



Contaminated Land Phase Two Further Intrusive Investigation for proposed residential development at Land Off Chapel Street, Manchester, M19 3QB.

Prepared for

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Introduction

Martin Environmental Solutions has been commissioned to carry out a further phase two intrusive investigation for a proposed residential development on land at 7-9 Chapel Street, Manchester, M19 3QB.

The Phase II Intrusive investigation follows previous phase I desk study report and initial Phase II investigation, report ref; 2492-1, and report ref 2761-1 produced by Martin Environmental Solutions, which identified some elevated levels of contaminants on site.

Further works have been undertaken on site and this report details the findings of additional investigations along with a remediation plan for the site.

The Site:

Site Address: 7-9 Chapel Street, Manchester, M19 3QB.

Grid reference: 387486; 394216

An aerial photograph of the site is included in Figure 1.

Current Site use:

At the time of the investigation the former industrial site buildings had been demolished and concrete hard standing removed from across the site.



Phase I and Initial Phase II findings

The site was first developed between 1849-1892 with a Mission Room in the centre of the site. By 1905-11 the site had been redeveloped with a smithy to the western section. By 1956 the site is an engineering works, later redeveloped between 1968-1981. Off site a reservoir was identified ~100m to the south of the site from 1893 until 1956 when the carpet mill was redeveloped into a saw mill and later a church. A house estate was erected on the northern section opposite the site in 2018. A large electricity sub-station was located to the south 40m away on Elbow Street from 1907.

The initial phase II investigation consisted of a series of trial holes across the site. These identified elevated levels of contaminations in five areas as indicated in the report and the plan in figure 2.

The Phase II additional Intrusive Investigation

A site visit was conducted on the 8th June 2024 to undertake an intrusive investigation. The site had been cleared at the time of the visit with previous buildings demolished. A sampling program of 18 sample locations, identified in Figure 2, spread across the site at approximately 10m centres were undertaken. Some of these were located adjacent to the previously sampled locations. Both rounds of sampling are shown on the plan in Figure 3.

The samples were sent to Chemtech environmental a UKAS and MCERTs laboratory and each analysed for heavy metals, Total Petroleum Hydrocarbons (TPH) and Polyaromatic Hydrocarbons (PAH), and Asbestos.

The demolition of the buildings on site had also seen the removal of the concrete hardstanding across the site.

Elevated levels of Arsenic were identified from the second round of monitoring in TP4a and TP11a, and in the first round at TP5a and 8a. TP4 & 5 were in similar locations to the southeast of the site.

In addition, elevated lead levels were encountered across the centre of the site (front to back) In TP5, 7-12 15 & 16 during the second investigation which mirrored the first round with the exception of the northwest corner where elevated lead was found in the first round.



Elevated Total Petroleum Hydrocarbons (TPH) were identified in TP6 during the first round and TP11, 13 & 15 in the second.

Elevated Polyaromatic Hydrocarbons levels were identified in TP1B, 3A, 5A and 6A (i.e. surface levels) during the first phase of investigation. During the second-round elevated levels were encountered in TP 4, 8-13, 16 & 18. These correspond to the first round plus some additional areas. Predominantly the central strip of the site to form the roadway and the western corners.

Further Investigations

Since the above results were obtained further made ground has been removed from site, particularly across the centre of the site covering the above TP 5, 7-12, 15-16 locations. Confirmation of site levels and foundation designs have been made.

On the 2nd September 2024 a further site visit was made, the aim to verify removal of additional contaminated material in the centre of the site. A total of eight samples were taken from across the side walls and base of the excavation. These were sent to Chemtech Environmental Limited laboratories for analysis. The samples were tested for the heavy metals, Polyaromatic hydrocarbons, total petroleum hydrocarbons and asbestos.

Anecdotally the made ground had been removed down to clean clay.

The full sampling results are presented in Appendix 1, the sampling locations in Figure 4. The results have been compared against the LQM/CIEH S4UL's for a residential without homegrown produce scenario & the C4SL value for Lead. Soil organic matter varied across the site from 2.4-5.5%.

Details of each trial pits, including photographs are shown in Appendix 2.

Material comprised of clay with gravel.

The results of the samples identified no asbestos fibres, no elevated levels of heavy metals, no elevated levels of total Petroleum Hydrocarbons.

No elevated levels of Polyaromatic hydrocarbons were identified with the exception of the very front entrance to the site when compared against the residential with home grown produce criterion. However, this area is to be the main entrance roadway in to



the site and the levels when compared to the commercial criteria are below the threshold. It is however recommended that the last section right up to the boundary be excavated at this located (~0.30m).

No odour was identified at the time of the visit. (previously odours had been identified in this area of hydrocarbon and an amount of tar impregnated wooden timbers was removed as part of the excavation of the area).

