

Report prepared at
Land at Hayes End Road
Hayes
London
UB4 8EH

On behalf of
Bugler Homes

Report reference
20-184.01

Report date
September 2020

Prepared by
Aviron Associates Limited

Report Quality Management

Project Name	Land at Hayes End Road, Hayes, London, UB4 8EH		
Project Title	Phase I Geo-Environmental Risk Assessment		
Client	Bugler Homes		
Project Number	20-184.01		
Version	Revision 1		**Date**
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1.0 PROJECT AND SITE INFORMATION

1.1 APPOINTMENT

Aviron Associates Limited (Aviron) was retained by Bugler Homes (the "Client") to prepare a Phase I Geo-Environmental Risk Assessment (GERA) of the following premises:

Land at Hayes End Road, Hayes, London, UB4 8EH (hereafter referred to as the "site").

The purpose of this Phase I GERA is to present a desk-based study to identify potential areas of contaminative concern associated with the proposed residential re-development of the site. Geotechnical advice shall also be provided in regard of new foundations.

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 in Hayes End Road, off the Uxbridge Road, in Hayes End, Hayes. The site is located approximately 2.6 kilometres (km) from Hayes and Harlington Railway Station.
National Grid Ref.	Centred at approximately 508860E, 181920N.
Current Land Use	The site currently comprises a warehouse structure which houses SW Best Cars Limited, a vehicle dealership and Brandon Tool Hire. A vehicle maintenance area is also present within the car dealership. **Figure 1** is presented as the Existing Site Layout Plan. **Figure 2** and **3** is presented as the Site Photographs.
Surrounding Land Use	The site is located within a wider industrial estate located within the larger residential area of Hayes End. The site is directly surrounding with industrial units.
Proposed Land Use	It is proposed existing buildings and redevelopment of the site to provide a building of 5 storeys with flexible commercial floorspace (Class E) at ground floor and residential accommodation (Use Class C3) at upper floors, with associated residential amenity space, landscaping, car and cycle parking, refuse storage and access. **Figure 4** is presented as the Proposed Development Plan.

1.3 SITE RECONNAISSANCE

A site walkover survey was completed on 30 April 2020 included an inspection of the site and surrounding area, where safe and accessible. The purpose of the survey was 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. Internal access was not possible.

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 Walkover Survey

Physical Site Characteristics	
Existing Structures	Brick-built two storey warehouse building with a flat roof located in the centre of the site. A smaller brick-built addition with a pitched roof is located in the north of the site.
Basements	None observed.
Visual Topography and Site Surfacing	Essentially level and comprising building layouts surrounded by concrete surfacing.
Retaining Structures and Slopes	Essentially level.
Drainage Issues	None observed.
Trees and Hedges	Several rough shrubs and semi mature trees are located along the western boundary.
Made and Infilled Ground	Made Ground is anticipated across the site, underlying the existing buildings and hardstanding.
Contaminative Characteristics	
Above or Underground Storage Tanks and Drums	No evidence of ASTs or USTs. Two portable Intermediate Bulk Containers (IBCs) are located in the south of the site, associated with the car dealership.
Fuel Interceptors	Nothing obvious. Typical of interceptor chambers a 3-stage man-hole configuration was not observed within the site.
Waste Storage and Disposal	Several car parts are located in the west of the site. Typical waste bins associated with the office use within the structures present.

Hazardous Material Storage and Use	Two portable IBCs are located in the south of the site, associated with the car dealership. The IBCs hold waste oils and fluids associated with vehicle maintenance.
Asbestos Containing Materials (ACMs)	Potential ACMs within the fabric of the buildings, typically within the roofing. An asbestos survey is recommended prior to demolition.
Boiler Houses	None observed on site.
Sub-stations	None observed on site.
Surface Staining	Surface staining located in the west of the site associated with the car dealership. Generally, 'house-keeping' is reasonably good across remainder of the site.
Potentially Contaminative Activities	Evidence of potentially contaminative activities principally comprise; 1. Generally Made Ground beneath the buildings and hardstanding. 2. The current use as car dealership with car maintenance area.

1.3.1 Summary of Physical Site Characteristics

Consideration should be made to existing below ground infrastructure, including existing foundations which may inhibit the construction of new foundations following grubbing out.

Tree species locally bordering the site should be considered in relation to any required adjustment to foundation depths, and heave precautions should they be necessary.

