CONTAMINATED LAND
INTRUSIVE INVESTIGATION

Gess Gates Farm
Stane Street
Adversane
West Sussex
RH14 9JR

apple environmental

May 2024

Contents

	Company information	4
1	Introduction and scope of work	5
2	Methodology	7
3	On-site observations	9
4	Results from soil analyses	13
5	Interpretation	18
6	Results evaluation	22
7	Review of conceptual site model	23
8	Summary and recommendations	25
9	Limitations	26
10	References and specified sources of information	27

Appendices

	Laboratory data	44
	Calibration certification	57

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1 Introduction and scope of work

Apple Environmental has been appointed to undertake an intrusive soil contamination investigation at Gess Gates Farm, Adversane, West Sussex.

An environmental desk-study and preliminary risk assessment previously undertaken at the site in March 2022 by EAS Limited (Report Ref. 500/White&Sons/GessGatesFarm/PCRA) had identified a potential land contamination concern, due to the former and current agricultural use of the barn and its surroundings.

In view of the proposal to convert an existing barn on the site to a farm dwelling, the conceptual model within the desk study had highlighted a perceived risk from associated agricultural activities, with potentially significant pathway linkages that could enable contamination to reach receptors.

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

An intrusive investigation was subsequently recommended 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 visual examination of the area and sub-surface material, as well as the laboratory analysis of material samples.

As such, the specific objectives are:

- to excavate an appropriate number of trial pits at the site to a minimum depth of 1200mm;
- 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 pits 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 analyse the soil 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.

2 Methodology

As stated above, the overall aim of this investigation is to assess the sub-surface of the site in order to determine any risk that may be present as a result of ground contamination.

For this purpose, three trial pits were excavated upon the site to a minimum depth of 1200mm, at the locations shown below in Figure 1.

Figure 1 Plan showing the sampling locations



Trial pit sampling locations

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 100 - 200mm and 500 - 600mm.

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*

* 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.

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

3 On-site observations

It is understood from BGS data that the bedrock beneath the site is characterised by the Cretaceous Weald Clay Formation, with no superficial deposits.

The natural geology was confirmed within all trial pits, with no evidence of made-ground or fill in any of the sampled 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 8th May 2024.

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

Location ID	Depth (mm)	Notes
TP.01	0 - 240	Mid-brown sandy clay loam with rootlets
	240 - 760	Orange brown wet, sticky sandy clay
	760 - 1200	Mottled orange brown and grey wet sticky clay
Groundwater	1100mm	Slow groundwater seepage resting around 1100mm

Photograph 1 Trial pit and removed soil material - Location TP.01





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

Location ID	Depth (mm)	Notes
TP.02	0 - 230	Mid-brown sandy clay loam with rootlets
	230 - 740	Orange brown wet, sticky sandy clay with rootlets
	740 - 1200	Mottled orange brown and grey wet sticky clay
Groundwater	1150mm	Slow groundwater seepage resting around 1150mm

Photograph 2 Trial pit and removed soil material - Location TP.02





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

Location ID	Depth (mm)	Notes
TP.03	0 - 320	Mid-brown sandy clay loam with rootlets
	320 - 820	Orange brown wet, sticky sandy clay with rootlets
	820 - 1200	Mottled orange brown and grey wet sticky clay
Groundwater	1200mm	Slow groundwater seepage resting around 1200mm

Photograph 3 Trial pit and removed soil material - Location TP.03





4 Results from soil analyses

The results from the soil analyses are displayed in Tables 4 to 9 below. Any determinand detected has been highlighted in **bold** type.

Table 4 Results for specified inorganics in soil - metals

Determinand (mg/kg)	TP.01		TP.02		TP.03	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Arsenic	**7**	**4**	**6**	**6**	**5**	**4**
Boron	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	**0.3**	< 0.2	< 0.2	< 0.2	**0.4**	< 0.2
Chromium	**13**	**20**	**11**	**12**	**10**	**8**
Hexavalent chromium	< 2	< 2	< 2	< 2	< 2	< 2
Copper	**24**	**15**	**12**	**7**	**45**	**10**
Lead	**142**	**21**	**24**	**11**	**53**	**14**
Mercury (total)	< 1	< 1	< 1	< 1	< 1	< 1
Nickel	**10**	**9**	**7**	**6**	**7**	**7**
Selenium	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	**150**	**50**	**63**	**46**	**129**	**74**

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

Determinand (mg/kg)	TP.01		TP.02		TP.03	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Cyanide (total)	< 1	< 1	< 1	< 1	< 1	< 1
Sulphate (total)	**312**	< 200	**226**	< 200	**206**	< 200
Sulphide	< 5	< 5	< 5	< 5	< 5	< 5
Chloride	**28**	**32**	**21**	**24**	**25**	**16**
Asbestos	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected

Table 6 Results for specified hydrocarbons in soil

Determinand (mg/kg)	TP.01		TP.02		TP.03	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	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	< 0.002	< 0.002	< 0.002	< 0.002
p & m-Xylene	< 0.002	< 0.002	< 0.002	< 0.002	< 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 Results for poly-aromatic hydrocarbons in soil

Determinand (mg/kg)	TP.01		TP.02		TP.03	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	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	< 0.1	< 0.1
Pyrene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 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	< 0.1	< 0.1
Benzo(b)fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 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	< 0.1	< 0.1
Indeno(123-cd)pyrene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 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 8 Results for petroleum hydrocarbons in soil

Determinand (mg/kg)	TP.01		TP.02		TP.03	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	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 9 Non-specified VOCs - measured by photo-ionisation detection in-situ

TP.01		TP.02		TP.03	
Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm

5 Interpretation

Tables 10 to 12 below show the soil guideline concentrations 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.

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, as the mean organic content was determined as 1.03%; which approximates to 1.83% SOM.

Table 10 Soil guideline concentrations for inorganics referred to for this assessment

Determinand (mg/kg)	Guideline concentration for 1% SOM	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 11 Soil guideline concentrations for PAHs referred to for this assessment

Determinand (mg/kg)	Guideline concentration for 1% SOM	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 12 Soil guideline concentrations for TPHs referred to for this assessment

Determinand (mg/kg)	Guideline concentration for 1% SOM	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

6 Results evaluation

As detailed above, three trial pits were excavated across the site to a minimum depth of 100mm; from each of which two soil samples were collected for laboratory analysis, representing the direct and indirect contact zones.

In the absence of any particular visible contamination hotspots the sampling locations were additionally selected to represent proposed external recreational areas, as well as beneath the proposed dwelling. The latter was not only positioned to determine any risk to construction workers but also to identify any vapour phase pathway that could impact future occupants of the dwelling.

In doing so, the results reproduced in Tables 4 to 9 above have shown that although there were a number of determinands present within the soil on the site, there was no determinand detected above its corresponding referenced soil guideline criteria, when considered for residential development.

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 13 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 soft landscaped areas as part of this 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 13 Perceived risk to receptors

Contaminants identified	Potential pathways	Perceived level of risk	Comments and reasoning
No contamination detected	Ingestion of soil	4	In the absence of any identified soil contamination at the site, the corresponding risk from ingestion of soil is expected to be low.
	Dermal contact with soil	4	In the absence of any identified soil contamination at the site, 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 soil contamination at the site, the corresponding risk from the inhalation of soil dust is expected to be low.
	Consumption of home-grown vegetables	4	In the absence of any identified soil contamination at the site, the corresponding risk from ingesting contaminated vegetables is expected to be low.
	Inhalation or ignition of gases or vapours	4	In the absence of any identified soil contamination or made-ground at the site, the corresponding risk from gases or organic vapours is deemed to be low.
	Contact with main services and building fabric below ground	4	In the absence of any identified soil contamination at the site, the corresponding risk to underground services and building fabric from aggressive chemical residue is expected to be low.
	Contact with groundwater and other off-site environmental media	4	In the absence of any identified soil contamination at the site, 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 in the areas where the new dwelling has been proposed.

For this purpose, three trial pits were excavated across the site, down to a minimum depth of 1200mm, 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).

The results from this intrusive investigation have shown that there was no determinand present above its soil guideline concentration for residential development in any of the intrusively investigated areas.

On the basis of these findings therefore, the site appears to be suitable for residential development with soft landscaped areas.

8.2 Recommendations

Despite the fact that there has been no contamination concern identified on this site, it is still recommended that an informal observation strategy should be put in place during any groundworks to be undertaken.

More specifically, care should be taken during the working of the site to investigate any soils, which are suspected by sight, odour or suspicion, to be contaminated.

In the event of any discovery of potentially contaminated soil, the location, type and quantity should be recorded, and the contaminated land officer at Horsham District Council notified immediately. Approval may need to be sought prior to continuing groundworks or implementing any mitigation.

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 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.