Conclusions & Recommendations

Ground gas

The preliminary desk study report identified infilled ground in the vicinity of the site from historically filled reservoirs, the last infilled in the 1950's, 70yrs previously. The report concluded that it was unlikely ground gas would still be produced after such an elapse of time and the risk from ground gas affecting the site was low. Additional research identified a recent planning application for a mill/engineering site to the south and on/adjacent to the former reservoir, redeveloped in the early 1950's. (Planning application 113618/FO/2016 & CDN/17/0092). Gas monitoring undertaken at this site identified no ground gas, no elevated levels of methane or carbon dioxide and a site characteristic gas situation of CS1 / Green was determined.

The phase I report for this development did however recommend, purely as a precaution, the inclusion of gas protection measures.

Foundation designs have now been confirmed. Strip and pile foundations are to be used for the proposed housing, with a solid, reinforced cast in situ concrete floor. A visqueen gas membrane will be included within the design as per the drawings in Appendix 3. Service Penetrations of the slab are to be kept to a minimum.

In accordance with BS8485:2015+A1:2019 the above design will result in a gas protection score of 3.5, sufficient for a CS2 level of protection.



On-site contamination

The above works have confirmed that the elevated pollutant levels within the central area of the site have been removed. This area represented the most heavily compacted section of the site. However, previous investigations have identified elevated levels of heavy metals and PAH's to the eastern and western sections of the site.

The site is underlaid by a layer of heavy clay, confirmed through the latest investigation running across the site, no ground water has been encountered during the subsequent investigations.

The previous recommendations to break any pollutant linkage still stand. Namely:

1. Ensure a minimum of 600mm clean material is provided in garden amenity areas, with a geotextile no dig layer below. 450mm clean material in other soft landscaping areas.
2. All services to be laid in trenches backfilled with clean imported material.
3. All mains water pipework to be of a Barrier pipework.

Verification of the installed pipework, clean backfill of service trenches the proposed gas membrane and the 600/450mm clean cover system will be required.

The proposed measures will break any source-pathway-receptor pollutant linkage between the residual contaminants and the receptors ensuring the site is safe and suitable for use.

A watching brief should be maintained throughout the construction of the new building and any signs of potential contamination found are fully investigated, with appropriate remedial action taken as necessary and the local planning authority informed of the findings.



Updated Conceptual Model

The table represents a basic conceptual model. It highlights the potential sources of pollutants identified from the gathered information, and potential pathways in which any contaminants could reach the identified receptors.

Pathway	Description	Identified sources	Receptor at risk	Probability	Consequence	Risk
1	Run off and seepage into groundwater from any spillages	Heavy metals, PAHs, TPH,	Watercourse/ Environment	Low likelihood	Mild	Low
2	Migration of gases into the building.	-	Future users	Unlikely	Medium	Low
3	Inhalation of gases/ vapours outside	-	Construction workers future users	Likely	Mild	Very Low
4	Inhalation of fine particles	Heavy metals, PAHs, TPH,	Construction workers future users	Likely Unlikely (cover system)	Mild Medium	Low Low
5	Direct ingestion of contaminated soil	Heavy metals, PAHs, TPH,	Construction workers	Low likelihood	Minor	Very Low
6	In-direct ingestion of contaminated soil	Heavy metals, PAHs, TPH,	-	Unlikely	Medium	Low
7	Absorption via direct dermal contact with contaminated soil	Heavy metals, PAHs, TPH,	Construction workers	Low likelihood	Minor	Very Low



		CONSEQUENCE			
		Severe	Medium	Mild	Minor
PROBABILITY	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very low Risk	Very low Risk

