

CONTAMINATED LAND INTRUSIVE INVESTIGATION

25 Mengham Road
Hayling Island
Hampshire
PO11 9EG



July 2024

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1 Introduction and scope of work

Apple Environmental has been appointed to undertake an intrusive soil contamination investigation at 25 Mengham Road, Hayling Island, Hampshire.

An environmental desk study report and preliminary risk assessment previously undertaken at the site by Apple Environmental (Report Ref. CL/3512/CAAD) did not identify any potential land contamination concerns; however intrusive investigation has been requested by Havant Borough Council due to their concerns over the former presence of a garage to the southwest of the site.

In considering their comments, the contaminants deemed to be potentially present included general inorganics, hydrocarbons (both petroleum and poly-aromatic), and VOCs.

An intrusive investigation was subsequently undertaken in order to determine the presence and extent of any such contamination, and to assess the overall risk more fully.

The aims of this work therefore have been to devise and implement an appropriate strategy such that it has been possible to:

- determine the nature of the sub-surface material on-site;
- determine the presence of unacceptable ground contamination in specified areas, along with its nature and extent;
- assess the degree to which the site itself could be contributing to the contamination of environmental media off-site;
- observe or presume contaminant-pathway-receptor relationships on site; and
- assess the risk to future users of the site, as well as building structures and services.

This type of assessment relies upon the visual examination of the area and sub-surface material, as well as the laboratory analysis of material samples.

As such, the specific objectives have been:

- to drill three boreholes at the site to a minimum depth of 2000mm;
- to characterise the nature of the sub-surface material at each of these locations;
- to collect at least 2 soil samples from each of the bores for laboratory analysis generally representing the direct and indirect contact zones;
- to collect additional soil samples from where there may be any other specific or noticeable contamination concern;
- to collect groundwater samples from each of the bores (where present);
- to analyse the soil and water samples for a range of contamination indicators;
- to ascertain the significance of all chemical or physical data obtained;
- to determine the risk to future users based upon residential usage; and
- to make appropriate recommendations in order to reduce and/or eliminate any risks, as identified.

The soil profile from each investigated location has been logged within Section 3 below, along with photographs showing the excavated arisings.

Soil samples were collected from each of the highlighted locations representing approximate depths of 200 - 300mm(bgl) (due to the thickness of the concrete), and 500 - 600mm(bgl). Groundwater samples were also obtained from two of the bores.

All of the samples were placed immediately into a sterilised container and transferred into refrigerated cold-boxes until removed for analysis.

Chemical analysis was undertaken for the following determinands:

- arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc;
- sulphate, sulphide, chloride, cyanide, ammonia and asbestos;
- benzene, toluene, ethylbenzene and xylene (all isomers);
- polycyclic aromatic hydrocarbons (speciated), petroleum hydrocarbons (banded TPHCWG); and
- phenols and non-speciated VOCs*
- VOCs**

* Photo-ionisation detection was undertaken in-situ on the removed soil in order to detect vapours originating from any VOC residue (fuels/solvents etc.) that may be present in each excavated area.

This was performed by means of an externally calibrated Phocheck Tiger PID. Calibration certification has been appended to this report.

** VOC analysis was undertaken on one groundwater sample.

All chemical analyses were undertaken by a UKAS accredited laboratory. Laboratory certification has been appended to this report.

3 On-site observations

The site exists as a converted former commercial building with concrete yard areas.

It is understood from BGS data that the bedrock beneath the site is characterised by the Portsmouth Sand and Whitecliff Sand Members with overlying superficial river terrace deposits. Both the superficial geology and the underlying bedrock were noted in all investigated locations.

The sub-surface material strata logs have been reproduced below in Tables 1 to 3 along with any detailed observations.

Photographs showing the removed material have been appended to each strata log (Photographs 1 to 3).

The intrusive investigation was undertaken on the 17th July 2024.

Table 1 Strata log - Location **BH.01**

Location ID	Depth (mm)	Notes
BH.01	0 - 250	Concrete
	250 - 1500	Mid-brown, sandy, clayey, silty gravels with small angular flints (10-30mm diameter).
	1500 - 1900	Orange, coarse sand with gravels (5-15mm diameter).
	1900 - 2000	Orange, sandy clay with angular gravels (5-20mm diameter).
Groundwater	-	Groundwater was struck at a depth of 1800mm (bgl) and rested at a depth of 1000mm.

Photograph 1 Removed soil material - Location BH.01



Left to right, bottom to top 0 - 2000mm

Table 2 Strata log - Location **BH.02**

Location ID	Depth (mm)	Notes
BH.02	0 - 250	Concrete
	250 - 630	Light brown, sandy clay with very small gravels (5-10mm diameter).
	630 - 950	Orange/brown dry, firm, sandy clay with v small gravels (5-10mm diameter).
	950 - 1550	Orange/brown sandy gravels (5-20mm diameter).
	1550 - 2250	Orange/brown sand with gravels (5-20mm diameter).
	2250 - 3000	Orange/green sandy clay.
Groundwater	-	Groundwater was struck at a depth of 1500mm (bgl) and rested at a depth of 1200mm.

Photograph 2 Removed soil material - Location BH.02



Left to right, bottom to top 0 - 3000mm

Table 3 Strata log - Location **BH.03**

Location ID	Depth (mm)	Notes
BH.03	0 - 50	Tarmacadam.
	50 - 300	Made-ground comprising concrete and brick fragments.
	300 - 1500	Mid-brown clayey sand, some of which was compacted between 1000mm and 1500mm.
	1500 - 2000	Mid-brown, sandy, clayey gravels (5-20mm diameter).
	2000 - 3000	Light-brown sandy clay.
Groundwater	-	Groundwater was not detected

Photograph 3 Removed soil material - Location BH.03



Left to right, bottom to top 0 - 3000mm

4 Results from soil and groundwater analyses

The results from the soil and groundwater analyses are displayed in Tables 4 to 13 below. Any determinand detected has been highlighted in **bold** type.

