

GROUND CONDITIONS DESK TOP STUDY AND PRELIMINARY RISK ASSESSMENT

University of Reading

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EXECUTIVE SUMMARY

Section	Summary
Background	RPS Consulting Services Ltd (RPS) was commissioned by the University of Reading to undertake a Phase 1 Geo-Environmental Desk Study and Preliminary Environmental Risk Assessment of land located to the south of the M4, Reading. The report has been commissioned prior to the proposed development of the site for a mixed use including residential properties, school, hospital and employment space.
Site Details	Site area: 484 hectares National Grid Reference: Approximate 475458 E, 168753 N Current site use: The site currently comprises a mixed use including undeveloped fields, farm and residential properties, agricultural land and university facilities, commercial and leisure / hospitality premises. Proposed site use: The proposed development comprises a mixed use development. Surrounding land use: The site is generally located in an area of mixed rural, residential and commercial usage.
Site Inspection	A targeted site inspection was undertaken on 5th and 6th May 2022. This identified a number of potentially contaminative land uses including builder's yards/compounds and storage areas associated with the farms, commercial premises and research facilities. Visual evidence of contamination associated with the above land uses was <u>not</u> identified. Old gravel pits and historical landfills / areas of worked ground were also inspected for evidence of potential contamination. No visual evidence of infilled ground was apparent from the walkover survey associated with these features.
Site History	A review of historical maps indicates that since 1872 the land has predominantly been within agricultural use with a number of drains/ ditches, gravel pits and ponds located across the site. From 1979 the M4 motorway and subsequently the B3270 have been constructed on the norther perimeter of the site. Off-site historical potential sources of contaminants of concern include a gas works, sawmills and sewage works.
Environmental Setting	The site is indicated to be underlain by a Secondary A and Secondary B Aquifers relating to the superficial deposits (where present) and unproductive Aquifer relating to the bedrock of the London Clay Formation. The site is not indicated to be located in a groundwater Source Protection Zone (SPZ). There is one sensitive groundwater abstraction within the University of Reading ownership boundary. The nearest main surface watercourse is the River Loddon which cuts through the site trending approximately SW-NE.
Preliminary Environmental Risk Assessment	An outline conceptual site model (CSM) has been derived on the basis of the desk top study and site reconnaissance. The potential risks to identified receptors are assessed as an overall low to moderate risk. Though significant Made Ground and widespread gross contamination is not anticipated potential localised sources of contamination have been identified which may pose risk to sensitive receptors. A number of historical landfills are identified on site and these have the potential to represent a source of ground gas along with any further areas of deep Made Ground.
Preliminary Geotechnical Risk Register	An initial review of ground related development constraints identified that variable geology and the presence of Made Ground has the potential to lead to deepened foundations in parts of the site. Additionally natural sulphate levels and the pH of the natural materials and contaminants associated with Made Ground may generate the requirement for chemical resistant concrete and upgraded water supply pipes. The London Clay may be considered of medium volume change potential and may lead to a requirement for heave protection / deepening of foundations. Shallow groundwater may also impact on slope stability and dewatering of shallow excavations.
Conclusions and Recommendations	The outline CSM produced upon completion of the desk top study assessment has identified a number of potential pollutant linkages that may be active upon the redevelopment of the Application Site. It is therefore recommended that the potential for these linkages to be active is assessed through an intrusive Site Investigation. The scope of investigation works should target the identified potential sources of contamination and should be phased.

