Preliminary Risk Assessment
And
Site Investigation and Generic Quantitative Risk Assessment

Commercial Development

Report prepared at
Land to rear of 162-188 Cranford Drive
Hayes
UB3 4LG

On behalf of
Kearns Development Limited

Report reference
24-221.01

Report date
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Prepared by
Aviron Associates Limited

Report Quality Management			
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1.0 PROJECT AND SITE INFORMATION

1.1 APPOINTMENT

Aviron Associates Limited (Aviron) was retained by Kearns Development Limited (the "Client") to prepare a tier 1 Preliminary Risk Assessment (PRA) and complete a Site Investigation (SI) leading towards a tier 2 Generic Quantitative Risk Assessment (GQRA) of the following premises:

Land to the rear of 162-188 Cranford Drive, Hayes UB3 4LG (hereafter referred to as the "site").

The PRA forms a tier 1 assessment by completing a desk-based study with site walkover to identify potential areas of contaminative concern associated with the proposed development of the site. The PRA will then form a preliminary Conceptual Site Model (CSM) with recommendations for any further investigation or risk assessment.

The SI will investigate the pollutant linkages established within the PRA in order to produce suitable data for the preparation of a tier 2 GQRA to refine the CSM and as necessary provide recommendations for any further investigation or tier 3 Detailed Quantitative Risk Assessment (DQRA). Alternatively, it may be possible to make remediation recommendations immediately following the GQRA.

In addition, geotechnical issues shall be investigated to provide recommendations for new foundations, drainage and pavement 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 to the rear of Cranford Drive, off Carfax Road, on the southern outskirts of Hayes, approximately 1.05 kilometres (km) to the south of Hayes & Harlington railway station. **Figure 1** is presented as the Site Location Plan.
National Grid Ref.	Centred at approximately 509930 178370.
Current Land Use	The site comprises a recently cleared rectangular plot of land, formerly in use as a terrace of lock-up garages. Semi-mature and mature trees are located near to the southern site boundary, and also locally within rear gardens to the north of the site. **Figure 2** is presented as the Existing Site Layout Plan.

Table 1.2: Site Details	
	Figure 3 is presented as the Site Photographs.
Surrounding Land Use	The site is located in a residential area surrounded predominantly by residential premises of Cranford Drive to the north, Carfax Road to the north-east, and Wilkins Close to the west. A place of worship is located to the south-east and an area of public amenity to the south. The M4 motorway is located further to the south of the site.
Proposed Land Use	The proposed development comprises the construction of four new detached residential dwellings with private gardens, as well as parking located in the east of the site. **Figure 4** is presented as the Proposed Development Plan.

1.3 SITE WALKOVER SURVEY

A site walkover survey was undertaken on 17 July 2024 and included an inspection of the site and surrounding area, where safe and accessible. The purpose of the survey is to identify any potential on-site or nearby contaminative activities or potential sources of land contamination. Additionally, as part of the survey any features which may affect site re-development in terms of physical site and ground conditions were noted.

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

Table 1.3: Summary of Site Walkover Survey	
Physical Site Characteristics	
Existing Structures	None observed. The site has been recently demolished to ground slab level.
Basements	None observed.
Visual Topography and Site Surfacing	The site is generally level. Surfacing is predominantly concrete.
Retaining Structures and Slopes	The site is generally level.
Drainage Issues	None observed.
Surface Waters	None observed.
Trees and Hedges	Semi-mature and mature trees line the southern site boundary, and also locally within rear gardens to the north of the site.
Made and Infilled Ground	Should be anticipated beneath the former lock-up garages and hardstanding.
Contaminative Characteristics	
Above or Underground Storage Tanks (ASTs/USTs) and Drums	None observed.

Table 1.3: Summary of Site Walkover Survey	
Fuel Interceptors	Three-chambered interceptor located at the western end of the site.
Waste Storage and Disposal	None observed.
Hazardous Material Storage and Use	None observed.
Asbestos Containing Materials (ACMs)	None observed.
Boiler Houses	None observed.
Sub-stations	None observed.
Surface Staining	None observed.
Potentially Contaminative Activities	Potentially contaminative activities observed include the previous use of the site as lock-up garages.

1.3.1 Summary of Physical Site Characteristics

Consideration should be made towards the make-up and competency of the underlying strata, the influence of trees on the proposed development buildings and the interceptor at the western end of the site.

1.3.2 Summary of Contaminative Site Characteristics

Potentially contaminative activities observed including the previous use of the site as lock-up garages and the interceptor at the western end of the site.

2.0 DESK STUDY REVIEW

Historical Ordnance Survey (OS) maps were obtained as part of the Envirocheck database search within report package reference 352983381 dated 16 July 2024, 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. A summary of the ground hazards for construction purposes is also included.

2.1 HISTORICAL REVIEW

Historical Ordnance Survey (OS) maps were reviewed, and the historical development of the site and the surrounding land is summarised in the following table.

Table 2.1: History of the Site and Surrounding Land

Date (scale)	Site History	Surrounding Land History
1864 (1:2,500) 1868 (1:10,560) 1876 (1:2,500) 1895 (1:2,500) 1897 (1:10,560) 1914 (1:2,500) 1920 (1:10,560) 1932 (1:10,560)	The site is shown to have comprised undeveloped agricultural land or pasture at this time.	The historical mapping indicates that the site was surrounded by agricultural land or pasture in all directions. Cranford House, within Cranford Park marked 220m to the south-east of the site. River Crane marked 275m to the east, flowing in a southerly direction. Ditch, later marked as Frog's Ditch shown 290m to the south-west,
1934 (1:2,500) 1935 (1:10,560)	The site is shown to have been developed in the east as part of a rectangular structure, amongst a series of buildings arranged in a grid-formation, possibly military in nature as described in 2.1.1 below.	Numerous detached buildings arranged in a grid-formation predominantly to the north and west of the site.
1938 (1:10,560)	No notable changes to site use.	A substantial school building is marked 175m to the north-west of the site, later shown as Cranford Park School.
1948 (aerial photograph) 1960 (1:10,000) 1963-64 (1:2,500)	The previous building in the east of the site is shown to have been removed and replaced with three rectangular buildings located in the east, centre and west, likely to have been post-war prefabricated housing.	Post-war prefabricated housing noted immediately north and west of the site along the newly constructed Cranford Drive and Carfax Road.
1965 (1:10,000) 1966 (1:1,250) 1970 (1:10,000)	The site is shown to have remained the same. The houses are marked as 68 Carfax Road and 200 and 206 Cranford Drive.	The Maurice Child Memorial Hall is marked 15m to the south-east of the site. The M4 motorway is marked 45m to the south of the site. Cranford House is no longer marked.

Table 2.1: History of the Site and Surrounding Land		
Date (scale)	**Site History**	**Surrounding Land History**
1972 (1:1,250) 1974 (1:1,250) 1975 (1:10,000) 1989 (1:10,000) 1992 (1:1,250)	The site is shown to have been redeveloped as a terrace of lock-up garages, to the rear of numbers 162-188 Cranford Drive.	The immediate surroundings to the north and west are shown to have been redeveloped as terraced housing of Cranford Drive and Wilkins Close respectively. New school buildings constructed within the grounds of Cranford Park School 90m to the north.
1999 (aerial photograph) 1999-2024 (1:10,000) incl.	No notable changes to site use.	Trees marked to the south-east and south-west of the site.
2024 (1:10,000) 2024 (aerial photograph) 2024 current edition	At the time of the site walkover, the site had been cleared of the former lock-up garages.	No notable changes to surrounding use.
Note: All distances are approximate.		

2.1.1 Anecdotal Evidence

Internet based research indicates that the buildings on site in 1934 and 1938 may have been part of a National Filling Factory also referenced on one of the BGS borehole logs in the vicinity of the site, 367m to the north-west as 'Govt Munitions Factory, Hayes' or 'Formerly Munitions Factory, Harlington'. The layout of the buildings corresponds to description of the munitions factory where buildings were spaced some 75 feet apart for safety reasons.

2.1.2 Summary of Historical Landuses

A review of the historical Ordnance Survey maps show that the site was in use as agricultural land or pasture up until the time of the mapping edition of 1934, when a detached building was marked in the east of the site, possibly associated with a former munitions factory. By 1948 the site had been developed as three prefabricated houses on Carfax Road and Cranford Drive. The site was redeveloped as a terrace of lock-up garages by 1972. The site was then cleared of the garages by the time of the site walkover in 2024.

The site surroundings appear to have been in use as either agricultural land or pasture before being developed by 1934, 1948 and again in 1972. With the exception of the former munitions factory, there are no significant commercial or industrial landuses observed within the immediate surroundings.

2.2 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

2.2.1 Anticipated Geology

Relevant geological information has been determined using the British Geological Survey (BGS) extract sheet 269 of Windsor, which have been summarised in table 2.1.1 below.

Table 2.2.1: 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 Taplow Gravel Member	Wolstonian	Average 5m, locally to 9m	Sand and gravel, locally with lenses of silt, clay or peat	Principal aquifer
Solid London Clay Formation	Ypresian	Up to 150m	Laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay	Unproductive strata

The Envirocheck report indicates that there are no references to artificial ground, worked ground or made ground within 250m of the site.

The Envirocheck report also indicates that there are no references to landslips or faults recorded within 250m of the site.

2.2.2 Ground Conditions – BGS Borehole and Trial Pit Records

The following selection of the nearest relevant BGS recorded logs for historical drilling located within 500m of the site are summarised in table 2.2.2.

Table 2.2.2: Borehole and Trial Pit Records			
BGS ID (distance and direction from site, m)	**Depth of borehole m bgl**	**Lithological sequence metres (m) below ground level (bgl)**	**Other notes/ Aquifer Status**
TQ07NE320 (186m south-west) Heathrow Surface Access O27	10.0m	Topsoil to 0.4m bgl. Stiff very silty Clay to 2.4m bgl. Medium dense Gravel with Sand to 5.2m bgl. Stiff Clay to 10.0m bgl.	-
TQ07NE370 (367m north-west) Govt. Munitions Factory Hayes	121.92m	Drift to 3.94m bgl. London Clay to 62.42m bgl. Reading Beds to 81.36m bgl. Upper Chalk to 121.92m bgl.	Rest water level at 12.42m bgl (1916)
TQ07NW153 (434m north-east) Harlington Drainage 27	10.0m	Firm to stiff fissured silty shaley Clay to 9.5m bgl.	8.8m bgl (Jul 1972)

2.2.3 Anticipated Ground Conditions

Reference to the anticipated geology and the BGS borehole records, indicate that the following anticipated ground conditions are likely at the site:

- Taplow Gravel Member – GRAVEL, possibly with Sand and Clay.
- London Clay Formation – firm becoming stiff fissured CLAY.

Reference to groundwater strikes and resting water levels on the BGS borehole records, suggest that groundwater may be encountered within the Taplow Gravel Member at relatively shallow depth.

2.2.4 Hydrogeology

The hydrogeology of the site has been determined by the superficial and the solid geology of the Taplow Gravel Member and the London Clay Formation, which are classified by the Environment Agency as a principal aquifer and unproductive strata respectively.

Principal aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability which may support water supply and/or river base flow on a strategic scale. Unproductive strata comprise rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The combined classification groundwater vulnerability beneath the site is noted as 'Principal Superficial Aquifer - High Vulnerability'.

Both the Envirocheck report and the Environment Agency website (August 2024) indicate that the site is not located within an Environment Agency source protection zone (SPZ).

The Envirocheck report indicates that the site is located in a groundwater flooding susceptibility area, where there is noted to be 'Potential for Groundwater Flooding to Occur at Surface'.

The Envirocheck report indicates that the nearest reference to a groundwater abstraction licence in the site area is noted at a location 615m to the south-west at Wet Pit, High Street where the abstraction is described as 'Mineral Products: Mineral Washing'. There are no 'Public Water Supply' abstraction licenses for premises within 1000m of the site.

2.2.5 Hydrology

The nearest surface water feature is located 198m to the south-east of the site at the location of what appears to be a drainage ditch or channel on the historical mapping. The Ordnance Survey Water Network included in the Envirocheck report indicates that there is a network line (inland river) also located 198m to the south-east of the site at the location of the surface water feature described above.

The River Crane was originally marked approximately 295m to the east: however, has been since redirected to a location some 405m to the east of the site. Frogs Ditch is located 294m to the south-west.

The Envirocheck report indicates that there are no references to surface water abstraction licences and no references to surface water abstraction for 'Public Water Supply' within 1000m of the site.

The Envirocheck report indicates that there are no references to discharge consents, pollution incidents to controlled waters, or Local Authority Pollution Prevention and Controls within 250m of the site.

The Envirocheck report indicates that the site is not located in an area that is at risk of 'extreme flooding' or 'flooding' from rivers or sea without defences. The site is not located in an area that is used for flood water storage, nor is it located in an area that benefits from flood defences.

The Envirocheck report indicates that the eastern end of the site is located within a surface water 1 in 100 and 1 in 1000 year flood extent.

2.3 LANDFILLS AND BIO-GROUND GAS

2.3.1 Landfills, Waste Management Facilities and Infilled Ground

The Envirocheck report indicates that there are no historical landfill sites, BGS recorded landfill sites, Local Authority recorded landfill sites or registered landfill site located within 250m of the site.

There is a registered landfill site 365m to the south-west at 'Crane Meadow', where authorised waste includes 'Hardcore, Brickwork, Stone, Concrete', 'Road Metal', 'Sand, Silica', and 'Subsoil, Clay', dated 1 January 1989.

There is also a historical landfill site (Harlington) located 295m to the south-west of the site, where the 'Deposited Waste included Inert Waste'. The input dates are noted as 31 October 1986 to 31 October 1989.

There is one reference to Licensed Waste Management Facilities (Landfill Boundaries), at a location 382m to the south-west, 'The Gravel Pit', where the site is categorised as 'Landfills Taking Other Wastes (Construction, Demolition, Dredgings)'. The licence status is noted as 'Issued', dated 28th September 1977.

The Envirocheck report indicates that there are no references to potentially infilled land (non-water or water) within 250m of the site.

2.3.2 Preliminary Risk Assessment (PRA) – Bio-Ground Gas

Table 2.3.2 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 bio-ground gas risks exist, and whether further investigation and assessment is necessary.

Table 2.3.2: Preliminary Risk Assessment (PRA) – Bio-Ground Gas			
Potential Source	**Risk**	**Risk Rating**	**Rationale**
Made Ground (CO_2 + CH_4)	Human health Explosion	Very Low	Made Ground should be anticipated due to the former buildings associated with the use of the site. Organic degradable material is not however expected, and the risk of ground gas generation from Made Ground beneath the site is considered to be low/very low.
Alluvial Strata (CO_2 + CH_4)	Human health Explosion	Negligible	No Alluvial deposits within 250m of the site.
Landfills (CO_2 + CH_4)	Human health Explosion	Negligible	No historical landfill sites noted within 250m of the site. Landfills and Licensed Waste Management Facilities (Landfill Boundaries) recorded within the 251-500m search band to the south-west; however, deposits of biodegradable waste types are not expected to have occurred.
Infilled Ground + Burial Sites (CO_2 + CH_4)	Human health Explosion	Negligible	No potentially infilled ground noted within 250m of the site.
Coal and Mining (CO_2 + CH_4)	Human health Explosion	Negligible	Not located in a coal mining area. Non-coal mining areas of Great Britain, noted as 'no hazard'.
Soil Vapours	Human health Explosion	Low/Very Low	Soil vapour risk potentially from the more recent use of the site as lock-up garages, and possible small-scale maintenance of vehicles.
COMBINED RISK RATING = VERY LOW			

A very low combined risk from ground gas ingress and explosion is considered. Limited sources of risk have been identified and thus precautionary monitoring only is recommended to provide quantitative data to support the qualitative assessment.

2.4 RADON GAS

Information from the Envirocheck report (using data supplied by the BGS) indicates that 'the property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level)', and that radon protection measures are not required.

The UK Health Security Agency (HSA) has published reports containing radon Affected Area maps for the whole of the United Kingdom and indicates (in August 2024) that the site is noted to be located in an area where 'All parts of this 1km grid square are in the lowest band of radon potential. Less than 1% of homes at

or above the Action Level.'

Notwithstanding the above, a Radon report is recommended immediately prior to any re-development plans as radon guidance periodically changes and the above advice may be outdated by the time of any re-development.

The HSA website (ukradon.org) can be used to purchase radon reports, where an address-specific radon report may be obtained. It should however be noted that for redevelopment sites, a GeoReport provided by the British Geological Survey may be more appropriate.

2.5 GROUND STABILITY, NATURAL CAVITIES AND MINING HAZARDS

Table 2.5 indicates potential ground stability, natural cavities and mining hazards identified within the Envirocheck report for the site.

These will be considered in terms of the proposed development and detailed in the following section 2.5, Preliminary Ground Hazards Summary.

Table 2.5: Ground Stability, Natural Cavities and Mining	
Hazard	**Ground Stability and Natural Cavities Hazard Potential**
Potential for Collapsible Ground Stability	Very Low
Potential for Compressible Ground Stability	No Hazard
Potential for Ground Dissolution	No Hazard
Landslides	Very Low
Running Sands	No Hazard
Shrink-Swell Clay	No Hazard
Natural Cavities	None within 500m
Hazard	**Mining Hazard Potential**
BGS recorded mineral sites	None within 500m
Coal mining affected areas	No Hazard
Mining instability	None within 500m
Man-made mining cavities	None within 500m
Non coal mining areas of Great Britain	No Hazard

Table 2.5: Ground Stability, Natural Cavities and Mining	
Potential mining areas	No Hazard
Potentially Infilled Land	None recorded within the site extents, or within 250m.
Other mining/quarrying	None recorded within the site extents, and none within 250m of the site.

The site is not affected by man-made mining cavities, nor is it located in a coal mining affected area. The risk of non-coal mining is noted as 'no hazard'. The risk of shrink-swell clay is noted to be 'no hazard'.

2.6 PRELIMINARY GROUND HAZARDS SUMMARY

The following Table 2.6 provides a summary of the preliminary ground hazards identified with the ground and groundwater conditions and historical site use as determined from the desk-based information accumulated within the PRA. The following key plan should be considered in regard of plausible risk:

❍ - Further action required. Potentially plausible hazard.

❍ - Unlikely to represent a hazard, no further consideration required.

Table 2.6: Preliminary Ground Hazards Summary		
Ground Hazard	**Plausible**	**Description**
Topographic		
Site constraints	❍	Restricted site access due to substantial concrete hard surfacing across the site.
Slopes, embankments, cuttings	❍	Foundation type and construction difficulties. Remedial measures to stabilise slopes, embankments and cuttings, and mitigate risks of landslides.
Man-made		
Filled ground/ made ground/ infilled basements	❍	Foundation type and construction difficulties locally associated with previous development.
Existing foundations and below ground structures	❍	Foundation type and construction difficulties. Obstructions locally to new construction. Influence of existing and adjacent foundations to new construction. Vibration associated with the construction technique.
Mining instability	❍	Foundation type and construction difficulties. Appropriate mining investigation.
Ground chemistry	❍	Made Ground locally is heterogenous and subject to composition may present a risk of sulphate and sulphide attack on buried concrete.

