

CONTAMINATED LAND RISK ASSESSMENT

PHASE 1 DESK TOP STUDY – PRELIMINARY RISK ASSESSMENT

Maxika Homes Ltd

**220 Elgar Road
Reading**



Our Ref: SES/MH/ER/1#1

Date: 15th December 2020

Client:

Maxika Homes Ltd
12 Drays Lane
Rotherfield Peppard
Henley-on-Thames
RG9 5JW

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**220 Elgar Road
Reading**

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EXECUTIVE SUMMARY

Current site conditions	A building used as office space for a driving school occupies the site.
Proposal	The proposal is for residential development. No planning application was available for viewing at the time of report completion.
Adjacent site conditions	Residential dwellings bound the site to the north, south and west, with a road to the east
Site history	Kilns were situated on site until 1932. The current building, formerly mapped as a laboratory, has been mapped on the site since 1958
Geology	Lambeth Group - Clay, Silt and Sand.
Hydrogeology	The site is on a high vulnerability Secondary A Bedrock aquifer and is not in a groundwater source protection zone.
Hydrology	Surface water flow is expected to flow to the north and west leading to the River Kennet 85 m north-west of the site.
Potential sources and contaminants	Potential sources are considered to possibly exist from on and off-site activities.
Conclusions	Plausible pollutant linkages and significant uncertainties are considered to potentially exist from on and off-site sources. A moderate risk is evident and therefore an intrusive investigation is considered to be needed.

1. INTRODUCTION AND OBJECTIVES

1.1 Introduction

The purpose of this assessment is to examine specifically the current and potential risks to human, ecological and ground and surface water receptors associated with possible contamination of the ground at the site located at:

220 Elgar Road
Reading
RG2 0BW

OS Grid Ref: 471503, 172104

The proposal is for residential development. No planning application was available for viewing at the time of report completion.

1.2 Objectives

The primary objective of this risk assessment is to assess potential contamination sources, the pathways which these could possibly take through the environment and then the effects on likely receptors. A preliminary Conceptual Site Model (CSM) has been developed and evaluation of the risks is given. Subsequently, if needed, recommendations are made with regard to further (Phase 2) investigation and/or remediation.

2. SITE CHARACTERISATION

2.1 Current setting and condition (Drawing 1)

The site assessed for this investigation currently comprises 0.14 ha of land located on Edgar Road. Residential dwellings bound the site to the north, south and west, with a road to the east (Photo 1). A building used as office space for a driving school occupies the site (Photos 1 & 2). The topography of the land on the site slopes down to the north and west.

PHOTO 1 Aerial view



PHOTO 2 Google Streetview View from W



2.2 Former investigations and consultations

No former investigations in relation to contamination have been undertaken for the site.

2.3 Relevant planning history for the site.

091872

Site Address:

Change of use from B1 offices to D1 Church Use.

25/10/2009

Decision Sent Date:

Decision Date:

920541

Site Address:

Change of use from office (B1) to driving test centre (sui generis).

12/11/1992

Decision Sent Date:

Decision Date:

891394

Site Address:

Construction of light industrial 'Hi-tech' unit plus on site parking(renewal of planning permission 86TP802)

30/08/1989

Decision Sent Date:

Decision Date:

2.4 Site history (see Historical maps – Appendix A)

A chronological list of potential sources of contamination and significant features on and surrounding the site considered relevant to the proposed development are outlined below (Table 1).

TABLE 1 Significant features on the historical maps

Land use	Direction	Distance (m)	Notes
On-site			
Waterloo kilns (1879-1932)	On-site	0	<i>Part of a brick works extended 1963</i>
Building mapped (1958)	On-site	0	
Mapped as a laboratory (1963-c.1993)	On-site	0	
Off site			
Kilns and brick works (1879-c.1932)	S	1	
Works/Industrial estate (1931-current)	W	123	
Engineering works (1932-c.1978)	E	63	

2.5 Soils, geology and hydrology

BGS maps indicate that the site is located on:

Superficial geology

No superficial deposits recorded.

