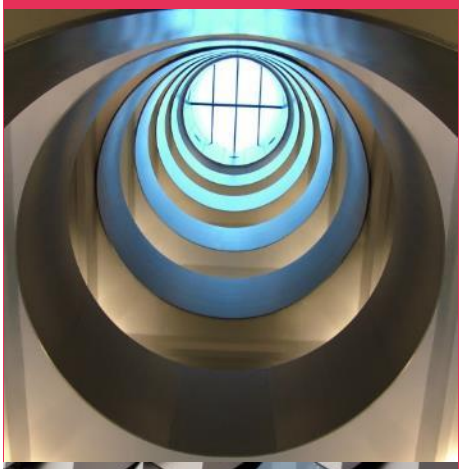

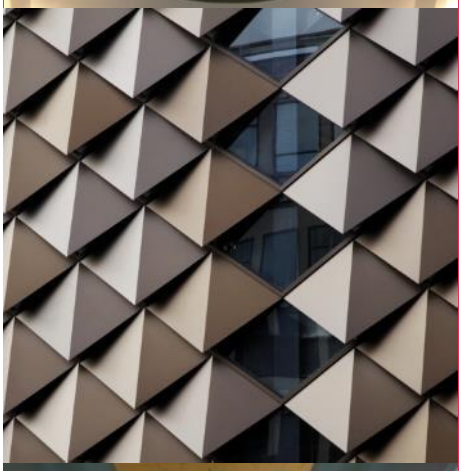

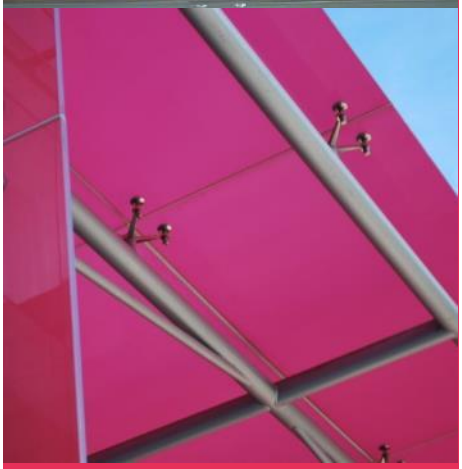

Land to the North-East of Junction 11 of the M40, Banbury

Preliminary Site Assessment

Curtins Ref: 070077-CUR-00-XX-RP-GE-001

Revision: V01

Issue Date: 18 January 2019

Client Name: Monte Blackburn Ltd

Client Address: Euro House, Beehive Trading Park, Haslingden Road, Blackburn, BB1 2EE

Site Address: Junction 11, M40, Banbury, OX16 3AB

Rev	Description	Issued by	Checked	Date
V01	First Issue	LD	RB	18 January 2019

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins Limited with respect to the information contained in the report will not extend to any third party.

