



**Daniel Vickerstaff**

# **Noak Hill Fishery, 259a Noak Hill Road, Billericay CM12 9UN**

Preliminary Geo-environmental Risk Assessment Report

1921805 R01 (01)

**April 2021**





## RSK GENERAL NOTES

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**Project No.:** 1921805 R01 (01)

**Title:** Preliminary Geo-environmental Risk Assessment Report: Noak Hill Fishery, 259a Noak Hill Road, Billericay, CM12 9UN

**Client:** Daniel Vickerstaff

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### Revision control sheet

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

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# 1 INTRODUCTION

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## 1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by Daniel Vickerstaff to carry out a Preliminary Geo-environmental Risk Assessment of the land at Noak Hill Fishery, 259a Noak Hill Road Billericay, CM12 9UN. The project was carried out to an agreed brief as set out in RSK's proposal (Ref. 1921805-01T(00), dated 4th March 2021).

RSK's service constraints are shown in **Appendix A**.

The Site in question is being considered for development for residential use.

## 1.2 Objectives

The objective of the work is to provide:

- A review of the development history and industry on the site, including a study of archival Ordnance Survey mapping and other sources of historical information as appropriate, e.g. local archives, trade directories and planning records;
- A study of local geology, hydrogeology and surface water setting;
- The identification of potential geological hazards, including radon;
- A review of relevant environmental data held by appropriate statutory authorities, e.g. the local Environmental Health Department and the Environment Agency, obtained in the form of an environmental database report (Envirocheck or GroundSure Report) and, where appropriate, through direct contact;
- A site reconnaissance survey;
- Liaison where possible with current occupiers of the site;
- A preliminary conceptual model of contamination on the site identifying possible pollutant linkages;
- An assessment of the environmental risks and liabilities associated with site ownership; and
- Engineer site attendance to complete walkover and in-situ CBR testing.

## 1.3 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. The assessment of the contamination status of the site is in line with the technical approach presented in Land Contamination Risk Management (LCRM) (Environment Agency, 2020) – which supersedes CLR11 Model Procedures for Land Contamination – and in general accordance with BS 10175: 2011 + A2 2017 (BSI, 2017). It is also compliant with relevant planning policy and guidance.

The scope of the intrusive investigation has been designed in line with the recommendations of BS5930:2015+A1:2020 Code of practice for ground investigations (BSI, 2020), which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. It has also been developed in general accordance with BS 10175: 2011 + A2 2017. Ground gas assessment has been undertaken in general accordance with BS8576: 2013 and BS 8485:2015+A1:2019.

A brief summary of relevant legislation and policy relating to land contamination is given in **Appendix C**.

## **1.4 Existing reports**

No existing reports relevant to the site assessment have been provided to RSK.

## **1.5 Limitations**

This report is subject to the RSK service constraints given in **Appendix A** and limitations that may be described through this document.

## 2 SITE DETAILS

### 2.1 Site location

Site location details are presented in **Table 1** and a site location plan is provided on **Figure 1**.

**Table 1 Site location details**

Site name	Noak Hill Fishery, Billericay
Full site address and postcode	259a Noak Hill Road, Billericay, CM12 9UN
National Grid reference (centre of site)	568537 , 191228

### 2.2 Site description

The Site boundary and current site layout are shown on **Figure 2**. The Site covers an area of c. 0.9 hectares. It is currently occupied by a large pond in the north east of the site. In the south west of the site there are two single-storey structures present. The roofs of the buildings comprise a combination of corrugated steel and cement roofing.

The site is accessed via a small single track. The eastern site boundary is flanked by mature deciduous trees and the River Crouch.

### 2.3 Surrounding land uses

The Site is located in Billericay, within a predominantly residential setting. The area surrounding the site comprises of arable farm lands, undeveloped fields and several residential properties. Immediate surrounding land uses are described in **Table 2**.

**Table 2 Surrounding land uses**

North	Pastoral farmland
East	Arable farmland
South	River Crouch with arable farmland beyond
West	Residential properties along Noak Hill Road

### 2.4 Development plans

The proposed layout of the site, at the time of preparing this report, is shown in **Appendix B**.

