CONTAMINATED LAND
INTRUSIVE INVESTIGATION

Nutbourne Place Farm
Nutbourne Lane
Nutbourne
West Sussex
RH20 2HF

apple environmental

March 2025

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1 Introduction and scope of work

Apple Environmental has been appointed to undertake an intrusive soil contamination investigation at Nutbourne Place Farm, Nutbourne Lane, Nutbourne, West Sussex.

An environmental desk study report and preliminary risk assessment previously undertaken at the site by Apple Environmental (Report Ref. CL/3719/NUT) identified a potential land contamination concern due to its previous use and the use of the outer-lying site for horticultural farming.

In view of the proposal to change the use of the site to residential use, potentially significant pathway linkages were deemed to be present, such that these could enable contamination to reach receptors.

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

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

The aims of the investigation were:

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

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:

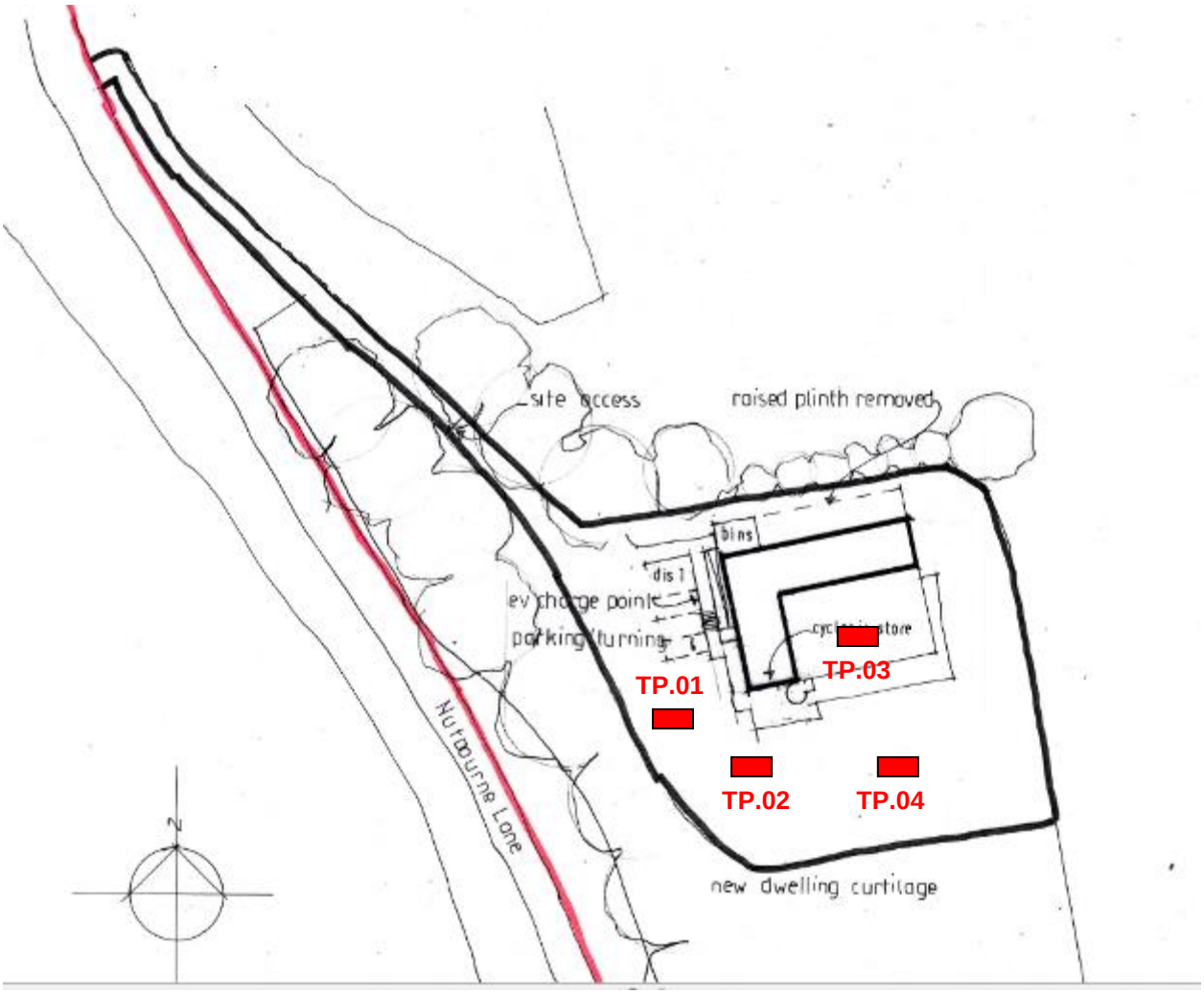
- to excavate four trial pits at the site down to an expected minimum depth of 1000mm;
- to characterise the nature of the sub-surface material at each of these locations;
- to collect at least 2 soil samples from each of the bores/pits for laboratory analysis generally representing the direct and indirect contact zones;
- to collect additional soil samples from where there may be other specific or noticeable contamination concerns;
- 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, four trial pits were excavated across the site, at the locations shown below in Figure 1.