Bedrock geology

1:50 000 scale bedrock geology description: Lambeth Group - Clay, Silt and Sand. Sedimentary Bedrock formed approximately 48 to 59 million years ago in the Palaeogene Period. Local environment previously dominated by swamps, estuaries and deltas.

Hydrology

Flow of groundwater may occur through the soils to the aquifer at depth.

Surface water flow is expected to flow to the north and west leading to the River Kennet 85 m north-west of the site.

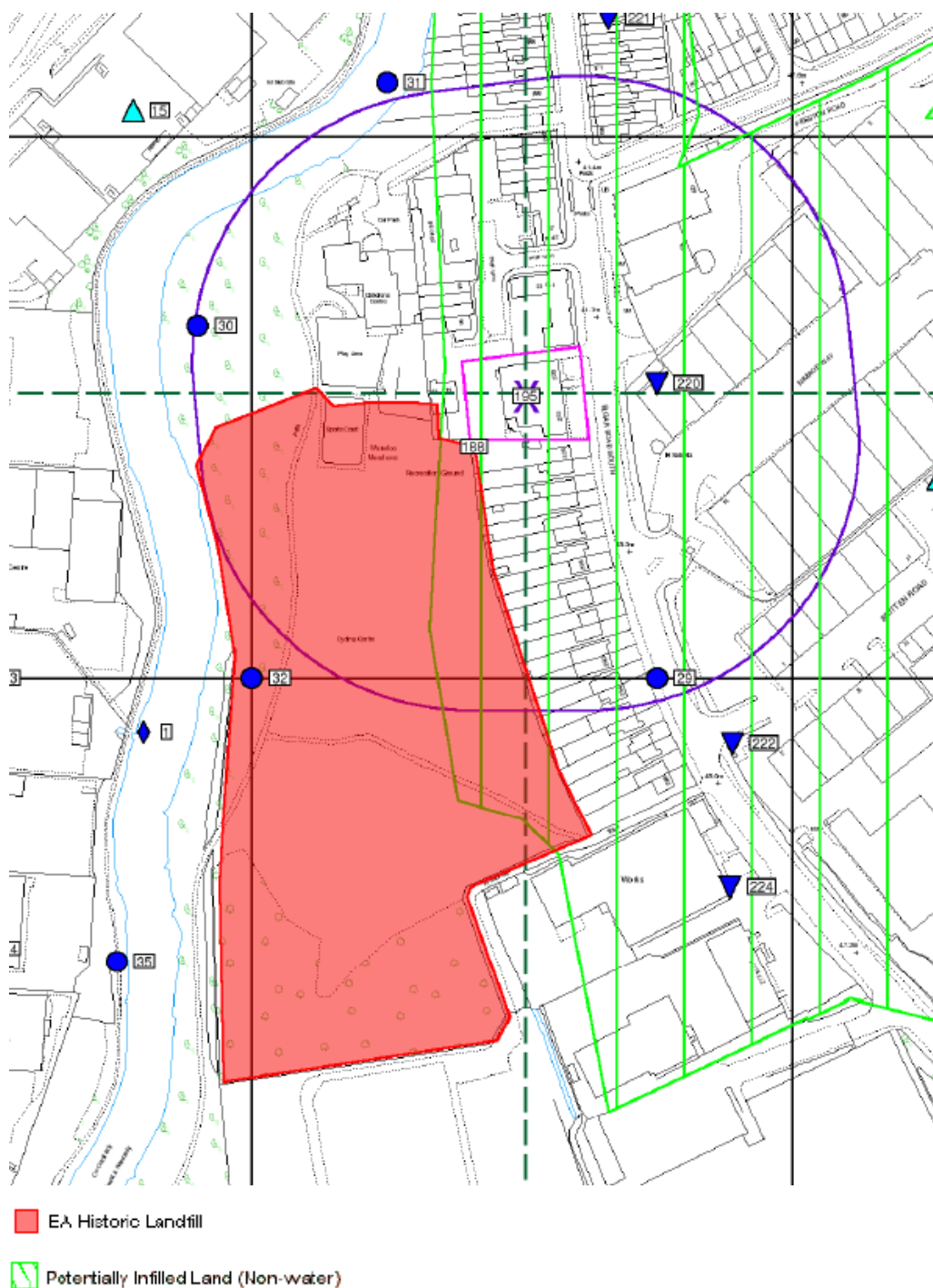
The site is on a high vulnerability Secondary A Bedrock aquifer and is not in a groundwater source protection zone.

