GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 4
Human Health Generic Assessment Criteria for Commercial Scenario

Compound	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
Barium	22,000	22,000	22,000
Beryllium	12	12	12
Boron	240,000	240,000	240,000
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	2,300	2,300	2,300
Elemental Mercury (Hg^0)	15 (4)	33 (11)	58 (26)
Inorganic Mercury (Hg^{2+})	1,120	1,120	1,120
Methyl Mercury (Hg^{4+})	290 (73)	310 (142)	320
Nickel	980	980	980
Selenium	12,000	12,000	12,000
Vanadium	9,000	9,000	9,000
Zinc	740,000	740,000	740,000
Cyanide (free)	650	650	650
Volatile Organic Compounds			
Benzene	27	50	98
Toluene	56,000 (869)	107,000 (1,916)	184,000 (4,357)
Ethylbenzene	6,000 (518)	13,000 (1,216)	27,000 (2,844)
Xylene - m	6,200 (625)	14,100 (1,474)	31,200 (3,457)
Xylene - o	6,600 (478)	15,000 (1,120)	33,000 (2,618)
Xylene - p	5,900 (576)	13,600 (1,353)	30,000 (3,167)
Total xylene	5,900 (625)	13,600 (1,474)	30,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	7,500	12,100	22,400
1,1,1,2 Tetrachloroethane	110	250	560
1,1,2,2-Tetrachloroethane	270	550	1,130
1,1,1-Trichloroethane	700	1,300	3,000
1,1,2 Trichloroethane	89	180	382
1,1-Dichloroethene	24	43	87
1,2-Dichloroethane	0.67	0.97	1.65
1,2,4-Trimethylbenzene	330	640	1,040
1,3,5-Trimethylbenzene	NR	NR	NR
1,2-Dichloropropane	3	6	11
Carbon Tetrachloride (tetrachloromethane)	2.9	6.3	14.2
Chloroethane	901	1,223	1,972
Chloromethane	1.0	1.1	1.5
Cis 1,2 Dichloroethene	14	23	44
Dichloromethane	257	339	526
Tetrachloroethene (PCE)	24	55	125
Trichloroethene (TCE)	0.7	1.5	3.4
Trans 1,2 Dichloroethene	21	37	76
Vinyl Chloride (chloroethene)	1.1	1.4	2.2
Semi-Volatile Organic Compounds			
2-Chloronaphthalene	370 (114)	902 (280)	2,098 (669)
Acenaphthene	110,000	110,000	110,000
Acenaphthylene	110,000	110,000	110,000
Anthracene	520,000	540,000	540,000
Benzo(a)anthracene	170	170	180
Benzo(a)pyrene	77	77	77
Benzo(b)fluoranthene	44	45	45
Benzo(g,h,i)perylene	3,900	3,900	4,000
Benzo(k)fluoranthene	1,200	1,200	1,200
Chrysene	350	350	350
Dibenzo(a,h)anthracene	3.5	3.6	3.6
Fluoranthene	23,000	23,000	23,000
Fluorene	63,000 (31)	68,000	71,000
Hexachloroethane	21 (8)	50 (20)	111 (48)
Indeno(1,2,3-cd)pyrene	500	510	510
Naphthalene	1,800 (76)	3,900 (183)	7,800 (432)
Phenanthrene	22,000	22,000	23,000
Pyrene	54,000	54,000	54,000
Phenol	440*	690*	1,300*
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC_5-EC_6	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC_6-EC_8	7,800 (144)	17,400 (322)	39,600 (736)
Aliphatic hydrocarbons >EC_8-EC_{10}	2,000 (78)	4,800 (190)	11,300 (451)
Aliphatic hydrocarbons >EC_{10}-EC_{12}	9,700 (48)	22,900 (118)	47,300 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	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_{10}	3,500 (613)	8,100 (1,503)	17,000 (3,580)
Aromatic hydrocarbons >EC_{10}-EC_{12}	16,000 (364)	28,000 (899)	34,000 (2,150)
Aromatic hydrocarbons >EC_{12}-EC_{16}	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
Minerals			
Asbestos	Stage 1 test – No asbestos detected with ID; Stage 2 test - <0.001% dry weight (exceedance of either equates to an exceedance of the GAC)[1]		

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, PAHs napthalene, acenaphthene and acenaphthylene, 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)

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.

K 2. Generic Assessment criteria for Controlled Waters

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

Protection of the water environment

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.

The term 'controlled waters' refers to 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 and surface water protection as well as 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 within "The Environment Agency's approach to groundwater protection", version 1.0 (March 2017)[(1)] and the associated guidance "Land contamination groundwater compliance points: quantitative risk assessments (March 2017)[(1a)] that have replaced the previous guidance document "Groundwater Principles and Practice (GP3)". When assessing risks to groundwater, the following need to be considered:

- 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 to avoid pollution, deterioration in the status of groundwater bodies and to prevent sustained, upward trends in pollutant concentrations in groundwater.*
- Where pollutants have already entered groundwater, the priority is to take all necessary and reasonable measures to:
    - ***minimise*** *further entry of "contaminants" where there is a defined source*
    - ***limit the pollution*** *of groundwater or any effect on the status of the groundwater body from the future expansion of the 'plume', if necessary, by actively reducing its extent.*

Within the context of groundwater risk assessments on sites affected by land contamination, "reasonable" means feasible without involving disproportionate costs. What costs are "disproportionate" depends on site-specific circumstances, which may include:

- Considerations of technical feasibility such as identified by the remedial options appraisal, this may be due to the distribution or nature of the contamination and the available remedial methods to treat the identified contamination;
- Sustainability considerations.

DEFINITIONS AND SUBSTANCE CLASSIFICATIONS

Risks to surface waters:

When assessing risks to surface waters, the following list of definitions should be understood:

Priority substances (PS) are harmful substances originally identified under the Water Framework Directive (WFD) 2000/60/EC as substances 'presenting a significant risk to or via the aquatic environment' at a European level. Member States are required to incorporate the identified **PS** into their country-wide monitoring programmes. There are currently 33 **PS** defined within the Priority Substances Directive (2013/39/EU; Annex 1), with a further 12 additional substances due to come into force from 22 December 2018. Directive 2013/39/EU has been transposed into domestic legislation for England and Wales by The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Under the umbrella of **PS**, there is a sub-set of substances identified as being "hazardous", and these are referred to as **Priority hazardous substances (PHS).** The list of **PHS** is defined at EU level within the Priority Substances Directive (2013/39/EU). The WFD defines hazardous substances 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.' There are currently **21 PHS** (previously 15 PHS, with a further 6 substances added in 22 December 2018).

There is also another group of substances defined at EU level and which are referred to as **other pollutants (OP)** in Directive 2013/39/EU**.** These are additional substances which although not **priority substances**, have EQS which are identical to those laid down in the legislation which applied prior to 13 January 2009 (Directive 2008/105/EU). The **OP** are listed along with the **priority substance (PS)** within the Priority Substances Directive (2013/39/EU),and their associated EQS are also listed therein. There are 6 **OP** defined within the Priority Substances Directive (2013/39/EU).

In addition to the EU level substances, there are also a group of pollutants defined at a Member State level, referred to as **Specific pollutants (SP)**. These substances are pollutants which are released in significant quantities into water bodies in each of the individual European Member States. Under the WFD, Member States are required to set their own EQS for these substances. An indicative list of **SP** is given in Annex VIII of the WFD. Many of the substances categorised as **SP** in the UK were formerly List 2 substances under the old Groundwater Directive (80/68/EEC). The **SP** are defined within Part 2 (Table 1) of The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Risks to groundwater:

When assessing risks to groundwater, the following definitions should be understood:

Under the requirements of the Groundwater Daughter Directive (2006/118/EU), the UK has published a list of substances it considers to be **hazardous substances** with respect to groundwater. In their advisory capacity to the government, this list has been derived by the UK Joint Agencies Groundwater Directive Advisory Group (JAGDAG), of which the Environment Agency is a member. The latest JAGDAG list of **hazardous substances** was published in January 2019 and the Environment Agency will use the updated list of hazardous substances from this date for all new activities that may lead to the discharge of hazardous substances to groundwater. The list is extensive and can be found in full at:

https://www.wfduk.org/stakeholders/jagdag

Selecting the appropriate assessment criteria

When assessing the risks to controlled waters, various assessment criteria apply, depending on the nature of the assessment and the conceptual site model.

Where a surface water body is involved, then Environmental Quality Standards (EQS) are the relevant assessment criteria as they are designed to be protective of surface water ecology.

Where a public water supply or a Principal aquifer is involved, then the standards defined in The Water Supply (Water Quality) Regulations(2) are the primary source of assessment criteria. The Private Water Supplies Regulations(3) may also be applicable in some cases. For instances where there are no UK assessment criteria, then the World Health Organisation (WHO) drinking water guidelines(4) may be used.

This appendix presents the generic assessment criteria (GAC) that RSK considers suitable for assessing risks to controlled waters for our most commonly encountered determinants. A full list of EQS for England and Wales are included in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

The RSK GAC for controlled waters are presented in **Table 1** and **Table 2**. In line with the Environment Agency's Remedial Targets Methodology, the GAC for controlled waters are termed 'target concentrations'.

The appropriate target concentrations should be selected with consideration to:

- the site conceptual model (i.e. the receptor at potential risk);
- whether the substance is already present in groundwater at the site;
- whether or not the substance is classified as a priority hazardous substance under the Priority Substances Directive (2013/39/EC) (see above), or as a hazardous substance according to the current list of JAGDAG determinations(5); and
- background concentrations in the aquifer (if applicable).

It is important to remember that the WFD and Environment Agency guidance(1 & 1a) support a sustainable, risk-based approach be applied to groundwater contamination. Exceedance of any target concentration does not necessarily imply that an unacceptable risk exists or that remediation is inevitably required.