Figure 1 Plan showing the sampling locations



Trial pit 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(bgl) and 500 - 600mm(bgl).

Each collected sample was placed immediately into a sterilised container and transferred into a refrigerated cold-box 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

The subject site primarily exists as a raised timber-constructed building which has most recently seen use as a commercial tea room premises, surrounded by soft landscaping; some of which shows evidence of previous horticultural use

It is understood from BGS data that the bedrock beneath the site is characterised by the Hythe Formation (sandstone) with no expected overlying superficial deposits.

The bedrock was observed in all of the trial pits.

Made-ground was noted within one of the pits extending to a depth of 100mm, where it is expected to have been emplaced for engineering purposes.

The sub-surface material strata logs have been reproduced below in Tables 1 to 4 along with any detailed observations.

Photographs showing the trial pits and removed material have been appended to each strata log (Photographs 1 to 4).

The intrusive investigation was undertaken on the 13th March 2025.

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

Location ID	Depth (mm)	Notes
TP.01	0 - 20	Grass
	20 - 200	Dark-brown, soft, silty topsoil
	200 - 1000	Yellow, soft, silty sandstone with sandstone lithorelicts
Groundwater	-	Groundwater was not reached

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 - 20	Grass
	20 - 220	Dark brown, clayey topsoil
	220 - 1000	Yellow, soft-firm, coarse sandstone with sandstone lithorelicts
Groundwater	-	Groundwater was not reached

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 - 20	Very dry, clayey topsoil
	20 - 650	Dark-brown clayey subsoil
	650 – 1000	Orange/yellow coarse sandstone with sandstone lithorelicts
Groundwater	-	Groundwater was not reached

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





Table 4 Strata log - Location **TP.04**

Location ID	Depth (mm)	Notes
TP.04	0 - 20	Very dry, clayey soil
	20 - 650	Dark-brown clayey subsoil
	650 - 1000	Orange/yellow coarse sandstone with sandstone lithorelicts
Groundwater	-	Groundwater was not reached

Photograph 4 Trial pit and removed soil material - Location TP.04





4 Results from soil analyses

The results from the soil analyses are displayed in Tables 5 to 10 below. Any determinand detected has been highlighted in **bold** type.

Table 5 Results for specified inorganics in soil - metals

Determinand (mg/kg)	TP.01		TP.02	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Arsenic	< 10	< 10	< 10	< 10
Boron	< 2.5	< 2.5	< 2.5	< 2.5
Cadmium	**0.4**	**0.4**	**0.4**	**0.4**
Chromium	**6.8**	**7.1**	**6.8**	**7.2**
Hexavalent chromium	< 1.0	< 1.0	< 1.0	< 1.0
Copper	**11**	**8.6**	**10**	**7.6**
Lead	**23**	**13**	**22**	**10**
Mercury (total)	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	**13**	**14**	**12**	**15**
Selenium	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	**39**	**31**	**38**	**29**

Table 5 (Cont.) Results for specified inorganics in soil - metals

Determinand (mg/kg)	TP.03		TP.04	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Arsenic	< 10	< 10	< 10	< 10
Boron	< 2.5	< 2.5	< 2.5	< 2.5
Cadmium	**0.4**	**0.4**	**0.5**	**0.4**
Chromium	**7.7**	**7.0**	**7.1**	**5.6**
Hexavalent chromium	< 1.0	< 1.0	< 1.0	< 1.0
Copper	**13**	**12**	**8.5**	**7.0**
Lead	**15**	**17**	**14**	**5.5**
Mercury (total)	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	**12**	**13**	**14**	**17**
Selenium	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	**58**	**49**	**32**	**23**

Table 6 Results for specified inorganics in soil - non-metals

Determinand (mg/kg)	TP.01		TP.02	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Cyanide (total)	< 1	< 1	< 1	< 1
Sulphate (mg/l)	< 10	< 10	**14**	**28**
Sulphide	< 15	< 15	< 15	< 15
Chloride (mg/l)	**5.6**	**3.2**	**6.0**	**7.1**
Asbestos	Not detected	Not detected	Not detected	Not detected
	TP.03		TP.04	
	Depth 100-200mm	Depth 500-600mm	Depth 150-250mm	Depth 500-600mm
Cyanide (total)	< 1	< 1	< 1	< 1
Sulphate (mg/l)	< 10	**27**	< 10	< 10
Sulphide	< 15	< 15	< 15	< 15
Chloride (mg/l)	**1.9**	**6.5**	**1.8**	**1.4**
Asbestos	Not detected	Not detected	Not detected	Not detected