Figure 1 – Aerial Photograph





Figure 2 – Phase II Sampling Locations





Figure 3 – Phase 1 Intrusive Investigation Trail Pits Locations

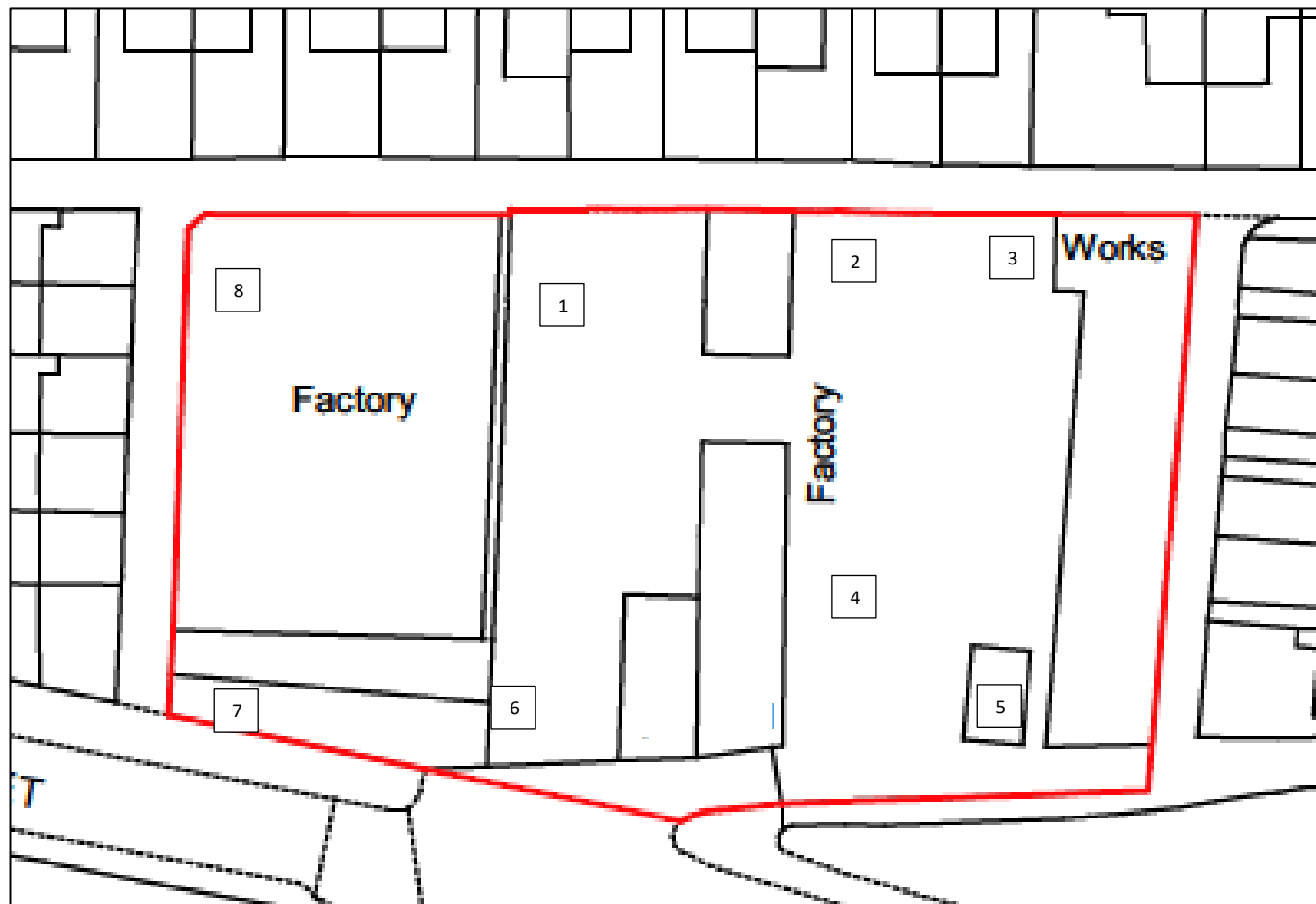
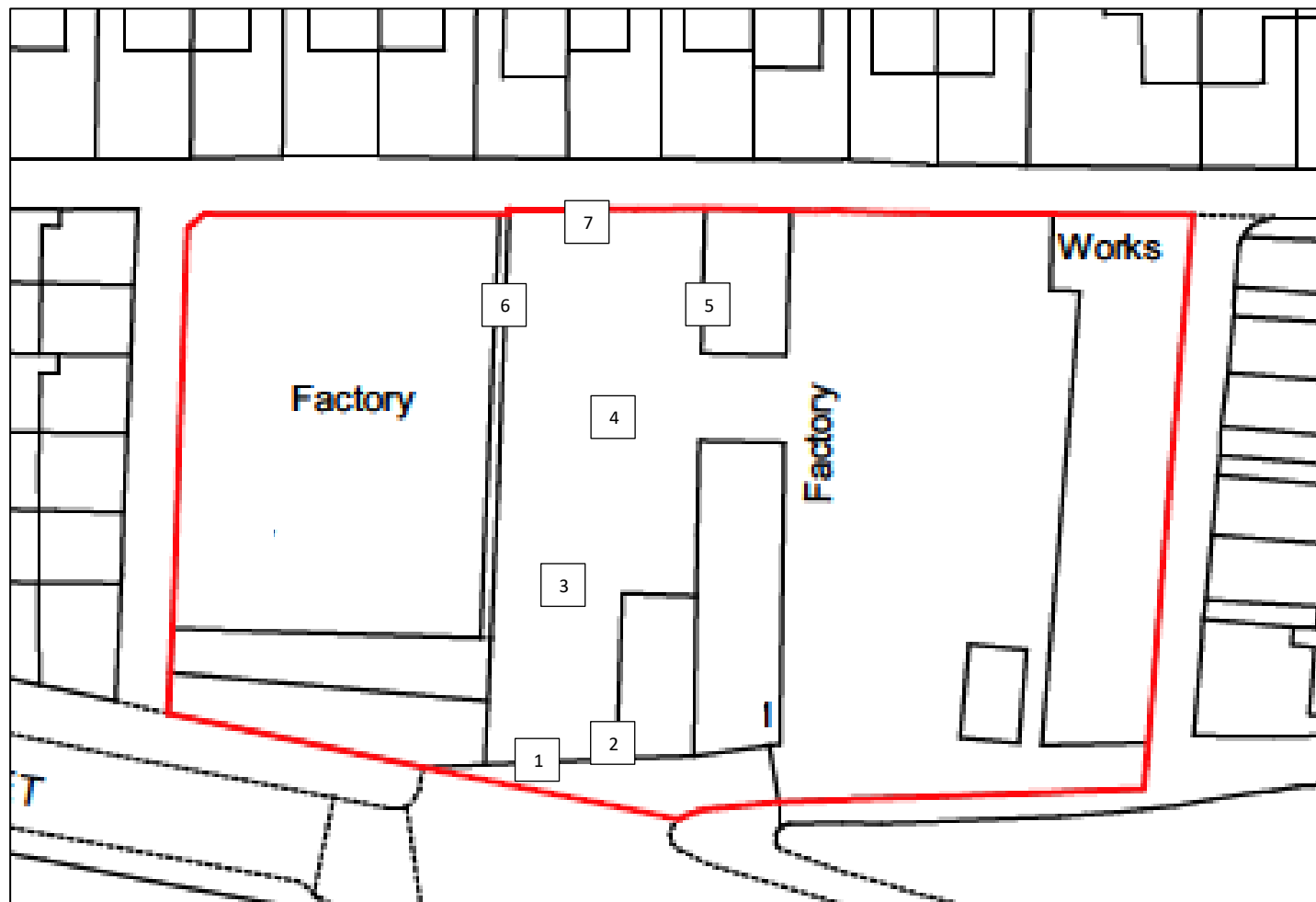




