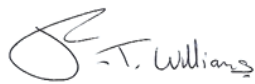


Contamination Assessment Report

Kings Pond, Alton, Hampshire, GU34 2SZ

On behalf of Alton Town Council

Report Reference: GWPR5623/CAR/October 2022			Status: Final
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EXECUTIVE SUMMARY	
PROPOSED DEVELOPMENT	At the time of reporting, November 2023, it was understood that the proposed development comprised dredging works of the underlying soil beneath the pond waters.
GEOLOGY AND HYDROGEOLOGY	The British Geological Survey Solid and Drift Geology Map for the Alton area (Alresford Sheet No.300) revealed that the site was underlain by superficial Alluvial and River Terrace Deposits underlain by bedrock deposits of the Zig-Zag Chalk Formation. An area of Made Ground (Undivided) was noted within the sites boundary however formed an area to the south, not beneath the water feature. It was understood this Made Ground (Undivided) were deposits placed on-site from previous dredging works. The DEFRA online maps indicated that the site was located on a Secondary (A) Aquifer associated with the superficial River Terrace Deposits underlain by a Principal Aquifer comprising the Zig-Zag Chalk Formation. Examination of the Environment Agency records showed that the site fell within a Environment Agency Flood Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.
CONTAMINATION	Asbestos Asbestos was identified within one sample (TP05/0.50m) as “Small ACM fragment typical of an asbestos – Amosite”. A Quantification was undertaken on the sample and indicated that asbestos was present at <0.001%. Benzo(a)pyrene Elevated levels of Benzo(a)pyrene were noted within the samples collected at TP03/1.20m bwl and TP05/0.50m bwl. Benzo(b)fluoranthene Elevated levels of Benzo(b)fluoranthene were noted within the samples collected at TP03/1.20m bwl and TP05/0.50m bwl. Dibenzo(a,h)anthracene Elevated levels of Dibenzo(a,h)anthracene were noted within the sample collected at TP03/1.20m bwl. Benzo(b)fluoranthene Elevated levels of Benzo(b)fluoranthene was noted within the surface water sample collected at the exit point of the feature. Benzo(k)fluoranthene Elevated levels of Benzo(k)fluoranthene was noted within the surface water sample collected at the exit point of the feature. Fluoranthene Elevated levels of Benzo(k)fluoranthene was noted within the surface water samples collected at the entrance and exit points of the feature.

1. INTRODUCTION

1.1. General

Ground and Water Limited were instructed by Alton Town Council on the 28th September 2023 to conduct a Contamination Assessment Report on the site at Kings Pond, Alton, Hampshire, GU34 2SZ. The scope of the investigation was detailed within the fee proposal GW-2365, dated the 25th September 2023.

1.2. Aims of the Investigation

The aim of this report was to supply the client and their designers with information regarding any potential contamination of the soils beneath the pond and the quality of the surface water entering/exiting the feature.

The techniques adopted for the investigation were chosen considering the requirements of the client, anticipated ground conditions, and bearing in mind the nature of the site, limitations to site access and other logistical limitations.

1.3. Conditions and Limitations

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

1.4. Technical Glossary

Generic technical terms and their description can be viewed within the glossary provided within Appendix B.

2. SITE SETTING

2.1. Site Location

The site comprised a ~19,272m² irregular-shaped plot of land, orientated in a north-east to south-west direction, along the north-western side of Ashdell Road. The site was located within the central portion of Alton, East Hampshire.

The national grid reference for the centre of the site was approximately SU 72292 39466. A site location plan is given within Figure 1.

2.2. Site Description

At the time of site works, October 2022, the site comprised the Kings Pond feature that formed the majority of the site. Surrounding the pond on all boundary sides was associated areas of open grassland that also contained a circular tarmac walkway. A car park area was located to the north-east extent of the site.

2.3. Proposed Development

At the time of reporting, November 2023, it was understood that the proposed development comprised dredging works of the underlying soil beneath the pond waters.

2.4. Geology

The British Geological Survey Solid and Drift Geology Map for the Alton area (Alresford Sheet No.300) revealed that the site was underlain by superficial Alluvial and River Terrace Deposits underlain by bedrock deposits of the Zig-Zag Chalk Formation. An area of Made Ground (Undivided) was noted within the sites boundary however formed an area to the south, not beneath the water feature. It was understood this Made Ground (Undivided) were deposits placed on-site from previous dredging works.

2.5. Hydrogeology and Hydrology

The DEFRA online maps indicated that the site was located on a Secondary (A) Aquifer associated with the superficial River Terrace Deposits underlain by a Principal Aquifer comprising the Zig-Zag Chalk Formation.

Examination of the Environment Agency records showed that the site fell within a Environment Agency Flood Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

3. SITE WORKS

3.1. Scope of Works

Site works were undertaken on the 6th November 2023 and comprised the recovery of soil samples from the underlying pond bed from five different locations (TP01 – TP05) across the pond. Two surface water samples were also collected from the entrance and exit of the water feature.

The location of the trial hole locations can be seen within Figure 2.

3.2. Sampling Procedures

A selection of samples were despatched to a laboratory for chemical testing purposes.

4. ENCOUNTERED GROUND CONDITIONS

4.1. Soil Conditions

The trial holes were logged by a Ground and Water Limited representative, generally in accordance with BS EN 14688 'Geotechnical Investigation and Testing – Identification and Classification of Soil'.

The ground conditions encountered within the trial holes constructed on the site did generally conform to that anticipated from examination of the geology map. Alluvial deposits were noted for the whole depth of the trial pits.

The succession of conditions and description of soils encountered in the trial holes in descending order is tabulated below.

Summary of Strata Encountered (BH01 – BH02)			
Strata	Top Depth (m bwl)	Base Depth (m bwl)	Thickness (m)
ALLUVIUM: Black to dark brown SILT with frequent organic detritus.	0.40 – 1.10	0.50 – 1.20	0.10

A trial hole location plan can also be viewed within Figure 2.

4.2. Obstructions

No artificial or natural sub-surface obstructions were noted during construction of the trial holes.

5. CONTAMINATION RISK ASSESSMENT

Chemical laboratory testing, scheduled by Ground and Water Limited, and carried out by ALS Laboratories UK Limited, was undertaken on five samples of the Alluvium. The samples were subjected to a combination of analysis that comprised:

- Asbestos screen;
- Semi-metals and heavy metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc;
- Polycyclic Aromatic Hydrocarbons (PAH's) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene;
- Speciated TPH including full aliphatic/aromatic split; and
- BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs).

A breakdown of the number of tests undertaken for each determinand is discussed in further sections. The chemical laboratory results are presented in Appendix C.

5.1.1. Soil Assessment Criteria and Results

At the time of reporting, November 2023, it was understood that the proposed development comprised dredging works of the underlying soil beneath the pond waters.

Based on the proposed development, the results of the chemical laboratory testing were compared to the Generic Assessment Criteria (GAC) for a ***“Public Open Space: Near Residential Housing”*** land-use scenario, as this was considered the most appropriate land-use scenario.

The definition for the Generic Assessment Criteria (GAC) for a ***“Public Open Space: Near Residential Housing”*** is as follows:

“Includes the predominantly grassed areas adjacent to high density housing, the central green area on many 1930’s – 1970’s housing estates, and smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soils with planting. It is assumed that the close proximity to the place of residence will allow tracking back of soil to occur.”

Where a contaminant of concern’s GAC varies according to the Soil’s Organic Matter (SOM), the SOM recorded for each uncontaminated soil type was used to derive the appropriate GAC for each soil type. A SOM value of 1%, the most conservative value, was utilised.

A summary of the analytical results and the comparison to the determinands adopted screening value are presented in the table below and overleaf.

Soil Contamination Test Results and Screening Values					
Determinand	Number of Samples	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Was the adopted screening value exceeded for relevant land-use scenario?
INORGANICS					
Asbestos	5	ND	Detected	ND	Yes – See Below
Cyanide (total)	5	<1	<1	24	No
Phenols	5	<0.035	<0.035	760	No
METALS					
Arsenic	5	4.03	7.91	79	No
Boron	5	<1	1.47	21000	No
Cadmium	5	0.556	1.32	120	No
Chromium (III)	5	17.2	32	1500	No
Chromium (Hexavalent)	5	<0.6	<0.6	8	No
Copper	5	47.9	88.2	12000	No
Lead	5	165	446	630	No
Mercury	5	0.151	0.83	16	No
Nickel	5	11.1	19.4	230	No
Selenium	5	2.37	2.93	1100	No
Vanadium	5	15.5	25.8	2000	No
Zinc	5	325	705	81000	No
TOTAL PETROLEUM HYDROCARBONS (TPHs)					
Aliphatic >C5 - C6	2	<0.01	<0.01	570000	No
Aliphatic >C6 - C8	2	<0.01	<0.01	600000	No
Aliphatic >C8 - C10	2	<0.01	<0.01	13000	No
Aliphatic >C10 - C12	2	<1	<1	13000	No
Aliphatic >C12 - C16	2	<1	2.21	13000	No
Aliphatic >C16 - C21	2	31.3	75.2	250000	No
Aliphatic >C21 - C35	2	207	254		
Aliphatic >C35 – C44	2	33.8	37.6	250000	No
Aromatic >C5 - C7	2	<0.01	<0.01	56000	No
Aromatic >C7 - C8	2	<0.01	<0.01	56000	No
Aromatic >C8 - C10	2	<0.01	<0.01	5000	No
Aromatic >C10 - C12	2	<1	<1	5000	No
Aromatic >C12 - C16	2	<1	1.21	5100	No
Aromatic >C16 - C21	2	20.6	41.7	3800	No
Aromatic >C21 - C35	2	298	385	3800	No
Benzene	2	<0.02	<0.02	72	No
Toluene	2	<0.02	<0.02	56000	No
Ethylbenzene	2	<0.02	<0.02	24000	No
m,p-Xylene	2	<0.04	<0.04	41000	No
o-Xylene	2	<0.04	<0.04	41000	No
POLYCYCLIC-AROMATIC HYDROCARBONS					
Acenaphthene	2	<0.08	0.392	15000	No
Acenaphthylene	2	<0.12	0.906	15000	No
Anthracene	2	<0.16	1.72	74000	No
Benzo(a)anthracene	2	2.92	9.27	29	No
Benzo(a)pyrene	2	4.47	14.1	5.7	Yes – See Below
Benzo(b)fluoranthene	2	5.08	16.3	7.1	Yes – See Below
Benzo(ghi)perylene	2	3.69	10.5	640	No

Soil Contamination Test Results and Screening Values					
Determinand	Number of Samples	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Adopted Screening Value (mg/kg)	Was the adopted screening value exceeded for relevant land-use scenario?
Benzo(k)fluoranthene	2	2.2	6.23	190	No
Chrysene	2	3.44	9.63	57	No
Dibenzo(a,h)anthracene	2	<0.23	1.73	0.57	Yes – See Below
Fluoranthene	2	4.98	17.9	3100	No
Fluorene	2	<0.1	0.457	9900	No
Indeno(1,2,3-cd)pyrene	2	3.09	8.89	82	No
Naphthalene	2	<0.09	<0.09	4900	No
Phenanthrene	2	1.19	4.33	3100	No
Pyrene	2	4.39	15.5	7400	No
MARKER FOR VOLATILE ORGANIC COMPOUND					
Methyl tert-butyl ether (MTBE)	2	<0.01	<0.01	73	No
ORGANIC MATTER					
Total Organic Carbon	5	7.01%	13.50%	N/A	N/A
Soil Organic Matter	5	12.10%	23.30%	N/A	N/A
Loss On Ignition	1	-	18.40%	N/A	N/A
The derivation of the Soil Assessment Criteria used within this report can be seen within Appendix D. The soil concentrations were typically compared to the LQM/CIEH Suitable for Use Levels (S4UL) (2014), based upon the assumption of 1% soil organic matter. A screening value for Lead is based on the Category 4 Screening Levels (C4SLs). Where no S4UL or C4SL is available for Cyanide, a SoBRA acute GAC is assigned. Where no S4UL or C4SL is available for MTBE, a CL:AIRE 2010 GAC is assigned. Where exceedances are noted, the trial hole and depth of sample is recorded.					

It should be noted that the end use of the material was not understood to be redeposited on-site and therefore the GAC used should be interpreted as an indicator for the means of comparison rather than a direct assessment. The material should be removed from site under a suitable Material Management Plan (MMP).

5.1.2. Soil Assessment

The comparison between the laboratory analysis and the assessment criteria indicates that there is an unacceptable risk to future receptors caused by exceedances of the following determinands: Asbestos, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenzo(a,h)anthracene.

Asbestos

Asbestos was identified within one sample (TP05/0.50m) as “Small ACM fragment typical of an asbestos – Amosite”. A Quantification was undertaken on the sample and indicated that asbestos was present at <0.001%.

An **Asbestos Management Strategy** should be put in place so that any potentially asbestos containing materials are identified and removed from site in a suitable manner to prevent cross-contamination.

It is recommended further sampling is undertaken within the vicinity of TP05 to increase the dataset and provide further samples for delineation of the asbestos containing material.

Benzo(a)pyrene

Elevated levels of Benzo(a)pyrene were noted within the samples collected at TP03/1.20m bwl and TP05/0.50m bwl.

Benzo(b)fluoranthene

Elevated levels of Benzo(b)fluoranthene were noted within the samples collected at TP03/1.20m bwl and TP05/0.50m bwl.

Dibenzo(a,h)anthracene

Elevated levels of Dibenzo(a,h)anthracene were noted within the sample collected at TP03/1.20m bwl.

5.2. Groundwater Risk Assessment

Surface water sampling of the entrance and exit points of the pond were recovered to provide an assessment of the general water quality. It was determined that the most applicable screening values to be used is the Environmental Quality Standards (EQS), which are protective of ecology within the water. Where no EQS is available, other water quality standards have been noted within the table. This assessment compares the recorded concentration of a determinand to a pre-defined GAC (EQS, USEPA and UK drinking water standard).

The chemical laboratory results are presented in Appendix C and have been summarised within the table below and overleaf. Only determinands that have an appropriate screening value have been included within the table.

Groundwater Contamination Test Results and Screening Values				
Determinand	Entrance Sample Concentration (µg/l)	Exit Sample Concentration (µg/l)	Adopted Screening Value (µg/l)	Was the adopted screening value exceeded?
INORGANICS				
pH	8.09	8.36	6.5 – 9.5 ⁵	No
Cyanide	< 50	< 50	1 ¹	No
Phenols	<50	<50	7.7 ⁸	No
METALS				
Arsenic	0.539	0.515	50 ¹	No
Boron	24.1	31.7	750 ¹	No
Cadmium	<0.08	<0.08	0.08 – 0.25 ^{1,2}	No
Chromium (III)	<1	<1	4.7 ¹	No
Chromium (Hexavalent)	< 30	< 30	3.4 ⁸	No
Copper	0.425	0.304	1 ¹	No
Lead	0.411	0.262	1.2 ¹	No
Mercury	< 0.01	< 0.01	0.07 ¹	No
Nickel	0.46	0.53	4 ¹	No
Selenium	<1	<1	7.5 ¹	No
Vanadium	<1	<1	86 ⁶	No
Zinc	2.66	8.17	10.9 ¹	No
PETROLEUM HYDROCARBONS				
Aliphatic >C5 – C6	<10	<10	15,000 ³	No
Aliphatic >C6 – C8	<10	<10		No
Aliphatic >C8 – C10	<10	<10	300 ³	No

Groundwater Contamination Test Results and Screening Values				
Determinand	Entrance Sample Concentration (µg/l)	Exit Sample Concentration (µg/l)	Adopted Screening Value (µg/l)	Was the adopted screening value exceeded?
Aliphatic >C10 – C12	<10	<10		No
Aliphatic >C12 – C16	<10	<10		No
Aliphatic >C16 – C21	<10	<10	Not derived	No
Aliphatic >C21 – C35	<10	<10	Not derived	No
Aromatic >EC5 – EC7	<10	<10	10 ³	No
Aromatic >EC7 – EC8	<10	<10	700 ³	No
Aromatic >EC8 – EC10	<10	<10	300 ³	No
Aromatic >EC10 – EC12	<10	<10	90 ³	No
Aromatic >EC12 – EC16	<10	<10		No
Aromatic >EC16 – EC21	<10	<10	90 ³	No
Aromatic >EC21 – EC35	<10	<10		No
Total TPH	<10	<10	10 ⁵¹	No
Benzene	< 1	< 1	10 ¹	No
Toluene	< 1	<1	74 ¹	No
Ethylbenzene	< 1	< 1	300 ³	No
Xylene	< 1	< 1	15.5-63.6 ¹	No
POLYCYCLIC-AROMATIC HYDROCARBONS				
Anthracene	<0.005	<0.005	0.1 ¹	No
Benzo(a)pyrene	<0.002	<0.002	0.00017 ¹	No
Benzo(b)fluoranthene	<0.005	0.0275	7	Yes
Benzo(k)fluoranthene	<0.005	0.0083		Yes
Benzo(ghi)perylene	<0.005	<0.005	7,8	No
Dibenzo(a,h)anthracene	<0.005	<0.005	0.0025 ^{6,8}	No
Fluoranthene	0.0218	0.047	0.0063 ¹	Yes
Fluorene	<0.005	<0.005	290 ⁶	No
Indeno(1,2,3-cd)pyrene	<0.005	<0.005	7,8	No
Naphthalene	<0.01	<0.01	2 ¹	No
Total EPA-16 PAHs	<0.082	0.134	0.1 ⁵	Yes
VOLATILE ORGANIC COMPOUND				
Total VOCs	<0.1	<0.1	-	No
¹ Environmental Quality Standards (EQS) ² Screening value changes as a result of calcium carbonate concentration of aquifer ³ WHO Guidelines for drinking water quality, 2022 ⁴ Site specific threshold calculated based on the bio-availability per sample ⁵ UK Drinking Water Standards ⁶ United States Environmental Protection Agency ⁷ For the group of priority substances for PAH, the AA EQS in water refer to the concentration of Benzo(a)pyrene on the toxicity of which they are based. Benzo(a)pyrene can be considered as a marker for other PAH's, hence only Benzo(a)pyrene must be monitored for comparison with the AA EQS. ⁸ Maximum concentration was level of detection which was the above the screening value.				

Benzo(b)fluoranthene

Elevated levels of Benzo(b)fluoranthene was noted within the surface water sample collected at the exit point of the feature.

Benzo(k)fluoranthene

Elevated levels of Benzo(k)fluoranthene was noted within the surface water sample collected at the exit point of the feature.

Fluoranthene

Elevated levels of Fluoranthene was noted within the surface water samples collected at the entrance and exit points of the feature.

5.3. Waste Disposal

The excavation soils is likely to produce waste which will require classification and then recycling or removal from site.

Under the Landfill (England and Wales) Regulations 2002 (as amended), prior to disposal, all waste must be classified as either: Inert; Non-hazardous; or Hazardous.

The Environment Agency's Hazardous Waste Technical Guidance (WM3) document outlines the methodology for classifying wastes. Once classified the waste can be removed to the appropriately licensed facilities, with some waste requiring pre-treatments prior to disposal.

Following the investigation, 5No. samples were submitted to the analytical laboratory to undergo a suite of testing for contamination testing, as discussed in the previous sections. Sampling depths were chosen to reflect the receptor of concern, human health, and typically comprised a surface or near surface sample and periodically to 1.00m bgl. Any horizon where olfactory or visual evidence of contamination was present was also sampled.

Based on a risk phase analysis of the chemical laboratory test results, in accordance with EC Hazardous Waste Directive and undertaken by Ground and Water Limited, all soil samples tested on-site were NON-HAZARDOUS. The results of the assessment are given within Appendix E.

Soils containing asbestos are considered HAZARDOUS if the level of asbestos in the Made Ground is above the threshold of 0.1% or visual fragments can be observed. As quantification of the asbestos in the sample recovered from TP05/0.50m bgl was <0.001% (less than 0.1%) the Made Ground with asbestos detected in was NON-HAZARDOUS with respect to waste classification.

It is important to note that whilst we consider our in-house assessment tool to be an accurate interpretation of the requirements of WM3, therefore producing an initial classification in accordance with the guidance, this method classifies soils as either non-hazardous or hazardous and landfill operators have their own assessment tools and can often come to different conclusions. As a result, some landfill operators could refuse to take apparently suitable waste. It is recommended that the receiving landfill views the results of this assessment and the chemical laboratory results to determine their own classification.

In addition to the samples described above, 1No. sample was scheduled to undergo Waste Acceptance Criteria (WAC) testing with single batch leachate from samples with a range of depths. The sample results were not available at the time of reporting and will provided as a revision to this report.

It should be noted that the receiving landfill may see the presence of Made Ground within the soils to be indicative of a non-hazardous classification despite the presence of the WAC testing certificates

indicating that it is inert. Therefore, it should be considered that all Made Ground is classified as Non-hazardous, subject to finalising with the receiving landfill.

Where contaminated soils are to be removed, they should be placed on an impermeable membrane (visqueen or similar) to ensure that no cross-contamination of soils occurs.