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. ICRCL 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

Laura Charman
Apple Environmental Ltd
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Stoney Lane
Medstead
Hampshire
GU34 5EL

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

DETS Report No: 24-05051

Site Reference:	None Supplied
Project / Job Ref:	CL/3587/GG
Order No:	None Supplied
Sample Receipt Date:	10/05/2024
Sample Scheduled Date:	10/05/2024
Report Issue Number:	1
Reporting Date:	16/05/2024

Authorised by:

[redacted]

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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4480

Soil Analysis Certificate						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24	08/05/24	08/05/24	08/05/24	08/05/24
Apple Environmental Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	**~TP / BH No**	TP.01/01/3587	TP.01/02/3587	TP.02/01/3587	TP.02/02/3587	TP.03/01/3587
~Project / Job Ref: CL/3587/GG	**~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: 16/05/2024	**DETS Sample No**	714293	714294	714295	714296	714297

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**	6.9	6.9	6.8	7.0	6.7
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	< 200	**MCERTS**	312	< 200	226	< 200	206
Total Sulphate as SO_4	%	< 0.02	**MCERTS**	0.03	< 0.02	0.02	< 0.02	0.02
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	34	28	22	26	32
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.03	0.03	0.02	0.03	0.03
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	< 5	< 5
TOC (Total Organic Carbon)	%	< 0.1	**MCERTS**	1.8	0.7	1.1	0.7	1.3
W/S Chloride (2:1)	mg/kg	< 1	**MCERTS**	28	32	21	24	25
W/S Chloride (2:1)	mg/l	< 0.5	**MCERTS**	14	15.9	10.4	12	12.5
Arsenic (As)	mg/kg	< 2	**MCERTS**	7	4	6	6	5
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	0.3	< 0.2	< 0.2	< 0.2	0.4
Chromium (Cr)	mg/kg	< 2	**MCERTS**	13	20	11	12	10
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**	24	15	12	7	45
Lead (Pb)	mg/kg	< 3	**MCERTS**	142	21	24	11	53
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**	10	9	7	6	7
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	< 3	**MCERTS**	150	50	63	46	129
Total Phenols (monohydric)	mg/kg	< 2	NONE	2.4	< 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 section and can affect the validity of results

Normec DETS Limited
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4480

Soil Analysis Certificate						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24				
Apple Environmental Ltd	**~Time Sampled**	None Supplied				
~Site Reference: None Supplied	**~TP / BH No**	TP.03/02/3587				
~Project / Job Ref: CL/3587/GG	**~Additional Refs**	None Supplied				
~Order No: None Supplied	**~Depth (m)**	None Supplied				
Reporting Date: 16/05/2024	**DETS Sample No**	714298				

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected				
pH	pH Units	N/a	**MCERTS**	6.6				
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**	< 10				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	< 0.01				
Sulphide	mg/kg	< 5	NONE	< 5				
TOC (Total Organic Carbon)	%	< 0.1	**MCERTS**	0.6				
W/S Chloride (2:1)	mg/kg	< 1	**MCERTS**	16				
W/S Chloride (2:1)	mg/l	< 0.5	**MCERTS**	7.9				
Arsenic (As)	mg/kg	< 2	**MCERTS**	4				
W/S Boron	mg/kg	< 1	NONE	< 1				
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2				
Chromium (Cr)	mg/kg	< 2	**MCERTS**	8				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	**MCERTS**	10				
Lead (Pb)	mg/kg	< 3	**MCERTS**	14				
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1				
Nickel (Ni)	mg/kg	< 3	**MCERTS**	7				
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2				
Zinc (Zn)	mg/kg	< 3	**MCERTS**	74				
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 section and can affect the validity of results

Normec DETS Limited
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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24	08/05/24	08/05/24	08/05/24	08/05/24
Apple Environmental Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	**~TP / BH No**	TP.01/01/3587	TP.01/02/3587	TP.02/01/3587	TP.02/02/3587	TP.03/01/3587
~Project / Job Ref: CL/3587/GG	**~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: 16/05/2024	**DETS Sample No**	714293	714294	714295	714296	714297

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	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
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	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
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	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
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 section and can affect the validity of results

Normec DETS Limited
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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24				
Apple Environmental Ltd	**~Time Sampled**	None Supplied				
~Site Reference: None Supplied	**~TP / BH No**	TP.03/02/3587				
~Project / Job Ref: CL/3587/GG	**~Additional Refs**	None Supplied				
~Order No: None Supplied	**~Depth (m)**	None Supplied				
Reporting Date: 16/05/2024	**DETS Sample No**	714298				

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				

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

Normec DETS Limited
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4480

Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24	08/05/24	08/05/24	08/05/24	08/05/24
Apple Environmental Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	**~TP / BH No**	TP.01/01/3587	TP.01/02/3587	TP.02/01/3587	TP.02/02/3587	TP.03/01/3587
~Project / Job Ref: CL/3587/GG	**~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: 16/05/2024	**DETS Sample No**	714293	714294	714295	714296	714297

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_Total	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