Figure 4 – Further Investigation Sampling Locations





Appendix 1 – Soil Sample Results



ANALYTICAL TEST REPORT

Contract no: 136428

Contract name: Chaple Street

Client reference: -

Clients name: Martin Environmental Solutions

Clients address: 14 Hermitage Way
Lytham
St Annes
FY8 4FX

Samples received: 05 September 2024

Analysis started: 05 September 2024

Analysis completed: 16 September 2024

Report issued: 16 September 2024

Key

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

Approved by:

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SAMPLE INFORMATION

MCERTS (Soils):

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

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
136428-1	SP1	-	Clay	-	-	12.5
136428-2	SP2	-	Clay	-	-	14.8
136428-3	SP3	-	Clay	-	-	12.8
136428-4	SP4	-	Clay	-	-	9.2
136428-5	SP5	-	Clay	-	-	10.6
136428-6	SP6	-	Clay with Gravel	-	-	11.6
136428-7	SP7	-	Clay	-	-	27.5



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SOILS

Lab number			136428-1	136428-2	136428-3	136428-4	136428-5	136428-6
Sample id			SP1	SP2	SP3	SP4	SP5	SP6
Depth (m)			-	-	-	-	-	-
Date sampled			02/09/2024	02/09/2024	02/09/2024	02/09/2024	02/09/2024	02/09/2024
Test	Method	Units						
Arsenic (total)	CE264 ^U	mg/kg As	6.7	9.6	7.0	4.2	5.2	10.2
Cadmium (total)	CE264 ^M	mg/kg Cd	<1.6	1.7	<1.6	<1.6	<1.6	2.0
Chromium (total)	CE264 ^U	mg/kg Cr	45.0	49.8	49.9	47.2	48.6	60.8
Copper (total)	CE264 ^M	mg/kg Cu	23.6	31.1	32.2	22.7	21.3	242.0
Lead (total)	CE264 ^U	mg/kg Pb	20.6	47.6	42.1	12.4	22.6	109.9
Mercury (total)	CE264 ^U	mg/kg Hg	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Nickel (total)	CE264 ^M	mg/kg Ni	25.0	34.0	30.5	26.8	25.4	246.0
Selenium (total)	CE264	mg/kg Se	<3	<3	<3	<3	<3	<3
Zinc (total)	CE264 ^M	mg/kg Zn	52.3	292.9	77.0	51.8	54.0	201.9
Total Organic Carbon (TOC)	CE197	% w/w C	1.6	2.2	3.2	1.4	1.6	1.5
Estimate of OMC (calculated from TOC)	CE197	% w/w	2.7	3.7	5.5	2.4	2.7	2.6
PAH								
Naphthalene	CE087 ^M	mg/kg	1.53	0.27	<0.02	<0.02	0.16	0.04
Acenaphthylene	CE087 ^M	mg/kg	<0.02	0.05	<0.02	<0.02	0.05	0.02
Acenaphthene	CE087 ^M	mg/kg	1.05	0.34	0.04	0.04	0.39	0.03
Fluorene	CE087 ^U	mg/kg	0.80	0.31	<0.02	<0.02	0.35	0.04
Phenanthrene	CE087 ^M	mg/kg	10.30	2.04	0.10	0.03	1.99	0.31
Anthracene	CE087 ^U	mg/kg	1.74	0.59	0.03	<0.02	0.42	0.08
Fluoranthene	CE087 ^M	mg/kg	11.81	2.75	0.22	0.03	2.79	0.46
Pyrene	CE087 ^M	mg/kg	9.77	2.63	0.22	0.03	2.68	0.45
Benzo(a)anthracene	CE087 ^U	mg/kg	5.04	1.27	0.14	0.03	1.26	0.27
Chrysene	CE087 ^M	mg/kg	5.81	1.30	0.14	<0.03	1.38	0.29
Benzo(b)fluoranthene	CE087 ^M	mg/kg	4.76	1.14	0.14	<0.02	1.22	0.29
Benzo(k)fluoranthene	CE087 ^M	mg/kg	1.81	0.46	0.06	<0.03	0.49	0.12
Benzo(a)pyrene	CE087 ^U	mg/kg	3.74	1.14	0.13	<0.02	1.08	0.25
Indeno(123cd)pyrene	CE087 ^M	mg/kg	1.49	0.48	0.06	<0.02	0.50	0.14
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.48	0.15	<0.02	<0.02	0.14	0.04
Benzo(ghi)perylene	CE087 ^M	mg/kg	1.97	0.61	0.08	<0.02	0.65	0.20
PAH (total of USEPA 16)	CE087	mg/kg	62.1	15.5	1.36	<0.34	15.6	3.03



