	1.15E+03
Aliphatic hydrocarbons >EC6-EC8		5.40E+00	4.77E+06	7.79E+03	7.78E+03	1.44E+02	4.77E+06	1.74E+04	1.74E+04	3.22E+02	4.77E+06	3.97E+04	3.96E+04	7.36E+02
Aliphatic hydrocarbons >EC8-EC10		4.30E-01	9.53E+04	2.02E+03	2.00E+03	7.77E+01	9.53E+04	4.91E+03	4.85E+03	1.90E+02	9.53E+04	1.17E+04	1.13E+04	4.51E+02
Aliphatic hydrocarbons >EC10-EC12		3.40E-02	9.53E+04	9.97E+03	9.69E+03	4.75E+01	9.53E+04	2.47E+04	2.29E+04	1.18E+02	9.53E+04	5.89E+04	4.73E+04	2.83E+02
Aliphatic hydrocarbons >EC12-EC16		7.60E-04	9.53E+04	8.26E+04	5.88E+04	2.37E+01	9.53E+04	2.04E+05	8.17E+04	5.91E+01	9.53E+04	4.81E+05	9.02E+04	1.42E+02
Aliphatic hydrocarbons >EC16-EC35	(b)	-	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC35-EC44	(b)	-	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aromatic hydrocarbons >EC8-EC9 (styrene)		6.50E+01	2.29E+04	3.66E+04	1.41E+04	6.26E+02	2.29E+04	8.39E+04	1.80E+04	1.44E+03	2.29E+04	1.93E+05	2.04E+04	3.35E+03
Aromatic hydrocarbons >EC_9-EC_{10}		6.50E+01	3.81E+04	3.55E+03	3.46E+03	6.13E+02	3.81E+04	8.66E+03	8.11E+03	1.50E+03	3.81E+04	2.05E+04	1.70E+04	3.58E+03
Aromatic hydrocarbons >EC10-EC12		2.50E+01	3.81E+04	1.92E+04	1.62E+04	3.64E+02	3.81E+04	4.69E+04	2.79E+04	8.99E+02	3.81E+04	1.10E+05	3.42E+04	2.15E+03
Aromatic hydrocarbons >EC12-EC16		5.80E+00	3.81E+04	2.02E+05	3.62E+04	1.69E+02	3.81E+04	4.76E+05	3.73E+04	4.19E+02	3.81E+04	1.03E+06	3.78E+04	1.00E+03
Aromatic hydrocarbons >EC16-EC21	(b)	-	2.82E+04	NR	NR	5.37E+01	2.83E+04	NR	NR	1.34E+02	2.84E+04	NR	NR	3.21E+02
Aromatic hydrocarbons >EC21-EC35	(b)	-	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01
Aromatic hydrocarbons >EC35-EC44	(b)	-	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01

Notes:

EC - equivalent carbon. GrAC - groundwater screening value. SAC - soil screening value.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%. This shading has also been used for the RBCA output where the theoretical solubility limit has been exceeded.

Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.

Calculated SAC does not exceed the soil saturation limit.

For consistency where the theoretical solubility limit within RBCA has been exceeded in production of the GrAC, these cellls have also been hatched red and the GrAC set at the solubility limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, polycyclic aromatic hydrocarbons, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 5
Human Health Generic Assessment Criteria for Commercial Scenario

Compound	GrAC for Groundwater (mg/l)	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals				
Arsenic	-	640	640	640
Cadmium	-	410	410	410
Chromium (III) - trivalent	-	8,600	8,600	8,600
Chromium (VI) - hexavalent	-	49	49	49
Copper	-	68,000	68,000	68,000
Lead	-	2,320	2,320	2,320
Elemental Mercury (Hg^0)	0.056	15 (4)	33 (11)	58 (26)
Inorganic Mercury (Hg^{2+})	-	1,120	1,120	1,120
Methyl Mercury (Hg^{4+})	100	290 (73)	310	320
Nickel	-	980	980	980
Selenium	-	12,000	12,000	12,000
Zinc	-	740,000	740,000	740,000
Cyanide	-	1,800	1,800	1,800
Volatile Organic Compounds				
Benzene	140	27	50	98
Toluene	590	56,000 (869)	107,000 (1,916)	184,000 (4,357)
Ethylbenzene	180	6,000 (518)	13,000 (1,216)	27,000 (2,844)
Xylene - m	200	6,200 (625)	14,100 (1,474)	31,200 (3,457)
Xylene - o	170	6,600 (478)	15,000 (1,120)	33,000 (2,618)
Xylene - p	200	5,900 (576)	13,600 (1,353)	30,000 (3,167)
Total xylene	200	5,900 (625)	13,600 (1,474)	30,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	48000	67,000 (20,400)	101,000 (33,100)	165,000 (62,700)
Trichloroethene	36	1	3	6
Tetrachloroethene	230	20	40	90
1,1,1-Trichloroethane	1300	700	1,300	3,000
1,1,1,2 Tetrachloroethane	1100	110	250	560
1,1,2,2-Tetrachloroethane	1100	270	550	1,130
Carbon Tetrachloride	5.7	2.9	6.3	14.2
1,2-Dichloroethane	6.1	0.67	0.97	1.65
Vinyl Chloride	0.41	0.06	0.08	0.12
1,2,4-Trimethylbenzene	57	330	640	1,040
1,3,5-Trimethylbenzene	38	NR	NR	NR
Semi-Volatile Organic Compounds				
Acenaphthene	3.2	110,000 (57)	110,000 (141)	110,000
Acenaphthylene	16	110,000 (86)	110,000 (212)	110,000
Anthracene	0.021	520,000	540,000	540,000
Benzo(a)anthracene	0.0038	170	170	180
Benzo(b)fluoranthene	0.002	44	45	45
Benzo(g,h,i)perylene	0.00026	3,900	3,900	4,000
Benzo(k)fluoranthene	0.0008	1,200	1,200	1,200
Chrysene	0.002	350	350	350
Dibenzo(a,h)anthracene	0.0006	3.5	3.6	3.6
Fluoranthene	0.23	23,000	23,000	23,000
Fluorene	1.9	63,000 (31)	68,000	71,000
Indeno(1,2,3-cd)pyrene	0.0002	500	510	510
Phenanthrene	0.53	22,000	22,000	23,000
Pyrene	0.13	54,000	54,000	54,000
Benzo(a)pyrene	0.0038	77	77	77
Naphthalene	19	1,800 (76)	3,900 (183)	7,800 (432)
Phenol	-	440*	690*	1,300*
Total Petroleum Hydrocarbons				
Aliphatic hydrocarbons EC_5-EC_6	36	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC_6-EC_8	5.4	7,800 (144)	17,400 (322)	39,600 (736)
Aliphatic hydrocarbons >EC_8-EC_{10}	0.43	2,000 (78)	4,800 (190)	11,300 (451)
Aliphatic hydrocarbons >EC_{10}-EC_{12}	0.034	9,700 (48)	22,900 (118)	47,300 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	0.00076	59,000 (24)	82,000 (59)	90,000 (142)
Aliphatic hydrocarbons >EC_{16}-EC_{35}	-	1,000,000**	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC_{35}-EC_{44}	-	1,000,000**	1,000,000**	1,000,000**
Aromatic hydrocarbons >EC_8-EC_9 (styrene)	65	14,000 (626)	18,000 (1,440)	20,000 (3,350)
Aromatic hydrocarbons >EC_9-EC_{10}	65	3,500 (613)	8,100 (1,503)	17,000 (3,580)
Aromatic hydrocarbons >EC_{10}-EC_{12}	25	16,000 (364)	28,000 (899)	34,000 (2,150)
Aromatic hydrocarbons >EC_{12}-EC_{16}	5.8	36,000 (169)	37,000	38,000
Aromatic hydrocarbons >EC_{16}-EC_{21}	-	28,000	28,000	28,000
Aromatic hydrocarbons >EC_{21}-EC_{35}	-	28,000	28,000	28,000
Aromatic hydrocarbons >EC_{35}-EC_{44}	-	28,000	28,000	28,000

Notes:

'-' Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.

NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used

EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.

* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report)

** Denoted SAC calculated exceeds 100% contaminant, hence 100% (1,000,000mg/kg) has been taken as SAC

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, polycyclic aromatic hydrocarbons, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.

(VALUE IN BRACKETS) The SAC has been set as the model calculated SAC with the saturation limit shown in brackets.

RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

(VALUE IN BRACKETS) For consistency where the GrAC exceeds the solubility limit, GrAC has been set at the solubility limit. The GrAC is conservative since concentrations of the chemical are very unlikely to be at sufficient concentration to result in an exceedance of the health criteria value at the point of exposure (i.e. indoor air) provided free-phase product is absent.

APPENDIX H
GENERIC ASSESSMENT FOR CONTROLLED WATERS

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

The water environment in the United Kingdom is protected under a number of regulatory regimes. The relevant environmental regulator is consulted where there may be a risk that pollution of 'controlled waters' may occur or may have occurred in the past. Controlled waters are coastal waters, inland freshwaters and groundwater. The EU Water Framework Directive (WFD) (2000/60/EC) is implemented via domestic regulations and guidance, covering aspects of groundwater, surface water and drinking water supply policy. Domestic legislation and guidance will vary across the United Kingdom. Therefore, the relevant legislation for England, Wales, Northern Ireland and Scotland should be reviewed, alongside guidance provided by the Environment Agency (EA), Natural Resource Wales (NRW), the Scottish Environmental Protection Agency (SEPA) or the Northern Ireland Environment Agency (NIEA), as appropriate.

The main objectives of the protection and remediation of groundwater under threat from land contamination are set out in the Environment Agency's Groundwater Protection: Principles and Practice (GP3) document[(1)]. When assessing risks to groundwater the following need to be taken into consideration:

- Where pollutants have not yet entered groundwater, all necessary and reasonable measures must be taken to
    - *prevent the input of hazardous substances into groundwater (see description of hazardous substances below)*
    - *limit the entry of other (non-hazardous) pollutants into groundwater so as to avoid pollution, and to avoid deterioration of the status of groundwater bodies or sustained, upward trends in pollutant concentration.*
- Where hazardous substances or non-hazardous pollutants have already entered groundwater, the priority is to
    - *minimise further entry of hazardous substances and non-hazardous pollutants into groundwater*
    - *take necessary and reasonable measures to limit the pollution of groundwater or impact on the status of the groundwater body from the future expansion of a contaminant 'plume', if necessary by actively reducing its extent if the economic, social and environmental benefits of doing so outweigh the costs.*

DEFINITIONS

Hazardous substances are defined in the Water Framework Directive 2000/60/EC as 'substances or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances that give rise to an equivalent level of concern.' All List 1 substances under the old Groundwater Directive (80/68/EEC) are hazardous substances, all radioactive substances are hazardous substances.

Non-hazardous substances are defined as 'substances capable of causing pollution that have not been classified as hazardous substances'. The non-hazardous list of pollutants does not simply replace the old WFD List II but includes a wider range of pollutants.

For the current list of classified substances please visit the UKTAG website www.wfduk.org./jagdag/

When assessing the risks to surface waters, various standards apply, including Environmental Quality Standards (EQS) which are protective of the water ecology.

The Water Supply (Water Quality) Regulations[(2)] are the primary source for assessing water bodies that may be used for public water supplies. The Private Water Supplies Regulations[(3)] may be applicable in some cases.

This appendix presents the generic assessment criteria (GAC) that RSK considers are suitable for assessing risks to controlled waters.

The RSK GAC for controlled waters are presented in Table 1. In line with the Environment Agency's Remedial Targets Methodology, the GAC for controlled waters are termed 'target concentrations'.

The target concentration can be derived by several means with consideration to

- whether the substance is classified as hazardous or non-hazardous by the EU under the WFD (2000/60/EC) and Groundwater Daughter Directive (2006/118/EC) implemented though the Environmental Permitting Regulations 2010
- background concentrations in the aquifer
- published guidance such as EQS that are protective of ecology or The Water Supply (Water Quality) Regulations 2010 that are protective of drinking water
- minimum reporting values (MRV) (or method detection limits if MRV are not provided).

It is important to remember that the WFD and GP3[(1)] guidance allow a risk-based and a cost-benefit approach to be applied to groundwater contamination. Exceedance of any target concentration does not necessarily imply that an unacceptable risk exists or that remediation is required either on a technical or cost-benefit basis. If pollutant concentrations at a site exceed target concentrations please speak to a member of the QRA group who will assist in making an appropriate assessment and recommendations.

Table 1: Target concentrations for controlled waters

Analytes in bold are hazardous, *analytes in italics are non-hazardous*, analytes in plain text are unclassified; according to JAGDAG Determination List June 2010 (revised June 2012).

Target concentrations shaded in GREEN are statutory values usually for drinking water or a surface watercourse ORANGE are non-statutory values

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Metals				
Arsenic	-	0.01[2]	0.05[5a]	0.025[5a]
Cadmium	0.0001[6]	0.005[2]	≤0.00008, 0.00008, 0.00009, 0.00015, 0.00025 [5b]	0.0002[15c]
Chromium (total)	-	0.05[2]	Sum values for chromium III and VI	
Chromium (III)	-	Use value for total chromium	0.0047[5a]	-
Chromium (VI)			0.0034[5a]	0.0006[5a]
Copper	-	2.0[2]	0.001 bioavailable[7]	0.00376 dissolved, where DOC ≤1mg/l[7]
				0.00376 + (0.002677 x ((DOC/2) – 0.0005)) µg/l dissolved, where DOC >1mg/l[7]
Lead	-	0.025 (before 25/12/2013), 0.01 (after 25/12/2013)[2]	0.0072[5c]	0.0072[5c]

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Mercury	0.00001[6]	0.001[2]	0.00005[5c]	0.00005[5c]
Nickel	-	0.02[2]	0.02[5c]	0.02[5c]
Selenium	-	0.01[2]	-	-
Zinc	-	3[4]	0.0109 bioavailable plus ambient background concentration (dissolved)[7]	0.0068 dissolved plus ambient background concentration[7]
Chlorinated solvents				
Trichloroethene	0.0001[6]	0.01[2]	0.01[5c]	0.01[5c]
Tetrachloroethene	0.0001[6]	0.01[2]	0.01[5c]	0.01[5c]
Tetrachloroethane	-	-	0.14[17]	-
1,1,1-Trichloroethane	0.0001[6]	-	0.1[5c]	0.1[5c]
1,1,2-Trichloroethane	0.0001[6]	-	0.4[5c]	0.3[5c]
Carbon tetrachloride (tetrachloromethane)	0.0001[6]	0.003[2]	0.012[5c]	0.012[5c]
1,2-Dichloroethane	0.001[6]	0.003[2]	0.01[5c]	0.01[5c]
Vinyl chloride (chloroethene)	-	0.0005[2]	-	-
Trihalomethanes	-	0.1[2, 8]	-	-
Chloroform (trichloromethane) (one of the trihalomethanes included above)	0.0001[6]	0.1[2, 8]	0.0025[5c]	0.0025[5c]

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Polycyclic aromatic hydrocarbons				
Acenaphthene	-	-	0.0058[9]	
Acenaphthylene	-	-	0.0058[9]	
Anthracene	-	-	0.0001[5c]	0.0001[15c]
Benzo(a)anthracene	-	-	0.000018[9]	
Benzo(b)fluoranthene	-	0.0001[2]	0.00003[15f]	0.00003[5f]
Benzo(k)fluoranthene	-			
Benzo(g,h,i)perylene	-		0.000002[15g]	0.000002[5g]
Indeno(1,2,3-cd)pyrene	-			
Chrysene	-	-	0.00001[9]	
Dibenzo(a,h)anthracene	-	-	0.00001[9]	
Fluoranthene	-	-	0.0001[5c]	0.0001[5c]
Fluorene	-	-	0.0021[9]	
Phenanthrene	-	-	0.003[9]	
Pyrene	-	-	0.00004[9]	
Benzo(a)pyrene	-	0.00001[2]	0.00005[5c]	0.00005[5c]
Naphthalene	-	-	0.0024[5c]	0.0012[15c]
Petroleum hydrocarbons				
Total petroleum hydrocarbons	-	0.01[11]	0.01[10,11]	
Benzene	0.001[6]	0.001[2]	0.01[5c]	0.008[5c]

