

ENVIRONMENT

Richborough Estates Limited
Spencer's Wood
Wokingham
Phase 1 Geo-Environmental Assessment

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EXECUTIVE SUMMARY

Executive Summary	
Site Address	Sheepbridge Farm, Basingstoke Road, Basingstoke Road, Swallowfield, RG7 1PX.
Proposed Development	Outline planning permission is sought with all matters reserved for future determination, save for the means of access via Basingstoke Road, for up to 420 dwellings (Use Class C3), an 80 bed care home (Use Class C2), 1ha of employment land (Use Class E(g), primary school (Use Class F1), local centre (Use Classes E(a), (b), (c), (f)), GP Surgery (Use Class E(e)), sports pitch and changing facility, public open space, SANG provision and associated infrastructure.
Current Site Use	The Site currently comprises agricultural land.
Site History	The Site has remained as undeveloped agricultural land since early mapping, with only a small farm building located in the north-western corner. Historical mapping indicates that the only change to the Site is the expansion of the farm buildings eastwards and the inclusion of drains across the field margins in 1967-69. Development has steadily increased since 1877 to the north and west of the Site. Evidence of gravel pits and clay pits are noted on the mapping, approximately 300m to the east and 750m to the west of the Site respectfully, between 1900 – 1961. An Old Brick Works is also indicated 500m west of the Site over the same period. Industrial activity in the form of a Fibre Moulding Works is shown to be present in 1967 but disappears from mapping by 1976. From 2001, an industrial estate is present the northwest of the Site, off Basingstoke Road, but is not shown to be present in the present day. Lastly, aerial photography from Google Earth Pro indicates that a solar farm was constructed on the field to the south-east of the Site circa. 2017.
Ground Conditions	Information published by the BGS indicates that the Site has no superficial deposits aside from a small area of River Terrace Deposits in the north-eastern and south-western corner. The remainder of the Site is directly underlain by London Clay Formation bedrock. The Environment Agency (EA) classifies the London Clay as Unproductive Strata and the River Terrace Deposits as a Secondary A Aquifer. A series of drainage ditches are located around every field boundary at the Site, all containing water between 0.75-1.5m deep, all contained water during the Site walkover.
Geotechnical Review	Based on the proposed low-density housing at the Site, shallow strip foundations bearing onto either the River Terrace Deposits (where present) or London Clay deposits may be suitable at the Site, depending upon the thicknesses and competency of the weathered portion of the London Clay.
Environmental Review	When considered in the context of the conceptual site model and the historical activities that have taken place (agricultural land), the proposed development is considered to pose a low risk to human health and controlled with limited potential sources of contamination being identified.
Recommendations	A ground investigation should be undertaken at the Site to confirm ground conditions at the Site, determine the ground gas regime, allow for in-situ and laboratory testing to quantify pollutant linkages and inform foundation design.
This summary should be read in conjunction with BWB's full report (ref. SWS-BWB-EGT-XX-RP-LE-0001_Ph1) and reflects an assessment of the Site based on information received by BWB at the time of production.	

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1. INTRODUCTION

Instruction

- 1.1 BWB Consulting (BWB) was instructed by Richborough Estates Limited (the Client) to carry out a Phase 1 Geo-Environmental Assessment for the Site at Spencer's Wood, Wokingham.
- 1.2 Outline planning permission is sought with all matters reserved for future determination, save for the means of access via Basingstoke Road, for up to 420 dwellings (Use Class C3), an 80 bed care home (Use Class C2), 1ha of employment land (Use Class E(g), primary school (Use Class F1), local centre (Use Classes E(a), (b), (c), (f)), GP Surgery (Use Class E(e)), sports pitch and changing facility, public open space, SANG provision and associated infrastructure.
- 1.3 A development masterplan is included as **Appendix 1**.