## 3 DESK-BASED ASSESSMENT

The desktop study was designed generally to meet the objectives of a preliminary (phase 1) investigation, as defined by BS 10175:2011 (BSI, 2017) and this assessment relates to LCRM Stage 1, Tier 1 preliminary risk assessment. The "vicinity" of the site for the purposes of this report is defined as locations situated within an approximate 250 m radius of the site, although certain sources and/ or sensitive targets further than 250 m may also have been considered.

The study aims principally to identify and assess the potential risks and liabilities associated with contamination of the ground, on and in the vicinity of the site. While this includes consideration of current operations and housekeeping on the site, the report does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

### 3.1 Site history

#### 3.1.1 Historical development record

The development history of the site and surrounding area based upon assessment of historical plans and records is detailed in **Table 3**. The historical maps reviewed are shown within the environmental database report in **Appendix D**.

**Table 3 Summary of historical development**

Date from	Date to	Historical Land Use (on-site)	Area of site
1874	1922	Farmland assumed to form part of the neighbouring Noakbridge Farm	NW of site
1937	Present	North western area comprises residential garden	NW of site
1972	1993	Poultry houses constructed within southern portion	West of site
1999	Present	Current site configuration, with lake excavated for use as a fishery	Entirety
Date from	Date to	Historical Land Use (off-site)	Distance (m) and orientation
1874	Present	River	NE boundary of site
1881	1960	Farmland	Around all areas of the site
1960	Present	Residential area	West of site 100 m
1999	Present	Golf Course	550 m

Relevant information sources: Historical OS maps <input checked="" type="checkbox"/> Town plans <input checked="" type="checkbox"/> Information from the Local Planning Authority <input type="checkbox"/> Aerial photography <input checked="" type="checkbox"/> Previous reports <input type="checkbox"/>	
<i>Note: Reference to published historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.</i>	

### 3.1.2 Unexploded ordnance

A review of publicly available unexploded ordnance (UXO) risk maps indicates that the site is located in an area with moderate potential for wartime bombs to be present (Zetica, 2021).

## 3.2 Information from environmental database report

Relevant environmental permits and incidents detailed within the environmental database report (see **Appendix D**) are summarised below in **Table 4**.

**Table 4 Summary of environmental permits, landfills and incidents**

Data type	Entries on-site	Entries <250m from site	Entries >250m from site of relevance	Details
<b>Agency and hydrological</b>				
Environmental permits – incorporating Integrated Pollution Prevention and Control, Integrated Pollution Controls, Local Authority Integrated Pollution Prevention and Control	-	-	-	
Enforcement and prohibition notices	-	-	-	
Pollution incidents to controlled waters, Prosecutions relating to controlled waters, Substantiated pollution incident register, Water Industry Act referrals	-	3	9 (501 m-1000 m)	Nearest Pollution incident was 16 m from site. Category 3- Minor incident was recorded
Discharge consents	-	5	8 (501 m-1000 m)	The nearest discharge consents is for Anglian Water Services Ltd. 95 m SW of the site



Data type	Entries on-site	Entries <250m from site	Entries >250m from site of relevance	Details
Registered radioactive substances	-	-	-	
<b>Landfill and waste</b>				
Active landfills	-	-	-	
Historic / closed landfills	-	-	-	
Other waste management licences	-	-	1 (501-1000 m)	Basildon District Council-Household commercial and industrial transfer station. 766 m from site.
Potentially in-filled land (pit, quarry, pond, marsh, river, stream, dock etc)		2	8 (501-1000 m)	The closest infilled land (water) is located at 64 m. West from the site.
<b>Hazardous substances/ industrial land uses</b>				
Control of Major Accident Hazards (COMAH) sites	-	-	-	
Explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS), Planning hazardous substance consents/ enforcements	-	-	-	
Contaminated land Part 2A register entries and notices	-	-	-	
Contemporary trade directory entries	-	-	3(251-500 m)	The nearest trader is located 276 m from site, north-west. The company is R J B Paving-Asphalt and coated macadam laying contractors
Fuel station entries	-	-	-	

Data type	Entries on-site	Entries <250m from site	Entries >250m from site of relevance	Details
<p><i>Note: Entries have only been included within the table where they are located within a 250m radius of the site or, where they fall outside of this radius but are considered to comprise a significant entry.</i></p>				

### 3.3 Information from regulatory authorities

#### 3.3.1 Planning records

Planning records held by the Local Authority Planning Department pertaining to the site and relevant to the current assessment are summarised in **Table 5**.