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Toluene	0.004[6]	0.7[12]	0.074[7]	0.074[7]
Ethylbenzene	-	0.3[12]	0.02[14]	0.02[14]
Xylene	0.003[6]	0.5[12]	0.03[5c]	0.03[15c]
Methyl tertiary butyl ether (MTBE)	-	0.015[13]		
Pesticides and herbicides				
Aldrin	0.000003[6]	0.00003[2]	0.00001[5d]	0.000005[5d]
Dieldrin	0.003[6]	0.00003[2]		
Endrin	0.000003[6]	0.0006[12]		
Isodrin	0.000003[6]	-		
Heptachlor	-	0.00003[2]		
Heptachlor epoxide	-	0.00003[2]		
Other individual pesticides	-	0.0001[2]		
Total pesticides	-	0.0005[2]		
Total DDT	0.000006[6]	0.001[12]	0.000025[5c]	0.000025[15c]
Azinphos – methyl	0.000001[6]	-	0.00001[1]	
Cyfluthrin	0.0001[6]	-	0.000001[14]	
Demetons	0.00005[6]	-	0.0005[14]	
Dichlorvos	-	-	0.000001[5c]	0.00004[5c]
Dimethoate	0.00001[6]	-	0.00048[5a]	0.00048[5a]
Endosulphan	0.000005[6]	-	0.000005[5c]	0.0000005[5c]

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Fenitrothion	0.000001[6]	-	0.00001[5c]	0.00001[5c]
Flucofuron	0.0001[6]	-	0.001[14]	
Malathion	0.000001[6]	-	0.00001[5c]	0.00002[5c]
Mevinphos	0.000005[6]	-	0.00002[14]	-
Omethoate	0.0001[6]	-	0.00001[14]	
PCSDs (cyfluthrin, sulcofuron, flucofuron and **permethrin**)	-	-	0.00005[14]	
Permethrin	0.000001[6]	-	0.00001[5a]	0.00001[5]
Sulcofuron	0.0001[6]	-	0.025[14]	
Triazaphos	0.0001[6]	-	0.000005[15]	
Atrazine	0.00003[6]	-	0.0006[5c]	0.0006[5c]
Simazine	0.00003[6]	-	0.001[5c]	0.001[5c]
Bentazone	0.1[6]	-	0.5[5c]	0.5[5a]
Linuron	0.0001[6]	-	0.0005[5a]	0.0005[5a]
Mecoprop	0.00004[6]	-	0.018[5a]	0.018[5a]
Trifluralin	0.00001[6]	-	0.00003[5c]	0.00003[5c]
Miscellaneous				
Cyanide (Hydrogen cyanide)	-	0.05[2]	0.001[5a]	0.001[5a]
Phenol	0.0005[6]	-	0.0077[5a]	0.0077[5a]
Sodium	-	200[2]	-	

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Chloride	-	250[2]	250[14]	-
Total ammonia[$] (ammonium (as NH_4^+) plus ammonia (NH_3)	-	0.5[2]	0.3[16]	-
Ammonia un-ionised (NH_3)	-	-	-	0.021[7]
Sulphate	-	250[2]	400[14]	-
Iron	-	0.20[2]	1[5a]	1[5a]
Manganese	-	0.05[2]	0.123 bioavailable[7]	No EQS required
Aluminium	-	0.2[2]	-	
Nitrate (as NO_3)	-	50[2]	-	
Nitrite (as NO_2)	-	0.1[2]	0.01[17]	-

Analytes in bold are hazardous, *analytes in italics are non hazardous*, analytes in plain text are unclassified. According to JAGDAG Determination List June 2010

Note: '-' A target concentration is not available.

[$]Please note that total ammonia (NH_4^+ and NH_3) is equivalent to ammoniacal nitrogen in laboratory reports

"Bioavailable" in relation to copper, zinc and manganese is the generic $EQS_{bioavailable}$[7] derived from the Metal Bioavailability Assessment Tool (M-BAT) developed by the Water Framework Directive UK Technical Advisory Group (WFDTAG). Exceedance of this value should prompt a site-specific assessment using the M-BAT with pH, DOC and Ca to derive a site-specific EQS termed the $PNEC_{dissolved}$. http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat

Notes

1. Environment Agency (2013), 'Groundwater Protection: Principles and Policy (GP3) v1.1'.
2. The Water Supply (Water Quality) Regulations 2000 (SI 2000/3184), as amended by SI 2001/2885, SI 2002/2469, SI 2005/2035, SI 2007/2734 and SI 2010/991.
3. The Private Water Supplies Regulations 1991. SI 1991 / 2790.
4. The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (as amended). SI 1996 / 3001.
5. The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010.

5a. Annual mean concentration (mg/l) for 'Good' standard

5b. Applies to hardness ranges of <40mg/l $CaCO_3$, 40–<50mg/l $CaCO_3$, 50–<100mg/l $CaCO_3$, 100–<200mg/l $CaCO_3$ and >/=200mg/l $CaCO_3$. The target concentrations included in Table 1 are listed in order of increasing calcium carbonate concentrations.

5c. Annual average EQS (surface waters)

5d. Sum of aldrin, dieldrin, endrin and isodrin

5e. Applies to hardness ranges of 0–50mg/l $CaCO_3$, 50–100mg/l $CaCO_3$, 100–250mg/l $CaCO_3$ and >250mg/l $CaCO_3$. The target concentrations included in Table 1 are listed in order of increasing calcium carbonate concentrations; applies to annual mean concentration (mg/l) of $CaCO_3$. Applies to annual mean concentration of metal (mg/l) for 'Good' standard.

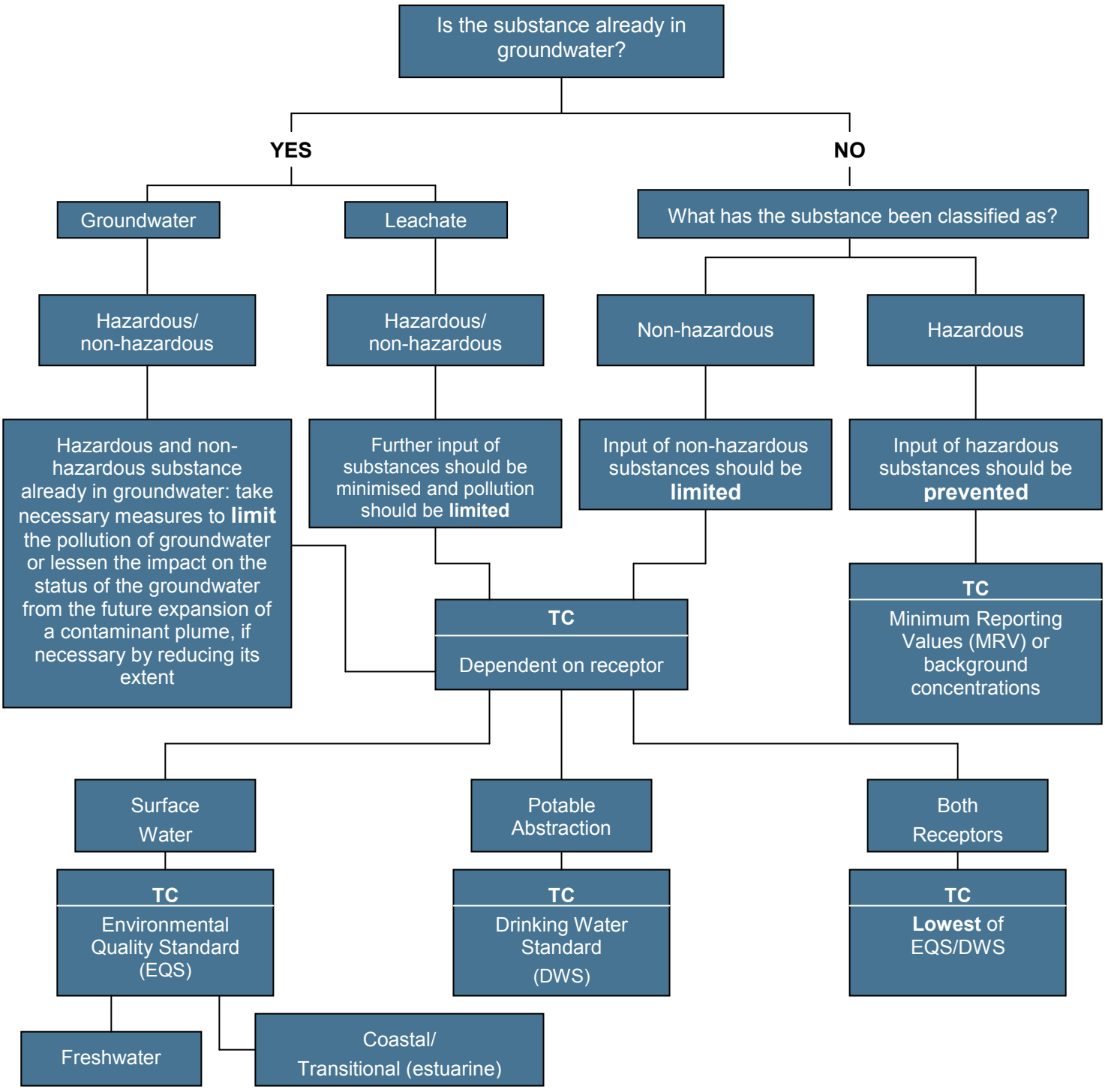
5f. Sum of benzo(b)fluoranthene and benzo(k)fluoranthene