Target concentrations shaded in green are statutory values	Target concentrations shaded in orange are non-statutory values

Note: Units µg/l throughout (unless otherwise stated)

Table 1: Target concentrations for controlled waters (excluding TPH CWG fractions)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Metals & other inorganics						
Hazardous substance	Specific pollutant	Arsenic	-	10[2]	50[6a]	25[6a]
Non-hazardous pollutant	Priority substance	Cadmium	0.1[7]	5[2]	≤0.08, 0.08, 0.09, 0.15, 0.25 [6b]	0.2[6a]
(Not determined)	-	Chromium (total)	-	50[2]	8.1 Sum values for chromium III and VI	-
(Not determined)	Specific pollutant	Chromium (III)	-	Use value for total chromium	4.7[6a]	-
Hazardous substance	Specific pollutant	Chromium (VI)			3.4[6a]	0.6[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
(Not determined)	Specific pollutant	Copper	-	2,000[2]	1 bioavailable[6a]	3.76 dissolved, where DOC ≤1mg/l[6a]
						3.76µg/l + (2.677µg/l x ((DOC/2) – 0.5µg/l)) dissolved, where DOC >1mg/l[6a]
Hazardous substance	Priority substance	Lead	-	10[2]	1.2 bioavailable[6a]	1.3[6a]
Hazardous substance	**Priority hazardous substance**	Mercury	0.01[7]	1[2]	0.07[6c]	0.07[6c]
Non-hazardous pollutant	Priority substance	Nickel	-	20[2]	4.0 bioavailable[6a]	8.6[6a]
Non-hazardous pollutant	-	Selenium	-	10[2]	-	-
Non-hazardous pollutant	Specific pollutant	Zinc	-	3,000[8]	10.9 bioavailable[6a]	6.8 dissolved [6a]
(Not determined)	Specific pollutant	Iron	-	200[2]	1000[6a]*1	1000[6a])*1
(Not determined)	Specific pollutant	Manganese	-	50[2] (0.05mg/l)	123 bioavailable[6a] (0.123mg/l)	-
(Not determined)	-	Aluminium	-	200[2]	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
					EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	**Priority hazardous substance**	Tributyltin compounds (Tributyltin-cation)	0.001[7]	-	0.0002[6a]	0.0002[6a]
(Not determined)	-	Sodium	-	200,000[2] (200 mg/l)	-	-
Non-hazardous pollutant	Specific pollutant	Cyanide (Hydrogen cyanide)	-	50[2] (0.05 mg/l)	1[6a] (0.001 mg/l)	1[6a] (0.001 mg/l)
Non-hazardous pollutant	-	Total ammoniacal nitrogen[$]	-	500[2] (0.5 mg/l) as NH_4 (472 expressed as NH_3; 389 expressed as N)	300[6f] (0.3 mg/l) as N (364 expressed as NH_3; 386 expressed as NH_4)	-
Non-hazardous pollutant	Specific pollutant	Ammonia un-ionised (equilibrium ratio calculated) (NH_3)	-	-	-	21[6a] (0.021 mg/l)
Non-hazardous pollutant	Specific pollutant	Chlorine	-	-	2[6a] (0.002 mg/l)	10[6d] (0.01 mg/l)
(Not determined)	-	Chloride	-	250,000[2] (250 mg/l)	-	-
(Not determined)	-	Sulphate	-	250,000[2] (250 mg/l)	-	-
(Not determined)	-	Nitrate (as NO_3)	-	50,000[2] (50 mg/l)	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
(Not determined)	-	Nitrite (as NO_2)	-	500[2] (0.5 mg/l)	10[9] (0.01 mg/l)	-
Volatile organic compounds (VOC)						
Non-hazardous pollutant	Other pollutant	Tetrachloroethene (tetrachloroethylene; PCE)	0.1[7]	10[2] sum of TCE and PCE	10[6a]	10[6a]
Hazardous substance	Other pollutant	Trichloroethene (trichloroethylene; TCE)	0.1[7]		10[6a]	10[6a]
Hazardous substance *(1,1,2,2-tetra - choloroethane)*	Specific pollutant	Tetrachloroethane	-	-	140[6a]	-
Hazardous substance	Other pollutant	Carbon tetrachloride (tetrachloromethane)	0.1[7]	3.0[2]	12[6a]	12[6a]
Non-hazardous pollutant	Priority substance	1,2-Dichloroethane	1.0[7]	3.0[2]	10[6a]	10[6a]
Non-hazardous pollutant	-	1.2-Dichloroethene (DCE) sum of cis and trans	-	50.0[4]	-	-
Hazardous substance	-	Vinyl chloride (chloroethene, chloroethylene)	-	0.5[2]	-	-
Non-hazardous pollutant	Priority substance	Dichloromethane	-	20[4]	20[6a]	20[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Non-hazardous pollutant	Priority substance	Trichlorobenzenes	0.01[7]	-	0.4[6a]	0.4[(6a)]
Hazardous substance	Priority substance	Trichloromethane (Chloroform)	0.1[7]	100[2a] (sum of **trihalomethanes** – chloroform, bromform, dibromochloromethane, bromodichloromethane)	2.5[6a]	2.5[6a]
(Not determined)	-	Bromoform	-		-	-
(Not determined)	-	Dibromochloromethane	-		-	-
(Not determined)	-	Bromodichloromethane	-		-	-
Non-hazardous pollutant	**Priority hazardous substance**	Di(2-ethylhexyl) phthalate (bis(2-ethylhexyl) phthalate, DEHP)	-	8[4]	1.3[6a]	1.3[6a]
(Not determined)	Specific pollutant	Benzyl butyl phthalate	-	-	7.5[6a]	0.75[6e]
Hazardous substance	**Priority hazardous substance**	Hexachlorobutadiene (as a pesticide, but reported in a VOC suite)	0.005[7]	0.1[2]	0.6[6c]	0.6[6c]
Semi-volatile organic compounds (SVOC)						
(Not determined) *Not to be confused with acenaphthene, which is a hazardous substance*	-	Acenaphthylene (Aro EC12-EC16)	-	-	5.8[10]	
Hazardous substance	**Priority hazardous substance**	Anthracene (Aro EC16-EC21)	-	-	0.1[6a]	0.1[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Non-hazardous pollutant	Priority substance	Naphthalene (Aro EC10-EC12)	-	-	2[6a]	2[6a]
Hazardous substance	Priority substance	Fluoranthene (Aro EC21-EC35) not used as an indicator for this EC band	-	-	0.0063[6a]	0.0063[6a]
Hazardous substance(s)	**Priority hazardous substance(s)**	Benzo(a)pyrene (Aro EC21-EC35)	-	0.01[2]	0.00017[6a]	0.00017[6a]
		Benzo(b)fluoranthene (Aro EC21-EC35)	-	0.1[2] sum of the concentration of the four specified compounds	No EQS for these substances. B(a)P should be used as the indicator compound instead.	
		Benzo(k)fluoranthene (Aro EC21-EC35)	-			
		Benzo(g,h,i)perylene (Aro EC21-EC35)	-			
		Indeno(1,2,3-cd) pyrene (Aro EC21-EC35)	-			
Non-hazardous pollutant	Specific pollutant	Phenol	-	-	7.7[6a]	7.7[6a]
Hazardous substance	Specific pollutant	2,4-Dichlorophenol	0.1[7]	-	4.2[6a]	0.42[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority substance	Pentachloro-phenol (PCP) (as a pesticide, but reported in an SVOC suite)	0.1[7]	0.1[2]	0.4[6a]	0.4[6a]
Petroleum hydrocarbons						
Hazardous substance	-	Total petroleum hydrocarbons	-	See Table 2 for individual (non-statutory) TPH CWG fractions with respect to drinking water receptors	See individual risk driving compounds (i.e. BTEX and PAH) for specific EQS	
Hazardous substance	Priority substance	Benzene (Aro EC5-EC7)	1[7]	1[2]	10[6a]	8[6a]
Hazardous substance	Specific pollutant	Toluene (Aro EC7-EC8)	4[7]	700[4]	74[6a]	74[6a]
Hazardous substance	-	Ethylbenzene (Aro EC8-EC10)	-	300[4]	300[11]	-
Hazardous substance	-	Xylenes (Aro EC8-EC10)	3[7]	500[4]	30[11]	-
Non-hazardous pollutant	-	Methyl tertiary butyl ether (MTBE)	-	15[12]	-	