2.6 Environmental data search

Environmental data (Appendix B) indicates the following:

- The site is on a high vulnerability Secondary A Bedrock aquifer and is not in a groundwater source protection zone.
- No Contaminated Land Register Entries and Notices mapped within 1000 m.
- The Urban Soil Chemistry maps (Appendix B) indicate no significant elevated soil metal concentrations in relation to the proposed development.
- The property is in a lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). No radon protective measures are necessary in the construction of new dwellings or extensions.
- No contemporary trade directory entries are listed for the site.
- Six pollution incidents to controlled waters are mapped within 250 m. All are classed as Category 3 (minor).
- No fuel station entries are listed within 300 m.
- One historical landfill site mapped 3 m south-west of the site. Deposited waste included inert and industrial. No input dates supplied. See Figure 1 for location.
- One area of potentially infilled land (non-water) is mapped on the site (date of mapping: 1995). See Figure 1 for location.

FIGURE 1 Landfill and infilled land locations



3. INITIAL CONCEPTUAL SITE MODEL

The initial conceptual site model detailed here is by a written and tabular description of the sources, pathways and receptors. A cross section or diagram is only added if this will aid in understanding the conceptual site model.

Model summary

The site is situated on soils of a high leaching potential. Potential sources of contamination are considered to exist from former on-site and off-site activities. The future residents will be the main receptors on site. Significant plausible pollutant linkages with regards to on-site residents, development workers and controlled waters are considered to potentially exist.

3.1 Potential sources

A review of the historical maps (Appendix A) and other information has identified that potential sources of contamination are considered to exist on the site from on and off-site sources (Table 2).

TABLE 2 Possible source locations and potential contaminants

Land use	Direction	Distance (m)	Potential Contaminants
On-site			
Waterloo kilns (1879-1932)	On-site	0	Metals, hydrocarbons
Building mapped (1958)	On-site	0	Asbestos
Infilled land (non-water) 1995	On-site	0	Methane, carbon dioxide
Off site			
Kilns and brick works (1879-c.1932)	S	1	Metals, hydrocarbons
Works/Industrial estate (1931-current)	W	123	Metals, hydrocarbons
Engineering works (1932-c.1978)	E	63	Metals, hydrocarbons, acids, inorganic compounds
Historical landfill site	SW	3	Methane, carbon dioxide, leachates
Infilled land (non-water) 1995	N,E,S	1	Methane, carbon dioxide

3.2 Receptors

Humans

- Residents in the proposed developments.
- Residents in adjacent properties.
- Development workers.

Controlled Waters

- The site is on a high vulnerability Secondary A Bedrock aquifer and is not in a groundwater source protection zone.
- Underlying aquifer.
- River Kennet 85 m north-west.

Ecology

- Animals and plants are considered to be possible receptors.

Buildings and services

- Underground pipes and foundations.

3.3 Pathways and plausible pollutant linkages (See Table 3)

Pathways to and from the site could exist via service channels and horizontal flow within the soils mapped on and adjacent to the site.

Human health

The main pathways considered possible are:

1. Ingestion of soil and dust
2. Soil and dust attached to homegrown vegetables/fruit
3. Dermal contact with soil
4. Dermal contact with dust
5. Inhalation of fugitive soil dust
6. Inhalation of fugitive dust
6. Inhalation of vapours outside
7. Inhalation of vapours inside
8. Ingress to water supplies is also considered
9. Ingress and accumulation of methane

Controlled Waters

Flow of groundwater may occur through the soils to the aquifer at depth.