**Table 5 Planning information**

Year	Details and application reference no.	Part of site
2019	Demolition of existing buildings and hardstanding in rear area of site and the construction of one new dwelling at 259 Noak Hill Road Great Burstead Billericay Essex CM12 9U	All
2018	Demolition of existing buildings inclusive of hardstandings to the rear of the existing dwelling and construction of two new dwellings at 259 Noak Hill Road Great Burstead Billericay Essex CM12 9UN	All

### 3.4 Site geology

#### 3.4.1 Anticipated geological sequence

Published records (British Geological Survey, 2021) for the area and available historical borehole logs indicate the geology of the site to be characterised by the succession recorded in **Table 6**.

**Table 6 Site geology**

Strata	Description	Estimated thickness	Permeability
Alluvium	Clay, silt, sand and gravel with localised peat.	A few metres	Variable
Head Deposits	Clay, silt, sand and gravel	A few metres	Variable
London Clay Formation	Stiff over consolidated silty clays	Circa 100 m	Non permeable
Relevant information sources: BGS Geoindex <input checked="" type="checkbox"/> BGS borehole logs <input type="checkbox"/> Previous SI reports <input type="checkbox"/>			

### 3.4.2 Radon

The environmental database report indicates that the site is not located within an 'Affected Area'. An 'Affected Area' is one with 1% or more homes above the radon Action Level of 200 Bq m<sup>-3</sup>. Therefore, the risk of significant ingress of radon into structures on-site is considered to be low and no radon protective measures are required within new dwellings (or extensions) at the site.

Note the site-specific assessment within the environmental database report is at a higher resolution and therefore provides greater detail than that publicly available in the indicative radon atlas at [www.ukradon.org](http://www.ukradon.org).

## 3.5 Mining and quarrying

No mining or quarrying appears to have taken place within a 250 m radius of the site.

## 3.6 Hydrogeology

A summary of the hydrogeological setting of the site, with respect to the anticipated geological sequence set out in Section 3.4 is presented below in Table 7.

- Envirocheck.
- BGS geological maps.
- Old Ordnance Survey Maps.

There are no recorded mines, quarries or natural cavities on or in the vicinity to the site.

**Table 7 Summary of hydrogeological setting**

Condition	Description
Aquifer characteristics	The site is underlain by a Secondary A aquifer relating to the superficial Head Deposits and Alluvium overlying an unproductive stratum relating to the bedrock geology of the London Clay Formation.

Condition	Description
Depth to groundwater and flow	The anticipated depth to the groundwater table is in the order of less than a few metres below ground level based on its proximity to the River Crouch and the water level within the lake, which is assumed to be in hydraulic continuity. Shallow groundwater in the site area is anticipated to flow in a north easterly direction, i.e. towards and in the direction of flow of the River Crouch.
Groundwater recharge/attenuation	Most of the site is currently unsurfaced and will therefore drain to ground.
Licensed groundwater abstractions	The environmental database report indicates that there are no current licensed groundwater abstractions within a 1 km radius of the site.
Source protection zones	Information available in the Envirocheck report indicates that the site does not lie within a currently designated groundwater Source Protection Zone (SPZ).

### 3.7 Hydrology

A summary of the hydrology within the site area is summarised in **Table 8**.

**Table 8 Summary of hydrology in site area**

Condition	Description
Surface watercourse s/features	The River Crouch forms the eastern flank of the site, flowing in a north easterly direction. A lake has been excavated on the site and is assumed to be in hydraulic continuity with the River Crouch. The water quality within both features appears good, based solely on visual observations.
Surface water abstractions	There is a single surface water abstraction recorded within a 1km radius, which relates to the abstraction of surface water some 67m to the south of the site for use in aquaculture (specifically fish farm / cress farm pond throughflow). It is noted that the abstraction is upgradient of the site.
Site drainage	Surface drainage for the site appears to currently discharge naturally to ground.
Preliminary flood risk assessment	The indicative floodplain map for the area, shows that the site lies within the designated floodplain of the River Crouch. The area falls into the Flood Zone 2 designation with Flood Zone 3 areas close to the site too.

