Report prepared at
Prince Bros
Whitebridge Garage
Old Bath Road
Charvil
RG10 9QJ

On behalf of
Jamie Prince

Report reference
22-140.01

Report date
March 2022

Prepared by
Aviron Associates Limited

Report Quality Management			
Project Name	Prince Bros, Whitebridge Garage, Old Bath Road, Charvil, RG10 9QJ		
Project Title	Phase I and II Geo-Environmental Risk Assessment		
Client	Jamie Prince		
Project Number	22-140.01		
Issue No.	1		**Date**
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1.0 PROJECT AND SITE INFORMATION

1.1 APPOINTMENT

Aviron Associates Limited (Aviron) was retained by Jamie Prince [the "Client"] to prepare a combined Phase I and Phase II Geo-Environmental Risk Assessment (GERA) of the following premises:

Prince Bros. Whitebridge Garage, Old Bath Road, Charvil, RG10 9QJ (hereafter referred to as the "site").

The GERA will include a Phase I desk study and a Phase II ground investigation. The desk study will be prepared using an Envirocheck Report and on-line data sources to identify potential issues of contaminative concern associated with the proposed redevelopment of the site.

The Phase I is to be supplemented with site data, obtained through a Phase II ground investigation. The aim of the Phase II GERA is to evaluate the ground conditions prior to development as well as evaluate any potential contaminant linkages, identified in the Preliminary Conceptual Site Model (CSM). Recommendations for any further investigation or risk assessment, identified during the course of the assessment shall be made at the end of the report. In addition, geotechnical issues shall be investigated to provide recommendations for new foundation design.

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 south of Old Bath Road (the A3032) in Charvil, approximately 500 metres (m) to the east of Twyford.
National Grid Ref.	Centred at approximately 478154 176030.
Current Land Use	The site currently comprises two large garage buildings located the centre-west and north of the site of Prince Brothers. Smaller cabins are located to the south-west and south-east of the site, owned by Twyford Van Hire. The buildings are surrounded by a concrete surfaced car park. Vehicles and car parts are stored around the site. **Figure 1** is presented as the Existing Site Layout and Characterisation Plan. **Figures 2** and **3** are presented as the Site Photographs.
Surrounding	The site is bound by Old Bath Road to the north, commercial warehouses to the west, a footpath and lake

Land Use	to the south, and a footpath and wooded land to the east.
Proposed Land Use	It is understood that the site is likely to be re-development into commercial or light industrial units with external hardstandings, parking, loading bays of narrow soft landscaped boarders to soften the development. A proposed development plan is unavailable at the time of reporting.

1.3 SITE WALKOVER SURVEY

A site walkover survey was undertaken by Aviron and the purpose of the survey was to identify any on-site or nearby potentially 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 surveys.

Table 1.3: Summary of Site Walkover Survey	
Physical Site Characteristics	
Existing Structures	Existing building in the centre-west of the site of brick construction clad with corrugated and cement sheet upper walls and roof. Existing building along the northern boundary also of brick construction clad with corrugated and cement sheet upper walls and roof. Existing cabin in the SW corner of the site. Existing cabin to the SW corner of the site.
Basements	None observed.
Visual Topography and Site Surfacing	Concrete hardstanding across the majority of site. Concrete in generally poor condition with potholes across the site and evidence of subsidence running N-S in the south of the site. Site is noticeable elevated (in surrounding topography) when compared to the neighbouring site to the west.
Retaining Structures and Slopes (artificial)	None observed.
Drainage Issues	Potholes forming puddles across the site. Large puddle formed above subsided concrete slab in the south of the site.
Trees and Hedges	No vegetation present on site. Trees and bushes surround the eastern and southern borders of the site.
Made and Infilled Ground	Made ground across the entire site reputed to have been imported from the neighbouring site to the west to enable a level construction platform.
Contaminative Characteristics	
Above or Underground	Three oil ASTs observed, located along the western wall of the centre-west garage and the

Storage Tanks and Drums	southern wall of the northern garage. See photographs (Figures 2, 3).
Fuel Interceptors	None observed, however likely to be present, just not identified during site visits.
Waste Storage and Disposal	Municipal and trade waste observed within bins/skips. Waste oil tanks observed by ASTs.
Hazardous Material Storage and Use	None observed.
Asbestos Containing Materials (ACMs)	Asbestos survey recommended prior to demolition works.
Boiler Houses	None observed.
Sub-stations	None observed.
Surface Staining	Local surface staining was observed around the ASTs shown in **Figure 2.**
Potentially Contaminative Activities	Storage of oils in ASTs and drums, vehicle maintenance, deconstructed vehicle storage in the east of the site. Other motor vehicle garage activities.

1.3.1 Summary of Physical Site Characteristics

Consideration should be made towards the make-up and competency of the underlying strata and the influence of trees on the proposed development buildings.

1.3.2 Summary of Contaminative Site Characteristics

Potentially contaminative activities observed at the site comprising motor vehicle garages, ASTs and vehicle parts storage.

2.0 DESK STUDY REVIEW

Historical Ordnance Survey (OS) maps were obtained as part of the Envirocheck database search within report package reference 291373285 dated 8 February 2022, included within **Appendix I**. Database information within the Envirocheck report also includes reference to the hydrogeology, hydrology, subsidence and mining risk and ground gas hazards in the site area and is summarised in the following sections.

2.1 HISTORICAL REVIEW

The historical maps for the site were obtained from the Envirocheck Report. A summary of the most relevant potentially contaminative uses or other features is presented in table 2.1.

Table 2.1: History of the Site and Surrounding Land

Date (scale)	Site History	Surrounding Land History
1872 (1:2,500) 1882 (1:10,560)	A road can be seen running north-south through the centre of the site, with an unidentified structure in the south. Two oblong structures exist in the west of the site. A drainage channel runs east to west across the southern boundary of the site.	Surrounding land consists of undeveloped fields, marshland and woodlands. The "old river" runs generally north-south, as close as 28m to the NE of the site. A stream is located 165m to the WSW of the site. A flour mill is located approximately 250m east of the site.
1899 (1:2,500) 1901 (1:10,560)	No notable changes are evident at the site.	A building named "Boat House" has been developed 216m ENE of the site.
1912 (1:2,500) 1914 (1:10,560)	The building to the south of the site has been removed. The oblong structures in the west of the site have been combined into a singular structure, half of which extends over the western boundary of the site.	No notable change was identified in the surrounding area.
1932 (1:2,500) 1932 (1:10,560)	The building in the west of the site has been removed. A second drainage channel is shown to run north to south in the east of the site. An area of hatching in the north-west of the site suggest some earth movement possible mineral extraction in this area. A small detached building is marked in the south-east corner of the site.	No notable change was identified in the surrounding area.
1948 (aerial photograph)	No discernible changes to site use are evident on the aerial photography of 1948.	No notable change was identified in the surrounding area.
19630 (1:10,000) 1966-1968 (1:2,500)	The site is now labelled as a scrap yard. All previous buildings had been removed and been replaced with several small buildings.	Development of a cement mixing works immediately to the east of the site. Cement mixing works contain ramps, conveyors and a

Table 2.1: History of the Site and Surrounding Land		
Date (scale)	**Site History**	**Surrounding Land History**
	Buildings exist in the north-east corner, either side of the road in the north of the site, in the south-eastern corner of the site, and west of the road in the south of the site. The drain is still located in the south of the site.	tank 27m SE of the site. Development of a builders yard 170m, and a pub 240m to the E of the site.
1972-1977 (1:2,500)	The small building to the east of the road to the north of the site has been replaced with a much larger rectangular building. The former road has been removed.	Development of a single rectangular building in the builders yard 187m east of the site. Development of residential properties to the SE, 250m from the site. A large plot of land immediately south of the site is now labelled as a lake (water). A large gravel pit also exists 180m SE of the site.
1984-1990 (1:2,500)	All previously existing buildings have been removed. Two large garage buildings now exist on the site, one in the north of the site and one in the centre-west of the site, as seen during the site walkover.	A large warehouse has been developed to the west of the site. The lake to the south of the site now extends to the east of the site and neighbouring cement works.
1999-2022 (1:2,500 and Aerial Photographs)	No notable changes are evident at the site.	The cement mixing works immediately to the east of the site have been removed, including the tank. The gravel pit to the SE of the site has now been filled with water.
Note: All distances are approximate.		

2.1.1 Anecdotal Evidence

No anecdotal evidence available regarding the history of the site.

2.1.2 Summary of Historical Landuses

A review of the historical Ordnance Survey (OS) maps indicates that from 1872 the site contained a number of unidentified buildings, a drainage channel and a road. The buildings were subsequently modified until they were eventually removed by 1932. The site was then labelled as a scrapyard containing several small buildings until circa 1984 when the site is shown to have been redeveloped as the existing large garage buildings currently in use.

Key surrounding land uses include the lake and gravel pit immediately to the south and south-east of the site respectively that have existed since circa 1972. The gravel pit was subsequently flooded and became a lake in circa 1999.

Notable surrounding industrial land use includes a cement mixing works immediately to the east of the site which existed between approximately 1966-1999.

2.2 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

2.2.1 Anticipated Geology

Relevant geological information is provided in table 2.1.1 below.

Table 2.1.1: Anticipated Geology

Stratum	Age	Possible Thickness (m)	Typical Description	Aquifer Status
Artificial/Made Ground None indicated on site	N/A	N/A	N/A	N/A
Superficial Alluvium	Holocene Epoch	N/A	Clay, silt, sand and gravel and peat. Typically layered.	Secondary (A) aquifer
Superficial Kempton Park Gravel Member (KPGR)	Devensian Stage	Average thickness 6m	Sand and gravel, locally with lenses of silt, clay or peat	Secondary (A) aquifer
Solid Seaford Chalk and Newhaven Chalk Formations (Undifferentiated) (SCNC)	Coniacian Age – Campanian Age	50-80m (Seaford Chalk) 45-75m (Newhaven Chalk)	Firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Also, soft to medium hard, smooth white chalks with numerous marl seams and flint bands.	Principal Aquifer

There are no landslips or fault lines recorded within 500m of the site.

Artificial Ground comprising 'worked ground' is noted in the south-east corner of the site as well immediately south of the site at the location of the former gravel pit and existing lakes marked on historical and current mapping.

2.2.2 Ground Conditions - Borehole and Trial Pit Records

There are numerous BGS recorded logs for historical drilling or excavation works for premises located within 500m of the site. The nearest pertinent recorded boreholes are summarised in table 2.2.2 below, indicating the Kempton Park Gravel Member (KPGR).

Table 2.2.2: BGS Borehole and Trial Pit Records			
BGS Reference	**Distance from Site (Direction)**	**Geology (Depth to base bgl)**	**Groundwater (Depth below ground level)**
Su77ne105	52m (NE)	Alluvium - 1.5m KPGR - 3m SCNC - 3.3m+	-
Su77ne83	98m (W)	Alluvium - 1.5m KPGR - 4.2m SCNC - 5.0+	-
Su77ne43	112m (S)	KPGR - 5.48m SCNC - 5.79m+	1.5m
Tq37se241/C	136m (SW)	Alluvium - 21.03m KPGR - 3.04m+	1.82m

2.2.3 Hydrogeology

The hydrogeology of the site has been determined by the superficial geology of the Alluvium and the Kempton Park Gravel Member which according to the Envirocheck report and the Environment Agency website are classified as secondary (A) aquifers. The solid geology of the Seaford Chalk and Newhaven Chalk Formations (Undifferentiated) are classified as principal aquifers.

Secondary (A) aquifers comprise permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. A principal aquifer is defined as a regionally extensive aquifer or aquifer system that has the potential to be used as a source of potable water.

The Envirocheck report indicates that the groundwater vulnerability is noted as 'Secondary Superficial Aquifer - High Vulnerability' above 'Principal Aquifer'.

The Envirocheck report indicates that the north-east of the site is located within an Environment Agency Total catchment (Zone III) Source Protection Zone (SPZ3). An Environment Agency outer protection zone (Zone II) Source Protection Zone (SPZ2) exists 7m to the north of the site.

The Envirocheck report indicates that there are twenty-two groundwater abstraction licences for premises within 2000m of the site. The most pertinent, relate to two licences for 'general washing/process washing' at locations within the site boundary associated with Environment Agency, Thames Region. The licences are

expected to relate to the processing of the mineral extraction associated with the gravel pit and lake noted on the historical mapping.

The Envirocheck report indicates that there is 'potential for groundwater flooding to occur at surface' in the area of the site.

2.2.4 Hydrology

There are no current surface water features onsite. The nearest surface water feature is indicated 2m to the south-west consisting of a drainage ditch. The nearest main river (or inland river) comprises the Old River 28m to the north-west of the site. The nearest lake is 8m to the south of the site.

The Envirocheck report indicates that there is one surface water abstraction licences for premises1566m north of the site, used for 'general agriculture: heat pump' associated with Environment Agency, Thames Region.

The Envirocheck report indicates that an area of 'extent of flooding or extreme flooding from river without defences' exists on the site. The site is not located in an area that benefits from flood defences, nor is the site use for flood water storage.

Information from the GOV.UK website (February 2022) indicates that the north-west of the site is located within a Flood Zone 3. An area running from the middle to the east of the site is within a Flood Zone 1 and the remainder of the site is located within a Flood Zone 2. Flood Zone 1 is described as: 'land and property in flood zone 1 which has a low probability of flooding'. Flood Zone 2 is described as 'Land and property in flood zone 2 have a medium probability of flooding'. Flood Zone 3 is described as: 'Land and property in flood zone 3 have a high probability of flooding'.

2.3 MINING AND SUBSIDENCE RISK

Table 2.3 indicates potential mining and subsidence hazards identified within the Envirocheck report for the site. These should be considered in terms of the proposed development.

Table 2.3: Mining and Subsidence Risk

Item	Potential Hazard
Shrink-Swell Clay	No Hazard
Landslides	Very Low
Ground Dissolution of Soluble Rocks	Very Low

Compressible Deposits	Moderate or No Hazard
Collapsible Deposits	Very Low or No Hazard
Running Sands	Low or Very Low
Infilled Land	No potentially infilled land within the site extents, or immediate vicinity.
Mining/quarrying	Worked ground noted int the south-eastern corner of the site associated with the former gravel pit and lake.

Information from the Envirocheck report indicates that there is worked ground within the south-eastern corner of the site. There are no references to potentially infilled land (non-water or water) within the site extents.

The site area (500m buffer) is not affected by man-made mining or natural cavities, nor is it located in a coal mining affected area, or in a non-coal mining area of Great Britain. Natural cavities in the form of a swallow hole occurs 826m to the west of the site in the Taplow Gravel Member overlying sub-cropping chalk strata.

There are no fault lines and no landslips recorded within 500m of the site.

2.4 NEW FOUNDATIONS AND DRAINAGE SUMMARY

Typically, Alluvium is not considered suitable for the construction of conventional shallow foundations, and a piled foundation solution is likely to be required. A ground investigation would confirm an appropriate foundation solution.

Shallow soakaway drainage is unlikely to be successful given the elevated seasonal groundwater anticipated in the Alluvium and Kempton Park Gravel Member.

2.5 LANDFILLS AND GROUND GAS

The Envirocheck report indicates that there is one historical landfill sites located 424m to the south of the site.

Table 2.5 summarises the gas risk for the site, based on the above information gained through the desk-based research. In accordance with current guidance (CIRIA C665), the gas generation potential for each source has been individually assessed, with references to potential gassing risk made according to the following definitions: Negligible, Very Low, Low, Moderate, High and Very High. The definitions are explained in Section 10.0 of the guidance.

The objective of this exercise is to determine if potentially unacceptable ground gas risks exist, and whether

further investigation and assessment is necessary.

Table 2.5: Preliminary Risk Assessment (PRA) - Ground Gas			
Potential Source	**Risk**	**Risk Rating**	**Rationale**
Made Ground (CO_2 + CH_4)	Human health Explosion	Low	Made Ground anticipated as a result of the construction of the historical buildings associated with the site and infilling to construct a level platform in sloping topography. However, there is no expectation that on-site soils will contain a high proportion of organic matter that would make a risk of hazardous ground gas likely.
Alluvial Strata (CO_2 + CH_4)	Human health Explosion	Moderate	Alluvial strata noted below the site, with potential for organic material within the Alluvium and Kempton Park Gravel Member.
Landfills (CO_2 + CH_4)	Human health Explosion	Negligible	None within 250m of the site.
Infilled Ground + Burial Sites (CO_2 + CH_4)	Human health Explosion	Low	No infilled ground or burial sites within 500m of the site, however infill likely as a result of the construction of a level platform in sloping topography.
Coal and Mining (CO_2 + CH_4)	Human health Explosion	Negligible	Non-coal mining area. Mining not anticipated.
Radon	Human health	Very Low	<1% of homes above action level. Radon protection not required.
Soil Vapours	Human health Explosion	Moderate/Low	On-site and off-site risk identified in connection with the ASTs and the tank within the adjacent historical cement mixing works.
COMBINED RISK RATING = MODERATE/LOW			

A Low risk from ground gas ingress and explosion is considered. A number of sources of risks from on-site and immediately neighbouring industrial/commercial land use.

3.0 REGULATORY INFORMATION, CONSULTATIONS AND OTHER

Unless otherwise stated regulatory database information has been obtained from the aforementioned Envirocheck report included as **Appendix I.**

3.1 STATUTORY REGISTERS AND AUTHORISATIONS

Table 3.1 includes the statutory registers and authorisations that relate to the site and surrounding area. Pertinent registers and authorisations will be used in conjunction with the desk-based review to determine the preliminary environmental risk.

Table 3.1: Statutory Registers and Authorisations

Item	0 – 250m	251 – 500m
Contaminated Land Register Entries and Notices	0	0
Records of Licensed Discharge Consents	0	3
Prosecutions Relating to Controlled Waters	0	0
Enforcements and Prohibition Notices	0	0
Integrated Pollution Controls	0	0
Integrated Pollution Prevention and Control	0	0
Local Authority Integrated Pollution Prevention and Control	0	0
Local Authority Pollution Prevention and Controls	18m SE - PG3/1Blending, packing, loading and use of bulk cement	1
Local Authority Pollution Prevention and Control Enforcements	0	0
Pollution Incidents to Controlled Waters	129m SE - Oils - Unknown - Category 3 - Minor Incident	8
Substantiated Pollution Incident	0	0
Prosecutions Relating to Authorised Processes	0	0
Registered Radioactive Substances	0	0
Records of Water Industry Act Referrals	0	0

Table 3.1: Statutory Registers and Authorisations		
Item	**0 – 250m**	**251 – 500m**
Explosive Sites	0	0
Planning Hazardous Substance Consents/Planning Hazardous Substance Enforcements	0	0
Notification of Installations Handling Hazardous Substances (NIHHS) Facilities and Control of Major Accident Hazards Facilities (COMAH)	0	0
Fuel Stations	0	0
Contemporary Trade Directory Entries	The following pertinent records in the Contemporary Trade Directory Entries within 250m of the site: 0m – C M C Engineering – Active 0m – Prince Bros – Inactive 0m – Grove Service Station - Inactive 0m – Jigsaw Joinery Solutions - Inactive 0m - Prince Bros – Inactive 0m - T A V Autocare Systems - Inactive 6m – Hanson Premix – Inactive 25m – Japsalon Performance Styling - Inactive 28m – Peoples Car Ltd. - Inactive 30m – Peoples Car – Inactive 34m – E-Quipfix Ltd - Active 37m – Total Tyre Company - Active	
National Grid High Voltage Underground Electricity Transmission Cables	0	0
National Grid High Pressure Gas Transmission Pipelines	0	0

3.2 CONSULTEES

3.2.1 Local Authority - Contaminated Land Officer

The Local Environmental Health Department has not been contacted as part of our project instruction.

3.2.2 Local Authority - Building Control Officer

The Local Planning Authority Building Control Officer has not been contacted as part of our project instruction.

3.2.3 Local Authority - Petroleum Officer

The Local Planning Authority Petroleum Officer has not been contacted as part of our project instruction.

3.2.4 Environment Agency - Contaminated Land and Groundwater

The Contaminated Land and Groundwater Team of Environment Agency has not been contacted as part of our project instruction.