Objectives

- 1.4 This report has been completed to present pertinent information into the environmental risks and liabilities associated with the Site. It has been completed to fulfil the requirements of a preliminary risk assessment in accordance with BS 10175:2011+A2:2017 'Investigation of potentially contaminated Sites, code of practice' and EA Guidance on Risk Management of Land Contamination <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>.
- 1.5 The report has also been prepared with reference to land contamination technical guidance available through <https://www.gov.uk/government/collections/land-contamination-technical-guidance>.
- 1.6 The objectives of this report are to:
 - Assess historical activities at the Site with respect to their potential impact on the Site environment;
 - Characterise the environmental setting of the Site, identify migration pathways and vulnerable receptors for contamination originating at the Site, focusing on potential soil and groundwater liabilities;
 - Assess historical and current surrounding land use in relation to known or potential off-Site contamination issues that may impact the Site;
 - Review existing Site investigation and remediation information for the Site, where available;
 - Develop a preliminary Conceptual Site Model (CSM); and
 - Assess potential environmental liabilities associated with the Site.

Scope of Work

- 1.7 The scope of work included:
 - A site visit to inspect the current Site and immediate surroundings, identify potential hazards associated with ground conditions or contamination and to determine

potential constraints with regards to ground investigation (photographs presented as **Appendix 2**);

- A review of the following information:
 - Groundsure report, reference HMD-214-XYN-KGL-VGK-CC4 (**Appendix 3**);
 - Historical Ordnance Survey Mapping (**Appendix 4**);
 - Historical aerial photographs (Google Earth) and other imagery (Groundsure)
 - British Geological Survey (BGS) 1:50 000 Scale, 'Reading', Sheet 268, Solid and Drift, (2000);
 - BGS online geological maps and exploratory hole records (www.bgs.ac.uk);
 - MAGIC website (www.natureonthemap.naturalengland.org.uk/magicmap);
 - Coal Authority Interactive Map Viewer (<http://mapapps2.bgs.ac.uk/coalauthority/home.html>);
 - Regional unexploded bomb risk maps.
- A summary of the key hazards or uncertainties that require additional investigation in order to further characterise the associated risks; and
- Production of a Geo-Environmental Assessment (this report), concluding in a qualitative assessment of the risks from contamination and ground-related constraints which may impact on the Site.

2. THE SITE

Site Location

- 1.8 The Site is located at Spencer's Wood, in Wokingham, centred at National Grid reference 471763, 166210. The approximate location of the Site is shown below in **Figure 2:1**.

Figure 2:1: Site Location Plan



Site Description

- 1.9 The Site forms an irregular shape of agricultural land and is located to the south of Spencer's Wood in Wokingham. It is bound by a residential development to the north, Basingstoke Road (B3349) to the west, and further agricultural land to the south and east.

Site Walkover

- 1.10 A Site walkover was conducted on 23rd December 2023 and photographs are presented within **Appendix 2**.
- 1.11 The Site was accessed via a gate off Basingstoke Road in the northwest of the Site, this was shared accessed with a neighbouring residential property. The access track was lined by small earth bunds with a concrete lay down area beyond the bunds. Anthropogenic materials such brick, timber and ceramic fragments were noted within the bunds.
- 1.12 A second concrete laydown areas was noted immediately north of the Site access point.
- 1.13 At the time of the walkover, the Site comprised fallow agricultural fields, each field was demarked by hedgerows with sporadic tree standards and drainage ditches. The ditches were noted to range between approximately 0.75m and 1.5m deep, all were noted to contain water which generally flowed from west to east.
- 1.14 A small area of the large central field was noted to have a pool of surface water, this was noted to be up to 0.2m deep and measured approximately 20m x 15m.
- 1.15 A redundant aboveground storage tank (AST) was noted within the hedge line along the western boundary, its capacity is estimated to be around 1500litres based upon its dimensions. The AST was approximately a third full of water at the time of the walkover, no visible sheen noted.
- 1.16 Overhead power cables ran along the western boundary, cutting around the northern area of the Site (running west to east) before merging with a second set of overheads in the northeastern area which in turn ran north to south across the Site.