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Pesticides, fungicides, insecticides and herbicides						
(Not determined) – assume to be Hazardous Substance as per below	-	Total pesticides	-	0.5[2]	-	-
(Not determined) - assume to be Hazardous Substance as per below	-	Other individual pesticides (unless otherwise detailed below)	-	0.1[2]	-	-
Hazardous substance(s)	Other pollutant (Cyclodiene pesticides)	Aldrin	0.003[7]	0.03[2]	0.01[6a] (sum of all four)	0.005[6a] (sum of all four)
		Dieldrin	0.003[7]	0.03[2]		
		Endrin	0.003[7]	0.1[2b] ('other individual pesticide')		
		Isodrin*[2]	0.003[7]	0.1[2b] ('other individual pesticide')		
Hazardous substance	Other pollutant	DDT (total)	0.002[7]	0.1[2] ('other individual pesticide')	0.025[6a]	0.025[6a]
Hazardous substance	Specific pollutant	Carbendazim	-	0.1[2] ('other individual pesticide')	0.15[6a]	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Chlorothalonil	-	0.1[2] ('other individual pesticide')	0.035[6a]	-
Hazardous substance	Priority substance	Cypermethrin	-	0.1[2] ('other individual pesticide')	8.0E^{-5}[6a]	8.0E^{-6}[6a]
Hazardous substance	Specific pollutant	Dimethoate	0.01[7]	0.1[2] ('other individual pesticide')	0.48[6a]	0.48[6a]
(Not determined)	Specific pollutant	Glyphosate	-	0.1[2] ('other individual pesticide')	196[6a]	196[6a]
Hazardous substance	Specific pollutant	Linuron	-	0.1[2] ('other individual pesticide')	0.5[6a]	0.5[6a]
Non-hazardous pollutant	Specific pollutant	Mecoprop	0.04[7]	0.1[2] ('other individual pesticide')	18[6a]	18[6a]
Non-hazardous pollutant	Specific pollutant	Methiocarb	-	0.1[2] ('other individual pesticide')	0.01[6a]	-
Non-hazardous pollutant	Specific pollutant	Pendimethalin	-	0.1[2] ('other individual pesticide')	0.3[6a]	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Permethrin	0.001[7]	0.1[2] ('other individual pesticide')	0.001[6a]	0.0002[6a]
Hazardous substance	Priority substance	Alachlor	-	0.1[2] ('other individual pesticide')	0.3[6a]	0.3[6a]
Hazardous substance	Priority substance	Atrazine	0.03[7]	100[4] ('other individual pesticide')	0.6[6a]	0.6[6a]
Hazardous substance	Priority substance	Diuron	-	0.1[2] ('other individual pesticide')	0.2[6a]	0.2[6a]
Hazardous substance	**Priority hazardous substance**	Endosulphan	0.005[7]	0.1[2] ('other individual pesticide')	0.005[6a]	0.0005[6a]
Non-hazardous pollutant	Priority substance	Isoproturon	-	0.1[2] ('other individual pesticide')	0.3[6a]	0.3[6a]
Hazardous substance	Priority substance	Simazine	0.03[7]	0.1[2] ('other individual pesticide')	1[6a]	1 [6a]
Hazardous substance	**Priority hazardous substance**	Trifluralin	0.01[7]	0.1[2] ('other individual pesticide')	0.03[6a]	0.03[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority substance	Dichlorvos	-	0.1[2] ('other individual pesticide')	6.0E^{-4}[6a]	6.0E^{-5}[6a]
Hazardous substance	Priority substance	Heptachlor and heptachlor epoxide	-	0.03[2]	2.0E^{-7}[6a]	1.0E^{-08}[6a]
Miscellaneous						
(Not determined)	Specific pollutant	Triclosan (antibacterial agent)	-	-	0.1[6a]	0.1[6a]
Hazardous substance	**Priority hazardous substance**	Perfluoro-octane sulfonic acid (and its derivatives) (PFOS)	-	-	6.5E^{-4}[6a]	1.3E^{-4}[6a]
Hazardous substance	**Priority hazardous substance**	Hexabromo cyclododecane (HBCDD)	-	-	0.0016[6a]	0.0008[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters

Notes:

'-' A target concentration is not available.

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

*1 Please note that although iron is listed in the 2015 Direction as 1.000 µg/l, the EQS remains at 1mg/l in Scotland and it is assumed this is an error and should read either 1,000 or 1000µg/l.

*2 Please note that although Isodrin is not listed in name within the group of "Cyclodiene pesticides" in Table 1 of Schedule 3 Part 3 of the 2015 Direction[6], the CAS number for Isodrin (465-73-6) **is** listed and therefore it is assumed that it has been missed off the named list of substances.

*3 Total petroleum hydrocarbons is used for consistency, but is an analytical method-defined measurement for a mixture of hydrocarbons subject to environmental analysis[11].

"Bioavailable" in relation to copper, zinc, nickel and manganese (but not lead) is the generic EQSbioavailable[6a] 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.

For zinc, if there is an exceedance of the EQSbioavailable in an initial GQRA, Tier 2 required that the EQS for zinc should also have the ambient background concentration of zinc added as well

Table 2: World Health Organization (WHO) guide values for TPH CWG fractions in drinking water[13] (as referenced in CL:AIRE, 2017[11])

TPH CWG fraction	WHO guide value for drinking water[13] (µg/l)
Aliphatic fractions:	
Aliphatic EC5-EC6	15,000
Aliphatic >EC6-EC8	15,000
Aliphatic >EC8-EC10	300
Aliphatic >EC10-EC12	300
Aliphatic >EC12-EC16	300
Aliphatic >EC16-EC21	-
Aliphatic >EC21-EC35	-
Aromatic fractions:	
Aromatic EC5-EC6	10 (benzene)
Aromatic >EC6-EC8	700 (toluene)
Aromatic >EC8-EC10	300 (ethyl benzene) 500 (xylenes)
Aromatic >EC10-EC12	90
Aromatic >EC12-EC16	90
Aromatic >EC16-EC21	90
Aromatic >EC21-EC35	90
Reference: World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva[13].	

References

1. Environment Agency (2018), 'The Environment Agency's approach to groundwater protection', version 1.2, February 2018 (formerly contained within GP3). https://www.gov.uk/government/collections/groundwater-protection

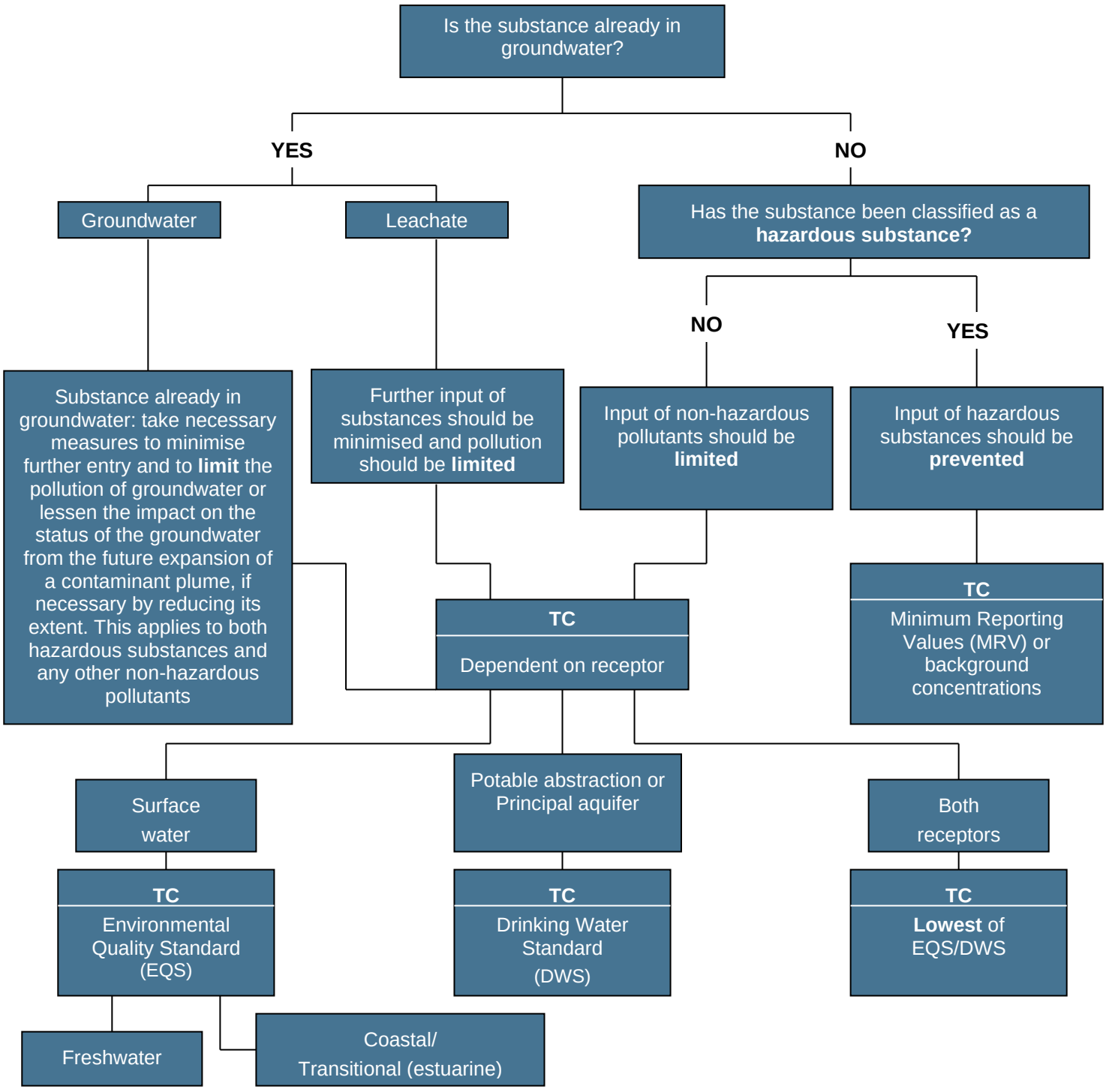
1a. Environment Agency (2017), 'Land contamination groundwater compliance points: quantitative risk assessments', March 2017 (formerly contained within GP3) [accessed 29 March 2017]. https://www.gov.uk/government/collections/groundwater-protection