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

Normec DETS Limited
Unit 1, Rose Lane Industrial Estate
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Tel : 01622 850410

Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24				
Apple Environmental Ltd	**~Time Sampled**	None Supplied				
~Site Reference: None Supplied	**~TP / BH No**	TP.03/02/3587				
~Project / Job Ref: CL/3587/GG	**~Additional Refs**	None Supplied				
~Order No: None Supplied	**~Depth (m)**	None Supplied				
Reporting Date: 16/05/2024	**DETS Sample No**	714298				

Determinand	Unit	RL	Accreditation					
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_Total	mg/kg	< 42	NONE	< 42				

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

Normec DETS Limited
Unit 1, Rose Lane Industrial Estate
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Lenham Heath
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Tel : 01622 850410

4480

Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24	08/05/24	08/05/24	08/05/24	08/05/24
Apple Environmental Ltd	**~Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
~Site Reference: None Supplied	**~TP / BH No**	TP.01/01/3587	TP.01/02/3587	TP.02/01/3587	TP.02/02/3587	TP.03/01/3587
~Project / Job Ref: CL/3587/GG	**~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: 16/05/2024	**DETS Sample No**	714293	714294	714295	714296	714297

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	< 2	< 2	< 2
p & m-xylene : HS 1D MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 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

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

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4480

Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 24-05051	**~Date Sampled**	08/05/24				
Apple Environmental Ltd	**~Time Sampled**	None Supplied				
~Site Reference: None Supplied	**~TP / BH No**	TP.03/02/3587				
~Project / Job Ref: CL/3587/GG	**~Additional Refs**	None Supplied				
~Order No: None Supplied	**~Depth (m)**	None Supplied				
Reporting Date: 16/05/2024	**DETS Sample No**	714298				

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				

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

Normec DETS Limited
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Maidstone
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Tel : 01622 850410

Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 24-05051	
Apple Environmental Ltd	
~Site Reference: None Supplied	
~Project / Job Ref: CL/3587/GG	
~Order No: None Supplied	
Reporting Date: 16/05/2024	

DETS Sample No	~TP / BH No	~Additional Refs	~Depth (m)	Moisture Content (%)	Sample Matrix Description
714293	TP.01/01/3587	None Supplied	None Supplied	16.9	Brown sandy clay with vegetation
714294	TP.01/02/3587	None Supplied	None Supplied	18.8	Light brown sandy clay
714295	TP.02/01/3587	None Supplied	None Supplied	17.6	Light brown sandy clay
714296	TP.02/02/3587	None Supplied	None Supplied	16	Light brown sandy clay
714297	TP.03/01/3587	None Supplied	None Supplied	17.1	Brown sandy clay with vegetation
714298	TP.03/02/3587	None Supplied	None Supplied	16.4	Light brown sandy clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S
~Sample details provided by customer section 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

Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 24-05051

Apple Environmental Ltd

~Site Reference: None Supplied

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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 section and can affect the validity of results

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

List of HWOL Acronyms and Operators
DETS Report No: 24-05051
Apple Environmental Ltd
~Site Reference: None Supplied
~Project / Job Ref: CL/3587/GG
~Order No: None Supplied
Reporting Date: 16/05/2024

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 section 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 - 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 - 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

SERVICE / INSPECTION SHEET

Instrument House
91-92 Shrivenham Hundred Business Park
Watchfield
Oxfordshire
SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

JOB NUMBER: 77217
INSTRUMENT: Tiger Select

SERIAL NUMBER: T-113211
DATE RECEIVED: 19/07/2023

FIRMWARE: 9.04
UPGRADED TO: 9.28

CUSTOMER: Apple Environmental Ltd

ITEMS RECEIVED	RECEIVED?	RTN?
Instrument		
Rubber Boot		
Battery Charger		
Charging Cradle		
Operation Manual		
Quick Start Guide		
Spares Kit		
Comms Cable		
Probe		
Peli Case		
Tubing		
Regulator		
Software (Memory Stick)		
	SIGNED:	

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

Comments:
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 aluminimum oxide
Flowrate 250ml/min, Block 7ml/min
Unit sent in without Benzene tube holder assembley, supplied a new one
Unit calibrated and bump tested
Settings retained as received: Measuring gas TAC RF 0.5
Power supply PAT tested

TECHNICIAN: Joe Herbert [redacted] DATE: 02/08/2023

shawcity
Life-saving solutions

CERTIFICATE OF CALIBRATION
Tiger Select

CALIBRATION CERTIFICATE NO: 77217

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

APPROVED SIGNATORY: [redacted]

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 ±2 %
The results indicate that the instrument conforms to the applicable parts of the published specification.

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