Potential Constraints to Ground Investigation

- 1.17 Two overhead power lines are present in the north and northeast of site, work exclusion zones will need to be in place during any intrusive investigation works.

Site Surroundings

- 1.18 The surrounding land uses at the time of the walkover survey are summarised in **Table 2:1**.

Table 2:1: Surrounding Land Use

Surrounding Land Use	
North	Residential
East	Mixed Residential / agricultural / solar farm
South	Agricultural
West	Residential

- 1.19 An aerial photograph representative of the site and surroundings is included in the Groundsure Report, dated 30/04/2022, which is presented in **Appendix 3**.

3. ANTICIPATED GROUND CONDITIONS

1.20 The anticipated ground conditions for the Site and controlled waters vulnerability are discussed within **Table 3:1**.

Table 3:1: Summary of Anticipated Ground Conditions

Anticipated Ground Conditions	
Geology	Information published by the BGS indicates that the Site has no superficial deposits aside from a small area of River Terrace Deposits in the north-eastern and south-western corner. The remainder of the Site is directly underlain by London Clay Formation bedrock. No BGS Borehole logs are located within the Site itself. However, a BGS Borehole log to the north of the Site (ref: SU76NW23) indicates Made Ground comprising clay, sand, gravel, and brick rubble to be present at a depth of 1.00m below ground level (bgl) overlying sand and gravel deposits to 7.00m bgl overlying the Lond Clay Formation. A log located 130m east of the Site (ref: SU76NW162) indicates the presence of Made Ground, comprising brick, at a depth of approximately 0.91m bgl. A log located 35m southwest of the Site (SU76NW166) recorded London Clay deposits to 49m overlying the Reading Beds to 71m with chalk beneath.
Hydrogeology	The Environment Agency (EA) classifies the London Clay as Unproductive Strata and the River Terrace Deposits as a Secondary A Aquifer. The following borehole logs make reference to groundwater depths encountered across the London Clay Geology: • SU76NW23: water struck at 1.00 bgl • SU76NW62: water struck at 1.24m bgl • SU76NW166: water struck at 22.8 metres bgl There are no abstractions relating to groundwater within 1km of the Site. There are no licenced discharges to groundwater recorded within 1km of the Site. The Site is not located within an EA groundwater Source Protection Zones.
Surface Waters	A series of drainage ditches are located around every field boundary at the Site, all containing water between 0.75-1.5m deep, generally noted to flow to the east The closest surface water feature to the Site is the River Loddon, located approximately 500m to the south-east of the Site. The Site is not within a designated Zone 2 or 3 flood plain area. The highest risk on Site of surface water flooding is a 1 in 30-year period located predominantly along the field ditches and the northern boundary of the Site. There are no active surface water abstraction licences within 1km of the Site. There are two records of revoked discharge licences within 500m of the Site. These records relate to the release of sewage to an unknown receiving watercourse approx. 300m south of the Site between 1968-1996, and miscellaneous discharges to a tributary of the River Loddon, approx. 250m east of the Site, between 1988-1992. One licence for the discharge of sewage to the River Loddon, approx. 400m south of the Site, is ongoing and has been effective since 1987.
Ground Gas & Radon	The Site is located in an area where less than <1% of properties exceed the Radon Action Level. Therefore, radon protection measures are not needed as part of the Proposed Development. A historical landfill located 100m east (approx.) of the Site alongside multiple filled gravel pits represent a potential source of ground gas.

Anticipated Ground Conditions	
Mining and Mineral Extraction	The Site itself has no evidence of historical mining or mineral extraction activity. However, historical mapping suggests that gravel and clay pits were located within 750m of the Site between 1900 – 1961 (approx.).
Environmental Sensitivity	The Site is located within the SSSI Impact Risk Zone, the Proposed Development doesn't not fall within the categories that require consultation. The Site is not located within a Nitrate Vulnerable Zone.

4. SITE HISTORY

- 1.21 Historical Ordnance Survey (OS) mapping for the Site area has been reviewed. These maps and plans date from 1872 to 2023. The historical plans reviewed are provided in **Appendix 4**. The key points of the historical development of the Site and surrounding area are summarised in **Table 4.1**. All distances quoted are approximate.