3.2.5 Coal Authority and Mining Searches UK

The Coal Authority and Mining Searches UK have not been contacted as part of our project instruction.

3.2.6 Sensitive Land Uses (Immediate Vicinity)

The site is located within a nitrate vulnerable zone.

4.0 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

4.1 METHODOLOGY

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. LCRM guidance replaces 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. A Preliminary Risk Assessment (PRA) and Conceptual Site Model (CSM) have been prepared as part of this desk study. Possible risks associated with potential source of contamination and sensitive receptors identified have been assessed via a source-pathway-receptor (SPR) model in accordance with current UK protocols. A risk may only exist where a plausible SPR linkage is presented and where the quantity or concentration of a contaminant is sufficient to pose harm. Under the statutory definition "Contamination" may only exist where contaminants pose a risk of harm to a receptor. Risk may be defined as a function of the likelihood and severity of any adverse effects resulting from a contamination event. This risk classification has been assessed in accordance with CIRIA C552. A summary of how risk is derived and the associated definition is presented below.

Table 4.1.1: Risk Ratings Matrix

	Consequence			
Probability	**Severe**	**Medium**	**Mild**	**Minor**
High Likelihood	**Very high risk**	**High risk**	**Moderate Risk**	**Moderate/low risk**
Likely	**High risk**	**Moderate Risk**	**Moderate/low risk**	**Low risk**
Low Likelihood	**Moderate Risk**	**Moderate/low risk**	**Low risk**	**Very low risk**
Unlikely	**Moderate/low risk**	**Low risk**	**Very low risk**	**Very low risk**

Table 4.1.2: Risk Ratings Definition

Risk Rationale	Definition
Very high risk	A high probability that severe harm could occur to determined receptor from identified contaminant - OR - evidence exists that severe harm to receptor is currently occurring. Urgent investigation and remediation should be considered. If demonstrated this risk is likely to result in substantial liability.
High risk	Harm is likely to occur to determined receptor from identified contaminant. Urgent investigation and short-term risk minimisation remediation followed by longer term fit for purpose remediation should be considered. If demonstrated this risk is likely to result in substantial liability.
Moderate Risk	It is possible that harm could occur to a determined receptor from identified contaminant. It is relatively unlikely that any harm would be severe or should harm occur it is likely to be relatively mild.
Moderate/low risk	It is possible that harm could occur to a determined receptor from identified contaminant. It is unlikely that any harm would be severe or should harm occur it is probable to be relatively mild.
Low risk	It is possible that harm could occur to a determined receptor from identified contaminant. It is unlikely that such harm, if indeed present, would at worst be mild.
Very low risk	There is a low possibility that harm could occur to a receptor. In such event the harm would not be severe.

4.2 POTENTIAL SOURCES OF CONTAMINATION

Based on the desk study and walkover survey completed, table 4.2 presents a summary of the potential sources identified.

Table 4.2: Potential Sources

Source	Description	Comments	On/off-site
1. Made Ground	Risk of soil contamination within the site associated with Made Ground and historic use as a scrap yard and garages.	Metals, hydrocarbons (TPH/PAH), VOC, asbestos	On
2. ASTs	Risk of localised soil contamination in connection with above ground storage tanks.	Hydrocarbons (TPH/PAH), VOC	On
3. Ground gases/vapours	Potential Made Ground on-site and hydrocarbon vapours from on-site and neighbouring industrial land use within 250m of the site.	Methane, carbon dioxide and hydrocarbon vapours.	On Off, E

4.3 PATHWAYS

A pathway is one or more routes or means that a receptor can be exposed to, or affected by, a contaminant.

Table 4.3: Plausible Pathways
On-Site and Locally
Direct contact; By humans and infrastructure
Underlying geology/hydrogeology; *secondary (A) aquifers above principal aquifer*
Inhalation and ingestion
Surface run-off/drainage

4.4 RECEPTORS

A receptor is either a living organism, a group of organisms, an ecological system, controlled waters or property that could be harmed or polluted by a contaminant. Table 4.4 examines the potential receptors.

Table 4.4: Potential Receptors

Receptor	Description	Comments	Plausible
Construction workers	Groundworkers and general construction works	Construction works proposed within the site	Yes
End users	Occupants of the proposed	Gardens and planted borders proposed around	Yes

Table 4.4: Potential Receptors			
Receptor	**Description**	**Comments**	**Plausible**
	development	the site	
Adjacent land users	Sensitive land uses identified in the immediate vicinity	Adjacent residential dwellings which could be affected by run-off or migration	Yes
Soft landscaping	Areas of new planting including lawns	Gardens and planted borders proposed around the site	Yes
Water supply pipes	Plastic pipework for potable water supply to housing may be affected if laid in contaminated soils	New supply required for redevelopment	Yes
Buildings & infrastructure	Buried concrete for new foundations may be in contact with aggressive ground (sulphur attack)	New building works proposed	Yes
Groundwater	Controlled waters (aquifers) beneath the site	Site underlain by secondary (A) aquifers above principal aquifer. Site located in a SPZ2 and SPZ3. No potable water abstraction in the vicinity.	Yes
Surface waters	Controlled water such as lakes, streams, rivers or coastal waters	Old River located 28m to the NE of the site. Lake located immediately south of the site.	Yes
Ecological receptors	Sensitive areas of ecological significance defined under Part 2A of EPA 1990	No ecological receptors within the immediate vicinity.	No

4.5 SUMMARY OF POLLUTANT LINKAGES FOR PROPOSED LAND USE - INITIAL CSM

The initial CSM is based upon the proposed site end use and the information currently consulted relating to various risk sources and plausible pollutant linkages and is presented within table 4.5.

Table 4.5: Initial Conceptual Site Model (for plausible pollutant linkage pathways)					
Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk & Justification**
Source 1 Soil Contamination (Made Ground)	Construction workers	Direct contact	Likely	Medium	Moderate Contaminative site use noted. Current use as garages and historic use as a scrap yard. Made Ground anticipated across the site due to previous and recent site. Short term risk to adults may exist if soil

					contamination exists. **Wear PPE.**
	End users	Direct contact	Likely	Mild	Moderate/Low Contaminative site use noted. Current use as garages and historic use as a scrap yard. Made Ground anticipated across the site due to previous and recent use. Completed development likely to be largely covered in hardstanding. **Complete Ground Investigation including soil chemical testing to confirm risk.**
	Adjacent land users	Direct contact via run-off	Unlikely	Mild	Very Low The site is generally level with significant hardstanding below buildings and external areas. Therefore, it is considered that run-off poses a limited risk to adjacent land users.
	Soft landscaping	Root uptake	Likely	Mild	Moderate/Low Contaminative site use noted. Current use as garages and historic use as a scrap yard. Made Ground anticipated across the site due to previous and recent site. Limited soft landscaping expected within the re-development, likely only to be planted boarders. **Complete Ground Investigation including soil chemical testing to confirm risk if soft landscaping proposed.**
	Water supply pipes	Direct contact	Likely	Medium	Moderate Contaminative site use noted. Current use as garages and historic use as a scrap yard. Made Ground anticipated across the site due to

					previous and recent site. **Complete Ground Investigation including soil chemical testing to confirm risk.**
	Buildings & infrastructure	Direct contract	Likely	Mild	Moderate/Low Aggressive ground conditions in underlying geology could attack concrete (sulphur attack). Moderate risk geology (Made Ground) anticipated below the site. **Consider soil sampling and chemical testing to quantify risk.**
	Surface Waters	Lateral migration through hydrogeology Run-off	Likely	Medium	Medium Contaminative site use noted. Current use as garages and historic use as a scrap yard. Made Ground anticipated across the site due to previous and recent site. Old River located 28m NE of the site. Groundwater may flow to the south towards the lake, which may act as a 'natural sump' for groundwater movement. **Consider soil and groundwater sampling and chemical testing to quantify risk.**
	Groundwater	Vertical migration through hydrogeology	Likely	Medium	Moderate Site underlain by secondary aquifer above principal aquifer. Contaminative site use noted. Current use as garages and historic use as a scrap yard. **Consider soil and groundwater sampling and chemical testing to quantify risk.**

	Ecological receptors	Run-off	Likely	Medium	Moderate Lake containing aquatic life to the south of the site. Contaminative site use noted. Current use as garages and historic use as a scrap yard. **Consider soil and groundwater sampling and chemical testing to quantify risk.**
Source 2 ASTs	Construction workers	Direct contact	Likely	Medium	Moderate Likely local soil (hydrocarbon) contamination exists in the vicinity of the ASTs. **Wear PPE.**
	End users	Direct contact	Likely	Mild	Moderate/Low Likely local soil (hydrocarbon) contamination exists in the vicinity of the ASTs. Completed development likely to be largely covered in hardstanding. **Complete Ground Investigation including soil chemical testing to confirm risk.**
	Soft landscaping	Root uptake	Likely	Mild	Moderate/Low Likely local soil (hydrocarbon) contamination exists in the vicinity of the ASTs. Limited soft landscaping expected within the re-development, likely only to be planted boarders. **Complete Ground Investigation including soil chemical testing to confirm risk if soft landscaping proposed.**

	Water supply pipes	Direct contract	Likely	Medium	Moderate Likely local soil (hydrocarbon) contamination exists in the vicinity of the ASTs. **Complete Ground Investigation including soil chemical testing to confirm risk.**
	Surface Waters	Lateral migration through hydrogeology Run-off	Likely	Medium	Medium Likely local soil (hydrocarbon) contamination exists in the vicinity of the ASTs. Old River located 28m NE of the site. Groundwater may flow to the south towards the lake, which may act as a 'natural sump' for groundwater movement. **Consider soil and groundwater sampling and chemical testing to quantify risk.**
	Groundwater	Vertical migration through hydrogeology	Likely	Medium	Moderate Site underlain by secondary aquifer above principal aquifer. Likely local soil (hydrocarbon) contamination exists in the vicinity of the ASTs. **Consider soil and groundwater sampling and chemical testing to quantify risk.**
	Ecological receptors	Run-off	Likely	Medium	Moderate Lake containing aquatic life to the south of the site. Likely local soil (hydrocarbon) contamination exists in the vicinity of the ASTs. **Consider soil and groundwater sampling and chemical testing to quantify risk.**

Source 3 Ground gases and Soil vapours	Construction workers	Inhalation of vapours/gas	Likely	Mild	Low Gas and vapour risk associated with Made Ground on site and current on-site use and historic adjacent land use. Risk limited when working in shallow excavation and outdoor air. **Wear PPE**
	End users	Inhalation of vapours/gas	Likely	Mild	Moderate/Low Gas and vapour risk associated with Made Ground on site and current on-site use and historic adjacent land use. **Complete ground gas testing and risk assessment to confirm risk potential.**

The overall environmental risk classification for the site is considered to be **MODERATE.** It would be prudent to:

1. Complete soil contamination testing of overlying soils to determine the presence or absence of contaminants. Additionally, pH, sulphate and sulphur testing should be completed to enable design of buried concrete.

2. Complete water contamination testing to determine the presence or absence of contaminants within groundwater beneath the site.

3. Complete ground gas monitoring to determine risks present due to the surrounding infilled land (Made Ground, tanks, adjacent land use).

4.5 CONTAMINANTS OF CONCERN FOR FUTURE SITE INVESTIGATION

Historical source of contamination associated with commercial scrap yard and garages indicates that there is moderate/low risk of contamination presented by the site. Sampling for environmental purposes, particularly if combined with geotechnical assessment that is already being undertaken, can be regarded as a way of furthering understanding of the site. Such an assessment can confirm whether the site is suitable for use and can act as a baseline assessment for which any future assessments can be compared.

The following 'general' suite of laboratory analysis of soil samples is proposed.

- Aviron's "Suite 1" of laboratory analysis shall be applied to future ground investigations which includes: arsenic, barium, cadmium, total chromium, copper, nickel, zinc, lead, mercury, selenium, water soluble boron, total cyanide, total sulphate, water soluble sulphide, speciated PAH, total phenols, pH.

- Asbestos: a common contaminant associated with historical commercial and domestic landuses and as a result of illegal fly-tipping.

- Total Petroleum Hydrocarbons (TPH CWG): A group of contaminants associated with vehicular use and fuel storage, leaks, drips and spills.

- Volatile Organic Compounds (VOC) associated with solvents and paint-based products.

The listed analytical suites will provide a screening for the majority of soil contaminants commonly found at brownfield sites.

5.0 GROUND INVESTIGATION WORK

5.1 METHOD STATEMENT AND GROUND INVESTIGATION APPROACH

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

A health and safety plan was completed before site work commenced. Ground 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 ground investigation was conducted in accordance with British Standards; BS5930:2015 'Code of Practice for Ground Investigation' and BS10175:2011 'Investigation of Potentially Contaminated sites'.

5.2 GROUND INVESTIGATION METHODS

Prior to the ground investigation works, ground-penetrating radar (GPR) was employed in order to avoid damage to the underground services within the site.

Window sample boreholes were employed to assess the ground conditions at the site and took account of access availability and underground service avoidance.

The principal methods of investigation were selected as window sample drilling to gain reasonable access, advance holes to depths of up to 5m below ground level (bgl) cause minimal surface damage and install monitoring wells. Window sample borehole locations were excavated to a depth of 1.2m bgl with hand digging tools to avoid services.

Figure is enclosed as the Exploratory Hole Location Plans. The plan shows the positions of exploratory holes relative to a recent aerial photograph.

5.2.1 Window Sample Drilling

Ten window sample boreholes (WS1-WS10) were drilled using a tracked window sample drilling rig on 3 and 4 March 2022 to depths of up to 3.0m bgl. Window sample boreholes were drilled to assess the ground conditions to a proposed depth of 3.0m bgl and to enable environmental soil sampling for laboratory testing and screening using human health risk assessment tools, however, drilling refusal (SPT N>50) occurred routinely in the very dense GRAVEL at 3.0m bgl.

The boreholes were also undertaken to enable the installation of ground gas monitoring wells.

The window sample boreholes were generally positioned in accessible areas of the site to provide spatial coverage and evaluation of ground conditions for the purpose of land quality assessment.

Table 5.2.1 discusses the rationale of window sample borehole positioning.

Table 5.2.1: Rationale of Window Sample Borehole Positioning	
Location	**Rationale**
WS1	Positioned in the south-east of the site for spatial coverage and to monitor off-site migration by the south-east of the site. Gas and groundwater monitoring well installed to 3.0m.
WS2	Positioned in the south-east of the site for spatial coverage and to monitor off-site migration by the south-west of the site. Gas and groundwater monitoring well installed to 3.0m.
WS3	Positioned in the centre-south-east of the site for spatial coverage and in the area of vehicle storage.
WS4	Positioned in the centre-south-west of the site for spatial coverage and in the area of vehicle storage.
WS5	Positioned in the east of the site for spatial coverage and in the area of vehicle storage.
WS6	Positioned in the centre of the site for spatial coverage and in the area of vehicle storage.
WS7	Positioned in the centre-north of the site for spatial coverage and targeted as close as possible to the AST. Gas and groundwater monitoring well installed to 3.0m.
WS8	Positioned in the west of the site for spatial coverage and targeted as close as possible to the AST. Gas and groundwater monitoring well installed to 3.0m.
WS9	Positioned in the north-east of the site for spatial coverage
WS10	Positioned in the north-west of the site for spatial coverage.

5.3 GROUND CONDITIONS

Exploratory hole logs and photographs are presented within **Appendix II**.

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

- MADE GROUND to depths of between 1.3m and 2.0m bgl; over
- Soft, firm and stiff grey and brown CLAY. Clay contains gravels in localised areas of medium-coarse angular flints. (ALLUVIUM)

- Loose, medium dense and very dense brown slightly clayey sandy GRAVEL. Gravels are fine-coarse subangular-angular flints. (Basal gravel of the ALLUVIUM, or possibly KEMPTON PARK GRAVEL MEMBER)

5.3.1 Field Observations

Visible and olfactory evidence of hydrocarbon contamination within alluvial clays within boreholes WS7 (~1.4m bgl) and WS8 (~1.3m bgl). Otherwise, visual and olfactory evidence of soil contamination was not observed.

Locations WS7 and WS8 are adjacent to ASTs and waste oil storage and thus the likely source of hydrocarbon contamination is the adjacent ASTs.

With the exception of local roots within WS4 between 1.2m-1.5m bgl, no significant roots or rootlets observed during the sampling of the ground investigation works.

5.4 GROUNDWATER LEVELS

5.4.1 Groundwater Levels: During Ground Investigation Works

Groundwater was encountered within all window sample borehole locations at 3.0m bgl, rising to 2.0m bgl after 20 minutes.

5.4.2 Groundwater and Gas Monitoring Wells

Locations WS1, WS2, WS7 and WS8 were converted to monitoring wells to enable standing groundwater level monitoring and ground gas monitoring. The wells were installed into the 101mm diameter window sample boreholes using 63mm external diameter and 50mm internal diameter HDPE standpipe.

Table 5.4.2 describes the construction of the wells.

Table 5.4.2: Monitoring Well Construction

Location	Depth of plain pipe and bentonite seal (m)	Response zone; depth of slotted pipe with gravel screen (m)	Depth of install (m)
WS1	Ground level (GL)-1.0	1.0-3.0	3.0
WS2	GL-1.0	1.0-3.0	3.0
WS7	GL-1.0	1.0-3.0	3.0

Table 5.4.2: Monitoring Well Construction			
Location	**Depth of plain pipe and bentonite seal (m)**	**Response zone; depth of slotted pipe with gravel screen (m)**	**Depth of install (m)**
WS8	GL-1.0	1.0-3.0	3.0

5.4.3 Groundwater and Gas Post-Investigation Monitoring and Groundwater Sampling

Prior to completing groundwater monitoring and sampling, bulk ground gases and soil vapours were monitored using a GFM 436 Gas Analyser and miniRAE Photon-Ionisation Detector (PID) on 28 March 2022 only. Gas monitoring was not completed on 15 March 2022 due to a malfunctioning GA2000 Gas Analyser, which was subsequently replaced with the GRM 436 for the visit of 28 March 2022.

Table 5.4.3 provides standing level groundwater 'dips' during post-investigation monitoring.

Table 5.4.3: Groundwater Monitoring Depths				
Location / Date	**Depth – bgl WS1**	**Depth – bgl WS2**	**Depth – bgl WS7**	**Depth – bgl WS8**
15 March 2022	2.29	2.25	1.31	Obstructed
28 March 2022	2.36	2.33	1.48	Obstructed
31 March 2022	Obstructed	2.19	1.65	1.49

The groundwater encountered in the window sample boreholes is expected to represent the secondary (A) aquifer of the Alluvium or Kempton Park Gravel Member.

Ground gas monitoring is discussed in section 10.0 of this report.

Field monitoring sheets are enclosed in **Appendix III.**

On 15 March 2022 the groundwater in the borehole installation in WS1, WS2 and WS7 were purged to remove ten-times the volume of water in the installation and the water allowed to re-charge to enable a groundwater sample to be collected for analysis. A clean bailer was used to obtain a sample from the well to avoid cross contamination between wells; and using clean latex gloves the sample was transferred into pre-labelled bottles and vials. Monitoring well WS8 was inaccessible due to be covered with containers and vehicle parts.

6.0 LABORATORY ANALYSES

6.1 SOIL GEOCHEMICAL TESTING

Table 6.1 details the soil samples that were collected and the associated geochemical analyses that were undertaken on the samples.