2. The Water Supply (Water Quality) Regulations 2016 (SI 2016/619)
    - 2a. Sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane
    - 2b. Standard applies to individual pesticides except aldrin, dieldrin, heptachlor and heptachlor epoxide, for which a separate standard is defined.
3. The Private Water Supplies (England) Regulations 2016. SI 2016 / 618
4. WHO (2011), *Guidelines for drinking-water quality*, 4th edn
5. JAGDAG hazard substance determinations (January 2019): This list contains substances that are determined to be hazardous substances or non-hazardous pollutants for the purposes of the groundwater directive 2006/118/EC. https://www.wfduk.org/stakeholders/jagdag [accessed 1 February 2021]
   The absence of an assessment or substance from the list means an assessment has not been completed and is therefore presented as 'Not determined'. For further details on how substances are assessed, see the Joint Agencies Groundwater Directive Advisory Group (JAGDAG) 'Methodology for the determination of hazardous substances in groundwater for the purposes of the groundwater directive 2006/118/EC' which is available from the JAGDAG website. The methodology is a UK –wide framework that sets criteria for how to assess whether a substance is a hazardous substances in groundwater.
6. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.
    - 6a. The EQS for these substances are based on a "long term mean" or an "annual average (AA)" EQS.
    - 6b. For cadmium and its compounds the EQS values vary depending on the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO3/l, Class 2: 40 to < 50 mg CaCO3/l, Class 3: 50 to < 100 mg CaCO3/l, Class 4: 100 to < 200 mg CaCO3/l and Class 5: ≥ 200 mg CaCO3/l).
    - 6c. The EQS for Mercury and hexachlorobutadiene are based on a "maximum acceptable concentration (MAC)" EQS in absence of an "annual average (AA)" EQS.
    - 6d. The EQS for chlorine in saltwater is based on the 95th percentile concentration of total residual oxidant, which refers to the sum of all oxidising agents existing in water, expressed as available chlorine.
    - 6e. The recommended saltwater standard is derived using a safety factor of 100. Where the standard is failed, it is recommended that supporting evidence of ecological damage should be obtained before committing to expensive action.
    - 6f. EQS for total ammonia is as per Schedule 3, Part 1, Table 7 of of the above directions. EQS applies to river types 1, 2 and 4 and 6 (namely upland and low alkalinity). The EQS for a lowland and high alkalinity rivers (types 3, 5 and 7) is 600µg/l (0.6mg/l).

   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

7. Minimum reporting values listed at https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values (updated 13 January 2017; accessed 29 March 2017). Note target concentration for xylenes is 3 μg/l each for o-xylene and m/p xylene as it may not be possible to separate m- and p-xylene; 135 tcb, 124 tcb, 123 tcb each to 0.01 μg/l)
8. The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (as amended). SI 1996 / 3001
9. Council Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (Freshwater Fish Directive) (78/659/EEC)
10. WRc plc (2002), R&D Technical Report P45.
11. CL:AIRE, 2017. Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies. V1.1.
12. 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
13. World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva. [accessed 29 March 2017] http://www.who.int/water_sanitation_health/dwq/chemicals/petroleumproducts_2add_june2008.pdf

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 L
GQRA DATA SCREENING ASSESSMENT

L 1. Soil Assessment to Human Health

Project / Site name: 305407 Boxx Storage Worthing

Date sampled					26/04/2024	26/04/2024	26/04/2024	26/04/2024	26/04/2024	26/04/2024
RSK					None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Sample reference					WS01	WS02	WS02	WS03	WS04	WS05
Additional ref					None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth					0.2	0.2	0.6	0.4	0.25	0.4
DETS ref number					712622	712623	712624	712625	712626	712627
		Human Health GAC for commercial (1% SOM)								
Analytical Parameter (Soil Analysis)	**Units**									
Moisture Content	%	NA			15	14.9	12.7	15.9	20.4	19.4
Asbestos in Soil Screen / Identification Name	Type	Not Detected			Not Detected	Not Detected	-	-	Not Detected	-
General Inorganics										
pH	pH Units	NA			8.5	8.7	8.4	8.2	8.2	8.2
Total Organic Carbon (TOC)	%	NA			2.55	3.23	3.57	1.53	2.55	3.4
Speciated PAHs										
Naphthalene	mg/kg	1800	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	110000	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	110000	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	63000	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	22000	RSK - Human health with commercial 2.5% OM)		< 0.1	0.58	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	520000	RSK - Human health with commercial 2.5% OM)		< 0.1	0.13	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	23000	RSK - Human health with commercial 2.5% OM)		< 0.1	0.59	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	54000	RSK - Human health with commercial 2.5% OM)		< 0.1	0.52	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	170	RSK - Human health with commercial 2.5% OM)		< 0.1	0.19	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	350	RSK - Human health with commercial 2.5% OM)		< 0.1	0.22	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	44	RSK - Human health with commercial 2.5% OM)		< 0.1	0.22	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	1200	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	77	RSK - Human health with commercial 2.5% OM)		< 0.1	0.19	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	500	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	3.5	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	3900	RSK - Human health with commercial 2.5% OM)		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Heavy Metals / Metalloids										
Arsenic (As)	mg/kg	640	RSK - Human health with commercial 2.5% OM)		26	13	16	5	13	7
Cadmium (Cd)	mg/kg	410	RSK - Human health with commercial 2.5% OM)		< 0.2	< 0.2	0.40	< 0.2	< 0.2	0.20
Chromium (hexavalent)	mg/kg	49	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
Chromium (Cr)	mg/kg	8600	RSK - Human health with commercial 2.5% OM)		17	12	12	8	17	22
Copper (Cu)	mg/kg	68000	RSK - Human health with commercial 2.5% OM)		49	74	59	14	87	42
Lead (Pb)	mg/kg	2300	RSK - Human health with commercial 2.5% OM)		179	464	42	16	44	19
Mercury (Hg)	mg/kg	33	RSK - Human health with commercial 2.5% OM)		< 1	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	980	RSK - Human health with commercial 2.5% OM)		13	12	9	8	16	15
Selenium (Se)	mg/kg	12000	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	740000	RSK - Human health with commercial 2.5% OM)		176	106	38	37	97	54
Monoaromatics										
Benzene	µg/kg	27	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
Toluene	µg/kg	56000	RSK - Human health with commercial 2.5% OM)		< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	µg/kg	6000	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
p + m xylene	µg/kg	12100	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	11.00	< 2
o -xylene	µg/kg	6600	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	7500	RSK - Human health with commercial 2.5% OM)		< 5	< 5	< 5	< 5	< 5	< 5
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	3200	RSK - Human health with commercial 2.5% OM)		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	7800	RSK - Human health with commercial 2.5% OM)		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	2000	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	9700	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	59000	RSK - Human health with commercial 2.5% OM)		< 3	< 3	< 3	< 3	< 3	< 3
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	1000000	RSK - Human health with commercial 2.5% OM)		< 3	< 3	< 3	< 3	< 3	< 3
TPH-CWG - Aliphatic >EC21 - EC34	mg/kg	1000000	RSK - Human health with commercial 2.5% OM)		< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	2081700	RSK - Human health with commercial 2.5% OM)		< 21	< 21	< 21	< 21	< 21	< 21
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	3500	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	16000	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	36000	RSK - Human health with commercial 2.5% OM)		< 2	< 2	< 2	< 2	< 2	< 2
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	28000	RSK - Human health with commercial 2.5% OM)		< 3	< 3	< 3	< 3	< 3	< 3
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	28000	RSK - Human health with commercial 2.5% OM)		< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	111500	RSK - Human health with commercial 2.5% OM)		< 42	< 42	< 42	< 42	< 42	< 42

Notes:

U/S = Unsuitable Sample I/S = Insufficient Sample

GAC exceeded

GAC above theoretical soil saturation limit

Abestos positively identified in sample and quantified

NA Not applicable

L 2. Controlled Waters

Project / Site name: Boxx Storage Worthing

Lab Report Number		**EQS Freshwater**	45428	45428	45428	
Lab Sample Number			716770	716771	716772	
Sample Reference			WS01	WS03	WS04	
Depth (m)			2.00	1.50	1.50	
Date Sampled			16/05/2024	16/05/2024	16/05/2024	
Analytical Parameter (Water Analysis)	**Units**					
General Inorganics						
pH	pH Units		7.7	7.5	7.7	
Sulphate as SO_4	mg/l	250	49	12	10	
Speciated PAHs						
Naphthalene	µg/l	2	< 0.01	< 0.01	< 0.01	
Acenaphthylene	µg/l	5.8	< 0.01	< 0.01	< 0.01	
Acenaphthene	µg/l	-	< 0.01	< 0.01	< 0.01	
Fluorene	µg/l	-	< 0.01	< 0.01	< 0.01	
Phenanthrene	µg/l	-	< 0.01	< 0.01	< 0.01	
Anthracene	µg/l	0.1	< 0.01	< 0.01	< 0.01	
Fluoranthene	µg/l	0.0063	< 0.01	< 0.01	< 0.01	
Pyrene	µg/l	-	< 0.01	< 0.01	< 0.01	
Benzo(a)anthracene	µg/l	-	< 0.01	< 0.01	< 0.01	
Chrysene	µg/l	-	< 0.01	< 0.01	< 0.01	
Benzo(b)fluoranthene	µg/l	0.1	< 0.01	< 0.01	< 0.01	
Benzo(k)fluoranthene	µg/l	0.1	< 0.01	< 0.01	< 0.01	
Benzo(a)pyrene	µg/l	0.00017	< 0.01	< 0.01	< 0.01	
Indeno(1,2,3-cd)pyrene	µg/l	0.1	< 0.01	< 0.01	< 0.01	
Dibenz(a,h)anthracene	µg/l	-	< 0.01	< 0.01	< 0.01	
Benzo(ghi)perylene	µg/l	0.1	< 0.008	< 0.008	< 0.008	
Total PAH						
Total EPA-16 PAHs	µg/l	-	< 0.16	< 0.16	< 0.16	
Heavy Metals / Metalloids						
Arsenic (dissolved)	µg/l	50	1.8	5.4	4.6	
Cadmium (dissolved)	µg/l	0.08	0.3	< 0.2	< 0.2	
Chromium (dissolved)	µg/l	4.7	3.1	2.6	2.3	
Chromium (hexavalent)	µg/l	3.4	<20	<20	<20	
Copper (dissolved)	µg/l	1	11.4	5.7	7.3	
Lead (dissolved)	µg/l	1.2	17.3	7.9	2.6	
Mercury (dissolved)	µg/l	0.07	< 0.04	< 0.04	< 0.04	
Nickel (dissolved)	µg/l	4	3.1	6.4	16.0	
Selenium (dissolved)	µg/l	-	5.2	0.9	1.3	
Zinc (dissolved)	µg/l	10.9	132	69	90	
Monoaromatics						
Benzene	µg/l	10	< 1	< 1	< 1	
Toluene	µg/l	74	< 5	< 5	< 5	
Ethylbenzene	µg/l	300	< 5	< 5	< 5	
p & m-xylene	µg/l	30	< 10	< 10	< 10	
o-xylene	µg/l		< 5	< 5	< 5	
MTBE (Methyl Tertiary Butyl Ether)	µg/l	-	< 10	< 10	< 10	
TPH-CWG - Aliphatic >C5 - C6	µg/l	15,000	< 10	< 10	< 10	
TPH-CWG - Aliphatic >C6 - C8	µg/l	15,000	< 10	< 10	< 10	
TPH-CWG - Aliphatic >C8 - C10	µg/l	300	< 10	< 10	< 10	
TPH-CWG - Aliphatic >C10 - C12	µg/l	300	< 10	< 10	< 10	
TPH-CWG - Aliphatic >C12 - C16	µg/l	300	< 10	< 10	< 10	
TPH-CWG - Aliphatic >C16 - C21	µg/l	-	< 10	< 10	< 10	
TPH-CWG - Aliphatic >C21 - C35	µg/l	-	< 10	< 10	< 10	
TPH-CWG - Aliphatic (C5 - C35)	µg/l	-	< 70	< 70	< 70	
TPH-CWG - Aromatic >C5 - C7	µg/l	10	< 10	< 10	< 10	
TPH-CWG - Aromatic >C7 - C8	µg/l	700	< 10	< 10	< 10	
TPH-CWG - Aromatic >C8 - C10	µg/l	300	< 10	< 10	< 10	
TPH-CWG - Aromatic >C10 - C12	µg/l	90	< 10	< 10	< 10	
TPH-CWG - Aromatic >C12 - C16	µg/l	90	< 10	< 10	< 10	
TPH-CWG - Aromatic >C16 - C21	µg/l	90	< 10	< 10	< 10	
TPH-CWG - Aromatic >C21 - C35	µg/l	90	< 10	< 10	< 10	
TPH-CWG - Aromatic (C5 - C35)	µg/l	-	< 70	< 70	< 70	
Total TPH (C5-C35)						
Total TPH	mg/l	N/A	< 140	< 140	< 140	

Notes:
Results screened against the most conservative critical concentration for each analytical parameter obtained from RSK's Commercial and Residential GACs

GAC 0.1 µg/l for sum of these four PAH compounds
Result exceeds critical concentration
DWS values used in absence of EQS values.

L 3. Ground gas

Exploratory position ID	Monitoring round	Monitoring date	Response zone top (mbgl)	Response zone base (mbgl)	Depth to water (mbgl)	Depth to base (mbgl)	Response zone geological unit	Methane - peak (%/vol)	Methane steady-state (%/vol)	Carbon dioxide peak (%/vol)	Carbon dioxide steady-state (%/vol)	Oxygen minimum (%/vol)	Carbon monoxide peak (ppm)	Hydrogen sulphide peak (ppm)	PID peak (ppm)	Peak gas flow max (l/hr)	Steady-state gas flow (l/hr)	Atmospheric pressure (mb)	Response zone entirely flooded?	Response zone partially flooded?
WS01	1	03/05/2024	1.5	5	0.12	4.55	London Clay Formation	0	0	0.1	0.1	21.6	0	0	0	0	0	999	TRUE	FALSE
WS01	2	16/05/2024	1.5	5	0.52	4.55	London Clay Formation	0	0	0.7	0.7	19	3	0	0.8	29.9	3.523	1006	TRUE	FALSE
WS01	3	30/05/2024	1.5	5	0.585	4.55	London Clay Formation	0	0	3	0.3	20.3	4	0	0.6	19.2	1.7	1003	TRUE	FALSE
WS02	2	16/05/2024	1.5	5	0.54	5.05	London Clay Formation	0	0	0.1	0.1	20.8	1	0	0.2	0.1	0	1006	TRUE	FALSE
WS02	3	30/05/2024	1.5	5	0.53	5.05	London Clay Formation	0	0	0.1	0.1	20.4	4	0	0.4	-0.1	-0.1	1003	TRUE	FALSE
WS03	1	03/05/2024	1	5	0.59	4.79	London Clay Formation	0.5	0.5	1.7	1.7	20	17	0	0.5	13.2	3.8	1000	TRUE	FALSE
WS03	2	16/05/2024	1	5	0.63	4.83	London Clay Formation	0.5	0.5	1.7	1.7	19.4	7	0	0.8	10.5	1.2	1006	TRUE	FALSE
WS03	3	30/05/2024	1	5	0.56	4.89	London Clay Formation	0.1	0.1	0.5	0.5	20.7	6	0	1.3	12.8	2.4	999	TRUE	FALSE
WS04	1	03/05/2024	1	5	1.04	5.03	London Clay Formation	0.4	0.4	1.2	1.2	20.7	1	0	0.3	0	0	1000	FALSE	TRUE
WS04	2	16/05/2024	1	5	0.88	5.03	London Clay Formation	0	0	1	1	17.4	6	0	1.3	16.5	2.1	1006	TRUE	FALSE
WS04	3	30/05/2024	1	5	0.745	5.04	London Clay Formation	0	0	0.4	0.4	20.5	5	0	1.3	9.9	0.9	1002	TRUE	FALSE

Exploratory position ID	Date	Device	Serial number	Atmospheric pressure (mb)	Weather	Air Temp (°C)	Ground condtions	Wind	Tidal state
Monitoring round 1									
WS01	03/05/2024	Ga500	G508819	999	Overcast	11	Dry	Light	NA
WS03	03/05/2024	Ga500	G508819	1000	Overcast	11	Dry	Light	NA
WS04	03/05/2024	Ga500	G508819	1000	Overcast	11	Dry	Light	NA
Monitoring round 2									
WS01	16/05/2024	Ga500	G508819	1006	Overcast, drizzle	11	Dry	Light	NA
WS02	16/05/2024	Ga500	G508819	1006	Overcast, drizzle	11	Dry	None	NA
WS03	16/05/2024	Ga500	G508819	1006	Overcast, drizzle	11	Dry	None	NA
WS04	16/05/2024	Ga500	G508819	1006	Overcast, drizzle	11	Dry	None	NA
Monitoring round 3									
WS01	30/05/2024	GA5000	G508819	1003	Overcast, drizzle	13	Dry	Light	NA
WS02	30/05/2024	GA5000	G508819	1003	Overcast	13	Dry	Light	NA
WS03	30/05/2024	GA5000	G508819	999	Overcast, drizzle	13	Dry	Light	NA
WS04	30/05/2024	GA5000	G508819	1002	Overcast, drizzle	13	Dry	Light	NA

This is a summary of the maximum reported concentrations per borehole (or min for oxygen)															
Exploratory position ID	Response zone top (mbgl)	Response zone base (mbgl)	Response zone geological unit	Number of monitoring rounds	Peak methane max (%/vol)	Steady-state methane max (%/vol)	Peak carbon dioxide max (%/vol)	Carbon dioxide steady-state max (%/vol)	Oxygen min (%/vol)	Peak gas flow max (l/hr)	Steady-state gas flow max (l/hr)	Depth to water min (mbgl)	Depth to water max (mbgl)	Atmospheric pressure min (mb)	Atmospheric pressure max (mb)
WS01	1.5	5	London Clay Formation	3	0	0	3	0.7	19	29.9	3.523	0.12	0.585	999	1006
WS02	1.5	5	London Clay Formation	2	0	0	0.1	0.1	20.4	0.1	0	0.53	0.54	1003	1006
WS03	1	5	London Clay Formation	3	0.5	0.5	1.7	1.7	19.4	13.2	3.8	0.56	0.63	999	1006
WS04	1	5	London Clay Formation	3	0.4	0.4	1.2	1.2	17.4	16.5	2.1	0.745	1.04	1000	1006

This is a summary of the maximum reported concentrations per borehole (or min for oxygen) EXCLUDING data from entirely flooded response zones															
Exploratory position ID	Response zone top (mbgl)	Response zone base (mbgl)	Response zone geological unit	Number of monitoring rounds	Peak methane max (%/vol)	Steady-state methane max (%/vol)	Peak carbon dioxide max (%/vol)	Carbon dioxide steady-state max (%/vol)	Oxygen min (%/vol)	Peak gas flow max (l/hr)	Steady-state gas flow max (l/hr)	Depth to water min (mbgl)	Depth to water max (mbgl)	Atmospheric pressure min (mb)	Atmospheric pressure max (mb)
WS04	1	5	London Clay Formation	1	0.4	0.4	1.2	1.2	20.7	0	0	1.04	1.04	1000	1000

Calculations of borehole hazardous gas flow rate in accordance with BS8485

Project No.:	305407
Client:	Bravo Services Limited
Site:	Boxx Storage Worthing

In accordance with BS8485 Section 6.3.1 the data presented below are calculations of borehole hazardous gas flow rates (Q_{hg}).

The Q_{hg} can then be used, along with a robust conceptual site model and review of the data collected, to designate a site characteristic (or zone) gas screening value (GSV).

GSVs are used to characterise the potential risk and inform mitigation measures where appropriate.

The assessment below presents calculated Q_{hg} values and compares them directly to Characteristic Situations as presented in BS8485 Table 2.