5g. Sum of benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene

6. Minimum reporting values listed in Annex (J) of Horizontal Guidance Note H1 (H1 Environmental Risk Assessment Framework, Environment Agency, April 2010 v2.0). Note target concentration for xylenes is 0.003mg/l each for o-xylene and m/p xylene.
7. DEFRA (2014). Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environment. Table 5.2a: Proposed standards for 29 specific pollutants – long-term mean value. Additional information on the Metal Bioavailability Assessment Tool (M-BAT) is available at http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat .
8. The Water Supply (Water Quality) Regulations 2000. (SI 2000 / 3184) – sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane.
9. WRc plc (2002), R&D Technical Report P45. Where predicted no-effect concentration is below the laboratory method detection limit (LMDL) for chrysene, dibenzo(a,h)anthracene and fluoranthene, the target concentration has been set at the LMDL of 0.00001mg/l.
10. Please note this is a very conservative value. If necessary please refer to EA (2009). *Petroleum hydrocarbons in Groundwater Supplementary Guidance for Hydrogeological Risk Assessment, which* provides advice on risk rankings of TPH CWG fractions. It may be possible to eliminate low risk fractions and/or those not detected above LMDL from concern.
11. Environment Agency (2009), 'Petroleum hydrocarbons in groundwater: supplementary guidance for hydrogeological risk assessment'.
12. WHO (2004), *Guidelines for drinking-water quality*, 3rd edn.

13. Drinking Water Inspectorate (London, UK). Environmental Information Request on MTBE in drinking water. Ref. DWI 1/10/18; dated 28 November 2006. Value is based on the odour threshold for MTBE, which is lower than a health-based guideline value.
14. Council Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment of the Community (Dangerous Substances Directive) - List II Substances (76/464/EEC).
15. The Water Framework Directive (200/60/EC). Freshwater Environmental Quality Standards.
16. UK TAG January 2008. Proposals for Environmental Quality standards for Annex VIII Substances. Long term 90%ile for upland low alkalinity water. The value for lowland high alkalinity waters is 0.6mg/l. (UKTAG recommends the adoption of the total ammonia standard from the UK Environmental Standards and Conditions (Phase 1) report dated August 2006. UKTAG believes that this approach will provide an effective level of protection for both total and unionised ammonia in freshwaters).
17. Council Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (Freshwater Fish Directive) (78/659/EEC)

FLOW CHART TO ASSIST WITH SELECTION OF TARGET CONCENTRATIONS



TC = Target concentration

When leachate is being assessed the 'compliance point' is the groundwater body. Therefore dilution within the groundwater body may be applied with caution before comparing with the TC.

When directly assessing a receptor, e.g., a river, the appropriate TC should be selected.

APPENDIX I
GENERIC ASSESSMENT CRITERIA FOR POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75m below finished ground levels, sample results from depths between 0.5m and 1.5m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

Table A3: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	**PE**	**PVC**
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	• BTEX + MTBE	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C_5–C_{10}) (Not including compounds within group 2e and 2f)	2	1.4
2e	• Phenols	2	0.4
2f	• Cresols and chlorinated phenols	2	0.04
3	Mineral oil C_{11}–C_{20}	10	Suitable
4	Mineral oil C_{21}–C_{40}	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as 'suitable', the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX J
COMPARISON OF SOIL DATA TO HUMAN HEALTH AND CONTROLLED WATERS ASSESSMENT CRITERIA