Table 6.1: Summary of the Analytical Schedule

Location	Strata Sampled	Position	Analyses
WS1 (0.1m)	Made Ground	South-east of site for spatial coverage	Suite 1, TPH CWG, SOM, Asbestos
WS2 (0.3m)	Made Ground	South-west of site for spatial coverage	Suite 1, TPH CWG, SOM, Asbestos, VOC
WS4 (0.3m)	Made Ground	Centre-south-west of site for spatial coverage	Suite 1, TPH CWG, SOM, Asbestos, VOC
WS6 (0.3m)	Made Ground	Centre of site for spatial coverage	Suite 1, TPH CWG, SOM, Asbestos
WS7 (0.3m)	Made Ground	Centre-north of site for spatial coverage and to target AST.	Suite 1, TPH CWG, SOM, Asbestos, VOC
WS7 (1.5m)	Natural CLAY	Centre-north of site for spatial coverage and to target AST.	Suite 1, TPH CWG, SOM, Asbestos
WS8 (0.3m)	Made Ground	West of site for spatial coverage and to target AST.	Suite 1, TPH CWG, SOM, Asbestos
WS8 (1.5m)	Natural CLAY	West of site for spatial coverage and to target AST.	Suite 1, TPH CWG, SOM, Asbestos
WS9 (0.25m)	Made Ground	North-east of site for spatial coverage	Suite 1, TPH CWG, SOM, Asbestos, VOC
WS10 (0.3m)	Natural SAND	North-west of site for spatial coverage	Suite 1, TPH CWG, SOM, Asbestos
WS3 (0.2m)	Made Ground	Centre-south-east of site.	WAC

Chemical sampling and testing generally targeted the overlying units of strata whereby virtue of surface deposition historical contaminants are most likely to be recorded. Generally Made Ground and natural units of strata were encountered and thus for soil contamination to exist the contaminants would need to exhibit from surface level downwards.

- Aviron's **'Suite 1'** includes the following parameters; arsenic, barium, cadmium, total chromium, copper, nickel, zinc, lead, mercury, selenium, water soluble boron, total cyanide, total sulphate, water soluble sulphate (SO_4), total sulphur, speciated PAH, total phenols and pH.
- The **TPH CWG** (Total Petrol Hydrocarbon Criteria Working Group) suite of analysis contains aromatic and aliphatic TPH speciation, Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) and Methyl Tert-Butyl Ether (MTBE).

- **SOM** (Soil Organic Matter) analysis is completed to enable correct guidance value selection for TPH and PAH.
- **Asbestos** screening is undertaken to determine or otherwise the presence of asbestos.
- **VOC** (Volatile Organic Compounds) screening for solvents or paint-based products.
- **WAC** (Waste Acceptance Criteria) screening is undertaken to determine classification of soils for off-site disposal purposes.

The aforementioned analytical suites were chosen to provide a suitable precautionary screening in accordance with the site conceptualisation.

The soil samples were sent to i2 Analytical Limited for environmental quality analysis.

6.2 GROUNDWATER CHEMICAL TESTING

One round of groundwater sampling has been completed to compliment the ground conditions, soil chemical results and groundwater observations made. The following samples were submitted for analysis:

- Four water samples were analysed for Aviron's Suite 1.
- Four water samples were analysed for a TPH CWG suite of analysis.
- Four water samples were analysed for VOC analysis.
- Four water samples were analysed for Hardness.

The aforementioned analytical suites were chosen to provide a suitable screening in accordance with the potential contaminants identified within the CSM.

Groundwater samples for environmental quality analysis were sent to Eurofins Chemtest.

6.3 SOIL GEOTECHNICAL TESTING

A programme of geotechnical laboratory testing was undertaken at K4 Soils and i2 Analytical Limited. Testing was completed on the fine (clay) and coarse (gravel) soils encountered beneath the site. The test procedures used were generally in accordance with the methods described in BS1377:1990.

Details of testing used are provided in table 6.3.

Table 6.3: Soil Geotechnical Testing		
Test	**Standard**	**Number of Samples**
Atterberg Limits (and Moisture Content) *The objective of Atterberg limits and moisture content testing is to determine plasticity and volume change potential of fine (clay and silt) soils*	BS1377: 1990: Part 2: Clause 3.2, 4.5, 5.0	12 (21)
Particle Size Distribution (PSD) *The objective of PSD testing is to determine grading of coarse (sand and gravel) soils*	BS1377: 1990: Part 2: Clause 9.2	3
Aviron LC Suite - pH, water soluble sulphate, total sulphate & total sulphur *To enable concrete classification to be specified*	UKAS accredited	14 (including 10 within the Suite 1 analysis)

6.4 SAMPLING PROTOCOL

All soil samples were collected from bored 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 or water sample was collected, and all samples were placed into clean sterilised jars/bottles/vials 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 suppression of volatiles.

A clean bailer was used to obtain a sample from each well to avoid cross contamination between wells; and using clean latex gloves the sample was transferred into pre-labelled bottles and vials.

7.0 ENVIRONMENTAL INTERPRETATIVE GUIDANCE

7.1 SOIL CONTAMINATION TESTING

7.1.1 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. LCRM guidance replaces 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.

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 generic quantitative risk assessment is completed upon using the relevant tier 1 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.

Atkins Limited has made their ATRISK^{SOIL} Soil Screening Values (SSVs) commercially available; however, there

remains industry debate about their use and derivation. Hence, Aviron have adopted the applied tier 1 guidance values published by recognised industry associations and statutory authorities. The application of ATRISK^{SOIL} SSVs is under on-going assessment.

In regard to lead; an S4UL does not exist, nor does any other reliable published guidance. Lead will only be compared to the C4SL because no S4UL or other guidance exists.

The C4SLs for lead has been developed using a low-risk criterion by selecting a lead concentration within the soil which is predicted to result in a blood concentration of 3.5ug/l which is considered to represent a low level of toxicological concern. Nonetheless LCRM recommends the use of C4SLs. Presently (2019) there is no published health criteria for what is considered to be a minimum risk for lead, unlike the compounds modelled in the S4ULs. It is understood this is due to lead being a non-threshold compound. To determine minimal risk criteria a scientific rationale needs to be established; which can be either toxicology or policy led. As yet neither has been established and hence the minimal risk criteria for lead have not been set.

The C4SL working group, on behalf of DEFRA were tasked with establishing the C4SLs modelling to known low risk criteria. In terms of the Categories (Cat) of risk; the following generical assumptions apply:

- Cat 1 – land is definitely contaminated and no need for investigation to prove.
- Cat 2 – land is most certainly contaminated and can be proved by investigation.
- Cat 3 – land unlikely to be contaminated and can be proved by investigation.
- Cat 4 – land definitely not contaminated.

The C4SLs were developed in the context that they would appraise chemical concentrations within land to demonstrate it was Cat 4 and definitely not contaminated. The use of the C4SLs have been widely adopted by the UK contaminated land industry by numerous consultants and local planning authorities.

In July 2014 the CIEH advised against the use of the C4SLs; and released their S4ULs in collaboration with LQM at The University of Nottingham in December 2014. Despite the earlier criticism from the CIEH a S4UL for lead was not provided.

Whilst deriving the lead C4SL a variety of lead blood levels were determined; being 1.6mg µg/dL, 3.5µg/dL and 5µg/dL. The respective lead C4SLs were 86mg/kg, 200mg/kg and 210mg/kg.

DEFRA selected the 3.5µg/dL value of 200mg/kg which is now used widely thorough the UK contaminated land industry for similar reasons stated above; establishing a nationwide precedence, generally because of the

absence of an alternative and also the Category 4 compliance in accordance with DEFRA's criteria.

Without an established minimal risk health criterion for lead it is not possible to determine a reliable 'in-house' screening value; not one which can withstand scrutiny and be indemnified. Any such value would be subject to a variety of assumptions and hence limit the credibility of the modelled output.

As such the application of the strongly precautionary C4SL for lead, selected by DEFRA for a site considered to be Category 4 and 'not contaminated' is considered acceptable.

7.2 GUIDANCE USED FOR THE ASSESSMENT OF CONTROLLED WATERS

In accordance with LCRM guidance, environmental quality standards (EQS) and drinking water standards can be used as generic assessment values for controlled water receptors. These criteria are used by the Environment Agency.

Specifically, to this project the 'Driver' which shall be selected as appropriate to determine the most suitable chemical standard shall be for the protection of aquatic life. Generally, these are the Environmental Quality Standards (EQS) and are 'hardness' related. Where the suitable EQS does not exist the UK Drinking Water Standard (UK DWS) shall be applied to make a conservative assessment.

Application of these standards shall provide a useful screening tool in the absence of other published guidance or site specific detailed risk assessment.

The assessment criteria used to assess the quality of groundwater beneath a given site should take into account the nature of the receptors which could be affected by the groundwater. The most sensitive receptors are regarded as abstractions, particularly for drinking water, followed by surface waters and sensitive ecosystems. Water supply services are also considered a receptor and should be considered where the services are likely to be in direct contact. As groundwater depths vary greatly across the site it is not considered a continuous body of groundwater (aquifer) exists.

The most sensitive receptor at the site is the underlying principle Chalk aquifer below the superficial strata of the Kempton Park Gravel Member circa 4m bgl. Additionally the adjacent lake is considered a sensitive receptor.

Where there are exceedances, the contaminants of concern will be subject to further consideration in a tier 2 assessment using site-specific criteria and the EAs Remedial Target Methodology (RTM) model to further determine risk.

7.3 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.

8.0 ASSESSMENT OF GEOCHEMICAL SOIL RESULTS

For the purpose of this assessment the aforementioned guidance (2.5% SOM) for a commercial end use given the site is likely to be re-developed into light industrial/commercial units.

Certificates of the laboratory analytical results are presented in **Appendix IV** along with the 'commercial' chemical assessment criteria.

8.1 ASSESSMENT OF SOIL GEOCHEMICAL RESULTS

Table 8.1 provides a summary of the comparisons of the results with the relevant assessment criteria.

Table 8.1: Summary of Geochemical Results

Location	Strata Sampled	Comments
WS1 (0.1m)	Made Ground	Benzo(b)fluoranthene recorded at 96mg/kg v's guidance of 44mg/kg. Benzo(a)pyrene recorded at 88mg/kg v's guidance of 35mg/kg. Dibenz(a,h)anthracene recorded at 17mg/kg v's guidance of 3.6mg/kg. While not elevated when compared to the commercial end use guidance; the total TPH concentration of 8,200mg/kg exceeds the 'inert waste criteria' of 500mg/kg and former 'rule of thumb' guidance 500-1000mg/kg for total TPH. It is likely this concentration shall result in a high waste disposal classification. Likewise, the total PAH concentration of 660mg/kg exceeds the 'inert waste criteria' of 100mg/kg.
WS2 (0.3m)	Made Ground	No exceedances reported. While not elevated when compared to the commercial end use guidance; the total TPH concentration of 2,900mg/kg exceeds the 'inert waste criteria' of 500mg/kg and former 'rule of thumb' guidance 500-1000mg/kg for total TPH. It is likely this concentration shall result in a high waste disposal classification.
WS4 (0.3m)	Made Ground	No exceedances reported. While not elevated when compared to the commercial end use guidance; the total TPH concentration of 1,400mg/kg exceeds the 'inert waste criteria' of 500mg/kg and former 'rule of thumb' guidance 500-1000mg/kg for total TPH. It is likely this concentration shall result in a high waste disposal classification. Likewise, the total PAH concentration of 150mg/kg exceeds the 'inert waste criteria' of 100mg/kg.
WS6 (0.3m)	Made Ground	No exceedances reported.
WS7 (0.3m)	Made Ground	No exceedances reported.
WS7 (1.5m)	Natural Clay	Lead recorded at 13,000mg/kg v's guidance of 2,300mg/kg. Dibenz(a,h)anthracene recorded at 5.0mg/kg v's guidance of 3.6mg/kg. While not elevated when compared to the commercial end use guidance; the total TPH concentration of 16,000mg/kg exceeds the 'inert waste criteria' of 500mg/kg and former

		'rule of thumb' guidance 500-1000mg/kg for total TPH. It is likely this concentration shall result in a high waste disposal classification. Likewise, the total PAH concentration of 320mg/kg exceeds the 'inert waste criteria' of 100mg/kg.
WS8 (0.3m)	Made Ground	No exceedances reported.
WS8 (1.5m)	Natural Clay	No exceedances reported. While not elevated when compared to the commercial end use guidance; the total TPH concentration of 830/kg exceeds the 'inert waste criteria' of 500mg/kg and former 'rule of thumb' guidance 500-1000mg/kg for total TPH. It is likely this concentration shall result in a high waste disposal classification.
WS9 (0.25m)	Made Ground	Benzo(b)fluoranthene recorded at 89mg/kg v's guidance of 44mg/kg. Dibenz(a,h)anthracene recorded at 13mg/kg v's guidance of 3.6mg/kg. While not elevated when compared to the commercial end use guidance; the total TPH concentration of 880mg/kg exceeds the 'inert waste criteria' of 500mg/kg and former 'rule of thumb' guidance 500-1000mg/kg for total TPH. It is likely this concentration shall result in a high waste disposal classification. Likewise, the total PAH concentration of 850mg/kg exceeds the 'inert waste criteria' of 100mg/kg.
WS10 (0.3m)	Made Ground	No exceedances reported. The total PAH concentration of 140mg/kg exceeds the 'inert waste criteria' of 100mg/kg.
WS3 (0.2m)	Made Ground	WAC tests indicates material is classified as at least stable non-reactive hazardous was in non-hazardous landfill. However, given high total TPH listed above, some waste may be classified as hazardous waste landfill. This should be confirmed by waste management contractors.
Notes: Barium EIC Generic Acceptance Criteria (EIC GAC) is 1300mg /kg (Residential) Chromium is assumed to be chromium II (not chromium IV).		

8.2 DISCUSSION OF SOIL GEOCHEMICAL EXCEEDANCES

Local exceedances of Lead and PAH have been recorded within the shallow Made Ground of WS1 (0.1m) and WS9 (0.25m) in addition to the natural Clay at a depth of 1.5m bgl beneath the Made Ground of WS7.

Professional opinion also deems there to be notable and potentially significant total TPH and PAH concentrations within:

- WS1 (0.1m). Total TPH recorded at 8,200mg/kg and total PAH at 660mg/kg.
- WS7 (1.5m). Total TPH recorded at 16,000mg/kg and total PAH at 320mg/kg.

- WS9 (0.25m). Total PAH at 850mg/kg.

Remaining total TPH and PAH concentrations discussed within table 8.1 should be considered in terms of waste management.

The presence of lead in urban environments can often be due to surface water run-off of (former) leaded fuel particles leaving vehicle exhausts, precipitating and falling to pavements, then becoming washed over adjacent land by surface water run-off during and following rainfall. It is likely the lead contamination recorded is a result of leaded fuel.

The presence of TPH is considered a result of fuel/oil spills given the use of the site as a scrap yard and recently vehicle maintenance facility.

The presence of PAH at shallow depth is likely a result of fuel/oil spills or, where corresponding TPH concentrations are not similarly high, more likely a product of ash/asphalt (bitumen) within the soil matrix.

As of the time of report preparation a formal development (site) plan does not exist. It is, however, likely the site will maintain a commercial/light industry due and once re-development contain large areas of hardstanding surfacing for uses including parking and loading bays.

As such the risk to human health shall be mitigated by the construction of permanent hardstanding which shall break the exposure linkage to underlying soil contamination. Where soft landscaped boarders are proposed an element of remedial works is likely to be required to construct a 'clean cover system' of Topsoil upon a geotextile membrane, most likely 600mm-1000mm thick to sustain root growth of the planted species.

Nonetheless the risk of soil contamination to controlled waters needs to be considered and will be further assessed in section 9.0.

9.0 ASSESSMENT OF GEOCHEMICAL WATER RESULTS

Laboratory certificates of analysis for groundwater samples are presented in **Appendix IV.**

A tier 1 assessment has been completed on the laboratory results by applying the freshwater hardness related EQS (>250µg/l CaCO3; based on groundwater test results) followed by the UK DWS.

The site is underlain by the Kempton Park Gravel Formation (secondary (a) aquifer) and the Seaford Chalk and Newhaven Chalk Formations (Undifferentiated) (principal aquifer).

Where exceedances of determinants exist a qualitative risk assessment shall be undertaken which may lead to further detailed quantitative risk assessment.

9.1 GROUNDWATER MONITORING WELL

Table 9.1 provides a summary of the comparisons of the results with the relevant assessment criteria.

Table 9.1: Summary of Geochemical Results

Location	Strata Sampled	Comments
WS1	Made Ground	No exceedances reported.
WS2	Made Ground	Lead (dissolved) recorded at 33ug/L v's guidance of 20ug/L.
WS7	Made Ground	Barium (dissolved) recorded at 1100ug/L v's guidance of 1000ug/L. Copper (dissolved) recorded at 30ug/L v's guidance of 28ug/L. Lead (dissolved) recorded at 110ug/L v's guidance of 20ug/L. Zinc (dissolved) recorded at 260ug/L v's guidance of 125ug/L. Aliphatic TPH >C8-C10 recorded at 8100ug/L v's guidance of 300ug/L. Aliphatic TPH >C10-C12 recorded at 15000ug/L v's guidance of 300ug/L. Aliphatic TPH >C12-C16 recorded at 29000ug/L v's guidance of 300ug/L. Aliphatic TPH >C16-C21 recorded at 24000ug/L v's guidance of 300ug/L. Aliphatic TPH >C21-C35 recorded at 11000ug/L v's guidance of 300ug/L. Aromatic TPH >C5-C7 recorded at 310ug/L v's guidance of 300ug/L. Aromatic TPH >C7-C8 recorded at 1600ug/L v's guidance of 300ug/L. Aromatic TPH >C8-C10 recorded at 9400ug/L v's guidance of 300ug/L. Aromatic TPH >C10-C12 recorded at 15000ug/L v's guidance of 300ug/L. Aromatic TPH >C12-C16 recorded at 23000ug/L v's guidance of 300ug/L. Aromatic TPH >C16-C21 recorded at 11000ug/L v's guidance of 300ug/L. Aromatic TPH >C21-C35 recorded at 1700ug/L v's guidance of 300ug/L. m & p-Xylene recorded at 530ug/L v's guidance of 500ug/L.

Lake (south of the site)	Made Ground	No exceedances reported.

A single round of groundwater sampling has been completed upon monitoring wells within WS1, WS7 and WS9.

An additional groundwater sample was taken from the lake immediately south of the site for the purposes of comparison.

The water sample recovered from WS1 and the lake recorded all concentrations of metals, PAH, TPH and VOC have been recorded at acceptable concentrations. Notably all PAH, TPH and VOC concentrations are below the laboratory method LOD.

The water sample recovered from WS2 recorded an exceedance of Lead.

The water sample recovered from WS7 recorded exceedances of Barium, Copper, Lead, Zinc, TPH and m & p-Xylene. It is noted WS7 us adjacent to an AST.

9.2 DISCUSSION OF GROUNDWATER GEOCHEMICAL EXCEEDANCES

Local exceedances of heavy metals and TPH have been recorded within the groundwater of WS7, an exceedance of lead has been recorded within the groundwater of WS2.

The source of the TPH/BTEX groundwater contamination within WS7 is most likely associated with the adjacent AST given the visual/olfactory evidence of soil contamination within the bored arisings and also the high concentrations of total TPH recorded within the soil at 1.5m bgl at 16,000mg/kg.

Whilst a levelling exercise has not been completed, the ground at the site is visually level. Taking account of groundwater levels from the simple 'dipping' exercise; groundwater in WS1/WS2 to the south of the site by the lake rests at circa 2.3m bgl and groundwater in WS7 and WS8 to the north of the site rests at circa 1.3m and 1.6m bgl respectively. Visually there does not appear to be an increase in ground level of ~0.6-1m from WS7/WS8 to WS1/WS2 (if anything levels reduce towards the south to provide natural run-off drainage). Thus with the groundwater data available it would appear groundwater is migrating in the southerly direction towards the lake; which is considered to be a natural 'sump' and thus hydrogeologic draw to groundwater.

Considering the groundwater results for WS1 and WS2, along with the sample from the lake suggests the TPH contamination recorded within WS7 and elsewhere across the site is local. This is based on the assumption that groundwater flow is southerly and should be confirmed following additional standing level monitoring and topographic surveying.

Furthermore, given the overlying unit of alluvial Clay which is typically negligibly permeable, the migratory risk of TPH contamination from WS7 is considered to be low and contamination is likely to be bound within the Clay strata and thus immobile.

However, it should not be discounted that the groundwater measurement within WS7/WS8 may be abnormal and representative of perched groundwater and therefore potential migration pathways towards other off-site receptors must still be considered, notably the Old River to the north-east of the site.