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Executive Summary

Appointment	Curtins have been instructed by Euro Garages to undertake a Preliminary Site Assessment or 'Desk Study' for a site referred to as 'Banbury 15', adjacent to Junction 11 of the M40. The PSA reporting has been prepared in support of the proposed re-development of the site and is designed for submission for planning purposes.
Current Site Status	The site comprises a broadly rectangular shaped parcel of open land currently in use as aricultural fields. The site is covered with rough vegetation and grass. A rough track crosses the northern portion of the site from east to west. The site is bounded to the north by agricultural fields, east and south by the A361 and to the west by the M40. The site topography varies is generally level with small surface undulations consistent with the use of the site as agricultural land. The site slopes gently from around 97 mAOD at the northern boundary to around 99mAOD at the southern boundary. Ditches are present across the site.
Site History	From the earliest available mapping in the 1850s until the present day the site is recorded as being occupied by open farmland. The sole exception is the construction of the track which crosses the northern portion of the site from east to west. This track appears on the mapping records from 1924. A small pond is present was formerly present within the south eastern portion of the, likely associated with a spring (natural or otherwise). The spring (recorded as 'rises') is channelled across the southern portion of the site on the historical mapping but no longer recorded from the late 1970s onwards. Other surface water features (drains) are suggested to traverse the site. Evidence of their realignment and probable culverting is noted. The surrounding area (<500m) primarily comprises agricultural fields and associated farm houses to the north and east, whilst to the west and south, the M40 is present along with an industrial estate and the town of Banbury.
Geology	There are no superficial deposits recorded on site, and the bedrock is the Charmouth Mudstone Formation which is a Mudstone unit within the Lower Lias deposits.
Hydrogeology	The bedrock deposits are classified as a Secondary Undifferentiated Aquifer. The development site is not listed within a groundwater Source Protection Zone (SPZ).
Hydrology	The nearest surface water feature is the River Cherwell which flows from northeast to south west, to the north of the site boundary. A small pond was present within the south-eastern portion of the site until the late 1970s. As noted above, the site historically included drain ditches that are either present, present as remnants or are probably culverted across the site.
Initial Ground Contamination Assessment	With reference to the history of the site and immediate surrounding area, the qualitative risk assessment (QRA) determined an overall Low level of risk associated with the proposed development. The risk presented to the development from ground gases is assessed as Moderate to Low at this stage and primarily controlled by potential for ground gases to arise from organic fill material in the former pond.
Recommendations	The following recommendations are made: • Undertake an intrusive ground investigation to support civil and structural design. • Undertake visual, olfactory screening of site soils with contamination screening (laboratory testing) to inform CDM and preliminary waste classification. Additional testing should be undertaken if and where any markers of contamination are revealed. • Undertake GQRA to further assess the risk presented by ground gases on-site. The requirement for additional surveys, e.g. archaeological or ecological, should be confirmed through advice from a suitably qualified and experienced professional.

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Appendices

1.0 Introduction

1.1 Brief

Curtins have been instructed by Euro Garages to prepare a Preliminary Site Assessment or 'Desk Study' for "*land to the north-east of Junction 11 of the M40"* (the site).

The location of the site is illustrated in Figure 2.1 and on plans presented within Appendix A.

This Preliminary Site Assessment in support of a hydrid planning application details of which are presented below:

> *Part A: Full planning application for the development of a new priority junction to the A361, internal roads and associated landscaping with 2 no. commercial buildings having a maximum floorspace of 33,110m^2 and with a flexible use [to enable changes in accordance with Part 6 Class V of the Town and Country Planning (General Permitted Development) Order 2015 (as amended)] within Class B2 or B8 of the Town and Country Planning (Use Classes) Order 1987 as amended, and ancillary Class B1 offices; and,*
>
> *Part B: Outline planning application for the development of up to 2 no. commercial buildings having a maximum floorspace of 16,890m^2 and having a flexible use [to enable changes in accordance with Part 6 Class V of the Town and Country Planning (General Permitted Development) Order 2015 (as amended)] within Class B2 or B8 of the Town and Country Planning (Use Classes) Order 1987 as amended, and ancillary Class B1 offices, with all other matters reserved for future approval.*

1.2 Scope

The Preliminary Site Assessment is intended to provide an overview of the geo-environmental setting of the site of interest. This will include the development of both a working conceptual and ground model for the site as well as an initial assessment of geo-environmental risks that could be presented to the development, intended site users and the wider environment.

Specifically, the Preliminary Site Assessment provides an initial assessment of the site with regard to:

a) Potential contamination of the site strata by historical and or current use.

b) The potential impact on the wider environment by historical and/or current use of the site of interest.

c) The potential impact from surrounding land uses and other environmental factors.

d) Potential problems associated with geological features such as faulting, mineral extraction, mining and land instability.

e) The location of potential sub-surface structures that may affect the proposed redevelopment.

f) The location of above-surface features that may affect the proposed redevelopment.

The Preliminary Site Assessment is a desk-based exercise with no ground investigations or intrusive works undertaken in support of its findings. The desk study can be utilised to establish the requirement for, and extent of, any such work.

2.0 Desk Study

In accordance with the scope identified in Section 1.1, this desk study has been undertaken using the following data sources, publicly available information, and involves no on-site intrusive investigations or testing.

- Envirocheck Report (1) (Appendix B);
- British Geological Society records (2), (3) and;
- UK Radon website (4).

2.1 Current Setting

The site comprises a broadly rectangular shaped parcel of open land currently in use as aricultural fields. The site is covered with rough vegetation and grass. A rough track crosses the northern portion of the site from east to west.

As illustrated in Figure 2.1 below, the site is bounded to the north by agricultural fields, east and south by the A361 and to the west by the M40.