Sample Identity		Industrial/Commercial Screening Value (1% SOM)	TP01	TP02	TP10	TP09	TP08	TP04	TP07	TP06a	TP11
Depth		**GACs**	**0.10**	**0.30**	**0.20**	**0.40**	**0.40**	**0.10**	**0.30**	**0.20**	**0.40**
Visual Fibre Screen			NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
pH	pH		7.97	8.14	8.23	7.79	8.06	8.37	9.28	8.11	8.65
Total Organic Carbon	% w/w		0.86	1.9	1.52	1.11	1.19	0.35	0.35	0.98	
Metals											
Arsenic	mg/kg	640	6	4	6	6	5	3	6	8	4
Cadmium	mg/kg	410	0.6	0.7	0.8	0.8	0.7	0.5	0.6	0.7	0.5
Copper	mg/kg	68000	10	20	21	24	14	6	10	13	2
Chromium	mg/kg	8600	18	17	19	19	16	10	15	20	7
Lead	mg/kg	2300	28	47	59	66	41	16	43	33	5
Mercury	mg/kg	1120	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.45
Nickel	mg/kg	980	14	14	14	14	12	6	10	16	5
Selenium	mg/kg	12000	1	1	1	1	1	1	1	1	1
Zinc	mg/kg	740000	36	51	64	58	51	24	68	44	9
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)											
Ali >C5-C6	mg/kg	3200	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Ali >C6-C8	mg/kg	7800	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Ali >C8-C10	mg/kg	2000	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Ali >C10-C12	mg/kg	9700	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Ali >C12-C16	mg/kg	59000	0.1	0.1	0.1	0.1	0.1	0.1	5.3	0.1	
Ali >C16-C21	mg/kg	Assess as sum below	0.1	0.1	0.1	0.1	0.1	0.1	10.5	0.1	
Ali >C21-C35	mg/kg		0.1	0.1	0.1	0.1	0.1	0.1	19.1	0.1	
Ali >C16-C35	mg/kg	1000000	0.2	0.2	0.2	0.2	0.2	0.2	29.6	0.2	
Total Aliphatics	mg/kg		0.1	0.1	0.1	0.1	0.1	0.1	35	0.1	
Aro >C5-C7	mg/kg	27	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Aro >C7-C8	mg/kg	56000	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Aro >C8-C9	mg/kg	14000	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Aro >C9-C10	mg/kg	3500	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Aro >C10-C12	mg/kg	16000	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Aro >C12-C16	mg/kg	36000	0.1	0.1	0.1	0.1	2.3	0.1	0.1	0.1	
Aro >C16-C21	mg/kg	28000	0.1	0.1	0.6	0.1	6.4	0.8	1.6	0.1	
Aro >C21-C35	mg/kg	28000	0.1	2	2.2	0.6	18.9	2.7	8	1.4	
Total Aromatics	mg/kg		0.1	2	2.8	0.6	27.7	3.4	9.7	1.4	
TPH (Ali & Aro)	mg/kg		0.1	2	2.8	0.6	27.7	3.4	44.6	1.4	
BTEX - Benzene	mg/kg	27	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
BTEX - Toluene	mg/kg	56000	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
BTEX - Ethyl Benzene	mg/kg	6000	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
BTEX - m & p Xylene	mg/kg	5900	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
BTEX - o Xylene	mg/kg	6600	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
MTBE	mg/kg	67000	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
PAHs (Polycyclic Aromatic Hydrocarbons)											
Acenapthene	mg/kg	110000	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.04	
Acenapthylene	mg/kg	110000	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	
Anthracene	mg/kg	520000	0.06	0.02	0.07	0.03	0.13	0.03	0.07	0.13	
Benzo(a)anthracene	mg/kg	170	0.17	0.13	0.37	0.18	1.35	0.21	0.55	0.25	
Benzo(a)pyrene	mg/kg	77	0.23	0.25	0.56	0.26	2.08	0.32	0.85	0.32	
Benzo(b)fluoranthene	mg/kg	44	0.16	0.18	0.46	0.19	2.26	0.26	0.64	0.24	
Benzo(ghi)perylene	mg/kg	3900	0.19	0.21	0.45	0.21	2.06	0.27	0.61	0.24	
Benzo(k)fluoranthene	mg/kg	1200	0.08	0.08	0.15	0.09	0.63	0.1	0.22	0.11	
Chrysene	mg/kg	350	0.2	0.2	0.48	0.24	1.56	0.27	0.58	0.28	
Dibenzo(ah)anthracene	mg/kg	3.5	0.04	0.05	0.1	0.06	0.51	0.05	0.16	0.04	
Fluoranthene	mg/kg	23000	0.26	0.2	0.64	0.32	2.21	0.32	0.72	0.48	
Fluorene	mg/kg	63000	0.02	0.01	0.01	0.01	0.02	0.01	0.02	0.04	
Indeno(123-cd)pyrene	mg/kg	500	0.23	0.24	0.57	0.27	2.44	0.34	0.78	0.3	
Napthalene	mg/kg	1800	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
Phenanthrene	mg/kg	22000	0.19	0.08	0.22	0.17	0.39	0.12	0.25	0.37	
Pyrene	mg/kg	54000	0.23	0.18	0.54	0.29	1.92	0.31	0.87	0.39	
Total PAH	mg/kg		2.04	1.82	4.64	2.3	17.6	2.6	6.35	3.23	
Volatile Organic Compounds (VOCs)											
Dichlorodifluoromethane	ug/kg		1	1	1						
Chloromethane :- {Methyl Chloride}	ug/kg		10	10	10						
Vinyl Chloride :- {Chloroethylene}	ug/kg	60	1	1	1						
Bromomethane	ug/kg		1	1	1						
Chloroethane	ug/kg		1	1	1						
Trichlorofluoromethane	ug/kg		1	1	1						
1,1-Dichloroethylene	ug/kg		1	1	1						
Carbon Disulphide	ug/kg	11000	1	1	1						
Methylene Chloride (Dichloromethane)	ug/kg		5	5	5						
trans-1,2-Dichloroethene	ug/kg		1	1	1						
1,1-Dichloroethane	ug/kg		1	1	1						
cis-1,2-Dichloroethylene	ug/kg		1	1	1						
2,2-Dichloropropane	ug/kg		1	1	1						
Bromochloromethane	ug/kg		5	5	5						
Chloroform :- {Trichloromethane}	ug/kg		1	1	1						
1,1,1-Trichloroethane	ug/kg	700000	1	1	1						
1,1-Dichloropropylene	ug/kg		1	1	1						
Carbon tetrachloride {Tetrachloromethane}	ug/kg	2900	1	1	1						
1,2-Dichloroethane	ug/kg	670	2	2	2						
Benzene	ug/kg	27000	1	1	1						
Trichloroethylene :- {Trichloroethene}	ug/kg	1000	1	1	1						
1,2-Dichloropropane	ug/kg		1	1	1						
Dibromomethane	ug/kg		1	1	1						
Bromodichloromethane	ug/kg		10	10	10						
cis-1,3-Dichloropropylene	ug/kg		1	1	1						
Toluene :- {Methylbenzene}	ug/kg	56000000	1	1	1						
trans-1,3-Dichloropropylene	ug/kg		1	1	1						
1,1,2-Trichloroethane	ug/kg		1	1	1						
1,3-Dichloropropane	ug/kg		1	1	1						
Tetrachloroethylene :- {Perchloroethylene}	ug/kg	20000	1	1	1						
Dibromochloromethane	ug/kg		3	3	3						
1,2-Dibromoethane	ug/kg		1	1	1						
Chlorobenzene	ug/kg	56000	1	1	1						
1,1,1,2-Tetrachloroethane	ug/kg	110000	1	1	1						
Ethylbenzene	ug/kg	6000000	1	1	1						
1,3+1,4-Dimethylbenzenes {m+p-Xylenes}	ug/kg	5900000	1	1	1						
1,2-Dimethylbenzene :- {o-Xylene}	ug/kg	6600	1	1	1						
Styrene :- {Vinylbenzene}	ug/kg		1	1	1						
Bromoform :- {Tribromomethane}	ug/kg		1	1	1						
Isopropylbenzene :- {Methylethylbenzene}	ug/kg		1	1	1						
1,1,2,2-Tetrachloroethane	ug/kg	270000	1	1	1						
1,2,3-Trichloropropane	ug/kg		1	1	1						
Bromobenzene	ug/kg		1	1	1						
n-Propylbenzene :- {1-phenylpropane}	ug/kg		1	1	1						
2-Chlorotoluene {1-Chloro-2-methylbenzene}	ug/kg		1	1	1						
1,3,5-Trimethylbenzene :- {Mesitylene}	ug/kg		1	1	1						
4-Chlorotoluene {1-Chloro-4-methylbenzene}	ug/kg		1	1	1						
tert-Butylbenzene {(1,1-Dimethylethyl)benzene}	ug/kg		2	2	2						
1,2,4-Trimethylbenzene	ug/kg	330000	1	1	1						
sec-Butylbenzene {1-Methylpropylbenzene}	ug/kg		1	1	1						
4-isopropyltoluene	ug/kg		1	1	1						
1,3-Dichlorobenzene	ug/kg	30000	1	1	1						
1,4-Dichlorobenzene	ug/kg	4400000	1	1	1						
n-ButylBenzene :- {1-Phenylbutane}	ug/kg		1	1	1						
1,2-Dichlorobenzene	ug/kg	2000000	1	1	1						
1,2-Dibromo-3-chloropropane	ug/kg		2	2	2						
1,2,4-Trichlorobenzene	ug/kg	220000	3	3	3						
Hexachlorobutadiene	ug/kg	31000	1	1	1						
1,2,3-Trichlorobenzene	ug/kg	102000	3	3	3						

= Exceedence of GAC for an industrial/commercial end-use

All GACs calculated by RSK or taken from EIC/AGS/CLAIRE Generic Assessment Criteria; and LQM/CIEH Generic Assessment Criteria

Sample Identity		Industrial/Commercial Screening Value (1% SOM)	TP12	TP13	TP15
Depth		**GACs**	**0.20**	**0.30**	**0.10**
Visual Fibre Screen			NAD	NAD	NAD
pH	pH		7.68	8.79	8.34
Total Organic Carbon	% w/w				
Metals					
Arsenic	mg/kg	640	7	6	2
Cadmium	mg/kg	410	0.6	0.5	0.5
Copper	mg/kg	68000	22	15	4
Chromium	mg/kg	8600	18	17	12
Lead	mg/kg	2300	76	57	9
Mercury	mg/kg	1120	0.46	0.17	0.17
Nickel	mg/kg	980	16	14	8
Selenium	mg/kg	12000	1	1	1
Zinc	mg/kg	740000	56	95	20
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)					
Ali >C5-C6	mg/kg	3200			
Ali >C6-C8	mg/kg	7800			
Ali >C8-C10	mg/kg	2000			
Ali >C10-C12	mg/kg	9700			
Ali >C12-C16	mg/kg	59000			
Ali >C16-C21	mg/kg	Assess as sum below			
Ali >C21-C35	mg/kg				
Ali >C16-C35	mg/kg	1000000			
Total Aliphatics	mg/kg				
Aro >C5-C7	mg/kg	27			
Aro >C7-C8	mg/kg	56000			
Aro >C8-C9	mg/kg	14000			
Aro >C9-C10	mg/kg	3500			
Aro >C10-C12	mg/kg	16000			
Aro >C12-C16	mg/kg	36000			
Aro >C16-C21	mg/kg	28000			
Aro >C21-C35	mg/kg	28000			
Total Aromatics	mg/kg				
TPH (Ali & Aro)	mg/kg				
BTEX - Benzene	mg/kg	27			
BTEX - Toluene	mg/kg	56000			
BTEX - Ethyl Benzene	mg/kg	6000			
BTEX - m & p Xylene	mg/kg	5900			
BTEX - o Xylene	mg/kg	6600			
MTBE	mg/kg	67000			
PAHs (Polycyclic Aromatic Hydrocarbons)					
Acenapthene	mg/kg	110000			
Acenapthylene	mg/kg	110000			
Anthracene	mg/kg	520000			
Benzo(a)anthracene	mg/kg	170			
Benzo(a)pyrene	mg/kg	77			
Benzo(b)fluoranthene	mg/kg	44			
Benzo(ghi)perylene	mg/kg	3900			
Benzo(k)fluoranthene	mg/kg	1200			
Chrysene	mg/kg	350			
Dibenzo(ah)anthracene	mg/kg	3.5			
Fluoranthene	mg/kg	23000			
Fluorene	mg/kg	63000			
Indeno(123-cd)pyrene	mg/kg	500			
Napthalene	mg/kg	1800			
Phenanthrene	mg/kg	22000			
Pyrene	mg/kg	54000			
Total PAH	mg/kg				
Volatile Organic Compounds (VOCs)					
Dichlorodifluoromethane	ug/kg				
Chloromethane :- {Methyl Chloride}	ug/kg				
Vinyl Chloride :- {Chloroethylene}	ug/kg	60			
Bromomethane	ug/kg				
Chloroethane	ug/kg				
Trichlorofluoromethane	ug/kg				
1,1-Dichloroethylene	ug/kg				
Carbon Disulphide	ug/kg	11000			
Methylene Chloride (Dichloromethane)	ug/kg				
trans-1,2-Dichloroethene	ug/kg				
1,1-Dichloroethane	ug/kg				
cis-1,2-Dichloroethylene	ug/kg				
2,2-Dichloropropane	ug/kg				
Bromochloromethane	ug/kg				
Chloroform :- {Trichloromethane}	ug/kg				
1,1,1-Trichloroethane	ug/kg	700000			
1,1-Dichloropropylene	ug/kg				
Carbon tetrachloride {Tetrachloromethane}	ug/kg	2900			
1,2-Dichloroethane	ug/kg	670			
Benzene	ug/kg	27000			
Trichloroethylene :- {Trichloroethene}	ug/kg	1000			
1,2-Dichloropropane	ug/kg				
Dibromomethane	ug/kg				
Bromodichloromethane	ug/kg				
cis-1,3-Dichloropropylene	ug/kg				
Toluene :- {Methylbenzene}	ug/kg	56000000			
trans-1,3-Dichloropropylene	ug/kg				
1,1,2-Trichloroethane	ug/kg				
1,3-Dichloropropane	ug/kg				
Tetrachloroethylene :- {Perchloroethylene}	ug/kg	20000			
Dibromochloromethane	ug/kg				
1,2-Dibromoethane	ug/kg				
Chlorobenzene	ug/kg	56000			
1,1,1,2-Tetrachloroethane	ug/kg	110000			
Ethylbenzene	ug/kg	6000000			
1,3+1,4-Dimethylbenzenes {m+p-Xylenes}	ug/kg	5900000			
1,2-Dimethylbenzene :- {o-Xylene}	ug/kg	6600			
Styrene :- {Vinylbenzene}	ug/kg				
Bromoform :- {Tribromomethane}	ug/kg				
Isopropylbenzene :- {Methylethylbenzene}	ug/kg				
1,1,2,2-Tetrachloroethane	ug/kg	270000			
1,2,3-Trichloropropane	ug/kg				
Bromobenzene	ug/kg				
n-Propylbenzene :- {1-phenylpropane}	ug/kg				
2-Chlorotoluene {1-Chloro-2-methylbenzene}	ug/kg				
1,3,5-Trimethylbenzene :- {Mesitylene}	ug/kg				
4-Chlorotoluene {1-Chloro-4-methylbenzene}	ug/kg				
tert-Butylbenzene {(1,1-Dimethylethyl)benzene}	ug/kg				
1,2,4-Trimethylbenzene	ug/kg	330000			
sec-Butylbenzene {1-Methylpropylbenzene}	ug/kg				
4-isopropyltoluene	ug/kg				
1,3-Dichlorobenzene	ug/kg	30000			
1,4-Dichlorobenzene	ug/kg	4400000			
n-ButylBenzene :- {1-Phenylbutane}	ug/kg				
1,2-Dichlorobenzene	ug/kg	2000000			
1,2-Dibromo-3-chloropropane	ug/kg				
1,2,4-Trichlorobenzene	ug/kg	220000			
Hexachlorobutadiene	ug/kg	31000			
1,2,3-Trichlorobenzene	ug/kg	102000			
= Exceedence of GAC for an industrial/commercial end-use					
All GACs calculated by RSK or taken from EIC/AGS/CLAIRE Generic Assessment Criteria; and					