Table 4 Results for specified inorganics in soil - metals

Determinand	BH.01 (mg/kg)		BH.02 (mg/kg)		BH.03 (mg/kg)	
	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm
Arsenic	8	7	11	10	9	9
Boron	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	19	20	27	24	18	25
Hexavalent chromium	< 2	< 2	< 2	< 2	< 2	< 2
Copper	12	12	11	9	14	11
Lead	25	23	13	12	40	11
Mercury (total)	< 1	< 1	< 1	< 1	< 1	< 1
Nickel	13	13	22	18	11	17
Selenium	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	45	47	46	41	59	45

Table 5 Results for specified inorganics in soil - non-metals

Determinand	BH.01 (mg/kg)		BH.02 (mg/kg)		BH.03 (mg/kg)	
	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm
Cyanide (total)	< 1	< 1	< 1	< 1	< 1	< 1
Sulphate (total)	608	603	254	< 200	476	< 200
Sulphide	< 5	< 5	< 5	< 5	< 5	< 5
Chloride	22	23	11	9	51	19
Asbestos	None detected	None detected	None detected	None detected	None detected	None detected

Table 6 Results for specified hydrocarbons in soil

Determinand	BH.01 (mg/kg)		BH.02 (mg/kg)		BH.03 (mg/kg)	
	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm
Benzene	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	< 0.002	< 0.002	0.006	0.006	< 0.002	< 0.002
p & m-Xylene	< 0.002	< 0.002	0.004	0.004	< 0.002	< 0.002
o-Xylene	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
MTBE	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Phenols	<2	<2	<2	<2	<2	<2

Table 7 Non-specified VOCs - measured by photo-ionisation detection in-situ

BH.01		BH.02		BH.03	
Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm
< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm

Table 8 Results for poly-aromatic hydrocarbons in soil

Determinand	BH.01 (mg/kg)		BH.02 (mg/kg)		BH.03 (mg/kg)	
	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm
Naphthalene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1	0.19	< 0.1
Pyrene	< 0.1	< 0.1	< 0.1	< 0.1	0.17	< 0.1
Benzo(a)anthracene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	< 0.1	< 0.1	< 0.1	< 0.1	0.13	< 0.1
Benzo(b)fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1	0.16	< 0.1
Benzo(k)fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	< 0.1	< 0.1	< 0.1	< 0.1	0.13	< 0.1
Indeno(123-cd)pyrene	< 0.1	< 0.1	< 0.1	< 0.1	0.12	< 0.1
Dibenzo(ah)anthracene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Coronene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total PAHs	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Table 9 Results for petroleum hydrocarbons in soil

Determinand	BH.01 (mg/kg)		BH.02 (mg/kg)		BH.03 (mg/kg)	
	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm	Depth 200-300mm	Depth 500-600mm
Aliphatic C5 - C6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6 - C8	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic C8 - C10	< 2	< 2	< 2	< 2	< 2	< 2
Aliphatic C10 - C12	< 2	< 2	< 2	< 2	< 2	< 2
Aliphatic C12 - C16	< 3	< 3	< 3	< 3	< 3	< 3
Aliphatic C16 - C21	< 3	< 3	< 3	< 3	< 3	< 3
Aliphatic C21 - C34	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic C35 - C40	< 10	< 10	< 10	< 10	< 10	< 10
Total Aliphatic (C5 - 40)	< 21	< 21	< 21	< 21	< 21	< 21
Aromatic C5 - C7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7 - C8	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic C8 - C10	< 2	< 2	< 2	< 2	< 2	< 2
Aromatic C10 - C12	< 2	< 2	< 2	< 2	< 2	< 2
Aromatic C12 - C16	< 2	< 2	< 2	< 2	< 2	< 2
Aromatic C16 - C21	< 3	< 2	< 2	< 2	< 2	< 3
Aromatic C21 - C35	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C35 - C40	< 10	< 10	< 10	< 10	< 10	< 10
Total Aromatic (C5 - 35)	< 21	< 21	< 21	< 21	< 21	< 21
Total (C6 - 40)	< 42	< 42	< 42	< 42	< 42	< 42

Table 10 Results for petroleum hydrocarbons in groundwater

Determinand	W.01 (BH.01) (mg/l)	W.02 (BH.02) (mg/l)
Aliphatic C5 - C6	< 0.01	< 0.01
Aliphatic C6 - C8	< 0.01	< 0.01
Aliphatic C8 - C10	< 0.01	< 0.01
Aliphatic C10 - C12	< 0.01	< 0.01
Aliphatic C12 - C16	< 0.01	< 0.01
Aliphatic C16 - C21	< 0.01	< 0.01
Aliphatic C21 - C34	< 0.01	< 0.01
Total Aliphatic (C5 - 34)	< 0.07	< 0.07
Aromatic C5 - C7	< 0.01	< 0.01
Aromatic C7 - C8	< 0.01	< 0.01
Aromatic C8 - C10	< 0.01	< 0.01
Aromatic C10 - C12	< 0.01	< 0.01
Aromatic C12 - C16	< 0.01	< 0.01
Aromatic C16 - C21	< 0.01	< 0.01
Aromatic C21 - C35	< 0.01	< 0.01
Total Aromatic (C5 -35)	< 0.07	< 0.07
Total (C5 - 35)	< 0.14	< 0.14

Table 11 Results for specified hydrocarbons in groundwater

Determinand	W.01 (BH.01) (mg/l)	W.02 (BH.02) (mg/l)
Benzene	< 0.001	< 0.001
Toluene	< 0.005	< 0.005
Ethylbenzene	< 0.005	< 0.002
p & m-Xylene	< 0.01	< 0.01
o-Xylene	< 0.005	< 0.005
MTBE	< 0.01	< 0.01