Table 7 Results for specified hydrocarbons (BTEX) in soil

Determinand (mg/kg)	TP.01		TP.02	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Benzene	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	< 0.01	< 0.01	< 0.01	< 0.01
p & m-Xylene	< 0.02	< 0.02	< 0.02	< 0.02
o-Xylene	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	< 0.01	< 0.01	< 0.01	< 0.01
Determinand (mg/kg)	TP.03		TP.04	
	Depth 100-200mm	Depth 500-600mm	Depth 150-250mm	Depth 500-600mm
Benzene	**0.11**	< 0.01	< 0.01	< 0.01
Toluene	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	< 0.01	< 0.01	< 0.01	< 0.01
p & m-Xylene	< 0.02	< 0.02	< 0.02	< 0.02
o-Xylene	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	< 0.01	< 0.01	< 0.01	< 0.01

Table 8 Results for poly-aromatic hydrocarbons in soil

Determinand (mg/kg)	TP.01		TP.02	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Naphthalene	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	**0.02**	< 0.02	< 0.02	< 0.02
Anthracene	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	**0.10**	< 0.02	**0.08**	< 0.02
Pyrene	**0.10**	< 0.02	**0.07**	< 0.02
Benzo(a)anthracene	**0.05**	< 0.02	**0.04**	< 0.02
Chrysene	**0.06**	< 0.02	**0.05**	< 0.02
Benzo(b)fluoranthene	**0.09**	< 0.02	**0.08**	< 0.02
Benzo(k)fluoranthene	**0.03**	< 0.02	**0.03**	< 0.02
Benzo(a)pyrene	**0.07**	< 0.02	**0.06**	< 0.02
Indeno(123-cd)pyrene	**0.05**	< 0.02	**0.04**	< 0.02
Dibenzo(ah)anthracene	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(ghi)perylene	**0.06**	< 0.02	**0.05**	< 0.02
Coronene	< 0.02	< 0.02	< 0.02	< 0.02
Total PAHs	**0.78**	< 0.34	**0.70**	< 0.34

Table 8 (Cont.) Results for poly-aromatic hydrocarbons in soil

Determinand (mg/kg)	TP.03		TP.04	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Naphthalene	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	**0.04**	**0.04**	< 0.02	< 0.02
Anthracene	**0.04**	< 0.02	< 0.02	< 0.02
Fluoranthene	**0.13**	**0.13**	**0.02**	< 0.02
Pyrene	**0.12**	**0.11**	**0.02**	< 0.02
Benzo(a)anthracene	**0.05**	**0.06**	< 0.02	< 0.02
Chrysene	**0.07**	**0.07**	< 0.02	< 0.02
Benzo(b)fluoranthene	**0.09**	**0.09**	< 0.02	< 0.02
Benzo(k)fluoranthene	**0.03**	**0.03**	< 0.02	< 0.02
Benzo(a)pyrene	**0.06**	**0.07**	< 0.02	< 0.02
Indeno(123-cd)pyrene	**0.04**	**0.04**	< 0.02	< 0.02
Dibenzo(ah)anthracene	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(ghi)perylene	**0.05**	**0.05**	< 0.02	< 0.02
Coronene	< 0.02	< 0.02	< 0.02	< 0.02
Total PAHs	**0.86**	**0.84**	**0.40**	< 0.34

Table 9 Results for petroleum hydrocarbons in soil

Determinand (mg/kg)	TP.01		TP.02	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Aliphatic C5 - C6	**0.11**	< 0.06	**0.10**	< 0.06
Aliphatic C6 - C8	**0.50**	< 0.06	**0.37**	< 0.06
Aliphatic C8 - C10	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic C10 - C12	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12 - C16	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16 - C21	**1.6**	< 1.0	< 1.0	< 1.0
Aliphatic C21 - C35	**14**	**3.0**	**6.7**	**3.0**
Aliphatic C35 - C44	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic C5 - C7	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7 - C8	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8 - C10	**0.26**	< 0.06	< 0.06	< 0.06
Aromatic C10 - C12	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12 - C16	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16 - C21	**1.6**	< 1.0	**1.4**	**1.7**
Aromatic C21 - C35	**16**	< 2.0	**8.2**	**2.9**
Aromatic C35 - C44	< 5.0	< 5.0	< 5.0	< 5.0
Total (C5 - 35)	**34**	< 10	17	**< 10**

Table 9 (Cont.) Results for petroleum hydrocarbons in soil

Determinand (mg/kg)	TP.03		TP.04	
	Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
Aliphatic C5 - C6	**0.13**	< 0.06	< 0.06	< 0.06
Aliphatic C6 - C8	**0.21**	< 0.06	< 0.06	**0.29**
Aliphatic C8 - C10	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic C10 - C12	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12 - C16	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16 - C21	**1.3**	< 1.0	< 1.0	< 1.0
Aliphatic C21 - C35	**6.5**	**6.1**	**4.7**	**3.8**
Aliphatic C35 - C44	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic C5 - C7	**0.11**	< 0.01	< 0.01	< 0.01
Aromatic C7 - C8	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8 - C10	< 0.06	< 0.06	< 0.06	< 0.06
Aromatic C10 - C12	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12 - C16	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16 - C21	**1.5**	**1.4**	**1.3**	**1.5**
Aromatic C21 - C35	**8.1**	**5.6**	**2.6**	< 2.0
Aromatic C35 - C44	< 5.0	< 5.0	< 5.0	< 5.0
Total (C5 - 35)	**18**	**13**	**< 10**	**< 10**