313586. **-** *Hatfield Business Park, Plot 4100* **- Tier 1 Groundwater Risk Assessment - Soil Leachate Results**

Sample Identity		Tier 2 Target Concentration (LTC2)	TP01	TP02	TP10	TP09	TP06a
Depth			0.10	0.30	0.20	0.40	0.20
Determinand	Units	UK DWS					
Metals							
Arsenic (leachable)	ug/l	10	1	1	1	2	1
Cadmium (leachable)	ug/l	5	1	1	1	1	1
Copper (leachable)	ug/l	2000	5	10	9	12	6
Chromium (leachable)	ug/l	50	1	1	1	1	1
Lead (leachable)	ug/l	10	1.0	1.0	1.0	1.0	1.0
Mercury (leachable)	ug/l	1	0.1	0.1	0.1	0.1	0.1
Nickel (leachable)	ug/l	20	1.0	1.0	1.0	2.0	1.0
Selenium (leachable)	ug/l	10	1	1	1	1	1
Zinc (leachable)	ug/l	3000	1	1	1	1	1
= exceedance of Tier 1 Target Concentration							

APPENDIX K
HASWASTE ASSESSMENT

envirolab

Haswaste, developed by Dr. Iain Haslock.

313586, Hatfield Business Park, Plot 4100

TP/WS/BH			TP01	TP02	TP10	TP09	TP08	TP04	TP07	TP06a	TP11
Depth (m)			0.10	0.30	0.20	0.40	0.40	0.10	0.30	0.20	0.40
Envirolab reference											
% Moisture		%									
pH (soil)			7.97	8.14	8.23	7.79	8.06	8.37	9.28	8.11	8.65
pH (leachate)											
Arsenic		mg/kg	6	4	6	6	5	3	6	8	4
Cadmium		mg/kg	0.6	0.7	0.8	0.8	0.7	0.5	0.6	0.7	0.5
Copper	updated v5.4e	mg/kg	10	20	21	24	14	6	10	13	2
CrVI or Chromium		mg/kg	18	17	19	19	16	10	15	20	7
Lead		mg/kg	28	47	59	66	41	16	43	33	5
Mercury		mg/kg	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.45
Nickel		mg/kg	14	14	14	14	12	6	10	16	5
Selenium		mg/kg	1	1	1	1	1	1	1	1	1
Zinc		mg/kg	36	51	64	58	51	24	68	44	9
Barium		mg/kg									
Beryllium		mg/kg									
Vanadium		mg/kg									
Cobalt		mg/kg									
Manganese		mg/kg									
Molybdenum		mg/kg									
Antimony		mg/kg									
Aluminium		mg/kg									
Bismuth		mg/kg									
CrIII		mg/kg									
Iron		mg/kg									
Strontium		mg/kg									
Tellurium		mg/kg									
Thallium		mg/kg									
Titanium		mg/kg									
Tungsten		mg/kg									
Ammoniacal N		mg/kg									
ws Boron		mg/kg									
PAH (Input Total PAH **OR** individual PAH results)											
Acenaphthene		mg/kg	0.01	0.01	0.01	0.01	0.03	0.01	0.02	0.04	
Acenaphthylene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	
Anthracene		mg/kg	0.06	0.02	0.07	0.03	0.13	0.03	0.07	0.13	
Benzo(a)anthracene		mg/kg	0.17	0.13	0.37	0.18	1.35	0.21	0.55	0.25	
Benzo(a)pyrene		mg/kg	0.23	0.25	0.56	0.26	2.08	0.32	0.85	0.32	
Benzo(b)fluoranthene		mg/kg	0.16	0.18	0.46	0.19	2.26	0.26	0.64	0.24	
Benzo(ghi)perylene		mg/kg	0.19	0.21	0.45	0.21	2.06	0.27	0.61	0.24	
Benzo(k)fluoranthene		mg/kg	0.08	0.08	0.15	0.09	0.63	0.10	0.22	0.11	
Chrysene		mg/kg	0.20	0.20	0.48	0.24	1.56	0.27	0.58	0.28	
Dibenzo(ah)anthracene		mg/kg	0.04	0.05	0.10	0.06	0.51	0.05	0.16	0.04	
Fluoranthene		mg/kg	0.26	0.20	0.64	0.32	2.21	0.32	0.72	0.48	
Fluorene		mg/kg	0.02	0.01	0.01	0.01	0.02	0.01	0.02	0.04	
Indeno(123cd)pyrene		mg/kg	0.23	0.24	0.57	0.27	2.44	0.34	0.78	0.30	
Naphthalene		mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
Phenanthrene		mg/kg	0.19	0.08	0.22	0.17	0.39	0.12	0.25	0.37	
Pyrene		mg/kg	0.23	0.18	0.54	0.29	1.92	0.31	0.87	0.39	
Coronene		mg/kg									
Total PAHs (16 or 17)		mg/kg	2.04	1.82	4.64	2.30	17.60	2.60	6.35	3.23	
TPH											
Petrol		mg/kg									
Diesel		mg/kg									
Lube Oil		mg/kg									
Crude Oil	New v5.4e										
White Spirit / Kerosene		mg/kg									
Creosote		mg/kg									
Unknown TPH with ID		mg/kg									
Unknown TPHCWG		mg/kg	0.1	2.0	2.8	0.6	27.7	3.4	44.6	1.4	
Total Sulphide		mg/kg									
Complex Cyanide		mg/kg									
Free (or Total) Cyanide		mg/kg									
Thiocyanate		mg/kg									
Elemental/Free Sulphur		mg/kg									
Phenols Input Total Phenols HPLC **OR** individual Phenol results.											
Phenol		mg/kg									
Cresols		mg/kg									
Xylenols		mg/kg									
Resourcinol		mg/kg									
Phenols Total by HPLC		mg/kg									
BTEX Input Total BTEX **OR** individual BTEX results.											
Benzene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Toluene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Ethylbenzene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Xylenes		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Total BTEX		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
PCBs (POPs)											
PCBs Total (eg EC7/WHO12)		mg/kg									
PBBs (POPs)											
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)		mg/kg									