The ultimate site characteristic GSV (for the site or for individual zones) to inform risk assessment and mitigation measures is detailed in the body of the report, and may be different to the individual calculations below.

The calculations below use peak concentrations and steady state flow to calculate the Q_{hg}.

Characteristic Situation	Hazard potential	GSV
1	Very Low	<0.07
2	Low	<0.7
3	Moderate	<3.5
4	Moderate to High	<15
5	High	<70
6	Very High	>=70

British Standard Institution (BSI) (2019), 'BS 8485:2015+A1:2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

KEY	
Qhg	Borehole hazardous gas flow rate (steady state flow * (peak concentration / 100))
GSV	Gas Screening Value
	GSV / Q_{hg} indicates very low hazard potential
	GSV / Q_{hg} indicates low to moderate hazard potential
	GSV / Q_{hg} indicates moderate or greater hazard potential
	Data exceeds either 1% CH_4, 5% CO_2 or 70 L/hr flow (see BS8485 Table 2)

SUMMARY OF Qhg VALUES PER BOREHOLE, PER MONITORING ROUND

BH NO.	DATE	CH_4 peak %v/v	CH_4 SS %v/v	CO_2 peak %v/v	CO_2 SS %v/v	O_2 min %v/v	Flow SS l/hr	Baro mbar	Q_{hg} CH_4	Q_{hg} CO_2	CS No.
WS01	03/05/2024	0	0	0.1	0.1	21.6	0	999	0.00	0.00	CS1
	16/05/2024	0	0	0.7	0.7	19	3.523	1006	0.00	0.02	CS1
	30/05/2024	0	0	3	0.3	20.3	1.7	1003	0.00	0.05	CS1
WS02	16/05/2024	0	0	0.1	0.1	20.8	0	1006	0.00	0.00	CS1
	30/05/2024	0	0	0.1	0.1	20.4	-0.1	1003	0.00	0.00	CS1
WS03	03/05/2024	0.5	0.5	1.7	1.7	20	3.8	1000	0.02	0.06	CS1
	16/05/2024	0.5	0.5	1.7	1.7	19.4	1.2	1006	0.01	0.02	CS1
	30/05/2024	0.1	0.1	0.5	0.5	20.7	2.4	999	0.00	0.01	CS1
WS04	03/05/2024	0.4	0.4	1.2	1.2	20.7	0	1000	0.00	0.00	CS1
	16/05/2024	0	0	1	1	17.4	2.1	1006	0.00	0.02	CS1
	30/05/2024	0	0	0.4	0.4	20.5	0.9	1002	0.00	0.00	CS1

WORST-CASE Qhg VALUES PER BOREHOLE

		Maximum CH_4		Maximum CO_2				Baro	Maximum Q_{hg}		
BH NO.	DATE	CH_4 peak %v/v	CH_4 SS %v/v	CO_2 peak %v/v	CO_2 SS %v/v	Min O_2	Max SS Flow	mbar	CH_4	CO_2	CS No.
WS01		0	0	3	0.7	19	3.523		0.00	0.11	CS2
WS02		0	0	0.1	0.1	20.4	0		0.00	0.00	CS1
WS03		0.5	0.5	1.7	1.7	19.4	3.8		0.02	0.06	CS1
WS04		0.4	0.4	1.2	1.2	17.4	2.1		0.01	0.03	CS1

WORST-CASE Qhg CHECK FOR SITE (BS8485 Section 6.3.7.4)

		Maximum CH_4		Maximum CO_2				Baro	Maximum Q_{hg}		
BH NO.	DATE	CH_4 peak %v/v	CH_4 SS %v/v	CO_2 peak %v/v	CO_2 SS %v/v	Min O_2	Max SS Flow	mbar	CH_4	CO_2	CS No
ALL		0.5	0.5	3	1.7	17.4	3.8		0.02	0.11	CS2

Calculations of borehole hazardous gas flow rate in accordance with BS8485

Project No.:	305407
Client:	Bravo Services Limited
Site:	Boxx Storage Worthing

In accordance with BS8485 Section 6.3.1 the data presented below are calculations of borehole hazardous gas flow rates (Q_{hg}).

The Q_{hg} can then be used, along with a robust conceptual site model and review of the data collected, to designate a site characteristic (or zone) gas screening value (GSV).

GSVs are used to characterise the potential risk and inform mitigation measures where appropriate.

The assessment below presents calculated Q_{hg} values and compares them directly to Characteristic Situations as presented in BS8485 Table 2.

The ultimate site characteristic GSV (for the site or for individual zones) to inform risk assessment and mitigation measures is detailed in the body of the report, and may be different to the individual calculations below.

The calculations below use peak concentrations and steady state flow to calculate the Q_{hg}.

Characteristic Situation	Hazard potential	GSV
1	Very Low	<0.07
2	Low	<0.7
3	Moderate	<3.5
4	Moderate to High	<15
5	High	<70
6	Very High	>=70

British Standard Institution (BSI) (2019), 'BS 8485:2015+A1:2019. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

KEY	
Qhg	Borehole hazardous gas flow rate (steady state flow * (peak concentration / 100))
GSV	Gas Screening Value
	GSV / Q_{hg} indicates very low hazard potential
	GSV / Q_{hg} indicates low to moderate hazard potential
	GSV / Q_{hg} indicates moderate or greater hazard potential
	Data exceeds either 1% CH_4, 5% CO_2 or 70 L/hr flow (see BS8485 Table 2)

SUMMARY OF Qhg VALUES PER BOREHOLE, PER MONITORING ROUND

BH NO.	DATE	CH_4 peak %v/v	CH_4 SS %v/v	CO_2 peak %v/v	CO_2 SS %v/v	O_2 min %v/v	Flow SS l/hr	Baro mbar	Q_{hg} CH_4	Q_{hg} CO_2	CS No.
WS04	03/05/2024	0.4	0.4	1.2	1.2	20.7	0	1000	0.00	0.00	CS1

WORST-CASE Qhg VALUES PER BOREHOLE

BH NO.	DATE	Maximum CH_4: CH_4 peak %v/v	Maximum CH_4: CH_4 SS %v/v	Maximum CO_2: CO_2 peak %v/v	Maximum CO_2: CO_2 SS %v/v	Min O_2	Max SS Flow	Baro mbar	Maximum Q_{hg}: CH_4	Maximum Q_{hg}: CO_2	CS No.
WS04		0.4	0.4	1.2	1.2	20.7	0		0.00	0.00	CS1

WORST-CASE Qhg CHECK FOR SITE (BS8485 Section 6.3.7.4)

BH NO.	DATE	Maximum CH_4: CH_4 peak %v/v	Maximum CH_4: CH_4 SS %v/v	Maximum CO_2: CO_2 peak %v/v	Maximum CO_2: CO_2 SS %v/v	Min O_2	Max SS Flow	Baro mbar	Maximum Q_{hg}: CH_4	Maximum Q_{hg}: CO_2	CS No
ALL		0.4	0.4	1.2	1.2	20.7	0		0.00	0.00	CS1

Appendix M
WM3 WASTE ASSESSMENT

envirolab

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Haswaste, developed by Dr. Iain Haslock.

11505-CTR		WS01	WS02	WS02	WS03	WS04	WS05	
Ref. 1		0.20	0.20	0.60	0.40	0.25	0.40	
Ref. 2								
Date		26/04/24	26/04/24	26/04/24	26/04/24	26/04/24	26/04/24	
% Moisture	%							
pH (soil)		8.5	8.7	8.4	8.2	8.2	8.2	
pH (leachate)								
Arsenic	mg/kg	26	13	16	5	13	7	
Cadmium	mg/kg	< 0.2	< 0.2	0.4	< 0.2	< 0.2	0.2	
Copper	mg/kg	49	74	59	14	87	42	
CrVI or Chromium	mg/kg	17	12	12	8	17	22	
Lead	mg/kg	179	464	42	16	44	19	
Mercury	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	
Nickel	mg/kg	13	12	9	8	16	15	
Selenium	mg/kg	< 2	< 2	< 2	< 2	< 2	<2	
Zinc	mg/kg	176	106	38	37	97	54	
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	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	0.13	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)anthracene	mg/kg	< 0.1	0.19	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	0.19	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	0.22	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	<0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Chrysene	mg/kg	< 0.1	0.22	< 0.1	< 0.1	< 0.1	< 0.1	
Dibenzo(ah)anthracene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	0.59	< 0.1	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Indeno(123cd)pyrene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Naphthalene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	0.58	< 0.1	< 0.1	< 0.1	< 0.1	
Pyrene	mg/kg	< 0.1	0.52	< 0.1	< 0.1	< 0.1	< 0.1	
Coronene	mg/kg							
Total PAHs (16 or 17)	mg/kg	<1.6	2.60	<1.6	<1.6	<1.6	<1.6	

TPH

Petrol	mg/kg							
Diesel	mg/kg							
Lube Oil	mg/kg							
Crude Oil	mg/kg							
White Spirit / Kerosene	mg/kg							
Creosote	mg/kg							
Unknown TPH with ID	mg/kg							
Unknown TPHCWG	mg/kg	42.0	42.0	42.0	42.0	42.0	42.0	

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Haswaste, developed by Dr. Iain Haslock.

11505-CTR		WS01	WS02	WS02	WS03	WS04	WS05						
Ref. 1		0.20	0.20	0.60	0.40	0.25	0.40						
Ref. 2													
Date		26/04/24	26/04/24	26/04/24	26/04/24	26/04/24	26/04/24						
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												

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Haswaste, developed by Dr. Iain Haslock.