Further works are required to identify the direction of groundwater flow across the site which should be considered to complete the risk assessment. Suggested works could include:

- A topographic survey of the installed monitoring wells to identify their topographic elevation to allow for accurate assessment of groundwater levels across the site and to determine a direction of groundwater flow.
- Installation of additional well(s) in a northerly direction from WS7 to confirm the above hypothesis (or otherwise) that groundwater is flowing in a southerly direction towards the lake. Associated levelling and sampling/testing of additional wells should be completed.

10.0 HAZARDOUS GROUND GAS MONITORING

Results for the ground gas monitoring are presented within **Appendix III**.

10.1 STRATEGY

As previously mentioned, four monitoring wells (WS1, WS2, WS7 and WS8) were installed in order to obtain baseline data regarding the potential hazardous ground gas risk at the site.

The window sample (WS) monitoring wells had response zones between 1m and ~3m into the Made Ground, Alluvial Clay and just entering the Kempton Park Gravels in order to detect any hazardous bio-gases that may migrate laterally through the granular units, but not be located too close to the surface as to be affected by ambient air.

Each monitoring well was completed with a 1m thick bentonite seal from ground level to 1m bgl to prevent atmospheric influence.

10.2 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 (CH_4), carbon dioxide (CO_2) and oxygen (O_2) was determined using a GRM 465 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 10.2 which also summarises weather conditions and atmosphere pressure. To determine rising or falling pressures local 'online' weather trends from the Met Office were consulted.

Table 10.2: Background Monitoring Data			
Date	**Atmospheric Pressure**	**Rising/Falling Pressure?**	**Depth to groundwater**
28 March 2022	1021mB	Falling	~1.3 – 2.3m bgl

Monitoring was completed by an Aviron field technician trained, initially by RAE Systems (and subsequently/periodically in-house), to use the MiniRAE and Ribble Enviro Limited (and subsequently/periodically in-house to operate the GFM 436. In-house training was provided in operation of the electronic dip-metre.

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. Worst case conditions were not encountered during the project period.

10.3 MONITORING

Table 10.3 summaries the measurements obtained.

Table 10.3: Summary of the Monitoring Measurements			
Gas	**Measured Conc. Range (% v/v)**		**Comments**
	Low	**High**	
CH_4	0.0 (<0.1)	0.1	Methane was detected below the guidance value of 1% at which point the characteristic situation is advised to increase to CS2. The singular detection was within WS7 where high TPH was recorded.
CO_2	0.4	1.1	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	19.7	20.3	Oxygen has been recorded at ambient concentrations, above 16% the point where it is considered there is potential for asphyxiation.
Hydrocarbon Vapour*	0.2	3.1	Low (PID) concentrations have been recorded suggesting the TPH detected is oil/lubricant and not solvent based.
Notes: *vapour concentration in parts per million (ppm)			

The monitoring wells remained constant and intact throughout; no replacement monitoring positions were installed during the period of this project.

10.4 VALIDITY OF DATA

The measurements obtained are considered to be valid and representative for the following reasons:

1. The integrity of the monitoring wells has not been compromised. There was no evidence of surface damage which may affect the underlying installations. There was a 'good' bentonite seal within the bored annulus from 1m depth to ground level 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.

2. Following review and testing of the data against the CSM, it is considered the data forms a true representation of the gaseous conditions beneath the site.

10.5 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 were determined using the following:

$$GSV\ (litres/hour) = \frac{Maximum\ steady\ state\ concentration\ (\%)}{100} \times Flow\ Rate\ (litres/hour).$$

Based on the maximum concentrations and flows recorded, the **GSV** for **methane** was **0.0 L/hr** and the **GSV** for **carbon dioxide** was **0.0057 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.

It is recommended a prolonged period gas monitoring is completed to enhance the dataset to complete this assessment. In advance of additional monitoring results and given the brownfield nature of the site, it would be prudent to make allowance for 'basic' gas protection to meet the requirements of CS-2.

11.0 REFINED ENVIRONMENTAL RISK ASSESSMENT

11.1 REVISED SOURCES OF CONTAMINATION

Following completion of the ground investigation and interpretation of test results the following sources of land contamination are considered to exist.

Table 11.1: Revised Sources

Source	Comments	On/off-site
1. Local PAH and TPH soil contamination	Found within overlying Made Ground strata and natural clay close to AST. Anecdotally considered to be typical of urban brownfield sites. The PAH often a product of ashy deposits and elevated levels of total TPH considered to be a result of spillage/leakage from a nearby ASTs and vehicle maintenance.	On
2. Groundwater contamination	Local heavy metals and TPH contamination within groundwater (WS7), considered to be a result of spillage/leakage from a nearby AST and possibly present at WS8 also.	On
3. Ground gases/vapours	Concentrations of carbon dioxide and methane recorded at acceptable concentrations which fall within Characteristic Situation 1 (CS1). Continue monitoring and in the interim make allowance basic gas protection to CS2.	On/Off

11.2 REVISED CONCEPTUAL SITE MODEL

Following interpretation of the laboratory results, site dynamics and the revision of potential soil contaminants within table 11.2 a refined conceptual model has been prepared and is presented in table 11.2.

Table 11.2: Refined Conceptual Site Model (for plausible pollutant linkage pathways)					
Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk & Justification**
Source 1 TPH + PAH Soil Contamination	Construction workers	Direct contact	Likely	Medium	Moderate/Low Elevated concentrations of TPH and PAH have been identified within the overlying Made Ground across the site. **Construction workers to wear suitable PPE.**
	End users	Direct contact Ingestion	Low likelihood	Medium	Moderate/Low Elevated concentrations of TPH and PAH have been identified within the overlying Made Ground across the site. Assuming predominantly hardstanding surface coverage of the development the exposure pathway shall be broken. **Should areas of soft landscaping be proposed a clean cover system shall be required and a Remediation Action Plan (RAP) should be prepared outlining the remedial method.**
	Adjacent land users	Direct contact via run-off	Unlikely	Mild	Very Low The site is generally level with significant hardstanding below buildings and external areas. Therefore, it is considered that run-off poses a limited risk to adjacent land users.
	Soft landscaping	Root uptake	Low likelihood	Medium	Moderate/Low Elevated concentrations of TPH and PAH have been identified within the overlying Made Ground across the site. Assuming predominantly hardstanding surface

					coverage of the development the exposure pathway shall be broken. **Should areas of soft landscaping be proposed a clean cover system shall be required and a Remediation Action Plan (RAP) should be prepared outlining the remedial method.** **Should any Topsoil be imported, ensure it is suitable and complies with BS3882.**
	Water supply pipes	Direct contact	Likely	Medium	Moderate Elevated concentrations of TPH and PAH have been identified within the overlying and underlying Made Ground/Clay across the site. **Consult local water authority in regard of pipe design/materials.** Likely barrier pipe will be required given soil chemistry and site history.
	Buildings & infrastructure	Direct contract	Low Likelihood	Medium	Moderate/Low Refer to section 12.7 for concrete design classes.
	Surface Waters	Lateral migration through hydrogeology Run-off	Low Likelihood	Medium	Moderate/Low Local TPH soil and groundwater contamination has been recorded. However, the migratory pathway to the south (lake) is limited by the overlying unit of Clay and the absence of poor water chemistry within wells WS1, WS2 and the lake. Current groundwater levels suggest groundwater is flowing to the south and

					towards the lake. Notwithstanding, groundwater movement may exist to the north and the Old River and the 'dip' reading from WS7 may represent perched groundwater held within the Clay unit. **Consider installation additional monitoring well(s) in the north of the site and completing a topographic survey of the monitoring wells to determine the direction of groundwater movement.**
	Groundwater	Vertical migration through hydrogeology Run-off	Low Likelihood	Medium	Moderate/Low The overlying unit of Clay is likely to be protective of the underlying aquifer and given site data is it not currently considered groundwater contamination is mobile. **However, local TPH contamination should be removed to ensure continued post-development protection of water resources.**
	Ecological receptors	Run-off	Low Likelihood	Medium	Moderate/Low Soil and groundwater chemistry adjacent to and within the lake is acceptable, suggesting soil contamination is not impacting the lake. Consideration towards possible groundwater migration to the north and the Old River should be made which would include the installation of additional wells in the north of the site and topographic levelling.

Source 2 Groundwater contamination	Construction workers	Direct contact	Low Likelihood	Mild	Low Construction workers unlikely to come into contact with groundwater at a depth of >1.3m bgl.
	End users	Direct contact	Low Likelihood	Mild	Low End users unlikely to come into contact with groundwater at a depth of >1.3m bgl.
	Surface Water, Groundwater and Ecology	Lateral migration through hydrogeology	Low Likelihood	Medium	Moderate/Low Local TPH contamination is evident in local groundwater of WS7. However, the migratory pathway to the south (lake) is limited by the overlying unit of Clay and the absence of poor water chemistry within wells WS1, WS2 and the lake. Current groundwater levels suggest groundwater is flowing to the south and towards the lake. Notwithstanding, groundwater movement may exist to the north and the Old River and the 'dip' reading from WS7 may represent perched groundwater held within the Clay unit. **Consider installation additional monitoring wells in the north of the site and completing a topographic survey of the monitoring wells to determine the direction of groundwater movement.**
Source 3 Ground gases and Soil vapours	Construction workers	Inhalation of vapours/gas	Low Likelihood	Mild	Low Gas and vapour risk associated with Made Ground on site, infilled ponds and gravel pit in

					the vicinity. Maximum concentrations and GSV indicate CS-1. Risk limited when working in shallow excavation and outdoor air. **Wear PPE**
	End users	Inhalation of vapours/gas	Low Likelihood	Mild	Low Gas and vapour risk associated with Made Ground on site, infilled ponds and gravel pit in the vicinity. Maximum concentrations and GSV indicate CS-1. However, continue gas monitoring for a prolonged period, otherwise make allowance for gas protection to CS-2.

11.3 RISK COMMENTARY

11.3.1 Contamination Risk from Soil to Human Health – Construction Workers

Concentrations of soil determinants are unlikely to present a short-term exposure risk to adult construction workers, specifically from the dermal contact, ingestion and inhalation pathways. Nonetheless construction workers should ensure suitable PPE is worn which would include:

- Gloves to prevent dermal contact with contaminated soils. It is advised that disposable latex gloves are worn beneath the outer 'work' gloves. This shall prevent skin contact with any contaminated soils which may come into contact with the 'work' gloves.
- To prevent ingestion of contaminated soils construction workers should avoid putting hands or objects in their mouth whilst on-site.
- To prevent ingestion of contaminated soils prior to eating or drinking construction workers should ensure their hands are properly washed, rinsed and dried. The use of latex gloves shall restrict any contaminated soils from coming into contact with the skin.
- To prevent inhalation of contamination soils construction workers should wear dust masks on dry and windy days. On damp or wet still days the risk of dust inhalation is low.

11.3.2 Contamination Risk from Soil to Human Health – End Users

The overlying Made Ground has recorded local TPH and PAH contamination which on the assumption the site shall be re-developed into a commercial/light industrial premises the exposure linkage to end users is expected to be broken by the construction of hardstanding.

However, should small areas of soft landscaped boarders be proposed a cover system shall be necessary.

Table 11.3.2 outlines a typical remedial cover system.

Table 11.3.2: Cover Systems

Garden Type	Depth (bgl)	Description
Landscaped boarders (areas where produce cannot be grown)	Ground Level - 300mm (or more depending on root requirements)	BS3882:2015 'clean' Topsoil

11.3.3 Contamination Risk from Soil to Human Health – Domestic Water Supply

The geochemical laboratory results should be provided to the local water authority to ensure the correct materials are chosen for water supply pipes. Following the formal withdrawal of WRAS Guidance Note No. 9-04-03 (October 2002) The Selection of Materials for Water Supply Pipes to be Laid in Contaminated Land the UK Water Industry Research Ltd (UKWIR) report entitled "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Reference 10/WM/03/21; ISBN: 1 84057 5697) should be consulted.

Generally, all services should be placed within dedicated runs backfilled with clean imported material.

The local water authority should be consulted on the design of new water mains and it is likely barrier pipe shall be required.

11.3.4 Contamination Risk to Controlled Waters

Geological mapping indicated the site to be underlain by the secondary (a) gravel aquifer and principal chalk aquifer where groundwater was encountered circa 1.3m to 2.3m bgl.

It is not considered that soils present a risk to groundwater/controlled waters on the basis that Made Ground and alluvial clays act as a migration barrier between the source (AST) and the underlying aquifer. Currently it is considered groundwater movement is towards the south and the lake where groundwater and surface water chemistry is acceptable.

However, it would be prudent to install additional well(s) to the north of the site to considered whether or

not groundwater within WS7/WS8 is perched and thus suggesting an abnormal direction of groundwater flow. The Old River is to the north of the site and thus additional well within the north of the site will enable a conclusion of groundwater flow direction. Once further well(s) are installed further groundwater sampling and testing should be considered along with topographic levelling of the wells.

11.3.5 Risk from Ground Gas

Potential ground gas risks were considered to comprise infilled ground and on-site Made Ground.

To further evaluate ground gas risk one round of monitoring has been completed within the project timeframe (including a worst-case visit) which have recorded acceptable GSV and maximum concentrations within in site. The concentrations recorded suggest Characteristic Situation 1 (CS1) and based on the ground condition encountered and professional opinion ground gas protection may not be required.

However, a prolonged period of monitoring should be completed to confirm this and in the interim gas protection to CS-2 should be considered as a precautionary measure.

12.0 GEOTECHNICAL ASSESSMENT

This section provides a geotechnical assessment in connection with the proposed development as described above and considers the GEO Limit State: failure or excessive deformation of the ground, in accordance with EN 1997 Eurocode 7: Geotechnical Design (and the UK National Annex to Eurocode 7).

It is assumed for the purposes of this assessment that the finished ground floor level of the proposed development works is the same as the ground level at each of the exploratory hole locations.

The assessment of the stability of any slopes or retaining structures across or adjacent the site, the requirement for additional retaining structures and the requirements for cut and fill that may be required to facilitate construction is outside the scope of this report. Although a very low qualitative risk of ground dissolution of soluble rocks have been determined in the Envirocheck report, a quantitative risk assessment of ground dissolution of soluble rocks is outside the scope of this report.

Where applicable the following assessment includes bearing resistance assuming conventional construction only and no allowances have been made for interaction between existing adjacent foundations and proposed foundations or loads.

Eurocode 7 Section 2.1 Basis for Geotechnical Design indicates that for each geotechnical design situation it shall be verified that no limit state is exceeded. Geotechnical design requirements have been established by three Geotechnical Categories, 1, 2 and 3. For the purpose of this assessment the development is Geotechnical Category 2: which include conventional types of structure and foundation with no exceptional risk or difficult or loading conditions. Designs for structures in Geotechnical Category 2 should normally include quantitative geotechnical data and analysis to ensure that the fundamental requirements are satisfied. Routine procedures for field and laboratory testing and for design and execution may be used for Geotechnical Category 2 designs.

12.1 FOUNDATION DESIGN CONCEPT

The following considerations will need to be taken in account in determining the foundation solution for the proposed development works:

- MADE GROUND to 2.0m bgl above soft CLAY soils (ALLUVIUM) to depths of up to 3.0m bgl.
- Elevated groundwater to 1.31m bgl.
- Adequate bearing resistance to support the proposed development works.

When the considering the above, a piled foundation solution is expected to be required.

The overlying CLAY soils present at shallow depth beneath the site are of low and medium volume change potential, above GRAVEL, which is of negligible volume change potential.

12.2 EXCAVATION CONDITIONS

Excavation of the materials encountered during the ground investigation should be achieved using conventional hydraulic excavation techniques.

12.2.1 Temporary Works

From the ground investigation undertaken, shallow excavations in the MADE GROUND and natural coarse soils are not expected to remain stable in the short term. Due to the requirement for excavations to facilitate the construction, and the potential for coarse soils and increased thicknesses of MADE GROUND locally, care should be taken to ensure that instability of excavations does not affect existing structures and services (e.g. foundations, roads, boundary walls or buildings) both on and off-site, and temporary support is expected to be required in order to achieve this. Further advice should therefore be sought from the appointed structural engineer and specialist contractor regarding temporary works. General guidance can be found within CIRIA Report 97: Trenching Practice, dated 2001.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times.

12.2.2 Dewatering

Groundwater was encountered during the return monitoring in WS1, WS2 and WS7 at depths as shallow as 1.31m bgl (March 2022), within the secondary (A) aquifer of the Alluvium or Kempton Park Gravel Member.

Dewatering of rising groundwater may be required in excavations beneath the site in wetter winter months following periods of heavy rainfall and high nearby river water levels, and further monitoring is therefore recommended to determine the seasonal groundwater level beneath the site.

12.3 EXISTING SERVICES/SUBSTRUCTURES

Due to the historical development of the site and site environs, existing services or sub-structures should be anticipated.

Where foundations or obstructions are encountered during excavations for the proposed foundations, all new foundations should be extended downwards to fully penetrate all redundant former construction.

12.4 BEARING STRATA

As discussed, due to the MADE GROUND and soft ALLUVIUM, and the bearing resistance required to support the proposed development works, a piled foundation solution is expected to be required.

12.4.1 Atterberg Limits and Material Properties

Atterberg limits tests conducted on the overlying CLAY strata at depths of between 1.0m and 3.0m bgl indicate that the fine soils comprise inorganic CLAY of low, intermediate and high plasticity (CL/CI/CH) with a modified plasticity index of between 15% and 36%, classified as being of medium volume change potential.

The results of particle size distribution (PSD) analysis confirm the grading of the underlying coarse soils at depths of 2.0m and 3.0m bgl as slightly clayey sandy fine to coarse GRAVEL, classified as being of negligible volume change potential.

12.4.2 Desiccation

Using the ratio of the moisture content (MC) to the liquid limit (LL) (an empirical indicator of desiccation, after Driscoll, 1983), the test results indicate that the CLAY strata overlying the site are potentially desiccated (MC:LL ratio 0.28-0.47).

An assessment in accordance with BRE Digest 412 Desiccation in Clay Soils 1996, indicates that the shear strength, moisture content and liquidity index profiles are also shown to be inconsistent between the sampling points indicating that desiccation is likely to have occurred in the CLAY strata encountered.

Consideration should therefore be given to extending foundations beneath the desiccated zone, on piled foundations. Mitigation measures to prevent lateral heave in the clay soils encountered across the site should be incorporated into the below ground construction.

12.4.3 Design Parameters

In the absence of laboratory triaxial test data an estimated critical state angle of shearing resistance (ϕ'_{crit}) of 25^{o} is assumed for the overlying CLAY strata using Table 2 of BS8002:1994 September 2001. It is assumed that the undrained cohesion is zero. An estimated critical state angle of shearing resistance (ϕ'_{crit}) of 34^{o} is assumed for the GRAVEL encountered beneath the site using Table 3 of BS8002:1994 September 2001. It is assumed that the GRAVEL is rounded and well graded.

Design parameters for the strata encountered beneath the site are included in Table 12.4.3 below

Table 12.4.3: Design Parameters			
Strata	**Volume Change Potential**	**Unit Weight (kN/m^3)**	**Critical State Angle of Shearing Resistance (ϕ'_{crit})**
CLAY	Medium	17-19	25
GRAVEL	Negligible	21	34

Geotechnical laboratory material property test results are presented within **Appendix V.**

12.5 TREE INFLUENCE ON FOUNDATIONS

When considering the influence of trees on foundations, the material properties of the strata beneath the site and the distance and species of the trees to the foundations are the determining factors.

For the purposes of this assessment the shallow soils beneath the site are classified as being of medium volume change potential above soils of negligible volume change potential.

Provided the proposed development works are supported on piled foundations an adjustment to foundation depths in accordance with NHBC Standards Chapter 4.2 Building Near Trees, 2021 is not required.

Should significant roots or desiccated soils be encountered during the groundworks, and/or previously unidentified tree stumps encountered during the site preparation works, foundations should be extended beneath the roots/desiccated soils and/or the depth adjusted to accommodate the species of tree stump encountered. A record of the findings associated with roots, desiccated soils and tree stumps should be kept during the groundworks phase.

Mitigation measures to prevent lateral heave in the clay soils encountered across the site should be incorporated into the below ground construction.

Mitigation measures to protect existing tree species during the construction process will also need to be considered.