### 3.8 Sensitive land uses

**Table 9** provides a summary of any environmentally sensitive areas identified within 250 m of the site based on the environmental database report.

**Table 9 Environmentally sensitive areas**

Feature	Present within 250m of site?	Details	Likely pathways from site?
International designations – Ramsar wetland, Special Area of Conservation (SAC), Special Protection Area (SPA)	No	-	-
National designations – Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), ancient woodland	No	-	-
Local designations – Local Nature Reserve, Site of Importance for Nature Conservation (SINC)	No	-	-
Nearest high sensitivity development, e.g. residential	Yes – on-site	The site comprises a residential land use	Most sensitive pathways will exist within areas of soft landscaping and private gardens

## 4 SITE RECONNAISSANCE FINDINGS

A site reconnaissance survey was completed on 15th March 2021 by RSK. The characteristics of the site observed during the walkover and from current Ordnance Survey maps are summarised in **Table 10**.

A site plan is provided in **Figure 2** with photographic records included in **Appendix E** detailing the main features identified below.

Whilst the walkover summary includes consideration of current operations and housekeeping on the site as potential sources of contamination, it does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

**Table 10 Site reconnaissance findings**

Feature	Description
<b>Physical characteristics</b>	
Access constraints	None
Site topography	The Site is essentially level.
Surface cover	The site was covered by soft standing, with no significant areas of hardstanding present.
Site drainage	No drain covers were noted during the site walkover. There was no runoff off visibly seen. There was standing water visible across the site, however, weather conditions had been extremely wet in the preceding days to the walkover being undertaken.
Surface water	The nearest surface watercourse to the site appears to be the River Crouch located on eastern site boundary. The northern portion of the site is formed by a small lake. There was no direct evidence of water contamination into the River Crouch.
Trees and hedges	The Site contained mature deciduous trees, observed on the sites eastern, western and northern boundaries.
Invasive species	Based upon the walkover survey obvious evidence of Japanese Knotweed or other invasive species has not been identified on-site. However, it should be noted that a detailed survey of the possible presence or absence of invasive species is outside of the scope of investigation.
Existing buildings on-site	The site contained two single-storey buildings. The structures comprised masonry walls with corrugated metal and cement pitched roofs. The structures are assumed to be remnant from the site's former use as a poultry farm and subsequently a fish farm.
Retaining walls and adjacent buildings on or close to site boundary	The closest nearby structures are the residential houses located on Noak Hill Road.

Feature	Description
Basements on-site	No evidence of existing or infilled basements was observed.
Made ground, earthworks and quarrying	Ground surfaces had been disturbed as a result of excavations for the lake and preparations to redevelop the former poultry buildings / fish farm for a single residential property. Significant volumes of soil are being temporarily stockpiled on-site and large volumes of debris from the former buildings and previous site operations litter the area. The demolition debris potentially includes asbestos containing materials.
Potentially unstable slopes on or close to site	None observed.
Buried and overhead services present	None observed.
<b>Environmental characteristics</b>	
Underground/ above ground storage tanks and pipework	A single skin above ground oil storage tank was observed near to one of the single-storey buildings. No obvious signs of former leaks or spills were observed on the ground surface in proximity to the tank.
Potentially hazardous materials storage and use	None observed. However, asbestos containing materials are likely to be present within the demolition debris which currently litters the site.
Asbestos-containing materials	The roofs to the current buildings comprised corrugated cement sheeting, which are likely to contain asbestos containing materials. The structures were in a state of disrepair and debris currently litters the site.
Waste storage	There was a skip on site, for the disposal of building materials.
Fly-tipping	None observed, however, demolition debris currently litters the site.
Electricity sub-stations/ transformers	None observed on or close to site.
Evidence of possible land contamination on-site	Whilst no ongoing potentially contaminative operations were observed, the site is currently littered with demolition debris (which is considered likely to include asbestos containing materials) and remnants from the site's most recent operation as a fish farm.
Potential off-site sources of ground contamination	No evidence of off-site ground contaminated was observed.