Table 2.6: Preliminary Ground Hazards Summary		
Ground Hazard	**Plausible**	**Description**
Unexploded Ordnance	❍	Detailed unexploded ordnance (UXO) risk assessment did not form part of our project instruction.
Geological		
Frost action	❍	Susceptibility of soils affected at pavement and foundation formation. Provision of non-frost susceptible materials.
Lateral soil instability	❍	Foundation type and construction difficulties. Provision of temporary works – shoring.
Soft clays, silts and compressible soils	❍	Foundation type and construction difficulties. Sufficient bearing resistance to support the proposed construction.
Shrinkable soils	❍	Foundation type and construction difficulties. Influence of trees on foundation depths. Potential for desiccation to have occurred and heave protection. NHBC Standards Chapter 4.2, Building Near Trees.
Ground dissolution of soluble rocks	❍	Negligible risk of ground dissolution of soluble rocks. Foundation type and construction difficulties. Dynamic probing, torque readings. A quantitative risk of ground dissolution of soluble rocks did not form part of our project instruction.
Ground chemistry	❍	Natural soils may present a risk of sulphate and sulphide attack on concrete locally.
Hydrogeological/Hydrological		
Elevated or rising groundwater, or perched water locally	❍	Foundation type and construction difficulties. Provision of temporary works – dewatering (possibly well-points) in shallow excavations due to surface water flooding. Provision of temporary works – shoring. Reduced bearing resistance. Effectiveness of soakaway drainage.
Fluvial or coastal scour/erosion	❍	Foundation type and construction difficulties. Remedial or preventative measures.
❍ - Further action required. Potentially plausible hazard. ❍ - Unlikely to represent a hazard, no further consideration required.		

Any proposed new construction will need to consider the possibility of former foundations locally across the site, the interceptor at the western end of the site, the required bearing resistance of the proposed buildings,

the influence of trees and elevated perched water locally.

Trees may influence the depth of foundations, and further assessment should be considered.

Shallow soakaway drainage may be successful given to the coarse soils anticipated, however the depth of seasonal groundwater will need to be determined.

A suitable ground investigation would confirm an appropriate foundation solution.

3.0 REGULATORY INFORMATION, CONSULTATIONS AND OTHER

Unless otherwise stated regulatory database information has been obtained from the 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	0
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	0	0
Local Authority Pollution Prevention and Control Enforcements	0	0
Pollution Incidents to Controlled Waters	0	17
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	Contemporary Trade Directory Entries within 250m of the site as follows: 106m E: UK Repair Centre - Domestic Appliances - Servicing, Repairs & Parts - Inactive	
Commercial Services Entries	No commercial Services Entries within 250m of the site	
National Grid High Voltage Underground Electricity Transmission Cables	32m S – 37m S	348m E – 407m W
National Grid High Pressure Gas Transmission Pipelines	0	0
Item	**Immediate Vicinity**	
Sensitive Land Uses	The southern boundary of the site is located in an Area of Adopted Green Belt.	

3.2 CONSULTEES

3.2.1 Local Authority - Contaminated Land Officer

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

3.2.2 Local Authority - Building Control Officer

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

3.2.3 Local Authority - Archaeological Officer

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

3.2.4 Local Authority - Petroleum Officer

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

3.2.5 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.

3.2.6 Coal Authority and Mining Searches UK

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

4.0 PRELIMINARY RISK ASSESSMENT

4.1 METHODOLOGY

A tier 1 PRA and CSM have been prepared in accordance with the technical approach on Land Contamination Risk Management (LCRM), which replaced 'CLR11'. Possible hazards identified by a potential source of contamination and sensitive receptors 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 viable and where the quantity or concentration of a contaminant (source) is sufficient to cause 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 in accordance with CIRIA C552. A summary of how risk is derived and the associated definition is presented in tables 4.1.1 and 4.1.2.

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**	**Key Contaminants of Concern**
1. Site-wide soil contamination	Risk of soil contamination within the site associated with previous buildings and use of the site and the possibility of the presence of Made Ground.	Metals, hydrocarbons (TPH/PAH), asbestos, VOC.
2. Local soil contamination	Risk of soil contamination from former buildings and use of the site, as well as the interceptor.	Metals, hydrocarbons (TPH/PAH), asbestos, VOC.
3. Asbestos	Risk of Asbestos Containing Soils (ACS) and Asbestos Containing Materials (ACMs) from former buildings across the site.	Asbestos.
4. Groundwater	Site is underlain by a principal aquifer; however, the site is not located in an SPZ.	Groundwater is anticipated at shallow depth beneath the site.
5. Ground gases/vapours	Very Low combined risk of hazardous ground gases is anticipated given the possibility of Made Ground and soil vapour risks within the site.	Hazardous bio-ground gas. Complete bio-ground gas monitoring.
TPH – Total Petroleum Hydrocarbons. PAH – Polycyclic Aromatic Hydrocarbons. VOC – Volatile Organic Compounds		

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; to humans and infrastructure
Underlying geology/*hydrogeology; shallow superficial geology comprising a 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 development.	Landscaped areas proposed around the site.	Yes
Adjacent land users	Occupants of surrounding residencies.	Adjacent residential dwellings which could be affected by run-off or migration.	Yes
Soft landscaping	Areas of new planting.	Landscaped areas proposed around the site.	Yes
Water supply pipes	Plastic pipework for potable water supply 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 a principal aquifer. No potable water supply licences for premises within 1000m of the site. The site is not located in an SPZ.	Yes
Surface waters	Controlled water such as lakes, streams, rivers or coastal waters.	Inland river 198m to the south-east of the site.	Yes
Ecological receptors	Sensitive areas of ecological significance defined under Part 2A of EPA 1990.	The southern boundary of the site is located in an Area of Adopted Green Belt	Yes

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**	**Linkage No.**
Source 1 Site-wide soil contamination	Construction workers	Direct contact	Likely	Mild	Moderate/Low *Note 1.* Site formerly in use as possible munitions filling factory and recently as lock-up garages and there is a risk that overlying Made Ground across the site may contain common soil contaminants. Potential asbestos arising from former building materials. Short term risk to adults not expected to be significant. Provided suitable **Personal Protective Equipment (PPE) is worn.**	1
	End users	Direct contact	Likely	Medium	Moderate *See Note 1.*	2
	Adjacent land users	Direct contact via run-off	Low Likelihood	Mild	Low *Note 2*. Site is underlain by a principal aquifer. Site is level, enclosed and covered in hardstanding. No evidence of surface staining. The level and enclosed site restricts run-off.	3
	Soft landscaping	Root uptake	Likely	Medium	Moderate *Note 3.* Potential for made ground has been identified which may impact soft landscaping and root development.	4
	Water supply pipes	Direct contact	Low Likelihood	Medium	Moderate/Low *Note 1.*	5
	Buildings & infrastructure	Direct contact	Low Likelihood	Medium	Moderate/Low *Note 1.* Aggressive ground conditions within Made Ground could attack concrete (sulphur attack).	6
	Groundwater	Vertical migration	Unlikely	Medium	Low	7

Table 4.5: Initial Conceptual Site Model (for plausible pollutant linkage pathways)						
Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk & Justification**	**Linkage No.**
		through hydrogeology			*Note 4.* Site is underlain by a principal aquifer. The site is not located in an SPZ. Soil contaminants may leach downwards due to principal aquifer beneath the site. However, the site is hard surfaced, restricting pathway to controlled water receptor.	
	Surface water	Run-off	Unlikely	Mild	Very Low *Note 5.* No inland rivers within the vicinity. Main river 198m to the south-east.	8
	Ecology	Direct contact via run-off	Unlikely	Mild	Very Low *See Note 2*.	9
Source 2 Local soil contamination	Construction workers	Direct contact	Low Likelihood	Mild	Low *Note 6.* On site contaminative features of interest including former buildings and interceptor.	10
	End users	Direct contact	Low Likelihood	Medium	Moderate/Low *See Note 6.*	11
	Adjacent land users	Direct contact via run-off	Low Likelihood	Mild	Low *See Note 6.*	12
	Soft landscaping	Root uptake	Low Likelihood	Medium	Moderate/Low *See Note 6.*	13
	Water supply pipes	Direct contact	Low Likelihood	Medium	Moderate/Low *See Note 6.*	14
	Buildings & infrastructure	Direct contact	Low Likelihood	Medium	Moderate/Low *See Note 6.*	15
	Groundwater	Vertical migration through hydrogeology	Unlikely	Medium	Low *See Note 4.*	16
	Surface	Run-off	Unlikely	Mild	Very Low	17

Table 4.5: Initial Conceptual Site Model (for plausible pollutant linkage pathways)						
Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk & Justification**	**Linkage No.**
	water				*See Note 5.*	
	Ecology	Direct contact via run-off	Unlikely	Mild	Low *See Note 2.*	18
Source 3 Asbestos	Construction workers	Inhalation	Likely	Mild	Low *Note 7.* Potential for ACMs from buildings.	19
	End users	Inhalation	Low Likelihood	Medium	Moderate/Low *See Note 7.*	20
	Adjacent land users	Inhalation	Low Likelihood	Mild	Low *Note 8.* Potential for ACMs from buildings. Distance and dispersion in outdoor air limits risk.	21
Source 4 Groundwater	Construction workers End users Adjacent land users Water supply pipes	Direct contact	Low Likelihood	Mild	Low *Note 9.* Site is underlain by a principal aquifer. The site is not located in an SPZ. Soil contaminants may leach downwards due to principal aquifer beneath the site. However, the site is hard surfaced, restricting pathway to controlled water receptor.	22
	Soft landscaping	Root uptake	Low Likelihood	Mild	Low *See Note 9.*	23
	Groundwater Surface water Ecology	Lateral migration through hydrogeology	Low Likelihood	Mild	Low *See Note 9.*	24
Source 5 Ground gases and Soil vapours (on/off site source)	Construction workers	Inhalation of vapours/gas	Unlikely	Mild	Very Low *Note 10.* No notable sources of ground gas identified within the site	25
	End users	Inhalation of vapours/gas	Unlikely	Mild	Very Low *See Note 10.*	26

The overall environmental risk classification for the site is considered to be generally **MODERATE/LOW** and as such pollutant linkages should be examined further by means of site investigation.

4.6 CONSIDERATIONS FOR SITE INVESTIGATION

The following provides a summary to outline further investigation in order complete the risk assessment:

1. **Investigation of soil contamination.** This should be completed on both a spatial and targeted basis. Spatial coverage should be achieved in order to targeted areas of the site where potential sources of contamination may exist and ideally where these sources overlay a pathway for risk to exist (i.e. within proposed garden areas). Local sources of contamination, such as the adjacent electricity sub-station and former PFS should also be targeted.

2. **Investigation of groundwater contamination.** Monitoring wells should be installed and if encountered groundwater samples can be obtained for analysis. Where groundwater is not encountered obtain deeper soil samples for suitable analysis to enable risk assessment.

3. **Investigation of hazardous bio-ground gases and soil vapours.** Monitoring wells should be installed to enabling precautionary bio-ground gas and vapour monitoring.

To assess the Low risk the following analysis should be completed:

- Aviron's "**ES-1**" of laboratory analysis shall be applied to future site 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 Polycyclic Aromatic Hydrocarbons (PAH), speciated Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) and Methyl Tert-Butyl Ether (MTBE), organic matter, total phenols, pH and asbestos. **Provides broad analysis of common soil contaminants.**

- Volatile Organic Compounds (VOC). **To determine the risk associated with the use/disposal of solvents.**

The listed suite of analysis is considered suitable and will provide a screening for the majority of commonly found soil contaminants, which shall be followed through into the site investigation (section 5.0).

5.0 SITE INVESTIGATION WORK

5.1 METHOD STATEMENT AND SITE INVESTIGATION APPROACH

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

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

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

5.2 SITE INVESTIGATION METHODS

Section 4.5 prepared an initial CSM where pollutant linkages with a greater risk than low would require suitable investigation. Table 5.2 presents what it considered to be a suitable method and rationale of investigation which was completed on 26 July 2024.

Table 5.2: Rationale of Site Investigation Positions

Location	Rationale	Monitoring Well
	Window Sample (WS) Boreholes	
WS1	West of the site to determine ground conditions beneath the proposed building in Plot 1 and enable soil sampling and to target the three-chambered interceptor.	Gas and groundwater monitoring well installed to 1.5m.
WS2	North-west of the site to determine ground conditions beneath the proposed building in Plot 2 and enable soil sampling. Positioned for spatial coverage.	Not installed.
WS3	Centre-south of the site beneath the proposed building in Plot 2 and the previous garage buildings to determine ground conditions and enable soil sampling.	Gas and groundwater monitoring well installed to 1.6m.
WS4	North-east of the site beneath the proposed building in Plot 3 to determine ground conditions and enable soil sampling. Positioned for spatial coverage.	Not installed.
WS5	South-east of the site beneath the proposed building in Plot 4 and the previous garage buildings to determine ground conditions and enable soil sampling.	Gas and groundwater monitoring well installed to 4.0m.
WS6	West of the site to determine shallow ground conditions and enable soil sampling beneath the previous garage buildings.	Not installed.

WS7	Centre-south-west of the site to determine shallow ground conditions and enable soil sampling beneath the previous garage buildings.	Not installed.
WS8	Centre-south-east of the site to determine shallow ground conditions and enable soil sampling beneath the previous garage buildings.	Not installed.
	Machine Trial Pits (SP)	
SP1	East of the site to determine shallow ground conditions and enable soil infiltration testing for soakaway design.	Not installed.

Exploratory Hole Location Plans are enclosed as **Figures 5** and **6.**

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

5.2.1 Window Sample Drilling

Window sample boreholes WS1 to WS8 were drilled to depths of up to 4.0m bgl using an Archway Dart drilling rig. The purpose of the window sampling was to evaluate ground conditions at shallow depths, collect soil samples for geochemical and geotechnical laboratory analysis and to determine soil strength by means of SPTs.

The action of window sampling also enables the installation of monitoring wells to determine standing groundwater levels and ground gas testing.

Standard Penetration Tests were undertaken at 1m intervals to depths of up to 4.0m bgl within the boreholes in accordance with BS EN SO 22476-3 “Standard Penetration Test 2005”. Drilling refusal (SPT N>50) occurred routinely in the overlying coarse soils of the Taplow Gravel Member where the drilling was terminated to prevent jamming, and damage to the drilling rig and tooling.

Hand penetrometer readings were taken at 0.25m depth intervals or where appropriate in the fine soils encountered to determine the shear strength profile beneath the site.

Disturbed soil samples were also collected from bored arisings for geochemical and geotechnical laboratory tests which are further discussed within section 6.0.

5.2.2 Machine Trial Pitting

Trial pit SP1 was excavated to a depth of 2.1m bgl using a mini-tracked 360-degree excavator.

The purpose of the trial pitting was to evaluate ground conditions at shallow depths and enable soil infiltration testing for soakaway design in accordance with BRE D365, 2016.

5.3 GROUND CONDITIONS

The 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:

- CONCRETE to depths of between 0.15m and 0.25m bgl.
- MADE GROUND to depths of between 0.3m and 0.6m bgl.
- Firm becoming stiff silty sandy gravelly CLAY (Taplow Gravel Member) to depths of between 0.9m and 1.5m bgl.
- Medium dense and dense, locally very dense clayey silty sandy and very sandy GRAVEL/gravelly SAND (Taplow Gravel Member) to depths of up to 2.3m bgl (WS4).
- Stiff becoming very stiff and fissured silty CLAY (London Clay Formation) to the maximum termination depth of 4.0m bgl in WS4.

5.3.1 Field Observations

No discernible odours or staining were noted during the logging and sampling procedure of the investigation works.

Roots and rootlets were recorded locally in the overlying soils to depths of between 0.5m and 0.7m bgl.

5.4 GROUNDWATER LEVELS

5.4.1 Groundwater Levels: During Site Investigation Works

Groundwater was encountered during the site investigation works completed on 26 July 2024 at the depths detailed in table 5.4.1 below.

Table 5.4.1: Groundwater During Investigation		
Location	**Depth – bgl (during GI)**	**Comments**
WS1	Dry to 1.5m	The wet strata noted in the base of trial pit SP1 at 2.1m bgl is expected to represent the principal aquifer of the Taplow Gravel Member.
WS2	Dry to 1.0m	
WS3	Dry to 2.0m	
WS4	Dry to 4.0m	
WS5	Dry to 1.0m	
WS6	Dry to 0.9m	
WS7	Dry to 0.9m	
WS8	Dry to 0.9m	
SP1	Wet at the base of the trial pit at 2.1m	

5.4.2 Groundwater and Gas Monitoring Wells

Selected boreholes were converted to monitoring wells to enable standing groundwater level monitoring and ground gas monitoring. Wells were installed into 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	1.0-1.5	1.5
WS3	GL-1.0	1.0-1.6	1.6
WS5	GL-1.0	1.0-4.0	4.0

5.4.3 Groundwater and Gas Post-Investigation Monitoring

In all instances and prior to completing groundwater monitoring and field measurements bulk ground gases and soil vapours were monitored using a GFM 435 Gas Analyser and miniRAE Photon-Ionisation Detector (PID) on the dates shown in table 5.4.3, which provides standing level groundwater 'dips' during post-investigation monitoring.

Table 5.4.3: Groundwater Monitoring Depths			
Location / Date	**Depth – bgl WS1**	**Depth – bgl WS3**	**Depth – bgl WS5**
31 July 2024	Dry to 1.48m	Dry to 1.59m	1.85m
9 August 2024	Dry to 1.48m	Dry to 1.59m	1.85m
16 August 2024	Dry to 1.48m	Dry to 1.59m	1.86m

Further to comments made regarding the groundwater within table 5.4.1, it is expected that the water encountered during the monitoring represents the principal aquifer of the Taplow Gravel Member.

Ground gas monitoring is discussed in section 9.0 of this report.

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

6.0 LABORATORY ANALYSIS

6.1 SOIL GEOCHEMICAL TESTING

Table 6.1 details the soil samples which were collected and submitted for geochemical analysis.

Table 6.1: Soil Geochemical Testing

Location	Strata Sampled	Objective	Analysis
WS1 (0.4m)	Natural Clay	Shallow sample to determine baseline concentrations of natural Clay (west coverage) adjacent the interceptor.	ES-1, VOC
WS3 (0.3m)	Made Ground	Shallow sample to determine baseline concentrations of Made Ground (centre-south coverage).	ES-1
WS3 (0.8m)	Natural Clay	Shallow sample to determine baseline concentrations of natural Clay (centre-south coverage).	ES-1
WS4 (0.3m)	Made Ground	Shallow sample to determine baseline concentrations of Made Ground (north-east coverage).	ES-1
WS6 (0.3m)	Made Ground	Shallow sample to determine baseline concentrations of Made Ground (west coverage).	ES-1
WS7 (0.3m)	Made Ground	Shallow sample to determine baseline concentrations of Made Ground (centre-south-west coverage).	ES-1
WS8 (0.3m)	Made Ground	Shallow sample to determine baseline concentrations of Made Ground (centre-south-east coverage).	ES-1
SP1 (0.3m)	Made Ground	Shallow sample to determine baseline concentrations of Made Ground (east coverage).	ES-1, VOC
COMP1 (0.2-0.4m)	Made Ground	Composite Made Ground sample from across the site to determine off-site soil disposal parameters	WAC

Chemical sampling and testing targeted the overlying units of Made Ground and natural Clay strata whereby virtue of surface deposition historical contaminants are most likely to be recorded. The purpose of sampling slightly deeper natural strata is to generate a baseline understanding of natural soil chemistry and to understand phytotoxic elements at depths of root growth.