11505-CTR		WS01	WS02	WS02	WS03	WS04	WS05						
Ref. 1		0.20	0.20	0.60	0.40	0.25	0.40						
Ref. 2													
Date		26/04/24	26/04/24	26/04/24	26/04/24	26/04/24	26/04/24						
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	2.00	2.00	2.00	2.00	2.00	2.00						
Toluene	mg/kg	5.00	5.00	5.00	5.00	5.00	5.00						
Ethylbenzene	mg/kg	2.00	2.00	2.00	2.00	2.00	2.00						
Xylenes	mg/kg	4.00	4.00	4.00	4.00	4.00	4.00						
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												
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												

envirolab

Haswaste, developed by Dr. Iain Haslock.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

11505-CTR		WS01	WS02	WS02	WS03	WS04	WS05						
Ref. 1		0.20	0.20	0.60	0.40	0.25	0.40						
Ref. 2													
Date		26/04/24	26/04/24	26/04/24	26/04/24	26/04/24	26/04/24						
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												
Asbestos in Soil	Thresholds												
Asbestos detected in Soil (enter Y or N)	Y	N	N	N	N	N	N						
		If 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) *Please be advised, if the calculation cell is "0.00000" DOES NOT MEAN asbestos testing has been undertaken and the result is zero.*	≥0.1%	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.										If Asbestos in Soil above is "**Y**", but Asbestos % above is "<0.1%", t	
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y												
		If visual identifiable pieces of asbestos are present, <u>you cannot use Asbestos % results</u> 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.										If visual identifiable pieces of asbestos are present, <u>you cannot use</u> Therefore, if Asbestos in Soil above is "**Y**", the Asbest	
		Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.										Identifiable Pieces	
		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.										All visual asbestos pieces need to be removed leaving onl	

Hazardous Property	Thresholds	Cut Off Value	**If cells below turn yellow and the text turns red, the samples should be classified as Hazardous Waste.**										**If cells below turn y**
Corrosive HP8	≥5%	<1%	0.00670	0.00402	0.00442	0.00220	0.00498	0.00515	0.00000				
Irritant HP4	≥10%	<1%	0.00897	0.01008	0.00878	0.00224	0.01155	0.00567	0.00000				
Irritant HP4	≥20%	<1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000				

envirolab

Haswaste, developed by Dr. Iain Haslock.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

			WS01	WS02	WS02	WS03	WS04	WS05						
11505-CTR														
Ref. 1			0.20	0.20	0.60	0.40	0.25	0.40						
Ref. 2														
Date			26/04/24	26/04/24	26/04/24	26/04/24	26/04/24	26/04/24						
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000					
Specifc Target Organ Toxicity HP5	≥20%		0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00000					
Specifc Target Organ Toxicity HP5	≥1%		0.00326	0.00242	0.00230	0.00162	0.00326	0.00422	0.00000					
Specifc Target Organ Toxicity HP5	≥10%		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Aspiration Toxicity HP5	≥10%		0.00550	0.00550	0.00550	0.00550	0.00550	0.00550	0.00000					
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000					
Acute Toxicity HP6	≥0.25%	<0.1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Acute Toxicity HP6	≥5%	<0.1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Acute Toxicity HP6	≥25%	<1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Acute Toxicity HP6	≥0.25%	<0.1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Acute Toxicity HP6	≥2.5%	<0.1%	0.00326	0.00230	0.00230	0.00154	0.00326	0.00422	0.00000					
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000					
Acute Toxicity HP6	≥55%	<1%	#VALUE!	#VALUE!	0.00044	#VALUE!	#VALUE!	0.00042	0.00000					
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000					
Acute Toxicity HP6	≥0.5%	<0.1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Acute Toxicity HP6	≥3.5%	<0.1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Acute Toxicity HP6	≥22.5%	<1%	0.02666	0.05779	0.01329	0.00540	0.01806	0.01028	0.00000					
Carcinogenic HP7	≥0.1%		0.00420	0.00420	0.00420	0.00420	0.00420	0.00422	0.00000					
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000					
Carcinogenic HP7	≥1%		0.00000	0.00026	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					
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!					
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		0.00	0.00	0.00	0.00	0.00	0.00	0.00					
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Toxic for Reproduction HP10	≥0.3%		0.00263	0.00242	0.00182	0.00162	0.00323	0.00303	0.00000					
Toxic for Reproduction HP10	≥3%		0.00420	0.00420	0.00420	0.00420	0.00420	0.00422	0.00000					
Mutagenic HP11	≥0.1%		0.00420	0.00420	0.00420	0.00420	0.00420	0.00422	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					
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!					
Mutagenic HP11	≥1%		0.00263	0.00242	0.00182	0.00162	0.00323	0.00303	0.00000					
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		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					
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0					
HP13 Sensitising	≥10%		0.00326	0.00242	0.00230	0.00162	0.00326	0.00422	0.00000					
Ecotoxic HP14 amended v6	≥25%	<0.1%	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					

envirolab

Haswaste, developed by Dr. Iain Haslock.

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

11505-CTR			WS01	WS02	WS02	WS03	WS04	WS05						
Ref. 1			0.20	0.20	0.60	0.40	0.25	0.40						
Ref. 2														
Date			26/04/24	26/04/24	26/04/24	26/04/24	26/04/24	26/04/24						
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Be, V, Te, Tl, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Crosote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%).	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00000					
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Be, V, Te, Tl, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Crosote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%).	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	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					
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%		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					

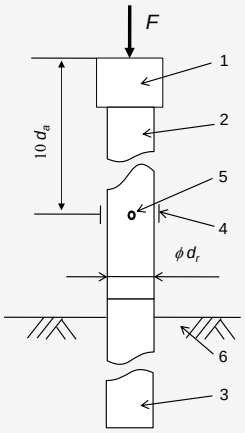
Appendix N
SPT CALIBRATION CERTIFICATE

SPT Calibration Report

Hammer Energy Measurement Report

Type of Hammer		Terrier
Test No		EQU2023_99
Client		Oakland SI
Test Depth (m)		11.70
Mass of hammer	m =	63.5kg
Falling height	h =	0.76m
E_{theor} =	$m \times g \times h$ =	473J

Characteristics of the instrumented rod



Key

1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

F Force
d_r Diameter of rod

Fig. B.1 and B.2
BS EN ISO 22476-3 : 2005 + A1 : 2011

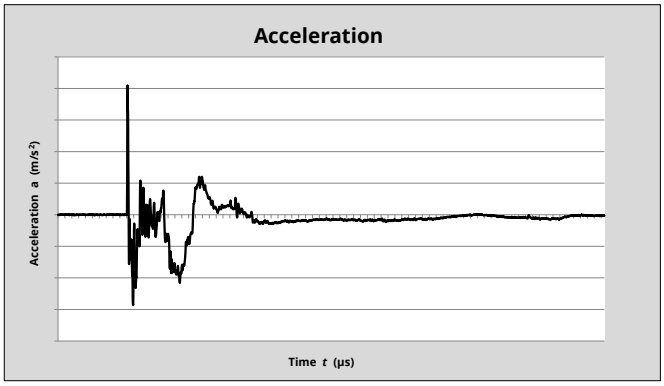
Diameter	d_r =	0.052 m
Length of instrumented rod		0.558 m
Area	A =	11.61 cm²
Modulus	E_a =	206843 MPa

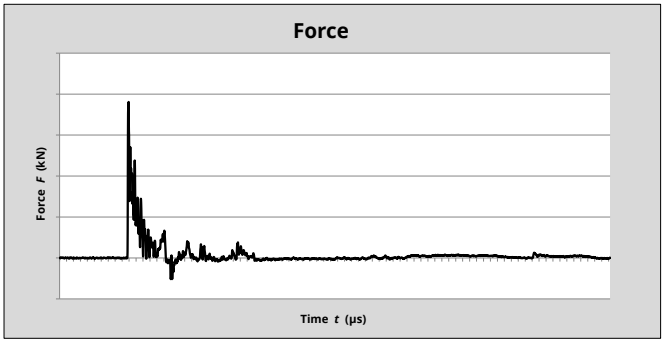
DATE OF TEST	VALID UNTIL	HAMMER ID
12/06/2023	11/06/2024	03

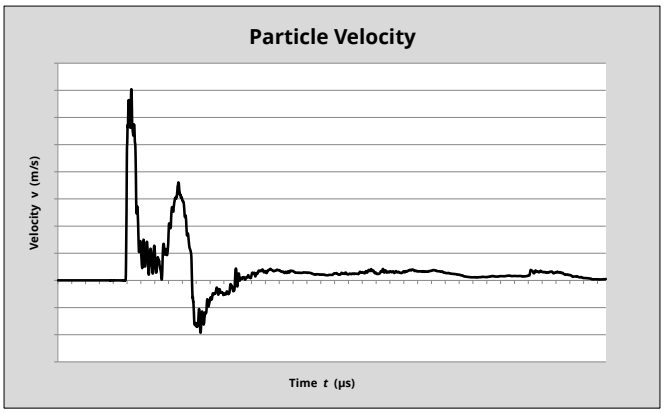
E_{meas} = **0.371** kN-m

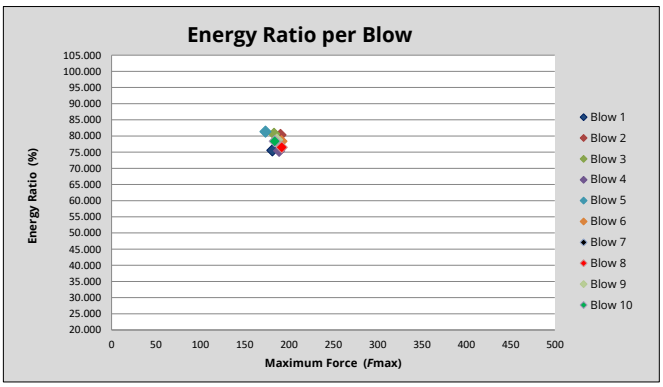
E_{theor} = **0.473** kN-m

Comments









Energy Ratio (Er) = $\frac{E_{meas}}{E_{theor}}$ **78.47%**

© COPYRIGHT 2023

Equipe SPT Analyzer Operator	Certificate prepared by	Certificate checked by	Certificate date
AF			19/06/2023