Table 4.1: Key Points of Development History

Dates	On Site	Off-Site
1872	The Site comprised agricultural fields. A pond is located in the southeast of the site.	Wells are noted directly to the north and west of the Site. A Gravel Pit is located 75m north.
1900-1909	No significant change noted.	Increased development around the Site. Gravel Pits are located to the east of the Site, approximately 150m away. An Old Brick Works is located approximately 500m to the west of the Site.
1956-1961	No significant change noted.	Many of the Gravel Pits are no longer noted on the mapping. The Old Brick Works is no longer present.
1967-1969	Drains are present across much of the Site. Mullins Farm (now known as Bodys Farm) has marginally expanded to the east.	A Fibre Moulding Works and Sawmill is present directly to the south-west of the Site. None of the previous Gravel Pits are still noted on the mapping. Residential Development around the Site increases.
1976-1988	No significant change noted.	Development around the Site continues to increase. The Fibre Moulding Works is no longer present whilst the Sawmill no longer named and is redeveloped as a number of small commercial units.
1994-2010	Buildings associated with Bodys Farm within the Site boundary have disappeared from mapping.	Wellington Industrial Estate is present to the north-west of the Site, adjacent to Basingstoke
2023	No significant change noted.	Wellington Industrial Estate is no longer noted on mapping.

Historical Aerial Photography and Imagery

- 1.22 Aerial photographs/imagery available through Google Earth and included within the Groundsure report are summarised in **Table 4.2**.

Table 4.2: Summary of Aerial Photography

Date (Source)	Description
2003 (Google Earth Pro)	The Site is shown as agricultural land. Residential developments are present to the north and west.
2017 (Google Earth Pro)	The Site itself remains unchanged, but a solar farm has been constructed to the south-east.

Date (Source)	Description
2017-2022 (Google Earth Pro)	No significant changes.

Operational / Company Records

- 1.23 No operational records have been made available for review as part of this assessment.

Planning History

- 1.24 The Wokingham Borough Council Planning Portal was accessed on 04/12/2023 and indicated that 1 planning application was submitted for the Site pre-1998 (ref: 11968). As this application was made prior to 1998, the details are stored on Wokingham Borough Council's microfiche records, which are unavailable for consultation.
- 1.25 Several planning applications have been made for land adjacent to the Site, however, none have included details pertinent to this assessment.

Unexploded Ordnance

- 1.26 Review of the unexploded ordnance risk maps available online indicates the Site to be in an area of low risk from UXO.

Summary of Site History

- 1.27 The Site has remained as undeveloped agricultural land since early mapping, with only a small farm building located in the north-western corner. Historical mapping indicates that the only change to the Site is the expansion of the farm buildings eastwards and the inclusion of drains across the field margins in 1967-69. The farm buildings appear to have been removed by 2001.
- 1.28 Development has steadily increased since 1877 to the north and west of the Site. Evidence of gravel pits are noted on the mapping. An Old Brick Works is also indicated 500m west of the Site over the same period. Industrial activity in the form of a Fibre Moulding Works is shown to be present in 1967 but is no longer mapped by 1976 and replaced with a number of smaller commercial units. From 2001, an industrial estate is present the northwest of the Site, off Basingstoke Road, but is not shown to be present in the present day. Lastly, aerial photography indicates that a solar farm was constructed on the field to the south-east of the Site circa. 2017.

5. REGULATORY SETTING

Permits Consents and Authorisations

- 1.29 A full listing of permits, consents and authorisations including discharge consents, pollution incidences and other environmental information, is included in the Groundsure report, presented in **Appendix 3**. The following pertinent features have been identified which have the potential to have a detrimental impact on Site:
- One pollution incident was recorded 180m south-west of the Site in 2002, relating to General Biodegradable Material and Waste leading to minor impact to land. Given the time that had elapsed and distance from site this is considered to represent a low risk to the environs.
 - Licensed pollutant release 74m (approx.) west of the Site, involving the unloading of petrol into storage at service stations. A historic permit for a dry cleaner is located approximately 175m northwest of the Site.
 - One ongoing licence for the discharge of sewage to the River Loddon, approx. 400m south of the Site, which has been effective since 1987.