Potentially significant land contamination or geotechnical issues arising from the survey are summarised below:

- Whilst no ongoing contaminative activities were observed, the site is littered with demolition debris and remnants from its former use as a fish farm and poultry house.

## 5 PRELIMINARY GEOTECHNICAL CONSTRAINTS

### 5.1 Design class

BS EN 1997-1 defines three different Geotechnical Categories that structures may fall into, which are summarised as follows:

- Category 1: Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations; with negligible risk.
- Category 2: Conventional types of structure and foundation with no exceptional risk or difficult ground or loading conditions.
- Category 3: Structures or part of structures, which fall outside limits of Geotechnical Categories 1 and 2. Examples include very large or unusual structures; structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions; structures in highly seismic areas; structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.

Based on the information provided above on the proposed development and in view of the anticipated ground conditions, a Geotechnical Category of Category 1 has been assumed for the purposes of designing the geotechnical investigation. This should be reviewed at all stages of the investigation and revised where necessary.

### 5.2 Preliminary geotechnical hazards assessment

A summary of commonly occurring geotechnical hazards associated with the anticipated geology outlined in Section 3.4 above is given in **Table 11** together with an assessment of whether the site may be affected by each of the stated hazards.

**Table 11 Summary of preliminary geotechnical risks that may affect site**

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Likely to affect ground engineering and foundation design and construction
Shrinkable clay soils	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Design to NHBC Standards Chapter 4 or similar



Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Highly compressible and low bearing capacity soils, (including peat and soft clay)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Likely to affect ground engineering and foundation design and construction
Silt-rich soils susceptible to rapid loss of strength in wet conditions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Likely to affect ground engineering and foundation design and construction
Running sand at and below water table	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Likely to affect ground engineering and foundation design and construction
Karstic dissolution features (including 'swallow holes' in Chalk terrain)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	May affect ground engineering and foundation design and construction – refer to Section 4.1.2
Evaporite dissolution features and/or subsidence	<input type="checkbox"/>	<input checked="" type="checkbox"/>	May affect ground engineering and foundation design and construction
Ground subject to or at risk from landslides	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Likely to require special stabilisation measures
Ground subject to periglacial valley cambering with gulls possibly present	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Likely to affect ground engineering and foundation design and construction
Ground subject to or at risk from coastal or river erosion	<input type="checkbox"/>	<input type="checkbox"/>	Likely to require special protection/stabilisation measures
High groundwater table (including waterlogged ground)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	May affect temporary and permanent works
Rising groundwater table due to diminishing abstraction in urban area	<input type="checkbox"/>	<input checked="" type="checkbox"/>	May affect deep foundations, basements and tunnels
Underground mining	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Likely to require special stabilisation measures
Effects of extreme temperature (e.g. cold stores or brick kilns/furnaces)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Likely to affect ground engineering and foundation design and construction

Hazard category	Hazard status based on desk study findings and proposed development		Engineering considerations if hazard affects site
	Could be present and/or affect site	Unlikely to be present and/or affect site	
Existing sub-structures (e.g. tunnels, foundations, basements, and adjacent sub-structures)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Likely to affect ground engineering and foundation design and construction
Filled and made ground (including embankments, infilled ponds and quarries)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Likely to affect ground engineering and foundation design and construction
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	May affect ground engineering and foundation design and construction
Site topography	<input type="checkbox"/>	<input checked="" type="checkbox"/>	May affect ground engineering and foundation design and construction
Note: Seismicity is not included in the above table as this is not normally a design consideration in the UK.			

## 6 INITIAL CONCEPTUAL SITE MODEL

In the UK land contamination is assessed using a risk-based approach taking account of the magnitude (severity of the hazard) and likelihood (probability) of occurrence. A 'receptor' is something that could be adversely affected by contamination (e.g. people, an ecological system, property or a water body). A 'pathway' is a route or means by which a receptor is or could be exposed to or affected by a contaminant. A 'contaminant source' is a hazard but it can only pose a risk to a receptor where a pathway is present. The relationship between sources, pathways and receptors are referred to as a conceptual site model. A risk can only be released where a contaminant source, pathway and receptor are all in place, referred to as a 'pollutant linkage'.