Table 10 Non-specified VOCs - measured by photo-ionisation detection in-situ

TP.01		TP.02	
Depth 100-200mm	Depth 500-600mm	Depth 100-200mm	Depth 500-600mm
< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
TP.03		**TP.04**	
Depth 100-200mm	Depth 500-600mm	Depth 120-250mm	Depth 500-600mm
< 0.1 ppm	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm

5 Interpretation

Tables 11 to 13 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 for inorganic species, despite the mean organic content being determined as 1.1%; which approximates to 1.9% SOM.

Table 11 Soil guideline concentrations for inorganics referred to for this assessment

Determinand	Soil guideline concentration (mg/kg)		Origin
	1%	6%	
Arsenic	37	37	Atkins ATRISK Category 4 Screening Level
Boron	290	290	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Cadmium	22.1	22.1	Atkins ATRISK Category 4 Screening Level
Chromium	14300	14300	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Chromium VI	20.5	20.5	Atkins ATRISK Category 4 Screening Level
Copper	4730	4790	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Lead	200	200	Category 4 Screening Level[(a)]
Mercury (elemental)	0.0863	1.44	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Mercury (inorganic Hg^{2+})	180	180	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Nickel	136	136	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Selenium	375	375	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Zinc	20000	20300	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Free Cyanide	34	34	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Phenols (SOM 1%)	267	1200	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Benzene (SOM 1%)	0.137	0.871	Atkins ATRISK (C4SL) for residential with home-grown produce
Toluene (SOM 1%)	113	780	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Ethylbenzene (SOM 1%)	50.7	453	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
o-Xylene (SOM 1%)	26.4	336	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
m-Xylene (SOM 1%)	25	328	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
p-Xylene (SOM 1%)	24	312	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

Table 12 Soil guideline concentrations for PAHs referred to for this assessment

Determinand	Soil guideline concentration (mg/kg)		Origin
	1% SOM	6% SOM	
Naphthalene	0.829	12.2	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Acenaphthylene	608	2760	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Acenaphthene	210	1100	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Fluorene	735	2610	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Phenanthrene	95	440	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Anthracene	10200	26200	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Fluoranthene	983	2980	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Pyrene	668	2120	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Benzo(a)anthracene	7.2	13	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Chrysene	15	27	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(b)fluoranthene	2.6	3.7	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(k)fluoranthene	77	100	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(a)pyrene	2.2	3.0	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Indeno(123-cd)pyrene	27	41	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Dibenzo(ah)anthracene	0.24	0.3	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Benzo(ghi)perylene	320	350	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce

Table 13 Soil guideline concentrations for TPHs referred to for this assessment

Determinand	Soil guideline concentration (mg/kg)		Origin
	1% SOM	6% SOM	
Aliphatic TPH C5-C6	42.7	369	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C6-C8	99.3	1240	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C8-C10	13.9	204	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C10-C12	81.7	1180	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C12-C16	385	4130	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C16-35	210000	210100	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aliphatic TPH C35-C44	65000	110000	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce
Aromatic TPH C5-C7	0.137	0.871	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C7-C8	113	780	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C8-C10	20.5	232	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C10-C12	70	468	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C12-16	165	830	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C16-21	319	1040	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C21-C35	1120	1710	Atkins ATRISK (CLEA 1.07) for residential with home-grown produce
Aromatic TPH C35-C44	1100	1700	LQM/CIEH S4ULs (CLEA 1.06) for residential with home-grown produce

6 Results evaluation

As detailed above, four trial pits were excavated across the site to a minimum depth of 1000mm; from each of which two soil samples were collected for laboratory analysis, representing the direct and indirect contact zones.

In doing so, the results reproduced in Tables 5 to 10 above have shown that although there were a small number of determinands present within the soil, there was none above their 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 14 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 a soft landscaped recreational area associated with the proposed dwelling, and groundworks will be undertaken for the installation of new services etc.

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 14 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	5	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	5	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	3	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	3	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.

For this purpose, four trial pits were excavated, down to a minimum depth of 1000mm, 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 have shown that there were no determinands above guideline criteria for residential development in any of the samples analysed.

There were also no other visual or olfactory concerns noted.