1.3.2 Summary of Contaminative Site Characteristics

Consideration will need to be made towards the following;

- Generally Made Ground beneath the buildings and hardstanding which may contain commonly encountered contaminants.
- Activities associated with the recent use of the site as car maintenance.

2.0 HISTORICAL REVIEW

Historical Ordnance Survey (OS) maps were obtained as part of the Envirocheck database search within report package reference 241897747 dated 30 April 2020. The information contained in these maps is summarised in the following sections and included within **Appendix I**.

2.1 SITE HISTORY

2.1.1 Summary of Site History - Available Historical Mapping

The earliest available Ordnance Survey map edition of **1868, 1:10,560** indicates that the site comprised several structures within the centre and a larger structure located within the south of the site which also continues off site. The structures appear to form a portion of a wider development described as 'The Shurbbery'. The resolution is low, and the use of the site is not clear from the mapping edition.

No changes have occurred within the site by the time of the **1895-1896, 1:2,500** mapping edition.

The **1914, 1:2,500** mapping edition shows that no significant changes have occurred within the site. The southern structure is now annotated as Hayesend House.

The **1935, 1:2,500** mapping edition shows that no significant changes have occurred within the site.

The **1961-1966, 1:2,500** mapping edition shows that the initial structures located within the site and to the south of the site have been removed. The site has now been redeveloped with a large structure located within the centre of the site with an undeveloped strip surrounding the structure. No annotation is present detailing the use of the site.

The **1975, 1:1,250** mapping edition shows that no significant changes have occurred within the site. The structure is now annotated as a Warehouse.

The **1990-1995, 1:10,000** mapping edition shows that no significant changes have occurred within the site.

The **2003, 1:10,000** mapping edition shows that no significant changes have occurred within the site.

The **2013, 1:10,000** mapping edition shows that no significant changes have occurred within the site.

The current mapping edition, **2020, 1:10,000**, shows that the site remains unchanged and appears as found within the walkover survey.

2.1.2 Summary of Site History

The historical mapping indicates the site was initially (1868) located within a rural setting and appears to comprise a range of smaller structures and a portion of a larger farmstead. The site remained unchanged up to the 1961 mapping edition where the site was redeveloped with the addition of a large warehouse structure in the centre of the site. The warehouse appeared to remain unchanged up to the current mapping edition and walkover survey. The current mapping shows that the site is now located within a wider industrial estate.

2.2 SURROUNDING LAND HISTORY

Table 2.2 provides a summary of historical land uses in the immediate vicinity of the site. This is approximately defined by the search buffer at a radius of approximately 500m on the 1:10,500 and 1:10,000 maps and 250m on the 1:2,500/1:1,250 maps.

Table 2.2 : Historical Surrounding Land Uses

Surrounding Features	Dates from mapping	Approximate distance	Direction
Numerous ponds - Redeveloped as residential properties	1868 1914-1961	200m-450m	W, NW, E & S
Continued residential development	1914-current	50-500m	All
Wider industrial estate comprising several warehouses, depots and garages	1961-current	0-150m	All
Garage	1975-current	270m	W
No further significant land uses have been observed in the historical data set within the specified vicinity to the site.			

2.2.1 Summary of Surrounding Land History

The historic mapping shows that the surrounding area within the initial mapping edition (1868) comprised a predominantly rural setting with several farms/farmsteads with sparse residential development. Residential development appears to significant began by the 1914 mapping edition which continued up to the current mapping. The 1961 mapping edition shows the development of the wider industrial estate, within which the current site is located. The 1961 and later 1975 mapping shows the addition of serval industrial buildings within approximately 150m of the site. The structures comprise garages, depots and warehouses. The current mapping edition shows that the site is now situated within an urban setting with surrounding

industrial structures which are then surrounding with widespread residential developments.

2.3 ARCHAEOLOGICAL CONSIDERATIONS.

None noted within the historical dataset within the immediate vicinity of the site. The Local Authority archaeological officer has not been contacted as part of our instruction.

3.0 ENVIRONMENTAL SETTING

Unless otherwise stated Geo-Environmental Setting information has been obtained from Landmarks Envirocheck Database and Geology Datasheets within report package ref. 241897747 dated 30 April 2020. These are included as **Appendix II**.

3.1 ANTICIPATED GEOLOGY

The British Geological Survey (BGS) sheet 255 (1:50,000 edition) of Beaconsfield was consulted, and presented within table 3.1 is the anticipated geology.