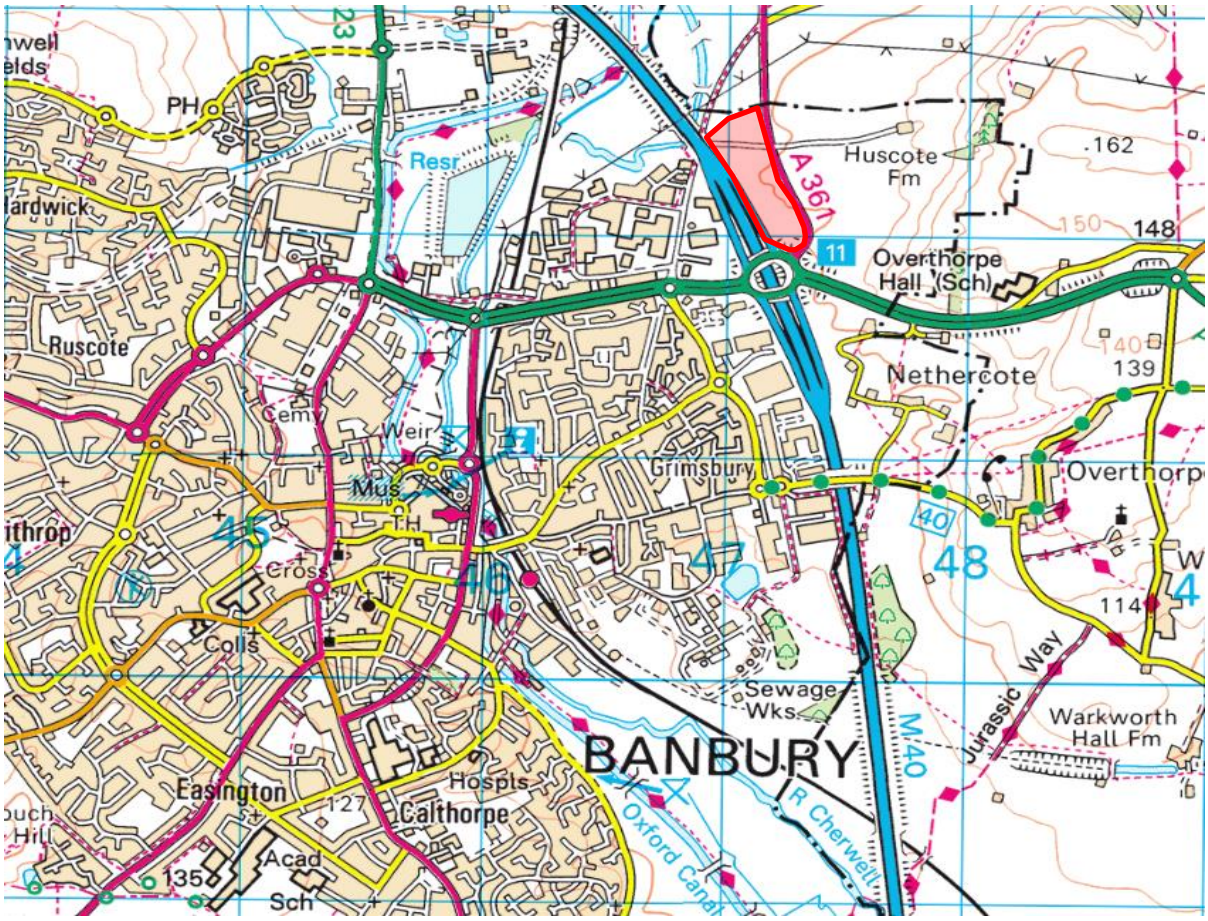


Figure 2.1 *Site Location Plan*

Development site outlined in red. Centre of site located at National Grid Reference: 447149, 242161.

The site topography varies is generally level with small surface undulations consistent with the use of the site as agricultural land. The site slopes gently from around 97 mAOD at the northern boundary to around 99 mAOD at the southern boundary. Ditches are present across the site.

2.2 Surrounding Land Use

Table 2.2 *Surrounding Area Land Uses (current)*

Surrounding Land Uses	N	Agricultural fields.
	E	A361 (road).
	S	A361 (road).
	W	M40 including Junction 11 slip road and verges.