8.2 Recommendations

The findings from the soil 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 Horsham District Council 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 sampling may only provide a general indication of contamination present. There is always the possibility that other undetected contaminants exist, or, that the 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. 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 2024

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

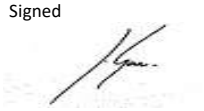
Apple Environmental Limited
Unit 3 Estevan Farm
Stoney Lane
GU34 5EL

7 - 11 Harding Street
Leicester
LE1 4DH

Analytical Test Report: L25/02844/APL - 25-60047-Amendment A

Your Project Reference:	**Nutbourne Farm CL/3723/NUT**		
Your Order Number:	TP.01/01.3723	Samples Received / Instructed:	17/03/2025 / 17/03/2025
Report Issue Number:	1	Sample Tested:	17/03 to 26/03/2025
Samples Analysed:	8 sample(s)	Report issued:	27/03/2025

Signed



James Gane
Analytical Services Manager
CTS

Notes:

Amendment A 27/03/2025- Report amended to edit project reference

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report with the exception of the asbestos test portion which is held for 6 months unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with CTS method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Asbestos

Please note: Where futher analaysis is required samples identified as containing asbestos are screened and tested on an as recevied basis. No correction is made for moisture content and other than the asbestos test(s) these results are not covered by our accrediation

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

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

This report shall not be reproduce except in full

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited, subUKAS - Subcontracted to a laboratory UKAS accredited for this test, subMCERTS - Subcontracted to a laboratory MCERTS accredited for this test

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

UKAS accreditation on waters only covers the Ground water and Surface water matrices

Date of Issue: 12.03.25

Issued by: J. Gane

Issue No: 4

Rev No: 26

CONSTRUCTION TESTING SOLUTIONS
A PHENNA GROUP COMPANY

7 - 11 Harding Street
Leicester
LE1 4DH

L25/02844/APL - 25-60047-Amendment A

Project Reference - Nutbourne Farm
CL/3723/NUT

Analytical Test Results - Solid

Lab Reference			471629	471630	471631	471632	471633	471634
Client Sample ID			TP.01/01.3723	TP.01/02.3723	TP.02/01.3723	TP.02/02.3723	TP.03/01.3723	TP.03/02.3723
Client Sample Location			-	-	-	-	-	-
Client Sample Type			Soil	Soil	Soil	Soil	Soil	Soil
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.10	0.50	0.10	0.50	0.10	0.50
Depth - Bottom (m)			0.20	0.60	0.20	0.60	0.20	0.60
Date of Sampling			13/03/2025	13/03/2025	13/03/2025	13/03/2025	13/03/2025	13/03/2025
Time of Sampling			1030	1035	1045	1050	1100	1105
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay
Determinant	**Units**	**Accreditation**						
Arsenic	(mg/kg)	MCERTS	< 10	< 10	< 10	< 10	< 10	< 10
Boron (w/s)	(mg/kg)	u	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Cadmium	(mg/kg)	MCERTS	0.4	0.4	0.4	0.4	0.4	0.4
Chromium (Total)	(mg/kg)	UKAS	6.8	7.1	6.8	7.2	7.7	7.0
Copper	(mg/kg)	MCERTS	11	8.6	10	7.6	13	12
Iron	(mg/kg)	u	15000	17000	14000	15000	13000	14000
Lead	(mg/kg)	MCERTS	23	13	22	10	15	17
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	13	14	12	15	12	13
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	39	31	38	29	58	49
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	7.4	7.5	7.6	7.8	7.6	7.4
Sulphate (Water soluble as SO_4)	(mg/l)	u	< 10	< 10	14	28	< 10	27
Sulphide	(mg/kg)	u	< 15	< 15	< 15	< 15	< 15	16
Water Soluble Chloride	(mg/l)	u	5.6	3.2	6.0	7.1	1.9	6.5
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	0.04	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	0.05	< 0.02	0.04	< 0.02	0.05	0.06
Benzo (a) pyrene	(mg/kg)	MCERTS	0.07	< 0.02	0.06	< 0.02	0.06	0.07
Benzo (b) fluoranthene	(mg/kg)	MCERTS	0.09	< 0.02	0.08	< 0.02	0.09	0.09
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	0.06	< 0.02	0.05	< 0.02	0.05	0.05
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.03	< 0.02	0.03	< 0.02	0.03	0.03
Chrysene	(mg/kg)	MCERTS	0.06	< 0.02	0.05	< 0.02	0.07	0.07
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	0.10	< 0.02	0.08	< 0.02	0.13	0.13
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	0.05	< 0.02	0.04	< 0.02	0.04	0.04
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	0.02	< 0.02	< 0.02	< 0.02	0.04	0.04
Pyrene	(mg/kg)	MCERTS	0.10	< 0.02	0.07	< 0.02	0.12	0.11
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	0.76	< 0.32	0.67	< 0.32	0.83	0.82
Coronene	(mg/kg)	u	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PAH Content (PAH17)	(mg/kg)	u	0.78	< 0.34	0.70	< 0.34	0.86	0.84
TOC	(%)	MCERTS	1.3	0.7	1.4	0.7	1.4	1.3
Asbestos	-	UKAS	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

CONSTRUCTION TESTING SOLUTIONS
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7 - 11 Harding Street
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L25/02844/APL - 25-60047-Amendment A