Table 3.1 : Anticipated Geology

Stratum	Age	Possible Thickness (m)	Typical Description	Aquifer Status
Artificial/Made Ground				
None noted below the site	N/A	N/A	N/A	N/A
Superficial				
Boyn Hill Gravel Member	Quaternary-Hoxnian to Wolstonian	1-9m, average 5m	Sand and gravel, with possible lenses of silt, clay or peat.	Secondary (A) aquifer
Solid				
London Clay Formation	Palaeogene - 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

There are no fault lines recorded within 250m of the site.

The Envirocheck report indicates that there are no references to 'artificial ground' noted within 1000m of the site.

3.2 BGS HISTORICAL BOREHOLE RECORDS

There is one historic BGS borehole log available for historic drilling works undertaken within the vicinity of the site. The record was situated approximately 80m to the north east of the site dated August 2002. No information is provided regarding the strata encountered, or groundwater depths within the borehole.

3.3 HYDROGEOLOGY

The hydrogeology of the site has been determined by the superficial and the solid geology of the Boyn Hill Gravel Member and the London Clay Formation, which according to the Envirocheck report and the GOV.UK website are classified as a secondary (A) aquifer and unproductive strata respectively. Secondary (A) aquifers comprise permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. Unproductive strata comprise rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The groundwater vulnerability for the natural (superficial) strata beneath the site is noted to be a 'Secondary Superficial Aquifer - Medium Vulnerability'.

Both the Envirocheck report and the GOV.UK website (April 2020) indicate that the site is not located within a source protection zone.

The Envirocheck report indicates that there are multiple groundwater abstraction licences recorded for premises within 2000m of the site. The nearest licence refers to groundwater abstracted at a location 28m to the south east, for the purposes of 'Horticulture and Nurseries: Spray Irrigation - Spray Irrigation Definition Order'. There are six licences in place which reference drinking as an abstraction use. All of which are operated by Hillingdon Hospital NHS Trust, situated between 1899m and 1922m to the west of the site.

3.4 HYDROLOGY AND FLOODING

The Envirocheck report indicates that the nearest surface water is located 674m to the north east, comprising an inland river.

There are no records in the Envirocheck report relating to surface water abstraction licenses, including 'potable water' for premises within 2000m of the site.

The Envirocheck report indicates that there are no prosecutions or enforcements relating to controlled waters noted in connection with premises within 500m of the site.

The Envirocheck report indicates that there are no records in connection with pollution incidents to controlled waters within 250m of the site and no records detailing discharge consents for premises within 250m of the site.

The Envirocheck report indicates that there is one 'Local Authority Pollution Prevention and Controls' noted

in connection with premises within 250m of the site, at the location of a Texaco petrol filling station (PFS) 28m to the south. The PFS appears to be no longer in use.

The Envirocheck report indicates that the site is NOT at risk of flooding from rivers or seas without defences, and is NOT at risk of 'extreme' flooding from rivers or seas without defences. The Environment Agency website (April 2020) indicates that the site is NOT located within a Flood Zone 2 and a Flood Zone 3.

The site is not located in an area that benefits from flood defences. The site area is not shown to be used for flood storage.

The Envirocheck report indicates that the site is NOT located in a 1 in 30, 1 in 100 or 1 in 1000 year surface water flood extent.

The Envirocheck report indicates that the site is located within a BGS groundwater flooding susceptibility area, where there is 'potential for groundwater flooding to occur at surface'.

3.5 WASTE MANAGEMENT, LANDFILLING AND GROUND GAS

Information from the Envirocheck report and the Environment Agency website indicates that there are no landfill sites located within 500m of the site.

The Envirocheck report indicates that there are no records of potentially infilled land (Non-water) within 250m of the site.

There is one record of potentially infilled land (water) within 250m of the site. The record is located 217m to the north east of the site comprising 'Unknown Filled Ground (Pond, Marsh, River, Stream, Dock, etc), dated 1960. Then pond is shown on the historic mapping editions up to the current mapping where it appears to have been infilled and redeveloped.

The Health Protection Agency (HPA) records indicate that the property is located within an area where <1% of properties are above the Radon Action Level, and that radon protection measures are not required.

Based on the above information gained through the desk-based research table 3.3 summarises the gas risk for the site. 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 objective of this exercise is to determine if potentially unacceptable ground gas risks exist and further investigation and assessment is necessary.

