



Report prepared at
Land at Johnson Drive
Finchampstead
RG40 3NW

On behalf of
Palatine Homes Limited

Report reference
23-176.02 : version 3

Report date
December 2024

Prepared by
Aviron Associates Limited

Report Quality Management			
Project Name	Land at Johnson Drive, Finchampstead, RG40 3NW		
Project Title	Supplementary Site Investigation and Generic Quantitative Risk Assessment		
Client	Palatine Homes Limited		
Project Number	23-176.02		
Version	3 (5-Units scheme)		Date
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1.0 PROJECT AND SITE INFORMATION

1.1 APPOINTMENT

Aviron Associates Limited (Aviron) was retained by Palatine Homes Limited (the “Client”) to prepare undertake a Supplementary Site Investigation (SI) leading towards a tier 2 Generic Quantitative Risk Assessment (GQRA) of the following premises:

Land at Johnson Drive, Finchampstead, RG40 3NW (hereafter referred to as the “site”).

This assessment follows the recently issued Preliminary Risk Assessment and Site Investigation report, version 1, referenced 23-176.01 and dated August 2023.

Supplementary investigation has been designed to address the recommendations of the above report and also requests from Wokingham Borough Council (WBC) which are summarised in table 1.1.

Table 1.1: Environment Risk Summary		
Item	Risk Description	To be addressed?
Aviron Recommendations		
1	Local Polycyclic Aromatic Hydrocarbon (PAH) contamination within Made Ground in the east of the site around existing workshops (Plot 3 rear garden to Plot 4 frontage)	Further to this assessment a Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to detail a remedial method to address the PAH soil contamination.
2	Asbestos Containing Soils (ACS) detected in the north of the site (Plot 1 and 2 gardens) in 2017 but not in 2023.	Further to this assessment a Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared. This will include an Asbestos Management Plan.
3	Potential for undiscovered soil contamination during workshop removal	Further to this assessment a Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared.
4	Any imported Topsoil should be chemically suitable for use in private gardens.	Further to this assessment a Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to provide a criterion for the re-use and import of suitable Topsoil.
5	Ensure material encountered is suitable for desired water main.	Further to this assessment a Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared with the recommendation to consult local water authority prior to water main installation.
6	Ingress of hazardous ground gases (CH ₄ + CO ₂) into new homes and depleted oxygen.	A final round of worst-case round of ground gas monitoring is reported herein conclude the gas risk assessment.
WBC Requests		
7	Review recently moved soil locations and historic burn sites to ensure they have been included in the site analysis.	Supplementary investigation around the moved soil location shall be reported herein and previously completed shall be applied to address the historic burn site and assessed herein.

The Supplementary SI will investigate the outstanding pollutant linkages in order to produce suitable data for the preparation of a tier 2 GQRA to refine the CSM and as necessary conclude requirements for the remediation strategy.

Aviron has relied upon information received from the Client and their agents as accurate, unless contradicted by written documentation or site observations.

1.2 THE SITE

Table 1.2 provides a summary of site details and surrounding area.

Table 1.2: Site Details	
Site Location	The site is located at the northern end of Johnson Drive, off Nine Mile Ride (B3430), approximately 2km to the north-east of Finchampstead. Figure 1 is presented as a Site Location Plan.
National Grid Ref.	Centred at 480592 165179.
Current Land Use	The site is split into two distinct areas, one in the north of the site accessed using a tree-lined gravel track leading off Johnson Drive in the south-west of the site, and the other in the south of the site via the garden of 6 Johnson Drive to the south. Northern two-thirds of the site: an area comprising disused land and woodland, used for the storage of building materials, a stockpile of crushed concrete and soil understood to have resulted from the excavation of a swimming pool to the adjacent home. Two buildings/workshops are also located in the south-east of this area. Southern third of the site: a section of the rear garden of the adjacent number 6 Johnson Drive, including landscaped borders and trees. An equestrian building is also located in the north-east of this area. Figure 2 is presented as the Existing Site Layout Plan. Figures 3 and 4 are presented as the Site Photographs.
Surrounding Land Use	The site is located within an urban area with homes to the south and west, and woodland to the north and east.
Proposed Land Use	The proposed development comprises the construction of eight new detached homes and garages with private gardens, and an access road running along the northern boundary and into the centre of the site at three locations. Figure 5 is presented as the Proposed Development Plan.

1.3 SITE WALKOVER SURVEY

A site walkover survey was undertaken on 18 November 2024 and included an inspection of the site and surrounding area, where safe and accessible. The purpose of the survey is to identify any potential on-site or nearby contaminative activities or potential sources of land contamination.

Additionally, as part of the survey any features which may affect site re-development in terms of physical site and ground conditions were noted.

Table 1.3 provides a description of site features observed during the walkover survey and also current Ordnance Survey maps made available at the time of report writing.

Table 1.3: Summary of Site Walkover Survey	
Physical Site Characteristics	
Existing Structures	Two single storey warehouse/workshop type buildings in the northern two-thirds of the site along the eastern boundary. The buildings are of block construction clad and roofed with corrugated metal sheeting. Wooden equestrian building in the southern two-thirds of the site along the eastern boundary.
Basements	None observed.
Visual Topography and Site Surfacing	The site slopes gently downwards from approximately 66.5 metres (m) above Ordnance Datum (AOD) in south to 63.3m AOD in the north, as noted on the Site Plan by Paul Edwards Architecture (reference 2554 - 14A, dated November 2022) supplied by the Client. With the exception of the gravel access track in the south-west and further gravel tracks through the centre of the site, the site is predominantly covered in grass/scrub. Bare earth is located around the equestrian building in the southern third of the site.
Retaining Structures and Slopes	None observed.
Drainage Issues	None observed.
Surface Waters	None observed.
Trees and Hedges	Significant number of mature trees, including numerous cypresses, oak, poplar and hedges around the northern, eastern and western site boundaries, as well within the southern third of the site.
Made and Infilled Ground	Slightly raised mounds observed locally across the north of the site and around a group of trees in the south, which could indicate the presence of made ground. Made ground should be anticipated beneath the buildings along the eastern boundary.
Contaminative Characteristics	
Above or Underground Storage Tanks and Drums	None observed.
Fuel Interceptors	None observed.
Waste Storage and Disposal	A small stockpile of clayey, gravelly Sand understood to be from the excavation of a swimming pool to the adjacent home was observed by the north-east boundary (Photos 3 and 4 and 11 and 12) which is defined by the wide area of Figure 6 as it is understood similar material has been removed from site.

Table 1.3: Summary of Site Walkover Survey

Hazardous Material Storage and Use	None observed.
Asbestos Containing Materials (ACMs)	None observed. An asbestos survey is recommended prior to the redevelopment works.
Boiler Houses	None observed.
Sub-stations	None observed.
Surface Staining	None observed.
Potentially Contaminative Activities	Limited contaminative activities associated with the storage of building materials including potential for undiscovered ACMs. Burning of materials is understood to have occurred in the north of the site at an area shown in Figure 6 , an area illustrated by the Client and generally appears to be the area of exposed earth shown in Photo 6.

2.0 SITE INVESTIGATION WORK

2.1 METHOD STATEMENT AND SITE INVESTIGATION APPROACH

A method statement detailing how the site investigation was to be conducted was produced in accordance with current statutory guidance, best practices and the Client's instructions.

A health and safety plan was completed before site work commenced. Site investigation staff were briefed on the potential contaminants likely to be encountered, and the appropriate personal protective equipment (PPE) to be adopted for this type of investigation.

The site investigation was conducted in accordance with British Standards; BS5930:2015+A1 'Code of Practice for Ground Investigation', BS1377-1:2016 'Methods of test for soils for Civil Engineering Purposes' and BS10175:2011+A2:2017 'Investigation of Potentially Contaminated sites'.