12.6 FOUNDATION TYPE, DEPTH AND ALLOWABLE BEARING PRESSURE

12.6.1 Trench Fill/Strip Foundations

As discussed, due to MADE GROUND extending to 2.0m bgl, soft CLAY (ALLUVIUM) to 3.0m bgl, shallow groundwater, and the required bearing resistance anticipated, conventional shallow foundations are unlikely to be economically viable for the proposed development works.

Consideration should therefore be given to supporting the proposed development works on piled foundations.

It should be noted that the above recommendations have been made using data in window sample boreholes WS1 to WS10 completed.

12.6.2 Piled Foundations

The advice of a piling specialist should be sought to determine the working loads of their proprietary piling technique when considering the ground and groundwater conditions encountered beneath the site, and the health and safety implications of working within the confines of the site and adjacent neighbouring properties.

Consideration should be given to additional ground investigation work comprising cable and percussion boreholes to depths sufficient to enable piled foundation design.

12.6.3 Floor Slab

Due to the extent of MADE GROUND and soft CLAY encountered, the ground floor slabs beneath the proposed development works should be suspended on ground beams.

Mitigation measures to prevent lateral heave in the clay soils encountered across the site should also be incorporated into the below ground construction.

12.7 CONCRETE CLASSIFICATION

In accordance with Building Research Establishment (BRE) Special Digest 1: 2005 - Concrete in Aggressive Ground, the following laboratory test data has been used to derive classifications for buried concrete (Table C2, brownfield locations) beneath the site:

- Soluble Sulphate (2:1 extract) – 0.04 to 1.2g/l
- Sulphate (groundwater) – 0.0014 to 0.0067g/l

- pH – 7.0 to 10.4
- Total Sulphate SO_4 – 0.047 – 0.57%
- Total Sulphur – 0.042 – 0.69%
- Total Potential Sulphate – 0.126 – 2.07%
- Oxidisable Sulphide < 0.3 to 1.61%

"*BRE guidance suggests that 'if significant number of determination of oxidisable sulphides is above 0.3%, then use the results of total potential sulphate to determine the concrete class*".

Oxidisable sulphide has been calculated above 0.3% SO_4 in three of the samples tested at 0.1m and 1.5m bgl, and exceeds the threshold where the concrete classification is based on oxidisable sulphide and total potential sulphate. Although oxidisable sulphide exceeds 0.3%, the action of piling is unlikely to result in 'worked ground' and the results of soluble sulphate therefore apply.

Based on the results obtained for soluble sulphate the Design Sulphate (DS) Class for buried concrete beneath the site is DS-2. Where foundations are constructed above the groundwater level, the Aggressive Chemical Environment for Concrete (ACEC) Class is AC-1s. For foundations below groundwater the ACEC Class is AC-2.

Where Made Ground in the area of WS1 at 0.1m bgl is used as backfill against foundations, the results of soluble sulphate and total potential sulphate apply and the Design Class would be DS-4, and the ACEC, AC-3s.

It should be noted that additional considerations for the determination of concrete class and appropriate aggregate use are set out in BRE Special Digest 1. These are considerations specific to the soil type, the proposed development and the type of concrete foundations to be used at the site.

Laboratory results for the pH, sulphate and sulphur testing are included within **Appendix IV**.

12.8 SOAKAWAY DRAINAGE

The overlying CLAY strata and elevated groundwater encountered are unlikely to be suitable for soakaway drainage, and an alternative to shallow soakaway drainage should therefore be sought.

13.0 CONCLUSIONS AND RECOMMENDATIONS

This Phase I/II Geo-Environmental Risk Assessment comprising a desk study review and a ground investigation, for environmental purposes, has provided an assessment of the site's history, geo-environmental setting and an evaluation of ground conditions.

13.1 ENVIRONMENTAL

Table 13.1 summarises the pertinent environmental risks providing advice on further works and assessment.

Table 13.1: Environment Risk Summary

Medium	Risk No.	Risk Description	Comments/Recommendations
Soils	1	TPH and PAH Made Ground contamination to future site occupants.	Risk expected to be mitigated by anticipated hardstanding cover system. In the event soft landscaped boarders are proposed construct a minimum 300mm thick cover system. Accordingly prepare Remediation Action Plan. Any imported Topsoil should be chemically suitable and comply with BS382.
	2	Hotspot of TPH contamination around ASTs/waste oil drums.	Likely these hotspot swill require removal to ensure long term protection of controlled water resources. Known locations are shown as ASTs on Figures 1 and 4 and evidenced by WS7 and WS8 ground conditions.
	3	Ensure material encountered is suitable for desired water main.	Consult local water authority prior to water main installation. Likely barrier pipe shall be required.
Ground Gas	4	Ingress of hazardous ground gases (CH4 + CO2) into new units and depleted oxygen.	Gas monitoring results at the time of issue are acceptable. Complete a prolonged period of gas monitoring to confirm characteristic situation and in the interim made precautionary allowance for basic gas protection to CS-2.
Groundwater	5	Current site data suggests groundwater flow towards the south and the lake. Water quality in wells within the south (WS1 and WS2) is acceptable as is water quality within the lake. However, perched water may existing within WS7/WS8 and thus groundwater movement may be incorrect and actually northerly towards the Old River.	Install further monitoring well(s) in the north to enable a topographic levelling exercise and an additional round of water sampling and testing to complete the understanding of the groundwater regime.

Once the above five risks have been evaluated/implemented the environmental risk assessment can be

considered complete and the development suitable for occupancy.

13.2 GEOTECHNICAL

This report and the Clients preferred foundation solution should be presented to the Local Authority or appropriate build warranty provider for approval prior to construction.

Table 13.2 summarises the geotechnical assessment and pertinent risks.

Table 13.2: Geotechnical Risk Summary

Element	Comments	Recommendations
Foundations	Due to the extent of MADE GROUND, soft CLAY, elevated groundwater and the bearing resistance anticipated to support the proposed development works, a piled foundation solution will be required. Temporary shallow excavations are not expected to be stable. Groundwater encountered at 1.31m bgl during return monitoring (March 2022).	Piled foundations will be required. Dewatering may be required in wetter winter months. Consider continued groundwater monitoring. Temporary works expected to be required. Shallow soils encountered comprise predominantly CLAY of medium volume change potential (NHBC Chapter 4.2, Building Near Trees), above GRAVEL of negligible volume change potential. Generally concrete classification of DS-2, AC-1s/AC-2.
Floor Slabs	Suspended.	Mitigation measures required to prevent heave.
Drainage	Soakaway drainage unlikely to be suitable.	Consider alternative to shallow soakaways.
Pavements		Once the road pavement formation level has been determined, provision should be made for undertaking in-situ CBR tests to determine the requirements for road pavement design.
Abnormals	Piled foundations expected to be required.	It is recommended that additional ground investigation works including cable and percussion boreholes are drilled to a sufficient depth to enable piled foundation design. Additional testing for piling mat design is also recommended.

14.0 PROJECT INSTRUCTION AND LIMITATIONS

14.1 SCOPE OF WORKS

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

- Drilling of ten window sample boreholes to depths of up to 5.0m bgl, and conversion of the boreholes to wells for the purposes of monitoring groundwater and for hazardous ground gas.
- Logging the strata within each exploratory hole noting any water strikes.
- Collecting disturbed soil samples from exploratory holes and submit for geochemical laboratory tests to determine the presence or absence of soil contaminants, and geotechnical material property tests to enable foundation and pavement recommendations.
- All soil samples were collected in accordance with the instruction and ground conditions and submitted to UKAS/MCERTS accredited laboratories for testing.
- Preparing an interpretative GERA report to interpret ground conditions with respect to potential environmental risks and provide recommendations for foundation design and engineering parameters.

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

14.2 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.

14.3 LIMITATIONS

A risk assessment in connection with unexploded ordnance is beyond the scope of this report.

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.

This report provides recommendations for foundation design based upon the ground conditions encountered and where possible makes predictions for possible variations in ground conditions. However, it is always possible that not all variations in ground conditions can be accounted for and shall also be dependent upon design loadings and foundation construction techniques used. It should be acknowledged that ground conditions may vary from intrusive point to intrusive point and without undertaking continuous investigation it is impossible to entirely understand variations in ground conditions. Our recommendations should therefore not supersede the project's Consulting Structural and Civil Engineers design.

Groundwater sampling and testing was not undertaken as part of this instruction.

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.

15.0 REFERENCES AND OTHER SOURCES OF INFORMATION

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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 Eurocode 7 Geotechnical Design Part 1 General Rules

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

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Vesic. 1973. Analysis of Ultimate Loads of Shallow Foundations

Figures

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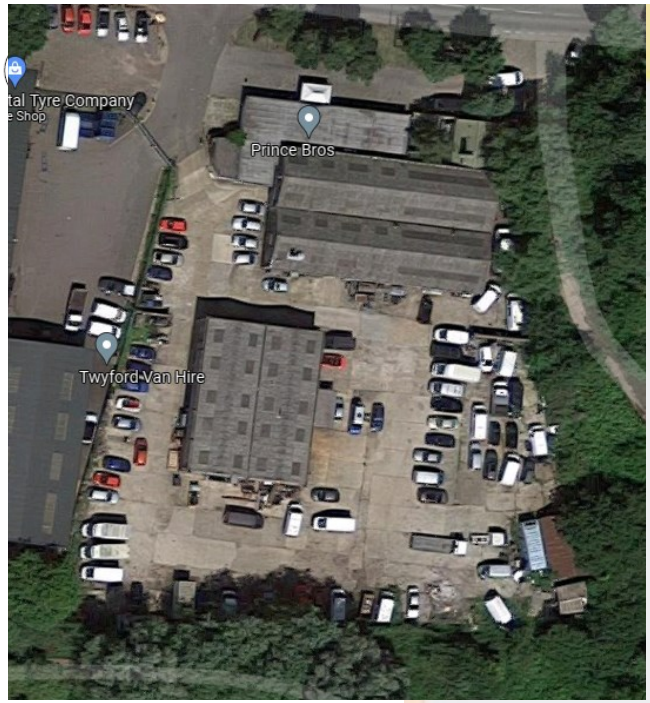

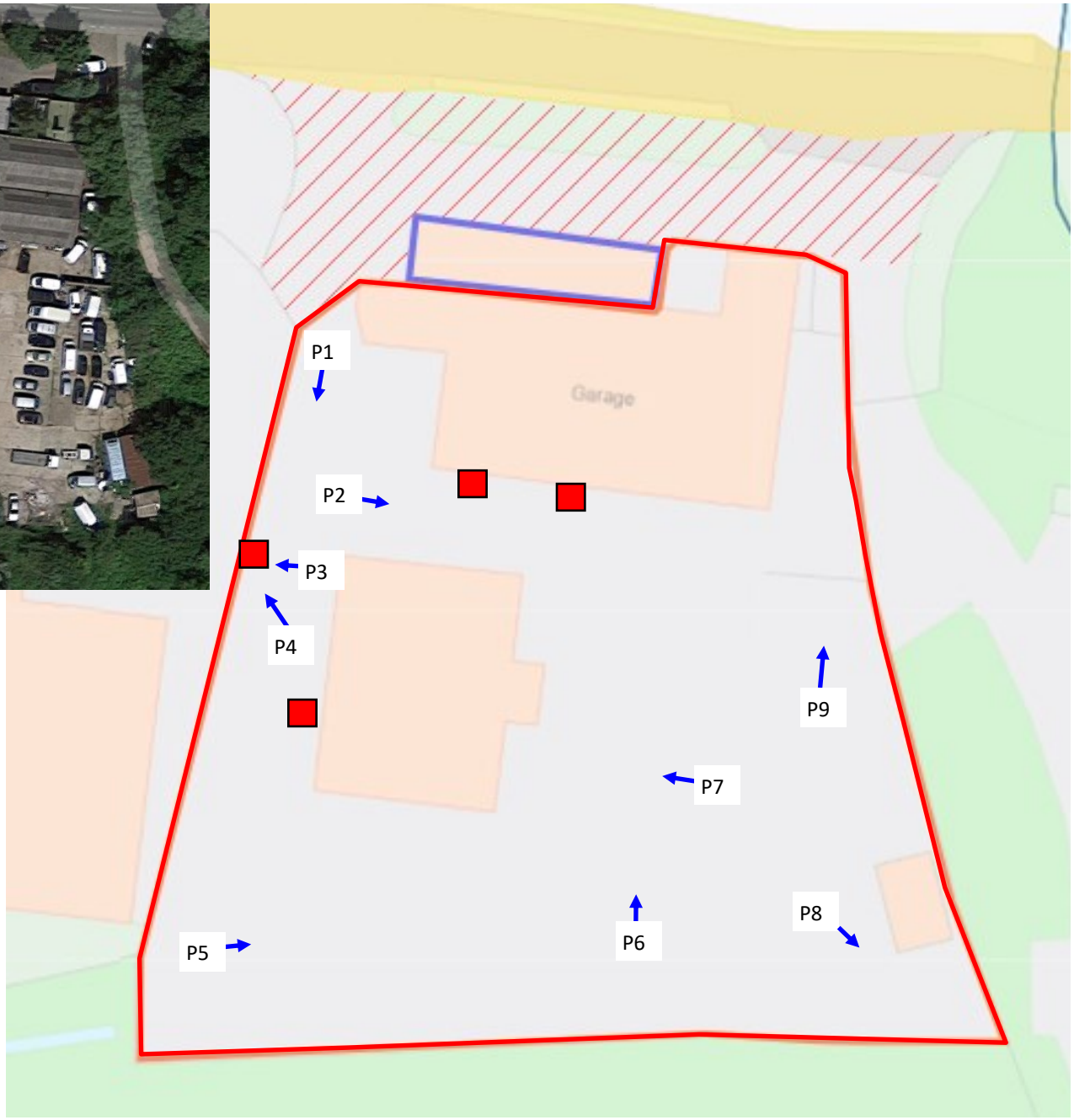

Legend

- Approximate Site Boundary
- Above Ground Storage Tank
- Photograph Direction

Notes

Figure 1

Drawing Title	Existing Site Layout, Aerial Photograph and Characterisation Plan
Project Number	22-140.01
Project Title	Prince Bros. Whitebridge Garage, Charvil, RG10 9QJ
Drawn by	CB
Checked by	JB
Scale	NTS

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Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Legend

Notes

Figure 2

Drawing Title

Site Photographs

Project Number	22-140.01

Project Title

Prince Bros. Whitebridge Garage, Charvil, RG10 9QJ

Drawn by	CB
Checked by	JB
Scale	

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Photo 7

Photo 8

Photo 9

Legend

Notes

Figure 3

Drawing Title

Site Photographs

Project Number	22-140.01

Project Title

Prince Bros. Whitebridge Garage, Charvil, RG10 9QJ

Drawn by	CB
Checked by	JB
Scale	

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Legend

- Approximate Site Boundary
- Window Sample Borehole
- Monitoring Well
- Above Ground Storage Tank

Notes

Figure 4

Drawing Title	Exploratory Hole Location Plan
Project Number	22-140.01
Project Title	Prince Bros. Whitebridge Garage, Charvil, RG10 9QJ
Drawn by	CB
Checked by	JB
Scale	NTS

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Appendices

I Enviroheck Database Report

II Exploratory Hole Logs and Photographs

III Field Monitoring Results

IV Soil and Water Chemical Results and Assessment Criteria

V Soil Geotechnical Results

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Appendix

I Envirocheck Database Report

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Appendix

II Exploratory Hole Logs and Photographs

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WINDOW SAMPLE LOG

Site:	Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ	22-140.01	WS1
Client:	**Start:**	**End:**	**Sheet:**
Jamie Prince	03/03/2022	03/03/2022	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
Tracked WS Rig	NT	NT

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests Depth	No	Type	SPT Results 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Notes
Dark brown gravelly silty SAND. Sand is coarse. Gravels are coarse rounded-subrounded pebbles. (MADE GROUND)		(0.2) **0.2**		0.1	1	ES								
Brown sandy gravelly CLAY. Sand is medium. Gravels are fine-coarse subangular-angular brick fragments, clinker and flints. (MADE GROUND)		(0.4) **0.6**												
Brown clayey gravelly SAND. Gravels are fine-coarse rounded-angular pebbles and flints. (MADE GROUND)		(0.4) **1.0**		1.0	2	D								
Firm brown gravelly CLAY. Gravels are fine-coarse subangular-angular chalks, clinker and flints. (MADE GROUND)		(0.3) **1.3**		1.2		SPT	1	1	2	2	2	3	9	
Firm grey CLAY. (ALLUVIUM)		(0.5) **1.8**		1.5	3	D								
Firm to stiff brown CLAY. (ALLUVIUM)		(0.8) **2.6**		2.0	4	SPT D	2	2	3	4	4	4	15	
				2.5	5	D								
... hole drilled to 3.0m bgl. However, no recovery past 2.6m bgl.				3.0	6	SPT D	3	4	4	4	4	5	17	

Casing record

Date	Diameter (mm)	Depth (m)
03/03/2022	101	1.00

Chiselling records

Time	From (m)	To (m)
-	-	-

Water level observations (depths in metres below gl)

Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03/03/2022	3.00	2.00	Fast	2.00	
15/03/2022	-	-	-	2.29	

Remarks

Roots not encountered within borehole.
Gas and groundwater moitoring installation to 3.0m bgl.

SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample

By	
Logged	CB
Checked	OB
Scale	01:25

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WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS2
Client:	Start:	End:	Sheet:
Jamie Prince	03/03/2022	03/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests Depth	No	Type	SPT Results 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Notes
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) **0.2**												
Brown gravelly CLAY. Gravels are fine-coarse subangular-angular pebbles, brick fragments, clinker and flints. (MADE GROUND)		(1.0)		0.3	1	ES								
				1.0	2	D								HP 2
		1.2		1.2		SPT	1	1	1	1	1	2	5	
Soft brown gravelly CLAY. Gravels are medium-coarse angular flints. (ALLUVIUM)		(0.3) **1.5**		1.5	3	D								HP 2.9 HP 3.3
Grey CLAY. (ALLUVIUM)		(0.5) **2.0**		2.0	4	SPT D	1	2	2	2	3	2	9	HP 1.8 HP 1.8
Firm brown with grey mottling CLAY. (ALLUVIUM)		(0.9) **2.9**		2.5	5	D								HP 5.1 HP 5.4
				2.8	6	D								HP 5.7
Dense grey slightly clayey very sandy GRAVEL. Gravels are fine-coarse subangular-subrounded flints. (KEMPTON PARK GRAVEL MEMBER)		**3.0**				SPT	6	7	9	9	10	9	37	

Casing record

Date	Diameter (mm)	Depth (m)
03/03/2022	101	1.00

Chiselling records

Time	From (m)	To (m)
-	-	-

Water level observations (depths in metres below gl)

Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03/03/2022	3.00	2.00	Fast	2.00	
15/03/2022	-	-	-	2.25	

Remarks

Roots not encountered within borehole.
Gas and groundwater moitoring installation to 3.0m bgl.

SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample

	By
Logged	CB
Checked	OB

Scale 01:25

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WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS3
Client:	Start:	End:	Sheet:
Jamie Prince	04/03/2022	04/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests			SPT Results						N' Value	Notes
				Depth	No	Type	75mm	75mm	75mm	75mm	75mm	75mm		
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) **0.2**		0.2	1	WAC								
Brown sandy gravelly CLAY. Gravels are fine-coarse subangular-angular, brick fragments, tile fragments, and flints. (MADE GROUND)		(0.2) **0.4**												
Dark grey silty sandy gravelly CLAY. Sand is medium. Gravels are fine-coarse subangular-angular, brick fragments, clinker and glass. (MADE GROUND)		(0.6) **1.0**												HP: 6.1
Firm to stiff greyish brown gravelly CLAY. Gravels are fine-coarse subangular bricks. (MADE GROUND)		(0.6) **1.6**		1.2		SPT	1	3	3	4	4	4	15	HP: 5.1
Grey CLAY. (ALLUVIUM)		(0.4) **2.0**		2.0		SPT	3	3	5	5	4	5	19	HP: 2.6
Medium-dense brown slightly clayey very sandy GRAVEL. Gravels are fine-coarse subangular-subrounded flints. (KEMPTON PARK GRAVEL MEMBER)		(1.0) **3.0**		3.0		SPT	3	3	3	4	4	4	15	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
04/03/2022	101	1.00	-	-	-	04/03/2022	3.00	2.00	Fast	2.00	

Remarks		By
Borehole backfilled with arisings. Roots not encountered within borehole.	Logged	CB
	Checked	OB
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample		Scale 01:25

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WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS4
Client:	Start:	End:	Sheet:
Jamie Prince	03/03/2022	03/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests			SPT Results						N' Value	Notes
				Depth	No	Type	75mm	75mm	75mm	75mm	75mm	75mm		
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		*(0.2)* **0.2**												
Grey and brown gravelly CLAY. Gravels are fine-coarse subangular-angular, brick fragments, clinker and flints. (MADE GROUND)		*(0.6)* **0.8**		0.3	1	ES								
Grey and cream gravelly CLAY. Gravels are fine-coarse subangular-angular sandstones and. Dark grey laminations within sandstone gravels. (MADE GROUND)		*(0.4)* **1.2**		1.2	2	SPT ES	1	1	1	1	1	1	4	
Soft black SILT. Decayed rootlets throughout. (ALLUVIUM)		*(0.3)* **1.5**												
Soft and soft to firm greyish brown CLAY. (ALLUVIUM)		*(1.3)* **2.8**		2.0		SPT	2	2	2	2	2	2	8	HP: 2.6 HP: 3.5 HP: 4 HP: 3.4 HP: 2.5
Dense grey clayey sandy GRAVEL. Gravels are fine-coarse subangular flints. (KEMPTON PARK GRAVEL MEMBER)		*(0.2)* **3.0**		3.0		SPT	9	9	10	10	10	12	42	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03/03/2022	101	1.00	-	-	-	03/03/2022	3.00	2.00	Fast	2.00	

Remarks	By	
Borehole backfilled with arisings. Decayed roots to 1.5m.	Logged	CB
	Checked	OB
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample		Scale 01:25

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WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS5
Client:	Start:	End:	Sheet:
Jamie Prince	04/03/2022	04/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests			SPT Results						N' Value	Notes
				Depth	No	Type	75mm	75mm	75mm	75mm	75mm	75mm		
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) 0.2												
Stiff brown gravelly CLAY. Gravels are fine-coarse subangular-angular chalks, brick fragments, clinker and flints. (MADE GROUND)		(1.3)												HP 3.5
				1.2		SPT	1	3	3	7	8	8	26	
		1.5												HP 4.5
Stiff brown gravelly CLAY. Gravels are medium-coarse angular flints. (ALLUVIUM)		(0.7)		1.6	1	D								
				2.0		SPT	5	5	4	5	5	5	19	HP 3.6
		2.2												
Dense brown slightly clayey very sandy GRAVEL. Gravels are fine-coarse subangular-subrounded flints. (KEMPTON PARK GRAVEL MEMBER)		(0.8)												
		3.0		3.0		SPT	5	6	8	10	10	12	40	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
04/03/2022	101	1.00	-	-	-	04/03/2022	3.00	2.00	Fast	2.00	

Remarks	By	
Borehole backfilled with arisings. Roots not encountered within borehole.	Logged	CB
	Checked	OB
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample		Scale 01:25

Aviron Associates Limited - Badgemore House || Badgemore Park || Gravel Hill || Henley on Thames || RG9 4NR - T:01491 413 722 - M: 07787771686 -E:james@aviron.co.uk

WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS6
Client:	Start:	End:	Sheet:
Jamie Prince	03/03/2022	03/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests Depth	No	Type	SPT Results 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Notes
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) **0.2**												
Black sandy gravelly CLAY. Sand is medium. Gravels are fine-coarse subangular-angular chalks, clinker, glass and plastic. (MADE GROUND)		(0.2) **0.4**		0.3	1	ES								
Dark grey gravelly CLAY. Gravels are fine-coarse subangular-angular, brick fragments, clinker, glass and flints. (MADE GROUND)		(0.6) **1.0**		1.0	2	D								
Soft brown gravelly CLAY. Gravels are fine-coarse rounded chalks. (MADE GROUND)		(0.3) **1.3**		1.2		SPT	1	2	2	1	2	2	7	HP: 3.7
Black gravelly SILT. Gravels are fine-coarse subangular-angular, brick fragments and tile fragments. (MADE GROUND)		(0.3) **1.6**		1.5	3	D								
Soft grey CLAY. (ALLUVIUM)		(1.2) **2.8**												HP: 7.1
				2.0	4	SPT D	1	1	1	1	1	1	4	HP: 3.1
														HP: 3.2
				2.5	5	D								HP: 3.5
Very dense greyish brown slightly clayey very sandy GRAVEL. Gravels are fine-coarse subangular-subrounded flints. (KEMPTON PARK GRAVEL MEMBER)		(0.2) **3.0**		3.0	6	SPT D	8	9	13	13	14	15	55	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03/03/2022	101	1.00	-	-	-	03/03/2022	3.00	2.00	Fast	2.00	

Remarks	By	
Borehole backfilled with arisings. Roots not encountered within borehole.	Logged	CB
	Checked	OB
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample		Scale 01:25

Aviron Associates Limited - Badgemore House || Badgemore Park || Gravel Hill || Henley on Thames || RG9 4NR - T:01491 413 722 - M: 07787771686 -E:james@aviron.co.uk

WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS7
Client:	Start:	End:	Sheet:
Jamie Prince	03/03/2022	03/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests: Depth	No	Type	SPT Results: 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Notes
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) 0.2												
Brown gravelly CLAY. Gravels are fine-coarse subangular-angular brick fragments, clinker and flints. (MADE GROUND)		(0.4) 0.6		0.3	1	ES								
Brown sandy gravel. Sand is coarse. Gravels are fine-coarse subangular flints. (MADE GROUND)		(0.4) 1.0												HP: 2.5
Stiff brown gravelly CLAY. Gravels are fine-coarse subangular-angular brick fragments. (MADE GROUND)		(0.4) 1.4		1.1	2	D								
				1.2		SPT	4	4	4	4	5	4	17	HP: 2.6
Soft grey CLAY. Dark staining and hydrocarbon odour at 1.4m (ALLUVIUM)		(1.5) 2.9		1.5	3	ES								HP: 6.2
				2.0		SPT	1	1	1	1	1	1	4	HP: 2.9
														HP: 2.0
Very dense grey slightly clayey sandy GRAVEL. Gravels are fine-coarse subangular-subrounded flints. (KEMPTON PARK GRAVEL MEMBER)		3.0		3.0		SPT	8	11	13	15	25		53	

Casing record

Date	Diameter (mm)	Depth (m)
03/03/2022	101	1.00

Chiselling records

Time	From (m)	To (m)
-	-	-

Water level observations (depths in metres below gl)

Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03/03/2022	3.00	2.00	Fast	2.00	
15/03/2022	-	-	-	1.31	

Remarks

Roots not encountered within borehole.
Gas and groundwater moitoring installation to 3.0m bgl.

SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample

	By
Logged	CB
Checked	OB

Scale 01:25

Aviron Associates Limited - Badgemore House || Badgemore Park || Gravel Hill || Henley on Thames || RG9 4NR - T:01491 413 722 - M: 07787771686 -E:james@aviron.co.uk

WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS8
Client:	Start:	End:	Sheet:
Jamie Prince	04/03/2022	04/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests Depth	No	Type	SPT Results 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Notes
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) 0.2												
Dark grey silty gravelly CLAY. Gravels are fine-coarse subangular-angular brick fragments. (MADE GROUND)		(0.4) 0.6		0.3	1	ES								
Grey gravelly SAND. Sand is coarse. Gravels are fine-coarse subangular flints. (MADE GROUND)		(0.7) 1.3												HP: 2.4
				1.2		SPT	1	0	1	1	5	5	12	
Firm brown gravelly CLAY. Gravels are fine-coarse subangular-angular tile fragments and metal fragments. Dark staining and hydrocarbon odour at 1.3m. (MADE GROUND)		(0.3) 1.6		1.5	2	ES								HP: 3.6
Soft grey CLAY. (ALLUVIUM)		(0.4) 2.0		1.7	3	D								HP: 4.5
				2.0		SPT	1	1	1	1	1	1	4	
... hole drilled to 3.0m bgl. However, no recovery past 2.0m bgl.		3.0		3.0		SPT	1	1	2	1	1	2	6	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
04/03/2022	101	1.00	-	-	-	04/03/2022	3.00	2.00	Fast	2.00	
						15/03/2022	-	-	-	-	

Remarks	By	
Roots not encountered within borehole. Gas and groundwater moitoring installation to 3.0m bgl.	Logged	CB
	Checked	OB
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample		Scale 01:25

Aviron Associates Limited - Badgemore House || Badgemore Park || Gravel Hill || Henley on Thames || RG9 4NR - T:01491 413 722 - M: 07787771686 -E:james@aviron.co.uk

WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ		22-140.01	WS9
Client:	Start:	End:	Sheet:
Jamie Prince	03/03/2022	03/03/2022	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
Tracked WS Rig	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests Depth	No	Type	SPT Results 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Notes
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) 0.2												
Black and white gravelly SAND. Sand is coarse. Gravels are fine-coarse subangular-angular chalks, concrete and tarmac. (MADE GROUND)		0.3		0.25	1	ES								
Brown clayey gravelly SAND. Sand is medium. Gravels are fine-coarse subangular-angular brick fragments, concrete and flints. (MADE GROUND)		(0.6) 0.9												
Stiff brown gravelly CLAY. Gravels are fine-coarse subangular-angular brick fragments, concrete, flints and metal fragments. (MADE GROUND)		(1.1)		1.0	2	D								HP: 3.7
				1.2		SPT	2	7	7	5	5	6	23	HP: 6.5
				1.5	3	D								HP: 7.3
														HP: 3.7
		2.0		2.0	4	SPT D	3	3	3	3	6	8	20	HP: 2.7
Stiff brown with grey mottling gravelly CLAY. Gravels are medium-coarse angular flints. (ALLUVIUM)		(0.9)												HP: 4.9
				2.5	5	D								
		2.9		2.8	6	D								
Very dense brown slightly clayey sandy GRAVEL. Gravels are fine-coarse subangular-subrounded flints. (KEMPTON PARK GRAVEL MEMBER)		3.0				SPT	10	11	13	14	14	15	56	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03/03/2022	101	1.00	-	-	-	03/03/2022	3.00	2.00	Fast	2.00	

Remarks	By	
Borehole backfilled with arisings. Roots not encountered within borehole.	Logged	CB
	Checked	OB
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample		Scale 01:25

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WINDOW SAMPLE LOG

Site:	Project No.	Borehole:
Prince Bros, Whitebridge Garage, Charvil, RG10 9QJ	22-140.01	WS10
Client: Jamie Prince	**Start:** 03/03/2022	**End:** 03/03/2022	**Sheet:** 1 of 1
Method/Plant Used: Tracked WS Rig	**Co-ordinates:** NT	**Ground Level:** NT

Description of Strata	Legend	Depth (m bgl) (thickness)	Well Cnstr.	Samples/Tests Depth	No	Type	SPT Results 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Notes
Light grey CONCRETE. Concrete consists of 70% lithic fragments, 25% matrix and 5% voids. (MADE GROUND)		(0.2) **0.2**												
Soft grey gravelly CLAY. Gravels are fine-coarse subangular-angular chalks, brick fragments, clinker and flints. (MADE GROUND)		(1.3)		0.3	1	ES								
				1.0	2	D								
				1.2		SPT	1	1	1	1	1	1	4	HP 3.5
		1.5		1.5	3	D								
Loose to medium dense becoming very dense brown slightly clayey sandy GRAVEL. Gravels are fine-coarse subangular-subrounded flints. Becomes less clayey and sandy with depth. (KEMPTON PARK GRAVEL MEMBER)		(1.5)		2.0	4	SPT D	2	2	3	2	2	3	10	
				2.5	5	D								
		3.0		3.0	6	SPT D	9	11	13	15	15	14	57	

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03/03/2022	101	1.00	-	-	-	03/03/2022	3.00	2.00	Fast	2.00	

Remarks	By	
Borehole backfilled with arisings. Roots not encountered within borehole.	Logged	CB
	Checked	OB
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample		Scale 01:25

Aviron Associates Limited - Badgemore House || Badgemore Park || Gravel Hill || Henley on Thames || RG9 4NR - T:01491 413 722 - M: 07787771686 -E:james@aviron.co.uk

Exploratory Hole Photographs

Project Number 22-140.01 **Project Title** PRINCE BROS SITE, WHITEBRIDGE GARAGE, CHARVIL, RG10 9QJ **Taken by** CB **Date** 03-04/03/2022

WS1 hand pit arisings

WS1 arisings

WS2 concrete core

WS2 arisings

WS3 hand pit arisings

WS3 arisings

Exploratory Hole Photographs

Project Number 22-140.01 **Project Title** PRINCE BROS SITE, WHITEBRIDGE GARAGE, CHARVIL, RG10 9QJ **Taken by** CB **Date** 03-04/03/2022

WS4 concrete core

WS4 arisings

WS5 concrete core

WS5 hand pit arisings

WS6 concrete core

WS6 arisings

Exploratory Hole Photographs

Project Number 22-140.01 **Project Title** PRINCE BROS SITE, WHITEBRIDGE GARAGE, CHARVIL, RG10 9QJ **Taken by** CB **Date** 03-04/03/2022

WS7 concrete core

WS7 arisings

WS8 hand pit arisings

WS8 arisings

WS9 hand pit arisings

WS9 arisings

Exploratory Hole Photographs

Project Number	22-140.01	**Project Title**	PRINCE BROS SITE, WHITEBRIDGE GARAGE, CHARVIL, RG10 9QJ	**Taken by**	CB	**Date**	03-04/03/2022

WS10 concrete core

WS10 arisings

Appendix

III Field Monitoring Results

Aviron Associates Limited - Head Office
Badgemore House - Badgemore Park - Gravel Hill - Henley on Thames - RG9 4NR
Contacts
T; 01491 413 722 - M: 07787 771 686 - F: 01491 413 722 - E: james@aviron.co.uk - W: www.aviron.co.uk

MONITORING DATA SHEET

SITE Prince Bros. Site, Whitebridge Garage, Charvil, RG10 9QJ
PROJECT 22-140.01

VISIT NUMBER 1
DATE 15/03/2022

EQUIPMENT Dip metre
TAKEN BY JD

Record of Stable Concentrations										Interpretation			
Location	Time	Flow (l/h)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Prs. (mB)	PID (ppm)	Water (m bgl)	Base Well (m bgl)	CH4 GSV (l/h)	CO2 GSV (l/h)	CS	NHBC
Site	Gas Analyser malfunctioning						0.0	n/a	n/a	n/a	n/a	n/a	n/a
WS1	Gas Analyser malfunctioning						1.8	2.29	2.90	0	0		
WS2	Gas Analyser malfunctioning						0.2	2.25	2.90	0	0		
WS7	Gas Analyser malfunctioning						1.0	1.31	2.95	0	0		
WS8	Inacessible												

Weather Observations						Pressure Observations			Notes
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C		Source	Pressure Records	Trend	Gas results not taken due to faulty analyser
Dry	Clear	Calm	None	Before		Metoffice	Location	Falling	
Moist	Sunny	Light	Slight			GA2000	Time	Steady	
Wet	Slight	Moderate	Moderate	After			Pressure	Rising	Worst case conditions? (<1000mB and Falling)
Snow	Cloudy	Strong	Heavy						
Frozen	Overcast								
	Fog/Mist								

Aviron Associates Limited
Badgemore House - Badgemore Park - Gravel Hill - Henley on Thames - RG9 4NR
T: 01491 413 722 - E: james@aviron.co.uk

MONITORING DATA SHEET

SITE Prince Bros. Site, Whitebridge Garage, Charvil, RG10 9QJ
PROJECT 22-140.01

VISIT NUMBER 2
DATE 28/03/2022

EQUIPMENT GRM 436 + MiniRAE
TAKEN BY DN

Record of Stable Concentrations										Interpretation			
Location	Time	Flow (l/h)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Prs. (mB)	PID (ppm)	Water (m bgl)	Base Well (m bgl)	CH4 GSV (l/h)	CO2 GSV (l/h)	CS	NHBC
Site	16:30	0.0	0.0	0.0	20.6	1021	0.0	n/a	n/a	n/a	n/a	n/a	n/a
WS1	16:45	0.0	0.0	0.8	20.3	1021	2.2	2.36	2.90	0	0		
WS2	16:40	0.0	0.0	0.4	20.1	1021	1.3	2.33	2.90	0	0		
WS7	16:35	0.0	0.1	1.1	19.7	1021	3.1	1.38	2.95	0	0		
WS8	Inacessible												

Weather Observations					
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C	
Dry	Clear	Calm	None	Before	14
Moist	Sunny	Light	Slight		
Wet	Slight	Moderate	Moderate	After	14
Snow	Cloudy	Strong	Heavy		
Frozen	Overcast				
	Fog/Mist				

Pressure Observations			
Source	Pressure Records		Trend
Metoffice	Location	**Henley**	Falling
GFM 436	Time	**15:30**	Steady
	Pressure	**1023**	Rising

Notes	
Worst case conditions? (<1000mB and Falling)	No

Aviron Associates Limited
Badgemore House - Badgemore Park - Gravel Hill - Henley on Thames - RG9 4NR
T: 01491 413 722 - E: james@aviron.co.uk

MONITORING DATA SHEET

SITE Prince Bros. Site, Whitebridge Garage, Charvil, RG10 9QJ
PROJECT 22-140.01

VISIT NUMBER 3
DATE 31/03/2022

EQUIPMENT Dip metre
TAKEN BY CB

Record of Stable Concentrations										Interpretation			
Location	Time	Flow (l/h)	CH4 (% v/v)	CO2 (% v/v)	O2 (% v/v)	Baro. Prs. (mB)	PID (ppm)	Water (m bgl)	Base Well (m bgl)	CH4 GSV (l/h)	CO2 GSV (l/h)	CS	NHBC
Site		Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	n/a	n/a	n/a	n/a	n/a	n/a
WS1		Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	Obstructed	2.90				
WS2		Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	2.19	2.90				
WS7		Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	1.65	2.95				
WS8		Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	Not Taken	1.49	2.95				

Weather Observations					
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C	
Dry	Clear	Calm	None	Before	
Moist	Sunny	Light	Slight		
Wet	Slight	Moderate	Moderate	After	
Snow	Cloudy	Strong	Heavy		
Frozen	Overcast				
	Fog/Mist				

Pressure Observations			
Source	Pressure Records		Trend
Metoffice	Location		Falling
GFM 436	Time		Steady
	Pressure		Rising

Notes	
Gas monitoring completed as undertaken on 28/03/2022	
Dips taklen to check g/w flow direction	
Worst case conditions? (<1000mB and Falling)	

Aviron Associates Limited
Badgemore House - Badgemore Park - Gravel Hill - Henley on Thames - RG9 4NR
T: 01491 413 722 - E: james@aviron.co.uk

Appendix

IV Soil and Water Chemical Results and Assessment Criteria

Aviron Associates Limited - Head Office
Badgemore House - Badgemore Park - Gravel Hill - Henley on Thames - RG9 4NR
Contacts
T; 01491 413 722 - M: 07787 771 686 - F: 01491 413 722 - E: james@aviron.co.uk - W: www.aviron.co.uk

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

2183

Final Report

Report No.:	22-08067-1
Initial Date of Issue:	10-Mar-2022
Client	Aviron Associates Ltd
Client Address:	Badgemore House Badgemore Park Gravel Hill Reading Henley on Thames RG9 4NR
Contact(s):	Charlie Bartlett James Burkitt
Project	22-140.01 Prince Bros Site, Whitebridge Garage

Quotation No.:		**Date Received:**	04-Mar-2022
Order No.:	22-140.01	**Date Instructed:**	04-Mar-2022
No. of Samples:	10		
Turnaround (Wkdays):	5	**Results Due:**	10-Mar-2022
Date Approved:	10-Mar-2022		

Approved By:

[redacted]