5.4. Duty of Care

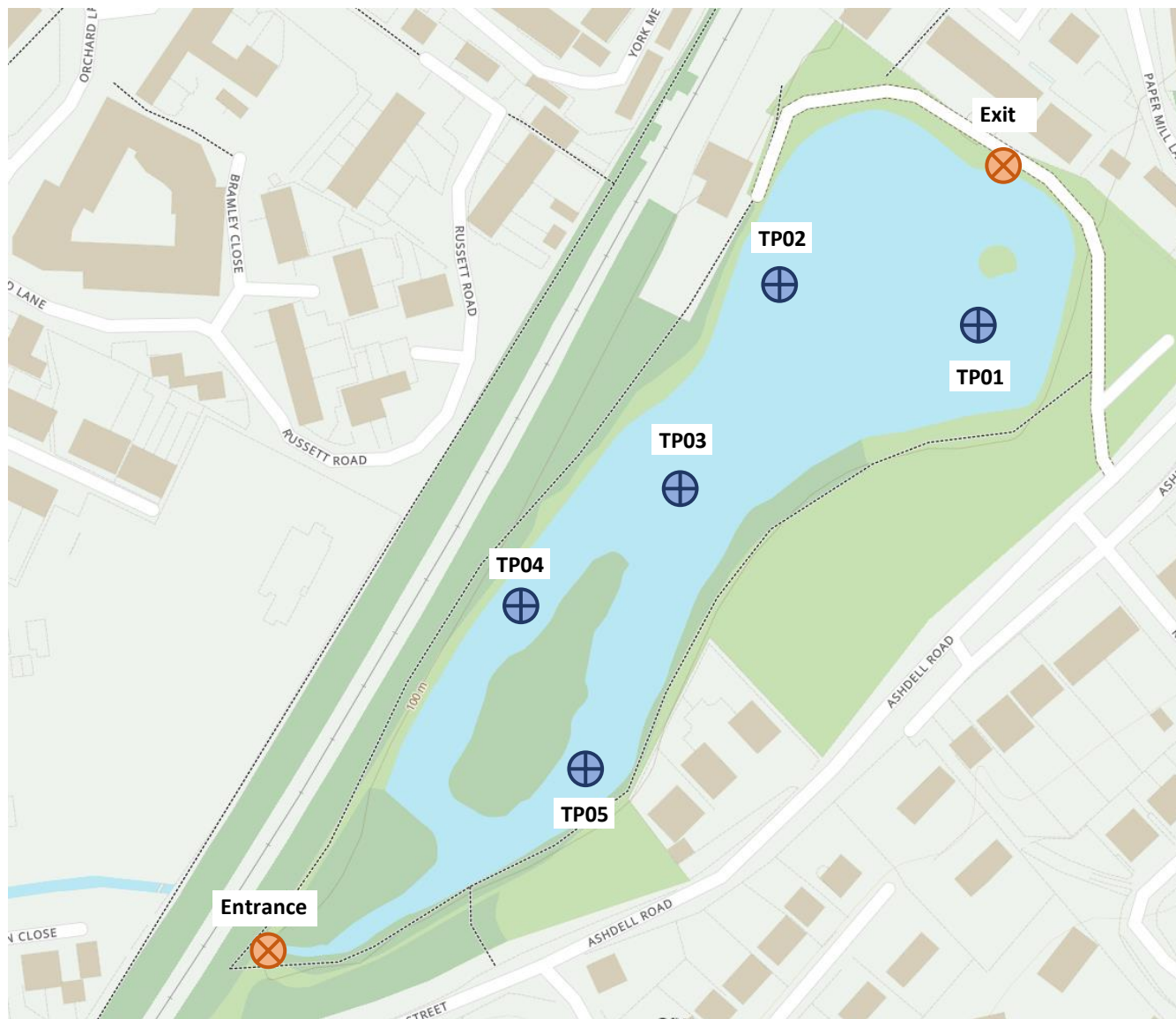
Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

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

The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.

FIGURES





⊗ Surface Water Samples

⊕ Silt Bed Sample



Approximately 30m

Kings Pond, Alton, Hampshire

Alton Town Council

November 2022

Figure 2 – Trial Hole Location Plan

GWPR5623



APPENDIX A: Conditions and Limitations

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

The report has been prepared on the basis of information, data and materials which were available at the time of writing. Accordingly, any conclusions, opinions or judgements made in the report should not be regarded as definitive or relied upon to the exclusion of other information, opinions and judgements.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Any decisions made by you, or by any organisation, agency or person who has read, received or been provided with information contained in the report ("you" or "the Recipient") are decisions of the Recipient and we will not make, or be deemed to make, any decisions on behalf of any Recipient. We will not be liable for the consequences of any such decisions.

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

Any Recipient must take into account any other factors apart from the Report of which they and their experts and advisers are or should be aware. The information, data, conclusions, opinions and judgements set out in the report may relate to certain contexts and may not be suitable in other contexts. It is your responsibility to ensure that you do not use the information we provide in the wrong context.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development required evaluation by other involved parties.

The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground conditions have been sampled or monitored in recorded locations and tests for some of the more common chemicals generally expected. Other concentrations of types of chemicals may exist.

The conclusions and recommendations relate to Kings Pond, Alton, Hampshire, GU34 2SZ.

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

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot-by-plot basis prior to the construction of foundations. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

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

Only our client may rely on this report and should this report or any information contained in it be provided to any third party we accept no responsibility to the third party for the contents of this report save to the extent expressly outlined by us in writing in a reliance letter addressed from us to the third party.

Recipients are not permitted to publish this report outside of their organisation without our express written consent.

APPENDIX B:

Technical Glossary

TECHNICAL GLOSSARY

The list of possible definitions within the report may be seen below. Please note that some definitions may not be relevant to this report.

HYDROGEOLOGY:

A **Principal Aquifer** is a layer of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary (A) Aquifers consist of deposits with permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers.

Secondary (B) Aquifers consist of deposits with predominantly lower permeability layers with may stoke and yield limited amounts of groundwater due to localised features such as fissures, think permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Secondary Aquifers (Undifferentiated) are assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both a minor aquifer and non-aquifer in different locations due to the variable characteristics of the rock type.

Unproductive Strata are rock layers with low permeability that have negligible significance for water supply or river base flow. These were formerly classified as non-aquifers.

FLOOD ZONES:

Environment Agency Flood Zone 2, defined as; land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.

Environment Agency Flood Zone 3 shows the extent of a river flood with a 1 in 100 (1% or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

Environment Agency Flood Zone 3 area that benefits from flood defences, defined as; land and property in this flood zone would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year.

GROUNDWATER SOURCE PROTECTION ZONES (SPZS):

Inner Zone (SPZ1): This zone is 50 day travel time of pollutant to source with a 50 metres default minimum radius.

Outer Zone (SPZ2): This zone is 400 day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source depending on the amount of water taken.

Total Catchment (SPZ3): This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

Zone of Special Interest (SPZ4): This zone is where local conditions require additional protection.

IN-SITU STRENGTH GEOTECHNICAL TESTING:

Windowless Sample and/or Cable Percussion and/or Rotary Boreholes provide samples of the ground for assessment but they do not give any engineering data. The standard penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil. The test uses a thick-walled sample tube, with an outside diameter of 50mm and an inside diameter of 35mm, and a length of around 650mm. This is driven into the ground at the bottom of a borehole by blows from a slide hammer with a weight of 63.5kg falling through a distance of 760mm. The sample tube is driven 150mm into the ground and then the number of blows needed for the tube to penetrate each 75mm up to a depth of 450mm is recorded. The sum of the number of blows is termed the "standard penetration resistance" or the "N-value".

Dynamic Probing involves the driving of a metal cone into the ground via a series of steel rods. These rods are driven from the surface by a hammer system that lifts and drops a 63.5kg (SHDP) hammer onto the top of the rods through a set height, thus ensuring a consistent energy input. The number of hammer blows that are required to drive the cone down by each 100mm increment are recorded. These blow counts then provide a comparative assessment from which correlations have been published, based on dynamic energy, which permits engineering parameters to be generated. (The Dynamic Probe 'Super Heavy' (SHDP) Tests were conducted in accordance with BS 1377; 1990; Part 9, Clause 3.2).

APPENDIX C:

Chemical

Laboratory Testing



Units 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528777
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Ground and Water Ltd
Head Office
2 The Long Barn
Norton Farm, Selborne Road
Alton
Hampshire
GU34 3NB

Attention: Aubyn Shortland

CERTIFICATE OF ANALYSIS

Date of report Generation:	07 November 2023
Customer:	Ground and Water Ltd
Sample Delivery Group (SDG):	231011-65
Your Reference:	GWPR5623
Location:	Alton Pond, Hampshire
Report No:	710062
Order Number:	GWPR5623

This report has been revised and directly supersedes 709240 in its entirety.

We received 7 samples on Wednesday October 11, 2023 and 7 of these samples were scheduled for analysis which was completed on Thursday October 26, 2023. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager



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CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
28762859	Entrance		0.00 - 0.00	06/10/2023
28762866	Exit		0.00 - 0.00	06/10/2023
28762874	TP01		1.10	06/10/2023
28762879	TP02		1.20	06/10/2023
28762883	TP03		1.20	06/10/2023
28762888	TP04		0.70	06/10/2023
28762894	TP05		0.50	06/10/2023

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend X Test N No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)		Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	28762894	28762888	28762879	28762874	28762866	28762859	
								1kg Cardboard Container (ALE215)	250g Amber Jar (ALE210)	1kg Cardboard Container (ALE210)	1kg Cardboard Container (ALE215)	250g Amber Jar (ALE210)	Vial (ALE297)	250ml Plastic (ALE208)
ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 1									X			
Anions by Kone (soil)	All	NDPs: 0 Tests: 5								X				
Anions by Kone (w)	All	NDPs: 1 Tests: 2										N		
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 5												
Asbestos Quantification - Full	All	NDPs: 0 Tests: 1												
Boron Water Soluble	All	NDPs: 0 Tests: 5												
CEN Readings	All	NDPs: 1 Tests: 0												
Coronene	All	NDPs: 0 Tests: 1												
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 7												
Dissolved Metals by ICP-MS	All	NDPs: 1 Tests: 2												
Dissolved Organic/Inorganic Carbon	All	NDPs: 1 Tests: 0												
EPH by GCxGC-FID	All	NDPs: 0 Tests: 1												
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2												
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2												
EPH CWG GC (S)	All	NDPs: 0 Tests: 2												



CERTIFICATE OF ANALYSIS

Validated

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Client Ref.: GWPR5623

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Location: Alton Pond, Hampshire

Superseded Report: 709240

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	X Test		N No Determination Possible									
Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other												
Fluoride	All	NDPs: 1 Tests: 0										
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2										
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2										
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 5										
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 2										
Loss on Ignition in soils	All	NDPs: 0 Tests: 1										
Mercury Dissolved	All	NDPs: 1 Tests: 2										
Metals in solid samples by OES	All	NDPs: 0 Tests: 5										
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 1										
PAH by GCMS	All	NDPs: 0 Tests: 5										
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 2										
PCBs by GCMS	All	NDPs: 0 Tests: 1										
pH	All	NDPs: 0 Tests: 5										
pH Value	All	NDPs: 0 Tests: 2										
pH Value of Filtered Water	All	NDPs: 1 Tests: 0										



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Results Legend X Test N No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type										
	28762894	TP05		0.50	1kg Cardboard Container (ALE215)	S										
	28762888	TP04		0.70	250g Amber Jar (ALE210)	S										
	28762883	TP03		1.20	1kg Cardboard Container (ALE210)	S										
	28762879	TP02		1.20	250g Amber Jar (ALE210)	S										
	28762874	TP01		1.10	1kg Cardboard Container (ALE215)	S										
	28762866	Exit		0.00 - 0.00	250g Amber Jar (ALE210)	S										
	28762859	Entrance		0.00 - 0.00	1kg Cardboard Container (ALE215)	S										
Phenols by HPLC (S)	All	NDPs: 0 Tests: 5														
Phenols by HPLC (W)	All	NDPs: 1 Tests: 2														
Sample description	All	NDPs: 0 Tests: 5														
Total Organic Carbon	All	NDPs: 0 Tests: 5														
TPH CWG (W)	All	NDPs: 0 Tests: 2														
TPH CWG GC (S)	All	NDPs: 0 Tests: 2														
VOC MS (S)	All	NDPs: 0 Tests: 2														
VOC MS (W)	All	NDPs: 0 Tests: 2														

28762894	TP05		0.50	250g Amber Jar (ALE210)	S	X			X	X							
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CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
28762874	TP01	1.10	Dark Brown	N/A	None	Vegetation
28762879	TP02	1.20	Dark Brown	N/A	None	None
28762883	TP03	1.20	Dark Brown	N/A	None	None
28762888	TP04	0.70	Dark Brown	N/A	None	Vegetation
28762894	TP05	0.50	Dark Brown	N/A	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Results Legend			Customer Sample Ref.		Entrance	Exit	TP01	TP02	TP03	TP04
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.00 - 0.00	0.00 - 0.00	1.10	1.20	1.20	0.70
M	mCERTS accredited.				Surface Water (SW)	Surface Water (SW)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
aq	Aqueous / settled sample.				06/10/2023	06/10/2023	06/10/2023	06/10/2023	06/10/2023	06/10/2023
diss.filt	Dissolved / filtered sample.				00:00	00:00	00:00	00:00	00:00	00:00
tot.unfilt	Total / unfiltered sample.				11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
*	Subcontracted - refer to subcontractor report for accreditation status.				231011-65	231011-65	231011-65	231011-65	231011-65	231011-65
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery				28762859	28762866	28762874	28762879	28762883	28762888
(F)	Trigger breach confirmed									
1-4*5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
Arsenic (diss.filt)	<0.5 µg/l	TM152	0.539	#	0.515	#				
Boron (diss.filt)	<10 µg/l	TM152	24.1	#	31.7	#				
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	#	<0.08	#				
Chromium (diss.filt)	<1 µg/l	TM152	<1	#	<1	#				
Copper (diss.filt)	<0.3 µg/l	TM152	0.425	#	0.304	#				
Lead (diss.filt)	<0.2 µg/l	TM152	0.411	#	0.262	#				
Nickel (diss.filt)	<0.4 µg/l	TM152	0.46	#	0.53	#				
Selenium (diss.filt)	<1 µg/l	TM152	<1	#	<1	#				
Vanadium (diss.filt)	<1 µg/l	TM152	<1	#	<1	#				
Zinc (diss.filt)	<1 µg/l	TM152	2.66	#	8.17	#				
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01		<0.01					
Sulphate	<2000 µg/l	TM184	10900	#	16400	#				
Cyanide, Total	<50 µg/l	TM227	<50	2	<50	2				
Chromium, Hexavalent	<30 µg/l	TM241	<30		<30					
pH	<1 pH Units	TM256	8.09	#	8.36	#				
Phenol	<2 µg/l	TM259	<2	2	<2	2				
Cresols	<6 µg/l	TM259	<6	2	<6	2				
Xylenols	<8 µg/l	TM259	<8	2	<8	2				
Phenols, Total Detected monohydric	<16 µg/l	TM259	<16	2	<16	2				
Moisture Content Ratio (% of as received sample)	%	PM024					75	74	72	76
Loss on ignition	<0.7 %	TM018					18.4			
Phenol	<0.01 mg/kg	TM062 (S)					<0.01 #	<0.01	<0.01	<0.01
Cresols	<0.01 mg/kg	TM062 (S)					<0.01 #	<0.01	<0.01	0.041
Xylenols	<0.015 mg/kg	TM062 (S)					<0.015 #	<0.015	<0.015	<0.015
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)					<0.035 #	<0.035	<0.035	<0.035
Organic Carbon, Total	<0.2 %	TM132					7.43 #	7.01	8.54	12.9
Soil Organic Matter (SOM)	<0.35 %	TM132					12.8 #	12.1	14.7	22.2
pH	1 pH Units	TM133					7.9	7.88	7.64	7.71
Chromium, Hexavalent	<0.6 mg/kg	TM151					<0.6	<0.6	<0.6	<0.6
Cyanide, Total	<1 mg/kg	TM153					<1	<1	<1	<1
PCB congener 28	<0.003 mg/kg	TM168					<0.03			
PCB congener 52	<0.003 mg/kg	TM168					<0.03			

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

[illegible]



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Results Legend		Customer Sample Ref.	TP05				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.50				
M	mCERTS accredited.		Soil/Solid (S)				
aq	Aqueous / settled sample.		06/10/2023				
diss,filtr	Dissolved / filtered sample.		00:00				
tot.unfilt	Total / unfiltered sample.		11/10/2023				
*	Subcontracted - refer to subcontractor report for accreditation status.		231011-65				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		28762894				
(F)	Trigger breach confirmed						
1-4.5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	75				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
Cresols	<0.01 mg/kg	TM062 (S)	0.04				
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015				
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)	<0.035				
Organic Carbon, Total	<0.2 %	TM132	13.5	#			
Soil Organic Matter (SOM)	<0.35 %	TM132	23.3	#			
pH	1 pH Units	TM133	7.34				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6				
Cyanide, Total	<1 mg/kg	TM153	<1				
Arsenic	<0.6 mg/kg	TM181	7.32				
Cadmium	<0.02 mg/kg	TM181	1.32				
Chromium	<0.9 mg/kg	TM181	31.2				
Copper	<1.4 mg/kg	TM181	87.4				
Lead	<0.7 mg/kg	TM181	271				
Mercury	<0.1 mg/kg	TM181	0.163				
Nickel	<0.2 mg/kg	TM181	18.6				
Selenium	<1 mg/kg	TM181	2.37				
Vanadium	<0.2 mg/kg	TM181	24.8				
Zinc	<1.9 mg/kg	TM181	705				
Boron, water soluble	<1 mg/kg	TM222	1.47				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.13				
Asbestos Quantification - Gravimetric - %	<0.001 %	TM304	<0.001	#			
Asbestos Quantification - PCOM Evaluation - %	<0.001 %	TM304	<0.001	#			
Additional Asbestos Components (Using TM048)		TM304	None	#			
Analysts Comments		TM304	N/A				
Asbestos Quantification - Total - %	<0.001 %	TM304	<0.001	#			

SDG: 231011-65
Client Ref.: GWPR5623

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Superseded Report: 709240

PAH by GCMS

[illegible]



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

TPH CWG (S)

Results Legend		Customer Sample Ref.	TP01	TP04				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss,filtr	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-456@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	81.9	71.3				
Aliphatics >C5-C6 (HS_1D_AL)	<0.01 mg/kg	TM089	<0.01	<0.01				
Aliphatics >C6-C8 (HS_1D_AL)	<0.01 mg/kg	TM089	<0.01	<0.01				
Aliphatics >C8-C10 (HS_1D_AL)	<0.01 mg/kg	TM089	<0.01	<0.01				
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1 mg/kg	TM414	<1	<1				
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1 mg/kg	TM414	2.21	<1	#	3 #		
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1 mg/kg	TM414	75.2	31.3	#	3 #		
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1 mg/kg	TM414	254	207	#	3 #		
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1 mg/kg	TM414	33.8	37.6		3		
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5 mg/kg	TM414	366	277		3		
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10 mg/kg	TM414	941	711		3		
Aromatics >EC5-EC7 (HS_1D_AR)	<0.01 mg/kg	TM089	<0.01	<0.01				
Aromatics >EC7-EC8 (HS_1D_AR)	<0.01 mg/kg	TM089	<0.01	<0.01				
Aromatics >EC8-EC10 (HS_1D_AR)	<0.01 mg/kg	TM089	<0.01	<0.01				
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1 mg/kg	TM414	<1	<1	#	3 #		
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1 mg/kg	TM414	1.21	<1	#	3 #		
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1 mg/kg	TM414	41.7	20.6	#	3 #		
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1 mg/kg	TM414	385	298	#	3 #		
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1 mg/kg	TM414	148	116		3		
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1 mg/kg	TM414	44.8	32.3		3		
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5 mg/kg	TM414	575	435		3		
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10 mg/kg	TM414	941	711				
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<0.05 mg/kg	TM089	<0.05	<0.05				
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<0.05 mg/kg	TM089	<0.05	<0.05				
GRO >C5-C10 (HS_1D_TOTAL)	<0.02 mg/kg	TM089	<0.02	<0.02				

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

TPH CWG (W)[illegible]

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

VOC MS (S)

[illegible]



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&\$@ Sample deviation (see appendix)

Subcontracted test. (F) Trigger breach confirmed 1-5&*&\$@ Sample deviation (see appendix)		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Asbestos Actinolite	Asbestos Anthophyllite	Asbestos Tremolite	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP01 1.10 SOLID 06/10/2023 00:00:00 11/10/2023 05:00:00 231011-65 28762874 TM048	17/10/2023	Alex Horner	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP02 1.20 SOLID 06/10/2023 00:00:00 11/10/2023 05:00:00 231011-65 28762879 TM048	17/10/2023	Odhran McLernon	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP03 1.20 SOLID 06/10/2023 00:00:00 11/10/2023 05:00:00 231011-65 28762883 TM048	17/10/2023	Odhran McLernon	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP04 0.70 SOLID 06/10/2023 00:00:00 11/10/2023 05:00:00 231011-65 28762888 TM048	17/10/2023	Odhran McLernon	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP05 0.50 SOLID 06/10/2023 00:00:00 11/10/2023 05:00:00 231011-65 28762894 TM048	17/10/2023	Odhran McLernon	Small ACM fragment typical of an asbestos board	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Asbestos Quantification - Full

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&+\$\$@ Sample deviation (see appendix)

		Additional Asbestos Components	Analysts Comments	Asbestos Quantification - Gravimetric - %	Asbestos Quantification - PCOM	Asbestos Quantification - Total - %
Cust. Sample Ref.	TP05 0.50 SOLID	None (#)	N/A	<0.001 (#)	<0.001 (#)	<0.001 (#)
Depth (m)						
Sample Type	06/10/2023 00:00:00					
Date Sampled	11/10/2023 05:00:00					
Date Received	231011-65					
SDG	28762894					
Original Sample	TM304					
Method Number						



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Notification of NDPs (No determination possible)