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313586, Hatfield Business Park, Plot 4100

TP/WS/BH	TP01	TP02	TP10	TP09	TP08	TP04	TP07	TP06a	TP11
Depth (m)	0.10	0.30	0.20	0.40	0.40	0.10	0.30	0.20	0.40
Envirolab reference									
POPs Dioxins and Furans Input Total Dioxins and Furans **OR** individual Dioxin and Furan results.									
2,3,7,8-TeCDD	mg/kg								
1,2,3,7,8-PeCDD	mg/kg								
1,2,3,4,7,8-HxCDD	mg/kg								
1,2,3,6,7,8-HxCDD	mg/kg								
1,2,3,7,8,9-HxCDD	mg/kg								
1,2,3,4,6,7,8-HpCDD	mg/kg								
OCDD	mg/kg								
2,3,7,8-TeCDF	mg/kg								
1,2,3,7,8-PeCDF	mg/kg								
2,3,4,7,8-PeCDF	mg/kg								
1,2,3,4,7,8-HxCDF	mg/kg								
1,2,3,6,7,8-HxCDF	mg/kg								
2,3,4,6,7,8-HxCDF	mg/kg								
1,2,3,7,8,9-HxCDF	mg/kg								
1,2,3,4,6,7,8-HpCDF	mg/kg								
1,2,3,4,7,8,9-HpCDF	mg/kg								
OCDF	mg/kg								
Total Dioxins and Furans	mg/kg								
Some Pesticides (POPs unless otherwise stated)									
Aldrin	mg/kg								
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*	mg/kg								
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*	mg/kg								
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*	mg/kg								
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*	mg/kg								
Dieldrin	mg/kg								
Endrin	mg/kg								
χ Hexachlorocyclohexane (gamma-HCH) (lindane) ***OR*** *Total HCH*	mg/kg								
Heptachlor	mg/kg								
Hexachlorobenzene	mg/kg								
o,p'-DDT *(leave empty if total DDT results used)*	mg/kg								
p,p'-DDT ***OR*** *Total DDT*	mg/kg								
χ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*	mg/kg								
Chlordecone (kepone)	mg/kg								
Pentachlorobenzene	mg/kg								
Mirex	mg/kg								
Toxaphene (camphechlor)	mg/kg								
Tin									
Tin *(leave empty if Organotin and Tin excl Organotin results used)*	mg/kg								
Organotin									
Dibutyltin; DiBT	mg/kg								
Tributyltin; TriBT	mg/kg								
Triphenyltin; TriPT	mg/kg								
Tetrabutyltin; TeBT	mg/kg								
Tin excluding Organotin									
Tin excl Organotin	mg/kg								

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313586, Hatfield Business Park, Plot 4100

TP/WS/BH	TP01	TP02	TP10	TP09	TP08	TP04	TP07	TP06a	TP11
Depth (m)	0.10	0.30	0.20	0.40	0.40	0.10	0.30	0.20	0.40
Envirolab reference									
Asbestos in Soil	Thresholds								
Asbestos detected in Soil (enter Y or N)	Y	n	n	n	n	n	n	n	n	n
		Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7								
Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below	%								
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)	≥0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
		If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.								
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y	n	n	n	n	n	n	n	n	n
		If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.								
		Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.								
		All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.								
Hazardous Property	Thresholds	Cut Off Value								
Corrosive HP8	≥5%	<1%	0.00425	0.00379	0.00444	0.00444	0.00373	0.00232	0.00367	0.00490	0.00187
Irritant HP4	≥10%	<1%	0.00192	0.00279	0.00317	0.00350	0.00224	0.00107	0.00192	0.00253	0.00075
Irritant HP4	≥20%	<1%	0.00422	0.00530	0.00575	0.00583	0.00602	0.00220	0.00391	0.00512	0.00124
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00020	0.00018	0.00046	0.00023	0.00176	0.00026	0.00064	0.00032	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00346	0.00326	0.00365	0.00365	0.00307	0.00192	0.00288	0.00384	0.00134
Specifc Target Organ Toxicity HP5	≥10%		0.00450	0.00638	0.00800	0.00725	0.00638	0.00300	0.00850	0.00550	0.00113
Aspiration Toxicity HP5	≥10%		0.00002	0.00021	0.00029	0.00007	0.00278	0.00035	0.00447	0.00015	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00081	0.00055	0.00081	0.00081	0.00068	0.00041	0.00081	0.00107	0.00057
Acute Toxicity HP6	≥5%	<0.1%	0.00360	0.00341	0.00379	0.00379	0.00321	0.00206	0.00302	0.00398	0.00149
Acute Toxicity HP6	≥25%	<1%	0.01157	0.01645	0.01974	0.01975	0.01658	0.00685	0.01675	0.01398	0.00291
Acute Toxicity HP6	≥0.25%	<0.1%	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00005
Acute Toxicity HP6	≥2.5%	<0.1%	0.00346	0.00326	0.00365	0.00365	0.00307	0.00192	0.00288	0.00384	0.00134
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00006	0.00007	0.00008	0.00008	0.00007	0.00005	0.00006	0.00007	0.00005
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00353	0.00335	0.00375	0.00375	0.00316	0.00199	0.00296	0.00393	0.00144
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014
Acute Toxicity HP6	≥22.5%	<1%	0.01126	0.01617	0.01910	0.01939	0.01448	0.00649	0.01595	0.01350	0.00286
Carcinogenic HP7	≥0.1%		0.00346	0.00470	0.00590	0.00660	0.00410	0.00192	0.00446	0.00384	0.00134
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00020	0.00018	0.00046	0.00023	0.00176	0.00026	0.00064	0.00032	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		7.97	8.14	8.23	7.79	8.06	8.37	9.28	8.11	8.65
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		7.97	8.14	8.23	7.79	8.06	8.37	9.28	8.11	8.65
Toxic for Reproduction HP10	≥0.3%		0.00450	0.00638	0.00800	0.00725	0.00638	0.00300	0.00850	0.00550	0.00113
Toxic for Reproduction HP10	≥3%		0.00346	0.00326	0.00365	0.00365	0.00307	0.00192	0.00446	0.00384	0.00134
Mutagenic HP11	≥0.1%		0.00346	0.00326	0.00365	0.00365	0.00307	0.00192	0.00446	0.00384	0.00134
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Mutagenic HP11	≥1%		0.00283	0.00283	0.00283	0.00283	0.00242	0.00121	0.00202	0.00323	0.00101
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00346	0.00326	0.00365	0.00365	0.00307	0.00192	0.00288	0.00384	0.00134
Ecotoxic HP14	≥1.0	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.06439	0.08216	0.09863	0.09798	0.08783	0.03811	0.08582	0.07688	0.01988
Ecotoxic HP14	≥25%	<0.1%	0.01612	0.02053	0.02465	0.02451	0.02172	0.00951	0.02103	0.01924	0.00497
Ecotoxic HP14	≥25%	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.01611	0.02072	0.02491	0.02455	0.02445	0.00984	0.02547	0.01935	0.00497

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313586, Hatfield Business Park, Plot 4100

TP/WS/BH	TP01	TP02	TP10	TP09	TP08	TP04	TP07	TP06a	TP11
Depth (m)	0.10	0.30	0.20	0.40	0.40	0.10	0.30	0.20	0.40
Envirolab reference									
Ecotoxic HP14 individual substance specific thresholds (Benzo(a)anthracene, Dibenz(ah)anthracene (or Total PAH if only used), Sn, TriPT) ≥0.0025%	0.000204	0.000182	0.000464	0.000230	0.001760	0.000260	0.000635	0.000323	0.000000
Ecotoxic HP14 individual substance specific thresholds (Co, γ-HCH, DiBT, TriBT) ≥0.025%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or POP Pesticides) >0.005%	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans) >0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans) >0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

If other contaminants need adding to Haswaste, please contact Envirolab.