In line with LCRM (Environment Agency, 2020) and BS 10175: 2011 + A2 2017 (BSI, 2017), RSK has used information in the preceding sections to identify hazards (sources of contaminants), receptors that may be impacted and plausible linking pathways. Where all three are present this is termed a potentially complete contaminant linkage and a qualitative risk estimation is made.

### 6.1 Potential soil, soil vapour and groundwater linkages

#### 6.1.1 Potential sources of contamination

Potential sources of soil and groundwater contamination identified from current activities and the history of the site and surrounding area are presented in **Table 12**. Ground gas sources are addressed in the next section.

**Table 12 Potential sources of soil and groundwater contamination**

Potential sources	Contaminants of concern
<b>On-site</b>	
Debris from previous land uses, which comprised poultry houses and fish farm.	Potentially including brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos and hydrocarbons from former use of heating oil.
Former potentially contaminative activities may have historically impacted the near surface soils and where natural soils have been reworked, the potential exists for debris to have become mixed.	Unknown fill material but potentially including brick, ash and clinker and containing toxic and phytotoxic metals, inorganics, polycyclic aromatic hydrocarbons (PAHs), asbestos and hydrocarbons from former use of heating oil.
<b>Off-site</b>	
None observed	-

### 6.1.2 Sensitive receptors and linking exposure/ migration pathways

Sensitive receptors identified at or in the vicinity of the site that could be affected by the potential sources identified above comprise:

- current/ future site users – residential users [oral, dermal and inhalation exposure with impacted soil, soil vapour and dust/fibres, ingestion of home-grown produce];
- current adjacent site users – residential users [migration of contamination via dust/fibre deposition];
- future buildings and services [direct contact with contaminated soils or groundwater and chemical attack];
- existing/ future vegetation [direct contact with contaminated soils or groundwater and root uptake leading to phytotoxicity];
- groundwater in secondary A aquifer within the superficial deposits;
- surface water course (On-site lake and River Crouch).

Potential linking pathways are show in brackets for each item above.

Please note that construction workers and future maintenance workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures according to the CDM Regulations.

Ecological receptors are only considered within the conceptual model in the context of statutory protected sites.

## 6.2 Potential ground gas linkages

### 6.2.1 Ground gas generation potential

Potential ground gas sources identified for the site and surrounding are shown in **Table 13**.

**Table 13 Potential ground gas sources**

Potential sources	Indicative ground gas generation potential (CIEH, 2008)	Additional information
<b>On-site</b>		
Natural soil strata with a low degradable organic content, e.g. alluvium, peat	Very low	Peat may be contained within the Alluvium predicted within proximity to the River Crouch.
Made ground with low degradable organic content (e.g. up to 5% organic material and no easily degradable waste).	Very low	Made ground soils observed at surface and within stockpiles.
<b>Off-site</b>		
None	-	-

### 6.2.2 Preferential pathways for ground gas migration

Credible preferential pathways potentially connecting the source and receptor through vertical and lateral migration are:

- geology of the Alluvium and Head Deposits, which is likely to be permeable.
- building foundations.
- construction joints and cracks within building structure.
- utility routes and service penetrations into buildings.

### 6.2.3 Sensitive receptors and linking pathways

Sensitive receptors identified at or in the vicinity of the site that could be affected by the potential ground gas sources identified above comprise:

- future site users – residential users [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion/ asphyxiation].
- future buildings and services [migration and ingress of ground gases into buildings, build-up in confined spaces and explosion].

The assessment has identified receptors to include building structures and proposed end-users.

Construction workers have not been identified as receptors for the purposes of this assessment. Risks may still be present to construction workers especially where works include the entry into excavations within the ground. Construction workers should undertake appropriate risk assessments and risks should be managed through health and safety procedures and the use of PPE.

### 6.2.4 Summary

Due to the absence of any ground gas generation sources with a risk above very low, no potential linkage has been identified and the risks associated with ground gas has not been considered further within the conceptual site model.