Project Reference - Nutbourne Farm
CL/3723/NUT

Analytical Test Results - Solid

Lab Reference			471635	471636
Client Sample ID			TP.04/01.3723	TP.04/02.3723
Client Sample Location			-	-
Client Sample Type			Soil	Soil
Client Sample Number			-	-
Depth - Top (m)			0.10	0.50
Depth - Bottom (m)			0.20	0.60
Date of Sampling			13/03/2025	13/03/2025
Time of Sampling			1115	1120
Sample Matrix			Clay	Clay
Determinant	**Units**	**Accreditation**		
Arsenic	(mg/kg)	MCERTS	< 10	< 10
Boron (w/s)	(mg/kg)	u	< 2.5	< 2.5
Cadmium	(mg/kg)	MCERTS	0.5	0.4
Chromium (Total)	(mg/kg)	UKAS	7.1	5.6
Copper	(mg/kg)	MCERTS	8.5	7.0
Iron	(mg/kg)	u	16000	20000
Lead	(mg/kg)	MCERTS	14	5.5
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	14	17
Selenium	(mg/kg)	u	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	32	23
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0
pH	pH Units	MCERTS	7.6	7.7
Sulphate (Water soluble as SO_4)	(mg/l)	u	< 10	< 10
Sulphide	(mg/kg)	u	< 15	< 15
Water Soluble Chloride	(mg/l)	u	1.8	1.4
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (a) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (b) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (k) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02
Chrysene	(mg/kg)	MCERTS	< 0.02	< 0.02
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	0.02	< 0.02
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	< 0.02	< 0.02
Pyrene	(mg/kg)	MCERTS	0.02	< 0.02
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	0.38	< 0.32
Coronene	(mg/kg)	u	< 0.02	< 0.02
PAH Content (PAH17)	(mg/kg)	u	0.40	< 0.34
TOC	(%)	MCERTS	0.8	< 0.5
Asbestos	-	UKAS	No asbestos detected	No asbestos detected

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L25/02844/APL - 25-60047-Amendment A

Project Reference - Nutbourne Farm
CL/3723/NUT

Analytical Test Results - VPH / EPH

Lab Reference			471629	471630	471631	471632	471633	471634
Client Sample ID			TP.01/01.3723	TP.01/02.3723	TP.02/01.3723	TP.02/02.3723	TP.03/01.3723	TP.03/02.3723
Client Sample Location			-	-	-	-	-	-
Client Sample Type			Soil	Soil	Soil	Soil	Soil	Soil
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.10	0.50	0.10	0.50	0.10	0.50
Depth - Bottom (m)			0.20	0.60	0.20	0.60	0.20	0.60
Date of Sampling			13/03/2025	13/03/2025	13/03/2025	13/03/2025	13/03/2025	13/03/2025
Time of Sampling			1030	1035	1045	1050	1100	1105
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay
Determinant	**Units**	**Accreditation**						
Benzene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	0.11	< 0.01
Toluene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m&p Xylene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o-Xylene	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C_5 to C_6 [HS_MS_1D_AL]	(mg/kg)	MCERTS	0.11	< 0.06	0.10	< 0.06	0.13	< 0.06
Aliphatic >C_6 to C_8 [HS_MS_1D_AL]	(mg/kg)	MCERTS	0.50	< 0.06	0.37	< 0.06	0.21	< 0.06
Aliphatic >C_8 to C_{10} [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aliphatic >C_{10} to C_{12} [EH_2D_AL]	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic >C_{12} to C_{16} [EH_2D_AL]	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic >C_{16} to C_{21} [EH_2D_AL]	(mg/kg)	MCERTS	1.6	< 1.0	< 1.0	< 1.0	1.3	< 1.0
Aliphatic >C_{21} to C_{35} [EH_2D_AL]	(mg/kg)	MCERTS	14	3.0	6.7	3.0	6.5	6.1
Aliphatic >C_{35} to C_{44} [EH_2D_AL]	(mg/kg)	u	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic >C_5 to C_7 [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	0.11	< 0.01
Aromatic >C_7 to C_8 [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C_8 to C_{10} [HS_MS_1D_AR]	(mg/kg)	MCERTS	0.26	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Aromatic >C_{10} to C_{12} [EH_2D_AR]	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic >C_{12} to C_{16} [EH_2D_AR]	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic >C_{16} to C_{21} [EH_2D_AR]	(mg/kg)	MCERTS	1.6	< 1.0	1.4	1.7	1.5	1.4
Aromatic >C_{21} to C_{35} [EH_2D_AR]	(mg/kg)	MCERTS	16	< 2.0	8.2	2.9	8.1	5.6
Aromatic >C_{35} to C_{44} [EH_2D_AR]	(mg/kg)	u	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total >C_5 to C_{35} [EH_2D+HS_1D_Total]	(mg/kg)	MCERTS	34	< 10	17	< 10	18	13

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L25/02844/APL - 25-60047-Amendment A