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313586, Plot 4100, Hatfield Business Park

TP/WS/BH			TP12	TP13	TP15						
Depth (m)			0.20	0.30	0.10						
Envirolab reference											
% Moisture		%									
pH (soil)			7.68	8.79	8.34						
pH (leachate)											
Arsenic		mg/kg	7	6	2						
Cadmium		mg/kg	0.6	0.5	0.5						
Copper	updated v5.4e	mg/kg	22	15	4						
CrVI or Chromium		mg/kg	18	17	12						
Lead		mg/kg	76	57	9						
Mercury		mg/kg	0.46	0.17	0.17						
Nickel		mg/kg	16	14	8						
Selenium		mg/kg	1	1	1						
Zinc		mg/kg	56	95	20						
Barium		mg/kg									
Beryllium		mg/kg									
Vanadium		mg/kg									
Cobalt		mg/kg									
Manganese		mg/kg									
Molybdenum		mg/kg									
Antimony		mg/kg									
Aluminium		mg/kg									
Bismuth		mg/kg									
CrIII		mg/kg									
Iron		mg/kg									
Strontium		mg/kg									
Tellurium		mg/kg									
Thallium		mg/kg									
Titanium		mg/kg									
Tungsten		mg/kg									
Ammoniacal N		mg/kg									
ws Boron		mg/kg									
PAH (Input Total PAH **OR** individual PAH results)											
Acenaphthene		mg/kg									
Acenaphthylene		mg/kg									
Anthracene		mg/kg									
Benzo(a)anthracene		mg/kg									
Benzo(a)pyrene		mg/kg									
Benzo(b)fluoranthene		mg/kg									
Benzo(ghi)perylene		mg/kg									
Benzo(k)fluoranthene		mg/kg									
Chrysene		mg/kg									
Dibenzo(ah)anthracene		mg/kg									
Fluoranthene		mg/kg									
Fluorene		mg/kg									
Indeno(123cd)pyrene		mg/kg									
Naphthalene		mg/kg									
Phenanthrene		mg/kg									
Pyrene		mg/kg									
Coronene		mg/kg									
Total PAHs (16 or 17)		mg/kg									
TPH											
Petrol		mg/kg									
Diesel		mg/kg									
Lube Oil		mg/kg									
Crude Oil	New v5.4e										
White Spirit / Kerosene		mg/kg									
Creosote		mg/kg									
Unknown TPH with ID		mg/kg									
Unknown TPHCWG		mg/kg									
Total Sulphide		mg/kg									
Complex Cyanide		mg/kg									
Free (or Total) Cyanide		mg/kg									
Thiocyanate		mg/kg									
Elemental/Free Sulphur		mg/kg									
Phenols Input Total Phenols HPLC **OR** individual Phenol results.											
Phenol		mg/kg									
Cresols		mg/kg									
Xylenols		mg/kg									
Resourcinol		mg/kg									
Phenols Total by HPLC		mg/kg									
BTEX Input Total BTEX **OR** individual BTEX results.											
Benzene		mg/kg									
Toluene		mg/kg									
Ethylbenzene		mg/kg									
Xylenes		mg/kg									
Total BTEX		mg/kg									
PCBs (POPs)											
PCBs Total (eg EC7/WHO12)		mg/kg									
PBBs (POPs)											
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)		mg/kg									

Haswaste, developed by Dr. Iain Haslock.

313586, Plot 4100, Hatfield Business Park

TP/WS/BH	TP12	TP13	TP15						
Depth (m)	0.20	0.30	0.10						
Envirolab reference									
POPs Dioxins and Furans Input Total Dioxins and Furans **OR** individual Dioxin and Furan results.									
2,3,7,8-TeCDD	mg/kg								
1,2,3,7,8-PeCDD	mg/kg								
1,2,3,4,7,8-HxCDD	mg/kg								
1,2,3,6,7,8-HxCDD	mg/kg								
1,2,3,7,8,9-HxCDD	mg/kg								
1,2,3,4,6,7,8-HpCDD	mg/kg								
OCDD	mg/kg								
2,3,7,8-TeCDF	mg/kg								
1,2,3,7,8-PeCDF	mg/kg								
2,3,4,7,8-PeCDF	mg/kg								
1,2,3,4,7,8-HxCDF	mg/kg								
1,2,3,6,7,8-HxCDF	mg/kg								
2,3,4,6,7,8-HxCDF	mg/kg								
1,2,3,7,8,9-HxCDF	mg/kg								
1,2,3,4,6,7,8-HpCDF	mg/kg								
1,2,3,4,7,8,9-HpCDF	mg/kg								
OCDF	mg/kg								
Total Dioxins and Furans	mg/kg								
Some Pesticides (POPs unless otherwise stated)									
Aldrin	mg/kg								
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*	mg/kg								
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*	mg/kg								
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*	mg/kg								
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*	mg/kg								
Dieldrin	mg/kg								
Endrin	mg/kg								
χ Hexachlorocyclohexane (gamma-HCH) (lindane) ***OR*** *Total HCH*	mg/kg								
Heptachlor	mg/kg								
Hexachlorobenzene	mg/kg								
o,p'-DDT *(leave empty if total DDT results used)*	mg/kg								
p,p'-DDT ***OR*** *Total DDT*	mg/kg								
χ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*	mg/kg								
Chlordecone (kepone)	mg/kg								
Pentachlorobenzene	mg/kg								
Mirex	mg/kg								
Toxaphene (camphechlor)	mg/kg								
Tin									
Tin *(leave empty if Organotin and Tin excl Organotin results used)*	mg/kg								
Organotin									
Dibutyltin; DiBT	mg/kg								
Tributyltin; TriBT	mg/kg								
Triphenyltin; TriPT	mg/kg								
Tetrabutyltin; TeBT	mg/kg								
Tin excluding Organotin									
Tin excl Organotin	mg/kg								

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Haswaste, developed by Dr. Iain Haslock.

313586, Plot 4100, Hatfield Business Park

TP/WS/BH	TP12	TP13	TP15						
Depth (m)	0.20	0.30	0.10						
Envirolab reference									
Asbestos in Soil	Thresholds								
Asbestos detected in Soil (enter Y or N)	Y								
Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below	%	n	n	n					
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)	≥0.1%		#VALUE!	#VALUE!	#VALUE!	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y		n	n	n						

Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7

If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.

If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.

Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.

All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.

Hazardous Property	Thresholds	Cut Off Value								
Corrosive HP8	≥5%	<1%	0.00438	0.00406	0.00257	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Irritant HP4	≥10%	<1%	0.00341	0.00249	0.00072	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Irritant HP4	≥20%	<1%	0.00572	0.00452	0.00207	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥1%		#VALUE!	#VALUE!	#VALUE!	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥10%		0.00760	0.01188	0.00250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Aspiration Toxicity HP5	≥10%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00097	0.00081	0.00028	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥5%	<0.1%	0.00360	0.00341	0.00245	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥25%	<1%	0.02038	0.02215	0.00552	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00005	0.00002	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥2.5%	<0.1%	0.00346	0.00326	0.00230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00006	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00356	0.00333	0.00237	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00014	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥22.5%	<1%	0.02032	0.02210	0.00547	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7	≥0.1%		0.00760	0.00570	0.00230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		7.68	8.79	8.34	0.00	0.00	0.00	0.00	0.00	0.00
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		7.68	8.79	8.34	0.00	0.00	0.00	0.00	0.00	0.00
Toxic for Reproduction HP10	≥0.3%		0.00760	0.01188	0.00250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Toxic for Reproduction HP10	≥3%		0.00346	0.00326	0.00230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mutagenic HP11	≥0.1%		0.00346	0.00326	0.00230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Mutagenic HP11	≥1%		0.00323	0.00283	0.00162	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00346	0.00326	0.00230	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Ecotoxic HP14	≥1.0	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.09978	0.10545	0.03298	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Ecotoxic HP14	≥25%	<0.1%	0.02495	0.02636	0.00824	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Ecotoxic HP14	≥25%	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.02495	0.02636	0.00824	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

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TP/WS/BH		TP12	TP13	TP15					
Depth (m)		0.20	0.30	0.10					
Envirolab reference									
Ecotoxic HP14 individual substance specific thresholds (Benzo(a)anthracene, Dibenz(ah)anthracene (or Total PAH if only used), Sn, TriPT)	≥0.0025%	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Ecotoxic HP14 individual substance specific thresholds (Co, γ-HCH, DiBT, TriBT)	≥0.025%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	>0.005%	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

If other contaminants need adding to Haswaste, please contact Envirolab.