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SOILS

Lab number			136428-1	136428-2	136428-3	136428-4	136428-5	136428-6
Sample id			SP1	SP2	SP3	SP4	SP5	SP6
Depth (m)			-	-	-	-	-	-
Date sampled			02/09/2024	02/09/2024	02/09/2024	02/09/2024	02/09/2024	02/09/2024
Test	Method	Units						
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	<0.6	<0.6	2	<0.6	<0.6	1
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	<1	<1	7	<1	<1	3
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	<1.5	<1.5	27	<1.5	<1.5	10
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	<4.5	<4.5	44	<4.5	<4.5	29
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	<2	<2	11	<2	<2	9
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
EPH Aliphatic (>C16-C35)	CE250	mg/kg	<3	<3	<3	<3	<3	16
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	2
Subcontracted Analysis								
Asbestos (qualitative)	\$	-	NAD	NAD	NAD	NAD	NAD	NAD



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SOILS

Lab number			136428-7
Sample id			SP7
Depth (m)			-
Date sampled			02/09/2024
Test	Method	Units	
Arsenic (total)	CE264 ^U	mg/kg As	6.6
Cadmium (total)	CE264 ^M	mg/kg Cd	<1.6
Chromium (total)	CE264 ^U	mg/kg Cr	56.6
Copper (total)	CE264 ^M	mg/kg Cu	30.5
Lead (total)	CE264 ^U	mg/kg Pb	29.2
Mercury (total)	CE264 ^U	mg/kg Hg	<0.7
Nickel (total)	CE264 ^M	mg/kg Ni	35.9
Selenium (total)	CE264	mg/kg Se	<3
Zinc (total)	CE264 ^M	mg/kg Zn	76.6
Total Organic Carbon (TOC)	CE197	% w/w C	2.4
Estimate of OMC (calculated from TOC)	CE197	% w/w	4.1
PAH			
Naphthalene	CE087 ^M	mg/kg	<0.02
Acenaphthylene	CE087 ^M	mg/kg	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02
Phenanthrene	CE087 ^M	mg/kg	0.03
Anthracene	CE087 ^U	mg/kg	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.03
Pyrene	CE087 ^M	mg/kg	0.03
Benzo(a)anthracene	CE087 ^U	mg/kg	<0.02
Chrysene	CE087 ^M	mg/kg	<0.03
Benzo(b)fluoranthene	CE087 ^M	mg/kg	<0.02
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.03
Benzo(a)pyrene	CE087 ^U	mg/kg	<0.02
Indeno(123cd)pyrene	CE087 ^M	mg/kg	<0.02
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	<0.34