Table 12 Non-specified VOCs - measured by photo-ionisation detection in-situ

Determinand	W.01 (BH.01) (mg/l)	W.02 (BH.02) (mg/l)
Non-specified VOCs	< 0.1	<0.1

Table 13 Results for VOCs in groundwater

Determinand	W.01 (BH.01) (mg/l)	Determinand	W.01 (BH.01) (mg/l)
Dichlorodifluoromethane	< 0.005	Bromodichloromethane	< 0.005
Vinyl Chloride	< 0.005	Dibromomethane	< 0.005
Chloromethane	< 0.005	TAME	< 0.005
Chloroethane	< 0.005	cis-1,3-Dichloropropene	< 0.005
Bromomethane	< 0.005	Toluene	< 0.005
Trichlorofluoromethane	< 0.005	trans-1,3-Dichloropropene	< 0.005
1,1-Dichloroethene	< 0.005	1,1,2-Trichloroethane	< 0.01
MTBE	< 0.07	1,3-Dichloropropane	< 0.005
trans-1,2-Dichloroethene	< 0.005	Tetrachloroethene	< 0.005
1,1-Dichloroethane	< 0.005	Dibromochloromethane	< 0.005
cis-1,2-Dichloroethene	< 0.005	1,2-Dibromoethane	< 0.005
2,2-Dichloropropane	< 0.005	Chlorobenzene	< 0.005
Chloroform	< 0.005	1,1,1,2-Tetrachloroethane	< 0.005
Bromochloromethane	< 0.01	Ethyl Benzene	< 0.005
1,1,1-Trichloroethane	< 0.005	m,p-Xylene	< 0.01
1,1-Dichloropropene	< 0.005	o-Xylene	< 0.005
Carbon Tetrachloride	< 0.005	Styrene	< 0.005
1,2-Dichloroethane	< 0.01	Bromoform	< 0.01
Benzene	< 0.001	Isopropylbenzene	< 0.005
1,2-Dichloropropane	< 0.005	1,1,2,2-Tetrachloroethane	< 0.01
Trichloroethene	< 0.005	1,2,3-Trichloropropane	< 0.005

Table 13 (Cont.) Results for VOCs in groundwater

Determinand	W.01 (BH.01) (mg/l)
n-Propylbenzene	< 0.01
Bromobenzene	< 0.01
2-Chlorotoluene	< 0.01
1,3,5-Trimethylbenzene	< 0.01
4-Chlorotoluene	< 0.01
tert-Butylbenzene	< 0.01
1,2,4-Trimethylbenzene	< 0.01
sec-Butylbenzene	< 0.07
p-Isopropyltoluene	< 0.01
1,3-Dichlorobenzene	< 0.01
1,4-Dichlorobenzene	< 0.005
n-Butylbenzene	< 0.005
1,2-Dichlorobenzene	< 0.005
2-Dibromo-3-chloropropane	<0.01
Hexachlorobutadiene	< 0.005

5 Interpretation

Tables 14 to 19 below show the soil guideline concentrations and water quality screening values used as part of this assessment.

Where Environment Agency guideline values are unavailable, soil guideline concentrations derived using CLEA software packages and other published guidelines have been consulted. In all instances guideline values for residential end-use with home-grown produce have been considered.

For the purposes of this assessment therefore, the following guideline criteria have been referred to:

- Environment Agency Category 4 Screening Levels (2014);
- CIEH (LQM) GAC 3rd Edition (residential end-use);
- Atkins ATRISK SSVs (residential end-use with home-grown produce);
- GAC CLEA generated value for residential end-use with home-grown produce; and
- others, as available.

In the absence of any UK groundwater contamination guidelines, the following criteria have been referred to:

- UK Drinking Water Standards ;
- Environment Agency MRVs;
- WHO Drinking Water Quality Guideline values;
- Dutch Standards for Groundwater Quality; and
- Atkins ATRISK WSVs (residential end-use with home-grown produce);

Note that for some guideline values a choice of soil organic matter (SOM) concentration is provided whereby different guideline concentrations exist for SOM values of between 1% and 6%.

In this specific instance the more stringent guideline value for 1% SOM has been referred to, despite the mean organic content being determined as 0.6%; which approximates to 1% SOM.

Table 14 Soil guideline concentrations for inorganics referred to for this assessment

Determinand	Guideline concentration for 1% SOM (mg/kg)	Origin
Arsenic	37	Atkins ATRISK Category 4 Screening Level
Boron	290	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Cadmium	22.1	Atkins ATRISK Category 4 Screening Level
Chromium	14300	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Chromium VI	20.5	Atkins ATRISK Category 4 Screening Level
Copper	4730	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Lead	200	Category 4 Screening Level ^(a)
Mercury (elemental)	0.0863	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Mercury (inorganic Hg ²⁺)	180	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Nickel	136	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Selenium	375	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Zinc	20000	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Free Cyanide	34	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Sulphate	10000	ICRCL Action Value domestic gardens ^(b)
Sulphide	1000	ICRCL Action Value all uses ^(b)
Phenols (SOM 1%)	267	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Benzene (SOM 1%)	0.137	Atkins ATRISK (C4SL) for residential with home-grown produce
Toluene (SOM 1%)	113	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Ethylbenzene (SOM 1%)	50.7	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
o-Xylene (SOM 1%)	26.4	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
m-Xylene (SOM 1%)	25	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
p-Xylene (SOM 1%)	24	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce

(a) Quoted for residential land-use 0-7 year-old child taking into account bioavailability, with exposure parameters as detailed in report SR3.

(b) This 'withdrawn' value has been quoted in the absence of any other available published guideline.