The analytical suites were chosen to provide a suitable screening in accordance with the potential contaminants identified within the site conceptualisation presented within section 4.5.

Soil samples for environmental quality analysis were sent to Eurofins Chemtest Limited.

6.2 SOIL GEOTECHNICAL TESTING

A programme of geotechnical laboratory testing was undertaken at K4 Soils Laboratory and Eurofins Chemtest Limited. Testing was completed on the fine and coarse 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 6.2.

Table 6.2: 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 and the potential for desiccation to have occurred*	BS1377: 1990: Part 2: Clause 3.2, 4.5, 5.0	4 (8)
Particle Size Distribution (PSD) *The objective of PSD testing is to determine the grading and classification of coarse (sand and gravel) soils*	BS1377: 1990: Part 2: Clause 9.0	2
Aviron LC Suite - pH, water soluble sulphate, total sulphate & total sulphur *To enable concrete classification to be specified*	UKAS accredited	10 (including 2 within the Suite 1 analysis)

6.3 SOIL SAMPLING PROTOCOL

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

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

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

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

7.0 ENVIRONMENTAL INTERPRETATIVE GUIDANCE

7.1 GENERIC QUANTITATIVE RISK ASSESSMENT

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

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

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

7.2 GUIDANCE USED FOR ASSESSING SOIL CONTAMINATION

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

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

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

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

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

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

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.

It is noted monitoring is proposed to be precautionary.

8.0 ASSESSMENT OF GEOCHEMICAL SOIL RESULTS

Development proposed include predominantly private gardens with small landscaped frontages and therefore the residential with homegrown produce from the guidance listed in section 6.2 shall be selected.

In order to select the appropriate Soil Organic Matter (SOM) value for appraisal of PAH and TPH the mean average SOM value was determined from the laboratory dataset and accordingly the 21% SOM value was selected.

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

8.1 ASSESSMENT OF SOIL GEOCHEMICAL RESULTS

Table 8.1 provides a summary of the results for each sample analysed when compared to the relevant assessment criteria.

Table 8.1: Summary of Geochemical Results

Location	Strata	Determinant	Measured Conc. (mg/kg)	Guidance Conc. (mg/kg)
WS1 (0.4m)	Natural Clay	All determinants recorded at acceptable concentrations	n/a	n/a
WS3 (0.3m)	Made Ground	All determinants recorded at acceptable concentrations	n/a	n/a
WS3 (0.8m)	Natural Clay	All determinants recorded at acceptable concentrations	n/a	n/a
WS4 (0.3m)	Made Ground	All determinants recorded at acceptable concentrations	n/a	n/a
WS6 (0.3m)	Made Ground	All determinants recorded at acceptable concentrations	n/a	n/a
WS7 (0.3m)	Made Ground	All determinants recorded at acceptable concentrations	n/a	n/a
WS8 (0.3m)	Made Ground	All determinants recorded at acceptable concentrations	n/a	n/a
SP1 (0.3m)	Made Ground	All determinants recorded at acceptable	n/a	n/a

		concentrations		
COMP1 (0.2-0.4m)	Made Ground	Results suggest 'inert' waste classification		

Notes:

Barium EIC Generic Acceptance Criteria (EIC GAC) is 1300mg/kg (Residential)

Chromium is assumed to be chromium II (not chromium IV).

Waste soil classification should be confirmed by submitting all chemical results to a licensed waste management operator for formal waste classification.

8.2 DISCUSSION OF SOIL GEOCHEMICAL EXCEEDANCES

All determinants have been recorded at acceptable concentrations and are considered to be found in 'low' (based on professional judgement) concentrations.

No abnormal conditions were identified within the samples submitted for testing from across the site.

Notably the majority of TPH (fuel) and PAH concentrations were below laboratory method limits of detection (LOD) and all solvent (VOC) concentrations were below laboratory method LOD.

It is considered currently and historical land uses, parking of cars/storage, have not chemically impacted the site.

Notwithstanding and following removal of buildings there always remains potential for undiscovered contamination. It is recommended a discovery strategy is enacted and as necessary in the event of contaminative discoveries, suitable remediation (and subsequent verification) is undertaken to the requirement and approval of the local planning authority.

9.0 HAZARDOUS GROUND GAS MONITORING

9.1 STRATEGY

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

A very low combined risk from ground gas ingress and explosion is considered and monitoring was completed as a precautionary to provide quantitative data to a previously completed qualitative risk assessment.

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

9.2 MONITORING

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

Monitoring work was completed on the dates specified within table 9.2 which also summarises weather conditions and atmosphere pressure. To determine rising or falling pressures local 'online' weather trends from the Met Office and/or the monitoring apparatus were consulted.

Table 9.2: Background Gas Monitoring Data

Date	Atmospheric Pressure	Rising/Falling Pressure?	Worst Case Conditions?	Groundwater above response zone?
31 July 2024	1012-1011mB	Falling	No	No
9 August 2024	1015mB	Rising	No	No
16 August 2024	1015mB	Falling	No	No

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

9.3 MONITORING

Table 9.3 summaries the results obtained which are enclosed in **Appendix III**.

Table 9.3: Summary of Monitoring Results			
Gas	**Measured Conc. Range (% v/v)**		**Comments**
	Low	**High**	
CH_4	0.0 (<0.1)	0.0 (<0.1)	Methane was not detected (<0.1%) and thus is below the guidance value of 1% at which point the characteristic situation is advised to increase to CS2.
CO_2	0.0 (<0.1)	0.3	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	18.8	19.8	Oxygen has been recorded at ambient concentrations, above 16% the point where it is considered there is potential for asphyxiation.
Vapour*	0.0 (<0.1)	1.8	Very low (PID) concentrations have been recorded. This concurs with the ground conditions and geochemical laboratory results suggesting the absence of soil vapour risk to new homes.

*vapour concentration in parts per million (ppm)

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

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

9.4 INTERPRETATION OF DATA

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

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

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

Based on the GSV for carbon dioxide which is between below 0.07l/h the site is considered to conform the Characteristic Situation 1 (CS1) and the data collected conforms to the qualitative means of the preliminary risk assessment.

Gas protection is not considered necessary for the new units based on:

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

10.0 REVISED RISK ASSESSMENT

10.1 REVISED SOURCES OF CONTAMINATION

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

Table 10.1: Revised Sources			
Source	**Description**	**Comments**	**On/off-site**
6. Undiscovered contamination	Potential for undiscovered soil contamination following floor slab removal, site clearance and interceptor removal.	Enact discovery strategy, see **Appendix V**.	On
1. Site wide contamination is not considered to exist and is no longer considered a source of risk. Potentially undiscovered contamination (risk) shall be captured by enacting a discovery strategy.			
2. Local soil contamination is not considered to exist and is no longer considered a source of risk. Potentially undiscovered contamination (risk) shall be captured by enacting a discovery strategy.			
3. Asbestos is not considered to present a risk. Potentially undiscovered asbestos contamination (risk) shall be captured by enacting a discovery strategy.			
4. Groundwater contamination is not considered to exist.			
5. Ground gases are not considered to present a risk.			

10.2 REVISED CONCEPTUAL SITE MODEL

Following interpretation of the laboratory results, site dynamics and the revision of potential soil contaminants within table 10.1 a revised conceptual model has been prepared and is presented in table 10.2.

Table 10.2: Refined Conceptual Site Model (for plausible pollutant linkage pathways)						
Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk & Justification**	**Linkage No.**
6. Undiscovered contamination	Construction workers	Direct contact	Unlikely	Mild	Very Low *Note 11.* No evidence of soil contamination following investigation. However, there remains potential for discovery following site clearance, floor slab and interceptor removal. **Action. Enact Discovery Strategy and any subsequent (and as necessary) remediation and**	24

Table 10.2: Refined Conceptual Site Model (for plausible pollutant linkage pathways)						
Source	**Receptor**	**Pathway**	**Probability**	**Consequence**	**Risk & Justification**	**Linkage No.**
					verification.	
	End users	Direct contact	Unlikely	Mild	Very Low *See Note 11.*	25
	Adjacent land users	Direct contact via run-off	Unlikely	Mild	Very Low *See Note 11.*	26
	Soft landscaping	Root uptake	Unlikely	Mild	Very Low *See Note 11.*	27
	Water supply pipes	Direct contact	Unlikely	Mild	Very Low *See Note 11*.	28
	Buildings & infrastructure	Direct contact	Unlikely	Mild	Very Low *Note 12*. Non-aggressive ground conditions encountered. See section 10.7.	29
	Groundwater	Vertical migration through hydrogeology	Unlikely	Mild	Very Low *Note 13*. No evidence of soil contamination following investigation. The site is not located in an SPZ.	30
	Surface waters	Vertical and lateral migration through hydrogeology	Unlikely	Mild	Very Low *Note 14*. No Surface water (inland rivers) in the wider site area and see Note 13.	31
	Ecology	Direct contact via run-off	Unlikely	Mild	Very Low *See Note 11*.	32

10.3 RISK COMMENTARY

10.3.1 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 outer '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 contamination from 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.

Notwithstanding there always remains risk for undiscovered contamination and thus a Discovery Strategy should be enacted. Enclosed as **Appendix V** is the Discovery Strategy which should be affixed to the site office notice board interceptor be removed as part of construction works the Discovery Strategy method within **Appendix V** should be followed.

10.3.2 Contamination Risk from Soil to Human Health – End Users

No visual or olfactory evidence of soil contamination was observed during the ground investigation. A soil sampling and geochemical testing scheme of the Made Ground and natural strata was completed as part of this assessment which recorded concentrations of a wide variety of determinants to below the relevant end use criteria. It is considered that nether current nor previous site uses have impacted the site and remedial work is not considered necessary.

10.3.3 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.

10.3.4 Contamination Risk from Soils to Controlled Waters

It is not considered that soils present a risk to groundwater/controlled waters given the absence of of abnormal ground conditions and also the absence of soil contamination.

10.3.5 Contamination Risk from Groundwater

Contaminated groundwater is not considered to exist beneath the site.

10.3.6 Risk from Ground Gas

No potential significant ground risks were considered following the completion of the PRA.

To further evaluate ground gas risk three rounds of monitoring has been completed within the project timeframe which have recorded acceptable GSV and maximum concentrations within in site. The concentrations recorded suggest Characteristic Situation 1 (CS1).

Given the absence of a notable source of risk, the absence of abnormal ground conditions, the very low risk determined following the PRA is considered accurate following gas monitoring and gas protection is not considered necessary.

11.0 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) where applicable.

It is assumed for the purposes of this assessment that the finished ground floor level of the proposed development buildings 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.

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.

11.1 GROUND MODEL

The following table 11.1 provides the ground model for the site as determined from ground conditions encountered during the site investigation works.

Table 11.1: Ground Model				
Stratum	**Description**	**Top of Stratum (m bgl)**	**Bottom of Stratum (m bgl)**	**Average Thickness (m)**
CONCRETE	Concrete and occasional steel rebar	0.0	0.15 - 0.25	0.2
MADE GROUND	Compacted flint cobbles (clay locally)	0.15 - 0.25	0.3 - 0.6	0.16
CLAY	Firm becoming stiff silty sandy gravelly CLAY	0.3 - 0.6	0.9 - 1.5	0.9
GRAVEL/SAND	Medium dense and very dense clayey silty sandy and very sandy GRAVEL/gravelly SAND	0.9 - 1.5	2.3	0.8
CLAY	Stiff becoming very stiff fissured silty CLAY	2.3	4.0	-
Groundwater				
Wet strata encountered locally during the investigation works in SP1 at a depth of 2.1m bgl. Groundwater noted in WS5 at a depth of 1.85-1.86m bgl during return monitoring in July/August 2024. Monitoring installations in WS1 and WS3 dipped 'dry' at 1.48m and 1.59m bgl.				

11.2 FOUNDATION DESIGN CONCEPT

The ground model and the following considerations will need to be taken in account in determining the foundation solution for the proposed development buildings:

- Potential for desiccation to have occurred in the overlying CLAY horizon and heave protection.
- Medium-volume change potential soils above GRAVEL/SAND above high-volume change potential soils within the influence of trees.
- Temporary works in GRAVEL/SAND and dewatering of seasonally elevated groundwater.

The fine soils present at shallow depth beneath the site are of intermediate plasticity showing medium-volume change potential (VCP), above GRAVEL/SAND of negligible VCP, above CLAY of high VCP.

Assumed maximum 'characteristic action' (or line load) of 90kN/m run on conventional shallow foundations 0.6m wide on medium dense GRAVEL/SAND at depths of between 1.0m and 1.5m bgl may be acceptable for the proposed development buildings subject to the above considerations.

It is assumed that the 'characteristic action' comprises a vertical permanent action. Further information regarding the permanent actions and variable actions (making up the 'characteristic actions') applied to the foundations may be required along with confirmation of the foundation type and foundation dimensions.

11.2 EXCAVATION CONDITIONS

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

11.2.1 Temporary Works

From the ground investigation undertaken, excavations in the overlying natural fine soils during dry conditions may be expected to remain stable in the short term. However, due to the elevated groundwater noted, as well as coarse soils (GRAVEL/SAND) and the requirement for excavations to depths of up to 1.5m bgl to facilitate the construction, 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 may 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.

11.2.2 Dewatering

Groundwater was encountered during the return monitoring in WS5 at a depth of 1.85-1.86m bgl in July/August 2024.

The groundwater encountered is expected to represent the principal aquifer of the Taplow Gravel Member.

On the basis of the data obtained; dewatering may be required in shallow excavations beneath the site (as of July/August 2024).

Groundwater is expected to rise in wetter winter months, and ongoing groundwater monitoring is recommended to determine the seasonal groundwater level below the site.

Consideration should be given to a summer build programme when groundwater is expected to be lower.

11.3 EXISTING SERVICES/SUBSTRUCTURES

Due to the historical development of the site, and the 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, including the interceptor in the west of the site.

11.4 BEARING STRATA

Provided foundations are extended below the overlying desiccated clay soils, conventional shallow foundations 0.6m wide on medium dense GRAVEL/SAND at depths of 1.0-1.5m bgl may be acceptable for the proposed development buildings.

Bearing resistance for the medium dense GRAVEL/SAND at depths of 1.0-1.5m bgl is provided below pending confirmation of the required foundation actions, foundations widths, foundation depths and tolerable settlement.

11.4.1 Atterberg Limits and Material Properties

Atterberg limits tests conducted on the fine soils of the Kempton Park Gravel Member overlying the site at depths of 1.0m bgl indicate that the strata comprise inorganic CLAY of intermediate plasticity (CI). The modified plasticity index was determined to be 23% and 25% indicating soils of medium volume change potential (VCP).

Results of particle size distribution (PSD) analysis indicate that the coarse soils of the Taplow Gravel Member at depths of 2.0m bgl comprise clayey silty sandy and very sandy GRAVEL of negligible VCP.

The fine soils of the underlying London Clay Formation at depths of 3.0m and 4.0m bgl indicate that the strata comprise inorganic CLAY of high to very high plasticity (CH/CV). The modified plasticity index was determined to be 41% and 43% indicating soils of high VCP.

For the purposes of this assessment and in accordance with NHBC Standards Chapter 4.2, Building Near Trees, the soils across the site are classified as being of medium VCP, above negligible VCP, above high VCP.

11.4.2 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 soils at shallow depth across site are potentially desiccated (MC:LL ratio 0.43-0.46). An assessment in accordance with BRE Digest 412 Desiccation in Clay Soils, 1996, including a number of material properties and shear strength profiles confirms that desiccation is expected to have occurred, possibly as a result of former and existing adjacent trees.

Desiccated fine soils (silt and clay) result from moisture being withdrawn from the soil, typically by root action. Heave forces occur following the re-hydration of these soils, by swelling on account of increased moisture content.

Moisture content within fine soils can increase due to seasonal weather variations (rain) and also the removal of trees, whereby moisture is no longer being drawn from the soil by root action. The effect of heave is increased when trees are removed. The upward heave force can lift foundations causing structural damage (cracking of masonry, movement of door/window frames). Conversely during periods of dry weather, the moisture content reduces causing fine soils to shrink and the upward heave force to reduce; in such an event the foundation (re)settles. To remove the risk of continued and abnormal movement beneath the base of new foundations due to swelling and shrinking of fine soils the foundations should be placed beneath the desiccated zone.

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

It is recommended that foundations are extended beneath the potentially desiccated zone, into the medium dense GRAVEL/SAND beneath at 1.0-1.5m bgl.

The soil sampling and testing undertaken provides for a preliminary assessment only based on limited sampling and testing locations. To enable a comprehensive desiccation assessment, consideration should be given to additional soil sampling, in-situ testing and profiling and laboratory analysis including soil suction tests.

11.4.3 Design Parameters

Characteristic values for design parameters for the strata encountered beneath the site are included in Table 11.4.3 below.

Table 11.4.3: Design Parameters			
Stratum	**Volume Change Potential**	**Unit Weight - $\gamma_{,k}$ (kN/m³)**	**Critical State Angle of Friction - $\phi'_{cv,k}$ (degrees)**
CLAY (0.9/1.5m)	Medium	18	25
GRAVEL/SAND (2.3m)	Negligible	19	35
CLAY (4.0m)	High	18-19	22

For assessment purposes a characteristic value of the angle of shearing resistance (ϕ) of 35° has been determined for the GRAVEL/SAND strata at the anticipated foundation formation level of 1.0-1.5m bgl. The characteristic value of the angle of shearing resistance was derived using the relationship between ϕ and the average SPT N-value (N=25+) after Peck, Hanson and Thornburn (Foundation Engineering, 1967). Bearing capacity factors determined by Vesic (Analysis of Ultimate Loads of Shallow Foundations, 1973) have been applied. It is assumed that groundwater will not rise above 0.5m bgl.

Please note that when using this data for design purposes, the effects of eccentric loading are taken into account, and that the bearing pressure is limited to account for maximum tolerable settlement beneath the structures and adjacent properties.

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

11.5 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 fine soils at shallow depth across the site are classified as being of medium VCP above coarse soils of negligible VCP above fine soils of high VCP, and an adjustment to foundation depths in accordance with NHBC Standards Chapter 4.2, Building Near Trees, 2023 may be required.

An arboricultural survey is recommended to determine whether there is a sufficient thickness of coarse soils at the anticipated foundation formation level of 1.0-1.5m bgl to mitigate the influence of adjacent tree species in accordance with NHBC Standards Chapter 4.2.

Should roots or desiccated soils be encountered during the groundworks, and/or previously unidentified trees or 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/tree stump encountered.