2.2 SITE INVESTIGATION METHODS

The supplementary site investigation was designed to address suitable risks within table 1.1 as follows:

-  Risk items 1 and 7. Provide supplementary investigation in regard to local PAH contamination within Made Ground in the east of the site and also north of the site where historic burning occurred. This notes that PAH is a key contaminant associated with ash/incomplete combustion.
-  Risk item 2. Provide supplementary ACS analysis on a spatial basis.
-  Risk item 6. Complete a final round of worst-case ground gas monitoring.

All intrusive locations were pre-cleared prior to the ground investigation works using a Cable Avoidance Tool (CAT) and tracing of manhole covers, which was completed to endeavour service avoidance during this exercise.

Five hand excavated trial pits (HP11 to HP15) were completed with hand tools to shallow depths of up to 0.35m below ground level (bgl) to enable soil sampling and laboratory testing for screening for human health risk assessment. Shallow depths we selected to target the overlying soils where the greatest risk of soil contamination would exist from former site activities, such as car breaking, storages, soil movements and burning. All of these potentially contaminated activities would deposit contamination to the surface.

Table 2.2 presents what it considered to be a suitable method and rationale of investigation which was completed 18 November 2024.

Table 2.2: Rationale of Site Investigation Positions	
Locations	Rationale
HP11 – HP13	Hand excavated trial pit. In south of site in the bottom of gardens previously un-investigation though previously considered to be uncontaminated.
HP14 – HP15	Hand excavated trial pit. Located in the north-east of the site in the area of the stockpiled soil.

An Exploratory Hole Location Plan is enclosed as **Figure 7**.

Figure 7 also presents positions where soil contamination was identified (or not) following the outcome of the previously issued SI and GQRA report. The location of previously encountered soil contamination and the areas of stockpiling and burning were taken into account when designing the investigation. No exploratory holes were targeted towards the area of burning as the locality of this area has been previously investigated and recorded soil contamination, therefore any overlaying proposed garden areas shall be subject to a remedial cover system.

2.3 GROUND CONDITIONS

The exploratory hole logs and photographs are presented within **Appendix I**.

Detailed strata descriptions are shown on the respective exploratory hole logs though in general ground conditions comprise:

- Re-worked Topsoil (HP11 to HP13) and re-worked natural strata/Clay (HP14 and HP15) and with inclusions of flint gravel and brick noted to depths up to 0.35m bgl.

2.3.1 Field Observations

No discernible odours or staining were noted during the ground investigation works in the soils encountered across the site.

Roots and rootlets were recorded routinely across the site during the site investigation work to depths of up to 0.1m bgl.

Groundwater was not encountered within the shallow holes excavated.

3.0 LABORATORY ANALYSIS

3.1 SOIL GEOCHEMICAL TESTING

Table 3.1 details the soil samples which were collected and submitted for geochemical analysis.

Table 3.1: Soil Geochemical Testing			
Location	Strata Sampled	Objective	Analysis
HP11 (0.1-0.2m)	Reworked Topsoil	Shallow sample to determine baseline concentrations of Made Ground adjacent the building/workshop (east coverage).	ES-1
HP12 (0.1-0.2m)	Reworked Topsoil	Shallow sample to determine baseline concentrations of Made Ground inside the building/workshop (east coverage).	ES-1
HP13 (0.1-0.2m)	Reworked Topsoil	Shallow sample to determine baseline concentrations of Made Ground (south-west coverage).	ES-1
HP14 (0.1-0.2m)	Reworked Clay	Shallow sample to determine baseline concentrations of Made Ground (east coverage).	ES-1
HP15 (0.1-0.2m)	Reworked Clay	Sample to determine baseline concentrations of Natural Clay at depth (west coverage).	ES-1

Chemical sampling and testing targeted the overlying units of reworked Topsoil and natural Clay strata whereby virtue of surface deposition, historical contaminants are most likely to be recorded. The analytical suites were chosen to provide a suitable screening in accordance with the potential contaminants identified and also provide continuity with the previously issued SI and GQRA report.

Soil samples for environmental quality analysis were sent to Eurofins Chemtest Limited within ice packed cool boxes on 19 November 2024 for the following analysis:

-  Aviron's "ES-1" of suite laboratory analysis which includes; arsenic, barium, cadmium, total chromium, copper, nickel, zinc, lead, mercury, selenium, water soluble boron, total cyanide, total sulphate, water soluble sulphide, speciated Polycyclic Aromatic Hydrocarbons (PAH), speciated Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) and Methyl Tert-Butyl Ether (MTBE), organic matter, total phenols, pH and asbestos. **Provides broad analysis of common soil contaminants.**

PAH analysis shall detect key contaminants following burning.

TPH, BTEX and MTBE shall detect key contaminants following car breaking.

3.2 SOIL SAMPLING PROTOCOL

All soil samples were collected from bored or excavated arisings using a trowel and following Aviron's standard protocols for soil sampling. To avoid cross contamination, the sampling equipment was cleaned using de-ionised water after each sample was retrieved.

Clean latex gloves were used each time a soil sample was collected, and all samples were placed into clean sterilised jars for submission to the UKAS/MCERTS accredited laboratory.

All sample containers were labelled on-site immediately prior to filling. These samples were identified by a label placed on the body of each container and the following information was recorded; site name, date collected, unique sample number, soil sample depth.

Samples for geochemical analysis were then placed into a cool box containing ice packs to maintain refrigerated conditions following collection and transport to the laboratory. Ice packs were changed every twenty-four hours where necessary to maintain cool conditions and suppress volatiles.

4.0 ENVIRONMENTAL INTERPRETATIVE GUIDANCE

4.1 GENERIC QUANTITATIVE RISK ASSESSMENT

The purpose of a tier 2 GQRA is to determine the suitability of the site for proposed development and end use.

The site investigation shall collect soil samples whereby determinant chemical measured in the soil through laboratory analysis have been compared with guidance values which are appropriate to the receptor under consideration. The guidance values or screening criteria applied shall be industry adopted generic values which following a screening of the laboratory analysis shall determine whether or not a site is contaminated, as defined under Part IIA of the EPA 1990 and specification in regard of the proposed development and identified receptors.

Where exceedances of guidance values or recorded a GQRA is can be used to appraise risk and make recommendations in regard of further investigation, remediation and/or tier 3 Detailed Quantitative Risk Assessment (DQRA).

4.2 GUIDANCE USED FOR ASSESSING SOIL CONTAMINATION

Aviron has followed the technical approach on Land Contamination Risk Management (LCRM), accessed on gov.uk website and other available guidance to assess contaminant concentrations.

Details of the methodology and Aviron's position on the adoption of guidance values is outlined below.

The available chemical data, from soil samples tested, is sorted into appropriate datasets depending on sampling regime and ground conditions. An initial GQRA is completed using the relevant and industry available screening criteria and where appropriate, statistical modelling. Risks to human health shall be initially assessed by comparing soil chemical data against various published screening criteria. These have been sourced from the following and in order of preference:

-  Category 4 Screening Levels (C4SLs) prepared by the Department of Environmental Food and Rural Affairs (DEFRA) and published March 2014.
-  Phase 2 C4SLs prepared by CL:AIRE and published May 2021.
-  Suitable 4 Use Levels (S4ULs) prepared by Land Quality Management/Chartered Institute of Environmental Health (LQM/CEIH) and published December 2014. LQM acknowledgement for use of S4ULs. *"Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3275. All rights reserved"*.

- 🌱 Soil Guidance Values (SGVs) prepared by the Environment Agency (EA)/DEFRA and published 2009.
- 🌱 Soil Generic Assessment Criteria (GAC) prepared by Environment Industries Commission (EIC)/Association of Geotechnical and Geoenvironmental Specialists (AGS)/Contaminated Land: Application In Real Environments (CL:AIRE) and published 2010.

Aviron have adopted the above hierarchy in response to LCRM recommendations.