Table 15 Soil guideline concentrations for PAHs referred to for this assessment

Determinand	Guideline concentration for 1% SOM (mg/kg)	Origin
Naphthalene	2.3	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Acenaphthylene	608	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Acenaphthene	210	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Fluorene	735	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Phenanthrene	95	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Anthracene	10200	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Fluoranthene	983	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Pyrene	668	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Benzo(a)anthracene	7.2	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Chrysene	15	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(b)fluoranthene	2.6	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(k)fluoranthene	77	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(a)pyrene	2.2	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Indeno(123-cd)pyrene	27	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Dibenzo(ah)anthracene	0.24	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(ghi)perylene	320	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce

Table 16 Soil guideline concentrations for TPHs referred to for this assessment

Determinand	Guideline concentration for 1% SOM (mg/kg)	Origin
Aliphatic TPH C5-C6	42.7	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C6-C8	99.3	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C8-C10	13.9	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C10-C12	81.7	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C12-C16	385	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C16-C35	210000	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C35-C44	65000	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Aromatic TPH C5-C7	0.137	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C7-C8	113	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C8-C10	20.5	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C10-C12	70	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C12-C16	165	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C16-C21	319	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C21-C35	1120	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C5-C35	1100	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce

Table 17 Water guideline concentrations for petroleum hydrocarbons referred to for this assessment

Determinand	Water guideline concentration mg/l	Origin
Aliphatic TPH C5-C6	1.93	Atkins ATRISK (CLEA 1.07) for residential use
Aliphatic TPH C6-C8	1.40	Atkins ATRISK (CLEA 1.07) for residential use
Aliphatic TPH C8-C10	0.0296	Atkins ATRISK (CLEA 1.07) for residential use
Aliphatic TPH C10-C12	0.0228	Atkins ATRISK (CLEA 1.07) for residential use
Aliphatic TPH C12-C16	0.00547	Atkins ATRISK (CLEA 1.07) for residential use
Aliphatic TPH C16-35	-	-
Aliphatic TPH C35-C44	0.3*	WHO Drinking water
Aromatic TPH C5-C7	0.0888	Atkins ATRISK (CLEA 1.07) for residential use
Aromatic TPH C7-C8	96.4	Atkins ATRISK (CLEA 1.07) for residential use
Aromatic TPH C8-C10	0.985	Atkins ATRISK (CLEA 1.07) for residential use
Aromatic TPH C10-C12	3.87	Atkins ATRISK (CLEA 1.07) for residential use
Aromatic TPH C12-16	10.5	Atkins ATRISK (CLEA 1.07) for residential use
Aromatic TPH C16-21	0.543	Dutch SRC (February 2001) Groundwater
Aromatic TPH C21-C35	0.0066	Dutch SRC (February 2001) Groundwater
Aromatic TPH C35-C44	0.04	Dutch standards (2009) Groundwater

* Dependent upon body weight

Table 18 Water guideline concentrations for BTEXs referred to for this assessment

Determinand	Water guideline concentration mg/l	Origin
Phenols	1690	Atkins ATRISK (CLEA 1.07) for residential use
Benzene	0.0888	Atkins ATRISK (CLEA 1.07) for residential use
Toluene	96.4	Atkins ATRISK (CLEA 1.07) for residential use
Ethylbenzene	13.4	Atkins ATRISK (CLEA 1.07) for residential use
o-Xylene	5.00	Atkins ATRISK (CLEA 1.07) for residential use
m-Xylene	4.10	Atkins ATRISK (CLEA 1.07) for residential use
p-Xylene	4.29	Atkins ATRISK (CLEA 1.07) for residential use

Table 19 Water guideline concentrations for VOCs referred to for this assessment

Determinand	Water guideline concentration mg/l	Determinand	Water guideline concentration mg/l
Dichlorodifluoromethane	-	Bromodichloromethane	-
Vinyl Chloride	0.0005 (drinking water standards)	Dibromomethane	-
Chloromethane	0.0531 Atkins ATRISK (CLEA 1.07) for residential use	TAME	-
Chloroethane	41.5 Atkins ATRISK (CLEA 1.07) for residential use	cis-1,3-Dichloropropene	-
Bromomethane	-	Toluene	4 (EA MRV)
Trichlorofluoromethane	-	trans-1,3-Dichloropropene	-
1,1-Dichloroethene	-	1,1,2-Trichloroethane	0.1 (EA MRV)
MTBE	-	1,3-Dichloropropane	-
trans-1,2-Dichloroethene	0.676 Atkins ATRISK (CLEA 1.07) for residential use	Tetrachloroethene	1.66 Atkins ATRISK (CLEA 1.07) for residential use
1,1-Dichloroethane	11.4 Atkins ATRISK (CLEA 1.07) for residential use	Dibromochloromethane	-
cis-1,2-Dichloroethene	-	1,2-Dibromoethane	-
2,2-Dichloropropane	-	Chlorobenzene	-
Chloroform	3.88 Atkins ATRISK (CLEA 1.07) for residential use	1,1,1,2-Tetrachloroethane	6.89 Atkins ATRISK (CLEA 1.07) for residential use
Bromochloromethane	0.0725 Atkins ATRISK (CLEA 1.07) for residential use	Ethyl Benzene	-
1,1,1-Trichloroethane	0.1 (EA MRV)	m,p-Xylene	3 (EA MRV)
1,1-Dichloropropene	-	o-Xylene	3 (EA MRV)
Carbon Tetrachloride	-	Styrene	38.6 Atkins ATRISK (CLEA 1.07) for residential use

Table 19 (Cont.) Water guideline concentrations for VOCs referred to for this assessment

Determinand	Water guideline concentration mg/l	Determinand	Water guideline concentration mg/l
1,2-Dichloroethane	1 (EA MRV)	1,2,4-Trimethylbenzene	0.110 (Atkins ATRISK (CLEA 1.07) for residential use)
Benzene	1 (EA MRV)	sec-Butylbenzene	-
1,2-Dichloropropane	0.0969 (Atkins ATRISK (CLEA 1.07) for residential use)	p-Isopropyltoluene	-
Trichloroethene		1,3-Dichlorobenzene	-
Bromoform	15.9 Atkins ATRISK (CLEA 1.07) for residential use	1,4-Dichlorobenzene	-
Isopropylbenzene	-	n-Butylbenzene	-
1,1,2,2-Tetrachloroethane	-	1,2-Dichlorobenzene	-
1,2,3-Trichloropropane	-	2-Dibromo-3-chloropropane	-
n-Propylbenzene	-	Hexachlorobutadiene	-
Bromobenzene	-	4-Chlorotoluene	-
2-Chlorotoluene	-	tert-Butylbenzene	-
1,3,5-Trimethylbenzene	-		

6 Results evaluation

As detailed above, three boreholes were drilled across the site to a maximum depth of 3000mm; from each of which two soil samples were collected for laboratory analysis, representing the direct and indirect contact zones.