## 6.3 Preliminary risk assessment

The preliminary risk assessment findings and potentially complete contaminant linkages are shown in **Table 14** overleaf. The risk classification based on the combination of hazard consequence and probability using a risk matrix from CIRIA C552 (Rudland et al., 2001), a summary of which is included in **Appendix F**. This relates to Tier 1 preliminary risk assessment in LCRM (Environment Agency, 2020).

**Table 14 Risk estimation for potentially complete contaminant linkages**

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Potential risk	Justification
Debris from previous land uses, which comprised poultry houses and fish farm.	Future site users	Oral, dermal and inhalation exposure	Likely	High	High	Remnant debris may pose a risk to future users where pathways exist in areas of soft landscaping and private gardens
	Future adjacent site users	Oral, dermal and inhalation exposure	Unlikely	High	Low	Low – Fibre liberation from any ACM may be feasible
	Future Services	Direct contact with impacted ground	Unlikely	High	Low	No obvious signs of organic contaminants were identified during the walkover, which the potential to permeate plastic pipework
	Future planting	leaching from soils/ lateral migration of dissolved phase contaminants	Likely	Low	Low	Current vegetation visually appears unaffected.
	Surface water resources	leaching from soils/ lateral migration of dissolved phase contaminants	Likely	High	High	The potential exists for any remnant contaminants to migrate to the adjacent water course.
Former potentially contaminative activities may have historically impacted the near surface soils and where natural soils have been reworked,	Future site users	Oral, dermal and inhalation exposure	Likely	High	High	Remnant contamination may pose a risk to future users where pathways exist in areas of soft landscaping and private gardens
	Future adjacent site users	Oral, dermal and inhalation exposure	Unlikely	High	Low	Low – Fibre liberation from any ACM may be feasible

Potential source	Potential receptor	Possible pathway	Likelihood	Severity	Potential risk	Justification
the potential exists for debris to have become mixed.	Future Services	Direct contact with impacted ground	Unlikely	High	Low	No obvious signs of organic contaminants were identified during the walkover, which the potential to permeate plastic pipework
	Future planting	leaching from soils/ lateral migration of dissolved phase contaminants	Likely	Low	Low	Current vegetation visually appears unaffected.
	Surface water resources	leaching from soils/ lateral migration of dissolved phase contaminants	Likely	High	High	The potential exists for any remnant contaminants to migrate to the adjacent water course.

Risk matrix		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	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





Potentially complete contaminant linkages with a potential risk of moderate to low or higher identified in in **Table 16** comprise the risks posed principally to future residents and surface waters (lake and River Crouch).

## 6.4 Data gaps and uncertainties

Key data gaps and uncertainties identified in the CSM at desk study stage include:

- No information has currently been sought from the Local Authority relating to any contaminated land issues pertaining to the site;
- No ground investigation data has been collated at this time to confirm whether any contaminants (remnant from the site sites previous land uses) are present within the near surface soils.

## 7 CONCLUSIONS AND RECOMMENDATIONS

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The preliminary risk assessment has identified the site, which is proposed to be used for a residential land use, to have historically been used for poultry farming and more recently fish farming.

Whilst these former uses are unlikely to have caused any significant land contamination issues, which could render the site unsuitable for its proposed residential use, the site is currently littered with spoil and debris from the former land uses. The debris is considered likely to locally contain asbestos containing materials.

The debris currently littering the site and any associated near surface soils are considered to currently pose a potentially significant risk to future residents and lesser risk to surface waters. It is therefore considered essential that the current debris and associated made ground soils be removed from site to a suitably licensed landfill facility and the remnant soils validated by means of laboratory analysis to confirm that the site is suitable for its future residential land use and is not posing a risk to the adjacent surface water features or wider environment.

Documentation confirming that the debris and any associated soils have been removed by suitability qualified contractors to landfill, along with laboratory test certification to verify the removal, should be collated for submission to the local authority upon completion of the works.

Should areas of made ground remain, it is recommended that it be isolated below permanent hardstanding or a minimum of 600 mm of clean uncontaminated soil to protect future site users. Notwithstanding this, no grossly contaminated soils may remain, which are potentially mobile or leachable and could pose a risk to the nearby surface water resources.

It is recommended that this report be submitted to the local authority for review at the earliest opportunity.

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## FIGURES

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