A record of the findings associated with roots, desiccated soils and trees/tree stumps should be kept during the groundworks phase.

Mitigation measures to prevent heave in the overlying 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.

11.6 FOUNDATION TYPE, DEPTH AND ALLOWABLE BEARING PRESSURE

11.6.1 Trench Fill/Strip Foundations

Should the adjusted depths of foundations in accordance with NHBC Standards, and the requirements of temporary works be overcome in seasonally elevated groundwater, conventional shallow foundations 0.6m wide in medium dense GRAVEL/SAND at depths of 1.0-1.5m bgl may be suitable for the proposed development buildings. Foundations should be extended beneath the overlying desiccated CLAY horizon.

Using an assumed maximum vertical characteristic action of 90kN/m run (including the net increase due to foundation concrete when compared to excavated soils), and Design Approach 1 of Eurocode 7 (checking for a limit state of rupture or excessive deformation), Combination 1 and Combination 2 are both satisfied where the vertical design action (V_d) is less than the design value of the vertical bearing resistance (Rd) in each case. The GEO limit state requirement is therefore satisfied.

It is assumed that the action is vertical, and it is also assumed that the base of the foundations and the ground surface are horizontal. The vertical design actions include the trench fill foundations, assumed to be a maximum thickness of 1.5m, and also accounts for overburden. It is assumed that groundwater will not rise above 0.5m bgl.

The vertical characteristic action of **90kN/m run** corresponds to the bearing resistance in Table 11.6.1 of **150kN/m²** when applied to trench fill foundations 0.6m wide constructed on medium dense **GRAVEL/SAND** at depths of 1.0-1.5m bgl. The serviceability state is satisfied with the total settlement being restricted to **25mm**.

Table 11.6.1: Bearing Resistance

Exploratory Hole Location /Strata Type	Depth BGL (m)	Footing Width (m)	Bearing Resistance (kN/m²)	Comment
WS1-WS8 Medium dense GRAVEL/SAND	1.0-1.5	0.6	150	Subject to adjustments to foundation depths in accordance with NHBC Chapter 4.2.

An arboricultural survey is recommended to determine whether there is sufficient thickness of coarse soils at the anticipated foundation formation level of 1.0-1.5m bgl to mitigate the influence of adjacent tree species in accordance with NHBC Standards Chapter 4.2.

The total settlement beneath trench fill foundations 0.6m wide is anticipated to be less than 25mm for the medium dense GRAVEL/SAND soils encountered.

Please note that increasing foundation widths to accommodate an increased line load will result in an increase in the total settlement anticipated.

Consider temporary works due to potentially unstable coarse soils in seasonally elevated groundwater.

Notwithstanding the above it is recommended that the formation beneath each section of the proposed re-development works is inspected to assess the competency of the bearing strata prior to pouring of foundation concrete. The formation should not be allowed to loosen due to surface water, rainwater or groundwater ingress prior to pouring of foundation concrete.

It should be noted that the design actions and design layout/dimensions of the proposed works have not been supplied and the above bearing resistance accounts for conventional construction only. The moments resulting in eccentricity of loadings, and the settlement, sliding and overturning and the requirements for propping would need to be considered in the design of any retaining structures.

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

11.6.2 Floor Slabs and Heave

Due to the potential for desiccation to have occurred, it is recommended that the ground floor slabs beneath the proposed development buildings are suspended on ground beams.

Mitigation measures to prevent heave in the overlying fine soils encountered should also be incorporated into the below ground construction.

Mitigation measures to prevent heave should extend to all aspects of in-ground construction, which may include services such as drainage and manholes.

11.7 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 shallow buried concrete (Table C1, natural ground locations) beneath the site:

- Soluble Sulphate (2:1 extract) – 0.01 to 0.041g/l
- pH – 7.2 to 8.8
- Total Sulphate SO_4 – 0.01 – 0.073%
- Total Sulphur – 0.01 – 0.03%
- Total Potential Sulphate – 0.03 – 0.09%
- Oxidisable Sulphide < 0.3%

"*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 not been calculated above 0.3% SO_4 in the sample tested and does not exceed the threshold where the concrete classification is based on oxidisable sulphide and total potential sulphate.

Based on the results obtained for soluble sulphate the Design Sulphate (DS) Class for buried concrete beneath the site is DS-1. Assuming mobile groundwater (principal aquifer), the Aggressive Chemical Environment for Concrete (ACEC) Class is AC-1.

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**.

11.8 SOAKAWAY DRAINAGE

A soil infiltration test was completed within trial pit SP1 in general accordance with Building Research Establishment (BRE) Digest D365, February 2016, Soakaway Design.

The trial pit was excavated to a depth of 2.1m bgl and tested to determine the suitability for conventional soakaways in the overlying soils encountered at this location.

Excavation of the trial pit was completed at a steady rate; the trial pit was relatively stable under excavation and the trial pit was rapidly filled with a tankered water supply. The subsequent fall in water level was observed over the time period specified within the table of results.

One water fill was completed within the trial pit due to the poor infiltration noted as indicated within table 11.8 along with the infiltration rates and comments.

Table 11.8: Soil Infiltration Rates

Location (Test no.)	Testing depths (m bgl)	Strata Tested	Infiltration Rate (m/s)	Comments
SP1 (T1)	0.8-2.1	CLAY on GRAVEL	N/A	75% and 25% fill level not reached in the test after 220 minutes. No infiltration rate determined.

Due to poor infiltration and seasonally elevated groundwater, shallow soakage drainage in the overlying soils is not expected to be effective for the new development, and an alternative to shallow soakaways should be sought.

Soil infiltration test results are included within **Appendix VII**.

12.0 CONCLUSIONS AND RECOMMENDATIONS

This tier 1 PRA desk study and Site Investigation including tier 2 GQRA has provided an assessment of the site's history, geo-environmental setting and an evaluation of ground conditions.

12.1 ENVIRONMENTAL

Table 12.1 summarises the pertinent environmental risks providing advice on further works and assessment.

Table 12.1: Environment Risk Summary

Medium	Item	Risk Description	Comments/Recommendations
Soils	1	Potential for undiscovered soil contamination beneath hardstanding following removal of floor slabs to the barn and stable.	Refer to the Discovery Strategy within **Appendix V** to enable management of any events of contamination discovery.
	2	Any imported Topsoil should be chemically suitable for use in private gardens.	Import suitable Topsoil (BS3882) to sustain planting.
	3	Ensure material encountered is suitable for desired water main.	Consult local water authority prior to water main installation.
	No abnormal ground conditions encountered and all concentrations of determinants acceptable. In-situ soils are not considered to be contaminated.		
Landfill (Bio) Ground Gas	Preliminary risk assessment and gas monitoring has determined likely absence of risk. Three rounds of monitoring concur with the preliminary risk assessment. Gas protection not considered necessary Bio-ground gas protection not considered necessary.		
Radon Gas	The Envirocheck report indicates the site is located in an area where predominantly <1% of homes are above the Action Level. Notwithstanding the above, a Radon report is recommended immediately prior to the re-development as radon guidance periodically changes and the above advice may be outdated by the time of any re-development. The HSA website (ukradon.org) can be used to purchase radon reports.		
Groundwater	Ground conditions are not considered to present a notable risk to controlled waters.		

Once the above risks have been evaluated/implemented the environmental risk assessment can be considered complete and the development suitable for occupancy.

12.2 GROUND HAZARDS SUMMARY

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 12.2 summarises the pertinent Ground Hazards Summary.

Table 12.2: Ground Hazards Summary

Construction Issue	Ground Hazard	Recommendation
Below Ground Obstructions	Concrete hardstanding throughout and possible shallow foundations from former buildings. Interceptor noted in the west of the site.	Shallow obstructions likely to be removed with conventional excavation plant and hydraulic breaking equipment.
Foundations	Potentially desiccated fine soils noted to depths of up to 1.5m bgl. Conventional shallow foundations extended into the medium dense GRAVEL/SAND at 1.0-1.5m bgl are subject to adequate bearing resistance, further increased adjustments to foundation depths due to the influence of trees in accordance with NHBC Chapter 4.2, and the requirements of temporary works. Shallow excavations in fine soils during dry conditions may be stable in the short term, however instability expected to occur at depth in coarse soils and in seasonally elevated groundwater. Groundwater noted at depths as shallow as 1.85-1.86m bgl during return monitoring (July/August 2024). Groundwater expected to rise and fall seasonally.	Bearing resistance of 150kN/m^2 may be acceptable for trench fill foundations 0.6m wide at 1.0-1.5m bgl in medium dense GRAVEL/SAND, subject to design requirements. Dewatering expected to be required in shallow excavations depending on seasonal groundwater fluctuations. Consider ongoing seasonal groundwater monitoring and a summer build programme. Excavations may be unstable when not supported. Shoring of excavations expected to be required in elevated groundwater. Soils encountered are of medium volume change potential (VCP) (NHBC Chapter 4.2, Building Near Trees) above negligible VCP, above high VCP.
Floor Slabs and Heave	Suspended	Heave protection required in the overlying CLAY soils. Mitigation measures to prevent heave should extend to all aspects of in-ground construction, which may include services such as drainage and manholes.
Buried Concrete	Non-aggressive ground conditions encountered.	Concrete classification determined as DS-1, AC-1.
Drainage	Shallow soakaway drainage unlikely to be suitable given the poor infiltration in the overlying soils and seasonally elevated groundwater.	Consider alternative to soakaway drainage.
Abnormals	Assessment required to determine whether there is sufficient thickness of coarse soils at the anticipated foundation formation level of 1.0-1.5m bgl to mitigate the influence of adjacent tree	Complete arboricultural survey and assessment in accordance with NHBC Standards Chapter 4.2.

Table 12.2: Ground Hazards Summary		
Construction Issue	**Ground Hazard**	**Recommendation**
	species.	

13.0 PROJECT INSTRUCTION AND LIMITATIONS

13.1 SCOPE OF WORKS

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

- Undertake one day of window sample boreholes to depths of up to 5.0m bgl, including SPTs at 1m intervals.
- Install three of the boreholes with monitoring pipe to enable return gas and groundwater readings.
- Soil infiltration testing in a trial pit to BRE D365.
- Log the strata within each exploratory hole noting any water strikes.
- Collect disturbed soil samples from exploratory holes and submit for geochemical laboratory tests to determine the presence or absence of soil contaminants, and geotechnical material property tests to enable foundation recommendations and allow roadway and drainage design.
- All soil samples shall be collected in accordance with the instruction and ground conditions and submitted to UKAS/MCERTS accredited laboratories for testing.
- Prepare an interpretative GERA report to interpret ground conditions with respect to potential environmental risks and provide recommendations for foundation design and engineering parameters.

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

13.2 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.

13.3 LIMITATIONS

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

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

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

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.

This report comprises a Ground Investigation Report in accordance with BS EN 1997-2, unless otherwise stated. This report does not constitute a Geotechnical Design Report (BS EN 1997-2) and geotechnical recommendations in this report are for guidance only.

In accordance with the BS EN 1998-1:2004+A1:2013 'Eurocode 8: Design of Structures for Earthquake Resistance – Part 1', the UK is located in an area of very low seismicity, and seismic loading need not be considered.

Unless otherwise stated, a preliminary or detailed risk assessment of unexploded ordnance (UXO) is outside the scope of this report.

Also, unless otherwise stated, an assessment of invasive species such as Japanese Knotweed and Himalayan Balsam is outside the scope of this report.

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

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

14.0 REFERENCES AND OTHER SOURCES OF INFORMATION

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Figures

Legend

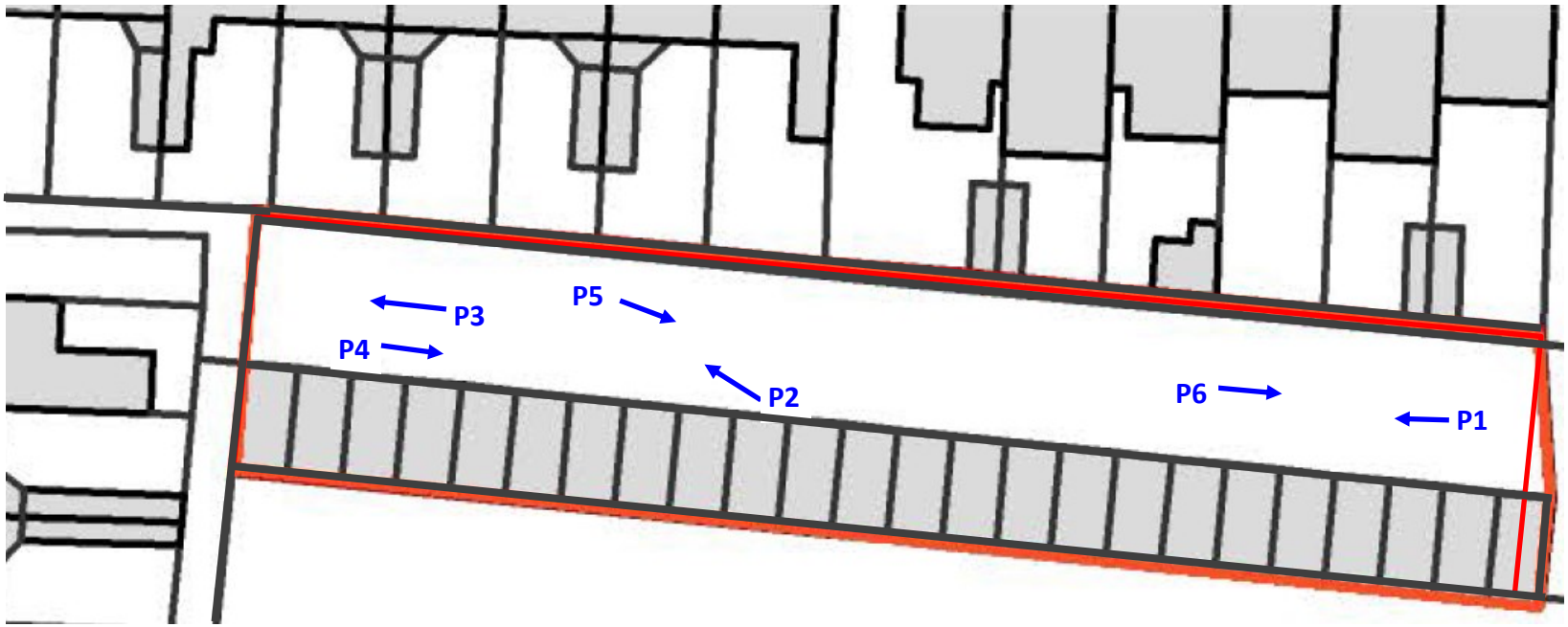
Approximate Site Boundary

Notes

Figure 1

Drawing Title	Site Location Plan
Project Number	24-221.01
Project Title	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG
Drawn by	OB
Checked by	JB
Scale	NTS

Aviron Associates Limited - Badgemore House - Gravel Hill - Henley on Thames - RG9 4NR - T: 01491 413 722 - M: 07787 771 686 - E: james@aviron.co.uk



Legend

Approximate Site Boundary

Photo Direction

Notes

Figure 2

Drawing Title

Existing Site Layout Plan

Project Number	24-221.01

Project Title

Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG

Drawn by	OB
Checked by	JB
Scale	NTS

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Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Legend

Notes

Figure 3

Drawing Title

Site Photographs

Project Number	24-221.01

Project Title

Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG

Drawn by	OB
Checked by	JB
Scale	NTS

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Legend

Approximate Site Boundary

Notes

Figure 4

Drawing Title

Proposed Development Plan

Project Number	24-221.01

Project Title

Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG

Drawn by	OB
Checked by	JB
Scale	NTS

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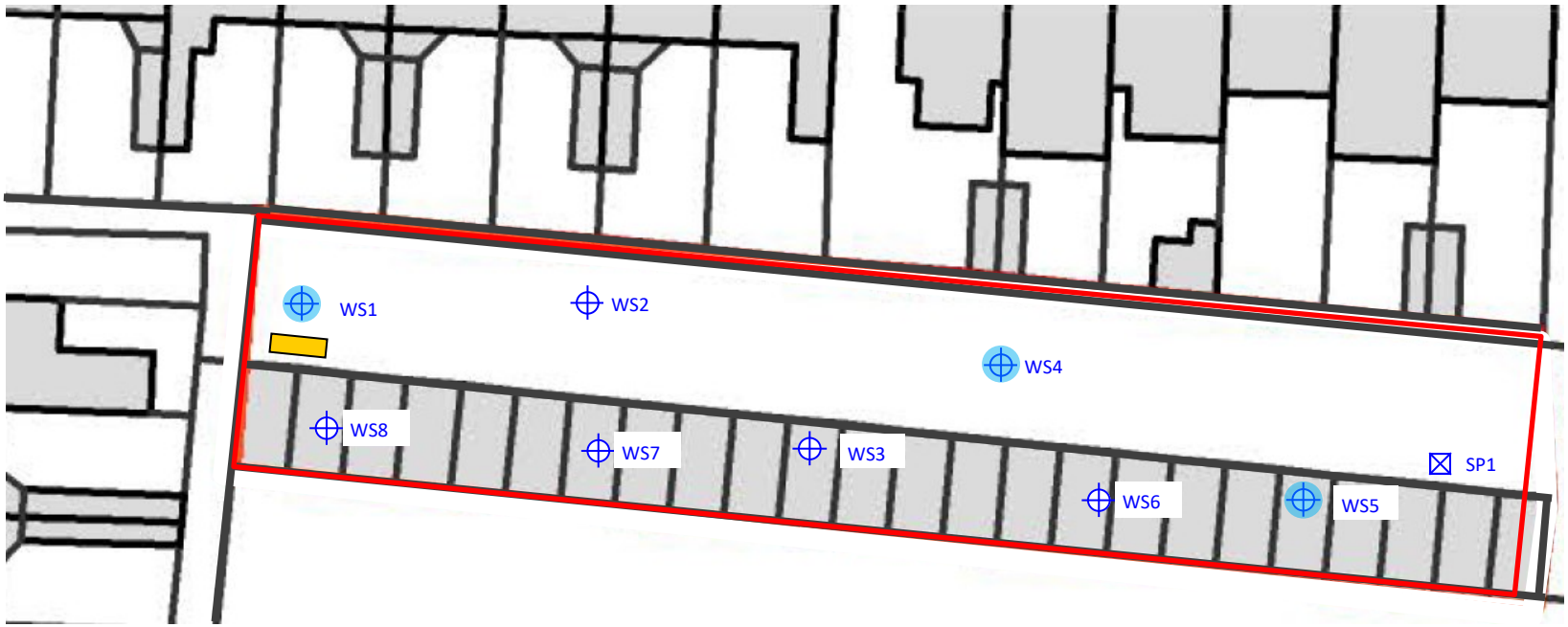

Legend

- Window Sample Location
- Monitoring Well
- Mechanical Trial Pit BRE 365
- Interceptor

Notes

Figure 5

Drawing Title

Exploratory Hole Location Plan - Existing Layout

Project Number	24-221.01

Project Title

Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG

Drawn by	OB
Checked by	JB
Scale	NTS

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Legend

- Window Sample Location
- Monitoring Well
- Mechanical Trial Pit BRE 365

Notes

Figure 6

Drawing Title	Exploratory Hole Location Plan - Proposed Development
Project Number	24-221.01
Project Title	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG
Drawn by	OB
Checked by	JB
Scale	NTS