Details: Stuart Henderson, Technical Manager

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage

Client: Aviron Associates Ltd				Chemtest Job No.:	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067
Quotation No.:				Chemtest Sample ID.:	1383998	1383999	1384000	1384001	1384002	1384003	1384004	1384005	1384006
				Sample Location:	WS1	WS2	WS4	WS4	WS6	WS7	WS7	WS9	WS10
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.10	0.30	0.30	1.20	0.30	0.30	1.10	0.25	0.30
				Date Sampled:	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022
				Asbestos Lab:	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM		DURHAM	DURHAM
Determinand	**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		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	2.5	11	8.8	34	9.0	10	12	3.3	8.3
pH	U	2010		4.0	8.5	8.5	8.4	10.3	8.6	10.2	9.2	9.7	8.8
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.89	0.79	1.7		1.8	0.87		0.92	2.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.051	0.040	0.056	1.2	0.19	0.37	0.071	0.17	0.076
Total Sulphur	U	2175	%	0.010	0.42	0.054	0.063	0.14	0.13	0.054	0.042	0.13	0.070
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50		< 0.50	0.50
Sulphate (Total)	U	2430	%	0.010	0.088	0.047	0.056	0.32	0.21	0.14	0.093	0.13	0.070
Arsenic	U	2450	mg/kg	1.0	3.6	12	7.7		11	9.6		8.6	10
Barium	U	2450	mg/kg	10	69	84	78		170	56		91	89
Cadmium	U	2450	mg/kg	0.10	0.43	0.71	2.1		3.5	0.34		0.32	1.2
Chromium	U	2450	mg/kg	1.0	10	16	10		19	15		220	10
Copper	U	2450	mg/kg	0.50	24	140	120		170	94		34	1000
Mercury	U	2450	mg/kg	0.10	0.10	0.37	0.18		0.98	0.13		< 0.10	0.21
Nickel	U	2450	mg/kg	0.50	5.8	22	18		20	15		12	13
Lead	U	2450	mg/kg	0.50	42	180	150		840	120		920	110
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20		< 0.20	< 0.20		< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	120	390	530		720	120		66	350
Organic Matter	U	2625	%	0.40	10	2.6	2.9		2.2	1.0		12	1.9
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	91	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	300	76	86		< 1.0	< 1.0		16	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	64	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	450	76	86		< 5.0	< 5.0		16	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	54	38	41		< 1.0	< 1.0		< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	770	580	280		< 1.0	8.5		78	55
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	6500	2100	990		< 1.0	8.9		790	250
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	430	120	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	7800	2900	1300		< 5.0	17		870	310

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage

Client: Aviron Associates Ltd					Chemtest Job No.:	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067
Quotation No.:					Chemtest Sample ID.:	1383998	1383999	1384000	1384001	1384002	1384003	1384004	1384005	1384006
					Sample Location:	WS1	WS2	WS4	WS4	WS6	WS7	WS7	WS9	WS10
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.10	0.30	0.30	1.20	0.30	0.30	1.10	0.25	0.30
					Date Sampled:	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022
					Asbestos Lab:	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		8200	2900	1400		< 10	17		880	310
Naphthalene	U	2700	mg/kg	0.10		4.9	< 0.10	2.2		1.2	< 0.10		0.50	1.8
Acenaphthylene	U	2700	mg/kg	0.10		7.5	< 0.10	1.1		0.52	< 0.10		4.9	1.0
Acenaphthene	U	2700	mg/kg	0.10		1.7	< 0.10	0.66		0.91	< 0.10		4.4	1.1
Fluorene	U	2700	mg/kg	0.10		2.0	< 0.10	0.73		0.70	< 0.10		4.9	2.2
Phenanthrene	U	2700	mg/kg	0.10		16	0.83	6.1		1.8	1.2		55	11
Anthracene	U	2700	mg/kg	0.10		12	0.54	2.5		0.71	0.53		21	3.2
Fluoranthene	U	2700	mg/kg	0.10		61	3.0	18		4.6	3.3		150	21
Pyrene	U	2700	mg/kg	0.10		72	3.5	19		5.0	3.5		170	20
Benzo[a]anthracene	U	2700	mg/kg	0.10		47	1.9	11		2.3	1.6		68	11
Chrysene	U	2700	mg/kg	0.10		57	2.4	13		3.5	2.5		82	14
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		96	2.8	18		4.4	2.1		89	15
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		37	0.99	7.2		1.4	1.1		34	5.7
Benzo[a]pyrene	U	2700	mg/kg	0.10		88	2.7	16		4.2	1.9		72	12
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		63	< 0.10	12		3.5	< 0.10		40	7.8
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		17	< 0.10	3.0		0.85	< 0.10		13	2.7
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		82	< 0.10	15		3.9	< 0.10		42	7.6
Total Of 16 PAH's	U	2700	mg/kg	2.0		660	19	150		40	18		850	140
Dichlorodifluoromethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Chloromethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Vinyl Chloride	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Bromomethane	U	2760	µg/kg	20			< 20	< 20			< 20		< 20	
Chloroethane	U	2760	µg/kg	2.0			< 2.0	< 2.0			< 2.0		< 2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloroethene	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Bromochloromethane	U	2760	µg/kg	5.0			< 5.0	< 5.0			< 5.0		< 5.0	
Trichloromethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Tetrachloromethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Benzene	U	2760	µg/kg	1.0		< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0			< 2.0	< 2.0			< 2.0		< 2.0	
Trichloroethene	N	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
1,2-Dichloropropane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Dibromomethane	U	2760	µg/kg	1.0			< 1.0	< 1.0			< 1.0		< 1.0	
Bromodichloromethane	U	2760	µg/kg	5.0			< 5.0	< 5.0			< 5.0		< 5.0	

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage

Client: Aviron Associates Ltd					Chemtest Job No.:	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067	22-08067
Quotation No.:					Chemtest Sample ID.:	1383998	1383999	1384000	1384001	1384002	1384003	1384004	1384005	1384006
					Sample Location:	WS1	WS2	WS4	WS4	WS6	WS7	WS7	WS9	WS10
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.10	0.30	0.30	1.20	0.30	0.30	1.10	0.25	0.30
					Date Sampled:	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022	03-Mar-2022
					Asbestos Lab:	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM		DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
cis-1,3-Dichloropropene	N	2760	µg/kg	10		< 10	< 10				< 10		< 10	
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0			< 1.0	< 1.0		< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10		< 10	< 10				< 10		< 10	
1,1,2-Trichloroethane	U	2760	µg/kg	10		< 10	< 10				< 10		< 10	
Tetrachloroethene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0		< 2.0	< 2.0				< 2.0		< 2.0	
Dibromochloromethane	U	2760	µg/kg	10		< 10	< 10				< 10		< 10	
1,2-Dibromoethane	U	2760	µg/kg	5.0		< 5.0	< 5.0				< 5.0		< 5.0	
Chlorobenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0		< 2.0	< 2.0				< 2.0		< 2.0	
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0			< 1.0	< 1.0		< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0			< 1.0	< 1.0		< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0			< 1.0	< 1.0		< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
Tribromomethane	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
Isopropylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
Bromobenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50		< 50	< 50				< 50		< 50	
N-Propylbenzene	U	2760	µg/kg	1.0		11	< 1.0				< 1.0		< 1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0		4.3	< 1.0				< 1.0		< 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0		1.5	< 1.0				< 1.0		< 1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0		17	< 1.0				< 1.0		< 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
N-Butylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50		< 50	< 50				< 50		< 50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0		< 1.0	< 1.0				< 1.0		< 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0		< 2.0	< 2.0				< 2.0		< 2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0			< 1.0	< 1.0		< 1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10			< 0.10	< 0.10		< 0.10	< 0.10

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage

Client: Aviron Associates Ltd			**Chemtest Job No.:**		22-08067
Quotation No.:			**Chemtest Sample ID.:**		1384007
			Sample Location:		WS7
			Sample Type:		SOIL
			Top Depth (m):		1.50
			Date Sampled:		03-Mar-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	27
pH	U	2010		4.0	8.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.15
Total Sulphur	U	2175	%	0.010	0.69
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50
Sulphate (Total)	U	2430	%	0.010	0.46
Arsenic	U	2450	mg/kg	1.0	23
Barium	U	2450	mg/kg	10	650
Cadmium	U	2450	mg/kg	0.10	8.7
Chromium	U	2450	mg/kg	1.0	53
Copper	U	2450	mg/kg	0.50	5300
Mercury	U	2450	mg/kg	0.10	0.48
Nickel	U	2450	mg/kg	0.50	590
Lead	U	2450	mg/kg	0.50	13000
Selenium	U	2450	mg/kg	0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	9200
Organic Matter	U	2625	%	0.40	16
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	900
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	2100
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	3700
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	2700
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	1600
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	61
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	11000
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	640
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	1200
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	2000
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	670
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	500
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	5100

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage

Client: Aviron Associates Ltd			**Chemtest Job No.:**		22-08067
Quotation No.:			**Chemtest Sample ID.:**		1384007
			Sample Location:		WS7
			Sample Type:		SOIL
			Top Depth (m):		1.50
			Date Sampled:		03-Mar-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	16000
Naphthalene	U	2700	mg/kg	0.10	14
Acenaphthylene	U	2700	mg/kg	0.10	5.9
Acenaphthene	U	2700	mg/kg	0.10	16
Fluorene	U	2700	mg/kg	0.10	9.1
Phenanthrene	U	2700	mg/kg	0.10	25
Anthracene	U	2700	mg/kg	0.10	3.8
Fluoranthene	U	2700	mg/kg	0.10	44
Pyrene	U	2700	mg/kg	0.10	43
Benzo[a]anthracene	U	2700	mg/kg	0.10	24
Chrysene	U	2700	mg/kg	0.10	38
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	32
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	11
Benzo[a]pyrene	U	2700	mg/kg	0.10	23
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	16
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	5.0
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	13
Total Of 16 PAH's	U	2700	mg/kg	2.0	320
Dichlorodifluoromethane	U	2760	µg/kg	1.0	
Chloromethane	U	2760	µg/kg	1.0	
Vinyl Chloride	U	2760	µg/kg	1.0	
Bromomethane	U	2760	µg/kg	20	
Chloroethane	U	2760	µg/kg	2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0	
1,1-Dichloroethene	U	2760	µg/kg	1.0	
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	
Bromochloromethane	U	2760	µg/kg	5.0	
Trichloromethane	U	2760	µg/kg	1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	
Tetrachloromethane	U	2760	µg/kg	1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	
Benzene	U	2760	µg/kg	1.0	2.1
1,2-Dichloroethane	U	2760	µg/kg	2.0	
Trichloroethene	N	2760	µg/kg	1.0	
1,2-Dichloropropane	U	2760	µg/kg	1.0	
Dibromomethane	U	2760	µg/kg	1.0	
Bromodichloromethane	U	2760	µg/kg	5.0	

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage

Client: Aviron Associates Ltd			**Chemtest Job No.:**		22-08067
Quotation No.:			**Chemtest Sample ID.:**		1384007
			Sample Location:		WS7
			Sample Type:		SOIL
			Top Depth (m):		1.50
			Date Sampled:		03-Mar-2022
			Asbestos Lab:		DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	
Toluene	U	2760	µg/kg	1.0	220
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	
1,1,2-Trichloroethane	U	2760	µg/kg	10	
Tetrachloroethene	U	2760	µg/kg	1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	
Dibromochloromethane	U	2760	µg/kg	10	
1,2-Dibromoethane	U	2760	µg/kg	5.0	
Chlorobenzene	U	2760	µg/kg	1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	
Ethylbenzene	U	2760	µg/kg	1.0	4400
m & p-Xylene	U	2760	µg/kg	1.0	22000
o-Xylene	U	2760	µg/kg	1.0	16000
Styrene	U	2760	µg/kg	1.0	
Tribromomethane	U	2760	µg/kg	1.0	
Isopropylbenzene	U	2760	µg/kg	1.0	
Bromobenzene	U	2760	µg/kg	1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	
N-Propylbenzene	U	2760	µg/kg	1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	
N-Butylbenzene	U	2760	µg/kg	1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	
Hexachlorobutadiene	U	2760	µg/kg	1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.10	1.3

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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 <37°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	Allkaline 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.
2450	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.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane 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; Dibenz[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.
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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
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 TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°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

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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-08311-1
Initial Date of Issue:	11-Mar-2022
Client	Aviron Associates Ltd
Client Address:	Badgemore House Badgemore Park Gravel Hill Reading Henley on Thames RG9 4NR
Contact(s):	Charlie Bartlett James Burkitt
Project	22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

Quotation No.:		**Date Received:**	07-Mar-2022
Order No.:	22-140.01	**Date Instructed:**	07-Mar-2022
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	11-Mar-2022
Date Approved:	11-Mar-2022		

Approved By:

[redacted]

Details: Stuart Henderson, Technical Manager

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

Client: Aviron Associates Ltd			**Chemtest Job No.:**		22-08311	22-08311	22-08311	22-08311
Quotation No.:			**Chemtest Sample ID.:**		1385132	1385133	1385134	1385135
			Sample Location:		WS5	WS8	WS8	WS8
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.6	0.3	1.5	1.7
			Date Sampled:		04-Mar-2022	04-Mar-2022	04-Mar-2022	04-Mar-2022
			Asbestos Lab:			DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A		-	-	
Asbestos Identification	U	2192		N/A		No Asbestos Detected	No Asbestos Detected	
Moisture	N	2030	%	0.020	24	16	18	22
pH	U	2010		4.0	8.2	8.2	8.2	7.8
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		2.2	3.6	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.049	0.077	0.20	0.066
Total Sulphur	U	2175	%	0.010	0.049	0.057	0.51	0.065
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50	1.9	
Sulphate (Total)	U	2430	%	0.010	0.097	0.14	0.57	0.17
Arsenic	U	2450	mg/kg	1.0		9.6	11	
Barium	U	2450	mg/kg	10		77	150	
Cadmium	U	2450	mg/kg	0.10		0.32	0.42	
Chromium	U	2450	mg/kg	1.0		31	19	
Copper	U	2450	mg/kg	0.50		14	27	
Mercury	U	2450	mg/kg	0.10		0.11	0.12	
Nickel	U	2450	mg/kg	0.50		17	16	
Lead	U	2450	mg/kg	0.50		46	110	
Selenium	U	2450	mg/kg	0.20		0.61	< 0.20	
Zinc	U	2450	mg/kg	0.50		160	180	
Organic Matter	U	2625	%	0.40		2.2	5.5	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		< 1.0	< 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		< 1.0	< 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0		< 1.0	< 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0		< 1.0	< 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0		< 1.0	< 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0		< 1.0	110	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0		< 1.0	370	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		< 5.0	480	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		< 1.0	< 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		< 1.0	< 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0		< 1.0	< 1.0	
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0		< 1.0	< 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0		6.6	< 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0		39	< 1.0	
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0		300	350	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0	

Results - Soil

Project: 22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

Client: Aviron Associates Ltd			**Chemtest Job No.:**		22-08311	22-08311	22-08311	22-08311
Quotation No.:			**Chemtest Sample ID.:**		1385132	1385133	1385134	1385135
			Sample Location:		WS5	WS8	WS8	WS8
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.6	0.3	1.5	1.7
			Date Sampled:		04-Mar-2022	04-Mar-2022	04-Mar-2022	04-Mar-2022
			Asbestos Lab:			DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		340	350	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		340	830	
Naphthalene	U	2700	mg/kg	0.10		< 0.10	< 0.10	
Acenaphthylene	U	2700	mg/kg	0.10		< 0.10	< 0.10	
Acenaphthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	
Fluorene	U	2700	mg/kg	0.10		< 0.10	< 0.10	
Phenanthrene	U	2700	mg/kg	0.10		2.2	< 0.10	
Anthracene	U	2700	mg/kg	0.10		1.6	< 0.10	
Fluoranthene	U	2700	mg/kg	0.10		4.2	3.6	
Pyrene	U	2700	mg/kg	0.10		3.9	3.6	
Benzo[a]anthracene	U	2700	mg/kg	0.10		2.6	2.0	
Chrysene	U	2700	mg/kg	0.10		2.9	1.3	
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		3.4	3.3	
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		1.5	1.4	
Benzo[a]pyrene	U	2700	mg/kg	0.10		3.1	2.7	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		1.5	< 0.10	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		0.64	< 0.10	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		1.7	< 0.10	
Total Of 16 PAH's	U	2700	mg/kg	2.0		29	18	
Benzene	U	2760	µg/kg	1.0		< 1.0	< 1.0	
Toluene	U	2760	µg/kg	1.0		< 1.0	< 1.0	
Ethylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0	
m & p-Xylene	U	2760	µg/kg	1.0		< 1.0	< 1.0	
o-Xylene	U	2760	µg/kg	1.0		< 1.0	< 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0		< 1.0	< 1.0	
Total Phenols	U	2920	mg/kg	0.10		< 0.10	< 0.10	

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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 <37°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	Allkaline 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.
2450	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.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane 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; Dibenz[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.
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.

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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 TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°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

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All water samples will be retained for 14 days from the date of receipt
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customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	22-08310-1
Initial Date of Issue:	15-Mar-2022
Client	Aviron Associates Ltd
Client Address:	Badgemore House Badgemore Park Gravel Hill Reading Henley on Thames RG9 4NR
Contact(s):	Charlie Bartlett James Burkitt
Project	22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

Quotation No.:		**Date Received:**	07-Mar-2022
Order No.:	22-140.01	**Date Instructed:**	07-Mar-2022
No. of Samples:	1		
Turnaround (Wkdays):	7	**Results Due:**	15-Mar-2022
Date Approved:	15-Mar-2022		

Approved By:

[redacted]

Details: Stuart Henderson, Technical Manager

Results - 2 Stage WAC

Project: 22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-08310								
Chemtest Sample ID:	1385131								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	WS3								
Top Depth(m):	0.2								
Bottom Depth(m):	1.0								
Sampling Date:	04-Mar-2022								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			3.0	3	5	6
Loss On Ignition	2610	M	%			3.8	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			4700	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			140	100	--	--
pH	2010	M				8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.025	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.017	0.015	0.033	0.15	0.5	2	25
Barium	1455	U	0.013	0.007	0.027	0.078	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0028	0.0019	0.0056	0.021	0.5	10	70
Copper	1455	U	0.046	0.048	0.091	0.071	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.016	0.0029	0.032	0.050	0.5	10	30
Nickel	1455	U	0.0033	0.0018	0.0066	0.021	0.4	10	40
Lead	1455	U	0.0032	0.0059	0.0063	0.055	0.5	10	50
Antimony	1455	U	0.016	0.012	0.032	0.13	0.06	0.7	5
Selenium	1455	U	0.0031	0.0026	0.0061	0.027	0.1	0.5	7
Zinc	1455	U	< 0.003	0.004	< 0.003	0.031	4	50	200
Chloride	1220	U	34	15	67	180	800	15000	25000
Fluoride	1220	U	2.0	0.77	4.0	9.6	10	150	500
Sulphate	1220	U	64	15	130	230	1000	20000	50000
Total Dissolved Solids	1020	N	220	100	440	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	30	25	59	260	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	13

Leachate Test Information	
Leachant volume 1st extract/l	0.323
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.270

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
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 <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
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; Dibenz[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.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

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<	"less than"
>	"greater than"
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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 TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
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Sample Deviation Codes

A - Date of sampling not supplied
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customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

2183

Final Report

Report No.:	22-10032-1
Initial Date of Issue:	22-Mar-2022
Client	Aviron Associates Ltd
Client Address:	Badgemore House Badgemore Park Gravel Hill Reading Henley on Thames RG9 4NR
Contact(s):	James Burkitt Orlando Blackwell
Project	22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

Quotation No.:		**Date Received:**	17-Mar-2022
Order No.:		**Date Instructed:**	17-Mar-2022
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	23-Mar-2022
Date Approved:	22-Mar-2022		

Approved By:

[redacted]