Date Received : 11/10/2023 10:37:17

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
28762874	TP01	1.10	Dissolved Organic/Inorganic Carbon	Insufficient Sample
28762874	TP01	1.10	Fluoride	Insufficient Sample
28762874	TP01	1.10	Mercury Dissolved	Insufficient Sample
28762874	TP01	1.10	Dissolved Metals by ICP-MS	Insufficient Sample
28762874	TP01	1.10	Anions by Kone (w)	Insufficient Sample
28762874	TP01	1.10	Phenols by HPLC (W)	Insufficient Sample
28762874	TP01	1.10	pH Value of Filtered Water	Insufficient Sample
28762874	TP01	1.10	CEN 10:1 Leachate (1 Stage)	Insufficient Sample
28762874	TP01	1.10	CEN Readings	Insufficient Sample
28762874	TP01	1.10	pH Value of Filtered Water	Insufficient Sample



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Table of Results - Appendix

Method No	Description
TM174	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM182	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM241	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	Determination of GRO by Headspace in waters
TM414	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
TM018	Determination of Loss on Ignition
TM116	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	ELTRA CS800 Operators Guide
TM133	Determination of pH in Soil and Water using the GLpH pH Meter
TM243	Mixed Anions In Soils By Kone
TM259	Determination of Phenols in Waters and Leachates by HPLC
TM410	Determination of Coronene in soils by GCMS
TM048	Identification of Asbestos in Bulk Material
TM062 (S)	Determination of Phenols in Soils by HPLC
TM152	Analysis of Aqueous Samples by ICP-MS
TM153	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM168	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM208	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM218	The determination of PAH in soil samples by GC-MS
TM222	Determination of Hot Water Soluble Boron in Soils (10:1 Water:Soil) by ICP OES.
TM227	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM415	Determination of Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
PM024	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM089	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM151	Determination of Hexavalent Chromium using Kone analyser
TM178	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM304	Asbestos Quantification in Soil: Fibres identified by morphology only

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Test Completion Dates

Lab Sample No(s)	28762859	28762866	28762874	28762879	28762883	28762888	28762894
Customer Sample Ref.	Entrance	Exit	TP01	TP02	TP03	TP04	TP05
AGS Ref.							
Depth	0.00 - 0.00	0.00 - 0.00	1.10	1.20	1.20	0.70	0.50
Type	Surface Water	Surface Water	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
ANC at pH4 and ANC at pH 6			17-Oct-2023				
Anions by Kone (soil)			18-Oct-2023	18-Oct-2023	18-Oct-2023	18-Oct-2023	18-Oct-2023
Anions by Kone (w)	13-Oct-2023	13-Oct-2023					
Asbestos ID in Solid Samples			17-Oct-2023	17-Oct-2023	17-Oct-2023	17-Oct-2023	17-Oct-2023
Asbestos Quantification - Full							26-Oct-2023
Boron Water Soluble			18-Oct-2023	18-Oct-2023	18-Oct-2023	18-Oct-2023	18-Oct-2023
Coronene			18-Oct-2023				
Cyanide Comp/Free/Total/Thiocyanate	16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023
Dissolved Metals by ICP-MS	17-Oct-2023	17-Oct-2023					
EPH by GCxGC-FID			16-Oct-2023				
EPH CWG (Aliphatic) Aqueous GC (W)	19-Oct-2023	19-Oct-2023					
EPH CWG (Aromatic) Aqueous GC (W)	19-Oct-2023	19-Oct-2023					
EPH CWG GC (S)			19-Oct-2023			19-Oct-2023	
GRO by GC-FID (S)			17-Oct-2023			17-Oct-2023	
GRO by GC-FID (W)	13-Oct-2023	13-Oct-2023					
Hexavalent Chromium (s)			16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023
Hexavalent Chromium (w)	18-Oct-2023	18-Oct-2023					
Loss on Ignition in soils			18-Oct-2023				
Mercury Dissolved	13-Oct-2023	13-Oct-2023					
Metals in solid samples by OES			17-Oct-2023	17-Oct-2023	17-Oct-2023	17-Oct-2023	17-Oct-2023
Moisture at 105C			13-Oct-2023				
PAH 16 & 17 Calc			17-Oct-2023				
PAH by GCMS			16-Oct-2023	17-Oct-2023	17-Oct-2023	18-Oct-2023	17-Oct-2023
PAH Spec MS - Aqueous (W)	18-Oct-2023	18-Oct-2023					
PCBs by GCMS			18-Oct-2023				
pH			17-Oct-2023	17-Oct-2023	16-Oct-2023	17-Oct-2023	16-Oct-2023
pH Value	17-Oct-2023	17-Oct-2023					
Phenols by HPLC (S)			16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023
Phenols by HPLC (W)	17-Oct-2023	17-Oct-2023					
Sample description			12-Oct-2023	12-Oct-2023	12-Oct-2023	12-Oct-2023	12-Oct-2023
Total Organic Carbon			18-Oct-2023	18-Oct-2023	18-Oct-2023	18-Oct-2023	19-Oct-2023
TPH CWG (W)	19-Oct-2023	19-Oct-2023					
TPH CWG GC (S)			19-Oct-2023			19-Oct-2023	
VOC MS (S)			16-Oct-2023			16-Oct-2023	
VOC MS (W)	12-Oct-2023	12-Oct-2023					



CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

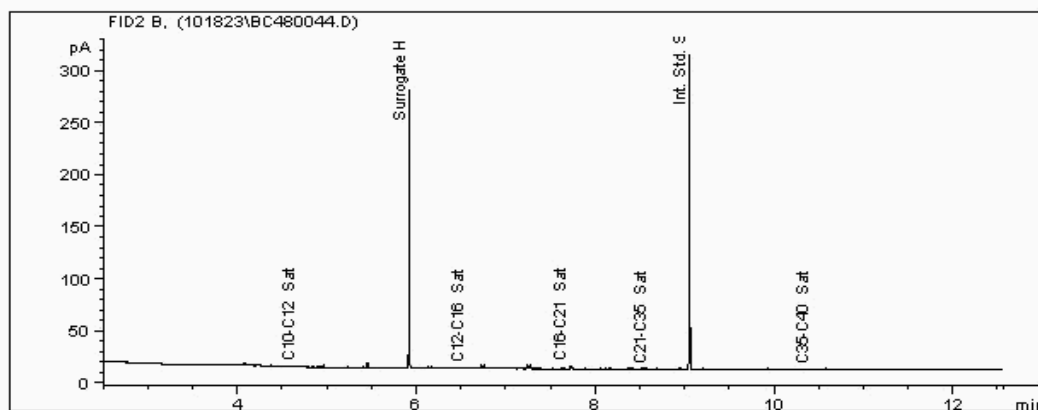
Sample No : 28771417
Sample ID : Entrance

Depth : 0.00 - 0.00

Speciated TPH - SATS (C12 - C40)

Sample Identity: 26744348-
Date Acquired : 19/10/2023 10:16:19 PM
Units : ppb
Dilution :
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	Surrogate H	193.2	0.196
3	C12-C16 Sat	0.0	0.000
4	C16-C21 Sat	0.0	0.000
5	C21-C35 Sat	0.0	0.000
6	Int. Std. S	231.1	0.250
7	C35-C40 Sat	0.0	0.000
Total Peak Area		424.3	





CERTIFICATE OF ANALYSIS

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SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

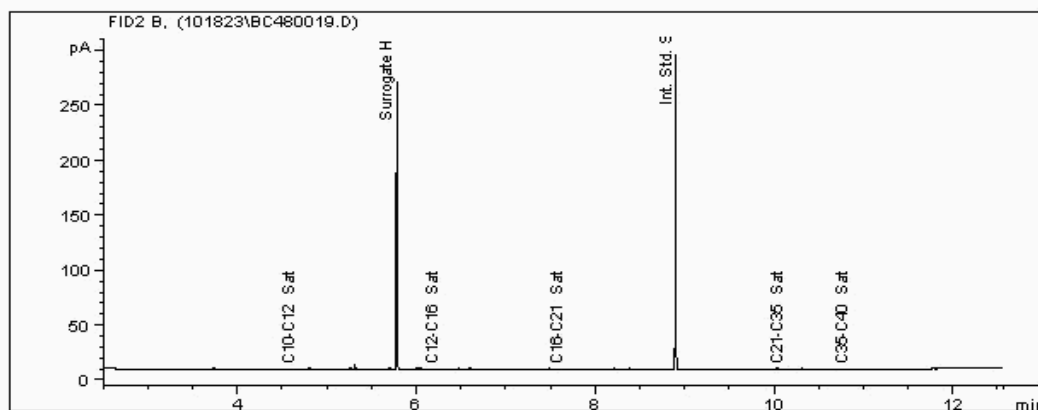
Sample No : 28771426
Sample ID : Exit

Depth : 0.00 - 0.00

Speciated TPH - SATS (C12 - C40)

Sample Identity: 26744365-
Date Acquired : 18/10/2023 19:53:31 PM
Units : ppb
Dilution : SE EXIT[0.00 - 0.00] ->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	Surrogate H	177.0	0.212
3	C12-C16 Sat	0.0	0.000
4	C16-C21 Sat	0.0	0.000
5	Int. Std. S	222.6	0.253
6	C21-C35 Sat	0.0	0.000
7	C35-C40 Sat	0.0	0.000
Total Peak Area		399.6	





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W)

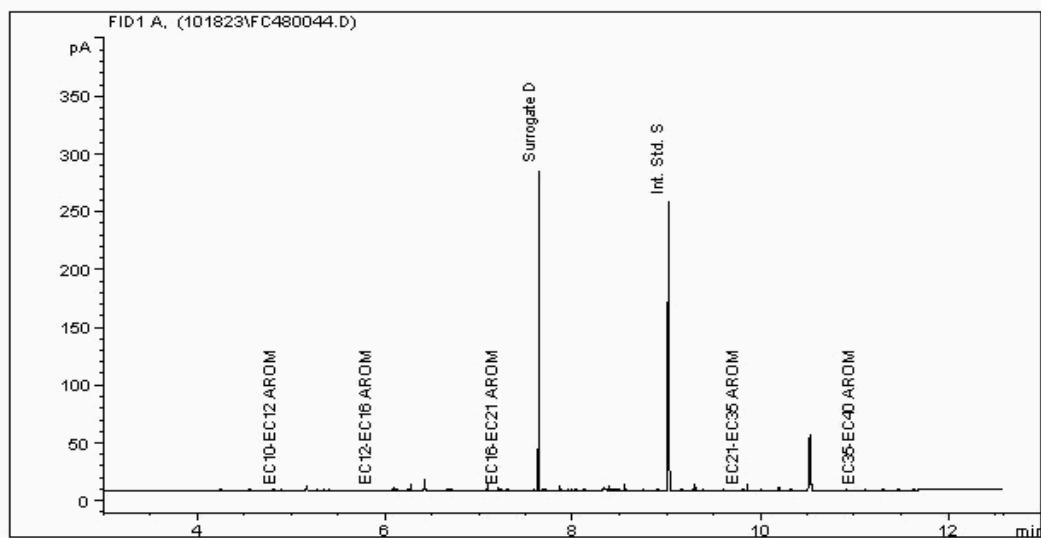
Sample No : 28771417
Sample ID : Entrance

Depth : 0.00 - 0.00

Speciated TPH - AROM (C12 - C40)

Sample Identity: 26744349-
Date Acquired : 19/10/2023 10:16:18 PM
Units : ppb
Dilution:

#	Compound Name	Main Peak Area	Amount
1	EC10-EC12 AROM	0.0	0.000
2	EC12-EC16 AROM	0.0	0.000
3	EC16-EC21 AROM	0.0	0.000
4	Surrogate D	190.8	0.235
5	Int. Std. S	191.8	0.250
6	EC21-EC35 AROM	0.0	0.000
7	EC35-EC40 AROM	0.0	0.000
Total Peak Area		382.6	





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Chromatogram

Analysis: EPH CWG (Aromatic) Aqueous GC (W)

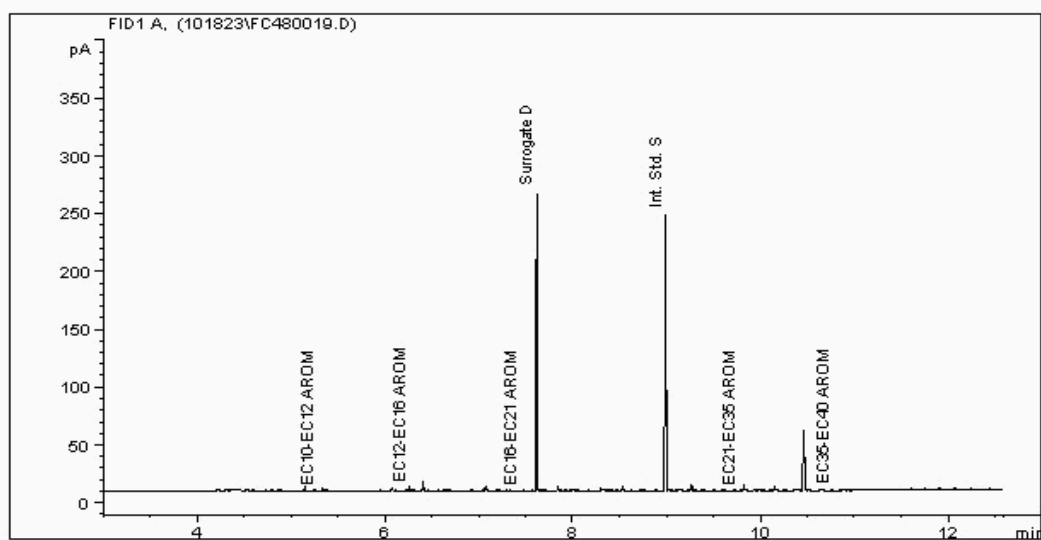
Sample No : 28771426
Sample ID : Exit

Depth : 0.00 - 0.00

Speciated TPH - AROM (C12 - C40)

Sample Identity: 26744366-
Date Acquired : 18/10/2023 19:53:31 PM
Units : ppb
Dilution: SE EXIT[0.00 - 0.00] ->

#	Compound Name	Main Peak Area	Amount
1	EC10-EC12 AROM	0.0	0.000
2	EC12-EC16 AROM	0.0	0.000
3	EC16-EC21 AROM	0.0	0.000
4	Surrogate D	157.4	0.202
5	Int. Std. S	191.4	0.253
6	EC21-EC35 AROM	0.0	0.000
7	EC35-EC40 AROM	0.0	0.000
Total Peak Area		348.9	





CERTIFICATE OF ANALYSIS

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SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

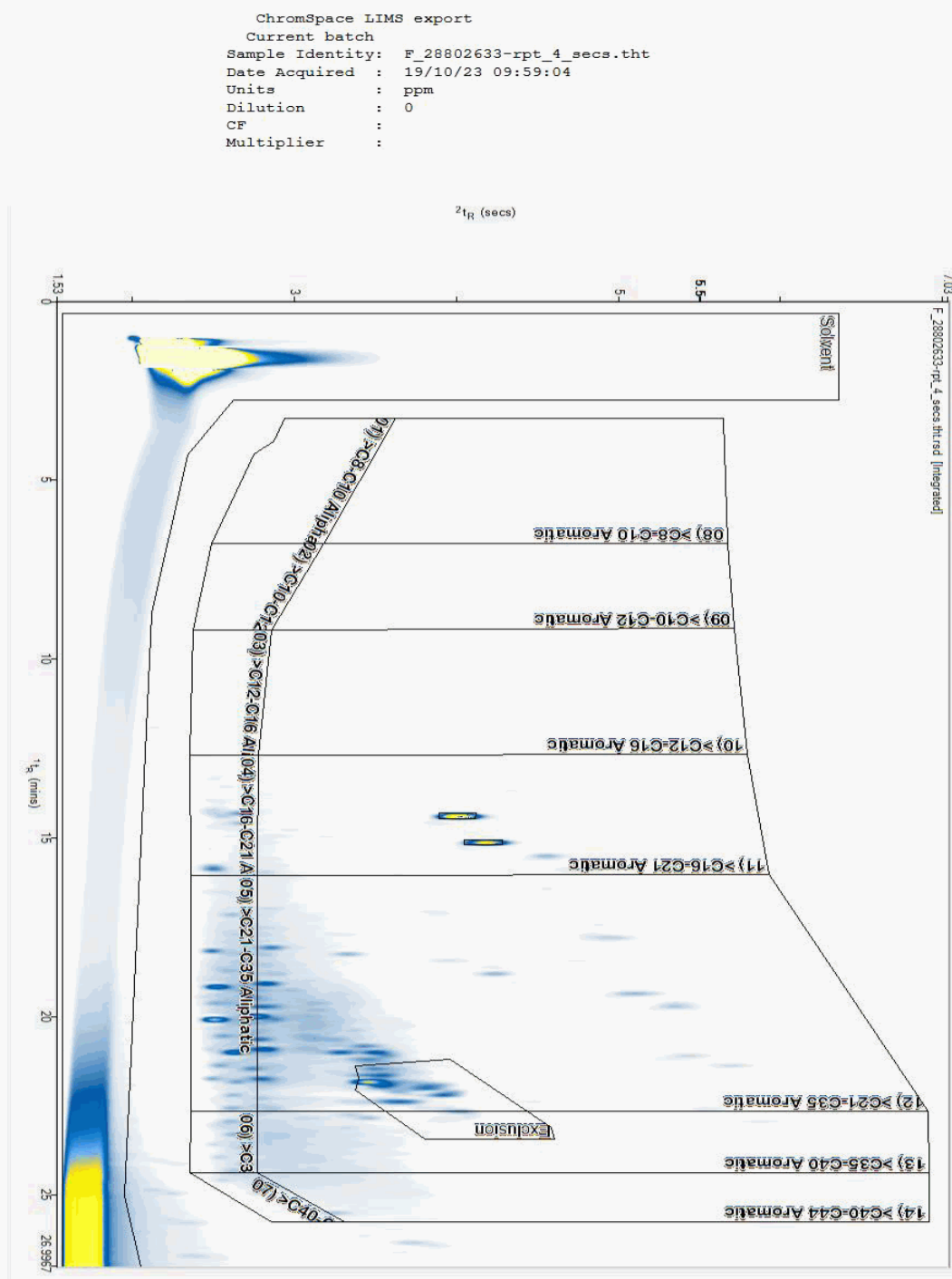
Superseded Report: 709240

Chromatogram

Analysis: EPH CWG GC (S)

Sample No : 28802633
Sample ID : TP04

Depth : 0.70





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

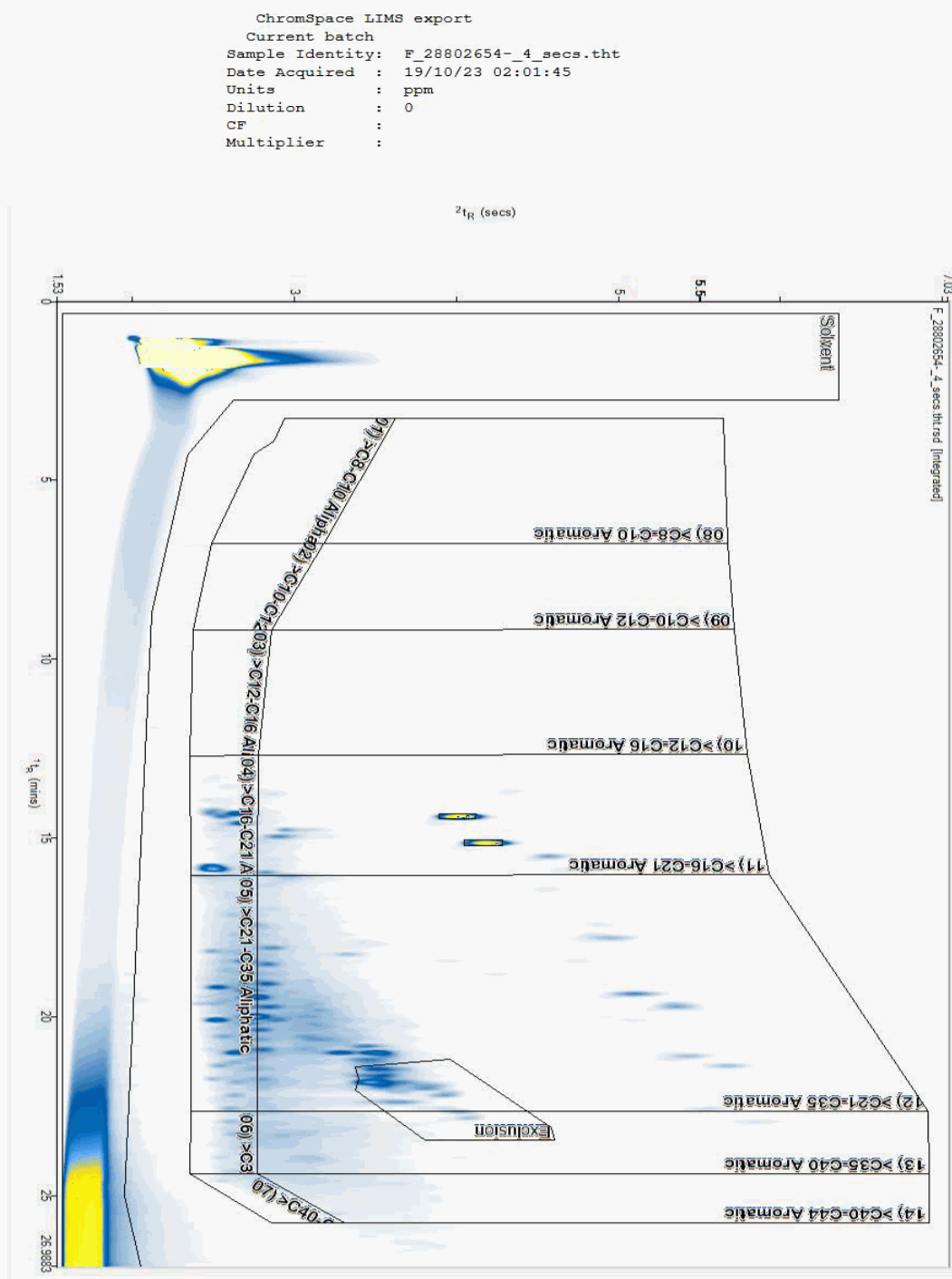
Superseded Report: 709240

Chromatogram

Analysis: EPH CWG GC (S)