3.0 Site History

A review of the available historical mapping from the Envirocheck Report (1) (Appendix B) and other information for the site and surrounding area has been undertaken and is presented below in Table 3.0a and Table 3.0b respectively.

Table 3.0a *Previous Site Uses and Potential Sources of Contamination*

Date	Description	Potential Sources of Contamination
1850s – Present day	The site has remained unchanged during this period, with the land unoccupied and used for agricultural means. The sole exception is the construction of the track which crosses the site in the north, from east to west. This track appears on the mapping records from 1924. Additionally, a small pond is present on the site boundary in the south east.It is not present on the recent mapping records so it is assumed that is has been infilled.	Potential for unrecorded deposits of Made Ground within the former pond. The presence of fly tipped material on site cannot be discounted.

Table 3.0b *Surrounding Land Uses and Potential Sources of Contamination*

Date	Description	Potential Sources of Contamination
1850s to 1970s	During this time, the surrounding area (<500m) comprised primarily of agricultural fields and their associated farm houses. The area was subject to minimal development. The Davontry Road is present to the west of the site, leading south west away from the site. The River Charwell and Great Western Railway are present within 500m of the site to the north west. 2no. small surface water features (ponds) are present, 1no. on the south eastern boundary and another approximately 50m to the south of the site.	Potential for unrecorded fly tipped material or Made Ground to be present in the vicinity of the site. Mobile groundwater based plumes of contamination arising from industrial estate to the west of the site. Air borne particulates from M40 and to a lesser extent lead (due to Clean Air Act band in 1996) with motorway constructed in the late 1980s / early 1990s.
1970s – present day	The town of Grimsbury (later Banbury) grows gradually over this period >500m to the south east of the site. In the mid 1990s when the M40 was constructed immediately west of the site, an industrial estate was constructed to the west of the M40.	

3.0.1 Unexploded Ordnance

UXO is a historical hazard that affects areas of the UK that have either been; subject to former military use, or historically bombed.

The likelihood of UXO being encountered on this development site is influenced by a number of factors including; the proximity to strategic targets, the nature of the development works being undertaken and evidence of local damage in the post-war periods amongst others. In order to determine the likelihood of UXO being present on a site, a step-wise risk assessment process is followed. This process is outlined within CIRIA C681 '*Unexploded Ordnance: A Guide for the Construction Industry*'.

A hazard screen indicates that the site was unlikely to have been used for military purposes (historical mapping records) and that the site is not located in an area that would have been likely subject to aerial bombing during the war (historical mapping, web-search for bombing near Banbury). Whilst the presence of nearby strategic targets cannot be ruled out and its considered unlikely that the site was bombed during the war.

On this basis, UXO is not considered likely to represent a hazard on the site and therefore the associated risks are considered to be very low and no further risk assessment is recommended.

UXO encounters cannot be discounted during any proposed intrusive works and uncontrolled dumping by home-guard and enemy bombers did occur. Whilst not deemed to be specifically required, good practice supports the adoption of a suitable emergency response plan for any unexpected UXO encounters.

4.0 Geology, Hydrogeology and Hydrology

4.1 Geology and Hydrogeology

A study of the Envirocheck report (1) and BGS Geology of Britain maps (2), (3) indicates the following geological succession underlying the site:

Table 4.1 *Geological/Hydrogeological Succession*

	Geology	Associated Hydrogeological Classification
Superficial	No superficial deposits are recorded on the site.	N/A
Bedrock	Charmouth Mudstone Formation	Secondary Undifferentiated[1]

Notes:

1. This has been assigned in cases when it has not been possible to attribute either catagor A or B to a rock type. Im most cases this means that the layer has previously been designated as both minor and non-aquifer.

The development site is not listed within a groundwater Source Protection Zone (SPZ) and no groundwater abstraction points have been identified on site.

The Charmouth Mudstone Formation is anticipated to have an overall low level of permeability however the Lower Lias group, in general, that includes limestone units, is expected to have variable permeability.

The presene of numerous surface water bodies across the site and the immediate surrounding area (including springs / rises) suggests the groundwater table is relativelty shallow locally to the site.

4.1.1 Existing Ground Investigation Data

No existing ground investigation reporting has been made available or obtained for the site.