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1 INTRODUCTION

1.1 Preamble

- 1.1.1 RPS Consulting Services Ltd (RPS) was commissioned by the University of Reading (UoR), herein referred to as the 'client' to undertake a Desk Top Study (DTS) and Preliminary Risk Assessment (PRA) of a large parcel of land located to the South of the M4. The nearest postcode to the site is RG6 4JL. It is understood the works are required to provide information in support of the site promotion and the subsequent outline planning application for a mixed use development as detailed in Section 1.5.
- 1.1.2 The site covers approximately 484 hectares and currently comprises primarily undeveloped fields with occasional farm properties and University buildings.
- 1.1.3 The Desk Study assessment is based upon a review of published information available from local, regional, and national agencies. The primary source of the desk study information is the Report provided by Groundsure, Ref. GSIP-2022-12621-9885¹ which is presented as Appendix A. Please note the terms and conditions attached to the supply of data from Groundsure.

1.2 Objectives

- 1.2.1 The principal objectives of this assessment were as follows:
- To assess potential sources of contamination at the site, associated with historical and current land uses both on site and in the surrounding area;
 - To review the environmental setting to assess the sensitivity of the surrounding area to contamination / pollution;
 - To produce an outline Conceptual Site Model (CSM) detailing how any contamination may impact the identified receptors via pollutant linkages;
 - To conclude on the likely requirement for further assessment and investigation to support site promotion and outline planning application;
 - To present a preliminary geotechnical appraisal; and
 - Identify likely significant ground related development constraints.

1.3 Legislation and Guidance

- 1.3.1 The assessment has been undertaken in general accordance with British Standard BS EN ISO 21365:2020 and is considered suitable to meet the initial requirements of planning as outlined within the National Planning Policy Framework (2021). The assessment also reflects the recommendations of Environmental Agency guidance, Land Contamination: Risk management, (LCRM 2020)².
- 1.3.2 This report has been produced in general accordance with:
- DEFRA Environmental Protection Act 1990: Part 2A - *Contaminated Land Statutory Guidance* (2012);

¹ Groundsure (2022): Groundsure Report, ref. GSIP-2022-12621-9885, dated 29th March 2022.

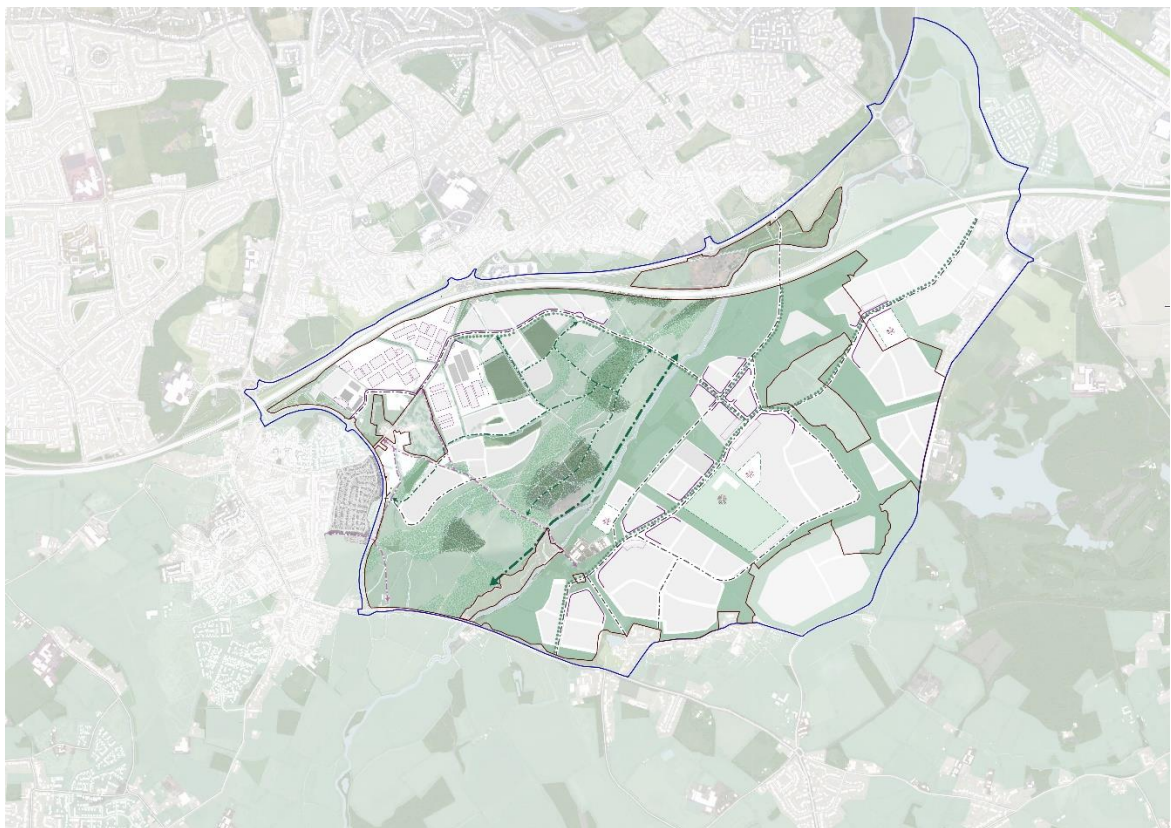
² Environment Agency (2020): Land Contamination: Risk Management (LCRM 2020), updated 19th April 2021.