Aviron Associates Limited - Badgemore House - Gravel Hill - Henley on Thames - RG9 4NR - T: 01491 413 722 - M: 07787 771 686 - E: james@aviron.co.uk

Appendices

I	Envirocheck Database Reports
II	Exploratory Hole Logs and Photographs
III	Field Monitoring Results
IV	Soil Contamination Results and Assessment Criteria
V	Discovery Strategy
VI	Soil Geotechnical Results
VII	Soil Infiltration Test Results

Appendix

I Envirocheck Database Reports

Appendix

II Exploratory Hole Logs and Photographs

WINDOW SAMPLE LOG

Site:	Project No.	Borehole:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	24-221.01	WS1
Client:	**Start:**	**End:**	**Sheet:**
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
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		
Concrete and occasional steel rebar.		(0.25)												
		0.25												
Compacted well rounded flint COBBLES. (MADE GROUND)		(0.1)												
		0.35												
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		(0.75)		0.5	1	D								HP = 10.6
														HP= 6.4
				1.0	2	D/SPT	7	11	13	16	17	4	50	For 235mm
		1.10		1.0	3	ES								HP = 7.5
Very dense orange brown clayey silty very sandy fine to coarse sub-angular to rounded GRAVEL of flint. (BOYN HILL GRAVEL MEMBER)		(0.4)												
		1.50		1.5		SPT	25		47	3			50	For 80mm

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
26/07/2024	101	1.00				26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. No roots present in borehole. Gas and groundwater monitoring well installed to 1.5m	Logged	DN
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample	Checked	OB
		Scale 01:25

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WINDOW SAMPLE LOG

Site:	Project No.	Borehole:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	24-221.01	WS2
Client:	**Start:**	**End:**	**Sheet:**
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
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		
Concrete and occasional steel rebar.		(0.25)												
		0.25												
Compacted well rounded flint COBBLES. (MADE GROUND)		(0.1)												
		0.35												
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. Roots observed to 0.5m. (BOYN HILL GRAVEL MEMBER)		(0.75)												HP = 10.8
				0.75	1	D								HP= 7.6
		0.90												
Very dense orange brown clayey silty very sandy fine to coarse sub-angular to rounded GRAVEL of flint. (BOYN HILL GRAVEL MEMBER)		1.00		1.0		SPT	25		50			50		For 40mm

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
26/07/2024	101	1.00				26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. Roots present in borehole to 0.5m.	Logged	DN
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample	Checked	OB
		Scale 01:25

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WINDOW SAMPLE LOG

Site:	Project No.	Borehole:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	24-221.01	WS3
Client:	**Start:**	**End:**	**Sheet:**
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
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
Concrete and occasional steel rebar.		(0.15) 0.15												
Compacted well rounded flint COBBLES. (MADE GROUND)		0.30		0.3	1	ES								
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)														HP = 11+
				0.8	2	ES								HP = 10.8
		1.10		1.0	3	D/SPT	6	12	15	18	17		50	for 220mm HP = 10.2
Firm to very stiff sandy slightly silty CLAY-BOUND GRAVEL. Gravel is fine to medium angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		1.5												
Very dense orange brown clayey very gravelly coarse SAND. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		2.0		2.0	4	D/SPT	25		50				50	for 30mm

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
26/07/2024	101	1.00				26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. No roots present in borehole. Gas and groundwater monitoring well installed to 1.6m SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample	Logged	DN
	Checked	OB
		Scale 01:25

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WINDOW SAMPLE LOG

Site:	Project No.	Borehole:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	24-221.01	WS4
Client:	**Start:**	**End:**	**Sheet:**
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
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		
Concrete and occasional steel rebar.		(0.25) 0.25		0.3	1	ES								
Firm grey silty sandy gravelly CLAY with fragments of slate. Gravel is fine to medium sub-angular to rounded of flint. (MADE GROUND).		(0.35) 0.60												
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		(0.90) 1.50		1.0	2	D/SPT	2	2	3	3	4	10	20	
Very dense orange brown clayey very gravelly coarse SAND. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		(0.50) 2.00		2.0	3	D/SPT	11	12	8	7	7	5	27	
Dense orange brown clayey very sandy fine to coarse sub-angular to rounded GRAVEL of flint. (BOYN HILL GRAVEL MEMBER)		(0.30) 2.30												
Stiff brown silty CLAY		(1.10) 3.40		3.0	4	D/SPT	4	4	5	7	7	9	28	
Stiff grey slightly fissured silty CLAY		(0.60) 4.00		4.0	5	D/SPT	5	7	7	11	10	10	38	

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
26/07/2024	101	1.00				26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. No roots present in borehole. Gas and groundwater monitoring well installed to 4.0m	Logged	DN
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample	Checked	OB
		Scale 01:25

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WINDOW SAMPLE LOG

Site:		Project No.	Borehole:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG		24-221.01	WS5
Client:	Start:	End:	Sheet:
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
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		
Concrete and occasional steel rebar.		(0.20)												
		0.20												
Compacted well rounded flint COBBLES. (MADE GROUND)		0.35												
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)				0.40	1	ES								
				0.75	2	D								
		0.90												
Very stiff sandy slightly silty CLAY-BOUND GRAVEL. Gravel is fine to medium angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		1.00		1.0		SPT	25		50				50	for 40mm

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
26/07/2024	101	1.00				26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. No roots present in borehole. Gas and groundwater monitoring well installed to 1.6m	Logged	DN
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample	Checked	OB
		Scale 01:25

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WINDOW SAMPLE LOG

Site:	Project No.	Borehole:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	24-221.01	WS6
Client:	**Start:**	**End:**	**Sheet:**
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
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		
Concrete and occasional steel rebar.		*(0.15)* **0.15**		0.30	1	ES								
Compacted well rounded flint COBBLES. (MADE GROUND)		**0.30**												
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		**0.90**												

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
						26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. No roots present in borehole.	Logged	DN
	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:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	24-221.01	WS7
Client:	**Start:**	**End:**	**Sheet:**
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
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		
Concrete and occasional steel rebar.		(0.15) 0.15		0.30	1	ES								
Compacted well rounded flint COBBLES. (MADE GROUND)		0.30												
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		0.90												

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
						26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. No roots present in borehole.	Logged	DN
	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:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	24-221.01	WS8
Client:	**Start:**	**End:**	**Sheet:**
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	**Co-ordinates:**	**Ground Level:**
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		
Concrete and occasional steel rebar.		(0.15) 0.15		0.25	1	ES								
Firm brown sity sandy gravellly CLAY with brick, concrete and slate fragments. (MADE GROUND)		(0.35) 0.50												
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. (BOYN HILL GRAVEL MEMBER)		(0.40) 0.90												

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
						26/07/2024	-	-	-	Dry	

Remarks	By	
No groundwater encountered. No visual or olfactory evidence of contamination. No roots present in borehole.	Logged	DN
SPT: Standard Penetration Test, HP: Hand Penetrometer, B: Bulk Sample, D: Disturbed Sample	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

TRIAL PIT LOG

Project:		Project No.	Trial Pit:
Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG		24-221.01	SP1
Client:	Start:	End:	Sheet:
Kearns Development Limited	26/07/2024	26/07/2024	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
JCB 3CX	NT	NT	

Description of Strata	Legend	Depth (m bgl) *(thickness)*	Well Cnstr.	Samples/Tests Depth	No	Type	Laboratory Test Details
Concrete and occasional steel rebar		*(0.25)* **0.25**					
Compacted well rounded flint COBBLES. (MADE GROUND)		*(0.15)* **0.40**		0.3	1	ES	
Firm becoming stiff orange brown silty sandy gravelly CLAY. Gravel is fine to coarse sub-angular to rounded of flint. Roots observed to 0.7m. (BOYN HILL GRAVEL MEMBER}		*(1.00)* **1.50**					
Orange brown clayey silty very sandy fine to coarse sub-angular to rounded GRAVEL of flint. (BOYN HILL GRAVEL MEMBER)		*(0.70)* **2.10**		2.0	2	B	

Dimensions (m)			Water level observations (depths in metres below gl)					
Length	Width	Depth	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
1.50	0.45	2.10	26/07/2024	wet at base	-	-	-	

Remarks		By
Roots present in trial pit to 0.7m. Base of trial pit wet on completion. No visual or olfactory evidence of contamination. Soaakage test carried out. Trial pit backfilled with arisings.	Logged	DN
	Checked	OB
		Scale 01:25

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

Exploratory Hole Photographs

Project Number 24-221.01 **Project Title** Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG **Taken by** DN **Date** 26/07/2024

WS1

WS2

WS3

WS4

WS5

WS6

Exploratory Hole Photographs

Project Number 24-221.01 **Project Title** Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG **Taken by** DN **Date** 26/07/2024

WS7

WS8

SP1

SP1 arisings

Appendix

III Field Monitoring Results

MONITORING DATA SHEET

SITE Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG
PROJECT 24-221.01

VISIT NUMBER 1
DATE 31/07/2024

EQUIPMENT GFM435 + MiniRAE
TAKEN BY AC

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
Site	12:04	n/a	0.0	0.0	20.4	1012	0.0	n/a	n/a	n/a	n/a	n/a
WS1	12:06	0.0	0.0	0.0	19.8	1012	1.2	Dry	1.48	0	0	CS-1
WS3	12:13	0.0	0.0	0.0	19.4	1012	1.6	Dry	1.59	0	0	CS-1
WS4	12:21	0.0	0.0	0.0	18.8	1011	1.8	1.85	4.02	0	0	CS-1

Weather Observations					
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C	
Dry	Clear	Calm	None	Before	26
Moist	Sunny	Light	Slight		
Wet	Slight	Moderate	Moderate	After	27
Snow	Cloudy	Strong	Heavy		
Frozen	Overcast				
	Fog/Mist				

Pressure Observations			
Source	Pressure Records		Trend
Metoffice	Location	**Hillingdon**	Falling
GFM435	Time	**06:00**	Steady
	Pressure	**1015**	Rising

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

Aviron Associates Limited
Badgemore House - Badgemore Park - Gravel Hill - Henley on Thames - RG9 4NR
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MONITORING DATA SHEET

SITE Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG
PROJECT 24-221.01

VISIT NUMBER 2
DATE 09/08/2024

EQUIPMENT GFM435 + MiniRAE
TAKEN BY AC

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
Site	10:29	n/a	0.0	0.0	20.4	1015	0.0	n/a	n/a	n/a	n/a	n/a
WS1	10:32	0.0	0.0	0.2	18.6	1015	0.0	Dry	1.48	0	0	CS-1
WS3	10:39	0.0	0.0	0.1	18.3	1015	0.8	Dry	1.59	0	0	CS-1
WS4	10:45	0.0	0.0	0.0	18.4	1015	1.8	1.85	4.02	0	0	CS-1

Weather Observations					
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C	
Dry	Clear	Calm	None	Before	17
Moist	Sunny	Light	Slight		
Wet	Slight	Moderate	Moderate	After	18
Snow	Cloudy	Strong	Heavy		
Frozen	Overcast				
	Fog/Mist				

Pressure Observations			
Source	Pressure Records		Trend
Metoffice	Location	**Hillingdon**	Falling
GFM435	Time	**06:00**	Steady
	Pressure	**1013**	Rising

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

Aviron Associates Limited
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MONITORING DATA SHEET

SITE Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG
PROJECT 24-221.01

VISIT NUMBER 3
DATE 16/08/2024

EQUIPMENT GFM435 + MiniRAE
TAKEN BY AC

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
Site	10:07	n/a	0.0	0.0	20.4	1015	0.0	n/a	n/a	n/a	n/a	n/a
WS1	10:10	0.0	0.0	0.3	19.1	1015	0.0	Dry	1.48	0	0	CS-1
WS3	10:20	0.0	0.0	0.0	19.3	1015	0.3	Dry	1.59	0	0	CS-1
WS4	10:28	0.0	0.0	0.0	19.5	1015	0.9	1.86	4.02	0	0	CS-1

Weather Observations					
State of Ground	Cloud Cover	Wind	Rain	Air Temperature °C	
Dry	Clear	Calm	None	Before	18
Moist	Sunny	Light	Slight		
Wet	Slight	Moderate	Moderate	After	19
Snow	Cloudy	Strong	Heavy		
Frozen	Overcast				
	Fog/Mist				

Pressure Observations			
Source	Pressure Records		Trend
Metoffice	Location	**Hillingdon**	Falling
GFM435	Time	**06:00**	Steady
	Pressure	**1015**	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

Appendix

IV Soil Contamination Results and Assessment Criteria

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

Final Report

Report No.:	24-24227-1
Initial Date of Issue:	08-Aug-2024
Re-Issue Details:	
Client	Aviron Associates Ltd
Client Address:	Badgemore House Badgemore Park Gravel Hill Reading Henley on Thames RG9 4NR
Contact(s):	David Norman James Burkitt Orlando Blackwell
Project	24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Quotation No.:		**Date Received:**	30-Jul-2024
Order No.:		**Date Instructed:**	30-Jul-2024
No. of Samples:	11		
Turnaround (Wkdays):	5	**Results Due:**	05-Aug-2024
Date Approved:	08-Aug-2024		

Approved By:

Details: David Smith, Technical Director

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

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd			**Chemtest Job No.:**			24-24227	24-24227	24-24227	24-24227	24-24227	24-24227	24-24227
Quotation No.:			**Chemtest Sample ID.:**			1843162	1843163	1843164	1843165	1843166	1843168	1843169
			Sample Location:			WS1	WS1	WS3	WS3	WS4	WS6	WS7
			Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):			0.4	1.0	0.3	0.8	0.3	0.3	0.3
			Bottom Depth (m):									
			Date Sampled:			26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
			Asbestos Lab:			NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
ACM Type		U	2192		N/A	-		-	-	-	-	-
Asbestos Identification		U	2192		N/A	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture		N	2030	%	0.020	14	14	9.1	14	14	12	11
Soil Colour		N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material		N	2040		N/A	Stones	Stones	Stones	None	None	Roots	Roots
Soil Texture		N	2040		N/A	Clay	Clay	Clay	Clay	Clay	Clay	Clay
pH at 20C		M	2010		4.0	8.4	8.6	8.8	8.6	8.7	7.2	7.6
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	0.54		0.42	0.44	1.1	0.48	< 0.40
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	< 0.010	< 0.010	0.033	< 0.010	0.019	0.041	< 0.010
Total Sulphur		U	2175	%	0.010	0.010	0.010	0.020	0.010	0.020	0.020	0.010
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Total)		U	2430	%	0.010	0.017	0.018	0.015	0.019	0.027	0.054	0.073
Arsenic		M	2455	mg/kg	0.5	6.2		3.6	9.2	3.9	9.6	11
Barium		M	2455	mg/kg	0.5	59		31	61	35	70	70
Cadmium		M	2455	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chromium		M	2455	mg/kg	0.5	24		14	27	17	36	31
Copper		M	2455	mg/kg	0.50	12		6.3	13	7.5	16	20
Mercury		M	2455	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	0.06
Nickel		M	2455	mg/kg	0.50	26		9.4	23	12	25	27
Lead		M	2455	mg/kg	0.50	9.8		8.5	12	15	14	18
Selenium		M	2455	mg/kg	0.25	0.40		< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Zinc		M	2455	mg/kg	0.50	34		55	44	35	51	60
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	HS_2D_AL	N	2780	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25	< 0.25		< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic EPH >C12-C16 MC	EH_2D_AL_#1	M	2690	mg/kg	1.00	< 1.0		< 1.0	1.6	1.4	< 1.0	< 1.0
Aliphatic EPH >C16-C21 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic EPH >C21-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	3.00	6.0		7.1	5.9	8.5	5.6	3.9
Aliphatic EPH >C35-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	< 10		< 10	< 10	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	5.00	7.8		7.8	8.4	13	7.0	5.0
Total Aliphatic EPH >C10-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	< 10		< 10	< 10	13	< 10	< 10
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd				**Chemtest Job No.:**		24-24227	24-24227	24-24227	24-24227	24-24227	24-24227	24-24227
Quotation No.:				**Chemtest Sample ID.:**		1843162	1843163	1843164	1843165	1843166	1843168	1843169
				Sample Location:		WS1	WS1	WS3	WS3	WS4	WS6	WS7
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.4	1.0	0.3	0.8	0.3	0.3	0.3
				Bottom Depth (m):								
				Date Sampled:		26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25	< 0.25		< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C16-C21 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	< 2.0		< 2.0	< 2.0	2.8	< 2.0	< 2.0
Aromatic EPH >C21-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	< 2.0		< 2.0	< 2.0	3.3	< 2.0	< 2.0
Aromatic EPH >C35-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	1.00	4.7		3.7	4.4	7.5	3.7	4.3
Total Aromatic EPH >C10-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	5.00	< 5.0		< 5.0	< 5.0	6.2	< 5.0	< 5.0
Total Aromatic EPH >C10-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	10.00	< 10		< 10	< 10	14	< 10	< 10
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35 MC	EH_2D_Total_#1	U	2690	mg/kg	10.00	< 10		< 10	< 10	19	< 10	< 10
Total EPH >C10-C40 MC	EH_2D_Total_#1	N	2690	mg/kg	10.00	< 10		< 10	< 10	27	< 10	< 10
Organic Matter		M	2625	%	0.40	0.86		0.53	< 0.40	0.64	0.62	0.53
Naphthalene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		M	2700	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		M	2700	mg/kg	2.0	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane		U	2760	µg/kg	1.0	< 1.0						
Chloromethane		M	2760	µg/kg	1.0	< 1.0						
Vinyl Chloride		M	2760	µg/kg	1.0	< 1.0						
Bromomethane		M	2760	µg/kg	20	< 20						
Chloroethane		U	2760	µg/kg	2.0	< 2.0						
Trichlorofluoromethane		M	2760	µg/kg	1.0	< 1.0						
1,1-Dichloroethene		M	2760	µg/kg	1.0	< 1.0						
Dichloromethane		N	2760	µg/kg	50	< 50						