IN addition to this, groundwater samples were taken from boreholes BH.01 and BH.02.

In doing so, the results reproduced in Tables 4 to 9 above have shown that although there were a number of chemical substances detected within the soil, there were no determinands identified above their corresponding referenced soil guideline criteria, when considered for residential development.

Furthermore, the results reproduced in Tables 10 to 13 above have shown that there were no chemical substances detected within the groundwater.

7 Review of conceptual model and risk assessment

Using the sampling results and observations made, the conceptual site model (CSM) from the Phase 1 desk study can now be reviewed and updated. In doing so any uncertainties highlighted within that report can now be readdressed and the corresponding risk reassessed.

In reviewing this conceptual model, Table 20 below highlights any perceived pollutant pathway linkages that may be present.

It should be noted that the following re-assessment of risk, has been made on the basis that there will be no soft landscaped areas as part of the new residential development.

The risk matrix used for this purpose is reproduced below in Figure 2.

Figure 2 Risk assessment algorithm

Potential severity	Risk rating						Severity of hazard	Probability of hazard	Overall risk
	5	5	10	15	20	25	5 = Fatality	1 = Improbable	1 - 6 Low
	4	4	8	12	16	20	4 = Major	2 = Remote	8 - 12 Medium
	3	3	6	9	12	15	3 = Minor	3 = Possible	15 - 25 High
	2	2	4	6	8	10	2 = Negligible	4 = Probable	
	1	1	2	3	4	5	1 = None	5 = Certainty	
		1	2	3	4	5			
	Probability						Severity of hazard x probability = risk rating		

Table 20 Perceived risk to receptors

Contaminants identified	Potential pathways	Perceived level of risk	Comments and reasoning
None	Ingestion of soil	4	In the absence of any identified chemical contamination, the corresponding risk from ingestion of soil is expected to be low.
	Dermal contact with soil	4	In the absence of any identified chemical contamination, the corresponding risk from direct and indirect contact with soil is expected to be low.
	Inhalation of soil dust	4	In the absence of any identified chemical contamination, the corresponding risk from inhalation of the soil is expected to be low.
	Consumption of home-grown vegetables	4	In the absence of any identified chemical contamination, the corresponding risk from ingesting contaminated fruit and vegetables is expected to be low.
	Inhalation or ignition of gases or vapours	4	In the absence of any identified organic material within made-ground, the corresponding risk from gases or vapours is deemed to be low.
	Contact with mains services and building fabric below ground	4	In the absence of any identified chemical contamination, the corresponding risk to underground services and building fabric is expected to be low.
	Contact with groundwater and other off-site environmental media	4	In the absence of any identified soil contamination, the likelihood of impacting groundwater and other off-site media is expected to be low.

8 Summary and recommendations

8.1 Summary

This report has aimed to determine whether or not there is any unacceptable soil contamination beneath the surface of the site, with a particular focus on whether the site may have been impacted by an off-site former garage to the immediate southwest.

For this purpose, three boreholes were drilled, down to a minimum depth of 2000mm, allowing the subsurface to be both visually characterised, and analytically assessed for possible contamination.

Soil samples were obtained from two separate depths at each location, and analysed for the determinands highlighted in the conceptual site model (CSM). Furthermore, groundwater samples were also obtained from two of the bores.

The results have shown that there were no determinands above guideline criteria for residential development in either the soil or water samples analysed.

There were also no other visual or olfactory concerns noted.

8.2 Recommendations

The findings from both the soil and groundwater analyses suggest that there should be no requirement to undertake any remedial action at this site.

It is however recommended that an informal observation strategy is put in place during all groundworks that take place as part of the development. Should there be a suspicion that the soil on or beneath the site could be potentially contaminated by means of observation or odour, then work should stop immediately to allow the concern to be appropriately investigated, and the contaminated land officer at HBC notified accordingly.

9 Limitations

This work has been undertaken in accordance with Apple Environmental Limited's standard terms and conditions.

The findings represent the professional opinion of the report author. All work carried out is based upon Apple Environmental Limited's current professional knowledge and understanding. It is therefore stated that the conclusions of this report have been based upon information gathered from a number of sources and it can only be assumed that this information provided was accurate and correct.

Intrusive investigation undertaken as part of this work has been restricted to a level of detail required to achieve the stated objectives of this work. The results of any measurements taken may vary spatially or with time, and further confirmatory measurements may wish to be considered, as necessary.

It is also pointed out that soil and groundwater sampling, may only provide a general indication of contamination present. There is always the possibility that other undetected contaminants exist, or, that detected contaminants may exist at a greater concentration than that specified in areas of the site that have not been intrusively investigated.

It is further noted that the findings detailed in this report relate entirely to the contaminative status of the site as at the time of compiling this report, and therefore can not take account of subsequent on or off-site activities that may have impacted the site after this date.