Sample No : 28802654
Sample ID : TP01

Depth : 1.10





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

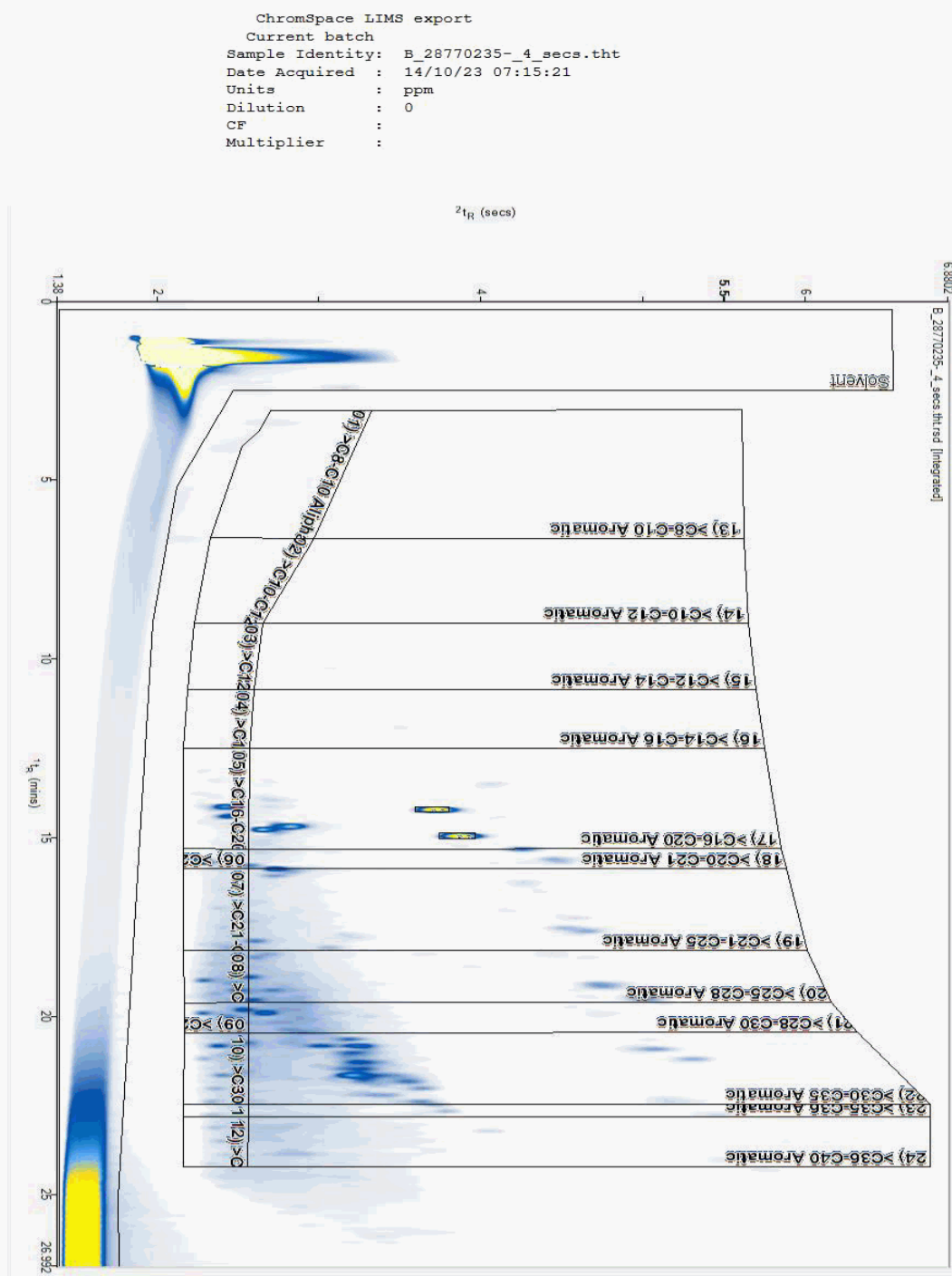
Superseded Report: 709240

Chromatogram

Analysis: EPH by GCxGC-FID

Sample No : 28770235
Sample ID : TP01

Depth : 1.10





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

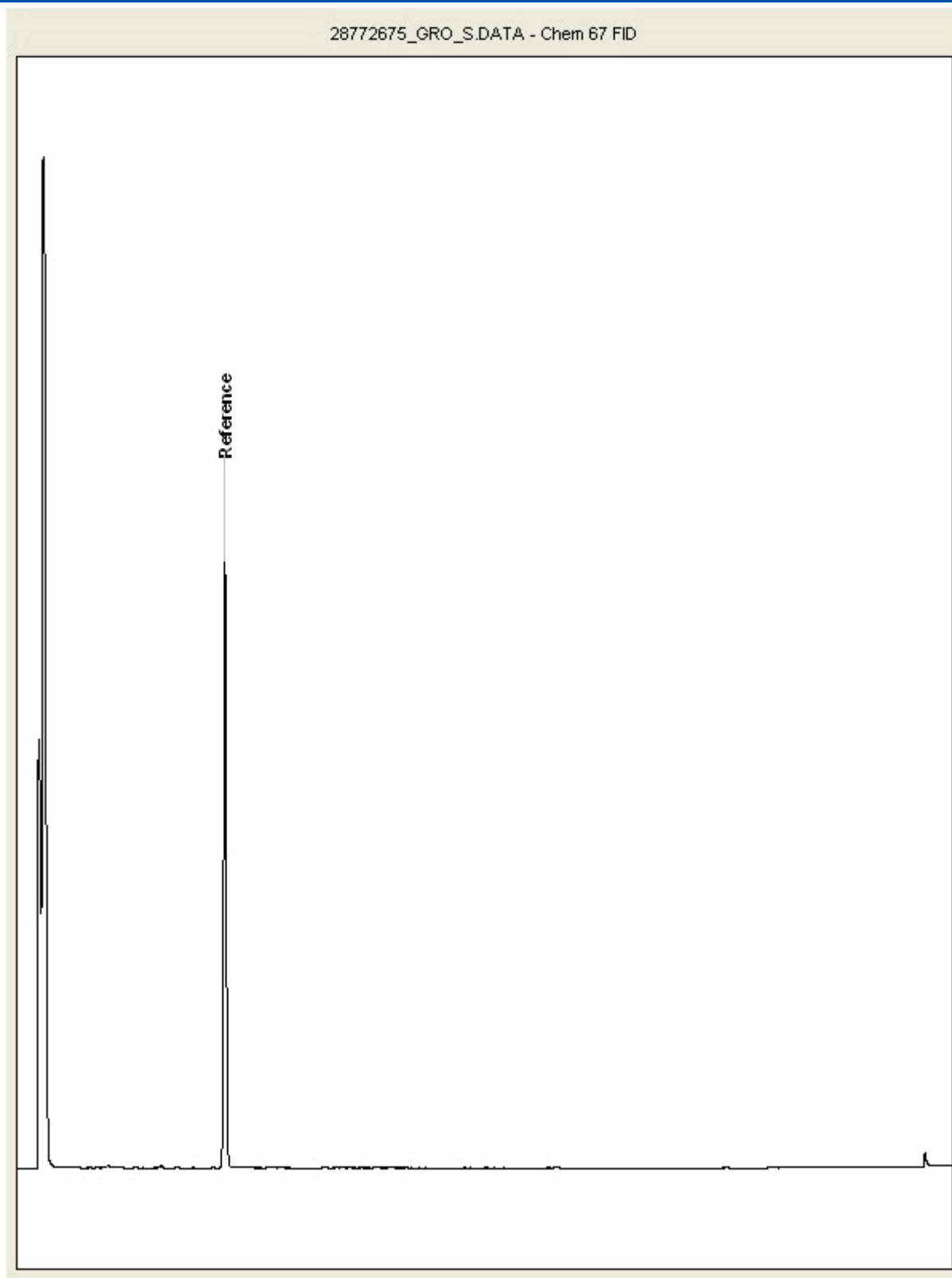
Superseded Report: 709240

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 28772675
Sample ID : TP01

Depth : 1.10





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

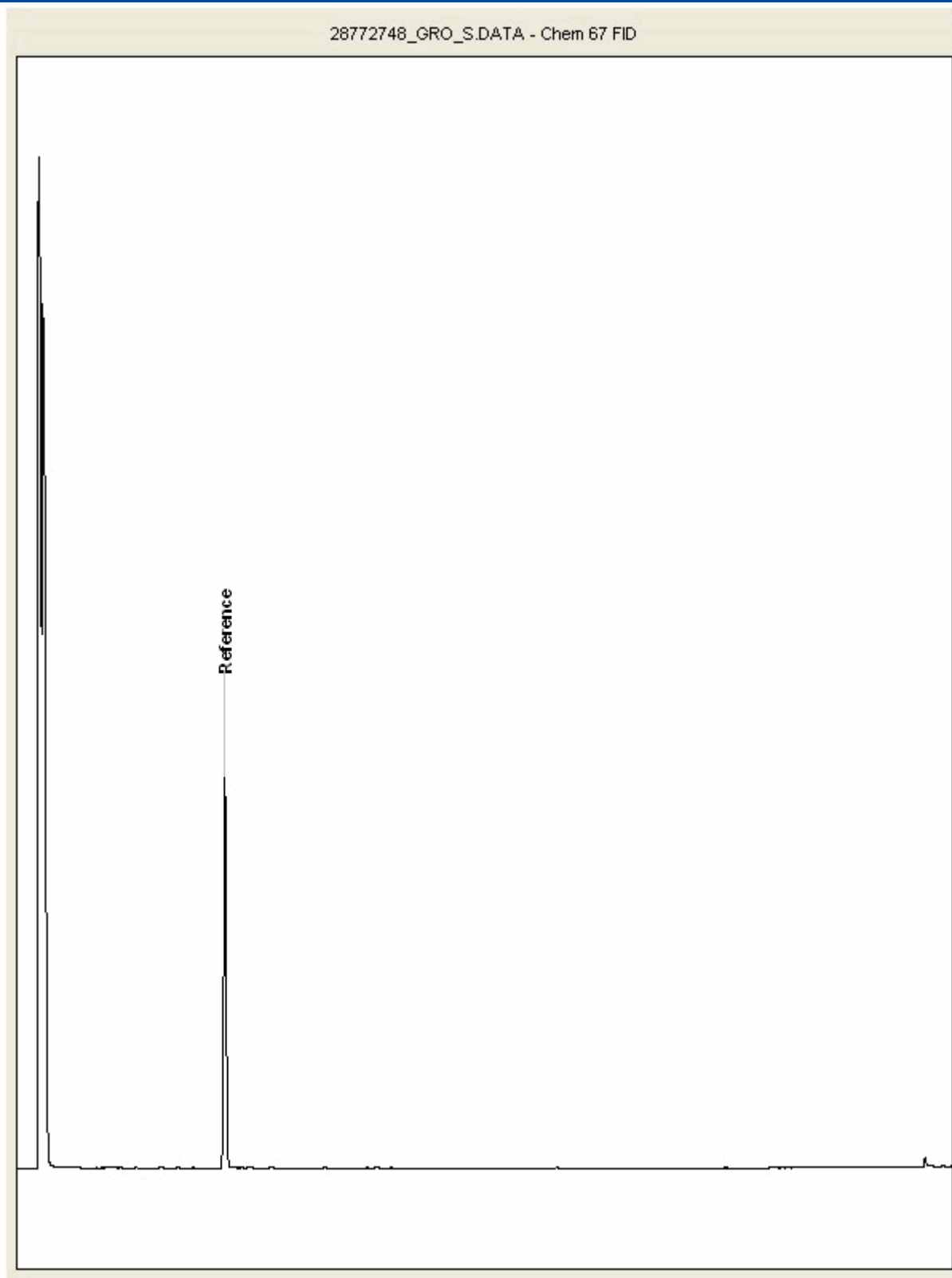
Superseded Report: 709240

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 28772748
Sample ID : TP04

Depth : 0.70





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

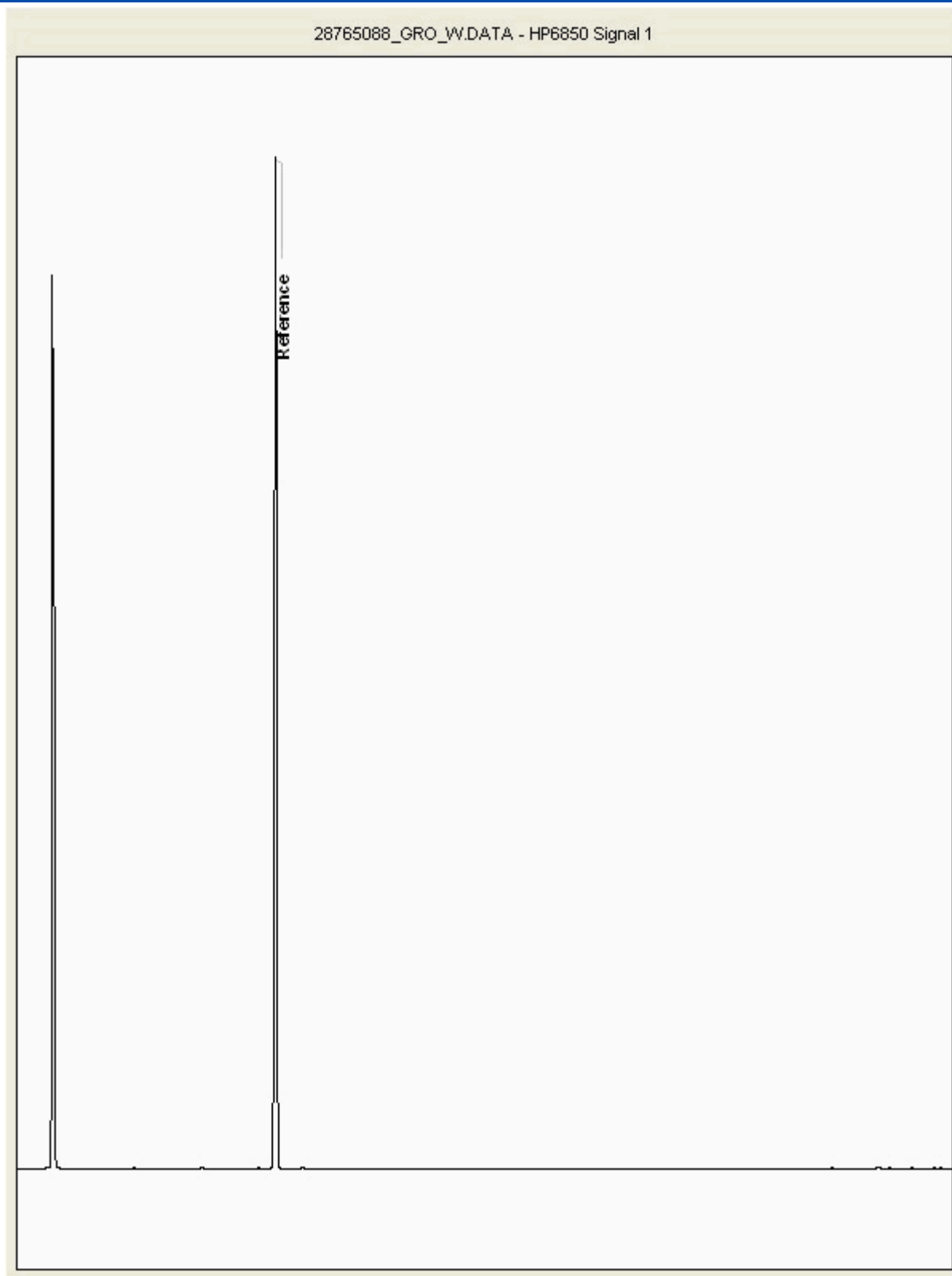
Superseded Report: 709240

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 28765088
Sample ID : Entrance

Depth : 0.00 - 0.00





CERTIFICATE OF ANALYSIS

Validated

SDG: 231011-65
Client Ref.: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

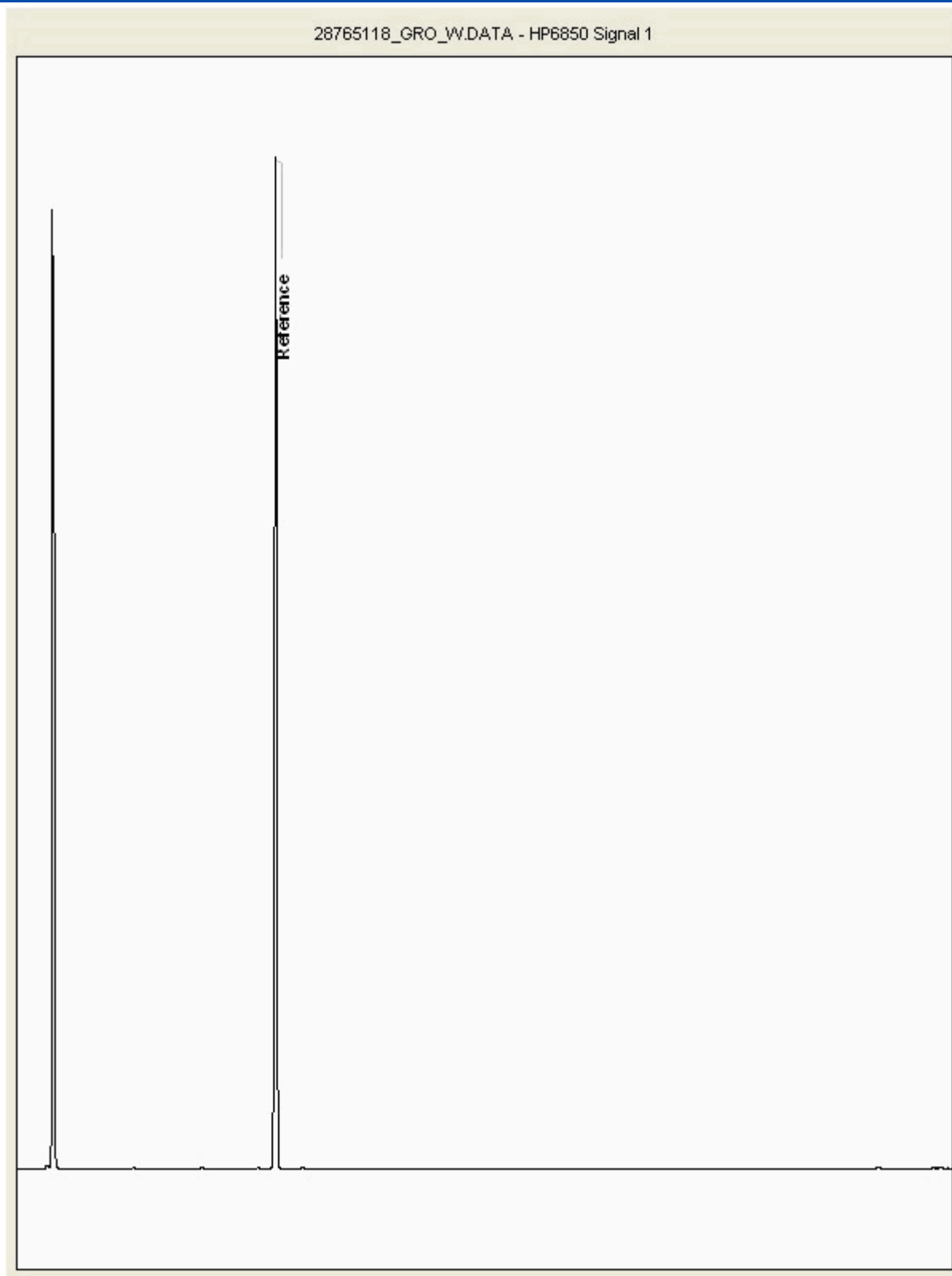
Superseded Report: 709240

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 28765118
Sample ID : Exit

Depth : 0.00 - 0.00





CERTIFICATE OF ANALYSIS

SDG: 231011-65
Client Ref: GWPR5623

Report Number: 710062
Location: Alton Pond, Hampshire

Superseded Report: 709240

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

General

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Tel: (01244) 528777
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Ground and Water Ltd
Head Office
2 The Long Barn
Norton Farm, Selborne Road
Alton
Hampshire
GU34 3NB

Attention: Aubyn Shortland

CERTIFICATE OF ANALYSIS

Date of report Generation:	09 November 2023
Customer:	Ground and Water Ltd
Sample Delivery Group (SDG):	231027-64
Your Reference:	GWPR5623
Location:	Alton Pond, Hampshire
Report No:	710364
Order Number:	GWPR5623

We received 1 sample on Friday October 27, 2023 and 1 of these samples were scheduled for analysis which was completed on Thursday November 09, 2023. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager



CERTIFICATE OF ANALYSIS

Validated

SDG: 231027-64
Client Ref.: GWPR5623

Report Number: 710364
Location: Alton Pond, Hampshire

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
28851960	TP01		1.10	26/10/2023

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 231027-64
Client Ref.: GWPR5623

Report Number: 710364
Location: Alton Pond, Hampshire

Superseded Report:

Results Legend



Test



No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

28851960

Customer
Sample Reference

TP01

AGS Reference

Depth (m)

1.10

Container

1kg Cardboard
Container

Sample Type

S

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

CEN Readings

All

NDPs: 0
Tests: 1

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 1

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0
Tests: 1

X

Fluoride

All

NDPs: 0
Tests: 1

X

Mercury Dissolved

All

NDPs: 0
Tests: 1

X

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Sample description

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 231027-64
Client Ref.: GWPR5623

Report Number: 710364
Location: Alton Pond, Hampshire

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
28851960	TP01	1.10	Dark Brown	Sludge	Vegetation	N/A

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



Superseded Report:

Page 5 of 9



CERTIFICATE OF ANALYSIS

Validated

SDG: 231027-64
Client Ref.: GWPR5623Report Number: 710364
Location: Alton Pond, Hampshire

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.231
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Alton Pond, Hampshire
Natural Moisture Content (%)	157
Dry Matter Content (%)	38.9

Case	
SDG	231027-64
Lab Sample Number(s)	28851960
Sampled Date	26-Oct-2023
Customer Sample Ref.	TP01
Depth (m)	1.10

Landfill Waste Acceptance
Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non- Hazardous Landfill	Hazardous Waste Landfill
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	-
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg) (EH_2D_AL)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	-
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00407	<0.0005	0.0407	<0.005	0.5	2	25
Barium	0.0424	<0.0002	0.424	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	<0.0003	<0.0003	<0.003	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00484	<0.001	0.0484	<0.01	4	50	200
Chloride	4.1	<2	41	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	18.6	<2	186	<20	1000	20000	50000
Total Dissolved Solids	249	<10	2490	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	4.38	<3	43.8	<30	500	800	1000

Leach Test Information

Date Prepared	28-Oct-2023
pH (pH Units)	8.14
Conductivity (µS/cm)	323
Volume Leachant (Litres)	0.760

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Leachates prepared in accordance with BS EN 12457 will be carried out at room temperature (20±5°C)

Stated limits are for guidance only and ALS Laboratories (UK) Limited cannot be held responsible for any discrepancies with current legislation

09/11/2023 07:35:42

07:35:35 09/11/2023



CERTIFICATE OF ANALYSIS

Validated

SDG: 231027-64
Client Ref.: GWPR5623

Report Number: 710364
Location: Alton Pond, Hampshire

Superseded Report:

Table of Results - Appendix

Method No	Description
PM024	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115	Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM090	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM104	Determination of Fluoride using the Kone Analyser
TM152	Analysis of Aqueous Samples by ICP-MS
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM259	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).