4.3 GUIDANCE USED FOR THE ASSESSMENT OF HAZARDOUS GROUND GAS

The principal influence for causing the migration of landgas in the ground is changes to barometric pressure. The most onerous landgas emission conditions on a site are usually observed following days of low or rapidly falling barometric pressure below 1000 millibars (mb).

Monitoring is usually performed over a period of several weeks or months in order to increase the chances of visiting the site on days when the conditions for monitoring worst-case results are correct. Gas monitoring results collected solely during high pressure conditions (>1000mb) may not provide a true value for worst case emission rates from the site.

Methane is produced by a number of processes, which can be biological or chemical in nature. The principal process is from the biogenic decay of organic material and is commonly found associated with landfill and organic marsh deposits or river silts. Methane can also be found associated with coal workings. It is explosive at concentrations of between 5 and 15%, with 5% being termed the lower explosive limit (LEL).

In assessing the risks from hazardous ground gas, reference has been made to the guidance from BS 8485:2015 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' and CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings' 2007 which adopts a risk characterisation strategy based on the maximum flow (L/hour) and maximum steady stated concentration (% v/v) of methane and carbon dioxide from a site to derive gas screening values (GSV) in litres/hour which are comparable with the Modified Wilson and Card classification (shown in Table 8.5 of C665) for any site which isn't intended to be developed as low-rise housing with vented underfloor void.

It is noted gas monitoring is precautionary.

5.0 ASSESSMENT OF GEOCHEMICAL SOIL RESULTS

Development proposed include predominantly private gardens and therefore the residential with homegrown produce from the guidance listed in section 4.2 shall be selected.

In order to select the appropriate Soil Organic Matter (SOM) value for appraisal of PAH and TPH the mean average SOM value was determined from the laboratory dataset and accordingly the 2.5% SOM value was selected.

Laboratory certificates of chemical analysis are presented in **Appendix II** along with the chemical assessment criteria.

5.1 ASSESSMENT OF SOIL GEOCHEMICAL RESULTS

Table 5.1 provides a summary of the results for each sample analysed when compared to the relevant assessment criteria.

Table 5.1: Summary of Geochemical Results				
Location	Strata	Determinant	Measured Conc. (mg/kg)	Guidance Conc. (mg/kg)
HP11 (0.1-0.2m)	Reworked Topsoil	All determinants recorded at acceptable concentrations	n/a	n/a
HP12 (0.1-0.2m)	Reworked Topsoil	All determinants recorded at acceptable concentrations	n/a	n/a
HP13 (0.1-0.2m)	Reworked Topsoil	All determinants recorded at acceptable concentrations	n/a	n/a
HP14 (0.1-0.2m)	Reworked Clay	All determinants recorded at acceptable concentrations	n/a	n/a
HP15 (0.1-0.2m)	Reworked Clay	Asbestos – chrysotile fibres/clumps	<0.001%	Present
Notes: Barium EIC Generic Acceptance Criteria (EIC GAC) is 1300mg/kg (Residential) Chromium is assumed to be chromium II (not chromium IV). Waste soil classification should be confirmed by submitting all chemical results to a licensed waste management operator for formal waste classification.				

5.2 DISCUSSION OF SOIL GEOCHEMICAL RESULTS

5.2.1 HP11 to HP13. Southern Garden Areas

All determinants, including metals, semi-metals, TPH, PAH and asbestos, have been recorded at acceptable concentrations within the re-worked Topsoil at HP11, HP12 and HP13. The results of this assessment concur with the outcome of previous investigations.

A remedial cover system to the rear gardens of Plots 1 to 3 is not considered necessary.

5.2.2 HP14 and HP15. Stockpiled Soil Area.

All determinants, including metals, semi-metals, TPH and PAH, have been recorded at acceptable concentrations within the re-worked natural Clay at HP14 and HP15.

However, a detection of asbestos has been recorded within HP15, positioned in close proximity to where Southern Testing (2017) previously encountered asbestos contamination within the rear garden of Plot 7 which is close to where material was burned.

5.2.3 Remediation Cover System Recommendation

Figure 8 is enclosed as enclosed as Combined Soil Contamination Plan which enable the following remedial works to be suggested:

-  **Asphalt Removal and Cover System Construction.** Removal of all asphalt/road plaining type material/Made Ground within the east of the site by the existing workshops about the **rear gardens to Plot 3 and frontage to Plot 4**. The cover system should comprise 600mm of clean Topsoil/sub-soil upon a geotextile membrane. A lesser thickness of cover may be suitable should the sub-crop of the 'clean natural strata formation' be verified.
-  **Asbestos Screening and Cover System Construction.** The Made Ground in the north of the site is unlikely to be physically suitable for new planting. It is recommended that prior to forming the gardens of Plots 7 and 8 in the north of the site a watching brief is made to inspection, screen and as necessary sample in-situ soils for asbestos content. A clean cover system should then be constructed to the **frontages and rear gardens of Plots 1 and 2** which should comprise 600mm of clean Topsoil/sub-soil upon a geotextile membrane. A lesser thickness of cover may be suitable should the sub-crop of the 'clean natural strata formation' be verified.

Once the above recommendations are appraised, a suitable Remediation Strategy should be prepared for

approval by the Local Planning Authority.

6.0 HAZARDOUS GROUND GAS MONITORING

6.1 STRATEGY

As previously presented within table 5.4.2 monitoring well installations were constructed in order to provide ground gas monitoring following the outcome of the preliminary ground gas assessment within section 2.3.

The installation of the monitoring wells have suitable response zones to enable the capture of ground gases which may possibly migrate through granular and fractured units beneath proposed homes. Each monitoring well was completed with a 1m thick bentonite seal from ground level to prevent atmospheric influence.

6.2 MONITORING

The presence of soil vapours was determined prior to bulk ground gas monitoring using a MiniRAE Photon Ionisation Detector (PID) from RAEs Systems. The presence of hazardous bio-gases including methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) was determined using a GFM Infra-Red Gas Analyser from Ribble Enviro Limited. The flow rate and atmospheric pressure, in millibars (mb), was also measured during the monitoring process. Depth to groundwater was measured using an electronic dip meter.

Monitoring work was completed on the dates specified within table 6.2 which also summarises weather conditions and atmosphere pressure. To determine rising or falling pressures local 'online' weather trends from the Met Office and/or the monitoring apparatus were consulted.

Table 6.2: Background Gas Monitoring Data				
Date	Atmospheric Pressure	Rising/Falling Pressure?	Worst Case Conditions?	Groundwater above response zone?
4 August 2023	1012mB	Falling	No	No
11 August 2023	1013mB	Steady	No	No
19 November 2024	996mB	Falling	Yes	No

Note 2 of C665 indicates 'worst case' conditions occur during falling and sub-1000mB atmospheric pressures. Section 5.5.1 of C665 indicates 'worst case' conditions are likely to occur during weather conditions such as rainfall, frost or dry weather.

6.3 MONITORING

Table 6.3 summaries the results obtained which are enclosed in **Appendix III**.

Table 6.3: Summary of Monitoring Results			
Gas	Measured Conc. Range (% v/v)		Comments
	Low	High	
CH ₄	0.0 (<0.1)	0.0 (<0.1)	Methane was not detected (<0.1%) and thus is below the guidance value of 1% at which point the characteristic situation is advised to increase to CS2.
CO ₂	0.4	2.8	Carbon dioxide has been detected at concentrations below the guidance value of 5% at which point the characteristic situation is advised to increase to CS2.
O ₂	17.8	20.1	Oxygen has been recorded at ambient concentrations, above 16% the point where it is considered there is potential for asphyxiation.
Vapour*	0.3	2.8	Very low (PID) concentrations have been recorded. This concurs with the ground conditions and geochemical laboratory results suggesting the absence of soil vapour risk to new homes.