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd				**Chemtest Job No.:**		24-24227	24-24227	24-24227	24-24227	24-24227	24-24227	24-24227
Quotation No.:				**Chemtest Sample ID.:**		1843162	1843163	1843164	1843165	1843166	1843168	1843169
				Sample Location:		WS1	WS1	WS3	WS3	WS4	WS6	WS7
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.4	1.0	0.3	0.8	0.3	0.3	0.3
				Bottom Depth (m):								
				Date Sampled:		26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Trans 1,2-Dichloroethene		M	2760	µg/kg	1.0	< 1.0						
1,1-Dichloroethane		M	2760	µg/kg	1.0	< 1.0						
cis 1,2-Dichloroethene		M	2760	µg/kg	1.0	< 1.0						
Bromochloromethane		U	2760	µg/kg	5.0	< 5.0						
Trichloromethane		M	2760	µg/kg	1.0	< 1.0						
1,1,1-Trichloroethane		M	2760	µg/kg	1.0	< 1.0						
Tetrachloromethane		M	2760	µg/kg	1.0	< 1.0						
1,1-Dichloropropene		U	2760	µg/kg	1.0	< 1.0						
Benzene		M	2760	µg/kg	1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane		M	2760	µg/kg	2.0	< 2.0						
Trichloroethene		N	2760	µg/kg	1.0	< 1.0						
1,2-Dichloropropane		M	2760	µg/kg	1.0	< 1.0						
Dibromomethane		M	2760	µg/kg	1.0	< 1.0						
Bromodichloromethane		M	2760	µg/kg	5.0	< 5.0						
cis-1,3-Dichloropropene		N	2760	µg/kg	10	< 10						
Toluene		M	2760	µg/kg	1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene		N	2760	µg/kg	10	< 10						
1,1,2-Trichloroethane		M	2760	µg/kg	10	< 10						
Tetrachloroethene		M	2760	µg/kg	1.0	< 1.0						
1,3-Dichloropropane		U	2760	µg/kg	2.0	< 2.0						
Dibromochloromethane		U	2760	µg/kg	10	< 10						
1,2-Dibromoethane		M	2760	µg/kg	5.0	< 5.0						
Chlorobenzene		M	2760	µg/kg	1.0	< 1.0						
1,1,1,2-Tetrachloroethane		M	2760	µg/kg	2.0	< 2.0						
Ethylbenzene		M	2760	µg/kg	1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene		M	2760	µg/kg	1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene		M	2760	µg/kg	1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene		M	2760	µg/kg	1.0	< 1.0						
Tribromomethane		U	2760	µg/kg	1.0	< 1.0						
Isopropylbenzene		M	2760	µg/kg	1.0	< 1.0						
Bromobenzene		M	2760	µg/kg	1.0	< 1.0						
1,2,3-Trichloropropane		N	2760	µg/kg	50	< 50						
N-Propylbenzene		U	2760	µg/kg	1.0	< 1.0						
2-Chlorotoluene		M	2760	µg/kg	1.0	< 1.0						
1,3,5-Trimethylbenzene		M	2760	µg/kg	1.0	< 1.0						
4-Chlorotoluene		U	2760	µg/kg	1.0	< 1.0						
Tert-Butylbenzene		U	2760	µg/kg	1.0	< 1.0						
1,2,4-Trimethylbenzene		M	2760	µg/kg	1.0	< 1.0						

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd				**Chemtest Job No.:**		24-24227	24-24227	24-24227	24-24227	24-24227	24-24227	24-24227
Quotation No.:				**Chemtest Sample ID.:**		1843162	1843163	1843164	1843165	1843166	1843168	1843169
				Sample Location:		WS1	WS1	WS3	WS3	WS4	WS6	WS7
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.4	1.0	0.3	0.8	0.3	0.3	0.3
				Bottom Depth (m):								
				Date Sampled:		26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Sec-Butylbenzene		U	2760	µg/kg	1.0	< 1.0						
1,3-Dichlorobenzene		M	2760	µg/kg	1.0	< 1.0						
4-Isopropyltoluene		U	2760	µg/kg	1.0	< 1.0						
1,4-Dichlorobenzene		M	2760	µg/kg	1.0	< 1.0						
N-Butylbenzene		U	2760	µg/kg	1.0	< 1.0						
1,2-Dichlorobenzene		M	2760	µg/kg	1.0	< 1.0						
1,2-Dibromo-3-Chloropropane		U	2760	µg/kg	50	< 50						
1,2,4-Trichlorobenzene		M	2760	µg/kg	1.0	< 1.0						
Hexachlorobutadiene		N	2760	µg/kg	1.0	< 1.0						
1,2,3-Trichlorobenzene		U	2760	µg/kg	2.0	< 2.0						
Methyl Tert-Butyl Ether		M	2760	µg/kg	1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols		M	2920	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd				**Chemtest Job No.:**		24-24227	24-24227	24-24227	24-24227
Quotation No.:				**Chemtest Sample ID.:**		1843170	1843171	1843172	1843173
				Sample Location:		WS8	SP1	SP1	COMP 1
				Sample Type:		SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.3	2.0	0.2
				Bottom Depth (m):					0.4
				Date Sampled:		26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
				Asbestos Lab:		NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type		U	2192		N/A	-	-		
Asbestos Identification		U	2192		N/A	No Asbestos Detected	No Asbestos Detected		
Moisture		N	2030	%	0.020	10	12	5.7	11
Soil Colour		N	2040		N/A	Brown	Brown	Brown	Brown
Other Material		N	2040		N/A	Stones	Stones	Stones	Stones
Soil Texture		N	2040		N/A	Loam	Clay	Sand	Clay
pH at 20C		M	2010		4.0	8.2	8.5	8.4	
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	0.51	< 0.40		
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.010	< 0.010	< 0.010	
Total Sulphur		U	2175	%	0.010	0.030	0.010	0.010	
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50		
Sulphate (Total)		U	2430	%	0.010	0.037	0.014	< 0.010	
Arsenic		M	2455	mg/kg	0.5	5.3	4.9		
Barium		M	2455	mg/kg	0.5	51	40		
Cadmium		M	2455	mg/kg	0.10	< 0.10	< 0.10		
Chromium		M	2455	mg/kg	0.5	16	16		
Copper		M	2455	mg/kg	0.50	13	8.7		
Mercury		M	2455	mg/kg	0.05	0.11	< 0.05		
Nickel		M	2455	mg/kg	0.50	15	14		
Lead		M	2455	mg/kg	0.50	26	8.3		
Selenium		M	2455	mg/kg	0.25	< 0.25	< 0.25		
Zinc		M	2455	mg/kg	0.50	38	33		
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05		
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05		
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05		
Aliphatic VPH >C6-C8 (Sum)	HS_2D_AL	N	2780	mg/kg	0.10	< 0.10	< 0.10		
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05		
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25	< 0.25	< 0.25		
Aliphatic EPH >C10-C12 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	2.6	< 2.0		
Aliphatic EPH >C12-C16 MC	EH_2D_AL_#1	M	2690	mg/kg	1.00	4.1	< 1.0		
Aliphatic EPH >C16-C21 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	3.9	< 2.0		
Aliphatic EPH >C21-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	3.00	12	3.7		
Aliphatic EPH >C35-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	< 10	< 10		
Total Aliphatic EPH >C10-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	5.00	23	< 5.0		
Total Aliphatic EPH >C10-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	23	< 10		
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05		
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05		

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd			**Chemtest Job No.:**			24-24227	24-24227	24-24227	24-24227
Quotation No.:			**Chemtest Sample ID.:**			1843170	1843171	1843172	1843173
			Sample Location:			WS8	SP1	SP1	COMP 1
			Sample Type:			SOIL	SOIL	SOIL	SOIL
			Top Depth (m):			0.3	0.3	2.0	0.2
			Bottom Depth (m):						0.4
			Date Sampled:			26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
			Asbestos Lab:			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05		
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25	< 0.25	< 0.25		
Aromatic EPH >C10-C12 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0		
Aromatic EPH >C12-C16 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0		
Aromatic EPH >C16-C21 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	2.7	< 2.0		
Aromatic EPH >C21-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	4.4	< 2.0		
Aromatic EPH >C35-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	1.00	7.5	2.8		
Total Aromatic EPH >C10-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	5.00	7.3	< 5.0		
Total Aromatic EPH >C10-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	10.00	15	< 10		
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50	< 0.50	< 0.50		
Total EPH >C10-C35 MC	EH_2D_Total_#1	U	2690	mg/kg	10.00	30	< 10		
Total EPH >C10-C40 MC	EH_2D_Total_#1	N	2690	mg/kg	10.00	38	< 10		
Organic Matter		M	2625	%	0.40	0.90	0.74		
Naphthalene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Acenaphthylene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Acenaphthene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Fluorene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Phenanthrene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Fluoranthene		M	2700	mg/kg	0.10	0.31	< 0.10		
Pyrene		M	2700	mg/kg	0.10	0.39	< 0.10		
Benzo[a]anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Chrysene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Benzo[b]fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Benzo[k]fluoranthene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Benzo[a]pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Indeno(1,2,3-c,d)Pyrene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Dibenz(a,h)Anthracene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Benzo[g,h,i]perylene		M	2700	mg/kg	0.10	< 0.10	< 0.10		
Total Of 16 PAH's		M	2700	mg/kg	2.0	< 2.0	< 2.0		
Dichlorodifluoromethane		U	2760	µg/kg	1.0		< 1.0		
Chloromethane		M	2760	µg/kg	1.0		< 1.0		
Vinyl Chloride		M	2760	µg/kg	1.0		< 1.0		
Bromomethane		M	2760	µg/kg	20		< 20		
Chloroethane		U	2760	µg/kg	2.0		< 2.0		
Trichlorofluoromethane		M	2760	µg/kg	1.0		< 1.0		
1,1-Dichloroethene		M	2760	µg/kg	1.0		< 1.0		
Dichloromethane		N	2760	µg/kg	50		< 50		

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd				**Chemtest Job No.:**		24-24227	24-24227	24-24227	24-24227
Quotation No.:				**Chemtest Sample ID.:**		1843170	1843171	1843172	1843173
				Sample Location:		WS8	SP1	SP1	COMP 1
				Sample Type:		SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.3	2.0	0.2
				Bottom Depth (m):					0.4
				Date Sampled:		26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
				Asbestos Lab:		NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
Trans 1,2-Dichloroethene		M	2760	µg/kg	1.0		< 1.0		
1,1-Dichloroethane		M	2760	µg/kg	1.0		< 1.0		
cis 1,2-Dichloroethene		M	2760	µg/kg	1.0		< 1.0		
Bromochloromethane		U	2760	µg/kg	5.0		< 5.0		
Trichloromethane		M	2760	µg/kg	1.0		< 1.0		
1,1,1-Trichloroethane		M	2760	µg/kg	1.0		< 1.0		
Tetrachloromethane		M	2760	µg/kg	1.0		< 1.0		
1,1-Dichloropropene		U	2760	µg/kg	1.0		< 1.0		
Benzene		M	2760	µg/kg	1.0	< 1.0	< 1.0		
1,2-Dichloroethane		M	2760	µg/kg	2.0		< 2.0		
Trichloroethene		N	2760	µg/kg	1.0		< 1.0		
1,2-Dichloropropane		M	2760	µg/kg	1.0		< 1.0		
Dibromomethane		M	2760	µg/kg	1.0		< 1.0		
Bromodichloromethane		M	2760	µg/kg	5.0		< 5.0		
cis-1,3-Dichloropropene		N	2760	µg/kg	10		< 10		
Toluene		M	2760	µg/kg	1.0	< 1.0	< 1.0		
Trans-1,3-Dichloropropene		N	2760	µg/kg	10		< 10		
1,1,2-Trichloroethane		M	2760	µg/kg	10		< 10		
Tetrachloroethene		M	2760	µg/kg	1.0		< 1.0		
1,3-Dichloropropane		U	2760	µg/kg	2.0		< 2.0		
Dibromochloromethane		U	2760	µg/kg	10		< 10		
1,2-Dibromoethane		M	2760	µg/kg	5.0		< 5.0		
Chlorobenzene		M	2760	µg/kg	1.0		< 1.0		
1,1,1,2-Tetrachloroethane		M	2760	µg/kg	2.0		< 2.0		
Ethylbenzene		M	2760	µg/kg	1.0	< 1.0	< 1.0		
m & p-Xylene		M	2760	µg/kg	1.0	< 1.0	< 1.0		
o-Xylene		M	2760	µg/kg	1.0	< 1.0	< 1.0		
Styrene		M	2760	µg/kg	1.0		< 1.0		
Tribromomethane		U	2760	µg/kg	1.0		< 1.0		
Isopropylbenzene		M	2760	µg/kg	1.0		< 1.0		
Bromobenzene		M	2760	µg/kg	1.0		< 1.0		
1,2,3-Trichloropropane		N	2760	µg/kg	50		< 50		
N-Propylbenzene		U	2760	µg/kg	1.0		< 1.0		
2-Chlorotoluene		M	2760	µg/kg	1.0		< 1.0		
1,3,5-Trimethylbenzene		M	2760	µg/kg	1.0		< 1.0		
4-Chlorotoluene		U	2760	µg/kg	1.0		< 1.0		
Tert-Butylbenzene		U	2760	µg/kg	1.0		< 1.0		
1,2,4-Trimethylbenzene		M	2760	µg/kg	1.0		< 1.0		

Results - Soil

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

Client: Aviron Associates Ltd			**Chemtest Job No.:**			24-24227	24-24227	24-24227	24-24227
Quotation No.:			**Chemtest Sample ID.:**			1843170	1843171	1843172	1843173
			Sample Location:			WS8	SP1	SP1	COMP 1
			Sample Type:			SOIL	SOIL	SOIL	SOIL
			Top Depth (m):			0.3	0.3	2.0	0.2
			Bottom Depth (m):						0.4
			Date Sampled:			26-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024
			Asbestos Lab:			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**				
Sec-Butylbenzene		U	2760	µg/kg	1.0		< 1.0		
1,3-Dichlorobenzene		M	2760	µg/kg	1.0		< 1.0		
4-Isopropyltoluene		U	2760	µg/kg	1.0		< 1.0		
1,4-Dichlorobenzene		M	2760	µg/kg	1.0		< 1.0		
N-Butylbenzene		U	2760	µg/kg	1.0		< 1.0		
1,2-Dichlorobenzene		M	2760	µg/kg	1.0		< 1.0		
1,2-Dibromo-3-Chloropropane		U	2760	µg/kg	50		< 50		
1,2,4-Trichlorobenzene		M	2760	µg/kg	1.0		< 1.0		
Hexachlorobutadiene		N	2760	µg/kg	1.0		< 1.0		
1,2,3-Trichlorobenzene		U	2760	µg/kg	2.0		< 2.0		
Methyl Tert-Butyl Ether		M	2760	µg/kg	1.0	< 1.0	< 1.0		
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10		

Results - Single Stage WAC

Project: 24-221.01 Land to the rear of 162-188 Cranford Drive, Hayes

						Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	24-24227							
Chemtest Sample ID:	1843173							
Sample Ref:								
Sample ID:								
Sample Location:	COMP 1							
Top Depth(m):	0.2							
Bottom Depth(m):	0.4							
Sampling Date:	26-Jul-2024							
Determinand	**SOP**	**HWOL Code**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625		M	%	0.49	3	5	6
Loss On Ignition	2610		M	%	3.0	--	--	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	EH_CU_1D_Total	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800		N	mg/kg	< 2.0	100	--	--
pH at 20C	2010		M		8.1	--	>6	--
Acid Neutralisation Capacity	2015		N	mol/kg	0.0020	--	To evaluate	To evaluate
Eluate Analysis				**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455		U	0.0014	0.014	0.5	2	25
Barium	1455		U	< 0.005	< 0.050	20	100	300
Cadmium	1455		U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455		U	0.0037	0.037	0.5	10	70
Copper	1455		U	0.0015	0.015	2	50	100
Mercury	1455		U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455		U	0.0011	0.011	0.5	10	30
Nickel	1455		U	0.0033	0.033	0.4	10	40
Lead	1455		U	0.0006	0.0064	0.5	10	50
Antimony	1455		U	0.0008	0.0077	0.06	0.7	5
Selenium	1455		U	0.0019	0.019	0.1	0.5	7
Zinc	1455		U	0.009	0.093	4	50	200
Chloride	1220		U	< 1.0	< 10	800	15000	25000
Fluoride	1220		U	0.24	2.4	10	150	500
Sulphate	1220		U	1.7	17	1000	20000	50000
Total Dissolved Solids	1020		N	18	180	4000	60000	100000
Phenol Index	1920		U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610		U	3.4	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

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	Water Accred.
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity at 25°C 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 at 20°C	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 <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	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.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
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	
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection	
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; 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.	

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection	
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil 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*	Dichloromethane extraction / GC-MS	
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS. Reported PCB 101 results may contain contributions from PCB 90 due to inseparable chromatography.	
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.	
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge	

Report Information

Key

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

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.
Any comments or interpretations are outside the scope of UKAS accreditation.
The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.
Uncertainty of measurement for the determinands tested are available upon request .
None of the results in this report have been recovery corrected.
All results are expressed on a dry weight basis.

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

For all other tests the samples were dried at ≤ 30°C prior to analysis.
All Asbestos testing is performed at the indicated laboratory .
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.
All water samples will be retained for 14 days from the date of receipt.
Charges may apply to extended sample storage.

Water Sample Category Key for Accreditation

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

Report Information

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

Clean Up Codes

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

HWOL Acronym System

HS - Headspace analysis
EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

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

Residential with Homegrown Produce
Soil Screening Values
Private Gardens

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INROGANICS + PAH				
Arsenic	37	37	37	C4SL/LQM S4UL
Boron	290	290	290	LQM S4UL
Cadmium	11	11	11	LQM S4UL
Chromium III	910	910	910	LQM S4UL
Chromium IV	6	6	6	LQM S4UL
Copper	2,400	2,400	2,400	LQM S4UL
Mercury	1.2	1.2	1.2	LQM S4UL
Nickel	180	180	180	LQM S4UL
Lead	200	200	200	LQM S4UL
Selenium	250	250	250	LQM S4UL
Zinc	3,700	3,700	3,700	LQM S4UL
Free Cyanide	34	34	34	ATRISK
Acenaphthene	210	510	1100	LQM S4UL
Acenaphthylene	170	420	920	LQM S4UL
Anthracene	2,400	5,400	11,000	LQM S4UL
Benzo(a)anthracene	7.2	11	13	LQM S4UL
Benzo(a)pyrene	2.2	2.7	3	LQM S4UL
Benzo(b)fluoranthene	2.6	3.3	3.7	LQM S4UL
Benzo(ghi)perylene	320	340	350	LQM S4UL
Benzo(k)fluoranthene	77	93	100	LQM S4UL
Chrysene	15	22	27	LQM S4UL
Dibenz(ah)anthracene	0.24	0.28	0.3	LQM S4UL
Fluoranthene	280	560	890	LQM S4UL
Fluorene	170	400	860	LQM S4UL
Indeno(123-cd)pyrene	27	36	41	LQM S4UL
Naphthalene	2.3	5.6	13	LQM S4UL
Phenanthrene	95	220	440	LQM S4UL

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
Pyrene	620	1,200	2,000	LQM S4UL
Phenols	78	0.98	1.1	LQM S4UL
TOTAL PETROLEUM HYDOCARBONS				
Benzene	0.087	0.17	0.37	LQM S4UL
Toluene	130	290	660	LQM S4UL
Ethlybenzene	47	110	260	LQM S4UL
o-xylene	60	140	330	LQM S4UL
m-xylene	59	140	320	LQM S4UL
p-xylene	56	130	310	LQM S4UL
Aliphatic EC 5-6	42	78	160	LQM S4UL
Aliphatic EC >6-8	100	230	530	LQM S4UL
Aliphatic EC >8-10	27	65	150	LQM S4UL
Aliphatic EC >10-12	130	330	760	LQM S4UL
Aliphatic EC >12-16	1,100	2,400	4300	LQM S4UL
Aliphatic EC >16-35	65,000	92,000	110,000	LQM S4UL
Aliphatic EC >35-44	65,000	92,000	110,000	LQM S4UL
Aromatic EC 5-7 (benzene)	70	140	300	LQM S4UL
Aromatic EC >7-8 (toluene)	130	290	660	LQM S4UL
Aromatic EC >8-10	34	83	190	LQM S4UL
Aromatic EC >10-12	74	180	380	LQM S4UL
Aromatic EC >12-16	140	330	660	LQM S4UL
Aromatic EC >16-21	260	540	930	LQM S4UL
Aromatic EC >21-35	1,100	1,500	1,700	LQM S4UL
Aromatic EC >35-44	1,100	1,500	1,700	LQM S4UL
Aromatic EC >44-70	1,600	1,800	1,900	LQM S4UL
ASBESTOS				
None Detectable			Aviron Adopted Value	

Appendix

V Discovery Strategy

HOW TO IDENTIFY CONTAMINATED SOILS
AND
WHAT TO DO?