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SDG: 231027-64
Client Ref.: GWPR5623

Report Number: 710364
Location: Alton Pond, Hampshire

Superseded Report:

Test Completion Dates

Lab Sample No(s)	28851960
Customer Sample Ref.	TP01
AGS Ref.	
Depth	1.10
Type	Soil/Solid (S)

Anions by Kone (w)	02-Nov-2023
CEN 10:1 Leachate (1 Stage)	30-Oct-2023
CEN Readings	02-Nov-2023
Dissolved Metals by ICP-MS	02-Nov-2023
Dissolved Organic/Inorganic Carbon	09-Nov-2023
Fluoride	01-Nov-2023
Mercury Dissolved	02-Nov-2023
Moisture at 105C	28-Oct-2023
pH Value of Filtered Water	02-Nov-2023
Phenols by HPLC (W)	03-Nov-2023
Sample description	28-Oct-2023



CERTIFICATE OF ANALYSIS

SDG: 231027-64
Client Ref: GWPR5623

Report Number: 710364
Location: Alton Pond, Hampshire

Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

General

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
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Asbestos Type	Common Name
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Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

APPENDIX D:

Soil/Water Assessment Criteria

Ground and Water Limited

Soil Guideline Values and Generic Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'. At preliminary risk assessment stage, risks are evaluated qualitatively. As the site investigation progresses to a generic or detailed quantitative risk assessment, data is collected and assessment criteria are utilised to evaluate whether the contaminants represent an unacceptable risk to the identified receptors.

1. Contaminated Land Exposure Assessment Model (CLEA)

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

The CLEA Guidance comprises the following documents:

- 1) EA Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
- 2) EA Science Report SC050021/SR3: Updated technical background to the CLEA model.
- 3) EA CLEA Bulletin (2009).
- 4) CLEA software version 1.07 (2015)
- 5) Toxicological reports and SGV technical notes.

The CLEA guidance and tools:

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

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

1.1. Land-use Scenarios

The CLEA model uses a range of standard land-use scenarios to develop conceptual exposure models outlined in the following sections.

1.1.1. Residential (with home grown produce) (RwHP)

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

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

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur. (Residential without homegrown produce (RwoHP)).

1.1.2. Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

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

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

1.1.3. Commercial/Industrial

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

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

2. LQM/CIEH Suitable 4 Use Levels (S4UL)

For derivation of these S4UL reference must be made to:

Nathanial, P., McCaffrey, C., Gillet, A., Ogden, R., Nathanial, J., *The LQM/CIEH S4UL's for Human Health Risk Assessment*. Land Quality Press. 2015

2.1. S4UL Background

The Land Quality Management/Chartered Institute of Environmental Health (LQM/CIEH) S4UL for a given land use is the concentration of the contaminant in soil at which the predicted daily exposure,

as calculated by the CLEA software, equals the Health Criteria Value. The S4ULs have been derived for substances based on various generic land use and soil organic matter contents.

The final output for each contaminant represents a synthesis of new toxicological (and fate and transport) reviews published since the preparation of the 2nd edition LQM/CIEH GAC's (Nathanial et al., 2009).

In the derivation of LQM/CIEH S4UL's the principles of 'minimal' or 'tolerable' risk enshrined in SR2, which has not been withdrawn, has been maintained.

2.2. S4UL Land-use

S4UL's have been derived for the basic CLEA land-uses, as described in section 1.2, and for two new land uses:

- Public Open Spaces near Residential Housing (POSresi).
- Public Park (POSpark).

2.2.1. Public Open Spaces near Residential Housing (POSresi)

Includes the predominantly grassed areas adjacent to high density housing, the central green area on many 1930's – 1970's housing estates, and smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soils with planting. It is assumed that the close proximity to the place of residence will allow tracking back of soil to occur.

2.2.2. Public Park (POSpark)

An area of open space, usually owned and maintained by the local authority, provided for recreational uses including family visits and picnics, children's play area, informal sporting activities (not a dedicated sports pitch), and dog walking. It is assumed that tracking back of soils into places of residence will be negligible.

The following LQM/CIEH S4ULs (Copyright Land Quality Management Limited) have been reproduced with permission, to the publication number S4UL3072.

3. Category 4 Screening Levels (C4SLs)

In the case of Lead, no SGV or GAC has been published to date. This is likely to be due to the toxicity review that is currently being undertaken by the Environment Agency. In the absence of updated toxicity information the SGV derived using CLEA 1.07 methodology and related toxicity will be used.

The overall objective of the C4SLs research project was to assist the provision of technical guidance in support of Defra's revised Statutory Guidance (SG) for Part 2A of the Environmental Protection Act 1990 (Part 2A) (Defra, 2012a). Specifically, the project aimed to deliver:

- A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
- A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

To help achieve a more targeted approach to identifying and managing contaminated land in relation to the risk (or possibility) of harm to human health, the revised SG presented a new four category

system for considering land under Part 2A, ranging from Category 4, where there is no risk that land poses a significant possibility of significant harm (SPOSH), or the level of risk is low, to Category 1, where the risk that land poses a significant possibility of significant harm (SPOSH) is unacceptably high. More specific guidance on what type of land should be considered as Category 4 (Human Health) is provided in Paragraphs 4.21 and 4.22 of the revised SG, as follows:

“4.21 The local authority should consider that the following types of land should be placed into Category 4: Human Health:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.

(c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).

4.22 The local authority may consider that land other than the types described in paragraph 4.21 should be placed into Category 4: Human Health if following a detailed quantitative risk assessment it is satisfied that the level of risk posed is sufficiently low.”

The C4SLs are intended as “relevant technical tools” (in relation to Paragraph 4.21(c)) to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

“The new statutory guidance will bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land.”

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

“SGVs are guidelines on the level of long-term human exposure to individual chemicals in soil that, unless stated otherwise, are tolerable or pose a minimal risk to human health.”

The implication of Paragraph 47(h) of the IA is that minimal risk is well within Category 4 and that the C4SLs should describe a higher level of risk which, whilst not minimal, can still be considered low enough to allow a judgement to be made that land containing substances at, or below, the C4SLs would typically fall within Category 4. This reflects Paragraph 4.20 of the revised SG, which states:

“4.20 The local authority should not assume that land poses a significant possibility of significant harm if it considers that there is no risk or that the level of risk posed is low. For the purposes of this Guidance, such land is referred to as a “Category 4: Human Health” case. The authority may decide that the land is a Category 4: Human Health case as soon as it considers it has evidence to this effect, and this may happen at any stage during risk assessment including the early stages.”

C4SLs, therefore, should not be viewed as “SPOSH levels” and they should not be used as a legal trigger for the determination of land under Part 2A.

The generic screening values referred to before usually take the form of risk-based Soil Guideline Values (SGVs) or other Generic Assessment Criteria (GACs) that are most typically derived using the Environment Agency’s Contaminated Land Exposure Assessment (CLEA) model, as described in the Environment Agency’s SR2, SR3 and SR7 reports (EA, 2009b & c; EA, 2008). It is anticipated that C4SLs will be used in a similar manner; as generic screening criteria that can be used within a GQRA, albeit describing a higher level of risk than the SGVs.

The suggested approach to the development of C4SLs consists of the retention and use of the CLEA framework, modified according to considerations of the underlying science within the context of Defra’s policy objectives relating to the revised SG. Within this context, it is suggested that the development of C4SLs may be achieved in one of three ways, namely:

- By modifying the toxicological parameters used within CLEA (while maintaining current exposure parameters);
- By modifying the exposure parameters embedded within CLEA (while maintaining current toxicological “minimal risk” interpretations); and
- By modifying both toxicological and exposure parameters.

There is also a suggested check on “other considerations” (e.g., background levels, epidemiological data, sources of uncertainty) within the approach, applicable to all three options.

It is suggested that a new term is defined for the toxicological guidance values associated with the derivation of C4SLs – a Low Level of Toxicological Concern (LLTC). A LLTC should represent an intake of low concern that remains suitably protective of health, and definitely does not approach an intake level that could be defined as SPOSH.

4. CL:AIRE Generic Assessment Criteria (GAC)

For derivation of the CL:AIRE Generic Assessment Criteria (GAC) reference should be made to the following report:

CL:AIRE, *The Soil Generic Assessment Criteria for Human Health Risk Assessment. Contaminated Land: Applications in the Real Environment*. 2009.

Within this report, Contaminated Land: Applications in Real Environments (CL:AIRE) provided Generic Assessment Criteria (GAC) in accordance with the CLEA software and the principles outlined previously for a further 35 contaminants sometimes encountered on land affected by contamination.

5. SoBRA Acute GAC

The Society of Brownfield Risk Assessment (SoBRA) identified that most human health risk assessments focus on the chronic risks arising from long-term exposure to specific substances. As chronic risks often occur at lower doses than acute risks, they are often the key drivers, however, in some instances the acute dose may also be an important consideration within risk assessments.

The methodology for deriving the acute GAC were related to two distinct receptor groups:

- Members of the public, where the 'critical' receptor for this group will typically be a female child, which is consistent with CLEA residential and Public Open Space/allotments land-uses;
- Workers involved with excavations. The critical receptor for this group is assumed to be a female working adult, without the use of PPE.

The acute GACs relate to short term exposure of high concentrations of a substance that lead to acute effects. They are not considered to be average exposures across a specific / defined area. As a result, the GACs should be normally be compared with the maximum likely concentration that the individual may be exposed to, and not the average concentration within a specific area.

The SoBRA acute GAC will primarily be used for contaminants that do not currently have any GAC, most notably Cyanide.

6. Detailed Quantitative Risk Assessments (DQRA)

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

- | |
|---|
| <ul style="list-style-type: none">▪ Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation.▪ Developing more accurate parameters using site data. |
|---|

7. Phytotoxicity

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

- BS3882:2015 – *Specification for Topsoil*

The trigger values are relevant only to those contaminants, where present in excess, have the potential to inhibit plant growth, or kill plants (Cu, Ni and Zn). The criteria have been based on a wide range of planting that are common within a multi-purpose topsoil.

8. Statistical Tests

DEFRA R&D Publication CLR 7 (DOE 1994) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

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

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

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

CL:AIRE published guidance in 2020, *Guidance in comparing soil contamination data with a critical concentration*, superseding the CL:AIRE/CIEH 2008 report of the same name. The guidance provides ways to assist land contamination stakeholders to apply statistical methods to their data to enable decisions under the legislative framework; either planning system or Part 2A of the Environmental Protection Act 1990.

The use of the statistical tests should only be applied if the following statements are valid for the datasets:

- Averaging areas, as well as the smallest area of concern have been identified on the basis of the CSM, including the desk study and/or the site walkover;
- The sample locations were chosen using a simple random, stratified random or stratified systematic (square, herringbone or triangular grid) sampling pattern, rather than being targeted to locations suspected of being contaminated;
- The sample locations are relatively evenly spread across the area and are not clustered, to avoid giving undue weight to some parts of the site over others in the calculated statistics;
- The analyses do not suggest a hotspot or outlier of contamination that should be treated as a separate zone. This has been established by a histogram and/or a names statistical test;
- The sample locations are all taken from one population (i.e. the same material);
- Where an averaging zone encompasses several averaging areas, analyses do not show a spatial trend or other spatial pattern across that zone; and
- The number of samples has been shown to be sufficient for a statistical analysis.

Any included statistical spreadsheet is based on an in-house method of statistical analysis, in line with those outlined within the CL:AIRE guidance (2020).

Treatment of Hot-Spots

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

9. Ground and Water Limited Soil Assessment Criteria

The Soil Assessment Criteria used in the preparation of the Generic Quantitative Risk Assessment are tabulated in the following pages, where the source of each has been outlined in the previous sections.

9.1. Inorganics

SoBRA – Acute Generic Assessment Criteria						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Cyanide	24	24	24	1400	24	24

9.2. Metals

C4SL Low Level of Toxicological Concern						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Lead	< 200	< 310	< 80	< 2300	< 630	< 1300

LQM/CIEH Suitable 4 Use Levels – Metals and Semi-metals						
Determinand	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Arsenic	37	40	43	640	79	170
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11000	45	240000	21000	46000
Cadmium	11	85	1.9	190	120	532
Chromium (III)	910	910	18000	8600	1500	33000
Chromium (VI)	6	6	1.8	33	7.7	220
Copper	2400	7100	520	68000	12000	44000
Elemental Mercury	1.2	1.2	21	58	16	30
Inorganic Mercury	40	56	19	1100	120	240
Methylmercury	11	15	6	320	40	68
Nickel	130	180	53	980	230	800
Selenium	250	430	88	12000	1100	1800
Vanadium	410	1200	91	9000	2000	5000
Zinc	3700	40000	620	730000	81000	170000

Phytotoxicity (Harmful to Plants) Threshold Trigger Values			
Determinand	Soil pH < 6.0 (mg/kg)	Soil pH 6.0 – 7.0 (mg/kg)	Soil pH > 7.0 (mg/kg)
Copper	100	135	200
Nickel	60	75	110
Zinc	200	200	300
Notes: BS3882:2015 – <i>Specification for Topsoil</i> . Based on a wide range of common plants that will be exposed to multi-purpose topsoil. Toxicity of contaminant may also be impacted by pH of soils. Site observation of plant vitality may give additional guidance.			

CL:AIRE Soil Generic Assessment Criteria				
Determinand	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Antimony	ND	550	ND	7500
Barium	ND	1300	ND	22000
Molybdenum	ND	670	ND	17000
ND – Not derived				

9.3. Total Petroleum Hydrocarbons (TPHs)

9.3.1. BTEX Compounds

LQM/CIEH Suitable 4 Use Levels – BTEX Compounds							
Determinand	Soil Organic Matter	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Benzene	1.0% SOM	0.087	0.38	0.017	27	72	90
	2.5% SOM	0.170	0.70	0.034	47	72	100
	6.0% SOM	0.370	1.40	0.075	90	73	110
Toluene	1.0% SOM	130	880	22	56000	56000	87000
	2.5% SOM	290	1900	51	110000	56000	95000
	6.0% SOM	660	3900	120	180000	56000	100000
Ethylbenzene	1.0% SOM	47	83	16	5700	24000	17000
	2.5% SOM	110	190	39	13000	24000	22000
	6.0% SOM	260	440	91	27000	25000	27000
o-Xylene	1.0% SOM	60	88	28	6600	41000	17000
	2.5% SOM	140	210	67	15000	42000	24000
	6.0% SOM	330	480	160	33000	43000	33000
m-Xylene	1.0% SOM	59	82	31	6200	41000	17000
	2.5% SOM	140	190	74	14000	42000	24000
	6.0% SOM	320	450	170	31000	43000	33000
p-Xylene	1.0% SOM	56	79	29	5900	41000	17000
	2.5% SOM	130	180	69	14000	42000	23000
	6.0% SOM	310	430	160	30000	43000	31000

SOM = Soil Organic Matter Content (%)

9.3.2. Total Petroleum Hydrocarbons – Aliphatic

LQM/CIEH Suitable 4 Use Levels For TPH							
Aliphatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-6	1.0% SOM	42	42	730	3,200 (304) sol	570,000 (304) sol	95,000 (304) sol
	2.5% SOM	78	78	1,700	5,900 (558) sol	590,000	130,000 (558) sol
	6.0% SOM	160	160	3,900	12,000 (1150) sol	600,000 (1150) sol	180,000 (1150) sol
EC >6-8	1.0% SOM	100	100	2,300	7,800 (144) sol	600,000	150,000 (144) sol
	2.5% SOM	230	230	5,600	17,000 (322) sol	610,000	220,000 (322) sol
	6.0% SOM	530	530	13,000	40,000 (736) sol	620,000	320,000 (736) sol
EC >8-10	1.0% SOM	27	27	320	2,000 (78) sol	13,000	14,000 (78) sol
	2.5% SOM	65	65	770	4,800 (118) vap	13,000	18,000 (118) vap
	6.0% SOM	150	150	1,700	11,000 (451) vap	13,000	21,000 (451) vap
EC >10-12	1.0% SOM	130 (48) vap	130 (48) vap	2,200	9,700 (48) sol	13,000	21,000 (48) sol
	2.5% SOM	330 (118) vap	330 (118) vap	4,400	23,000 (118) vap	13,000	23,000 (118) vap
	6.0% SOM	760 (283) vap	760 (283) vap	7,300	47,000 (283) vap	13,000	24,000 (283) vap
EC >12-16	1.0% SOM	1,100 (24) sol	1,100 (24) sol	11,000	59,000 (24) sol	13,000	25,000 (24) sol
	2.5% SOM	2,400 (59) sol	2,400 (59) sol	13,000	82,000 (59) sol	13,000	25,000 (59) sol
	6.0% SOM	4,300 (142) sol	4,400 (142) sol	13,000	90,000 (142) sol	13,000	26,000 (142) sol
EC >16-35	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000
EC >35-44	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000

SOM = Soil Organic Matter Content (%)

vap – GAC presented exceeds the vapour saturation limit, which is presented in brackets.

sol – GAC presented exceeds the soil saturation limit, which is presented in brackets.