Table 3.3 : Preliminary Ground Gas Risk Assessment

Potential Source	Risk	Risk Rating	Rationale
Made Ground (CO_2 + CH_4)	Human health Explosion	Moderate	Made Ground anticipated underlying the existing development. Surface staining with regards to hydrocarbon contamination noted during the site walkover. Historic industrial use of the site and surface staining with regards to hydrocarbon contamination noted during the site walkover. Potential for degrading hydrocarbons within underlying Made Ground pose risk for ground gas migration into proposed development.
Alluvial Strata (CO_2 + CH_4)	Human health Explosion	Negligible	No alluvial strata reported near the site.
Landfills (CO_2 + CH_4)	Human health Explosion	Negligible	No landfills identified within 500m of the site.
Infilled Ground (CO_2 + CH_4)	Human health Explosion	Low	Numerous infilled ponds have been noted within the historic mapping editions. It appears all of which have been redeveloped as residential properties. Therefore, it is not considered a risk is posed from the historic ponds and a low risk has been assigned.
Coal and Mining (CO_2 + CH_4)	Human health Explosion	Negligible	Non-coal mining areas. Mining not anticipated.
Radon	Human health	Very Low	<1% of homes above action level. Radon protection not recommended.
COMBINED RISK RATING = MODERATE			

A MODERATE risk from ground gas ingress and explosion is considered due to the historic use of the site and the presence of surface hydrocarbon staining within the site.

Ground gas monitoring is considered necessary.

4.0 REGULATORY INFORMATION, CONSULTATIONS AND OTHER

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

4.1 STATUTORY REGISTERS AND AUTHORISATIONS

Table 4.1 includes the statutory registers and authorisations that relate to the site and surrounding area.

Table 4.1 : 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	1 – Texaco PFS 28m S	0
Local Authority Pollution Prevention and Control Enforcements	0	0
Pollution Incidents to Controlled Waters	0	0
Substantiated Pollution Incident Register	0	0
Prosecutions Relating to Authorised Processes	0	0

Table 4.1 : Statutory Registers and Authorisations

Records of Radioactive Substances	0	0
Records of Water Industry Act Referrals	0	0
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
Records of Part 2A EPA 1990 sites	0	0
Fuel Stations	22m S – Hayes End Service Station, Texaco - closed	354m W – Uxbridge Service Station - obsolete
Industrial Land Use	Notable Contemporary Trade Directory Entries noted for premises within 100m: 0m N – Mangajo – Soft Drink Manufacturers – Inactive. 0m NE – Brandon Hire – Lifting Equipment – Active. 17m SW – Quality Tyre Services – Tyre Deals. Inactive. 17m SW – Road Link UK – Car Dealers, Active. 17m SW – Keeler Motor Group Ltd, Exhaust and Shock Absorber Centres, Inactive. 22m S – Quality Tyres, Tyre Dealers/Garage Services, Active. 22m S – Hadley Motors, Car Dealers, Active. 49m S – Keeler Tyre & Exhaust Centre, Exhaust and Shock Absorber Centres, Inactive. 64m W – Jewson, Builders Merchants, Active. 72m W – Mule, Precision Engineers, Inactive. 84m SW – Orange Ironing, Ironing and Home Laundry Services, Inactive. 95m W – Xpress Tools and Fittings, Builders' Tools and Equipment	

Table 4.1 : Statutory Registers and Authorisations

	Manufacturers, Inactive. 97m W – Draypark Motors, Wheel Manufacturers, Active.	
National Grid High Voltage Underground Electricity Transmission Cables	0	0
National Grid High Pressure Gas Transmission Pipelines	0	0

4.2 CONSULTEES

4.2.1 Local Authority - Contaminated Land Officer

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

4.2.2 Local Authority - Building Control Officer

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

4.2.3 Local Authority - Petroleum Officer

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

4.2.4 Environment Agency - Contaminated Land and Groundwater

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

4.2.5 Coal Authority and Mining Searches UK

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

4.2.6 Sensitive Land Uses

The Envirocheck report indicates that an Area of Adopted Green Belt is located 12m to the east of the site.

5.0 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

5.1 METHODOLOGY

A Preliminary Risk Assessment (PRA) and Conceptual Site Model (CSM) have been prepared in accordance with CLR11 based on the information obtained as part of this desk study and site inspection. Possible risks associated with potential source of contamination and sensitive receptors identified have been assessed via a source-pathway-receptor (SPR) model in accordance with current UK protocols.