- Environment Agency (2020) Land Contaminated: Risk Management (LCRM 2020);
- National Planning Policy Framework (2021);
- CIRIA (2001) C552 Contaminated Land Risk Assessment. A guide to good practice. (CIRIA 2001);
- West Berkshire Council Guidance for Developers.
- British Standard requirements for the '*Investigation of potentially contaminated sites - Code of practice*' (ref. BS10175:2011+A1:2017).

1.4 Assessment Area

1.4.1 The site boundary considered within this assessment is detailed upon Figure 1-1.

Figure 1-1: Site Boundary



1.4.2 The area defined by the 'Blue Line' boundary on the above plan is referred to as the 'Wider Assessment Site' within this report, and is broken down into two sub areas referred to as the 'UoR Ownership Boundary' and the 'Additional Land within the SDL Boundary' as set out on Figure 1-2 and Figure: 1-3 respectively.

Figure 1-2: UoR Ownership Boundary

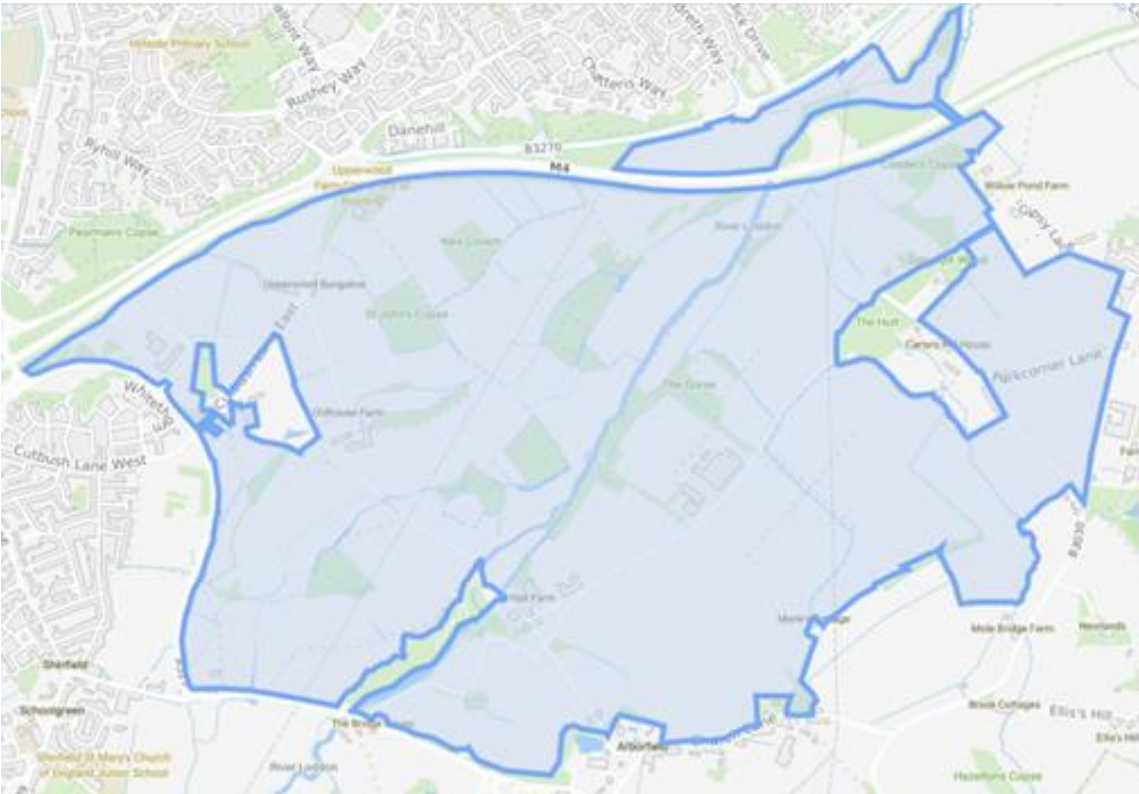
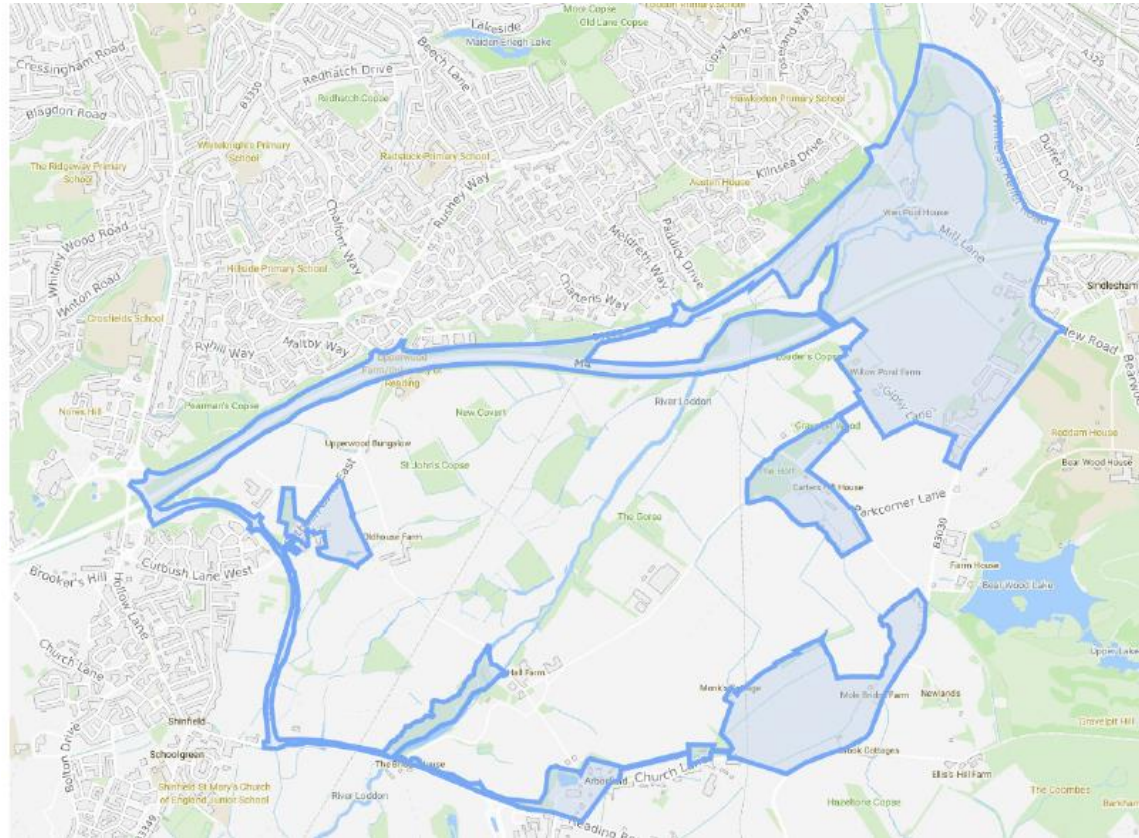