9.3.3. Total Petroleum Hydrocarbons – Aromatic

LQM/CIEH Suitable 4 Use Levels For TPH							
Aromatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-7 (Benzene)	1.0% SOM	70	370	13	26,000 (1220) ^{sol}	56,000	76,000 (1220) ^{sol}
	2.5% SOM	140	690	27	46,000 (2260) ^{sol}	56,000	84,000 (2260) ^{sol}
	6.0% SOM	300	1,400	57	86,000 (4710) ^{sol}	56,000	92,000 (4710) ^{sol}
EC >7-8 (Toluene)	1.0% SOM	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{sol}
	2.5% SOM	290	1,800	51	110,000 (1920) ^{sol}	56,000	95,000 (1920) ^{sol}
	6.0% SOM	660	3,900	120	180,000 (4360) ^{vap}	56,000	100,000 (4360) ^{vap}
EC >8-10	1.0% SOM	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}
	2.5% SOM	83	110	21	8,100 (1500) ^{vap}	5,000	8,500 (1500) ^{vap}
	6.0% SOM	190	270	51	17,000 (3850) ^{vap}	5,000	9,300 (3580) ^{vap}
EC >10-12	1.0% SOM	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}
	2.5% SOM	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (889) ^{sol}
	6.0% SOM	380	1,200	74	34,000 (2150) ^{sol}	5,000	10,000
EC >12-16	1.0% SOM	140	1,800	23	36,000 (169) ^{sol}	5,100	10,000
	2.5% SOM	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000
	6.0% SOM	660	2,500	130	38,000	5,000	10,000
EC >16-21	1.0% SOM	260	1,900	46	28,000	3,800	7,600
	2.5% SOM	540	1,900	110	28,000	3,800	7,700
	6.0% SOM	930	1,900	260	28,000	3,800	7,800
EC >21-35	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >35-44	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >44-70	1.0% SOM	1,600	1,900	1,200	28,000	3,800	7,800
	2.5% SOM	1,800	1,900	2,100	28,000	3,800	7,800
	6.0% SOM	1,900	1,900	3,000	28,000	3,800	7,900
SOM = Soil Organic Matter Content (%)							
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

9.4. Polycyclic Aromatic Hydrocarbons (PAHs)

LQM/CIEH Suitable 4 Use Levels For Polycyclic Aromatic Hydrocarbons (PAHs)							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Acenaphthene	1.0% SOM	210	3,000 (57.0) ^{sol}	34	84,000(57.0) ^{sol}	15,000	29,000
	2.5% SOM	510	4,700(141) ^{sol}	85	97,000(141) ^{sol}	15,000	30,000
	6.0% SOM	1100	6,000(336) ^{sol}	200	100,000	15,000	30,000
Acenaphthylene	1.0% SOM	170	2,900(86.1) ^{sol}	28	83,000(86.1) ^{sol}	15,000	29,000
	2.5% SOM	420	4,600(212) ^{sol}	69	97,000(212) ^{sol}	15,000	30,000
	6.0% SOM	920	6,000(506) ^{sol}	160	100,000	15,000	30,000
Anthracene	1.0% SOM	2,400	31,000(1.17) ^{vap}	380	520,000	74,000	150,000
	2.5% SOM	5,400	35,000	950	540,000	74,000	150,000
	6.0% SOM	11,000	37,000	2,200	540,000	74,000	150,000
Benzo(a)anthracene	1.0% SOM	7.20	11	2.90	170	29	49
	2.5% SOM	11	14	6.50	170	29	56
	6.0% SOM	13	15	13	180	29	62
Benzo(a)pyrene	1.0% SOM	2.20	3.20	0.97	35	5.70	11
	2.5% SOM	2.70	3.20	2.00	35	5.70	12
	6.0% SOM	3.00	3.20	3.50	36	5.70	13
Benzo(b)fluoranthene	1.0% SOM	2.60	3.90	0.99	44	7.10	13
	2.5% SOM	3.30	4.00	2.10	44	7.20	15
	6.0% SOM	3.70	4.00	3.90	45	7.20	16
Benzo(ghi)perylene	1.0% SOM	320	360	290	3,900	640	1,400
	2.5% SOM	340	360	470	4,000	640	1,500
	6.0% SOM	350	360	640	4,000	640	1,600
Benzo(k)fluoranthene	1.0% SOM	77	110	37	1,200	190	370
	2.5% SOM	93	110	75	1,200	190	410
	6.0% SOM	100	110	130	1,200	190	440
Chrysene	1.0% SOM	15	30	4.10	350	57	93
	2.5% SOM	22	31	9.40	350	57	110
	6.0% SOM	27	32	19	350	57	120
Dibenzo(ah)anthracene	1.0% SOM	0.24	0.31	0.14	3.50	0.57	1.10
	2.5% SOM	0.28	0.32	0.27	3.50	0.57	1.30
	6.0% SOM	0.30	0.32	0.43	3.60	0.58	1.40
Fluoranthene	1.0% SOM	280	1,500	52	23,000	3,100	6,300
	2.5% SOM	560	1,600	130	23,000	3,100	6,300
	6.0% SOM	890	1,600	290	23,000	3,100	6,300
Flourene	1.0% SOM	170	2,800 (30.9) ^{sol}	27	63,000(30.9) ^{sol}	9,900	20,000
	2.5% SOM	400	3,800(76.5) ^{sol}	67	68,000	9,900	20,000
	6.0% SOM	860	4,500(183) ^{sol}	160	71,000	9,900	20,000
Indeno(123-cd)pyrene	1.0% SOM	27	45	9.50	500	82	150
	2.5% SOM	36	46	21	510	82	170
	6.0% SOM	41	46	39	510	82	180
Naphthalene	1.0% SOM	2.30	2.6	4.10	190 (76.4) ^{sol}	4,900	1,200(76.4) ^{sol}
	2.5% SOM	5.60	5.6	10	460 (183) ^{sol}	4,900	1,900(183) ^{sol}
	6.0% SOM	13	13	24	1,100 (432) ^{sol}	4,900	3,000
Phenanthrene	1.0% SOM	95	1,300(183) ^{sol}	15	22,000	3,100	6,200
	2.5% SOM	220	1,500	38	22,000	3,100	6,200
	6.0% SOM	440	1,500	90	23,000	3,100	6,300
Pyrene	1.0% SOM	620	3,700	110	54,000	7,400	15,000
	2.5% SOM	1200	3,800	270	54,000	7,400	15,000
	6.0% SOM	2000	3,800	620	54,000	7,400	15,000
Coal Tar (Benzo(a)pyrene used as marker compound)	1.0% SOM	0.79	1.2	0.32	15	2.20	4.40
	2.5% SOM	0.98	1.2	0.67	15	2.20	4.70
	6.0% SOM	1.10	1.2	1.20	15	2.20	4.80
SOM = Soil Organic Matter Content (%)							
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

9.5. Volatile and Semi-volatile Organic Compounds

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
<i>Chloroalkanes & alkenes</i>							
1,2 Dichloroethane	1.0% SOM	0.11	0.16	0.054	12	300	300
	2.5% SOM	0.18	0.24	0.100	17	310	330
	6.0% SOM	0.31	0.41	0.190	29	310	380
1,1,2,2 Tetrachloroethane	1.0% SOM	1.60	3.90	0.41	270	1,400	1,800
	2.5% SOM	3.40	8.00	0.89	550	1,400	2,100
	6.0% SOM	7.50	17	2.00	1,100	1,400	2,300
1,1,1,2 Tetrachloroethane	1.0% SOM	1.20	1.50	0.79	110	1,400	1,500
	2.5% SOM	2.80	3.50	1.90	250	1,400	1,800
	6.0% SOM	6.40	8.20	4.40	560	1,400	2,100
Tetrachloroethene	1.0% SOM	0.31	0.32	2.0	24	3,200	1,400
	2.5% SOM	0.70	0.71	4.8	55	3,300	1,900
	6.0% SOM	1.60	1.60	11.0	130	3,400	2,500
1,1,1 Trichloroethane	1.0% SOM	8.80	9.00	48	660	140,000	57,000 ^{vap} (1425)
	2.5% SOM	18	18	110	1,300	140,000	76,000 ^{vap} (2915)
	6.0% SOM	39	40	240	3,000	140,000	100,000 ^{vap} (6392)
Tetrachloromethene	1.0% SOM	0.026	0.026	0.45	2.90	890	190
	2.5% SOM	0.056	0.056	1.00	6.30	920	270
	6.0% SOM	0.130	0.130	2.40	14	950	400
Trichloroethene	1.0% SOM	0.0093	0.0097	0.0320	0.73	76	41
	2.5% SOM	0.0200	0.0200	0.0720	1.50	78	54
	6.0% SOM	0.0430	0.0450	0.1600	3.40	79	69
Trichloromethane	1.0% SOM	0.91	1.20	0.42	99	2,500	2,600
	2.5% SOM	1.70	2.10	0.83	170	2,500	2,800
	6.0% SOM	3.40	4.20	1.70	350	2,500	3,100
Vinyl Chloride	1.0% SOM	0.0064	0.0150	0.0017	1.1	7.8	18
	2.5% SOM	0.0100	0.0190	0.0031	1.4	7.8	19
	6.0% SOM	0.0170	0.0290	0.0058	2.2	7.8	19
<i>Explosives</i>							
2,4,6 Trinitrotoluene	1.0% SOM	1.60	65	0.24	1,000	130	260
	2.5% SOM	3.70	66	0.58	1,000	130	270
	6.0% SOM	8.10	66	1.40	1,000	130	270
RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)	1.0% SOM	120	13,000	17	210,000	26,000	49,000(18.7) ^{sol}
	2.5% SOM	250	13,000	38	210,000	26,000	51,000
	6.0% SOM	540	13,000	85	210,000	27,000	53,000
HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)	1.0% SOM	5.70	67,00	0.86	110,000	13,000	23,000(0.35) ^{vap}
	2.5% SOM	13	67,00	1.90	110,000	13,000	23,000(0.39) ^{vap}
	6.0% SOM	26	67,00	3.90	110,000	13,000	24,000(0.48) ^{vap}
Atrazine	1.0% SOM	3.30	610	0.50	9,300	1,200	2,300
	2.5% SOM	7.60	620	1.20	9,400	1,200	2,400
	6.0% SOM	17.40	620	2.70	9,400	1,200	2,400

^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Pesticides							
Aldrin	1.0% SOM	5.70	7.30	3.20	170	18	30
	2.5% SOM	6.60	7.40	6.10	170	18	31
	6.0% SOM	7.10	7.50	9.60	170	18	31
Dieldrin	1.0% SOM	0.97	7.00	0.17	170	18	30
	2.5% SOM	2.00	7.30	0.41	170	18	30
	6.0% SOM	3.50	7.40	0.96	170	18	31
Dichlorvos	1.0% SOM	0.032	6.40	0.0049	140	16	26
	2.5% SOM	0.066	6.50	0.0100	140	16	26
	6.0% SOM	0.140	6.60	0.0220	140	16	27
Alpha - Endosulfan	1.0% SOM	7.40	160(0.003) ^{vap}	1.20	5,600(0.003) ^{vap}	1,200	2,400
	2.5% SOM	18	280(0.007) ^{vap}	2.90	7,400(0.007) ^{vap}	1,200	2,400
	6.0% SOM	41	410(0.016) ^{vap}	6.80	8,400(0.016) ^{vap}	1,200	2,400
Beta - Endosulfan	1.0% SOM	7.00	190(0.00007) ^{vap}	1.10	6,300(0.00007) ^{vap}	1,200	2,400
	2.5% SOM	17	320(0.0002) ^{vap}	2.70	7,800(0.0002) ^{vap}	1,200	2,400
	6.0% SOM	39	440(0.0004) ^{vap}	6.40	8700	1,200	2,500
Alpha - Hexachlorocyclohexanes	1.0% SOM	0.23	6.90	0.035	170	24	47
	2.5% SOM	0.55	9.20	0.087	180	24	48
	6.0% SOM	1.20	11	0.210	180	24	48
Beta - Hexachlorocyclohexanes	1.0% SOM	0.085	3.70	0.013	65	8.10	15
	2.5% SOM	0.200	3.80	0.032	65	8.10	15
	6.0% SOM	0.460	3.80	0.077	65	8.10	16
Gamma - Hexachlorocyclohexanes	1.0% SOM	0.06	2.90	0.0092	67	8.2	14
	2.5% SOM	0.14	3.30	0.0230	69	8.2	15
	6.0% SOM	0.33	3.50	0.0540	70	8.2	15
Chlorobenzenes							
Chlorobenzene	1.0% SOM	0.46	0.46	5.90	56	11,000	1,300(675) ^{sol}
	2.5% SOM	1.00	1.00	14	130	13,000	2,000(1520) ^{sol}
	6.0% SOM	2.40	2.40	32	290	14,000	2,900
1,2-Dichlorobenzene	1.0% SOM	23	24	94	2,000 (571) ^{sol}	90,000	24,000(571) ^{sol}
	2.5% SOM	55	57	230	4,800 (1370) ^{sol}	95,000	36,000(1370) ^{sol}
	6.0% SOM	130	130	540	11,000 (3240) ^{sol}	98,000	51,000(3240) ^{sol}
1,3-Dichlorobenzene	1.0% SOM	0.40	0.44	0.25	30	300	390
	2.5% SOM	1.00	1.10	0.60	73	300	440
	6.0% SOM	2.30	2.50	1.50	170	300	470
1,4-Dichlorobenzene	1.0% SOM	61	61	15	4,400 (224) ^{vap}	17,000 ^g	36,000 (224) ^{vap}
	2.5% SOM	150	150	37	10,000 (540) ^{vap}	17,000 ^g	36,000 (540) ^{vap}
	6.0% SOM	350	350	88 ^g	25,000 (1280) ^{vap}	17,000 ^g	36,000 (1280) ^{vap}
1,2,3,-Trichlorobenzene	1.0% SOM	1.50	1.50	4.70	102	1,800	770(134) ^{vap}
	2.5% SOM	3.60	3.70	12	250	1,800	1,100(330) ^{vap}
	6.0% SOM	8.60	8.80	28	590	1,800	1,600(789) ^{vap}
1,2,4,-Trichlorobenzene	1.0% SOM	2.60	2.60	55	220	15,000	1,700(318) ^{vap}
	2.5% SOM	6.40	6.40	140	530	17,000	2,600(786) ^{vap}
	6.0% SOM	15	15	320	1,300	19,000	4,000(1880) ^{vap}
1,3,5,-Trichlorobenzene	1.0% SOM	0.33	0.33	4.70	23	1,700	380(36.7) ^{vap}
	2.5% SOM	0.81	0.81	12	55	1,700	590(90.8) ^{vap}
	6.0% SOM	1.90	1.90	140	130	1,800	860(217) ^{vap}
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets.							
^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds							
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Chlorobenzenes (cont.)							
1,2,3,4,- Tetrachlorobenzene	1.0% SOM	15	24	4.40	1,700(122) ^{vap}	830	1,500(122) ^{vap}
	2.5% SOM	36	56	11	3,080(304) ^{vap}	830	1,600
	6.0% SOM	78	120	26	4,400(728) ^{vap}	830	1,600
1,2,3,5,- Tetrachlorobenzene	1.0% SOM	0.66	0.75	0.38	49(39.4) ^{vap}	78	110(39) ^{vap}
	2.5% SOM	1.60	1.90	0.90	120(98.1) ^{vap}	79	120
	6.0% SOM	3.70	4.30	2.20	240(235) ^{vap}	79	130
1,2,4, 5,- Tetrachlorobenzene	1.0% SOM	0.33	0.73	0.06	42(19.7) ^{sol}	13	25
	2.5% SOM	0.77	1.70	0.16	72(49.1) ^{sol}	13	26
	6.0% SOM	1.60	3.50	0.37	96	13	26
Pentachlorobenzene	1.0% SOM	5.80	19	1.20	640(43.0) ^{sol}	100	190
	2.5% SOM	12	30	3.10	770(107) ^{sol}	100	190
	6.0% SOM	22	38	7.00	830	100	190
Hexachlorobenzene	1.0% SOM	1.80(0.20) ^{vap}	4.10 (0.20) ^{vap}	0.47	110(0.20) ^{vap}	16	30
	2.5% SOM	3.30(0.50) ^{vap}	5.70 (0.50) ^{vap}	1.10	120	16	30
	6.0% SOM	4.90	6.70 (1.2) ^{vap}	2.50	120	16	30
Phenols & Chlorophenols							
BTEX	1.0% SOM	280	750	66	760 ^{dir} (31,000)	760 ^{dir} (11,000)	760 ^{dir} (8,600)
	2.5% SOM	550	1,300	140	1,500 ^{dir} (35,000)	1,500 ^{dir} (11,000)	1,500 ^{dir} (9,700)
	6.0% SOM	1100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir} (11,000)	3,200 ^{dir} (11,000)
Chlorophenols (4 Congeners)	1.0% SOM	0.87	94	0.13	3,500	620	1,100
	2.5% SOM	2.00	150	0.30	4,000	620	1,100
	6.0% SOM	4.50	210	0.70	4,300	620	1,100
Pentachlorophenols	1.0% SOM	0.22	27(16.4) ^{vap}	0.03	400	60	110
	2.5% SOM	0.52	29	0.08	400	60	120
	6.0% SOM	1.20	31	0.19	400	60	120
Others							
Carbon Disulphide	1.0% SOM	0.14	0.14	4.80	11	11,000	1,300
	2.5% SOM	0.29	0.29	10	22	11,000	1,900
	6.0% SOM	0.62	0.62	23	47	12,000	2,700
Hexachloro-1,3- Butadiene	1.0% SOM	0.29	0.32	0.25	31	25	48
	2.5% SOM	0.70	0.78	0.61	68	25	50
	6.0% SOM	1.60	1.80	1.40	120	25	51
^{vap} – GAC presented exceeds the vapour saturation limit, which is presented in brackets. ^{sol} – GAC presented exceeds the soil saturation limit, which is presented in brackets.							

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds					
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
1,1,2 Trichloroethane	1.0% SOM	0.60	0.88	0.28	94
	2.5% SOM	1.20	1.8	0.61	190
	6.0% SOM	2.70	3.9	1.40	400
1,1-Dichloroethane	1.0% SOM	2.40	2.50	9.20	280
	2.5% SOM	3.90	4.10	17	450
	6.0% SOM	7.40	7.70	35	850
1,1-Dichloroethene	1.0% SOM	0.23	0.23	2.80	26
	2.5% SOM	0.40	0.41	5.60	46
	6.0% SOM	0.82	0.82	12	92
1,2,4-Trimethylbenzene	1.0% SOM	0.35	0.41	0.38	42
	2.5% SOM	0.85	0.99	0.93	99
	6.0% SOM	2.00	2.30	2.20	220
1,2-Dichloropropane	1.0% SOM	0.024	0.024	0.62	3.3
	2.5% SOM	0.042	0.042	1.20	5.9
	6.0% SOM	0.084	0.085	2.60	12
2,4-Dimethylphenol	1.0% SOM	19	210	3.10	16000*
	2.5% SOM	43	410	7.20	24000*
	6.0% SOM	97	730	17	30000*
2,4-Dinitrotoluene	1.0% SOM	1.50	170*	0.22	3700*
	2.5% SOM	3.20	170	0.49	3700*
	6.0% SOM	7.20	170	1.10	3800*
2,6-Dinitrotoluene	1.0% SOM	0.78	78	0.12	1900*
	2.5% SOM	1.70	84	0.27	1900*
	6.0% SOM	3.90	87	0.61	1900*
2-Chloronaphthalene	1.0% SOM	3.70	3.80	40	390*
	2.5% SOM	9.20	9.30	98	960*
	6.0% SOM	22	22	230	2200*
Biphenyl	1.0% SOM	66*	220*	14	18000*
	2.5% SOM	160	500*	35	33000*
	6.0% SOM	360	980*	83	48000*
Bis (2-ethylhexyl) phthalate	1.0% SOM	280*	2700*	47*	85000*
	2.5% SOM	610*	2800*	120*	86000*
	6.0% SOM	1100*	2800*	280*	86000*
Bromobenzene	1.0% SOM	0.87	0.91	3.2	97
	2.5% SOM	2.0	2.1	7.6	220
	6.0% SOM	4.7	4.9	18	520
Bromodichloromethane	1.0% SOM	0.016	0.019	0.016	2.1
	2.5% SOM	0.030	0.034	0.032	3.7
	6.0% SOM	0.061	0.070	0.068	7.6
Bromoform	1.0% SOM	2.8	5.2	0.95	760
	2.5% SOM	5.9	11	2.1	1500
	6.0% SOM	13	23	4.6	3100
Butyl benzyl phthalate	1.0% SOM	1400*	42000*	220*	940000*
	2.5% SOM	3300*	44000*	550*	940000*
	6.0% SOM	7200*	44000*	1300*	950000*

*soil concentration above saturation limit

VOC and SVOC table continued overleaf

VOC and SVOC table continued from previous page

CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds					
Determinands		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Chloroethane	1.0% SOM	8.3	8.4	110	960
	2.5% SOM	11	11	200	1300
	6.0% SOM	18	18	380	2100
Chloromethane	1.0% SOM	0.0083	0.0085	0.066	1.0
	2.5% SOM	0.0098	0.0099	0.13	1.2
	6.0% SOM	0.013	0.013	0.23	1.6
<i>Cis</i> 1,2 Dichloroethene	1.0% SOM	0.11	0.12	0.26	14
	2.5% SOM	0.19	0.20	0.50	24
	6.0% SOM	0.37	0.39	1.0	47
Dichloromethane	1.0% SOM	0.58	2.10	0.10	270
	2.5% SOM	0.98	2.80	0.19	360
	6.0% SOM	1.70	4.50	0.34	560
Diethyl Phthalate	1.0% SOM	120*	1800*	19*	150000*
	2.5% SOM	260*	3500*	41*	220000*
	6.0% SOM	570*	6300*	94*	290000*
Di- <i>n</i> -butyl phthalate	1.0% SOM	13*	450*	2.00	15000*
	2.5% SOM	31*	450*	5.00	15000*
	6.0% SOM	67*	450*	12	15000*
Di- <i>n</i> -octyl phthalate	1.0% SOM	2300*	3400*	940*	89000*
	2.5% SOM	2800*	3400*	2100*	89000*
	6.0% SOM	3100*	3400*	3900*	89000*
Hexachloroethane	1.0% SOM	0.20	0.22	0.27	22*
	2.5% SOM	0.48	0.54	0.67	53*
	6.0% SOM	1.10	1.30	1.60	120*
Isopropylbenzene	1.0% SOM	11	12	32	1400*
	2.5% SOM	27	28	79	3300*
	6.0% SOM	64	67	190	7700*
Methyl <i>tert</i> -butyl ether (MTBE)	1.0% SOM	49	73	23	7900
	2.5% SOM	84	120	44	13000
	6.0% SOM	160	220	90	24000
Propylbenzene	1.0% SOM	34	40	34	4100*
	2.5% SOM	82	97	83	9700*
	6.0% SOM	190	230	200	21000*
Styrene	1.0% SOM	8.10	35	1.60	3300*
	2.5% SOM	19	78	3.70	6500*
	6.0% SOM	43	170	8.70	11000*
Total Cresols (2-, 3-, and 4-methylphenol)	1.0% SOM	80	3700	12	160000
	2.5% SOM	180	5400	27	180000*
	6.0% SOM	400	6900	63	180000*
<i>Trans</i> 1,2 Dichloroethene	1.0% SOM	0.19	0.19	0.93	22
	2.5% SOM	0.34	0.35	1.90	40
	6.0% SOM	0.70	0.71	0.24	81
Tributyl tin oxide	1.0% SOM	0.25	1.40	0.042	130*
	2.5% SOM	0.59	3.10	0.100	180*
	6.0% SOM	1.30	5.70	0.240	200*

*soil concentration above saturation limit

Ground and Water Limited

Waters Guideline Values and Generic Assessment Criteria

Land contamination can harm a number of receptors, most notably: human health; drinking water; groundwater; surface water; soils; ecosystems; and buildings/structures. The UK Government's stated objectives of LCRM are to enhance the health and wellbeing of all, whilst adding the economic, ecological and amenity value of the area through dealing with land contamination.

The risk assessment is an iterative process. At preliminary risk assessment stage, risks are evaluated qualitatively. As the site investigation progresses to a generic or detailed quantitative risk assessment, data is collected and assessment criteria are utilised to evaluate whether the contaminants represent an unacceptable risk to the identified receptors.