A single BGS borehole record (SP44SE184) is present in the centre of the northern half of the site. The available record relates to a trial pit that was excavated in 1978 during the construction of the M40.

The stratigraphy encountered on the site was as follows:

Depth Range	Geological Description
0.0m – 0.2m	Stiff dark brown slightly sandy silty CLAY with roots (Topsoil)
0.2m – 0.6m	Very stiff orange brown and brown mottled very silty CLAY with roots and trace gravel. (possible Alluvium).
0.6m – 2.4m	Firm orange brown and brown mottled grey slightly silty CLAY with trace of fine to coarse sub-angular gravel and fine roots. (weathered Lower Lias).
2.4m – 3.3m	Stiff becoming very stiff grey jointed silty CLAY with occasional fine sand partings and traces of fine toots. Limonite staining on join surfaces. (weathered Lower Lias).
3.3m – 3.4m	Strong grey fine grained LIMESTONE. (Lower Lias)

This stratigraphy is not entirely reflective of the BGS Geology records for the site, however the Charmouth Mudstone Formation is part of the Lower Lias Group which comprises interbedded mudstones, siltstones and limestone.

4.1.2 Mining and Mineral Extraction

The site does not lie in an area of coal mining and the nearest mineral extraction site is 444m south-east of the site, a former clay and shale quarry.

4.1.3 Land Gas

No landfill sites are located within 250 m of the development site. The presence of a small historic pond (infilled) within the south western portion of the site is noted as an isolated and limited source of potential ground gas.

The Envirocheck report (1) and UK Radon Mapping (4) confirms the site is in a lower probability radon area, with less than 1% of properties estimated to be at or above the radon action level.

On this basis, radon protection measures would not be considered necessary for the proposed development. If, and where, any occupiable basement spaces are to be provided within the developments (none shown at this stage), this advice should be revisited.

4.1.4 Ground Stability Issues

The Envirocheck report (1) confirms that there is a low to no hazard from the following ground stability hazards on the site; collapsible, compressible, dissolution, landslide, running sand, and shrinking or swelling clay.

4.2 Hydrology

The nearest surface water feature is the River Cherwell which flows from north-east to south-west, to the north of the site boundary.

A small pond was present within the south-eastern portion of the site until the late 1970s.

As noted above, the site historically included drain ditches that are either present, present as remnants or are probably culverted across the site.

The site is in an area stated to be at very low risk of surface water flooding according to the Envirocheck Report. A Flood Zone 2 is present encroaching on the very northern perimeter of the site.

The Envirocheck report (1) shows there are no discharge consents on-site, but there are two within 250 m.

5.0 Conceptual Site Model & Qualitative Risk Assessment

The Conceptual Site Model (CSM) and Qualitative Risk Assessment (QRA) are presented in the table within this section.

The CSM details the source-pathway-receptor linkages or potential contaminant linkages (PCLs) that have been identified for the site. The QRA details the associated level of risk relating to these PCLs.

The CSM and QRA concern the major risks to human health and controlled waters with additional, more specific risk assessment protocols contained within the main body of this reporting, as detailed in Section 5.1 below.

The QRA follows the framework outlined within CIRIA C552 which is summarised within Appendix C.

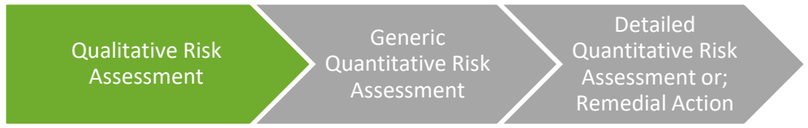
The 'risk rating' within the QRA refers to the risk that the source, pathway, receptor linkage or PCL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation.

5.1 Additional Risk Assessments

The following risk assessments, listed below, are not included within the main CSM and QRA but none-the-less can be of critical importance to the onward development of the site.

- The risk presented by **Ground Stability Hazards** is discussed in Section 4.1.4.
- The risk presented by **Mining and Mineral Extraction** is discussed and assessed in Section 4.1.2.
- The risk presented by **Radon** is discussed and assessed in Section 4.1.3.
- The risk presented by **Unexploded Ordnance** is discussed in Section 3.0.1.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. It has been assumed that any future construction works on site will be undertaken in compliance with these requirements and therefore construction workers involved in the building works at the site have been discounted as a human receptor in the conceptual site model.