10 References and specific sources of information

1. Investigation of potentially contaminated sites - code of practice (BSI 10175:2011+A2:2017)
2. Land Contamination Risk Management (LCRM) - Environment Agency (April 2021)
3. Using Soil Guideline Values - Environment Agency Science Report SC050021/SGV (March 2009)
4. The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment CIEH 3rd Ed. - Land Quality Management Ltd. (2015)
5. Atkins ATRISK SSCs (July 2017)
6. CLEA Software (Version 1.05) Handbook - Environment Agency Science Report SC050021/SR4 (January 2014)
7. ICRCCL 59/83 Trigger Concentrations - Department of the Environment (1983)
8. Land Affected by Contamination - Planning Practice Guidance - The Department for Communities and Local Government (June 2014)
9. The National Planning Policy Framework (Revised) - December 2023
10. Model procedures for the management of contaminated land (CLR-11) - Environment Agency (September 2004)
11. Contaminated Land Risk Assessment: A Guide to Good Practice (C552) - CIRIA (2001)
12. SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - CL:AIRE (September 2014)
13. British Geological Survey. Geology of Britain:
<http://mapapps.bgs.ac.uk/geologyofbritain/home.html?>

APPENDICES

- i Laboratory data
- ii Calibration certification



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DETS Report No: [REDACTED]

Site Reference: None Supplied

Project / Job Ref: [REDACTED]

Order No: None Supplied

Sample Receipt Date: 22/07/2024

Sample Scheduled Date: 22/07/2024

Report Issue Number: 1

Reporting Date: 26/07/2024

Authorised by:



Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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Lenham Heath
Maidstone
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Tel : 01622 850410



Soil Analysis Certificate					
DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24	17/07/24	17/07/24
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	~TP / BH No	BH.01/01/3610	BH.01/02/3610	BH.02/01/3610	BH.02/02/3610
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied
Reporting Date: 26/07/2024	DETS Sample No	727558	727559	727560	727561

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	8.2	8.0	8.2	8.0	8.5
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	608	603	254	< 200	476
Total Sulphate as SO ₄ (2:1)	%	< 0.02	MCERTS	0.06	0.06	0.03	< 0.02	0.05
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	159	210	43	40	60
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.16	0.21	0.04	0.04	0.06
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	< 5	< 5
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	0.7	0.8	0.4	0.4	1
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	22	23	11	9	51
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	11.1	11.3	5.3	4.5	25.4
Arsenic (As)	mg/kg	< 2	MCERTS	8	7	11	10	9
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	19	20	27	24	18
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	12	12	11	9	14
Lead (Pb)	mg/kg	< 3	MCERTS	25	23	13	12	40
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	13	13	22	18	11
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	< 3	MCERTS	45	47	46	41	59
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
TPH - Aliphatic >C35 - C40 : EH CU 1D AL	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >C35 - C40 : EH CU 1D AR	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic / Aromatic (C6 - C40) - Total : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion

Subcontracted analysis (S)

~Sample details provided by customer and can affect the validity of results

(hs) Please note deviating sample due to head space in container



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Soil Analysis Certificate					
DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24	17/07/24	
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	
~Site Reference: None Supplied	~TP / BH No	BH.03/02/3610	W.01/3610	W.02/3610	
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied	None Supplied	None Supplied	
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied	None Supplied	
Reporting Date: 26/07/2024	DETS Sample No	727563	727564	727565	

Determinand	Unit	RL	Accreditation	(hs)			
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected			
pH	pH Units	N/a	MCERTS	8.1			
Total Cyanide	mg/kg	< 1	NONE	< 1			
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	< 200			
Total Sulphate as SO ₄	%	< 0.02	MCERTS	< 0.02			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	18			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02			
Sulphide	mg/kg	< 5	NONE	< 5			
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	0.5			
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	19			
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	9.3			
Arsenic (As)	mg/kg	< 2	MCERTS	9			
W/S Boron	mg/kg	< 1	NONE	< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	25			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	11			
Lead (Pb)	mg/kg	< 3	MCERTS	11			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	17			
Selenium (Se)	mg/kg	< 2	MCERTS	< 2			
Zinc (Zn)	mg/kg	< 3	MCERTS	45			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2			
TPH - Aliphatic >C35 - C40 : EH CU 1D AL	mg/kg	< 10	NONE	< 10			
TPH - Aromatic >C35 - C40 : EH CU 1D AR	mg/kg	< 10	NONE	< 10			
TPH - Aliphatic / Aromatic (C6 - C40) - Total : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE	< 42			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion.
Subcontracted analysis (S)

~Sample details provided by customer and can affect the validity of results



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Soil Analysis Certificate - Speciated PAHs					
DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24	17/07/24	17/07/24
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	~TP / BH No	BH.01/01/3610	BH.01/02/3610	BH.02/01/3610	BH.02/02/3610
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied
Reporting Date: 26/07/2024	DETS Sample No	727558	727559	727560	727561

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.19
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.17
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.13
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.16
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.13
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.12
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Coronene	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Oily Waste PAHs	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Dutch 10 PAHs	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
Total WAC-17 PAHs	mg/kg	< 1.7	NONE	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7

~Sample details provided by customer and can affect the validity of results



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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 24-08270	~Date Sampled	17/07/24				
Apple Environmental Ltd	~Time Sampled	None Supplied				
~Site Reference: None Supplied	~TP / BH No	BH.03/02/3610				
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied				
~Order No: None Supplied	~Depth (m)	None Supplied				
Reporting Date: 26/07/2024	DETS Sample No	727563				

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Coronene	mg/kg	< 0.1	NONE	< 0.1			
Total Oily Waste PAHs	mg/kg	< 1	MCERTS	< 1			
Total Dutch 10 PAHs	mg/kg	< 1	MCERTS	< 1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			
Total WAC-17 PAHs	mg/kg	< 1.7	NONE	< 1.7			

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Maidstone
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Tel : 01622 850410



Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24	17/07/24	17/07/24	17/07/24
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	~TP / BH No	BH.01/01/3610	BH.01/02/3610	BH.02/01/3610	BH.02/02/3610	BH.03/01/3610
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Reporting Date: 26/07/2024	DETS Sample No	727558	727559	727560	727561	727562