Landfilling and Waste Management

- 1.30 A full listing of EA, BGS and Local Authority recorded landfills are provided in the Groundsure report presented in **Appendix 3**. The following facilities have been identified which have the potential to have a detrimental impact on Site.
- 1.31 One historical landfill Site has been identified within 500m of the Site, as detailed in **Table 5:1**.

Table 5:1: Historical Landfill Sites

Name	Distance from Site	Details
Sussex Way, Spencers Wood (Site ref: WOK75)	100m east (approx.)	Accepted inert, industrial, commercial, and household waste from 1960 to 1969.

- 1.32 Eight waste exemptions are present within 500m of the Site boundary, as detailed in **Table 5:2**.

Table 5:2: Waste Exemptions

Name	Distance from Site	Details
Balimore, Basingstoke Road, Spencers Wood, Reading, RG7 1AA Walford House Day Lewis Pharmacy	50-200m north- west	Sorting and de-naturing of controlled drugs for disposal
Heron Industrial Estate	40m south-west (approx.)	Storage of waste in a secure place

Name	Distance from Site	Details
Sheepbridge Court Farm	180m south-east (approx.)	Storage of sludge
David Wilson Homes	200-400m north-east	Use of waste in construction

- 1.33 Waste exemptions are required for handling small quantities of waste (below the thresholds of waste permitting legislation) or for low-risk waste management activities. Therefore, BWB do not consider them to represent a significant risk to the site.

6. GEOTECHNICAL APPRAISAL

- 1.34 The Groundsure report, Site history, current Site setting and geology setting have all been considered in order to provide an indication of the potential ground related constraints and opportunities in the context of the proposed development as set out in **Table 6:1**.

Table 6:1: Ground Related Constraints & Opportunities

Potential Constraint / Opportunity	Explanation	Potential Mitigation Options
Topsoil / Made Ground	Topsoil is expected to be present across the entire the Site. Made Ground was noted during the site walkover, this was limited to the bunds around the access track and two areas of concrete hardstanding.	Topsoil and Made Ground may be suitable for reuse on Site, subject to confirmation of chemical status and engineering properties via ground investigation, and confirmation of potential restrictions on reuse associated with waste management licencing.
Preliminary Foundation Solution	Based on the proposed lightly loaded residential housing at the Site, shallow strip foundations bearing onto the River Terrace Deposits (where present) or London Clay formation are likely to be suitable at the Site.	Ground investigation should be undertaken to confirm ground conditions at the Site and allow for in-situ and laboratory testing to inform foundation design.
Buried Obstructions	Given the historical uses of the Site there is limited potential for buried obstructions such as services and former foundations, however these may be present in the north-western corner where Brodys Farm was historically located.	Buried obstructions may require removal from Site within areas of proposed development.
Trees	Mature trees are present along the field boundaries of the Site.	Foundations in close proximity to new or existing trees may need to be locally deepened beyond the zone of influence of tree roots and/or heave precautions adopted.
Pyritic Geology	Ground conditions are expected to be pyritic based on the London Clay Geology.	As part of ground investigation works, appropriate testing should be undertaken in relation to aggressive ground conditions.
Ground Subsidence Risks	The Groundsure Report indicates a negligible to low risk on Site associated with shrink/swell clays, running sands, collapsible deposits, landslides, and dissolution of soluble rocks.	No further assessment is required.
Mineral Extraction	Potential historical mineral abstraction has been noted within the vicinity of the Site but is unlikely to affect the Site given the lack of anticipated sand and gravel deposits mapped across the Site area.	No further assessment is required.