*vapour concentration in parts per million (ppm)

Monitoring positions remained constant and intact. No replacement monitoring positions were installed during the period of this project. No damage was observed to the monitoring wells during works.

It is considered the integrity of the monitoring wells has not been compromised as there is no evidence of surface damage which may affect the underlying installations. There is a bentonite seal within the bored annulus preventing escape of ground gases and entry of atmospheric gases. The gas valve remained closed prior to all monitoring occasions so passive venting of ground gas is unlikely to have occurred as site visits were unannounced.

6.4 INTERPRETATION OF DATA

Under normal use of the site (i.e. above ground), the risk presented by methane and carbon dioxide is dependent on both the concentrations and the rate of flow. In accordance with Wilson and Card methodology specified in the CIRIA C655 document, Gas Screening Values (GSV) were determined using the formula below.

GSV =	(Maximum steady concentration / 100) x Flow rate
GSV measured in litres per hour (l/hr)	Maximum steady concentration measured in percent (%) Flow rate measured in l/hr.

Based on the maximum concentrations and flows recorded, the **GSV** for **methane** was **0.0 L/hr** and the **GSV** for **carbon dioxide** was **0.0 l/hr**.

Based on the GSV for carbon dioxide which is below 0.07l/h, along with the maximum recorded concentrations for carbon dioxide (<5%) and methane (<1%) the site is considered to fall within Characteristic Situation 1.

Gas protection shall not be required for the new units based on:

- 📍 the limited potential source of risk following the preliminary risk assessment;
- 📍 the GSV for carbon dioxide and methane is between 0.07l/h and 0.7l/h;
- 📍 the maximum concentrations carbon dioxide and methane are below 5% and 1% respectively;
- 📍 no abnormal ground conditions were recorded during the investigation;
- 📍 the monitoring dataset has encountered worst-case conditions.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This Supplementary Site Investigation including tier 2 GQRA has provided an assessment of risk to supplement the previously completed PRA and SI report.

Table 7.0 provides an updated summary of the environmental risks providing advice on further works and assessment.

Table 7.0: Updated Environment Risk Summary		
Item	Risk Description	To be addressed?
Avron Recommendations		
1	Local Polycyclic Aromatic Hydrocarbon (PAH) contamination within Made Ground in the east of the site around existing workshops (Plots 3 and 4 gardens)	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to detail a remedial method to address the PAH soil contamination shown within Figure 8 .
2	Asbestos Containing Soils (ACS) detected in the north of the site (Plots 1 and 2 gardens) in 2017 but not in 2023.	ACS were encountered during this recent investigation within the re-worked Clay sampled at HP15 within the rear garden of Plot 1. A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to detail a remedial method to address the ACS soil contamination shown within Figure 8 .
3	Potential for undiscovered soil contamination during workshop removal	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to address this aspect.
4	Any imported Topsoil should be chemically suitable for use in private gardens.	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared to provide a criterion for the re-use and import of suitable Topsoil and sub-soil.
5	Ensure material encountered is suitable for desired water main.	A Discovery Strategy, Remediation Strategy and Verification Plan shall be prepared with the recommendation to consult local water authority prior to water main installation.
6	Ingress of hazardous ground gases (CH ₄ + CO ₂) into new homes and depleted oxygen.	A final round of worst-case round of ground gas monitoring has concluded the gas risk assessment and characterised the site as CS1. Gas protection shall not be necessary.
WBC Requests		
7	Review recently moved soil locations and historic burn sites to ensure they have been included in the site analysis.	Supplementary investigation has recorded acceptable concentrations of all determinants analysed, with the exception of ACS within HP15. Where HP14 was completed in the rear garden of Plot 6 where moved soil was present, determinant concentrations are acceptable and compliment previous investigation. In the area of historic burning to rear gardens of Plots 1 and 2 a remedial cover system is proposed.

8.0 PROJECT INSTRUCTION AND LIMITATIONS

8.1 SCOPE OF WORKS

The following scope of work was undertaken to an agreed brief set out in Aviron's proposal and involves the following:

-  Hand pitting and targeted soil sampling to complement the human health risk assessment.
-  Log the strata within each exploratory hole noting any water strikes.
-  Collect disturbed soil samples from exploratory holes and submit for geochemical laboratory tests to determine the presence or absence of soil contaminants.
-  All soil samples shall be collected in accordance with the instruction and ground conditions and submitted to UKAS/MCERTS accredited laboratories for testing.
-  Complete a final worst-case round of gas monitoring.
-  Prepare an interpretative report to interpret ground conditions with respect to potential environmental risks.

Aviron has relied upon information received from the Client and their agents as accurate, unless contradicted by written documentation or site observations.

8.2 PUBLISHED GUIDANCE

This report follows the technical approach presented on Land contamination risk management (LCRM), accessed on gov.uk website. The guidance replaced the Contaminated Land Report 11 (CLR11) "Model Procedures for the Management of Land Contamination" prepared by the Environment Agency in 2004. CLR11, which was withdrawn in 2020, provided guidance on the application of management processes when assessing potentially contaminated land.

This project and report have been designed to fulfil the information requirements set out in LCRM.

This report is additionally prepared in accordance with current guidance notes, standards and practices as set out by the Environment Agency and statutory organisations in order to establish potential and significant contaminant linkages as defined in Part IIA of the Environmental Protection Act 1990.

8.3 LIMITATIONS

Aviron's scope of work has been designed to meet the timeframe and as such it may follow that further work would be prudent upon evaluation of the ground conditions. The scope of work provided shall provide a view of site conditions and understanding of potential geo-environmental risks and possible mitigation procedures.

The information used in this report has been derived from the site investigation, which in turn were based on known current and historical land uses identified at the site and surrounding area, available to Aviron at the time of the investigation.

Intrusive points chosen relate to the data collected and the risk assessment and recommendations will rely on these points only. It therefore follows that some areas of the site will not be examined. It is always possible that some areas not investigated may contain conditions which would be impossible to determine due to lack of evidence or time and budget restrictions.

A survey and an assessment of invasive species such as Himalayan Balsam and Japanese Knotweed is beyond the scope of this report.

Should changes in legislation, statutory requirements or industry practices occurred following issue of this report, this report should be viewed in light of these changes.

Should a notable time period elapse between the date issue of this report and the date of application of this report changes to site dynamics may occur and in particular the site inspection notes may no longer be applicable should any change of use occur to the site in the interim.

9.0 REFERENCES AND OTHER SOURCES OF INFORMATION

Previous Reports

Southern Testing Environmental & Geotechnical, Geoenvironmental Site Investigation Report (reference JT0117, dated October 2017)

STM Environmental Consultant, Contaminated Land Risk Assessment, Phase I Desk Study Report (reference PH1-2022-0000101, dated 10 November 2022)

Aviron. Preliminary Risk Assessment and site Investigation (reference 23-176.01, version 2, September 2024).