A risk may only exist where a plausible SPR linkage is presented and where the quantity or concentration of a contaminant is sufficient to pose harm. Under the statutory definition "Contamination" may only exist where contaminants pose a risk of harm to a receptor. Risk may be defined as a function of the likelihood and severity of any adverse effects resulting from a contamination event. This risk classification has been assessed in accordance with CIRIA C552. A summary of how risk is derived and the associated definition is presented in tables 5.1.1 and 5.1.2.

Table 5.1.1 : 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 5.1.2 : Risk Ratings Definition

Risk Rationale	Definition
Very high risk	A high probability that sever 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.

5.2 POTENTIAL SOURCES OF CONTAMINATION

Based on the desk study and site inspection completed table 5.2 presents a summary of the potential sources identified.

Table 5.2 : Potential Sources

Source	Description	Potential Contaminants	On/off-site
1. Made Ground/Soil Contaminants	The historic development of the site comprising a 'warehouse' and the current use as a car sales and tool hire business poses a risk of potentially contaminated Made Ground. Contemporary Trade Directory Entries reference an inactive soft drink manufacturer.	Metals, hydrocarbons (TPH/PAH), volatile organic compounds, asbestos	On
2. Ground gases/vapours	Degrading hydrocarbons within soils/groundwater beneath the site. Along with former petrol filling stations in the vicinity of the site.	Methane, carbon dioxide and soil vapours associated with the site and infilled land may migrate within the Boyn Hill Gravel Member towards the site	On and Off

5.3 PATHWAYS

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

Table 5.3 : Plausible Pathways

On-Site and Locally
Direct contact; By humans and infrastructure
Underlying geology/hydrogeology; secondary (A) aquifer over unproductive strata
Inhalation and ingestion
Surface run-off/drainage

5.4 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 5.4 examines the potential receptors.

Table 5.4 : 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	Communal gardens and planted borders proposed across the site	Yes
Adjacent land users	Sensitive land uses identified in the immediate vicinity	Adjacent commercial and residential properties which could be affected by run-off or migration	Yes
Soft landscaping	Areas of new planting including lawns	Areas of soft landscaping within proposed development	Yes
Water supply pipes	Plastic pipework for potable water supply to new apartments 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 where potentially contaminated Made Ground could exist and pyritic ground	Yes
Groundwater	Controlled waters (aquifers) beneath the site	Secondary (A) aquifer. Potential contamination may leach downwards or laterally off-site	Yes
Surface waters	Controlled water such as lakes, streams, rivers or coastal waters	No surface water within 250m of the site	No
Ecological receptors	Sensitive areas of ecological significance defined under Part 2A of EPA 1990	Area of adopted green belt located 12m to the east of the site.	Yes

5.5 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 5.5.

Table 5.5 : Initial Conceptual Site Model (for plausible pollutant linkage pathways)

Source	Receptor	Pathway	Probability	Consequence	Risk & Justification
Source 1 *Potentially contaminated Made Ground*	Construction workers	Direct contact	Low likelihood	Medium	Moderate/Low Historic development of the site as 'warehouse' along with current use of site as car dealership and builders' tool hire pose risk of common Made Ground contamination. Surface hydrocarbon staining noted within the car dealership during site walkover. Short term risk to adults not expected to be significant. **Wear PPE.**
	End users	Direct contact	Likely	Medium	Moderate Historic development of the site as 'warehouse' along with current use of site as car dealership and builders' tool hire pose risk of common Made Ground contamination. Surface hydrocarbon staining noted within the car dealership during site walkover. **Complete Ground Investigation to quantify risk and target areas of known risk due to surface staining.**
	Adjacent land users	Direct contact via run-off	Low likelihood	Medium	Moderate/low Historic development of the site as 'warehouse' along with current use of site as car dealership and builders' tool hire pose risk of common Made Ground contamination. Surface hydrocarbon staining noted within the car dealership during site walkover. Site comprising footprint of structure or concrete hardstanding preventing significant run off.

	Soft landscaping	Root uptake	Likely	Medium	Moderate Historic development of the site as 'warehouse' along with current use of site as car dealership and builders' tool hire pose risk of common Made Ground contamination. Made Ground not considered to be physically suitable to sustain plant growth. **Complete Ground Investigation. Any new planting will require a suitable thickness of Topsoil to support plant growth.**
	Water supply pipes	Direct contact	Likely	Medium	Moderate Historic development of the site as 'warehouse' along with current use of site as car dealership and builders' tool hire pose risk of common Made Ground contamination. Potential for Made Ground at depths of proposed water supply. **Complete Ground Investigation and consult local water authority.**
	Buildings & infrastructure	Direct contact	Likely	Medium	Moderate Aggressive ground conditions within Made Ground could attack concrete (sulphur attack). **Complete Ground Investigation.**
	Groundwater	Via underlying hydrogeology	Likely	Medium	Moderate Potentially contaminated Made Ground anticipated to exist beneath the site surfacing this may impact the underlying Secondary A aquifer. **Complete Ground Investigation.**