Based on the identified receptor, there are numerous assessment criteria that can be used, which have been outlined in the subsequent sections.

1. Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

1.1. Background

Within England and Wales, an appropriate agency must classify the ecological and chemical status of a body of surface water. The agency must also classify the chemical and quantitative status of a body of groundwater. The appropriate agency must review and update the classifications at least every 6 years as and when new data is collected through monitoring programmes. In addition to the classification and as part of the WFD, pollution of surface waters must be controlled by limiting the discharge of priority substances and other substances into surface water.

1.2. Surface Water

In order to aid with the classification, a series of environmental quality standards (EQS) for specific pollutants have been generated. The EQS refer to the dissolved fraction of metals within a water sample, therefore the sample collected must pass through a 0.45µm filter at the time of sampling. A number of metals have a bioavailable threshold and therefore a site specific meta bioavailability assessment should be undertaken.

Where the calculated mean value of a measurement is less than the limit of quantification and the limit of quantification is above the EQS, the result must not be used for determining a failed classification.

For the majority of substances, two values will be included for review; AA and MAC. The Annual Average (AA) is the arithmetic mean of the concentrations measured at different times during the year for each representative point within the water body. When using the Max Allowable Concentration (MAC) values, a statistical analysis may be undertaken to ensure an acceptable level of confidence for determining compliance with the MAC.

1.3. Groundwater

The appropriate agency must apply the threshold values for groundwater (in Table 1, Schedule 5) and, if any value is exceeded, undertake an appropriate investigation to determine whether or not the

applicable conditions for good groundwater chemical status are met. The criteria outlined are designed to be averaged across an aquifer rather than a site specific investigations.

2. The Water Supply (Water Quality) Regulations 2016

The water supply regulations apply in relation to the supply of water to premises for domestic purposes (including for cooking, drinking, food preparation and washing) or for food production purposes, both of which include the intended use for human consumption.

The point of compliance for the water supply is principally the consumers' taps, however, where stated the compliance point is the reservoir or treatment works.

3. World Health Organisation, Petroleum Products in Drinking Water, 2008

The World Health Organisation produced a background document for the development of WHO Guidelines for Drinking-water Quality, specifically relating to petroleum products (WHO/SDE/WSH/05.08/123). Petroleum products are used widely in a range of industrial applications, with the largest quantities used for gasoline, diesel and heating oil.

The difference in chemical and physical properties of each hydrocarbon means that they will behave differently within the environment, where their persistence is dictated by their volatilisation, biodegradation and dissolution within water. As a result of these, the heavier hydrocarbons typically have more persistence. Exposure to human health from petroleum hydrocarbons within drinking water can occur from a short to long-term, however the incident that leads to high concentrations within the drinking water will typically occur in the short term.

Petroleum products are a complicated mix of hundreds of compounds and therefore assessment can be difficult. The TPH-CWG method, developed in the USA, groups the TPH into a series of fractions based on the number of carbon atoms, coupled with the overall structure of the compound. This process enables the TPHs to be split into two distinct groups, aliphatics and aromatics.

4. SoBRA GAC_{gwvap}

Prior to the development of the SoBRA GAC_{gwvap}, there were no formally published UK GAC for the assessment of vapour risk arising from volatile contaminants in groundwater in the UK. The SoBRA groundwater vapour GAC (GAC_{gwvap}) is intended as a conservative screening tool that assessors may choose to use to help assess the long-term (chronic) risks to human health from inhalation of vapours arising from groundwater. They are intended for comparison with measured groundwater concentrations and represent the estimated concentration in groundwater below which the long-term risks to human health from vapour migration and inhalation can be considered low/tolerable, i.e. unlikely to be of concern (for the land use scenarios considered). When used as part of a Generic Quantitative Risk Assessment (GQRA) (which includes consideration of uncertainties) comparison of the GAC_{gwvap} with measured concentrations in groundwater can be used to screen out contaminants as being unlikely to represent an unacceptable risk to humans living or working above the groundwater plume.

The GAC have been derived for two land use scenarios for which the vapour intrusion pathway is likely to require assessment: residential and commercial. Generic assumptions have been made for each land use. These include assumptions about the depth to groundwater, soil type in the unsaturated zone, building dimension and foundation type, and receptor behaviour. The parameter values have been chosen to ensure that the GAC are precautionary for the vast majority of commercial and

residential properties in the UK. However, there may be particular situations where the GAC are not protective, for example where non aqueous phase liquid (NAPL) is present or preferential pathways exist.

5. Detailed Quantitative Risk Assessments (DQRA)

Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a DQRA may be undertaken to develop site specific values for relevant groundwater contaminants. As part of the EA Remedial Targets Methodology (RTM), a level 3 risk assessment will consider the effect of attenuation between the site and a downgradient receptor or compliance point. For a level 4 risk assessment the appropriateness of assessing dilution in a receiving watercourse or a pumping abstraction borehole will need to be considered.

The RTM also recommends that sensitivity/uncertainty analysis is incorporated into each stage of the assessment.

6. Ground and Water Limited Waters Assessment Criteria

The Waters Assessment Criteria used in the preparation of the Generic Quantitative Risk Assessment are tabulated in the following pages, where the source of each has been outlined in the previous sections.

6.1. Inorganics

Specific Pollutants				
Determinand	Long Term Fresh water (µg/l)	Short Term Fresh water (µg/l)	Long Term Salt water (µg/l)	Short Term Salt water (µg/l)
Cyanide	1	5	1	5
Phenol	7.7	46	7.7	46

Drinking Water Standards	
Determinand	Maximum allowable Concentration at compliance point (µg/l)
Cyanide	50
pH	6.5 – 9.5

6.2. Metals

Specific Pollutants				
Determinand	Long Term Fresh water (µg/l)	Short Term Fresh water (µg/l)	Long Term Salt water (µg/l)	Short Term Salt water (µg/l)
Arsenic	50	-	25	-
Chromium (III)	4.7	32	-	-
Chromium (VI)	3.4	-	0.6	32
Copper	1*	-	3.76	34
Iron	1000	-	1000	-
Manganese	123*	-	-	-
Zinc	10.9*	-	6.8	-

*Site specific bioavailability calculation should be undertaken.

EQS for Priority Substances and other substances

Determinand		AA-EQS Inland surface water (µg/l)	MAC-EQS Inland surface water (µg/l)	AA-EQS Other Surface waters (µg/l)	MAC-EQS Other Surface waters (µg/l)
Cadmium	<40mg/l CaCO ₃	<0.08	<0.45	0.2	-
	40 – <50mg/l	0.08	0.45		
	50 – <100mg/l	0.09	0.6		
	100 – <200mg/l	0.15	0.9		
	>200mg/l	0.25	1.5		
Lead		1.2	14	1.3	14
Mercury		-	0.07	-	0.07
Nickel		4	34	8.6	34

Threshold Values for Groundwater			
Determinand	Groundwater Impact on Surface Water (µg/l)	Drinking water Protected Area (µg/l)	General Quality of Groundwater Body (µg/l)
Aluminum	-	150	150
Arsenic	25.8 – 106	7.5	7.5
Boron	-	750	-
Cadmium	0.054 – 0.53	3.75	-
Copper	0.516 – 2.12	1500	1500
Lead	0.619 – 2.54	7.5	7.5
Mercury	0.026 – 0.106	0.75	-
Nickel	2.06 – 8.48	15	15
Selenium	-	7.5	-
Zinc	5.62 – 23.1	-	-

Drinking Water Standards	
Determinand	Maximum allowable Concentration at compliance point (µg/l)
Arsenic	10
Cadmium	5
Chromium	50
Copper	2
Lead	10
Mercury	1
Nickel	20

6.3. Total Petroleum Hydrocarbons (TPHs)

6.3.1. BTEX Compounds

Specific Pollutants				
Determinand	Long Term Fresh water (µg/l)	Short Term Fresh water (µg/l)	Long Term Salt water (µg/l)	Short Term Salt water (µg/l)
Toluene	74	380	74	370

EQS for Priority Substances and other substances				
Determinand	AA-EQS Inland surface water (µg/l)	MAC-EQS Inland surface water (µg/l)	AA-EQS Other Surface waters (µg/l)	MAC-EQS Other Surface waters (µg/l)
Benzene	10	50	8	50

Threshold Values for Groundwater			
Determinand	Groundwater Impact on Surface Water (µg/l)	Drinking water Protected Area (µg/l)	General Quality of Groundwater Body (µg/l)
Benzene	5.16 – 21.2	0.75	0.75
Toluene	38.2 – 157	-	-
Xylene (o+p+m)	15.5 – 63.6	-	-

6.3.2. Total Petroleum Hydrocarbons – Aliphatic

World Health Organisation	
Determinand	Drinking Water Standard (µg/l)
>C5 – C6	15,000
>C6 – C8	
>C8 – C10	
>C10 – C12	300
>C12 – C16	
>C16 – C21	
>C21 – C35	Not Derived
	Not Derived

6.3.3. Total Petroleum Hydrocarbons – Aromatic

World Health Organisation	
Determinand	Drinking Water Standard (µg/l)
>EC5 – EC7	10
>EC7 – EC8	700
>EC8 – EC10	300
>EC10 – EC12	90
>EC12 – EC16	
>EC16 – EC21	
>EC21 – EC35	90

6.4. Polycyclic Aromatic Hydrocarbons (PAHs)

EQS for Priority Substances and other substances				
Determinand	AA-EQS Inland surface water (µg/l)	MAC-EQS Inland surface water (µg/l)	AA-EQS Other Surface waters (µg/l)	MAC-EQS Other Surface waters (µg/l)
Anthracene	0.1	0.1	0.1	0.1
Fluoranthene	0.0063	0.12	0.0063	0.12
Naphthalene	2	130	2	130
Benzo(a)pyrene	0.00017	0.27	0.00017	0.027
Benzo(b)fluoranthene	*	0.017	*	0.017
Benzo(k)fluoranthene	*	0.017	*	0.017
Benzo(ghi)perylene	*	0.0082	*	0.00082
Indeno(123-cd)pyrene	*	-	*	-

*For the group of priority substances of polyaromatic hydrocarbons, the AA-EQS in water refer to the concentration of benzo(a)pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene must be monitored for comparison with the corresponding AA-EQS.

Threshold Values for Groundwater			
Determinand	Groundwater Impact on Surface Water (µg/l)	Drinking water Protected Area (µg/l)	General Quality of Groundwater Body (µg/l)
Anthracene	0.052 – 0.193	-	-
Benzo(a)pyrene	0.000089 – 0.000328	0.0075	-
Benzo(b)fluoranthene	0.016 – 0.058	0.075	-
Fluoranthene	0.0033 – 0.0122	-	0.075
Naphthalene	1.03 – 4.24	-	0.075

Drinking Water Standards	
Determinand	Maximum allowable Concentration at compliance point (µg/l)
Benzo(a)pyrene	0.010
Benzo(b) fluoranthene	0.10
Benzo(k)fluoranthene	
Benzo(ghi)perylene	
Indeno(1,2,3-cd)pyrene	

6.5. Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

EQS for Priority Substances and other substances				
Determinand	AA-EQS Inland surface water (µg/l)	MAC-EQS Inland surface water (µg/l)	AA-EQS Other Surface waters (µg/l)	MAC-EQS Other Surface waters (µg/l)
Perfluorooctane sulfonic acid (PFOS)	0.00065	36	0.00013	7.2

6.6. Volatile and Semi-volatile Organic Compounds

SoBRA GAC _{gw vap} for Petroleum Hydrocarbons			
Determinand	GAC _{gw vap} (µg/l) ^{1,2}		Aqueous Solubility (µg/l)
	Residential	Commercial	
1,2,4-Trimethylbenzene	24	2,200	559,000
Benzene ³	210	20,000	1,780,000
Ethylbenzene ³	10,000	960,000 (sol)	180,000
Isopropylbenzene	850	86,000 (sol)	56,000
Propylbenzene	2,700	240,000 (sol)	54,100
Styrene	8,800	810,000 (sol)	290,000
Toluene ³	230,000	21,000,000 (sol)	590,000
TPH Aliphatic EC5-EC6 ³	1,900	190,000 (sol)	35,900
TPH Aliphatic >EC6-EC8 ³	1,500	150,000 (sol)	5,370
TPH Aliphatic >EC8-EC10 ³	57	5,700 (sol)	427
TPH Aliphatic >EC10-EC12 ³	37	3,600 (sol)	34
TPH Aromatic >EC5-EC7 ³	210,000	20,000,000 (sol)	1,780,000
TPH Aromatic >EC7-EC8 ³	220,000	21,000,000 (sol)	590,000
TPH Aromatic >EC8-EC10 ³	1,900	190,000 (sol)	64,600
TPH Aromatic >EC10-EC12 ³	6,800	660,000 (sol)	24,500
TPH Aromatic >EC12-EC16 ³	39,000	3,700,000 (sol)	5,750
m-Xylene ^{3,5}	9,500	940,000 (sol)	200,000
o-Xylene ^{3,5}	12,000	1,100,000 (sol)	173,000
p-Xylene ²	9,900	980,000 (sol)	200,000
Notes			

1. GAC in *italics* with (sol) exceed aqueous solubility.
2. GAC rounded to two significant figures.
3. The GAC for these petroleum hydrocarbon contaminants have been calculated using a sub-surface soil to indoor air correction factor of 10 in line with the physical-chemical data sources.
4. The GAC for TPH fractions do not account for genotoxic mutagenic effects. Concentrations of TPH Aromatic >EC5-EC7 should therefore also be compared with the GAC for benzene to ensure that such effects are also assessed.
5. The Health Criteria Value used for each xylene isomer was for total xylene. If site specific additivity assessments are not completed, as a conservative measure the sum of isomer concentrations should be compared to the lowest xylene GAC (as is the case for soil GAC).

SoBRA GAC _{gwwap} for Polycyclic Aromatic Hydrocarbons			
Determinand	GAC _{gwwap} (µg/l) ^{1,2}		Aqueous Solubility (µg/l)
	Residential	Commercial	
Acenaphthene	170,000 (sol)	15,000,000 (sol)	4,110
Acenaphthylene	220,000 (sol)	20,000,000 (sol)	7,950
Fluorene	210,000 (sol)	18,000,000 (sol)	1,860
Naphthalene	220	23,000 (sol)	19,000
Notes			
1. GAC in <i>italics</i> with (sol) exceed aqueous solubility.			
2. GAC rounded to two significant figures.			

SoBRA GAC _{gwwap} for Pesticides			
Determinand	GAC _{gwwap} (µg/l) ^{1,2}		Aqueous Solubility (µg/l)
	Residential	Commercial	
Aldrin	47 (sol)	3,700 (sol)	20
<i>alpha</i>-Endosulfan	7,400 (sol)	590,000 (sol)	530
<i>beta</i>-Endosulfan	7,500 (sol)	600,000 (sol)	280
Notes			
1. GAC in <i>italics</i> with (sol) exceed aqueous solubility.			
2. GAC rounded to two significant figures.			

SoBRA GAC _{gwwap} for Halogenated Organics			
Determinand	GAC _{gwwap} (µg/l) ^{1,2}		Aqueous Solubility (µg/l)
	Residential	Commercial	
1,1,1,2-Tetrachloroethane	240	22,000	1,110,000
1,1,1-Trichloroethane	3,000	290,000	1,300,000
1,1,2,2-Tetrachloroethane	1,600	150,000	2,930,000
1,1,2-Trichloroethane	520	49,000	4,491,000
1,1-Dichloroethane	2,700	260,000	3,666,000
1,1-Dichloroethene	160	16,000	3,100,000
1,2,3,4-Tetrachlorobenzene	240	31,000 (sol)	7,800
1,2,3,5-Tetrachlorobenzene	7.0	600	3,500
1,2,3-Trichlorobenzene	35	3,100	21,000
1,2,4,5-Tetrachlorobenzene	8.1	700 (sol)	600
1,2,4-Trichlorobenzene	68	7,200	41,400
1,2-Dichlorobenzene	2,000	220,000 (sol)	133,000
1,2-Dichloroethane	8.9	850	8,680,000
1,2-Dichloropropane	22	2,600	2,050,000

1,3,5-Trichlorobenzene	7.4	660	6,000
1,3-Dichlorobenzene	31	2,800	103,000
1,4-Dichlorobenzene	5,000	<i>460,000 (sol)</i>	51,200
Bromobenzene	220	20,000	388,040
Bromodichloromethane	17	1,600	3,000,000
Bromoform (Tribromomethane)	3,100	400,000	3,000,000
Chlorobenzene	98	15,000	387,000
Chloroethane	10,000	1,000,000	5,742,000
Chloroethene (Vinyl Chloride)	0.62	63	2,760,000
Chloromethane	14	1,400	5,350,000
cis-1,2-Dichloroethene	130	13,000	7,550,000
Dichloromethane	3,300	370,000	20,080,000
Hexachlorobenzene	<i>16 (sol)</i>	<i>1,400 (sol)</i>	10
Hexachlorobutadiene	1.7	230	4,800
Hexachloroethane	8.5	740	49,900
Pentachlorobenzene	140	<i>12,000 (sol)</i>	500
Tetrachloroethene	34	4,600	225,000
Tetrachloromethane (Carbon Tetrachloride)	5.3	770	846,000
trans-1,2-Dichloroethene	160	16,000	5,250,000
Trichloroethene	5.7	530	1,370,000
Trichloromethane (Chloroform)	790	85,000	8,950,000
Notes 1. GAC in <i>italics</i> with (sol) exceed aqueous solubility. 2. GAC rounded to two significant figures.			

SoBRA GAC_{gwvap} for Others (organic and inorganic)			
Determinand	GAC_{gwvap} (µg/l) ^{1,2}		Aqueous Solubility (µg/l)
	Residential	Commercial	
2-Chloronaphthalene	160	<i>14,000 (sol)</i>	11,700
Biphenyl (Limonene)	<i>15,000 (sol)</i>	<i>1,300,000 (sol)</i>	4,060
Carbon disulphide	56	5,600	2,100,000
Mercury, elemental	1.1	<i>95 (sol)</i>	56
Methyl tertiary butyl ether (MTBE)	83,000	7,800,000	48,000,000
Notes 1. GAC in <i>italics</i> with (sol) exceed aqueous solubility. 2. GAC rounded to two significant figures.			

7. Climate Change

Review of the publication by SoBRA referenced: Guidance on Assessing Risk to Controlled Waters from UK Land Contamination Under Conditions of Future Climate Change, August 2022, addresses the consideration of climate change as part of groundwater risk assessments. Following the development of a preliminary Conceptual Site Model (CSM), climate change should be included by re-evaluating the potential Source-Pathway-Receptor (SPR) linkage assessment to account for the potential effects of climate change based on projections for the region of the site. It is recommended where practicable to use at least two contrasting future climate change scenarios, incorporating information for the periods of 2020s, 2050s and 2080s dependent on the relevant timeframe to the specific assessment. A qualitative assessment of the impact of climate change on the SPRs and resultant impacts on the contaminants linkages within the CSM. Quantitative data can be used to re-address the generic quantitative risk assessment for medium to long term climate change effects. For short-term extreme weather events the of “what if” scenarios should be considered. Consideration also needs to be given to the shortcomings of available simulation models in the UK where they are not equipped to model

temporal changes to parameter values and where mitigation measures may be appropriate to address this.

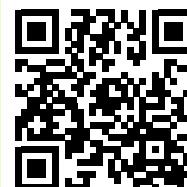
APPENDIX E:

Waste Hazard Assessment

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



SJQ40-6DVZD-II5QC

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

GWPR5623

Description/Comments

Project

GWPR5623

Site

Kings Pond, Alton

Classified by

Name:
Natasha Kearl
Date:
07 Nov 2023 10:48 GMT
Telephone:
01420 463047

Company:
Ground and Water
2 The Long Barn, Norton Farm, Selborne
Road
Alton
GU34 3NB

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

Course

Hazardous Waste Classification

Date

-

Purpose of classification

2 - Material Characterisation

Address of the waste

Kings Pond, Alton

Post Code **GU34 2SZ**

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

dredging works of the pond

Description of the specific process, sub-process and/or activity that created the waste

waste created during dredging works

Description of the waste

ALLUVIUM: Black to dark brown SILT with frequent organic detritus.