Surface water flow is expected to flow to the north and west leading to the River Kennet 85 m north-west of the site.

The site is on a high vulnerability Secondary A Bedrock aquifer and is not in a groundwater source protection zone.

The identified potential contaminants(sources) and receptors have been considered in relation to pathways that may link them (Table 3 and Appendix C):

TABLE 3 – Initial Conceptual Site Model (see Appendix C)

Potential source	Potential contaminants of concern	Plausible pathway	Potential receptor	Probability	Severity	Risk	Justification	Risk classification
ON-SITE								
Former kiln activities	Metals, hydrocarbons	Indoor inhalation, direct soil and dust ingestion and/or inhalation	Humans (site users)	Likely	Medium	Moderate	Residual contamination may be present from former commercial activities	Moderate
Infilled land	Methane, carbon dioxide	Indoor inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Significant natural attenuation given the time since infill* (building mapped on site by 1958)	Low
Building	Asbestos	Inhalation	Humans (site users)	Likely	Medium	Moderate	Asbestos may be present on the building and present a risk when disturbed	Moderate
OFF-SITE								
Former kiln and brick works	Metals, hydrocarbons	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Likely	Medium	Moderate	Migration of potential contaminants	Moderate
Works/industrial estate	Metals, hydrocarbons	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Distance and topography restricting pathways	Low
Former engineering works	Metals, hydrocarbons, acids, inorganic compounds	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Topography restricting pathways	Low
Historical landfill site	Methane, carbon dioxide, leachates	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Likely	Medium	Moderate	Significant natural attenuation of ground gases given the time since infill*. Some residual leachate contamination may be present	Moderate
Infilled land	Methane, carbon dioxide	Indoor inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Significant natural attenuation given the time since infill*	Low
Notes to table: * Given the length of time since in-fill, any potential gas generated during decomposition is likely to have peaked and be in decline. This information is based on the document prepared by CIRIA titled 'CIRIA C665 -Assessing risks posed by hazardous gases to buildings'. Section 7.2.5 (Figure 7.1), details that the landfill gas generation rate significantly reduces with the age of the waste. By 30 years, the rate of gas generation is insignificant, and by 50 years, the rate is minimal. Pathway: Classification of human exposure pathways (routes) from The CLEA model, Research and Development Publication CLR10. Probability and severity: Classification of Probability and Consequence from CIRIA C552 Contaminated land risk assessment, a guide to good practice 2001. Risk Classification from DETR Guidelines for Environmental Risk Assessment and Management, 2000								

4. RISK ASSESSMENT SUMMARY

4.1 Human health

A ***moderate*** potential risk exists from on and off-site sources. The likelihood of occurrence of significant risks associated with any significant contamination associated with activities on or surrounding the site is considered to be ***moderate/low***.

4.2 Controlled Waters

A ***moderate*** risk to groundwater is considered to exist due to potential sources possibly existing on the site.

4.3 Ecology

A ***low risk*** is considered to exist as no significant receptors on or within a significant distance of the site. Hence no plausible pollutant linkages are present.

4.4 Buildings and services

A ***moderate/low*** risk is considered to exist as aggressive substances which may affect the foundations or plastic/metal pipes of any buildings are considered to be present on the site.

5. UNCERTAINTIES AND RECOMMENDATIONS

Some risks are considered to be evident primarily from the presence of metals and hydrocarbons from former on and off-site sources. The major risk to human health could be from dermal contact/ingestion with metals and hydrocarbons in any proposed landscaped areas and from hydrocarbon vapour into indoor airspace. The risk to controlled waters is categorised as Moderate.

A Phase 2 investigation should be undertaken with sampling of the soil in order to substantiate the possible risks from contamination. The investigation should consist of soil samples from targeted boreholes or trial pits with samples analysed in a UKAS and MCERTS accredited laboratory for metals, hydrocarbons, solvents and other associated contaminants, such that a site-specific quantitative risk assessment can be undertaken and appropriate risk reduction measures recommended.