© Copyright 2023 **Equipe Group**, The Paddocks, Home Farm Offices, The Upton Estate, Banbury, Oxfordshire, OX15 6HU
Tel: +44 (0)1295 670990 Fax: +44 (0)1295 678232 Email: info@equipegroup.com

Appendix O BGS RADON GEOREPORT

GeoReports

British Geological Survey

ANGELA WALLIS
RSK ENVIRONMENT LTD
SPRING LODGE
172 CHESTER ROAD
HELSBY
FRODSHAM
WA6 0AR

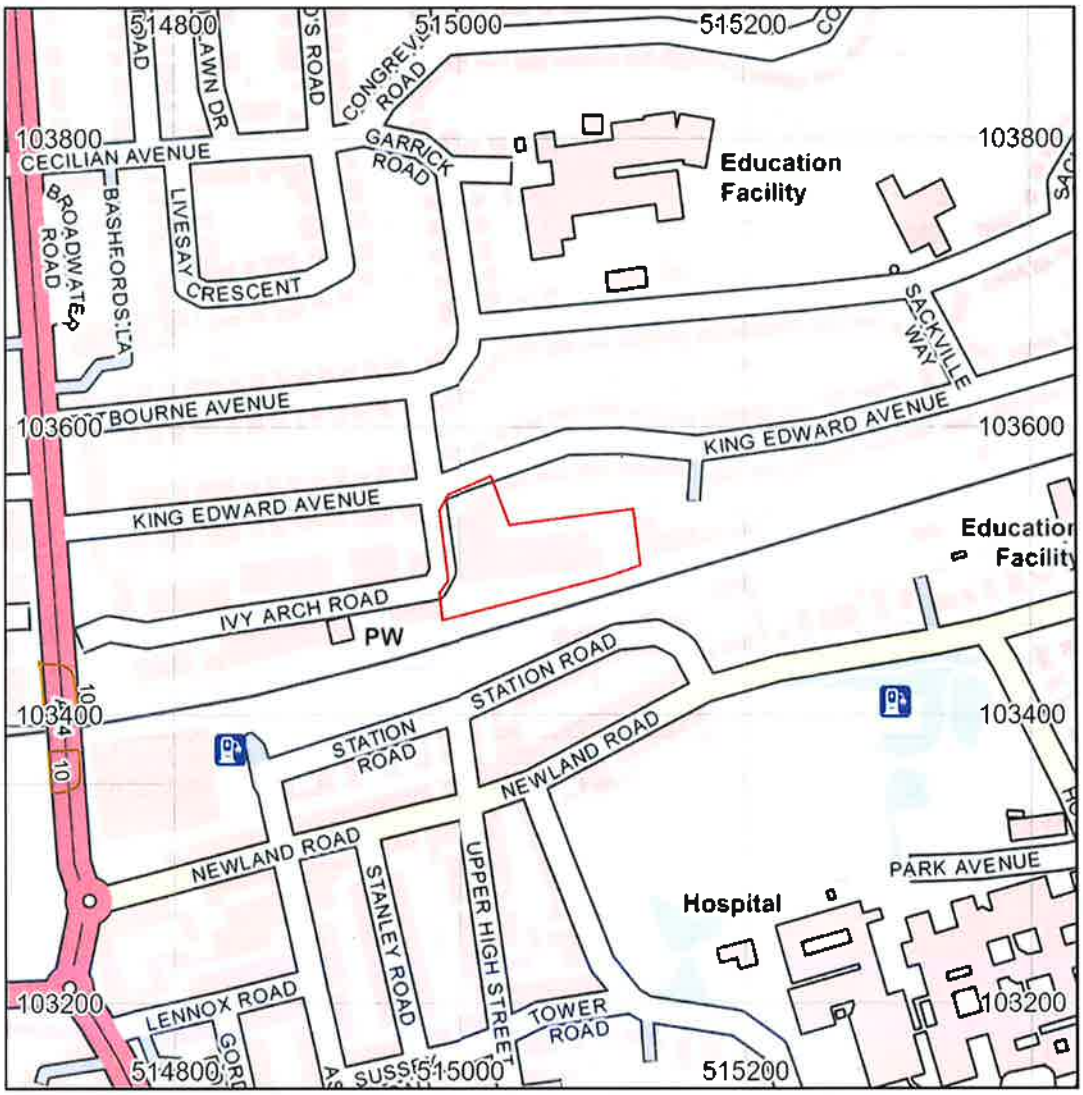
Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: ***BGS_339584/55911***

Client reference: 305407 Boxx Storage

Search location



Contains OS data © Crown Copyright and database right 2024. OS OpenMap Local: Scale: 1:5 000 (1cm = 50 m)
Search location indicated in red

This report describes a site located at National Grid Reference 515056, 103516. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.

© UKRI, 2024. All rights reserved.

Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2023 edition), which also provides guidance on what to do if the* result *indicates that protective measures are required.*

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2023 edition) Radon: Guidance on protective measures for new buildings?

BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

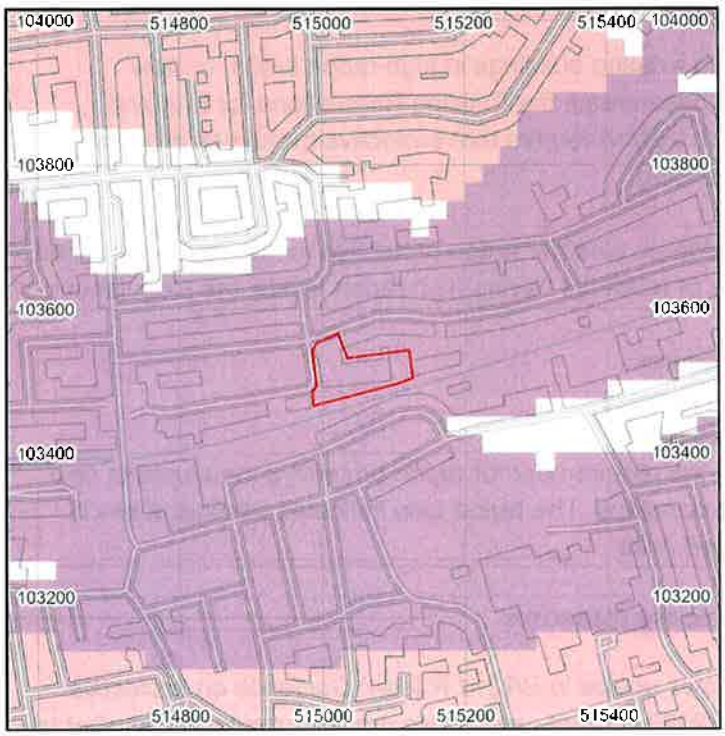
More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2023 Edition)*.

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The UKHSA provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

© UKRI, 2024. All rights reserved.

Radon Affected Area



% Homes estimated to be at or above the action level
0-1%
1-3%
3-5%
5-10%
10-30%
30-100%

Contains OS data © Crown Copyright and database right 2024
Scale: 1:10 000 (1cm = 100 m)
Search area indicated in red

Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be at or above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 3 TO 5% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

The UKHSA recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to be at or above the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a high radon level within the property; the only way to determine the radon level is to carry out a radon measurement.

© UKRI, 2024. All rights reserved.

The UKHSA advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels at or above the Action Level (200 Bq m^{-3}) should be remediated. Householders with levels between the Target Level (100 Bq m^{-3}) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. The UKHSA provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a "Radon Affected Area" as identified by the UKHSA. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were at or above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from the UKHSA at www.ukradon.org.

© UKRI, 2024. All rights reserved.

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level is at or above the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations 2017 require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293)**: Radon in the workplace.** BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.uk website: www.brebookshop.com

© UKRI, 2024. All rights reserved.

Contact Details

Keyworth Office
British Geological Survey
Environmental Science Centre
Nicker Hill
Keyworth
Nottingham
NG12 5GG
Tel: 0115 9363100
Email: enquiries@bgs.ac.uk

Wallingford Office
British Geological Survey
Maclean Building
Wallingford
Oxford
OX10 8BB
Email: enquiries@bgs.ac.uk

Edinburgh Office
British Geological Survey
Lyell Centre
Research Avenue South
Edinburgh
EH14 4AP
Tel: 0131 6671000
Email: enquiry@bgs.ac.uk

© UKRI, 2024. All rights reserved.

Terms and Conditions

General Terms & Conditions

This Report is supplied in accordance with the GeoReports Terms & Conditions available on the BGS website at https://shop.bgs.ac.uk/georeports and also available from the BGS Enquiry Service at the above address.

Important notes about this Report

- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

Copyright:
Copyright in materials derived from the British Geological Survey's work, is owned by UK Research and Innovation (UKRI) and/ or the authority that commissioned the work. You may not copy or adapt this publication, or provide it to a third party, without first obtaining UKRI's permission, but if you are a consultant purchasing this report solely for the purpose of providing advice to your own individual client you may incorporate it unaltered into your report to that client without further permission, provided you give a full acknowledgement of the source. Please contact the BGS Copyright Manager, British Geological Survey, Environmental Science Centre, Nicker Hill, Keyworth, Nottingham NG12 5GG. Telephone: 0115 936 3100.
© UKRI 2024 All rights reserved.

This product includes mapping data licensed from the Ordnance Survey® with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright 2024. All rights reserved. Licence number AC0000824781 EUL

Ordnance Survey

Report issued by
BGS Enquiry Service