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BS5930:2015+A1:2020. British Standards Institute. Code of Practice for Ground Investigations

BS10175:2011+A2:2017. British Standards Institute. Investigation of Potentially Contaminated Land - Code of Practice

BS EN ISO 14688-1:2002 Geotechnical investigation and testing – Identification and Classification of Soil – Identification and Description

BS EN ISO 14688-2:2004 Geotechnical investigation and testing – Identification and Classification of Soil – Principles for a Classification

BS EN ISO 22475-1:2006 Geotechnical investigation and testing - Sampling Methods and Groundwater Measurements

BS EN ISO 22476-3:2005 Standard Penetration Test

BS EN 1997-1:2004+A1:2013 Eurocode 7 Geotechnical Design Part 1 General Rules

BS EN 1997-2:2007 Eurocode 7 Geotechnical Design Part 2 Ground Investigation and Testing

NA to BS NA+A1:2014 to EN 1997-1.2004+A1:2013 UK National Annex to Eurocode 7 Geotechnical Design Part 1 General Rules

NA to BS EN 1997-2.2007 UK National Annex to Eurocode 7 Geotechnical Design Part 2 Ground Investigation and Testing

BS 8485:2015 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings' 2007

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NHBC (2017). National House Building Council Standards. Chapter 4

NHBC Guidance on Methane and Carbon Dioxide 2007 (Boyle and Witherington, 2007)

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SP1010 - Development of Category 4 Screening Levels for Land Affected by Contamination. Final Project Report (Revision 2). Contaminated Land: Applications In Real Environmental (CL:AIRE). September 2014

SR2: Human health toxicological assessment of contaminants in soil, Science Report SC050021/SR2, Environment Agency, August 2008

SR7: Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values, Science Report SC050021/SR7, Environment Agency, November 2008

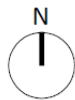
Stroud M A 1974. The Standard Penetration Test in Insensitive Clays and soft Rocks – Proc. ESOPTI 2(2) : 367-375

Stroud M 1988. The Standard Penetration Test - Its Application and Interpretation, ICE Geotechnical Conference on Penetration Testing in the UK

Vesic. 1973. Analysis of Ultimate Loads of Shallow Foundations

Figures

- 1 Site Location Plan
- 2 Existing Site Layout Plan
- 3 Site Photographs
- 4 Site Photographs
- 5 Proposed Development Plan
- 6 Soil Stockpiling and Burning Plan
- 7 Exploratory Hole Location Plan - Proposed Development
- 8 Combined Soil Contamination Identification Plan



Legend



Approximate Development Site Boundary

Landscape/Wildlife Corridor

Notes

Figure 1

Drawing Title

Site Location Plan

Project Number 23-176.02

Project Title

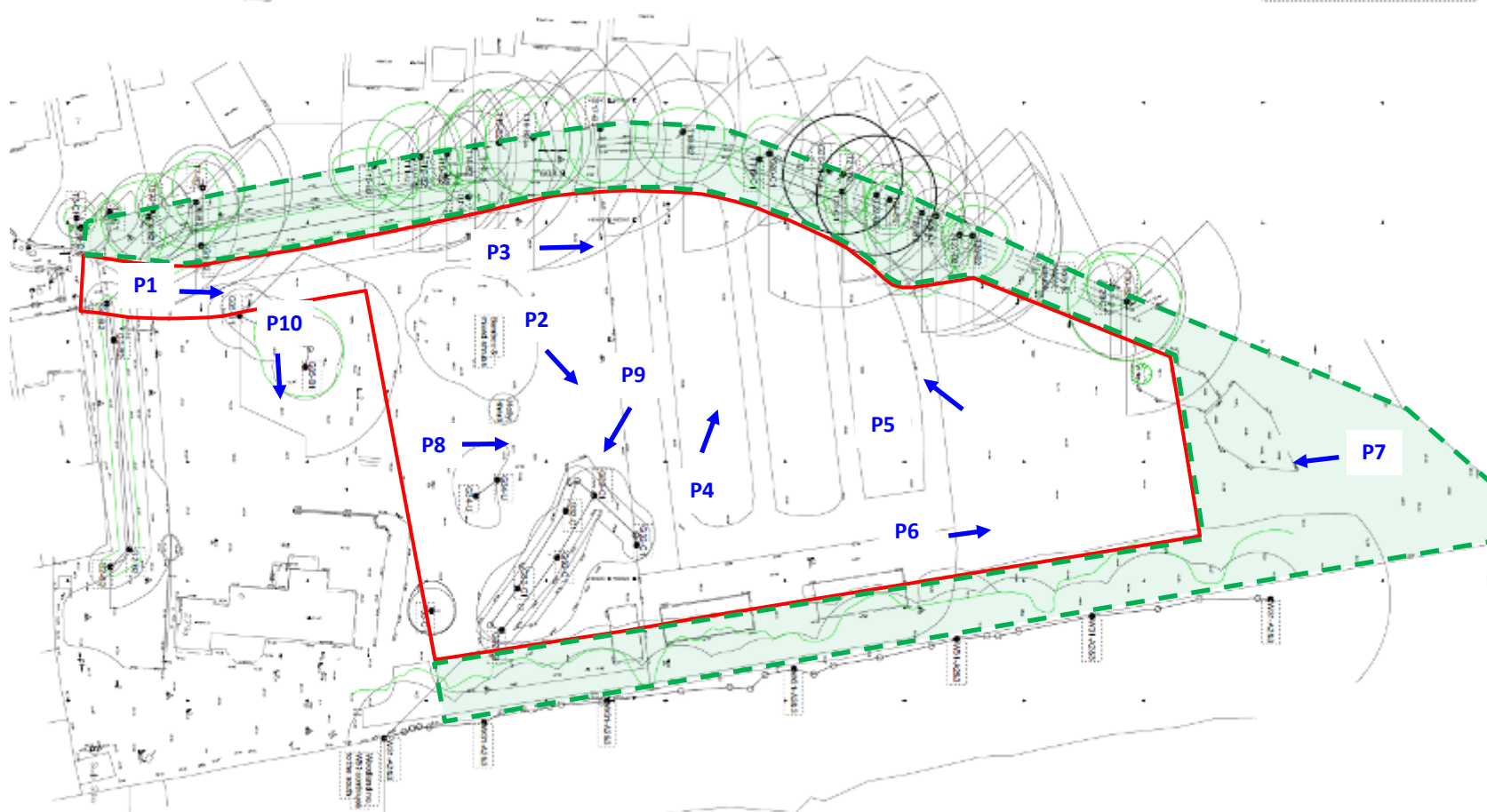
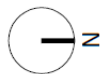
Land at Johnson Drive, Finchampstead, RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Legend

- Approximate Development Site Boundary
- Landscape/Wildlife Corridor
- Photo Direction

Notes

Figure 2

Drawing Title

Pre-Clearance Site Layout and Photograph Direction Plan

Project Number 23-176.02

Project Title

Land at Johnson Drive, Finchampstead, RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

Legend

Notes

Taken 18 November 2024

Figure 3

Drawing Title

Site Photographs

Project Number 23-176.02

Project Title

Land at Johnson Drive, Finchampstead, RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12

Legend

Notes

Photos 7-10 taken 18 November 2024.
Photos 11 and 12 provided by Client.

Figure 4

Drawing Title
Site Photographs

Project Number 23-176.02

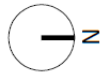
Project Title
Land at Johnson Drive, Finchampstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Rev. A: 24.11.22: Layout amended to
accord with Tree Consultants
comments

Project
Detached Houses
Land off Johnson Drive
Finchamstead

Legend

Notes

Provided by Client in 2024.

Figure 5

Drawing Title

Proposed Development Plan

Project Number 23-176.02

Project Title

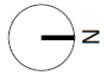
Land at Johnson Drive, Finchamstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Rev. A: 24.11.22: Layout amended to
accord with Tree Consultants
comments

Project
Detached Houses
Land off Johnson Drive
Finchamstead

Legend



Approximate location of former
spoil pile resultant from swim-
ming pool



Area of burning (see Photo 6)

Notes

Provided by Client in 2024.

Figure 6

Drawing Title

Soil Stockpiling and Burning Plan

Project Number 23-176.02

Project Title

Land at Johnson Drive, Finchamstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Rev. A: 24.11.22: Layout amended to
accord with Tree Consultants
comments

Project
Detached Houses
Land off Johnson Drive
Finchamstead

Legend

-  Approximate location of former
spoil pile
-  ST Contamination Identification
-  Aviron Contamination
Identification
-  Aviron 'Uncontaminated'
Location
-  Hand Pit Location

Notes

Provided by Client in 2024.