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP01-061023--1.10	1.10	Non Hazardous		3
2	TP02-061023--1.20	1.20	Non Hazardous		6
3	TP03-061023--1.20	1.20	Non Hazardous		8
4	TP04-061023--0.70	0.70	Non Hazardous		10
5	TP05-061023--0.50	0.50	Non Hazardous		13

Related documents

#	Name	Description
1	231011-65.hwol	ALS Hawarden .hwol file used to populate the Job

Report

Created by: Natasha Kearn

Created date: 07 Nov 2023 10:48 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	15
Appendix B: Rationale for selection of metal species	16
Appendix C: Version	17

Classification of sample: TP01-061023--1.10

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

Sample details

Sample name:	LoW Code:
TP01-061023--1.10	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
1.10 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
75%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 75% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.08 mg/kg		<0.08	mg/kg	<0.000008 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.12 mg/kg		<0.12	mg/kg	<0.000012 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.16 mg/kg		<0.16	mg/kg	<0.000016 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	4.55 mg/kg	1.32	1.502	mg/kg	0.00015 %	✓	
5	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	2.94 mg/kg		0.735	mg/kg	0.0000735 %	✓	
6	benzene	601-020-00-8	200-753-7	71-43-2	<0.02 mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
7	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	4.81 mg/kg		1.203	mg/kg	0.00012 %	✓	
8	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	6.2 mg/kg		1.55	mg/kg	0.000155 %	✓	
9	benzo[ghi]perylene	205-883-8	191-24-2		4.29 mg/kg		1.073	mg/kg	0.000107 %	✓	
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	2.2 mg/kg		0.55	mg/kg	0.000055 %	✓	
11	boron { boron tribromide }	005-003-00-0	233-657-9	10294-33-4	<1 mg/kg	23.173	<23.173	mg/kg	<0.00232 %		<LOD
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	0.556 mg/kg	1.285	0.179	mg/kg	0.0000139 %	✓	
13	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<0.6 mg/kg	1.923	<1.154	mg/kg	<0.000115 %		<LOD
14	chrysene	601-048-00-0	205-923-4	218-01-9	3.44 mg/kg		0.86	mg/kg	0.000086 %	✓	
15	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	47.9 mg/kg	1.126	13.483	mg/kg	0.00135 %	✓	
16	coronene	205-881-7	191-07-1		1.19 mg/kg		0.298	mg/kg	0.0000298 %	✓	

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
17	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
18	dibenz[a,h]anthracene				<0.23 mg/kg		<0.23 mg/kg	<0.000023 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
19	ethylbenzene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %			<LOD
	601-023-00-4	202-849-4	100-41-4								
20	fluoranthene				4.98 mg/kg		1.245 mg/kg	0.000125 %		✓	
		205-912-4	206-44-0								
21	fluorene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
		201-695-5	86-73-7								
22	indeno[123-cd]pyrene				3.41 mg/kg		0.853 mg/kg	0.0000852 %		✓	
		205-893-2	193-39-5								
23	lead { lead chromate }			1	165 mg/kg	1.56	64.342 mg/kg	0.00413 %		✓	
	082-004-00-2	231-846-0	7758-97-6								
24	mercury { mercury dichloride }				0.151 mg/kg	1.353	0.0511 mg/kg	0.00000511 %		✓	
	080-010-00-X	231-299-8	7487-94-7								
25	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %			<LOD
	603-181-00-X	216-653-1	1634-04-4								
26	naphthalene				<0.09 mg/kg		<0.09 mg/kg	<0.000009 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
27	nickel { nickel dihydroxide }				13.9 mg/kg	1.579	5.489 mg/kg	0.000549 %		✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
28	pH				7.9 pH		7.9 pH	7.9 pH			
			PH								
29	phenanthrene				1.19 mg/kg		0.298 mg/kg	0.0000298 %		✓	
		201-581-5	85-01-8								
30	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
31	pyrene				4.39 mg/kg		1.098 mg/kg	0.00011 %		✓	
		204-927-3	129-00-0								
32	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				2.53 mg/kg	1.405	0.889 mg/kg	0.0000889 %		✓	
	034-002-00-8										
33	polychlorobiphenyls; PCB				<0.21 mg/kg		<0.21 mg/kg	<0.000021 %			<LOD
	602-039-00-4	215-648-1	1336-36-3								
34	toluene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %			<LOD
	601-021-00-3	203-625-9	108-88-3								
35	TPH (C6 to C40) petroleum group				941 mg/kg		235.25 mg/kg	0.0235 %		✓	
			TPH								
36	vanadium { divanadium pentaoxide; vanadium pentoxide }				17.5 mg/kg	1.785	7.81 mg/kg	0.000781 %		✓	
	023-001-00-8	215-239-8	1314-62-1								
37	zinc { zinc chromate }				325 mg/kg	2.774	225.399 mg/kg	0.0225 %		✓	
	024-007-00-3	236-878-9	13530-65-9								
38	xylene				<0.08 mg/kg		<0.08 mg/kg	<0.000008 %			<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]								
39	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17.2 mg/kg	1.462	6.285 mg/kg	0.000628 %		✓	
		215-160-9	1308-38-9								
Total:									0.0575 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because Most likely worst case.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0235%)

Classification of sample: TP02-061023--1.20

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

Sample details

Sample name:	LoW Code:	
TP02-061023--1.20	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.20 m		
Moisture content:		
74%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 74% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	acenaphthene	201-469-6	83-32-9		<0.08 mg/kg		<0.08 mg/kg	<0.000008 %		<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.12 mg/kg		<0.12 mg/kg	<0.000012 %		<LOD
3	anthracene	204-371-1	120-12-7		<0.16 mg/kg		<0.16 mg/kg	<0.000016 %		<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	4.03 mg/kg	1.32	1.383 mg/kg	0.000138 %	✓	
5	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	2.92 mg/kg		0.759 mg/kg	0.0000759 %	✓	
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	4.55 mg/kg		1.183 mg/kg	0.000118 %	✓	
7	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	5.68 mg/kg		1.477 mg/kg	0.000148 %	✓	
8	benzo[ghi]perylene	205-883-8	191-24-2		3.77 mg/kg		0.98 mg/kg	0.000098 %	✓	
9	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	2.37 mg/kg		0.616 mg/kg	0.0000616 %	✓	
10	boron { boron tribromide }	005-003-00-0	233-657-9	10294-33-4	<1 mg/kg	23.173	<23.173 mg/kg	<0.00232 %		<LOD
11	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	0.742 mg/kg	1.285	0.248 mg/kg	0.0000193 %	✓	
12	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
13	chrysene	601-048-00-0	205-923-4	218-01-9	3.6 mg/kg		0.936 mg/kg	0.0000936 %	✓	
14	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	49.9 mg/kg	1.126	14.607 mg/kg	0.00146 %	✓	
15	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5			<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	dibenz[a,h]anthracene				<0.23 mg/kg		<0.23 mg/kg	<0.000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
17	fluoranthene				5.5 mg/kg		1.43 mg/kg	0.000143 %	✓	
		205-912-4	206-44-0							
18	fluorene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		201-695-5	86-73-7							
19	indeno[123-cd]pyrene				3.68 mg/kg		0.957 mg/kg	0.0000957 %	✓	
		205-893-2	193-39-5							
20	lead { lead chromate }			1	202 mg/kg	1.56	81.921 mg/kg	0.00525 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
21	mercury { mercury dichloride }				0.181 mg/kg	1.353	0.0637 mg/kg	0.00000637 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
22	naphthalene				<0.09 mg/kg		<0.09 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
23	nickel { nickel dihydroxide }				11.1 mg/kg	1.579	4.558 mg/kg	0.000456 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
24	pH				7.88 pH		7.88 pH	7.88 pH		
			PH							
25	phenanthrene				1.24 mg/kg		0.322 mg/kg	0.0000322 %	✓	
		201-581-5	85-01-8							
26	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
27	pyrene				4.83 mg/kg		1.256 mg/kg	0.000126 %	✓	
		204-927-3	129-00-0							
28	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				2.93 mg/kg	1.405	1.07 mg/kg	0.000107 %	✓	
	034-002-00-8									
29	vanadium { divanadium pentaoxide; vanadium pentoxide }				15.5 mg/kg	1.785	7.194 mg/kg	0.000719 %	✓	
	023-001-00-8	215-239-8	1314-62-1							
30	zinc { zinc chromate }				367 mg/kg	2.774	264.709 mg/kg	0.0265 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
31	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17.6 mg/kg	1.462	6.688 mg/kg	0.000669 %	✓	
		215-160-9	1308-38-9							
Total:								0.039 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
•	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP03-061023--1.20

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

Sample details

Sample name:	LoW Code:	
TP03-061023--1.20	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
1.20 m		
Moisture content:		
72%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 72% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	acenaphthene	201-469-6	83-32-9		0.392 mg/kg		0.11 mg/kg	0.000011 %	✓	
2	acenaphthylene	205-917-1	208-96-8		0.906 mg/kg		0.254 mg/kg	0.0000254 %	✓	
3	anthracene	204-371-1	120-12-7		1.72 mg/kg		0.482 mg/kg	0.0000482 %	✓	
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4		7.91 mg/kg	1.32	2.924 mg/kg	0.000292 %	✓	
5	benzo[a]anthracene	601-033-00-9	200-280-6		9.27 mg/kg		2.596 mg/kg	0.00026 %	✓	
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		14.1 mg/kg		3.948 mg/kg	0.000395 %	✓	
7	benzo[b]fluoranthene	601-034-00-4	205-911-9		16.3 mg/kg		4.564 mg/kg	0.000456 %	✓	
8	benzo[ghi]perylene	205-883-8	191-24-2		10.5 mg/kg		2.94 mg/kg	0.000294 %	✓	
9	benzo[k]fluoranthene	601-036-00-5	205-916-6		6.23 mg/kg		1.744 mg/kg	0.000174 %	✓	
10	boron { boron tribromide }	005-003-00-0	233-657-9		<1 mg/kg	23.173	<23.173 mg/kg	<0.00232 %		<LOD
11	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1	1.16 mg/kg	1.285	0.417 mg/kg	0.0000325 %	✓	
12	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8		<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
13	chrysene	601-048-00-0	205-923-4		9.63 mg/kg		2.696 mg/kg	0.00027 %	✓	
14	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7		81.4 mg/kg	1.126	25.661 mg/kg	0.00257 %	✓	
15	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5			<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	dibenz[a,h]anthracene				1.73 mg/kg		0.484 mg/kg	0.0000484 %	✓	
	601-041-00-2	200-181-8	53-70-3							
17	fluoranthene				17.9 mg/kg		5.012 mg/kg	0.000501 %	✓	
		205-912-4	206-44-0							
18	fluorene				0.457 mg/kg		0.128 mg/kg	0.0000128 %	✓	
		201-695-5	86-73-7							
19	indeno[123-cd]pyrene				8.89 mg/kg		2.489 mg/kg	0.000249 %	✓	
		205-893-2	193-39-5							
20	lead { lead chromate }			1	446 mg/kg	1.56	194.79 mg/kg	0.0125 %	✓	
	082-004-00-2	231-846-0	7758-97-6							
21	mercury { mercury dichloride }				0.83 mg/kg	1.353	0.315 mg/kg	0.0000315 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
22	naphthalene				<0.09 mg/kg		<0.09 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
23	nickel { nickel dihydroxide }				16.8 mg/kg	1.579	7.43 mg/kg	0.000743 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
24	pH				7.64 pH		7.64 pH	7.64 pH		
			PH							
25	phenanthrene				4.04 mg/kg		1.131 mg/kg	0.000113 %	✓	
		201-581-5	85-01-8							
26	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
27	pyrene				15.5 mg/kg		4.34 mg/kg	0.000434 %	✓	
		204-927-3	129-00-0							
28	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				2.93 mg/kg	1.405	1.153 mg/kg	0.000115 %	✓	
	034-002-00-8									
29	vanadium { divanadium pentaoxide; vanadium pentoxide }				24.2 mg/kg	1.785	12.096 mg/kg	0.00121 %	✓	
	023-001-00-8	215-239-8	1314-62-1							
30	zinc { zinc chromate }				474 mg/kg	2.774	368.185 mg/kg	0.0368 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
31	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				22.5 mg/kg	1.462	9.208 mg/kg	0.000921 %	✓	
		215-160-9	1308-38-9							
Total:								0.0611 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP04-061023--0.70

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

Sample details

Sample name:	LoW Code:
TP04-061023--0.70	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.70 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
76%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 76% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.08 mg/kg		<0.08 mg/kg	<0.000008 %			<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.12 mg/kg		<0.12 mg/kg	<0.000012 %			<LOD
3	anthracene	204-371-1	120-12-7		<0.16 mg/kg		<0.16 mg/kg	<0.000016 %			<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	6.98 mg/kg	1.32	2.212 mg/kg	0.000221 %		✓	
5	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	3.24 mg/kg		0.778 mg/kg	0.0000778 %		✓	
6	benzene	601-020-00-8	200-753-7	71-43-2	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %			<LOD
7	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	4.47 mg/kg		1.073 mg/kg	0.000107 %		✓	
8	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	5.08 mg/kg		1.219 mg/kg	0.000122 %		✓	
9	benzo[ghi]perylene	205-883-8	191-24-2		3.69 mg/kg		0.886 mg/kg	0.0000886 %		✓	
10	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	2.34 mg/kg		0.562 mg/kg	0.0000562 %		✓	
11	boron { boron tribromide }	005-003-00-0	233-657-9	10294-33-4	1.05 mg/kg	23.173	5.84 mg/kg	0.000584 %		✓	
12	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	0.942 mg/kg	1.285	0.291 mg/kg	0.0000226 %		✓	
13	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %			<LOD
14	chrysene	601-048-00-0	205-923-4	218-01-9	3.69 mg/kg		0.886 mg/kg	0.0000886 %		✓	
15	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	88.2 mg/kg	1.126	23.833 mg/kg	0.00238 %		✓	
16	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides,				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
	ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }									
	006-007-00-5									
17	dibenz[a,h]anthracene				<0.23 mg/kg		<0.23 mg/kg	<0.000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
18	ethylbenzene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
19	fluoranthene				5.81 mg/kg		1.394 mg/kg	0.000139 %	✓	
		205-912-4	206-44-0							
20	fluorene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		201-695-5	86-73-7							
21	indeno[123-cd]pyrene				3.09 mg/kg		0.742 mg/kg	0.0000742 %	✓	
		205-893-2	193-39-5							
22	lead { lead chromate }			1	271 mg/kg	1.56	101.45 mg/kg	0.0065 %	✓	
	082-004-00-0	231-846-0	7758-97-6							
23	mercury { mercury dichloride }				0.455 mg/kg	1.353	0.148 mg/kg	0.0000148 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
24	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
25	naphthalene				<0.09 mg/kg		<0.09 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
26	nickel { nickel dihydroxide }				19.4 mg/kg	1.579	7.354 mg/kg	0.000735 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
27	pH				7.71 pH		7.71 pH	7.71 pH		
			PH							
28	phenanthrene				1.55 mg/kg		0.372 mg/kg	0.0000372 %	✓	
		201-581-5	85-01-8							
29	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
30	pyrene				5.24 mg/kg		1.258 mg/kg	0.000126 %	✓	
		204-927-3	129-00-0							
31	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				2.79 mg/kg	1.405	0.941 mg/kg	0.0000941 %	✓	
	034-002-00-8									
32	toluene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
33	TPH (C6 to C40) petroleum group				711 mg/kg		170.64 mg/kg	0.0171 %	✓	
			TPH							
34	vanadium { divanadium pentaoxide; vanadium pentoxide }				25.8 mg/kg	1.785	11.054 mg/kg	0.00111 %	✓	
	023-001-00-8	215-239-8	1314-62-1							
35	zinc { zinc chromate }				488 mg/kg	2.774	324.908 mg/kg	0.0325 %	✓	
	024-007-00-3	236-878-9	13530-65-9							
36	xylene				<0.08 mg/kg		<0.08 mg/kg	<0.000008 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
37	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				32 mg/kg	1.462	11.225 mg/kg	0.00112 %	✓	
		215-160-9	1308-38-9							
Total:								0.0637 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

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

Force this Hazardous property to non hazardous because Most likely worst case.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0171%)

Classification of sample: TP05-061023--0.50

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

Sample details

Sample name:	LoW Code:
TP05-061023--0.50	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.50 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
75%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 75% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	acenaphthene	201-469-6	83-32-9		<0.08 mg/kg		<0.08 mg/kg	<0.000008 %			<LOD
2	acenaphthylene	205-917-1	208-96-8		<0.12 mg/kg		<0.12 mg/kg	<0.000012 %			<LOD
3	anthracene	204-371-1	120-12-7		<0.32 mg/kg		<0.32 mg/kg	<0.000032 %			<LOD
4	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	7.32 mg/kg	1.32	2.416 mg/kg	0.000242 %	✓		
5	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	7.08 mg/kg		1.77 mg/kg	0.000177 %	✓		
6	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	8.35 mg/kg		2.088 mg/kg	0.000209 %	✓		
7	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	9.63 mg/kg		2.408 mg/kg	0.000241 %	✓		
8	benzo[ghi]perylene	205-883-8	191-24-2		5.76 mg/kg		1.44 mg/kg	0.000144 %	✓		
9	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	3.9 mg/kg		0.975 mg/kg	0.0000975 %	✓		
10	boron { boron tribromide }	005-003-00-0	233-657-9	10294-33-4	1.47 mg/kg	23.173	8.516 mg/kg	0.000852 %	✓		
11	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1306-23-6	1.32 mg/kg	1.285	0.424 mg/kg	0.000033 %	✓		
12	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0	<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %			<LOD
13	chrysene	601-048-00-0	205-923-4	218-01-9	7.75 mg/kg		1.938 mg/kg	0.000194 %	✓		
14	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	87.4 mg/kg	1.126	24.601 mg/kg	0.00246 %	✓		
15	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5			<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
16	dibenz[a,h]anthracene				<0.46 mg/kg		<0.46 mg/kg	<0.000046 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
17	fluoranthene				14.4 mg/kg		3.6 mg/kg	0.00036 %		✓	
		205-912-4	206-44-0								
18	fluorene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
		201-695-5	86-73-7								
19	indeno[123-cd]pyrene				4.81 mg/kg		1.203 mg/kg	0.00012 %		✓	
		205-893-2	193-39-5								
20	lead { lead chromate }			1	271 mg/kg	1.56	105.677 mg/kg	0.00678 %		✓	
	082-004-00-2	231-846-0	7758-97-6								
21	mercury { mercury dichloride }				0.163 mg/kg	1.353	0.0552 mg/kg	0.00000552 %		✓	
	080-010-00-X	231-299-8	7487-94-7								
22	naphthalene				<0.09 mg/kg		<0.09 mg/kg	<0.000009 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
23	nickel { nickel dihydroxide }				18.6 mg/kg	1.579	7.345 mg/kg	0.000734 %		✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
24	pH		PH		7.34 pH		7.34 pH	7.34 pH			
25	phenanthrene				4.33 mg/kg		1.083 mg/kg	0.000108 %		✓	
		201-581-5	85-01-8								
26	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
27	pyrene				12.5 mg/kg		3.125 mg/kg	0.000313 %		✓	
		204-927-3	129-00-0								
28	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				2.37 mg/kg	1.405	0.832 mg/kg	0.0000832 %		✓	
	034-002-00-8										
29	vanadium { divanadium pentaoxide; vanadium pentoxide }				24.8 mg/kg	1.785	11.068 mg/kg	0.00111 %		✓	
	023-001-00-8	215-239-8	1314-62-1								
30	zinc { zinc chromate }				705 mg/kg	2.774	488.943 mg/kg	0.0489 %		✓	
	024-007-00-3	236-878-9	13530-65-9								
31	asbestos				<0.001 %		<0.001 %	<0.001 %			<LOD
	650-013-00-6	-----	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5								
32	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				31.2 mg/kg	1.462	11.4 mg/kg	0.00114 %		✓	
		215-160-9	1308-38-9								
Total:									0.0657 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
•	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

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

Description/Comments: Data from C&L Inventory Database

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

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

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

Description/Comments: Data from C&L Inventory Database

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

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

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

Description/Comments: Data from C&L Inventory Database

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

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015

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

Data source date: 23 Jul 2015

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

• **coronene** (EC Number: 205-881-7, CAS Number: 191-07-1)

Description/Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.

Data source: <http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en>

Data source date: 16 Jun 2014

Hazard Statements: STOT SE 2; H371

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

GB MCL index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s):

20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

• **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4

Description/Comments:

Additional Hazard Statement(s): Carc. 2; H351

Reason for additional Hazards Statement(s):

20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

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

Description/Comments: Data from C&L Inventory Database

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

Data source date: 21 Aug 2015

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

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

Description/Comments: Data from C&L Inventory Database

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

Data source date: 06 Aug 2015

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

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

Description/Comments: Data from C&L Inventory Database

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

Data source date: 06 Aug 2015

Hazard Statements: Carc. 2; H351

• **pH (CAS Number: PH)**

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

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

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

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

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

• **polychlorobiphenyls; PCB (EC Number: 215-648-1, CAS Number: 1336-36-3)**

GB MCL index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans;

POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.

Additional Hazard Statement(s): Carc. 1A; H350

Reason for additional Hazards Statement(s):

20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

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

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

• **divanadium pentaoxide; vanadium pentoxide (EC Number: 215-239-8, CAS Number: 1314-62-1)**

GB MCL index number: 023-001-00-8
Description/Comments: Hazard statements H301, H330, H350 added by HazWasteOnline due to ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be Carc. 1B; H350. The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.
Additional Hazard Statement(s): Carc. 1B; H350 , Acute Tox. 3; H301 , Acute Tox. 2; H330
Reason for additional Hazards Statement(s):
20 Sep 2022 - Carc. 1B; H350 hazard statement sourced from: ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be Carc. 1B; H350. The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.
28 Sep 2022 - Acute Tox. 3; H301 hazard statement sourced from: ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be "Acute tox 3; H301". The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.
28 Sep 2022 - Acute Tox. 2; H330 hazard statement sourced from: ATP 18 (Regulation (EU) 2022/692) considers vanadium pentoxide to be "Acute tox 2; H330". The GB MCL Agency has reached the same opinion [but is yet to formerly make this change to the MCL List]. Substance has therefore been self-classified.

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

Description/Comments: Data from C&L Inventory Database
Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Most likely worst-case

boron {boron tribromide}

worst-case

cadmium {cadmium sulfide}

Most likely worst-case

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

Most likely worst-case

copper {dicopper oxide; copper (I) oxide}

Most likely worst-case

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

Most likely worst-case

lead {lead chromate}

worst-case

mercury {mercury dichloride}

Most likely worst-case

nickel {nickel dihydroxide}

Most likely worst-case

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

Most likely worst-case

vanadium {divanadium pentaoxide; vanadium pentoxide}

Most likely worst-case

zinc {zinc chromate}

worst-case

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

worst case

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.2.GB - Oct 2021**

HazWasteOnline Classification Engine Version: 2023.308.5798.10726 (04 Nov 2023)

HazWasteOnline Database: 2023.308.5798.10726 (04 Nov 2023)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK:

2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021