Potential Constraint / Opportunity	Explanation	Potential Mitigation Options
Drainage and Soakaways	Soakaways are not considered a viable option at the Site due to the presence of the London Clay Formation bedrock geology.	Consultation with a drainage engineer is recommended to understand the potential drainage options available to the development of the Site area.

7. PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

Introduction

- 1.35 The risk posed by any contaminants in soil or groundwater will depend on the nature of the hazard, the probability of exposure, the pathway by which exposure occurs, and the likely effects on the receptors. A contaminant is defined as a substance that has the potential to cause harm, while a risk is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.
- 1.36 Three impact potentials exist for any given Site, all of which need to be considered in a risk assessment, which are:
- The Site impacting upon itself.
 - The Site impacting on its surroundings; and
 - The surroundings impacting on the Site.
- 1.37 The following sections discuss all the identified potential on and off-Site sources, pathways, and receptors in the context of the proposed development and plausible contaminant linkages which may represent a risk to identified receptors such as human health and/or controlled waters from the data gained from the desk study.
- 1.38 The assessment is qualitative and aimed to determine all likely contaminant linkages, with consideration of significance and allowing for uncertainties.
- 1.39 **Sources (S):** These are potential or known sources of contamination that may relate to a former land use or present Site feature or process (e.g. fuel storage tanks).
- 1.40 **Pathways (P):** A pathway is defined as a mechanism or route by which a contaminant comes into contact with, or otherwise affects a receptor. Pathways by which the identified receptors may be impacted upon in the context of the proposed development.
- 1.41 **Receptors (R):** Receptors are defined as people, living organisms, ecological systems, controlled waters, atmosphere, structures, and utilities that could be adversely affected by contaminant(s).

Conceptual Site Model

- 1.42 Consideration has been given to the likely sources, pathways and receptors which may be present, based on the information in the previous sections. These are presented in **Table 7:1** and **Table 7:2** and further information about the risk classification scheme is included within **Appendix 5**, with reference to CIRIA C552 'Contaminated land risk assessment - a guide to good practice'.
- 1.43 Under the Construction Design Management (CDM) Regulations 2015, construction and maintenance contractors must undertake their own risk assessments and mitigation to protect their staff, other human receptors and the environment from potential contamination. By law potential risks to human health and the environment from construction activities must appropriately identified and all necessary steps taken to

eliminate/manage that risk. Therefore, construction / maintenance workers are excluded as a receptor in the CSM.

- 1.44 A tabulated version of the Preliminary CSM based on the desk study and Site observations is presented in **Table 7:3**.

Table 7:1: Potential Sources of Contamination

Location	Potential Source	Contaminants of Potential Concern (CoPC)
On-Site	Agricultural uses and historical farm building carried throughout the Site and surrounding area.	- Heavy metals - Inorganics, such as cyanides, sulphates, and nitrates - pH - Asbestos - Pesticides & herbicides - Petroleum hydrocarbons - Heavy metals
Off-Site	Contamination associated with neighbouring commercial activity and landfill.	- Heavy metals - Inorganics, such as cyanides, sulphates, and nitrates - PAHs - Petroleum hydrocarbons - Methane, carbon dioxide
	Contamination associated with 1967 Electrical substation located 25m west of the Site	PCBs

Table 7:2: Relevant Potential Pathways and Receptors

Receptors	Pathways
Human Health: Future Site users (residential)	- Dermal contact with soil or dust - Incidental ingestion of soil and/or dust - Inhalation of dust and/or fibres - Ingestion of contaminated vegetables and/or soil attached to vegetables. - Migration and accumulation of ground gas in enclosed spaces leading to inhalation or explosion
Controlled Waters: - Groundwater (secondary A aquifer geologies) - Surface water (drainage ditches)	- Leaching of soil contaminants - Vertical and lateral migration - Surface run-off
Property: Building structures	Direct Contact

- 1.45 The following potential sources of contamination, identified during the review, are not considered likely to impact on the Site. These are detailed below, along with the appropriate justification for not being included within the preliminary CSM:

- Historical Old Brick Works; located over 500m west of the Site and disused for over 100 years.