ARE YOU AWARE YOU MAY BE WORKING WITH CONTAMINATED SOILS?

YES

ARE YOU WEARING PPE? HAVE YOU A PERMIT TO DIG?

YES

WHEN DIGGING IS THE SOIL :

FREE FROM ANY UNUSUAL COLOUR LIKE BLUE, GREEN, BLACK?

FREE FROM FUNNY SMELLS LIKE FUEL, SOLVENTS, GAS?

FREE FROM CEMENT FRAGMENTS OR FIBROUS MATERIAL?

FREE FROM HAZARDOUS CONTAINERS LIKE OIL/FUEL DRUMS OR TANKS?

FREE FROM RUSTED METALS, SHARPS ETC?

YES

CONTINUE WORKING SAFELY

NO

SAFELY **STOP** WORK
CONTACT YOUR SUPERVISOR.

SUPERVISOR CALL AVIRON ASSOCIATES LIMITED TO DISCUSS AND DETERMINE ACTION PLAN

NO

SPEAK TO SUPERVISOR. GET PPE AND PERMIT TO DIG.

YOU SHOULD HAVE PPE AND PERMIT TO DIG?

YES

NO

DO NOT START WORK UNTIL YOU HAVE PPE AND PERMIT TO DIG.

NO

DO NOT START WORK. SPEAK TO YOUR SUPERVISOR BEFORE STARTING AND COMPLETE YOUR TOOL BOX TALK.

YOU SHOULD BE AWARE AND READY NOW?

NO

LEAVE SITE.
SEEK FURTHER TRAINING.

CLIENT Mr + Mrs Hunter

PROJECT Haffenden Farmhouse

NO. 2**4-140.01**

ISSUE Version 1

AVIRON ASSOCIATES LIMITED

OFFICE 01491 413 722
JAMES 07787 771 686

HOW TO IDENTIFY CONTAMINATED SOILS AND WHAT TO DO?

ARE YOU AWARE YOU MAY BE WORKING WITH CONTAMINATED SOILS?

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YOU SHOULD BE AWARE AND READY NOW?

NO

LEAVE SITE.
SEEK FURTHER TRAINING.

CLIENT Kearns

PROJECT Cranford Drive

NO. 24-221.01

ISSUE Version 1

AVIRON ASSOCIATES LIMITED

OFFICE 01491 413 722
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INTERCEPTOR DISCOVERY STRATEGY
&
VERIFICATION PLAN

Client	Kearns Development Limited
Works	Discovery Strategy and Verification Plan
Site	Land to the rar of 162-188 Cranford Drive, Hayes, Ub3 4Lg

Project	Version	Date
24-221.01	1	21 August 2023

This section shall present a method for:

1. General contamination discovery and management.
2. Discovery, Remediation and Verification in the event of interceptor removal.
3. Removal and inspection of the concrete slab and verification of the exposed formation following slab removal.

Should additional contaminative discoveries be made during the below works, the strategy shall require updating.

General Site Discovery Strategy

Whilst the investigations undertaken on the site to date have been as thorough as conditions allowed, it remains possible that previously unexpected soil conditions may be encountered during the construction process. Examples may include, potential for asbestos, remnant demolition materials containing deleterious substances, black ashy materials, soils exhibiting strong odours, brightly coloured materials, and oily pockets within the soil.

During site clearance and groundworks all site operatives should be briefed on the discovery strategy, which provides an action plan should potentially contaminated materials be identified during works.

The Discovery Strategy flow chart should be:

1. Affixed to the site office notice board;
2. Form part of the site induction for all operatives;
3. Form part of the site health and safety file.

The Discovery Strategy flow chart should be printed and laminated.

Each site operative should be aware of their duties in the event of a potential 'contamination' discovery.

Any discovery of previously undiscovered contamination should be reported to the Local Planning Authority (LPA) and appropriate management of this must be approved by the LPA.

The action of discovery applies in the event local soil contamination is discovered. Thus, variations to this plan may be necessary following the results of 'Discovery Works' and should this be so further revisions of this VP shall be prepared and consulted; hence this VP remains a live document.

Interceptor Discovery Strategy

An interceptor is located in the west of the site (Figure 5).

The following discovery (and remediation strategy) along with verification plan shall be adopted in the event interceptor are removed from site:

1. Appoint competent contractor to undertake the works who is expected to be the main groundworkers contractor (principal contractor).
2. The contractor should prepare any necessary notifications to the HSE and any necessary RAMS.
3. Notify the remediation engineer prior to demolition and site clearance. The remediation engineer should be in attendance during works for the purpose of advising, recording and to take suitable photographs.
4. The interceptor should be pumped dry, de-gassed, cleaned and readied for removal. As necessary appoint a suitable contractor to complete this task and retain waste transfer notes for the disposal of any product resultant from pumping and cleaning the tank.
5. Under controlled conditions remove the interceptor from site. Dispose of by means of a registered waste carrier to a suitably licensed and appropriate waste management facility. As necessary trench support may be required.
6. Carefully complete excavation(s) within the area of the interceptor to identify the vertical and lateral extent of potentially impacted/contaminated material. It is expected contamination material shall be easily identified by a dark grey/black colouration and hydrocarbon/oil odour.
7. The excavation should be inspected, and any gross soil contamination removed to a point where hydrocarbon soil contamination has been 'chased out' and 'clean' natural soils are present within the resultant void(s).
8. Waste soils should be quarantined and safely stockpiled/covered if they cannot not be directly loaded to haulage vehicles and disposed of at a suitable waste management facility.
9. A photographic and written log of the exercise should be made.
10. Soil verification samples should then be collected from the resultant excavation(s) to demonstrate the absence of hydrocarbons.
11. The location and number of samples shall be dependant on the size of the excavation(s) though should be collected from the sides and base from exposed soils on the internal face/side of the excavation(s) and also the base to determine if excavation works were successful in removing the suspected contamination.
12. Verification samples should be submitted for TPH analysis and assessed against verification targets of the LQM/CIEH S4ULs.
13. The excavation/void should be immediately infilled with clean engineered fill for health and safety reasons.
14. Should excessive hydrocarbon contamination remain; the subject areas shall be further assessed and this 'live' document updated, as necessary, to provide further remediation methods.

Residential with Homegrown Produce
Soil Screening Values
Private Gardens

Determinant	1% SOM (mg/kg)	2.5% SOM (mg/kg)	6% SOM (mg/kg)	Criteria
METALS, SEMI-METALS, INROGANICS + PAH				
Arsenic	37	37	37	C4SL/LQM S4UL
Boron	290	290	290	LQM S4UL
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Chromium IV	6	6	6	LQM S4UL
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Acenaphthylene	170	420	920	LQM S4UL
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Benzo(k)fluoranthene	77	93	100	LQM S4UL
Chrysene	15	22	27	LQM S4UL
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Naphthalene	2.3	5.6	13	LQM S4UL
Phenanthrene	95	220	440	LQM S4UL

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Pyrene	620	1,200	2,000	LQM S4UL
Phenols	78	0.98	1.1	LQM S4UL
TOTAL PETROLEUM HYDOCARBONS				
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Toluene	130	290	660	LQM S4UL
Ethlybenzene	47	110	260	LQM S4UL
o-xylene	60	140	330	LQM S4UL
m-xylene	59	140	320	LQM S4UL
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Aromatic EC 5-7 (benzene)	70	140	300	LQM S4UL
Aromatic EC >7-8 (toluene)	130	290	660	LQM S4UL
Aromatic EC >8-10	34	83	190	LQM S4UL
Aromatic EC >10-12	74	180	380	LQM S4UL
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Aromatic EC >21-35	1,100	1,500	1,700	LQM S4UL
Aromatic EC >35-44	1,100	1,500	1,700	LQM S4UL
Aromatic EC >44-70	1,600	1,800	1,900	LQM S4UL
ASBESTOS				
None Detectable			Aviron Adopted Value	

Appendix

VI Soil Geotechnical Results

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

Job No.	Project Name	Programme	
35782	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG	Samples received	30/07/2024
		Schedule received	28/07/2024
Project No.	Client	Project started	30/07/2024
24-221.01	Aviron	Testing Started	09/08/2024

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%	%	%	%	
WS1	-	0.50	-	D	Orangish brown slightly mottled grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	24					
WS1	-	1.00	-	D	Orangish brown slightly mottled grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	20	96	46	19	27	
WS2	-	0.75	-	D	Orangish brown slightly mottled grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	22					
WS3	-	1.00	-	D	Brown slightly mottled grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	20	95	43	19	24	
WS3	-	2.00	-	D	Light reddish brown slightly mottled orangish brown and grey slightly gravelly very sandy silty CLAY (gravel is fm and sub-angular to rounded)	8.7					
WS4	-	1.00	-	D	Brown slightly mottled dark grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	17					
WS4	-	3.00	-	D	Brown slightly mottled bluish grey silty CLAY	21	100	70	27	43	
WS4	-	4.00	-	D	Dark grey silty CLAY	26	100	70	29	41	

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

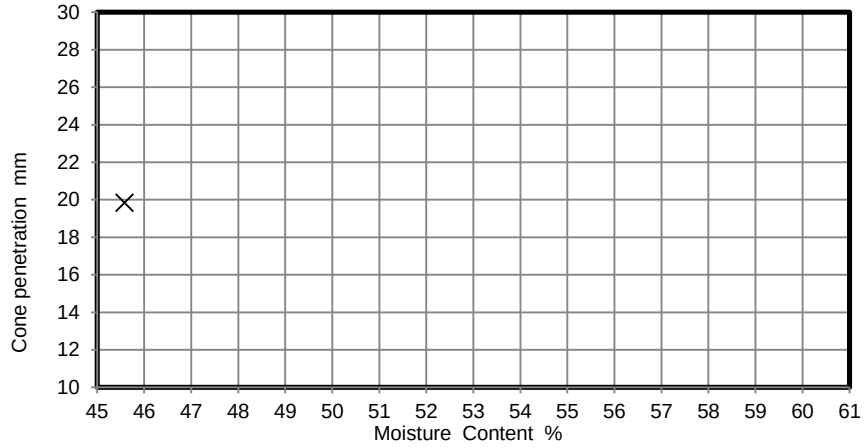
Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved
Initials **J.P**
Date: 13/08/2024

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

				Job No.	35782
				Borehole/Pit No.	WS1
Site Name	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG			Sample No.	-
Project No.	24-221.01	Client	Aviron	Depth Top m	1.00
Soil Description	Orangish brown slightly mottled grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)			Depth Base m	-
				Sample Type	D
				Samples received	30/07/2024
				Schedules received	28/07/2024
				Project Started	30/07/2024
				Date Tested	09/08/2024

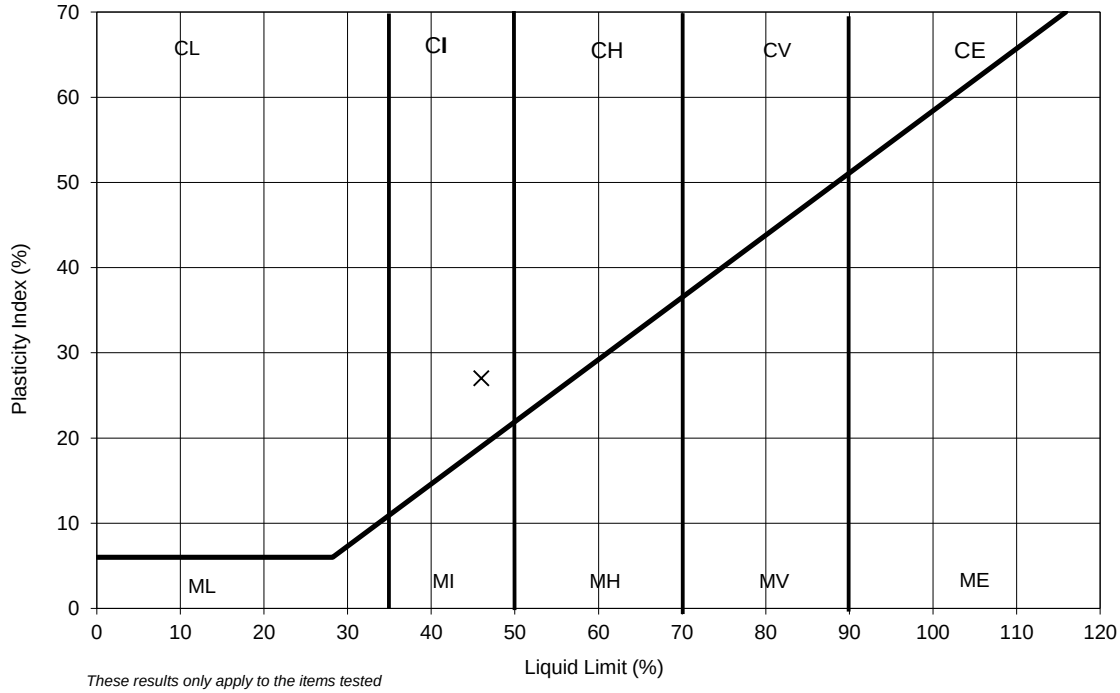


NATURAL MOISTURE CONTENT	**20**	**%**
% PASSING 425µm SIEVE	**96**	**%**
LIQUID LIMIT	**46**	**%**
PLASTIC LIMIT	**19**	**%**
PLASTICITY INDEX	**27**	**%**

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



These results only apply to the items tested

TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 13/08/2024

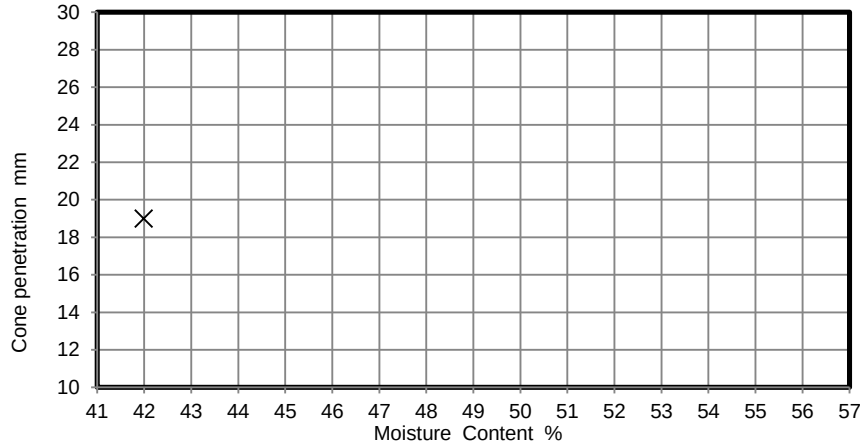
Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

2519

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

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

				Job No.	35782
				Borehole/Pit No.	WS3
Site Name	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG			Sample No.	-
Project No.	24-221.01	Client	Aviron	Depth Top m	1.00
Soil Description	Brown slightly mottled grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)			Depth Base m	-
				Sample Type	D
				Samples received	30/07/2024
				Schedules received	28/07/2024
				Project Started	30/07/2024
				Date Tested	09/08/2024

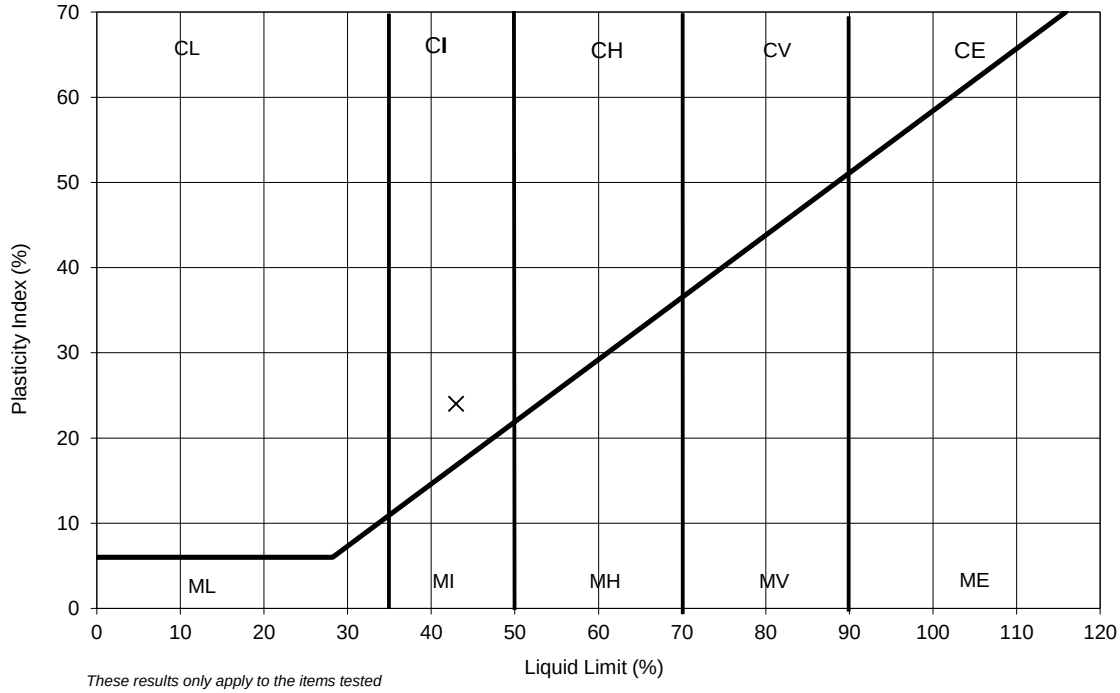


NATURAL MOISTURE CONTENT	**20**	**%**
% PASSING 425µm SIEVE	**95**	**%**
LIQUID LIMIT	**43**	**%**
PLASTIC LIMIT	**19**	**%**
PLASTICITY INDEX	**24**	**%**