ST. Southern Testing

Figure 7

Drawing Title

Exploratory Hole Location Plan

Project Number 23-176.02

Project Title

Land at Johnson Drive, Finchamstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS





Rev. A: 24.11.22: Layout amended to
accord with Tree Consultants
comments

Project
Detached Houses
Land off Johnson Drive
Finchamstead

Legend

-  Approximate location of former spoil pile
-  ST Contamination Identification
-  Asbestos Contamination
-  Aviron Contamination Identification
-  Aviron 'Uncontaminated' Location
-  Hand Pit Location
-  Cover System Area (soft landscaping only)

Notes

Provided by Client in 2024.

ST. Southern Testing

Figure 8

Drawing Title

Combined Soil Contamination Plan

Project Number 23-176.02

Project Title

Land at Johnson Drive, Finchamstead,
RG40 3NW

Drawn by OB

Checked by JB

Scale NTS



Appendices

- I Exploratory Hole Logs and Photographs
- II Soil Contamination Results and Assessment Criteria
- III Field Monitoring Results

Appendix

I Exploratory Hole Logs and Photographs

[illegible]

Remarks		By	
Rootlets noted to 0.1m bgl. No groundwater encountered in trial pit. No visual or olfactory evidence of contamination. Trial pit backfilled with arisings.	Logged	AC	
	Checked	OB	Scale 01:25



TRIAL PIT LOG

Project: Land at Johnson Drive, Finchampstead, RG40 3NW					Project No. 23-176.02		Trial Pit: HP12						
Client: Palatine Homes Limited				Start: 18/11/2024		End: 18/11/2024		Sheet: 1 of 1					
Method/Plant Used: Hand Dig Tools		Co-ordinates: NT			Ground Level: NT								
Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests								Laboratory Test Details	
				Depth	No	Type							
Dark brown clayey very silty gravelly fine SAND. Gravel is fine to medium angular to rounded of flint. Rare sub-angular fine to coarse gravel size fragments of brick. Rootlets to 0.1m. RE-WORKED TOPSOIL		(0.3) 0.3		0.1 - 0.2	1	ES1							

Dimensions (m)			Water level observations (depths in metres below gl)						
Length	Width	Depth	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks	
0.25	0.25	0.30	18/11/2024	-	-	-	-		
Remarks Rootlets noted to 0.15m bgl. No groundwater encountered in trial pit. No visual or olfactory evidence of contamination. Trial pit backfilled with arisings.						By		Scale 01:25	
						Logged			AC
						Checked			OB



TRIAL PIT LOG

Project: Land at Johnson Drive, Finchampstead, RG40 3NW					Project No. 23-176.02		Trial Pit: HP13							
Client: Palatine Homes Limited				Start: 18/11/2024		End: 18/11/2024		Sheet: 1 of 1						
Method/Plant Used: Hand Dig Tools		Co-ordinates: NT			Ground Level: NT									
Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests									Laboratory Test Details	
				Depth	No	Type								
Dark brown clayey very silty gravelly fine SAND. Gravel is fine to medium angular to rounded of flint. Rare sub-angular fine to coarse gravel size fragments of brick. Rootlets to 0.1m. RE-WORKED TOPSOIL		(0.3) 0.3		0.1 - 0.2	1	ES1								

Dimensions (m)			Water level observations (depths in metres below gl)						
Length	Width	Depth	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks	
0.25	0.25	0.30	18/11/2024	-	-	-	-		
Remarks Rootlets noted to 0.1m bgl. No groundwater encountered in trial pit. No visual or olfactory evidence of contamination. Trial pit backfilled with arisings.						By		Scale 01:25	
						Logged			AC
						Checked			OB

[illegible]

Remarks		By	
Roots noted to 0.1m bgl. No groundwater encountered in trial pit. No visual or olfactory evidence of contamination. Trial pit backfilled with arisings.	Logged	AC	Scale 01:25
	Checked	OB	



TRIAL PIT LOG

Project:		Land at Johnson Drive, Finchampstead, RG40 3NW		Project No.	23-176.02	Trial Pit:	HP15					
Client:				Palatine Homes Limited	Start:	18/11/2024	End:	18/11/2024	Sheet:	1 of 1		
Method/Plant Used:		Hand Dig Tools			Co-ordinates:		NT		Ground Level:		NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests									Laboratory Test Details
				Depth	No	Type							
Light brown mottled light orange light grey silty very sandy gravelly CLAY. Gravel is fine to medium angular to rounded of flint. Rare sub-angular fine to coarse gravel size fragments of brick. RE-WORKED NATURAL STRATA		(0.3) 0.3		0.1 - 0.2	1	ES1							

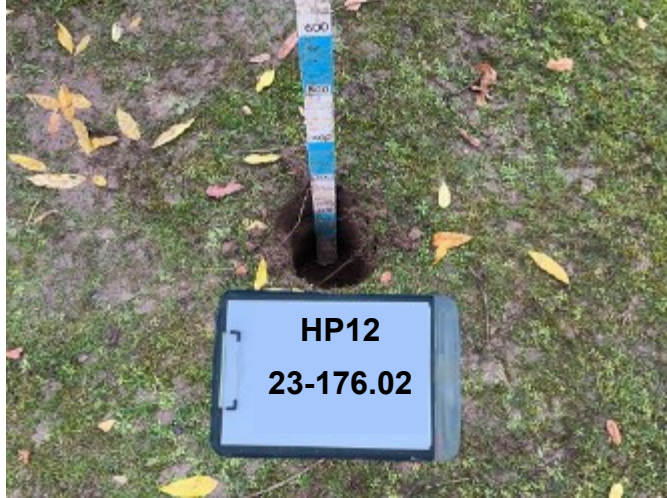
Dimensions (m)			Water level observations (depths in metres below gl)					
Length	Width	Depth	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
0.25	0.25	0.30	18/11/2024	-	-	-	-	
Remarks No roots present in trial pit. No groundwater encountered in trial pit. No visual or olfactory evidence of contamination. Trial pit backfilled with arisings.						By		
						Logged	AC	
						Checked	OB	Scale 01:25

Exploratory Hole Photos

Project Number	23-176.02	Project Title	Land at Johnson Drive, Finchampstead, RG40 3NW	Taken by	AC	Date	18/11/2024
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HP11



HP12



HP13



HP11 arisings



HP12 arisings



HP13 arisings

Exploratory Hole Photos

Project Number	23-176.02	Project Title	Land at Johnson Drive, Finchampstead, RG40 3NW	Taken by	AC	Date	18/11/2024
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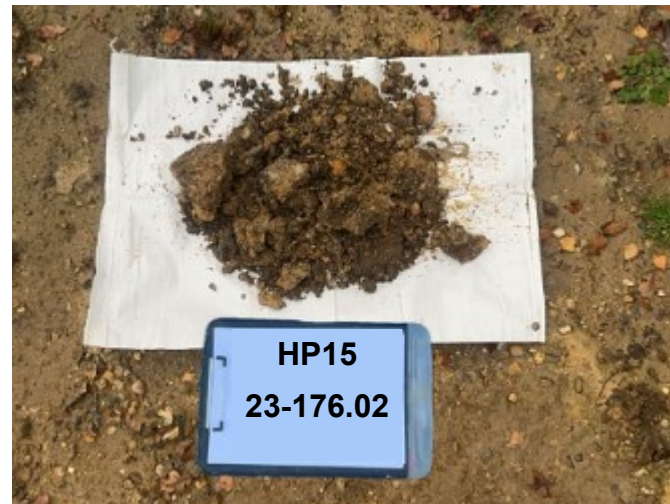
HP14



HP15



HP14 arisings



HP15 arisings

Appendix

III Soil Contamination Results and Assessment Criteria



Final Report

Report No.: 24-38025-1

Initial Date of Issue: 28-Nov-2024

Re-Issue Details:

Client Aviron Associates Ltd

Client Address: Badgemore House
Badgemore Park
Gravel Hill
Reading
Henley on Thames
RG9 4NR