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SOILS

Lab number			136428-7
Sample id			SP7
Depth (m)			-
Date sampled			02/09/2024
Test	Method	Units	
TPH			
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	<0.6
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	<1
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	<1.5
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	<4.5
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	<2
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	<1
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<0.5
EPH Aliphatic (>C16-C35)	CE250	mg/kg	<3
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<0.5
Subcontracted Analysis			
Asbestos (qualitative)	\$	-	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE264	Arsenic (total)	Aqua Regia Extraction, ICPOES	Dry	U	1.8	mg/kg As
CE264	Cadmium (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cd
CE264	Chromium (total)	Aqua Regia Extraction, ICPOES	Dry	U	2	mg/kg Cr
CE264	Copper (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cu
CE264	Lead (total)	Aqua Regia Extraction, ICPOES	Dry	U	2.3	mg/kg Pb
CE264	Mercury (total)	Aqua Regia Extraction, ICPOES	Dry	U	0.7	mg/kg Hg
CE264	Nickel (total)	Aqua Regia Extraction, ICPOES	Dry	M	2.1	mg/kg Ni
CE264	Selenium (total)	Aqua Regia Extraction, ICPOES	Dry	U	3	mg/kg Se
CE264	Zinc (total)	Aqua Regia Extraction, ICPOES	Dry	M	4	mg/kg Zn
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.016	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.015	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.013	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.013	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.014	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.017	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.017	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.016	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.012	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.028	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.025	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.019	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.019	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.017	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.019	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.028	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE250	EPH Aromatic (>EC10-EC12)	Solvent extraction, GCxGC-FID	As received		0.6	mg/kg
CE250	EPH Aromatic (>EC12-EC16)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC16-EC21)	Solvent extraction, GCxGC-FID	As received		1.5	mg/kg
CE250	EPH Aromatic (>EC21-EC35)	Solvent extraction, GCxGC-FID	As received		4.5	mg/kg
CE250	EPH Aromatic (>EC35-EC44)	Solvent extraction, GCxGC-FID	As received		2	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE250	EPH Aliphatic (>C10-C12)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aliphatic (>C12-C16)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
CE250	EPH Aliphatic (>C16-C35)	Solvent extraction, GCxGC-FID	As received		3	mg/kg
CE250	EPH Aliphatic (>C35-C44)	Solvent extraction, GCxGC-FID	As received		0.5	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-



Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

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

Key

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

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
136428-1	SP1	-	N	
136428-2	SP2	-	Y	PAH, VPH (IC)
136428-3	SP3	-	N	
136428-4	SP4	-	N	
136428-5	SP5	-	N	
136428-6	SP6	-	N	
136428-7	SP7	-	N	



Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Soil/Solid samples will be disposed of 4 weeks from initial receipt unless otherwise agreed.

Waters and leachate samples will be disposed of 2 weeks from report issue unless otherwise agreed.

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132693/469907-0

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones, where applicable.

Moisture Content Calculated on a Wet Weight basis



Lab number			136428-	136428-	136428-	136428-	136428-	136428-	136428-
Sample id			SP1	SP2	SP3	SP4	SP5	SP6	SP7
Depth (m)			-	-	-	-	-	-	-
Date sampled			02/09/2024	02/09/2024	02/09/2024	02/09/2024	02/09/2024	02/09/2024	02/09/2024
Test	Method	Units							
Arsenic (total)	CE264U	mg/kg As	6.7	9.6	7.0	4.2	5.2	10.2	6.6
Cadmium (total)	CE264M	mg/kg Cd	<1.6	1.7	<1.6	<1.6	<1.6	2.0	<1.6
Chromium (total)	CE264U	mg/kg Cr	45.0	49.8	49.9	47.2	48.6	60.8	56.6
Copper (total)	CE264M	mg/kg Cu	23.6	31.1	32.2	22.7	21.3	242.0	30.5
Lead (total)	CE264U	mg/kg Pb	20.6	47.6	42.1	12.4	22.6	109.9	29.2
Mercury (total)	CE264U	mg/kg Hg	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Nickel (total)	CE264M	mg/kg Ni	25.0	34.0	30.5	26.8	25.4	246.0	35.9
Selenium (total)	CE264	mg/kg Se	<3	<3	<3	<3	<3	<3	<3
Zinc (total)	CE264M	mg/kg Zn	52.3	292.9	77.0	51.8	54.0	201.9	76.6
Total Organic Carbon (TOC)	CE197	% w/w C	1.6	2.2	3.2	1.4	1.6	1.5	2.4
Estimate of OMC (calculated from TOC)	CE197	% w/w	2.7	3.7	5.5	2.4	2.7	2.6	4.1
PAH									
Naphthalene	CE087 M	mg/kg	1.53	0.27	<0.02	<0.02	0.16	0.04	<0.02
Acenaphthylene	CE087 M	mg/kg	<0.02	0.05	<0.02	<0.02	0.05	0.02	<0.02
Acenaphthene	CE087 M	mg/kg	1.05	0.34	0.04	0.04	0.39	0.03	<0.02
Fluorene	CE087 U	mg/kg	0.80	0.31	<0.02	<0.02	0.35	0.04	<0.02
Phenanthrene	CE087 M	mg/kg	10.30	2.04	0.10	0.03	1.99	0.31	0.03
Anthracene	CE087 U	mg/kg	1.74	0.59	0.03	<0.02	0.42	0.08	<0.02
Fluoranthene	CE087 M	mg/kg	11.81	2.75	0.22	0.03	2.79	0.46	0.03
Pyrene	CE087 M	mg/kg	9.77	2.63	0.22	0.03	2.68	0.45	0.03
Benzo(a)anthracene	CE087 U	mg/kg	5.04	1.27	0.14	0.03	1.26	0.27	<0.02
Chrysene	CE087 M	mg/kg	5.81	1.30	0.14	<0.03	1.38	0.29	<0.03
Benzo(b)fluoranthene	CE087 M	mg/kg	4.76	1.14	0.14	<0.02	1.22	0.29	<0.02
Benzo(k)fluoranthene	CE087 M	mg/kg	1.81	0.46	0.06	<0.03	0.49	0.12	<0.03
Benzo(a)pyrene	CE087 U	mg/kg	3.74	1.14	0.13	<0.02	1.08	0.25	<0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	1.49	0.48	0.06	<0.02	0.50	0.14	<0.02
Dibenz(ah)anthracene	CE087 M	mg/kg	0.48	0.15	<0.02	<0.02	0.14	0.04	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	1.97	0.61	0.08	<0.02	0.65	0.20	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	62.1	15.5	1.36	<0.34	15.6	3.03	<0.34