- The table below represents the first stage in the land quality risk assessment process; **the Qualitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be brought down to acceptable levels, i.e. low to negligible risk. The purpose of each stage of risk assessment is ultimately to establish if there is a requirement for additional levels of assessment to be made in order to have sufficient confidence to support a risk characterisation or management decision, e.g. remedial action.

Conceptual Site Model			Qualitative Risk Assessment			Action
Source	**Pathway(s)**	**Receptor(s)**	**Consequence (Potential Severity)**	**Likelihood of Occurrence**	**Risk Rating**	
On-site sources of potential contamination: Possible surficial or buried fly-tipped material. Possible Made Ground within former pond area. Ppotential contaminants of concern cannot be reliably evaluated at this stage and subject to investigation.	**Direct contact, ingestion and inhalation (soil, dust and vapours)**	**Future site users** Staff and visitors (public)	**Medium** Chronic health risk	**Unlikely** The site is deemed to have a very low contamination potential with the site history being dominated by farmland use since at least the 1880s.	**Low**	Confirm no free product or gross contamination is present within the soils and if present, undertake appropriate sampling. Contaminative screening of soils for CDM, re-use & preliminary waste classification.
	Vertical migration through unsaturated zone, followed by lateral migration through groundwater unbsaturated zone.	**Controlled waters (Groundwater)** No superficial deposits recorded Bedrock Secondary (undifferentiated) aquifer No SPZ within 250 m of site. No abstractions witin 250 m of the site.	**Mild** Pollution of non-sensitive water resources	**Unlikely** The site is deemed to have a very low contamination potential with the site history being dominated by farmland use since at least the 1880s.	**Very Low**	Confirm no free product or gross contamination is present within the soils and groundwater and if present, undertake appropriate sampling.
		Controlled waters (Surface water) River Cherwell (33 m north-west of site) Quality grade B in 2000.	**Medium** Pollution of sensitive water resources	**Unlikely** The site is deemed to have a very low contamination potential with the site history being dominated by farmland use since at least the 1880s.	**Low**	Confirm no free product or gross contamination is present within the soils and groundwater and if present, undertake appropriate sampling.

On-site and off-site sources of potential contamination: Ground gases associated with small (approximately <30 m at longest point) infilled pond in south-eastern corner of the site. No landfill sites within 250 m of the site boundary.	**Vertical and horizontal migration soils and bedrock**	**Future site users** Staff and visitors (public)	**Severe** Acute health risk, e.g. asphyxiation or risk from explosion	**Unlikely** With reference to BS8576 (2013) Guidance on investigations for ground gas – the on-site natural soil sources are considered to have Very Low gassing potential. With the infilled pond having a Low gassing potential albeit over a very small, discrete area of the site.	**Moderate / Low**	Investigate former pond alignment and, if present on site, undertake detailed logging and organic matter testing on materials recovered to confirm ground gas generation potential.
Off-site sources of potential contamination: Mobile groundwater based plumes of contamination arising from industrial estate to the west of the site. Air borne particulates from M40 and to a lesser extent lead (due to Clean Air Act band in 1996) with motorway constructed in the late 1980s / early 1990s. Potential contaminants of concern include: • Polycyclic aromatic hydrocarbons associated with particulates; • Lead.	**Horizontal migration through the shallow soils and air (dust/particulates)** Followed by direct contact, ingestion and inhalation (dust and vapours)	**Future site users** Staff and visitors (public)	**Medium** Chronic health risk	**Unlikely** The potential migration of off-site contamination from the industrial estate is considered as unlikely at this stage. Surface deposition of particulates and lead is likely to have occurred and, for particulates, be occurring along the site's western boundary. At this stage is considered unlikely that these will present an unacceptable risk to human health above considerations of air qulity associated with the ongoing use of the motorway.	**Low**	Contaminative screening of soils for CDM, re-use & preliminary waste classification.

6.0 Conclusions & Recommendations

This Preliminary Site Assessment has been developed to support the planning application for the proposed Eurogarages Service Station as well as to support the associated civil and structural design work.

6.1 Conclusions

The Preliminary Risk Assessment established that the history and the ground model are, in general, well-known. The presence of contamination cannot be discounted however, in general, considered unlikely.