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6 : HS 1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS 1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH CU 1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH CU 1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH CU 1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21 : EH CU 1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34 : EH CU 1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7 : HS 1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS 1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH CU 1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12 : EH CU 1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16 : EH CU 1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21 : EH CU 1D_AR	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35 : EH CU 1D_AR	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

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 (hs) Please note deviating sample due to head space in container



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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24	17/07/24		
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied		
~Site Reference: None Supplied	~TP / BH No	BH.03/02/3610	W.01/3610	W.02/3610		
~Project / Job Ref:	~Additional Refs	None Supplied	None Supplied	None Supplied		
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied	None Supplied		
Reporting Date: 26/07/2024	DETS Sample No	727563	727564	727565		

Determinand	Unit	RL	Accreditation	(hs)			
Aliphatic >C5 - C6 : HS 1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01			
Aliphatic >C6 - C8 : HS 1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05			
Aliphatic >C8 - C10 : EH CU 1D_AL	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C10 - C12 : EH CU 1D_AL	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C12 - C16 : EH CU 1D_AL	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C16 - C21 : EH CU 1D_AL	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C21 - C34 : EH CU 1D_AL	mg/kg	< 10	MCERTS	< 10			
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21			
Aromatic >C5 - C7 : HS 1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01			
Aromatic >C7 - C8 : HS 1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05			
Aromatic >C8 - C10 : EH CU 1D_AR	mg/kg	< 2	MCERTS	< 2			
Aromatic >C10 - C12 : EH CU 1D_AR	mg/kg	< 2	MCERTS	< 2			
Aromatic >C12 - C16 : EH CU 1D_AR	mg/kg	< 2	MCERTS	< 2			
Aromatic >C16 - C21 : EH CU 1D_AR	mg/kg	< 3	MCERTS	< 3			
Aromatic >C21 - C35 : EH CU 1D_AR	mg/kg	< 10	MCERTS	< 10			
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21			
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 42	NONE	< 42			

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24	17/07/24	17/07/24	17/07/24
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	~TP / BH No	BH.01/01/3610	BH.01/02/3610	BH.02/01/3610	BH.02/02/3610	BH.03/01/3610
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Reporting Date: 26/07/2024	DETS Sample No	727558	727559	727560	727561	727562

Determinand	Unit	RL	Accreditation					
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	6	6	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	4	4	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - BTEX / MTBE							
DETS Report No: 24-08270	~Date Sampled	17/07/24					
Apple Environmental Ltd	~Time Sampled	None Supplied					
~Site Reference: None Supplied	~TP / BH No	BH.03/02/3610					
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied					
~Order No: None Supplied	~Depth (m)	None Supplied					
Reporting Date: 26/07/2024	DETS Sample No	727563					

Determinand	Unit	RL	Accreditation				
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2			
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5			
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2			
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2			
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2			
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5			

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Water Analysis Certificate - TPH CWG Banded					
DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24		
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied		
~Site Reference: None Supplied	~TP / BH No	W.01/3610	W.02/3610		
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied	None Supplied		
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied		
Reporting Date: 26/07/2024	DETS Sample No	727564	727565		

Determinand	Unit	RL	Accreditation	(hs)			
Aliphatic >C5 - C6 : HS_1D_MS_AL	ug/l	< 10	NONE	< 10	< 10		
Aliphatic >C6 - C8 : HS_1D_MS_AL	ug/l	< 10	NONE	< 10	< 10		
Aliphatic >C8 - C10 : EH_CU_1D_AL	ug/l	< 10	NONE	< 10	< 10		
Aliphatic >C10 - C12 : EH_CU_1D_AL	ug/l	< 10	NONE	< 10	< 10		
Aliphatic >C12 - C16 : EH_CU_1D_AL	ug/l	< 10	NONE	< 10	< 10		
Aliphatic >C16 - C21 : EH_CU_1D_AL	ug/l	< 10	NONE	< 10	< 10		
Aliphatic >C21 - C34 : EH_CU_1D_AL	ug/l	< 10	NONE	< 10	< 10		
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	ug/l	< 70	NONE	< 70	< 70		
Aromatic >C5 - C7 : HS_1D_MS_AR	ug/l	< 10	NONE	< 10	< 10		
Aromatic >C7 - C8 : HS_1D_MS_AR	ug/l	< 10	NONE	< 10	< 10		
Aromatic >C8 - C10 : EH_CU_1D_AR	ug/l	< 10	NONE	< 10	< 10		
Aromatic >C10 - C12 : EH_CU_1D_AR	ug/l	< 10	NONE	< 10	< 10		
Aromatic >C12 - C16 : EH_CU_1D_AR	ug/l	< 10	NONE	< 10	< 10		
Aromatic >C16 - C21 : EH_CU_1D_AR	ug/l	< 10	NONE	< 10	< 10		
Aromatic >C21 - C35 : EH_CU_1D_AR	ug/l	< 10	NONE	< 10	< 10		
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	ug/l	< 70	NONE	< 70	< 70		
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Tot al	ug/l	< 140	NONE	< 140	< 140		

~Sample details provided by customer and can affect the validity of results
(hs) Please note deviating sample due to head space in container



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Water Analysis Certificate - BTEX / MTBE

DETS Report No: 24-08270	~Date Sampled	17/07/24	17/07/24			
Apple Environmental Ltd	~Time Sampled	None Supplied	None Supplied			
~Site Reference: None Supplied	~TP / BH No	W.01/3610	W.02/3610			
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied	None Supplied			
~Order No: None Supplied	~Depth (m)	None Supplied	None Supplied			
Reporting Date: 26/07/2024	DETS Sample No	727564	727565			

Determinand	Unit	RL	Accreditation	(hs)		
Benzene : HS_1D_MS	ug/l	< 1	ISO17025	< 1	< 1	
Toluene : HS_1D_MS	ug/l	< 5	ISO17025	< 5	< 5	
Ethylbenzene : HS_1D_MS	ug/l	< 5	ISO17025	< 5	< 5	
p & m-xylene : HS_1D_MS	ug/l	< 10	ISO17025	< 10	< 10	
o-xylene : HS_1D_MS	ug/l	< 5	ISO17025	< 5	< 5	
MTBE : HS_1D_MS	ug/l	< 10	ISO17025	< 10	< 10	