TPH									
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	<0.6	<0.6	2	<0.6	<0.6	1	<0.6
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	<1	<1	7	<1	<1	3	<1
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	<1.5	<1.5	27	<1.5	<1.5	10	<1.5
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	<4.5	<4.5	44	<4.5	<4.5	29	<4.5
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	<2	<2	11	<2	<2	9	<2
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	<1	<1	<1	<1	<1	<1	<1
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
EPH Aliphatic (>C16-C35)	CE250	mg/kg	<3	<3	<3	<3	<3	16	<3
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5
Subcontracted Analysis									
Asbestos (qualitative)	\$	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Form of Asbestos	\$	-							

Appendix 2 – Sampling logs

SP1 – North east rear corner, proposed rear garden



SP 1 – Entrance to site (south boundary)

Excavation 085m

Sample taken from wall clay and gravel.

SP2 – Middle northeast boundary proposed rear garden



SP 2 – Southern boundary, right of gate, within foundations of previous building.

Excavation to 1.9m, evidence of brick wall and layer of made ground. Gravel and clay

Sampe taken from above wall. clay seen below wall.

SP3 – Southeast corner of site proposed rear garden



SP 3 – 10m into the site in-line with entrance gate., base of excavation, 1.2m bgl.

Clay.

SP4 – Centre of site, original roadway connecting the two halves and between the buildings.



SP4 – Centre of site, original roadway connecting the two halves and between the buildings.

Sample from base of excavation, 0.7m clay and gravel.

SP5 – Right Hand side of excavation, 6m from the rear boundary



SP 5 – Right hand side of excavation, within the wall.

1.1m to bottom, 6m from the rear boundary.

Clay ad gravel.

SP6 – Left Hand side of excavation, 6m from the rear boundary



SP 6 – left hand side of excavation, in line with edge of gate, 6m from rear boundary

1.05m to base

Sample taken from the wall.

Gravel, sand clay.