Informed by: the overall low risk profile of the end use (commercial); the historical use of the site; and revealed soil and groundwater quality, the Qualitative Risk Assessment (Section 5.0) has assessed risk to future site users and controlled waters as being Low to Very Low.

Again with reference to the revealed ground model and existing monitoring data, the Qualitative Risk Assessment has assessed risk to human health from ground gases as being Moderate to Low at this stage specifically in-relation to the small infilled pond within the south-western corner of the site.

6.2 Recommendations

Based on these conclusions it is recommended that additional investigation is completed on site.

6.2.1 Additional Investigation

Additional investigation in the form of a ground investigation is recommended. The ground investigation should be designed to support the engineering elements (civil and structural) of the proposed development as well as enable the following, bulleted geo-environmental items to be resolved:

- Inspection of soils and, where encountered groundwater, for any signs of gross contamination;
    - Targeting of the former pond alignment and any areas of suspected fill.
- Check testing of soils and, where necessary, groundwater to inform construction hazard assessments and preliminary waste classification.

The outline scope of works for the ground investigation is detailed in Section 6.3 below.

6.2.2 Outline Remedial Recommendations

Subject to the findings of the additional investigation detailed above it is considered unlikely that remedial action will be required to reduce risk to acceptable levels.

At this stage it is considered likely that only responsive remedial works would be recommended:

- Preparation of a generic response plan for unforeseen contamination.

As well as demonstrating that any / all imported soils adopted as part of soft landscaping (where necessary) are confirmed to be suitable for use in line with local planning guidelines.

6.3 Outline Scope of Works for Ground Investigation

Minimal sources of contamination have been identified on site as part of the Qualitative Risk Assessment and the risk to the site from contamination is Low to Very Low.

Environmental sampling should only be undertaken if olfactory or visual signs of contamination are noted. On this basis, and in general, a non-targeted sampling strategy is recommended for the Ground Investigation in order to inform civil and structural design. Targeting of the former pond alignment and any areas of suspected fill should be undertaken.

The sampling strategy can be co-ordinated with the geotechnical sampling strategy but should allow adequate coverage of the site in line with current guidance.

It is envisaged that the ground investigation will comprise the following, all undertaken under the supervision of a suitably qualified engineer:

- Machine excavated trial pits to allow bulk characterisation of shallow site soils to inform future earthworks;
- Recovery of soil and, where necessary groundwater. samples to inform geotechnical and environmental assessments.

6.3.1 Contaminants of Concern

It is recommended that screening of the materials arising from the ground is undertaken as a means to: inform CDM requirements for site works; confirm their suitability for retention and/or re-use on site; and confirm preliminary waste classifcication.

Potential contaminants of concern (CoC) associated with the on-site and off-site sources identified within the tabulated Conceptual Site Model in Section 5.0 of this reporting include, but are not limited to:

- Polycyclic Aromatic Hyrdocarbons (PAHs);
- Toxic metals (lead).

The degradable content of the fill within the former pond should be evaluated (logging and sampling where necessary) to assess ground gas generation potential.

It is also noted that broad range environemtnal screening of soils should be considered to support; re-use, preliminary waste classification and/or transport or sale of on-site materials.

The potential for other CoC's to exist that are not listed above is considered unlikely and shall be at the discretion of the supervising Engineer if and where potentially contaminative material is revealed during the site works.

The potential for off-site sources of free product or mobile contaminants within the sub-surface environment is considered unlikely and again, shall be at the discretion of the supervising Engineer.

6.4 Other Considerations

The requirement for additional surveys, e.g. archaeological or ecological, should be confirmed through advice from a suitably qualified and experienced professional.

The presence of culverts across the site is considered likely and should be expected as part of any groundworks, including ground investigations. The advice of a suitably qualified drainage engineer should be sought in this respect.

References

1. **Envirocheck.** *Envirocheck Report, Ref 191367753_1_1.* January 2019.

2. **British Geological Society.** BGS Geology of Britain, http://mapapps.bgs.ac.uk/geologyofbritain/home.html. [Online]

3. —. BGS GeoIndex Onshore, http://mapapps2.bgs.ac.uk/geoindex/home.html. [Online]

4. **UK Radon.** *UK Radon Maps, http://www.ukradon.org/information/ukmaps.* accessed 01/2019.