Project Reference - Nutbourne Farm
CL/3723/NUT

Analytical Test Results - VPH / EPH

Lab Reference			471635	471636
Client Sample ID			TP.04/01.3723	TP.04/02.3723
Client Sample Location			-	-
Client Sample Type			Soil	Soil
Client Sample Number			-	-
Depth - Top (m)			0.10	0.50
Depth - Bottom (m)			0.20	0.60
Date of Sampling			13/03/2025	13/03/2025
Time of Sampling			1115	1120
Sample Matrix			Clay	Clay
Determinant	**Units**	**Accreditation**		
Benzene	(mg/kg)	MCERTS	< 0.01	< 0.01
Toluene	(mg/kg)	MCERTS	< 0.01	< 0.01
Ethylbenzene	(mg/kg)	MCERTS	< 0.01	< 0.01
m&p Xylene	(mg/kg)	MCERTS	< 0.02	< 0.02
o-Xylene	(mg/kg)	MCERTS	< 0.01	< 0.01
MTBE	(mg/kg)	MCERTS	< 0.01	< 0.01
Aliphatic >C_5 to C_6 [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	< 0.06
Aliphatic >C_6 to C_8 [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	0.29
Aliphatic >C_8 to C_{10} [HS_MS_1D_AL]	(mg/kg)	MCERTS	< 0.06	< 0.06
Aliphatic >C_{10} to C_{12} [EH_2D_AL]	(mg/kg)	MCERTS	< 1.0	< 1.0
Aliphatic >C_{12} to C_{16} [EH_2D_AL]	(mg/kg)	MCERTS	< 1.0	< 1.0
Aliphatic >C_{16} to C_{21} [EH_2D_AL]	(mg/kg)	MCERTS	< 1.0	< 1.0
Aliphatic >C_{21} to C_{35} [EH_2D_AL]	(mg/kg)	MCERTS	4.7	3.8
Aliphatic >C_{35} to C_{44} [EH_2D_AL]	(mg/kg)	u	< 5.0	< 5.0
Aromatic >C_5 to C_7 [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01
Aromatic >C_7 to C_8 [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.01	< 0.01
Aromatic >C_8 to C_{10} [HS_MS_1D_AR]	(mg/kg)	MCERTS	< 0.06	< 0.06
Aromatic >C_{10} to C_{12} [EH_2D_AR]	(mg/kg)	MCERTS	< 1.0	< 1.0
Aromatic >C_{12} to C_{16} [EH_2D_AR]	(mg/kg)	MCERTS	< 1.0	< 1.0
Aromatic >C_{16} to C_{21} [EH_2D_AR]	(mg/kg)	MCERTS	1.3	1.5
Aromatic >C_{21} to C_{35} [EH_2D_AR]	(mg/kg)	MCERTS	2.6	< 2.0
Aromatic >C_{35} to C_{44} [EH_2D_AR]	(mg/kg)	u	< 5.0	< 5.0
Total >C_5 to C_{35} [EH_2D+HS_1D_Total]	(mg/kg)	MCERTS	< 10	< 10

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Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
471629	TP.01/01.37 23	-	Soil	-	Greyish brown gravelly slightly sandy silty clay with occasional rootlets	20	17	100
471630	TP.01/02.37 23	-	Soil	-	Light brown gravelly slightly sandy silty clay with rare organic matter	19	12	100
471631	TP.02/01.37 23	-	Soil	-	Greyish brown gravelly slightly sandy silty clay with occasional rootlets	20	4.4	100
471632	TP.02/02.37 23	-	Soil	-	Light brown gravelly slightly sandy silty clay with rare rootlets	18	4.6	100
471633	TP.03/01.37 23	-	Soil	-	Greyish brown gravelly slightly sandy silty clay with rare rootlets	19	< 0.1	100
471634	TP.03/02.37 23	-	Soil	-	Greyish brown gravelly slightly sandy silty clay with occasional organic matter	19	< 0.1	100
471635	TP.04/01.37 23	-	Soil	-	Greyish brown gravelly slightly sandy silty clay	18	< 0.1	100
471636	TP.04/02.37 23	-	Soil	-	Light brown gravelly slightly sandy silty clay	20	< 0.1	100

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Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
471629	TP.01/01.3723	-	Soil	-	
471630	TP.01/02.3723	-	Soil	-	
471631	TP.02/01.3723	-	Soil	-	
471632	TP.02/02.3723	-	Soil	-	
471633	TP.03/01.3723	-	Soil	-	
471634	TP.03/02.3723	-	Soil	-	
471635	TP.04/01.3723	-	Soil	-	
471636	TP.04/02.3723	-	Soil	-	