SP7 – Along northern boundary in-line with entrance gate

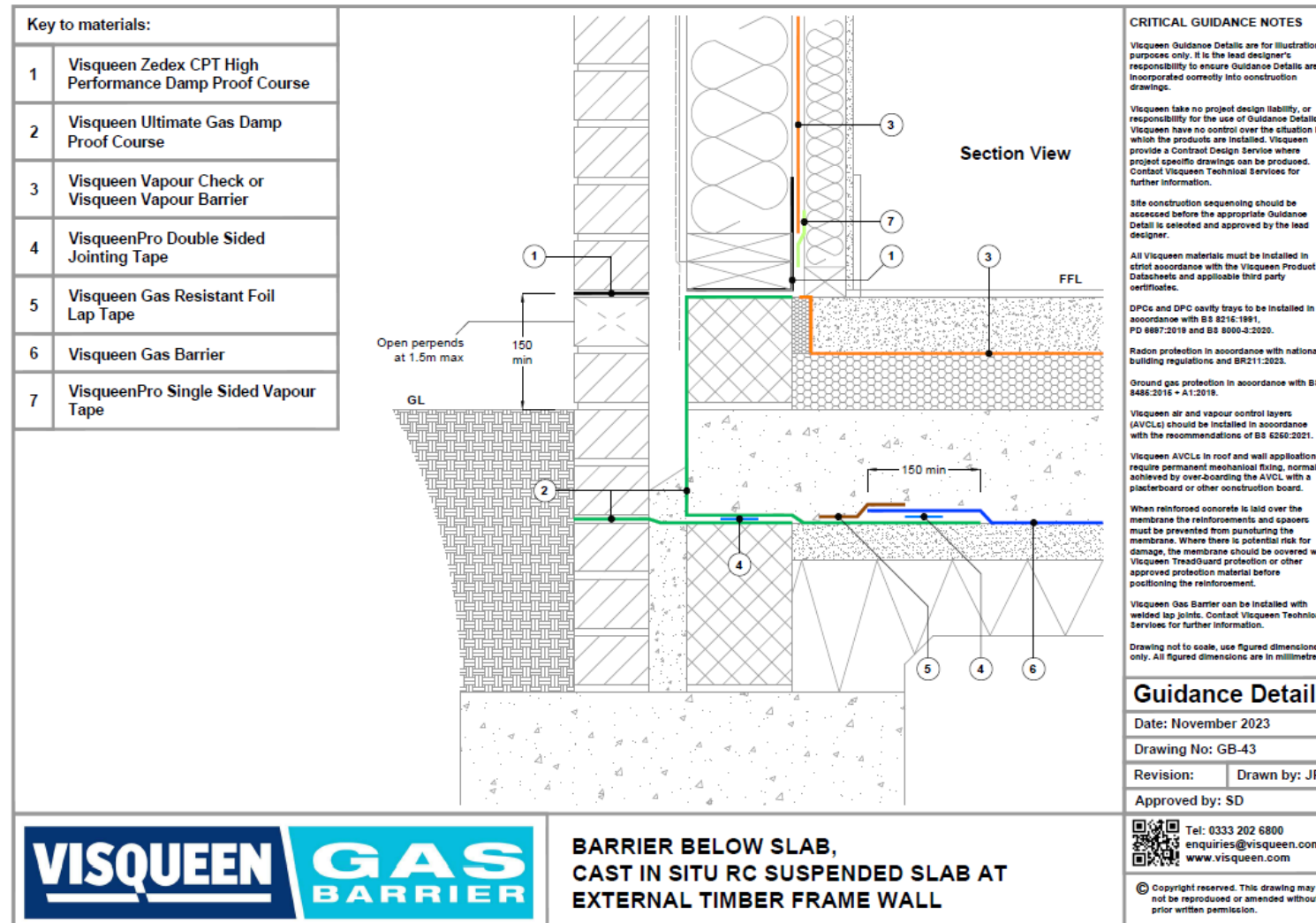


SP7 –northern boundary

Sample from base of excavation, clay.



Appendix 3 – Foundation details



**BARRIER BELOW SLAB,
CAST IN SITU RC SUSPENDED SLAB AT
EXTERNAL TIMBER FRAME WALL**



Appendix 4 – Conceptual Model Risk Assessment

A Preliminary Risk Assessment is usually undertaken as part of a desk study, outlines potential risks posed by potential contamination to all receptors by defining plausible “pollution linkages” and developing a preliminary conceptual model (PCM).

The purpose of this model is to define all possible complete pollution linkages, where the requisite source – pathway – target elements are present, and these elements being defined as:

- a contaminant (source) is a hazardous substance or agent, present at levels that have the potential to cause harm or damage a receptor
- a pathway is the means by or through which a contaminant comes into contact with, or otherwise affects, the receptor
- a receptor (target) is an entity (human being, aquatic environment, flora and fauna etc) that is vulnerable to the adverse effects of the contaminant

This relationship is termed a “pollution linkage”. It should be recognised that for a health or environmental risk to exist, all three elements of the relationship or linkage must be present, i.e.

- if there is no contaminant, or contaminant present at levels below those considered to be harmful or damaging to a receptor, then there can be no adverse effect on a receptor
- if there is no receptor present that can be adversely affected by a contaminant, no harm or damage can arise
- even where both a contaminant and a receptor are present, no harm or damage will occur if there is no pathway by or through which a linkage between the two can be established

The absence of one or more of each component (source, pathway, receptor) would prevent a pollutant linkage being established and there would be no significant environmental risk.



Consequence of Risk

CLASSIFICATION	DEFINITION	EXAMPLES
Severe	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Short term risk of pollution of sensitive (H1/H2) water resource. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem. Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of List I and II substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	Elevated concentrations which could result in "significant harm" or "significant possibility of significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Pollution of a highly sensitive (H1/H2) water resource. Significant damage/change to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.
Mild	Exposure to human health unlikely to lead to "significant harm". Equivalent to EA Category 3 pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Pollution of moderately sensitive (M1/M2) water resources. Minor or short-lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.



	Significant damage to crops, buildings, structures and services ("significant harm" as defined in Circular 1/2006).	
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services. Pollution of low sensitive (L1/L2) water resource. Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.



Probability of Risk Occurring

CLASSIFICATION	DEFINITION	EXAMPLES
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.	a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden. b) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space. b) Ground/groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.
Low Likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.	a) Elevated concentrations of toxic contaminants are present in soils at depths > 1m in a residential garden, or 0.5-1.0m in public open space. b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	a) Elevated concentrations of toxic contaminants are present below hardstanding. b) Light industrial unit <10 yrs old containing a double skinned UST with annual integrity testing results available.

Calculation of Risk

		CONSEQUENCE			
		Severe	Medium	Mild	Minor
PROBABILITY	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very low Risk	Very low Risk