Contact(s): David Norman
James Burkitt
Orlando Blackwell

Project 23-176.02 Land At Johnson Drive

Quotation No.: **Date Received:** 20-Nov-2024

Order No.: 23-176.02 **Date Instructed:** 20-Nov-2024

No. of Samples: 5

Turnaround (Wkdays): 5 **Results Due:** 26-Nov-2024

Date Approved: 28-Nov-2024

Approved By:

Details: David Smith, Technical Director

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Soil

Project: 23-176.02 Land At Johnson Drive

Client: Aviron Associates Ltd		Chemtest Job No.:		24-38025	24-38025	24-38025	24-38025	24-38025
Quotation No.:		Chemtest Sample ID.:		1898078	1898079	1898080	1898081	1898082
		Sample Location:		HP11	HP12	HP13	HP14	HP15
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.1	0.1	0.1	0.1	0.1
		Bottom Depth (m):		0.2	0.2	0.2	0.2	0.2
		Date Sampled:		18-Nov-2024	18-Nov-2024	18-Nov-2024	18-Nov-2024	18-Nov-2024
		Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	HWOL Code	Accred.	SOP	Units	LOD			
ACM Type		U	2192		N/A	-	-	-
Asbestos Identification		U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Asbestos by Gravimetry		U	2192	%	0.001			
Total Asbestos		U	2192	%	0.001			
Moisture		N	2030	%	0.020	14	14	15
Soil Colour		N	2040		N/A	Brown	Brown	Brown
Other Material		N	2040		N/A	Stones, Roots and	Stones, Roots and	Stones, Roots and
Soil Texture		N	2040		N/A	Clay	Clay	Loam
pH at 20C		M	2010		4.0	8.9	8.5	8.2
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	< 0.40	< 0.40	0.79
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.012	0.011	< 0.010
Total Sulphur		U	2175	%	0.010	0.010	0.010	0.030
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Sulphate (Total)		U	2430	%	0.010	0.030	0.029	0.056
Arsenic		M	2455	mg/kg	0.5	5.7	5.8	4.3
Barium		M	2455	mg/kg	0.5	24	23	39
Cadmium		M	2455	mg/kg	0.10	< 0.10	< 0.10	0.19
Chromium		M	2455	mg/kg	0.5	15	13	6.1
Copper		M	2455	mg/kg	0.50	6.8	6.4	9.0
Mercury		M	2455	mg/kg	0.05	0.05	0.06	0.10
Nickel		M	2455	mg/kg	0.50	3.7	3.3	3.8
Lead		M	2455	mg/kg	0.50	21	28	81
Selenium		M	2455	mg/kg	0.25	0.34	0.34	< 0.25
Zinc		M	2455	mg/kg	0.50	22	29	72
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	HS_2D_AL	N	2780	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	5.8	5.6	4.5
Aliphatic EPH >C12-C16 MC	EH_2D_AL_#1	M	2690	mg/kg	1.00	4.6	3.1	4.5
Aliphatic EPH >C16-C21 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	2.4	< 2.0	2.4
Aliphatic EPH >C21-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	3.00	< 3.0	< 3.0	8.4
Aliphatic EPH >C35-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	5.00	14	11	20

Results - Soil

Project: 23-176.02 Land At Johnson Drive

Client: Aviron Associates Ltd		Chemtest Job No.: 24-38025 24-38025 24-38025 24-38025 24-38025								
Quotation No.:		Chemtest Sample ID.: 1898078 1898079 1898080 1898081 1898082								
		Sample Location: HP11 HP12 HP13 HP14 HP15								
		Sample Type: SOIL SOIL SOIL SOIL SOIL								
		Top Depth (m): 0.1 0.1 0.1 0.1 0.1								
		Bottom Depth (m): 0.2 0.2 0.2 0.2 0.2								
		Date Sampled: 18-Nov-2024 18-Nov-2024 18-Nov-2024 18-Nov-2024 18-Nov-2024								
		Asbestos Lab: DURHAM DURHAM DURHAM DURHAM DURHAM								
Determinand	HWOL Code	Accred.	SOP	Units	LOD					
Total Aliphatic EPH >C10-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	14	11	20	13	11
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C16-C21 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	2.1	2.0	2.5	< 2.0	< 2.0
Aromatic EPH >C21-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	< 2.0	< 2.0	9.6	2.9	7.3
Aromatic EPH >C35-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	1.00	< 1.0	< 1.0	3.3	1.6	35
Total Aromatic EPH >C10-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	5.00	< 5.0	< 5.0	12	< 5.0	9.7
Total Aromatic EPH >C10-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	10.00	< 10	< 10	16	< 10	45
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35 MC	EH_2D_Total_#1	U	2690	mg/kg	10.00	16	13	32	18	21
Total EPH >C10-C40 MC	EH_2D_Total_#1	N	2690	mg/kg	10.00	16	13	36	19	56
Organic Matter		M	2625	%	0.40	2.4	8.1	6.7	0.53	0.97
Naphthalene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10
Acenaphthylene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10
Acenaphthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.20	< 0.10	< 0.10
Fluorene		M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.51	< 0.10	< 0.10
Anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.10	< 0.10	< 0.10
Fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10
Pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	1.2	< 0.10	< 0.10
Benzo[a]anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.45	< 0.10	< 0.10
Chrysene		M	2700	mg/kg	0.10	< 0.10	< 0.10	1.3	< 0.10	< 0.10
Benzo[b]fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.94	< 0.10	< 0.10
Benzo[k]fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10
Benzo[a]pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.82	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.59	< 0.10	< 0.10
Dibenz(a,h)Anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10
Benzo[g,h,i]perylene		M	2700	mg/kg	0.10	< 0.10	< 0.10	1.5	< 0.10	< 0.10
Total Of 16 PAH's		M	2700	mg/kg	2.0	< 2.0	< 2.0	9.3	< 2.0	< 2.0
Benzene		M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene		M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene		M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene		M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene		M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 23-176.02 Land At Johnson Drive

Client: Aviron Associates Ltd		Chemtest Job No.:					24-38025	24-38025	24-38025	24-38025	24-38025
Quotation No.:		Chemtest Sample ID.:					1898078	1898079	1898080	1898081	1898082
		Sample Location:					HP11	HP12	HP13	HP14	HP15
		Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):					0.1	0.1	0.1	0.1	0.1
		Bottom Depth (m):					0.2	0.2	0.2	0.2	0.2
		Date Sampled:					18-Nov-2024	18-Nov-2024	18-Nov-2024	18-Nov-2024	18-Nov-2024
		Asbestos Lab:					DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	HWOL Code	Accred.	SOP	Units	LOD						
Methyl Tert-Butyl Ether		M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection	
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)	
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.	
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.

Any comments or interpretations are outside the scope of UKAS accreditation.

The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.

Uncertainty of measurement for the determinands tested are available upon request .

None of the results in this report have been recovery corrected.

All results are expressed on a dry weight basis.

The following tests were analysed on samples 'as received' and the results subsequently corrected to a dry weight basis EPH, VPH, TPH, BTEX, VOCs, SVOCs, PCBs, Phenols.

For all other tests the samples were dried at $\leq 30^{\circ}\text{C}$ prior to analysis.

All Asbestos testing is performed at the indicated laboratory .

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.

All water samples will be retained for 14 days from the date of receipt.

Charges may apply to extended sample storage.