Details: Stuart Henderson, Technical Manager

Results - Water

Project: 22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

Client: Aviron Associates Ltd			**Chemtest Job No.:**		22-10032	22-10032	22-10032	22-10032
Quotation No.:			**Chemtest Sample ID.:**		1392908	1392909	1392910	1392911
Order No.:			Client Sample Ref.:		1	1	1	
			Sample Location:		WS1	WS2	WS7	Lake
			Sample Type:		WATER	WATER	WATER	WATER
			Date Sampled:		15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
pH	U	1010		N/A	7.1	7.0	7.2	7.7
Sulphur	N	1220	mg/l	1.0	22	4.7	4.7	7.3
Sulphate	U	1220	mg/l	1.0	67	14	14	22
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Total Hardness as CaCO3	U	1270	mg/l	15	560	210	230	130
Arsenic (Dissolved)	U	1455	µg/l	0.20	0.77	0.67	1.8	0.97
Boron (Dissolved)	U	1455	µg/l	10.0	230	50	44	30
Barium (Dissolved)	U	1455	µg/l	5.00	45	89	1100	27
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11	0.43	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	1.3	< 0.50	0.99	8.8
Copper (Dissolved)	U	1455	µg/l	0.50	3.5	2.9	30	3.4
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	17	4.4	14	1.8
Lead (Dissolved)	U	1455	µg/l	0.50	8.2	33	110	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	33	78	260	15
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	1600	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	810	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	8100	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	15000	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	29000	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	24000	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	11000	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	90000	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	310	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	1600	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	9400	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	15000	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	23000	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	11000	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	1700	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	62000	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	150000	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5

Results - Water

Project: 22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

Client: Aviron Associates Ltd			**Chemtest Job No.:**		22-10032	22-10032	22-10032	22-10032
Quotation No.:			**Chemtest Sample ID.:**		1392908	1392909	1392910	1392911
Order No.:			Client Sample Ref.:		1	1	1	
			Sample Location:		WS1	WS2	WS7	Lake
			Sample Type:		WATER	WATER	WATER	WATER
			Date Sampled:		15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	56	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	33	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	3.2	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	120	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	530	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	420	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	36	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	49	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	23	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	54	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	110	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	11	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	170	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	56	< 1.0

Results - Water

Project: 22-140.01 Prince Bros Site, Whitebridge Garage, Charvil

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Quotation No.:			**Chemtest Sample ID.:**		1392908	1392909	1392910	1392911
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			Sample Location:		WS1	WS2	WS7	Lake
			Sample Type:		WATER	WATER	WATER	WATER
			Date Sampled:		15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	90	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	70	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	59	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	120	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	N	1800	µg/l	0.010	< 0.010	< 0.010	95	< 0.010
Acenaphthylene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	µg/l	0.20	< 0.20	< 0.20	95	< 0.20
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

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Commerical End Use Soil Screening Values

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INROGANICS + PAH (SUITE 1)				
Arsenic	640	640	640	C4SL/LQM S4UL
Boron	240,000	240,000	240,000	LQM S4UL
Cadmium	190	190	190	LQM S4UL
Chromium III	8,600	8,600	8,600	LQM S4UL
Chromium IV	33	33	33	LQM S4UL
Copper	68,000	68,000	68,000	LQM S4UL
Mercury	26	26	26	LQM S4UL
Nickel	980	980	980	LQM S4UL
Lead	2,300	2,300	2,300	LQM S4UL
Selenium	12,000	12,000	12,000	LQM S4UL
Zinc	730,000	730,000	730,000	LQM S4UL
Free Cyanide	373	373	373	ATRISK
Acenaphthene	84,000	97,000	100,000	LQM S4UL
Acenaphthylene	83,000	97,000	100,000	LQM S4UL
Anthracene	520,000	540,000	540,000	LQM S4UL
Benzo(a)anthracene	170	170	180	LQM S4UL
Benzo(a)pyrene	35	35	36	LQM S4UL
Benzo(b)fluoranthene	44	44	45	LQM S4UL
Benzo(ghi)perylene	3,900	4,000	4,000	LQM S4UL
Benzo(k)fluoranthene	1,200	1,200	1,200	LQM S4UL
Chrysene	350	350	350	LQM S4UL
Dibenz(ah)anthracene	3.5	3.6	3.6	LQM S4UL
Fluoranthene	23,000	23,000	23,000	LQM S4UL
Fluorene	63,000	68,000	71,000	LQM S4UL
Indeno(123-cd)pyrene	500	510	510	LQM S4UL
Naphthalene	190	460	1,100	LQM S4UL
Phenanthrene	22,000	22,000	23,000	LQM S4UL
Pyrene	54,000	54,000	54,000	LQM S4UL
Phenols	760	760	760	LQM S4UL
TOTAL PETROLEUM HYDOCARBONS				
Benzene	27	47	90	LQM S4UL
Toluene	56,000	110,000	180,000	LQM S4UL
Ethlybenzene	5,700	13,000	27,000	LQM S4UL
o-xylene	6,600	15,000	33,000	LQM S4UL
m-xylene	6,200	14,000	31,000	LQM S4UL
p-xylene	5,900	14,000	30,000	LQM S4UL
Aliphatic EC 5-6	3,200	5,900	12,000	LQM S4UL
Aliphatic EC >6-8	7,800	17,000	40,000	LQM S4UL
Aliphatic EC >8-10	2,000	4,800	11,000	LQM S4UL
Aliphatic EC >10-12	9,700	23,000	47,000	LQM S4UL
Aliphatic EC >12-16	59,000	82,000	90,000	LQM S4UL
Aliphatic EC >16-35	1,600,000	1,700,000	1,800,000	LQM S4UL
Aliphatic EC >35-44	1,600,000	1,700,000	1,800,000	LQM S4UL
Aromatic EC 5-7 (benzene)	26,000	46,000	86,000	LQM S4UL
Aromatic EC >7-8 (toluene)	56,000	110,000	180,000	LQM S4UL
Aromatic EC >8-10	3,500	8100	17,000	LQM S4UL
Aromatic EC >10-12	16,000	28,000	34,000	LQM S4UL
Aromatic EC >12-16	36,000	37,000	38,000	LQM S4UL
Aromatic EC >16-21	28,000	28,000	28,000	LQM S4UL
Aromatic EC >21-35	28,000	28,000	28,000	LQM S4UL
Aromatic EC >35-44	28,000	28,000	28,000	LQM S4UL
Aromatic EC >44-70	28,000	28,000	28,000	LQM S4UL
ASBESTOS				
None Detectable			Aviron Adopted Value	

Appendix

IV Soil Geotechnical Results

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Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
31510	Prince Bros Site, Whitebridge Garage, Charvil, RG10 9QJ	Samples received	04/03/2022
		Schedule received	04/03/2022
Project No.	Client	Project started	07/03/2022
22-140.01	Aviron	Testing Started	10/03/2022

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%	%	%	%	
WS1	-	1.00	-	D	Dark grey and brown slightly sandy silty CLAY with rare fm angular to sub-angular gravel	19	94	45	15	30	
WS1	-	1.50	-	D	Greyish brown and dark brown slightly sandy silty CLAY	27					
WS1	-	2.00	-	D	Brown slightly gravelly silty CLAY (gravel is fm and sub-angular)	27	95	57	21	36	
WS1	-	2.50	-	D	Brown mottled orangish brown and dark grey slightly sandy silty CLAY with rare fine sub-angular gravel	26					
WS1	-	3.00	-	D	Brown slightly sandy gravelly silty CLAY (gravel is fmc and angular to sub-angular flint gravel)	13	21	33	13	20	Sample washed to obtain test fraction
WS2	-	1.00	-	D	Dark grey and greyish brown slightly sandy slightly gravelly silty CLAY (gravel is fmc and angular to sub-angular)	20	59	31	16	15	Sample washed to obtain test fraction
WS2	-	1.50	-	D	Dark brown slightly sandy silty CLAY	51					
WS2	-	2.00	-	D	Grey slightly gravelly silty CLAY (gravel is fine and sub-angular)	28	96	47	19	28	
WS2	-	2.50	-	D	Grey, dark brown and brownish grey slightly sandy silty CLAY	26					
WS2	-	2.80	-	D	Brown and light grey gravelly silty CLAY (gravel is fmc and sub-angular)	23	47	51	18	33	Sample washed to obtain test fraction
WS6	-	1.00	-	D	Greyish brown slightly sandy gravelly silty CLAY (gravel is fm and angular to sub-angular flint and chalk)	13	45	23	12	11	Sample washed to obtain test fraction
WS6	-	1.50	-	D	Dark grey and dark brown slightly sandy silty CLAY with rare fmc sub-angular flint gravel	43					

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0
These results only apply to the items tested

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

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Email: James@k4soils.com

Checked and Approved
Initials **J.P**
Date: 23/03/2022

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
31510	Prince Bros Site, Whitebridge Garage, Charvil, RG10 9QJ	Samples received	04/03/2022
		Schedule received	04/03/2022
Project No.	Client	Project started	07/03/2022
22-140.01	Aviron	Testing Started	10/03/2022

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%	%	%	%	
WS6	-	2.00	-	D	Brownish grey and grey gravelly silty CLAY (gravel is fmc and sub-angular)	15	44	36	18	18	Sample washed to obtain test fraction
WS6	-	2.50	-	D	Brown and brownish grey slightly sandy silty CLAY	28					
WS9	-	1.00	-	D	Dark brown and brown slightly sandy silty CLAY with rare fm sub-angular to sub-rounded gravel	22	95	57	19	38	
WS9	-	1.50	-	D	Greyish brown, dark grey and dark brown slightly sandy silty CLAY with rare fmc sub-angular to sub-rounded gravel	22					
WS9	-	2.00	-	D	Brownish grey slightly gravelly silty CLAY (gravel is fm and sub-angular)	17	79	60	23	37	
WS9	-	2.50	-	D	Brown and brownish grey slightly sandy silty CLAY with rare fm sub-angular gravel	29					
WS9	-	2.80	-	D	Brown and light grey slightly gravelly silty CLAY (gravel is fm and sub-angular)	20	72	70	22	48	
WS10	-	1.00	-	D	Grey slightly gravelly silty CLAY (gravel is fm and sub-angular)	31	81	48	25	23	
WS10	-	1.40	-	D	Greyish brown and brown slightly sandy slightly gravelly silty CLAY (gravel is fmc and angular to sub-angular)	21					

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0
These results only apply to the items tested

NOTE: The report shall not be reproduced except in full without authority of the laboratory

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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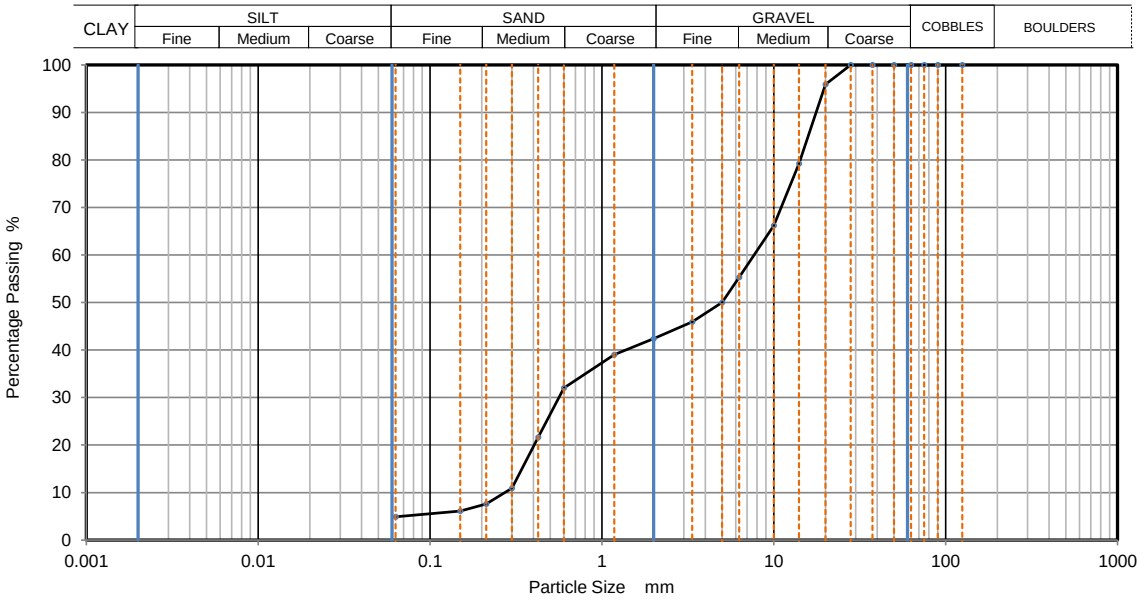
Date: 23/03/2022

2519 Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

PARTICLE SIZE DISTRIBUTION

				Job Ref	31510
				Borehole/Pit No.	WS6
Site Name	Prince Bros Site, Whitebridge Garage, Charvil, RG10 9QJ			Sample No.	-
Project No.	22-140.01	Client	Aviron	Depth Top	3.00 m
Soil Description	Greyish brown clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	D
				Samples received	04/03/2022
				Schedules received	04/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	07/03/2022
These results only apply to the items tested				Date tested	14/03/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	79		
10	66		
6.3	55		
5	50		
3.35	46		
2	42		
1.18	39		
0.6	32		
0.425	22		
0.3	11		
0.212	8		
0.15	6		
0.063	5		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	57.6
Sand	37.5
Fines <0.063mm	4.9

Grading Analysis		
D100	mm	
D60	mm	7.69
D30	mm	0.562
D10	mm	0.273
Uniformity Coefficient		28
Curvature Coefficient		0.15

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

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UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved

Initials: J.P

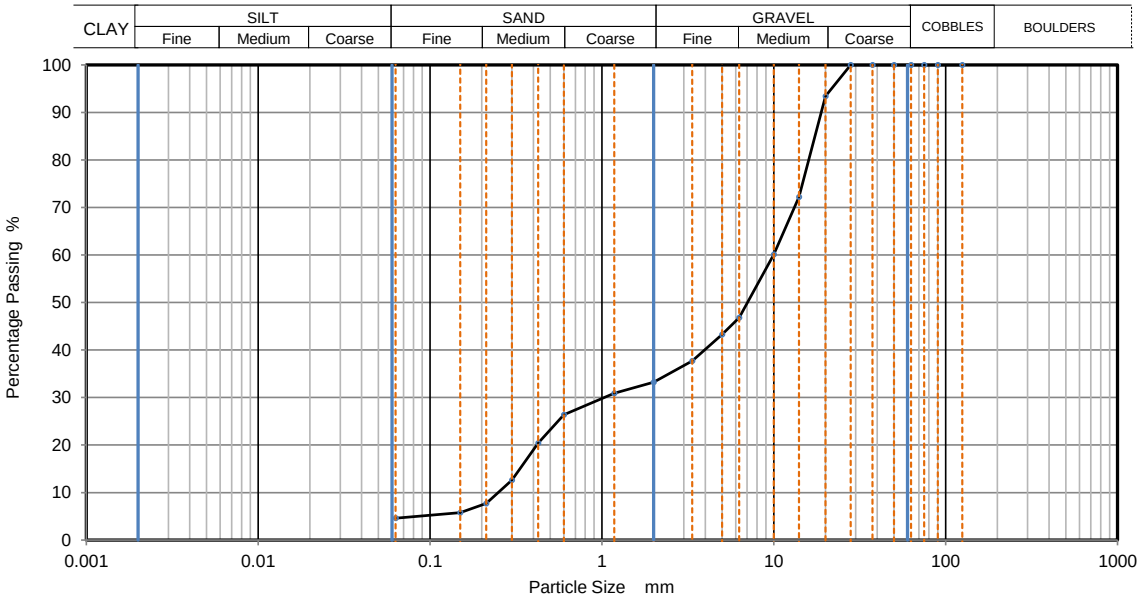
Date: 23/03/2022

PARTICLE SIZE DISTRIBUTION

Site Name	Prince Bros Site, Whitebridge Garage, Charvil, RG10 9QJ			Sample No.	-
Project No.	22-140.01	Client	Aviron	Depth Top	2.00 m
Soil Description	Brown clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	D
				Samples received	04/03/2022
				Schedules received	04/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	07/03/2022
				Date tested	14/03/2022

Job Ref: 31510
Borehole/Pit No.: WS10

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	93		
14	72		
10	60		
6.3	47		
5	43		
3.35	38		
2	33		
1.18	31		
0.6	26		
0.425	20		
0.3	13		
0.212	8		
0.15	6		
0.063	5		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	66.8
Sand	28.6
Fines <0.063mm	4.6

Grading Analysis		
D100	mm	
D60	mm	9.97
D30	mm	1.03
D10	mm	0.25
Uniformity Coefficient		40
Curvature Coefficient		0.43

Remarks

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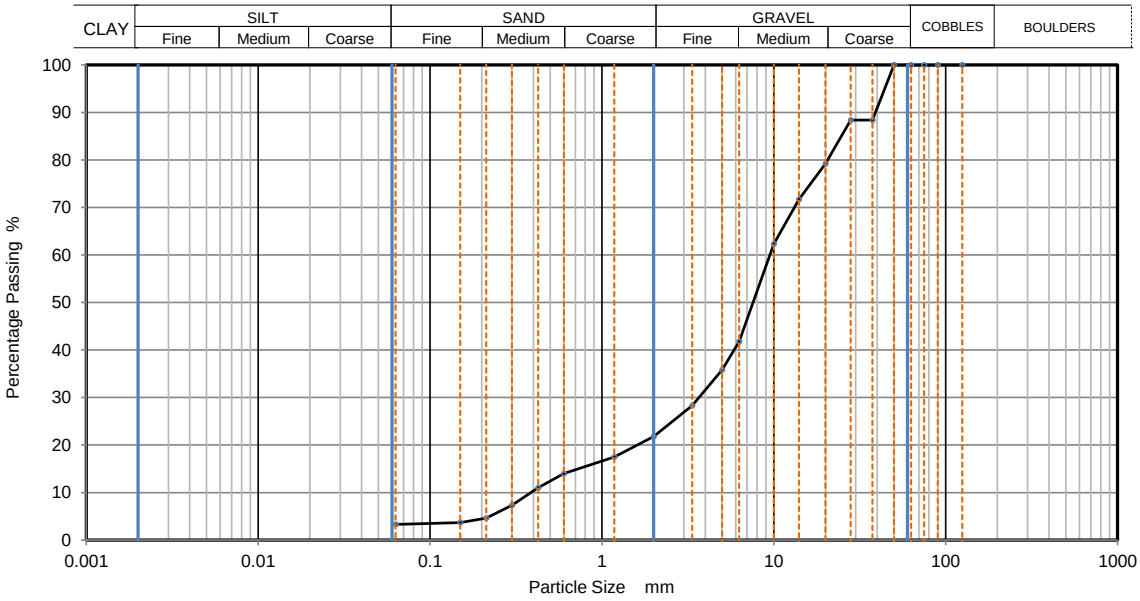
Date: 23/03/2022

PARTICLE SIZE DISTRIBUTION

				Job Ref	31510
				Borehole/Pit No.	WS10
Site Name	Prince Bros Site, Whitebridge Garage, Charvil, RG10 9QJ			Sample No.	-
Project No.	22-140.01	Client	Aviron	Depth Top	3.00 m
Soil Description	Brown slightly clayey sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	D
				Samples received	04/03/2022
				Schedules received	04/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	07/03/2022
				Date tested	14/03/2022

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	88		
28	88		
20	79		
14	72		
10	62		
6.3	42		
5	36		
3.35	28		
2	22		
1.18	18		
0.6	14		
0.425	11		
0.3	7		
0.212	5		
0.15	4		
0.063	3		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	78.2
Sand	18.5
Fines <0.063mm	3.3

Grading Analysis		
D100	mm	
D60	mm	9.5
D30	mm	3.66
D10	mm	0.388
Uniformity Coefficient		24
Curvature Coefficient		3.6

Remarks

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Initials: J.P

Date: 23/03/2022

AVIRON ASSOCIATES LIMITED

is a dynamic company of Chartered Environmental Surveyors and Geotechnical Engineers.

We continuously work hard to ensure our services are the most technically competent, efficient and viable in our market place. Our years of experience of vastly varied sites and projects compliment our ability to deliver assured and effective Ground Investigations and Risk Assessments of both Brownfield, Greenfield and Currently Developed Land.

Our clients choose Aviron to plan, design and manage their Ground Investigations and Land Remediation Schemes assisting in land procurement to deliver engineering requirements, discharge planning and ensure their sites are suitable, developable and sustainable.

Our tenaciously committed team ensure regardless of project value we will always deliver quickly, effectively and exceed expectations.

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