Table 7:3: Preliminary Conceptual Site Model

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
On-Site sources as detailed in Table 7:1 .	Dermal contact with, and incidental ingestion of soil and/or dust. Inhalation of dust and/or fibres.	Future Site users (residential)	Md	UI	L	Limited potential contamination sources have been identified. It is recommended that an intrusive ground investigation be completed to assess the extent of any potential contamination at the Site.
	Ingestion of contaminated vegetables and/or soil attached to vegetables.	Future Site users (residential)	Md	UI	L	In garden areas where there is the potential for allotments, the provision of a clean capping layer with appropriate demarcation at depth would limit the potential for vegetables to be grown in potentially contaminated soils. Existing topsoil on site should be tested to ensure its safe re-use across the new development.
	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future Site users (residential)	Md	UI	L	Significant sources of Made Ground is not expected across Site, but isolated patches could be possible. Ground investigation should include the installation of ground gas monitoring wells in order to determine the risk posed from ground gases.
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Aquifer A	Md	UI	L	A significant source of contamination has not been identified at the Site. A ground investigation should be undertaken to quantify the possibility for contaminants to impact on controlled waters.
	Vertical and lateral migration of contaminants.		Md	UI	L	
	Lateral migration of contaminants in groundwater		Md	UI	L	
	Surface run-off.	Drainage Ditches and River Loddon	Md	UI	L	The underlying strata of London Clay has a low permeability which will limit the potential for significant leaching and migration of contamination.
	Direct contact	Buried structures/foundations.	Md	UI	L	Sulphates and low pH in the ground could accelerate the degradation of buried concrete structures (e.g., foundations). Ground investigation should include an assessment of the concrete design class.

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
Off-Site sources as detailed in Table 7:1 .	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future Site users (residential)	Md	UI	L	The landfill and filled gravel pits in the vicinity of the Site may represent a potential source of ground gas. However, the cohesive nature of the underlying London Clay deposits will likely minimise ground gas migration and is therefore considered a low risk. The above should be confirmed through a ground gas monitoring programme completed as part of an intrusive ground.
	Lateral migration of contaminated groundwater.	Groundwater: Underlying Secondary Aquifer. A	Md	UI	L	Historical industrial activity to the south-west of the Site in the form of the Fibre Moulding Works represents a potential contamination source. However, due to the underlying London Clay Geology in the west of the Site, migration is deemed unlikely. This should be confirmed through ground investigation and, where possible, groundwater monitoring wells should be located along the Site boundaries in order to delineate any potential contamination.
VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low KEY: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor, Hi = High, Li = Likely, Lw = Low Likelihood, UI = Unlikely						
Pollutant Linkage Assessment Summary When considered in the context of the conceptual site model and the limited historical activities that have taken place LOW risk to human health. It is considered that London Clay deposits will significantly reduce any potential migration of any contaminants or hazardous ground gases which could potentially impact upon the site development. The risk posed to controlled waters is predominantly considered to be LOW due to a lack of significant contamination sources at the Site. It is recommended that a ground investigation be undertaken to quantify the identified pollutant linkages and assess likely mitigation measures.						

8. ENVIRONMENTAL LIABILITY ASSESSMENT

Statutory Liability

- 1.46 The contaminated land regime has implications for those who cause or knowingly permit land to be contaminated, or who own or occupy land that is contaminated. Contaminated land is defined in Section 78A(2) of Part IIA of the Environmental Protection Act 1990 as:
- 1.47 "Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:
- i. *Significant harm is being caused or there is a significant possibility of such harm being caused; or*
 - ii. *Significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused."*
- 1.48 Harm is defined in Section 78A(4) of the Environmental Protection Act 1990 as:
- 1.49 "Harm to the health of living organisms or other interference with ecological systems of which they form part and, in the case of man, includes harm to his property."
- 1.50 Once an area of land has been identified as contaminated land, appropriate persons will be identified as being responsible for the cost of cleaning up the land by the enforcing authority. The appropriate person will be liable for all or part of the remediation of the land. Two classes of appropriate person have been identified:
- Class A appropriate persons are those who cause or knowingly permit the pollutants to be in, on or under the land.
 - Class B appropriate persons are the owners(s) or occupier(s) of the land.
- 1.51 Where no Class A appropriate persons can be identified, then Class B appropriate persons may become liable.
- 1.52 Based on the information available regarding the Site, the potential for Statutory Authority action based on "pollution of controlled water" or "significant harm" as defined by Part IIA of the Environmental Protection Act 1990 is considered to be LOW.