	Ecology	Direct contact via run-off	Low Likelihood	Medium	Moderate/low Potentially contaminated Made Ground anticipated to exist beneath the site. Local area of adopted Green Belt to the east of the site. Site predominantly covered with structural footprint and concrete hard standing preventing run off to adjacent land. **Complete Ground Investigation.**
Source 2 *Soil ground gases*	Construction workers	Inhalation of vapours/gas	Likely	Mild	Moderate Historic development of the site as 'warehouse' along with current use of site as car dealership and builders' tool hire pose risk of common Made Ground contamination. Surface hydrocarbon staining noted within the car dealership during site walkover. Risks present for potential degrading hydrocarbon within underlying Made Ground posing ground gas risk. Risk mitigated working in outdoor air.
	End users	Inhalation of vapours/gas	Likely	Medium	Moderate/Low Made Ground anticipated underlying existing structure. Surface hydrocarbon staining noted within the car dealership during site walkover. Risks present for potential degrading hydrocarbon within underlying Made Ground posing ground gas risk. **Complete ground gas monitoring to confirm risk potential.**

The overall environmental risk classification for the site is **MODERATE** as a result of the historic development of the site and site environs, to present day and the current use.

5.5 CONTAMINANTS OF CONCERN FOR FUTURE SITE INVESTIGATION

Based on the known current and historical site and surrounding land uses the following analytical suites should be selected for future ground investigation works chemically assess soil quality;

- Aviron's "Suite 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 PAH, total phenols, pH and Organic Matter. **In relation to general Made Ground quality associated with identified Source 1.**

- Total Petroleum Hydrocarbons (TPH CWG). **In relation to activities associated with Source 1.**

- Asbestos. **In relation to activities associated with Source 1.**

- Volatile Organic Compounds (VOC). **In relation to activities associated with Source 1.**

The listed suites of analysis are considered suitable and will provide a screening for the majority of commonly found soil contaminants for the identified risk areas.

6.0 GEOTECHNICAL CONSIDERATIONS

6.1 GEOLOGICAL AND SUBSIDENCE RISK

Table 6.1 indicates potential mining and subsidence potential hazards identified within the Envirocheck report for the site. These should be considered in terms of the proposed re-development.

Table 6.1 : Mining and Subsidence

Item	Potential Hazard
Shrink-Swell Clay	Low
Landslides	Very Low
Ground Dissolution of Soluble Rocks	No Hazard
Compressible Deposits	No Hazard
Collapsible Deposits	Very Low
Running Sands	Very Low

The site is not located in an area affected by coal mining or natural cavities, nor is it located in a brine compensation area. There are no fault lines recorded within influencing distance of the site.

The Envirocheck report indicates that there are no references to 'artificial ground' noted within 1000m of the site.

6.2 NEW FOUNDATIONS AND DRAINAGE SUMMARY

The required loadings of the proposed development building along with the thickness and consistency of the overlying natural strata of the Boyn Hill Gravel Member, and depth to groundwater beneath the site will determine the feasibility of conventional shallow foundations. However, it is expected that the proposed five-storey building may require piled foundations.

Below ground concrete is likely to be present beneath the site associated with the historical use and more recently as a car dealership and tool hire business that could impact the proposed construction.

Tree species locally should be considered in relation to any required adjustment to foundation depths, and heave precautions should they be necessary

The numerous historic ponds indicate potentially elevated groundwater in the vicinity of the site. Soakaway

drainage in unlikely to be effective given the groundwater anticipated beneath the site.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This Phase I Geo-Environmental Risk Assessment has reviewed a number of desk-based sources of information along with a site inspection to determine any potential environmental and geotechnical risks which may impact the site.

7.1 ENVIRONMENTAL

Table 7.1 summarises the pertinent environmental risks providing advice on further works and assessment.