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



These results only apply to the items tested

TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 13/08/2024

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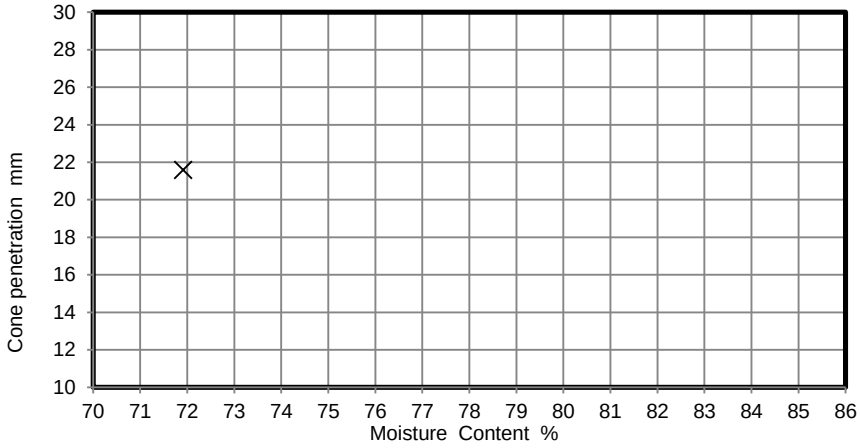
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

				Job No.	35782
				Borehole/Pit No.	WS4
Site Name	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG			Sample No.	-
Project No.	24-221.01	Client	Aviron	Depth Top m	3.00
Soil Description	Brown slightly mottled bluish grey silty CLAY			Depth Base m	-
				Sample Type	D
				Samples received	30/07/2024
				Schedules received	28/07/2024
				Project Started	30/07/2024
				Date Tested	09/08/2024

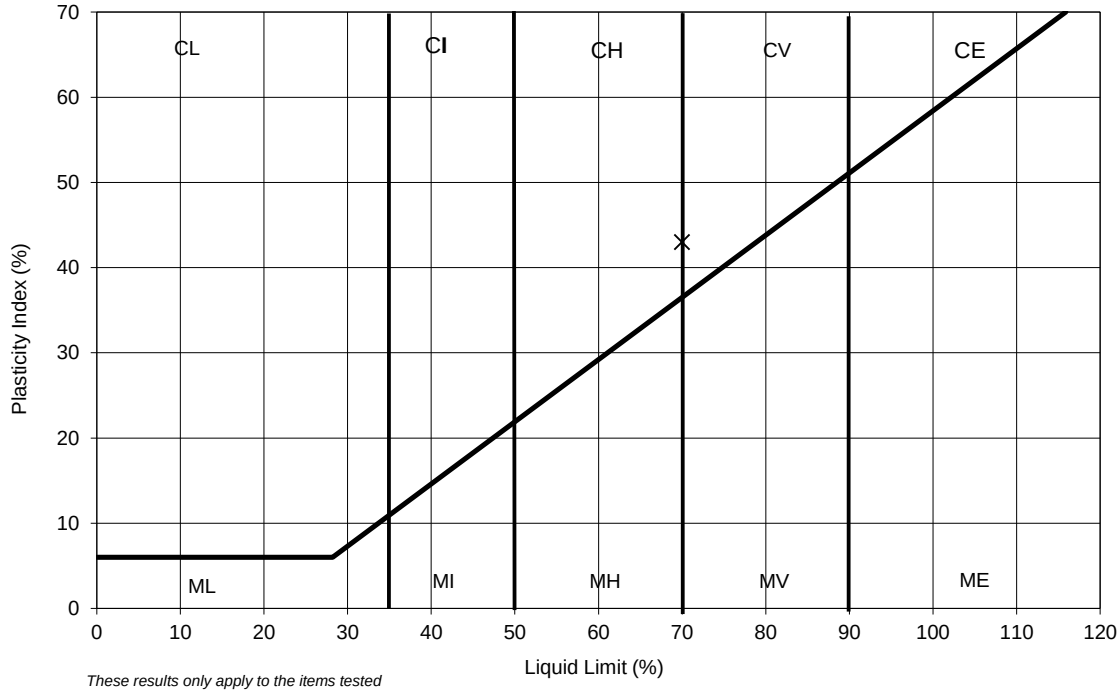


NATURAL MOISTURE CONTENT	**21**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**70**	**%**
PLASTIC LIMIT	**27**	**%**
PLASTICITY INDEX	**43**	**%**

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



These results only apply to the items tested

TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
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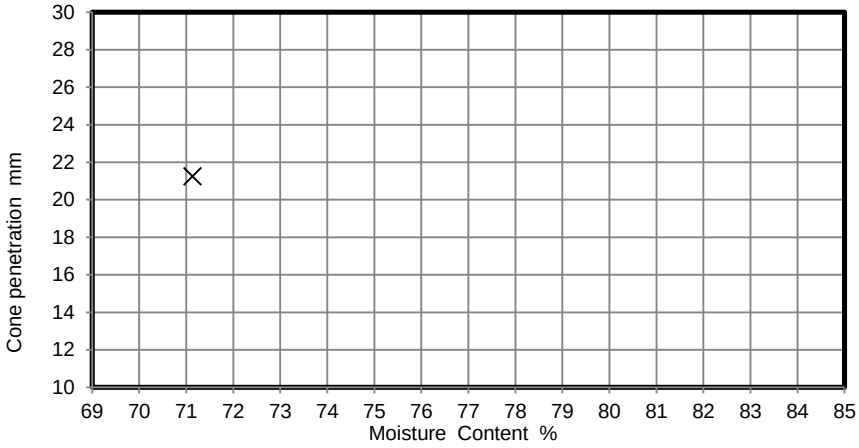
	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX			Job No.	35782
				Borehole/Pit No.	WS4
Site Name	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG			Sample No.	-
Project No.	24-221.01	Client	Aviron	Depth Top m	4.00
Soil Description	Dark grey silty CLAY			Depth Base m	-
				Sample Type	D
				Samples received	30/07/2024
				Schedules received	28/07/2024
				Project Started	30/07/2024
				Date Tested	09/08/2024

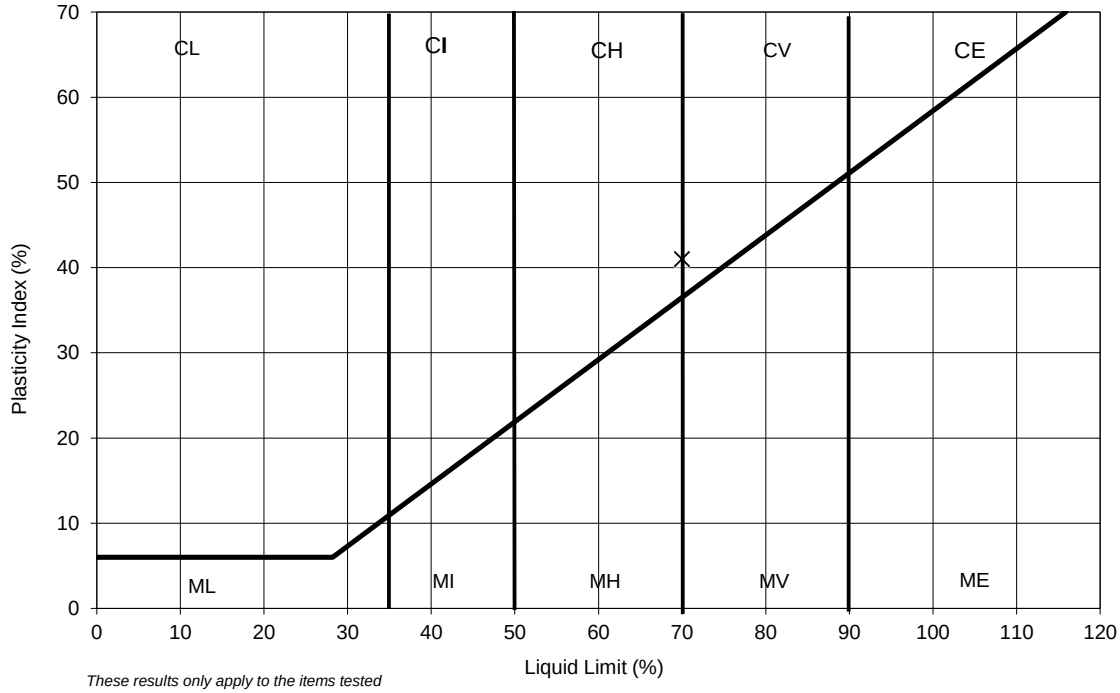


NATURAL MOISTURE CONTENT	**26**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**70**	**%**
PLASTIC LIMIT	**29**	**%**
PLASTICITY INDEX	**41**	**%**

Remarks

Factors corresponding to the cone penetration and moisture content range in Table 1 (BS1377:1990 ; Part 2)

PLASTICITY INDEX



These results only apply to the items tested

TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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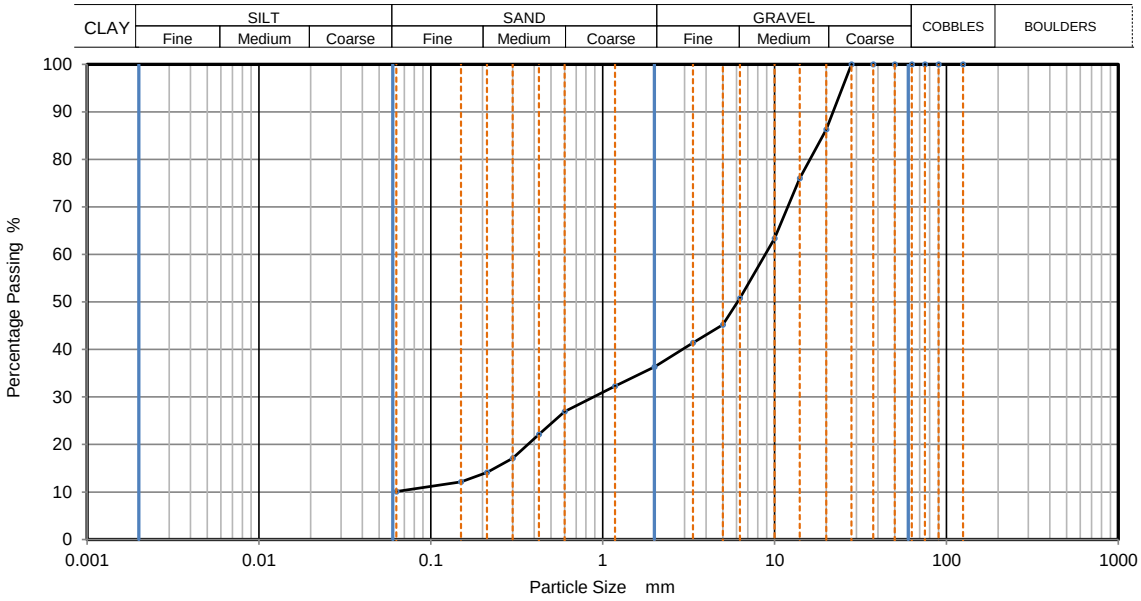
PARTICLE SIZE DISTRIBUTION

				Job Ref	35782
				Borehole/Pit No.	WS4
Site Name	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG			Sample No.	-
Project No.	24-221.01	Client	Aviron	Depth Top	2.00 m
Soil Description	Orangish brown clayey very sandy GRAVEL (gravel is fmc and sub-angular)			Depth Base	- m
				Sample Type	D
				Samples received	30/07/2024
				Schedules received	28/07/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	30/07/2024
				Date tested	07/08/2024

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	86		
14	76		
10	63		
6.3	51		
5	45		
3.35	41		
2	36		
1.18	32		
0.6	27		
0.425	22		
0.3	17		
0.212	14		
0.15	12		
0.063	10		

Sample Proportions	% dry mass
Very coarse	0
Gravel	64
Sand	26
Fines <0.063mm	10

Grading Analysis		
D100	mm	
D60	mm	8.83
D30	mm	0.886
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

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Tel: 01923 711288

Checked and Approved

Initials: **J.P**

Date: 13/08/2024

UKAS TESTING

2519

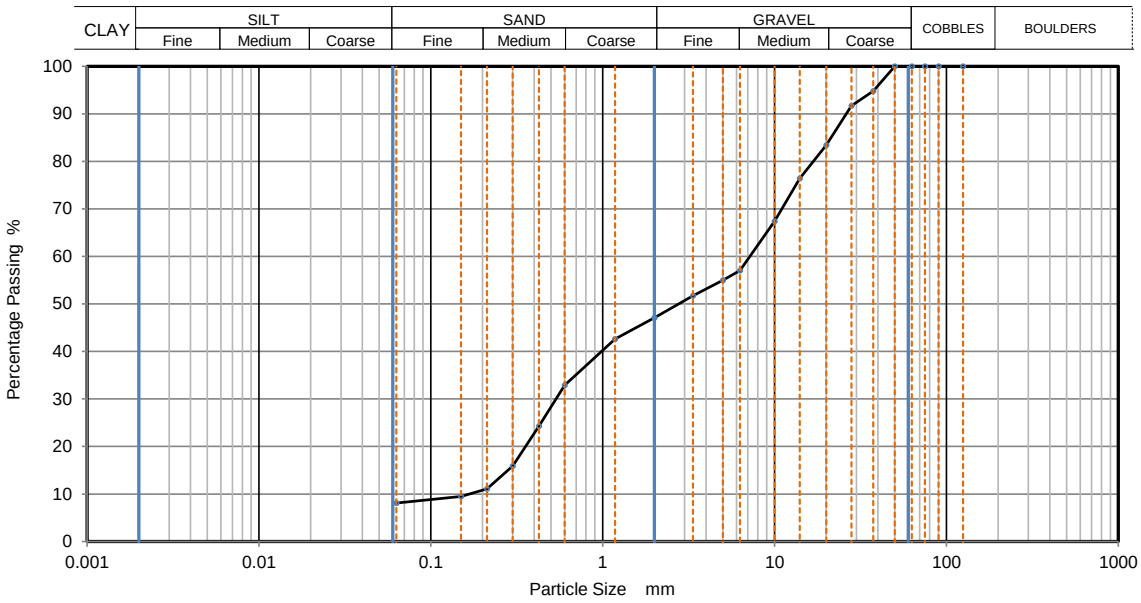
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3

PARTICLE SIZE DISTRIBUTION

Job Ref	35782				
Borehole/Pit No.	SP1				
Site Name	Land to the rear of 162-188 Cranford Drive, Hayes, UB3 4LG			Sample No.	-
Project No.	24-221.01	Client	Aviron	Depth Top	2.00 m
Soil Description	Orangish brown clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	B
				Samples received	30/07/2024
				Schedules received	28/07/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	30/07/2024
				Date tested	07/08/2024

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	95		
28	92		
20	83		
14	76		
10	67		
6.3	57		
5	55		
3.35	52		
2	47		
1.18	43		
0.6	33		
0.425	24		
0.3	16		
0.212	11		
0.15	10		
0.063	8		

Sample Proportions	% dry mass
Very coarse	0
Gravel	53
Sand	39
Fines <0.063mm	8

Grading Analysis		
D100	mm	
D60	mm	7.21
D30	mm	0.535
D10	mm	0.168
Uniformity Coefficient		43
Curvature Coefficient		0.24

Remarks

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Date: 13/08/2024

UKAS TESTING

2519

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MSF-5-R3

Appendix

VII Soil Infiltration Test Results

Soil Infiltration Test

24-221.01: Land to rear of 162-188 Cranford Drive, Hayes, UB3 4LG

Test Pit SP1 - F1

Date: 26/07/2024

Readings Recorded By: DN

Pit Dimensions: **1.5m(l) x 0.45m(w) x 2.1m(d)**

Start Water Level: **0.8m**

Actual Storage Volume: **1.42 m^3**

Effective Depth: **1.30 m**

Time (mins)	Depth BGL (m)
0	0.800
1	0.800
2	0.800
3	0.800
4	0.810
5	0.810
10	0.815
15	0.820
20	0.820
30	0.825
40	0.825
50	0.830
60	0.840
90	0.865
120	0.880
160	0.900
203	0.910
220	0.915

$$\text{Soil infiltration rate, } f = \frac{V_{p75\text{-}25}}{a_{p50} \times t_{p75\text{-}25}}$$

Effective Storage Volume, *V*: **1.5m x 0.45m x 1.3m**

V: **0.8775 m^3**

$V_{p75\text{-}25}$: **0.439 m^3**

Effective Internal Surface Area, a_{p50}: **1.95m2 + 0.585m2 + 0.675m2**

a_{p50}: **3.210 m^2**

Time of water level fall, $t_{p75\text{-}25}$: **- mins**

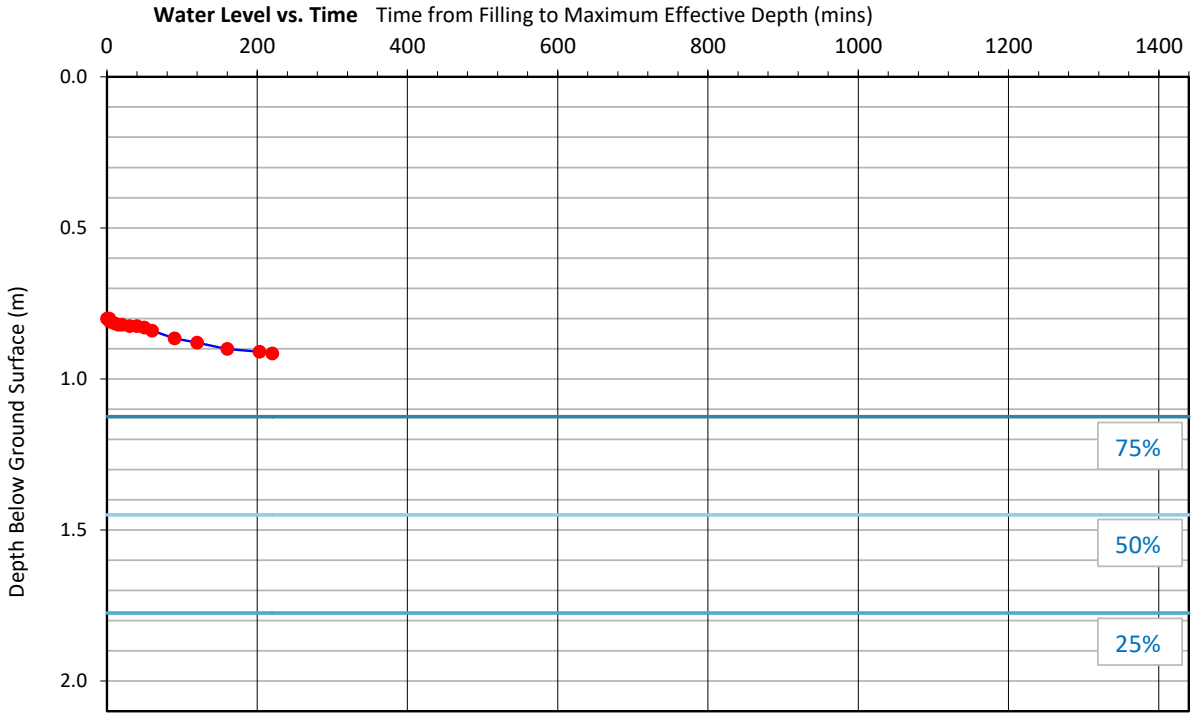
$t_{p75\text{-}25}$: **0 mins**

$t_{p75\text{-}25}$: **0 secs**

Soil infiltration rate, *f* : **0.43875/(3.21 x 0)**

***f* :** **ms^{-1}**

No rate determined



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