Third Party Liability

- 1.53 Based on the information contained in this report, it is the opinion of BWB that the potential for legal action by surrounding landowners, based on the potential for contamination to migrate off-Site, is considered to be LOW when considering the agricultural history of the Site.

Public Relations

- 1.54 The likelihood of public relations being tarnished due to contamination issues at the Site are considered to be LOW.

9. CONCLUSION AND RECOMMENDATIONS

Conclusions

- 1.55 The Site forms an irregular shape of agricultural land and is located to the south of Spencer's Wood in Wokingham. The Site is bound by a residential development to the north, Basingstoke Road (B3349) to the west, and agricultural land to the south and east.
- 1.56 The Site has remained as undeveloped agricultural land since early mapping, with only a small farm building located in the north-western corner. Historical mapping indicates that the only change to the Site is the expansion of the farm buildings eastwards and the inclusion of drains across the field margins in 1967-69.
- 1.57 Development has steadily increased since 1877 to the north and west of the Site. Evidence of gravel pits and clay pits are noted on the mapping, approximately 300m to the east and 750m to the west of the Site respectively, between 1900 – 1961. An Old Brick Works is also indicated 500m west of the Site over the same period. Industrial activity in the form of a Fibre Moulding Works is shown to be present in 1967 but disappears from mapping by 1976. From 2001, an industrial estate is present the northwest of the Site, off Basingstoke Road, but is not shown to be present in the present day. Lastly, aerial photography from Google Earth Pro indicates that a solar farm was constructed on the field to the south-east of the Site circa. 2017. Information published by the BGS indicates that the Site has no superficial deposits aside from a small area of River Terrace Deposits (a Secondary A Aquifer) in the north-eastern and south-western corners. The remainder of the Site is directly underlain by London Clay Formation bedrock (Unproductive Strata).
- 1.58 A series of drainage ditches are located around every field boundary at the Site, all containing water between 0.75-1.5m deep, all contained water during the Site walkover.
- 1.59 Based on the proposed residential housing at the Site, shallow strip foundations bearing onto either the River Terrace Deposits (where present) or London Clay deposits may be suitable at the Site, depending upon the thicknesses and competency of the weathered portion of the London Clay.
- 1.60 The proposed development is considered to pose a low risk to human health and controlled water with limited potential sources of contamination being identified.

Recommendations

- 1.61 A ground investigation should be undertaken at the Site to confirm ground conditions at the Site, determine the ground gas regime, allow for in-situ and laboratory testing to quantify pollutant linkages and inform foundation design.

10. REFERENCES

1. BS 10175:2011+A2:2017 Investigation of potentially contaminated Sites. Code of practice. British Standards Institute, 2017.
2. CIRIA C552 *Contaminated land risk assessment. A guide to good practice*. Rudland, D J, Lancefield, R M, Mayell, P N, 2001.
3. Environmental Protection Act 1990: Part 2A, Contaminated Land Statutory Guidance. Department for Environment Food and Rural Affairs (DEFRA), 2012.
4. Land Contamination Risk Management. Environment Agency, 2020.
5. <https://www.gov.uk/government/collections/land-contamination-technical-guidance>.
6. The Control of Asbestos Regulations. Health and Safety Executive, 2012.

APPENDICES

Appendix 1: Development Masterplan

Appendix 2: Site Photographs

Appendix 3: Groundsure Report

Appendix 4: Historical Mapping

Appendix 5: Classification of Risk