Table 7.1 : Environment Risk Summary

	Risk No.	Risk Description	Comments
Soils	1	Anticipated (shallow) Made Ground soil contamination from historic and current land use. Risks to construction workers and end-users.	Complete soil sampling and suitable chemical testing. Wear PPE.
	2	Potential deeper soil contamination associated with underground drainage leaks from historic existing site uses. Potential risk to controlled waters/aquifer.	Complete soil sampling and suitable chemical testing.
	3	Impact from Made Ground and hydrocarbon/solvent on soil quality. Risk to water main supply pipe.	Complete soil sampling and suitable chemical testing. Consult local water authority prior to water main installation. Likely barrier pipe will be required.
	4	Made Ground and general chemical soil quality. Risk of chemical attack of buried concrete.	Complete soil sampling and suitable chemical testing.
Groundwater	5	Groundwater anticipated beneath the site in secondary aquifer of the Boyn Hill Gravel Member	Complete groundwater sampling and suitable chemical testing if encountered.
Ground Gas/Vapour	6	Ingress of hazardous ground gases (CH4, CO2) and soil vapours into new building and depleted oxygen.	Complete suitable gas/vapour monitoring and risk assessment. If risk present mitigate by installing gas protection to ground floor slab and wall cavities.

In order to further evaluate and quantify risk a suitable ground investigation shall be required.

7.2 GEOTECHNICAL

The required loadings of the proposed development building along with the thickness and consistency of the overlying natural strata of the Boyn Hill Gravel Member and depth to groundwater beneath the site will

determine the feasibility of conventional shallow foundations.

However, it is expected that the proposed five-storey building will require piled foundations.

Below ground concrete is likely to be present beneath the site associated with the historic use and more recently as a car dealership and tool hire business that could impact the proposed construction.

Tree species locally should be considered in relation to any required adjustment to foundation depths, and heave precautions should they be necessary

Soakaway drainage in unlikely to be effective given the elevated groundwater anticipated beneath the site.

A ground investigation is recommended to determine foundation and drainage design.

8.0 PROJECT INSTRUCTION AND LIMITATIONS

8.1 SCOPE OF WORKS

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

- Site reconnaissance survey, to include inspection of the infrastructure and potential discussions with the owner regarding site activities.
- Procurement of available historical map editions, geo-environmental sensitivity data and British Geological Survey (BGS) borehole records.
- Identification of potential areas of environmental concern relating to current and/or historic site use and surroundings to prepare a refined Conceptual Site Model (CSM).
- Preparation of suitable conclusions and recommendations with regard to the site's suitability for use or the requirement for further assessment and site investigation on the basis of the CSM.

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

8.2 PUBLISHED GUIDANCE

This report follows the technical approach presented in Contaminated Land Report 11 (CLR11) "Model Procedures for the Management of Land Contamination" prepared by the Environment Agency in 2004. CLR11 provides 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 the Environment Agency Guidance on Requirements for Land Contamination Reports prepared by the Environment Agency in 2005.

Notwithstanding the above 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 pollutant linkages as defined in Part IIA of the Environmental Protection Act 1990.

8.3 LIMITATIONS

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

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

9.0 REFERENCES AND OTHER SOURCES OF INFORMATION

Landmark Envirocheck database search report package ref. 241897747, 30 April 2020.

DEFRA and Environment Agency, 2004. Model Procedures for the Management of Land Contamination, Contaminated Land Report 11.

British Geological Survey. Solid and drift edition sheet BGS map 255.

British Geological Survey Website. www.bgs.ac.uk

Environment Agency Website: www.environment-agency.gov.uk

BS10175. British Standards Institute. 2011, Investigation of Potentially Contaminated Land - Code of Practice.

Environment Agency. July 2005. Guidance on Requirements for Land Contamination Reports.

CIRIA. C552. Contaminated Land Risk Assessment. A Guide to Good Practice. January 2001.