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(hs) Please note deviating sample due to head space in container



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Water Analysis Certificate - Volatile Organic Compounds (VOC)

DETS Report No: 24-08270	~Date Sampled	17/07/24				
Apple Environmental Ltd	~Time Sampled	None Supplied				
~Site Reference: None Supplied	~TP / BH No	W.01/3610				
~Project / Job Ref: [REDACTED]	~Additional Refs	None Supplied				
~Order No: None Supplied	~Depth (m)	None Supplied				
Reporting Date: 26/07/2024	DETS Sample No	727564				

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

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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 24-08270	
Apple Environmental Ltd	
~Site Reference: None Supplied	
~Project / Job Ref: [REDACTED]	
~Order No: None Supplied	
Reporting Date: 26/07/2024	

DETS Sample No	~TP / BH No	~Additional Refs	~Depth (m)	Moisture Content (%)	Sample Matrix Description
727558	BH.01/01/3610	None Supplied	None Supplied	14.3	Brown sandy clay
727559	BH.01/02/3610	None Supplied	None Supplied	16.7	Brown sandy clay
727560	BH.02/01/3610	None Supplied	None Supplied	15.3	Brown sandy clay
727561	BH.02/02/3610	None Supplied	None Supplied	15.5	Brown sandy clay
727562	BH.03/01/3610	None Supplied	None Supplied	7.2	Brown sandy clay with stones and brick
727563	BH.03/02/3610	None Supplied	None Supplied	12.1	Brown sandy clay with vegetation

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

Insufficient Sample ^{1/S}

Unsuitable Sample ^{U/S}

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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 24-08270

Apple Environmental Ltd

~Site Reference: None Supplied

~Project / Job Ref: [REDACTED]

~Order No: None Supplied

Reporting Date: 26/07/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

-Sample details provided by customer and can affect the validity of results



Normec DETS Limited
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Water Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 24-08270

Apple Environmental Ltd

~Site Reference: None Supplied

~Project / Job Ref: [REDACTED]

~Order No: None Supplied

Reporting Date: 26/07/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	U	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	UF	Biological Oxygen Demand (BOD)	Determination using BOD sensors measuring the change of pressure	E133
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered

UF Unfiltered

~Sample details provided by customer and can affect the validity of results



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List of HWOL Acronyms and Operators

DETS Report No: 24-08270

Apple Environmental Ltd

~Site Reference: None Supplied

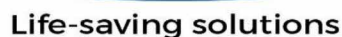
~Project / Job Ref: [REDACTED]

~Order No: None Supplied

Reporting Date: 26/07/2024

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total
~	Sample details provided by customer and can affect the validity of results

Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL
TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL
TPH CWG - Aliphatic >C35 - C40 - EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C34 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH CWG - Aliphatic C5 - C34 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH CWG - Aromatic >C35 - C40 - EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C35 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH CWG - Aromatic C5 - C35 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Total >C5 - C35 - HS_1D_MS+EH_CU_1D_Total
TPH CWG - Total >C6 - C40 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS



CUSTOMER: Apple Environmental Ltd

FIRMWARE: 9.04
UPGRADED TO: 9.28

TESTS	Pre Service	Post Service
Charger Test		ok
Battery charge Test		ok
Lamp Test	see notes	ok
Air Flow Test ≥ 220ml/min		250ml/min
Block Flow Test ≤ 15ml/min		7ml/min
Moisture Sensitivity = 0.0ppm		0.00ppm
Switch Test		ok
Sensor Test		ok
Alarm Test		ok
PC Comms Test		ok
Datalog Test		ok
Display Test		ok
Physical Inspection		ok
PAT Test	see notes	ok
Firmware Upgrade	see notes	ok
Software Upgrade (usb)	n/a	
Function Test		ok
Run Time		28hours8mins

Unit in for service and calibration
Firmware upgraded to latest version 9.28
Replaced select stack, sensor seal, inlet/ outlet seals and PTFE filter as per service
Cleaned lamp with aluminium oxide
Flowrate 250ml/min, Block 7ml/min
Unit sent in without Benzene tube holder assembly, supplied a new one
Unit calibrated and bump tested
Settings retained as received: Measuring gas TAC RF 0.5
Power supply PAT tested

DATE: 02/08/2023



Life-saving solutions

CERTIFICATE OF CALIBRATION

Tiger Select

CALIBRATION CERTIFICATE NO:



ISSUED BY: SHAWCITY LIMITED
DATE: 02/08/2023

APPROVED SIGNATORY:



NAME: Joe Herbert

CUSTOMER: Apple Environmental Ltd
INSTRUMENT: Tiger Select
SERIAL NUMBER: T-113211

CALIBRATION METHOD: CM03
AMBIENT CONDITIONS: 20°C ± 2°C and 50% (± 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.
The instrument was calibrated by exposing the sensor to known values of gas concentrations.
All gases were sampled through the complete probe and in line filter, where applicable.
The reference value is that generated by the certified source and the indicated value is that measured by the instrument.

CALIBRATION RESULTS

GAS	LOT No	REF. VALUE	INDICATED VALUE
Isobutylene	WO397588-2	100 ppm	100 ppm
Isobutylene	WO380827-2	1000 ppm	1000 ppm
Benzene	WO407569-2	5 ppm	5 ppm

COMMENTS:

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.
This provides a level of confidence of uncertainty of approximately 95%.
The uncertainty of measurement is $\pm 2\%$
The results indicate that the instrument conforms to the applicable parts of the published specification.

HEALTH & SAFETY, OCCUPATIONAL HYGIENE AND ENVIRONMENTAL MONITORING INSTRUMENTS

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