Water Sample Category Key for Accreditation

- DW - Drinking Water
- GW - Ground Water
- LE - Land Leachate
- NA - Not Applicable

Report Information

PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

NC - No Clean Up
MC - Mathematical Clean Up
FC - Florisil Clean Up

HWOL Acronym System

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 & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com



**Residential with Homegrown Produce
Soil Screening Values
Private Gardens**

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria	Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INORGANICS + PAH					Pyrene	620	1,200	2,000	LQM S4UL
Arsenic	37	37	37	C4SL/LQM S4UL	Phenols	78	0.98	1.1	LQM S4UL
Boron	290	290	290	LQM S4UL	TOTAL PETROLEUM HYDROCARBONS				
Cadmium	11	11	11	LQM S4UL	Benzene	0.087	0.17	0.37	LQM S4UL
Chromium III	910	910	910	LQM S4UL	Toluene	130	290	660	LQM S4UL
Chromium IV	6	6	6	LQM S4UL	Ethylbenzene	47	110	260	LQM S4UL
Copper	2,400	2,400	2,400	LQM S4UL	o-xylene	60	140	330	LQM S4UL
Mercury	1.2	1.2	1.2	LQM S4UL	m-xylene	59	140	320	LQM S4UL
Nickel	180	180	180	LQM S4UL	p-xylene	56	130	310	LQM S4UL
Lead	200	200	200	LQM S4UL	Aliphatic EC 5-6	42	78	160	LQM S4UL
Selenium	250	250	250	LQM S4UL	Aliphatic EC >6-8	100	230	530	LQM S4UL
Zinc	3,700	3,700	3,700	LQM S4UL	Aliphatic EC >8-10	27	65	150	LQM S4UL
Free Cyanide	34	34	34	ATRISK	Aliphatic EC >10-12	130	330	760	LQM S4UL
Acenaphthene	210	510	1100	LQM S4UL	Aliphatic EC >12-16	1,100	2,400	4300	LQM S4UL
Acenaphthylene	170	420	920	LQM S4UL	Aliphatic EC >16-35	65,000	92,000	110,000	LQM S4UL
Anthracene	2,400	5,400	11,000	LQM S4UL	Aliphatic EC >35-44	65,000	92,000	110,000	LQM S4UL
Benzo(a)anthracene	7.2	11	13	LQM S4UL	Aromatic EC 5-7 (benzene)	70	140	300	LQM S4UL
Benzo(a)pyrene	2.2	2.7	3	LQM S4UL	Aromatic EC >7-8 (toluene)	130	290	660	LQM S4UL
Benzo(b)fluoranthene	2.6	3.3	3.7	LQM S4UL	Aromatic EC >8-10	34	83	190	LQM S4UL
Benzo(ghi)perylene	320	340	350	LQM S4UL	Aromatic EC >10-12	74	180	380	LQM S4UL
Benzo(k)fluoranthene	77	93	100	LQM S4UL	Aromatic EC >12-16	140	330	660	LQM S4UL
Chrysene	15	22	27	LQM S4UL	Aromatic EC >16-21	260	540	930	LQM S4UL
Dibenz(ah)anthracene	0.24	0.28	0.3	LQM S4UL	Aromatic EC >21-35	1,100	1,500	1,700	LQM S4UL
Fluoranthene	280	560	890	LQM S4UL	Aromatic EC >35-44	1,100	1,500	1,700	LQM S4UL
Fluorene	170	400	860	LQM S4UL	Aromatic EC >44-70	1,600	1,800	1,900	LQM S4UL
Indeno(123-cd)pyrene	27	36	41	LQM S4UL	ASBESTOS				
Naphthalene	2.3	5.6	13	LQM S4UL	None Detectable				Aviron Adopted Value
Phenanthrene	95	220	440	LQM S4UL					

Appendix

III Field Monitoring Results

MONITORING DATA SHEET

SITE Land at Johnson Drive, Finchampstead, RG40 3NW
PROJECT 23-176.01



VISIT NUMBER 1
DATE 04/08/2023

EQUIPMENT GFM436 + MiniRAE
TAKEN BY AC

Record of Stable Concentrations										Interpretation		
Location	Time	Flow (l/h)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Pres. (mB)	PID (ppm)	Water (m bgl)	Base Well (m bgl)	CH4 GSV (l/h)	CO2 GSV (l/h)	CS
Site	9:40am	n/a	0.0	0.0	20.6	1012	0.0	n/a	n/a	n/a	n/a	n/a
WS1	10:40am	0.0	0.0	2.0	18.4	1012	2.8	3.67	4.04	0	0	CS-1
WS2	11:16am	0.0	0.0	0.4	20.1	1012	0.9	4.01	4.13	0	0	CS-1
WS5	10:00am	0.0	0.0	2.8	17.8	1012	1.4	dry	2.10	0	0	CS-1

Weather Observations						Pressure Observations				Notes	
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C		Source	Pressure Records		Trend		
						Metoffice	Location	Odiham	Falling		
Dry	Clear	Calm	None	Before	16	GFM436	Time	07:00	Steady		
Moist	Sunny	Light	Slight			After	16		Pressure	1017	Rising
Wet	Slight	Moderate	Moderate								
Snow	Cloudy	Strong	Heavy								
Frozen	Overcast										
	Fog/Mist										

MONITORING DATA SHEET

SITE Land at Johnson Drive, Finchampstead, RG40 3NW
PROJECT 23-176.01



VISIT NUMBER 2
DATE 11/08/2023

EQUIPMENT GFM436 + MiniRAE
TAKEN BY AC

Record of Stable Concentrations										Interpretation		
Location	Time	Flow (l/h)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Pres. (mB)	PID (ppm)	Water (m bgl)	Base Well (m bgl)	CH4 GSV (l/h)	CO2 GSV (l/h)	CS
Site	2:10pm	n/a	0.0	0.0	20.6	1013	0.0	n/a	n/a	n/a	n/a	n/a
WS1	2:32pm	0.0	0.0	1.3	19.0	1013	0.7	3.43	4.04	0	0	CS-1
WS2	2:45pm	0.0	0.0	0.9	19.5	1013	0.3	3.84	4.13	0	0	CS-1
WS5	2:20pm	0.0	0.0	1.3	18.4	1013	1.3	Dry	2.10	0	0	CS-1

Weather Observations						Pressure Observations				Notes		
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C		Source	Pressure Records		Trend			
						Metoffice	Location	Henley	Falling			
Dry	Clear	Calm	None	Before	24	GFM436	Time	07:00	Steady	Worst case conditions? (<1000mB and Falling)No		
Moist	Sunny	Light	Slight			Pressure	1013	Rising				
Wet	Slight	Moderate	Moderate	After	24							
Snow	Cloudy	Strong	Heavy									
Frozen	Overcast											
	Fog/Mist											

MONITORING DATA SHEET

SITE Land at Johnson Drive, Finchampstead, RG40 3NW
PROJECT 23-176.02



VISIT NUMBER 3
DATE 19/11/2024

EQUIPMENT GFM435 + MiniRAE
TAKEN BY DN

Record of Stable Concentrations										Interpretation		
Location	Time	Flow (l/h)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Pres. (mB)	PID (ppm)	Water (m bgl)	Base Well (m bgl)	CH4 GSV (l/h)	CO2 GSV (l/h)	CS
Site	9:00am	n/a	0.0	0.0	20.4	996	0.0	n/a	n/a	n/a	n/a	n/a
WS1	9:05am	0.0	0.0	0.7	19.8	996	0.1	2.89	4.04	0	0	CS-1
WS2	9:13am	0.0	0.0	0.3	19.8	996	0.3	2.94	4.13	0	0	CS-1
WS5	9:19am	0.0	0.0	1.0	19.1	996	0.1	dry	2.10	0	0	CS-1

Weather Observations						Pressure Observations				Notes	
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C		Source	Pressure Records		Trend	Worst case conditions? (<1000mB and Falling)	
						Metoffice	Location	Henley	Falling		
Dry	Clear	Calm	None	Before	2	GFM435	Time	08:00	Steady		
Moist	Sunny	Light	Slight				Pressure	997mB	Rising		
Wet	Slight	Moderate	Sleet	After	2						
Snow	Cloudy	Strong	Heavy								
Frozen	Overcast										
	Fog/Mist										

AVIRON ASSOCIATES LIMITED

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