Figures

1 Existing Site Layout Plan

2 Site Photographs

3 Site Photographs

4 Proposed Development

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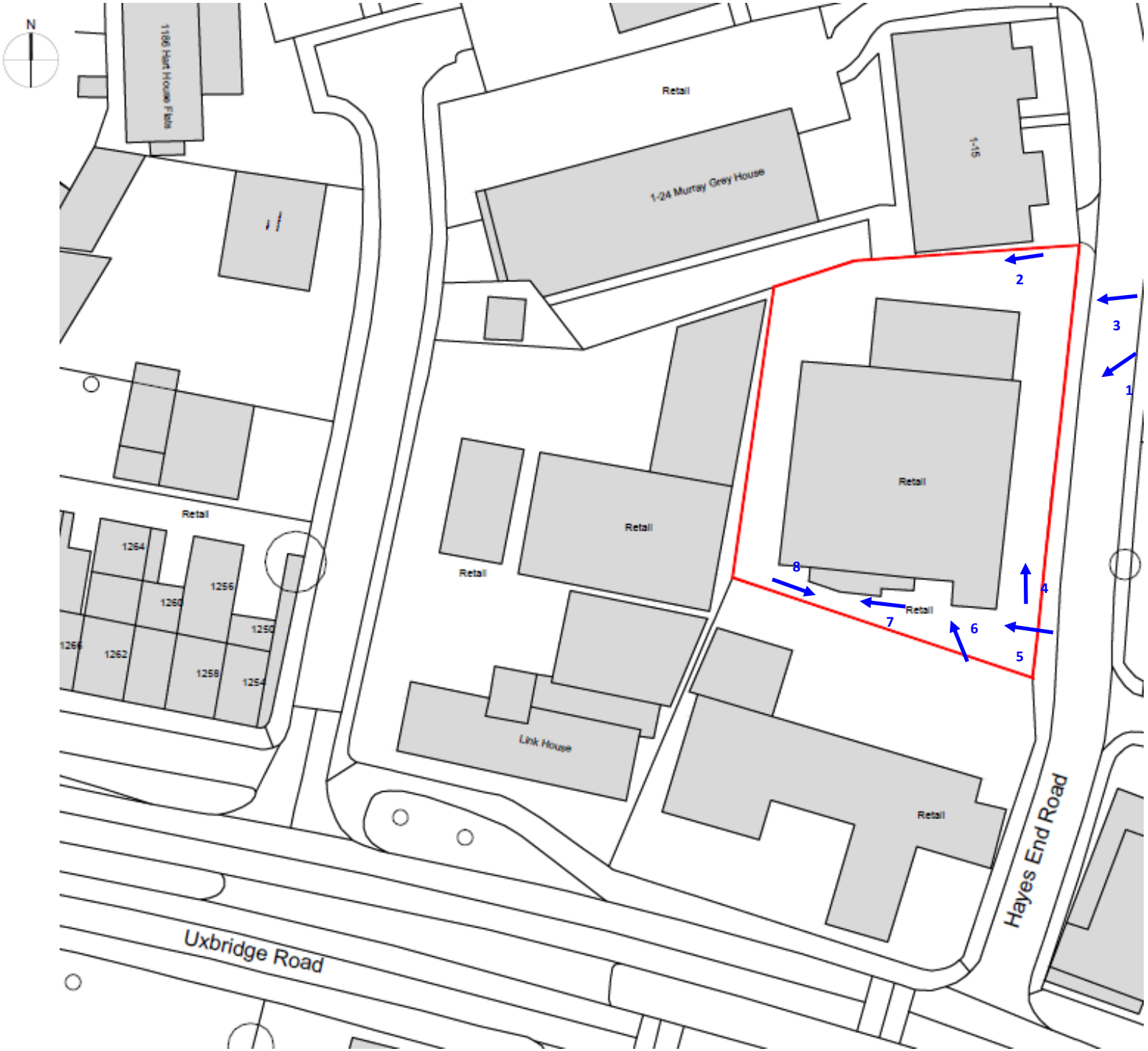

Legend

Development Boundary

Photo Direction

Notes

Drawing provided to Aviron by Client

Figure 1

Drawing Title

Site Location and Existing Layout Plan

Project Number	20-184.01

Project Title

Land at Hayes End Road, Hayes UB4 8EH

Drawn by	OB
Checked by	JB
Scale	NTS

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Photo 1



Photo 2



Photo 3



Photo 4

Legend

Notes

Photographs taken on 30 April 2020

Figure 2

Drawing Title

Site Photographs

Project Number	20-184.01

Project Title

Land at Hayes End Road, Hayes UB4 8EH

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Photo 5



Photo 6



Photo 7



Photo 8

Legend

Notes

Photographs taken on 30 April 2020

Figure 3

Drawing Title

Site Photographs

Project Number	20-184.01

Project Title

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Legend

Notes

Drawing provided to Aviron by Client

Figure 4

Drawing Title

Proposed Development Plan

Project Number	20-184.01

Project Title

Land at Hayes End Road, Hayes UB4 8EH

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Checked by	JB
Scale	NTS

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Appendices

I Historical Maps

II Envirocheck Report

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Appendix

I Historical Maps

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Appendix

II Envirocheck Report

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AVIRON ASSOCIATES LIMITED

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

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

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

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



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