The site investigation should be targeted with regard to sampling locations and all works be undertaken in accordance with BS 10175 - Investigation of Potentially Contaminated Sites: Code of Practice and CLR11 - Model Procedures for the Management of Land Contamination, using LQM/CIEH S4ULs guideline values.

The Phase 1 Preliminary Risk Assessment will need to be submitted to the relevant authorities for their comments prior to any development works on site.

DRAWING 1

Current site setting

NOTES:

 Site boundary

NOTES:

 Site boundary

Soil Environment Services

Drawing number	1
Drawing title	Current site setting
Scale	1: 4167
Date	15/12/2020



APPENDIX A

Historical maps

APPENDIX B

Environmental data

APPENDIX C

Risk consequence

Risk is regarded as being a combination of the likelihood of an ‘event’ occurring and its severity. Both elements must be considered when assessing risk. As defined in CIRIA C552:2001, the magnitude of the potential severity of risk occurring may be assessed against:

Consequence of Risk Being Realised (based on C552 CIRIA, 2001)

Consequence of risk being realised			
Classification	Category	Definition	Examples
Severe short-term (acute) risks only	Humans	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part 2A.	High concentrations of cyanide on the surface of an informal recreation area.
	Controlled Waters	Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource.	Major spillage of contaminants from site into controlled water.
	Property	Catastrophic damage to buildings/property.	Explosion causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
	Ecological System	A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.	
Medium chronic (long-term) risks; "significant harm"	Humans	Chronic damage to Human Health ("significant harm" as defined in Defra 2006).	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria
	Controlled Waters	Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution).	Leaching of contaminants from a site into a major or minor aquifer.
	Ecological System	A significant change in a particular ecosystem	Death of a species within a designated nature reserve.
Mild chronic (long-term) risks; less sensitive receptors	Controlled Waters	Pollution of non-sensitive water resources.	Pollution of non-classified groundwater.
	Property	Significant damage to buildings, structures and services ("significant harm" as defined in Circular on Contaminated Land, Defra, 2006). Damage to sensitive buildings/structures/services	Damage to building rendering it unsafe to occupy (e.g., foundation damage resulting in instability)
	Ecological System	Significant damage to crops. Damage to the environment.	
Minor chronic (long-term) risks; mild	Financial / project	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.	
	Humans	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc).	The presence of contaminants at such concentrations that protective equipment is required during site works.
	Property	Easily repairable effects of damage to buildings, structures and services	The loss of plants in a landscaping scheme. Discolouration of concrete.

Similarly, the classification of the magnitude of the probability of the risk occurring may be assessed against:

Probability of Risk Being Realised (C552 CIRIA, 2001)

Probability of risk being realised	
Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

The risk categories are summarised in the following table:

Risk Classification Matrix (C552 CIRIA, 2001)

Risk classification matrix					
(CIRIA C552, 2001, page 82)		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High	High	Moderate	Moderate/ Low
	Likely	High	Moderate	Moderate/ Low	Low
	Low Likelihood	Moderate	Moderate/ Low	Low	Very Low
	Unlikely	Moderate/ Low	Low	Very Low	Very Low

Risk Classification Definitions (C552 CIRIA, 2001)

Risk classification definitions	
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Moderate / Low	
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

REFERENCES

General guidance used:

BS 10175:2011 Investigation of potentially contaminated sites. British Standards Institution, London.

CLR 11: Model procedures for the management of land contamination. Environment Agency.

CIRIA C665 Assessing the risks posed by hazardous ground gases 2013.

CIRIA C682 The VOCs Handbook 2009 Investigation, assessing and managing risks from inhalation of Volatile Organic Compounds at land affected by contamination.

Chartered Institute for Environment and Health Indoor air quality in the home.

Environment Agency Guiding Principles for Land Contamination (GPLC).
(2010) Environment Agency.