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Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
SKALARCNS	MS - CL - Cyanide by Skalar	As received	Passing 10mm test sieve	Determination of cyanide (total / free / complex) in soil using a Skalar segmented flow analyser
SKALARHCS	MS - CL - Hexavalent Chromium by Skalar	As received	Passing 10mm test sieve	Determination of hexavalent chromium in soil using Skalar segmented flow analyser
ICPMETS	MS - CL - ICP Metals	Air dried	Passing 10mm test sieve	Determination of metals in soils via ICP
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
PAHASRDS	MS - CL - PAH (As Received)	As received	Passing 10mm test sieve	Determination of Polyaromatic hydrocarbons in soil via GC-MS
SULPHIDES	MS - CL - Sulphide in Soils	As received	Passing 10mm test sieve	Determination of sulphide in soil via titration
TOCS	MS - CL - TOC Eltra	Air Dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soils
GCXGCS	MS - CL - TPH & EPH by GCXGC	As received	Passing 10mm test sieve	Determination of TPH and EPH in soils via GCxGC-FID
CWGS	Calculation from VPH-S and EPH-S	As received	Passing 10mm test sieve	Determination of TPH CWG (Volatile Petroleum Hydrocarbons and Extractable Petroleum Hydrocarbons) in soils via Headspace-GC-MS and GC-GC-FID respectively
VPHS	MS - CL - VPH	As received	Passing 10mm test sieve	Determination of VPH in soils via Headspace-GC-MS
WSBORONS	MS - CL - WS Boron	Air dried	Passing 10mm test sieve	Determination of Water soluble Boron in soils via ICP
ASB	MS - AS - Asbestos	-	-	Fibre identification is in accordance with in house documented methods which are based on the procedure documented in the HSE Document HSG 248 "Asbestos: The analysts guide for sampling, analysis and clearance procedures"
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis

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Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
W - No time of sampling provided for water sample
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
471629	TP.01/01.3723	-	Soil	-	MS - CL - pH in Soils	R
471629	TP.01/01.3723	-	Soil	-	MS - CL - VPH	RX
471630	TP.01/02.3723	-	Soil	-	MS - CL - pH in Soils	R
471630	TP.01/02.3723	-	Soil	-	MS - CL - VPH	RX
471631	TP.02/01.3723	-	Soil	-	MS - CL - pH in Soils	R
471631	TP.02/01.3723	-	Soil	-	MS - CL - VPH	RX
471632	TP.02/02.3723	-	Soil	-	MS - CL - pH in Soils	R
471632	TP.02/02.3723	-	Soil	-	MS - CL - VPH	RX
471633	TP.03/01.3723	-	Soil	-	MS - CL - pH in Soils	R
471633	TP.03/01.3723	-	Soil	-	MS - CL - VPH	RX
471634	TP.03/02.3723	-	Soil	-	MS - CL - pH in Soils	R
471634	TP.03/02.3723	-	Soil	-	MS - CL - VPH	RX
471635	TP.04/01.3723	-	Soil	-	MS - CL - pH in Soils	R
471635	TP.04/01.3723	-	Soil	-	MS - CL - VPH	RX
471636	TP.04/02.3723	-	Soil	-	MS - CL - pH in Soils	R
471636	TP.04/02.3723	-	Soil	-	MS - CL - VPH	RX

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HWOL TPH Acronym Index

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
Total	Aliphatics and Aromatics
AL	Aliphatics Only
AR	Aromatics Only
2D	GC-GC - Double Coil Gas Chromatography
#1	EH_Total but with humics mathmatically subtracted
#2	EH_Total but with fatty acids mathmatically subtracted
_	Operator - underscore to separate acronyms (except for +)
+	Operator to indicate cumlative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

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SERVICE / INSPECTION SHEET

JOB NUMBER: 80324
INSTRUMENT: Tiger Select

SERIAL NUMBER: T-113211
DATE RECEIVED: 22/07/2024

FIRMWARE: 9.28
UPGRADED TO: 1.0.7

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

CUSTOMER: Apple Environmental Ltd

ITEMS RECEIVED	RECEIVED?	RTN?
Instrument	Yes	
Rubber Boot	Yes	
Battery Charger		
Charging Cradle		
Operation Manual		
Quick Start Guide		
Spares Kit		
Comms Cable		
Probe		
Peli Case	Yes	
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		239ML/MIN
Block Flow Test ≤ 15ml/min		15ML/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		OK
Firmware Upgrade		OK
Software Upgrade (usb)	N/A	
Function Test		OK
Run Time		29HR43MIN

Comments:
Unit in for service and calibration
Firmware upgraded to latest version 1.0.7
Replaced select stack, sensor seal, inlet/ outlet seals and PTFE filter as per service
Replaced lamp as per biennial service
Flowrate 239ml/min, Block 15ml/min
Unit calibrated and bump tested
Settings retained as received: Measuring gas TAC RF 0.5
Power supply PAT tested

TECHNICIAN: Joe Herbert DATE: 24/07/2024

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CERTIFICATE OF CALIBRATION
Tiger Select

CALIBRATION CERTIFICATE NO: 80324

ISSUED BY: SHAWCITY LIMITED
DATE: 24/07/2024

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	WO454592-1	100 ppm	100 ppm
Isobutylene	WO444131-2	1000 ppm	1000 ppm
Benzene	WO454234-10	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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Watchfield, Oxfordshire, SN6 8TY
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service@shawcity.co.uk