Figure 1-3: Additional Land within the SDL Boundary



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- 1.4.3 To allow the geological, hydrogeological and environmental setting to be adequately assessed for determination of a suitable Conceptual Site Model (CSM), data searches undertaken have initially included a buffer of up to 500 m from the Wider Assessment Site boundary.
- 1.4.4 A preliminary masterplan layout has been provided to RPS and is presented in Appendix B.
- 1.4.5 When describing features within the UoR Ownership Boundary and the Additional Land within the SDL Boundary, the area descriptors and zones set out on Drawings JSL4456-101 and JSL4456-102 have been used respectively.

1.5 Proposed Development

- 1.5.1 The proposed development is to comprise a mixed use development comprising:
- Circa 4,500 new homes;
 - Circa 300,000sqm of employment, research, creative arts and media space;
 - New local facilities including a Village Centre, and local neighbourhood facilities;
 - New primary schools and secondary education;
 - Opportunity for new hospital;
 - Opportunities for new shared community workspace;
 - Opportunities for elderly accommodation, including care;
 - New allotments /community gardens; and
 - Public open space, including a linear park along the River Loddon.
- 1.5.2 A preliminary masterplan layout is presented in Appendix B.

1.6 Limitations of Assessment

- 1.6.1 Due to the size of the Wider Assessment Site, the site walkover undertaken has been targeted to the areas identified as potential contamination sources from review of historical mapping obtained from Landmark. A full site walk over has not been undertaken.

2 SITE DESCRIPTION AND DESK STUDY: UOR OWNERSHIP BOUNDARY

2.1 Introduction

- 2.1.1 This section describes the setting, ground conditions and potential for contamination within the UoR Land Ownership Boundary. Within this section this area is herein referred to as the 'Application Site'. Particular features of interest are identified, referencing the areas set out on Drawing JSL4456-101, where appropriate.

2.2 Site Description

- 2.2.1 The location of the Application Site is on land south of the M4 motorway and B3270, north of Arborfield, Reading.
- 2.2.2 The topography of the Application Site is indicated from OS mapping to range generally between approximately 40 and 50 m Above Ordnance Datum (AOD), the River Loddon and land extending generally west at approximately 40 m AOD. A sharp increase in elevation is indicated in the northwestern corner rising from approximately 45 m AOD to 65 m AOD. A description of each area of the Application Site is presented within the remainder of this section.

2.2.2 NW Area

- 2.2.1 The area generally comprises a mix of agricultural land, areas of woodland, farm/residential properties, barns, and commercial premises. Land use / features include:
- Thames Valley Science Park (TVSP) located in the northwestern corner. See Plate 17.
 - Shinfield Studios located in the central part of the NW Area.
 - Shinfield Studios construction site located north of Shinfield Studios.
 - Areas of spoil / bunds /embankments associated with the M4 motorway and Eastern Relief Road. See Plate 17 and 18.
 - Upperwood Farm located in the northeastern corner.

2.2.3 SW Area

- 2.2.1 The area generally comprises a mix of agricultural land, areas of woodland, farm/residential properties, barns, and commercial premises. Land use / features include:
- Shinfield Grange located in northwestern corner.
 - Old House Farm located in the north of the SW Area.
 - Pumping station located in the east of the SW Area.
 - Hall Farm and Arborfield graveyard located in the east of the Application Site.

2.2.4 SE Area

- 2.2.1 The area generally comprises a mix of agricultural land, areas of woodland, and farm/residential properties. Land use / features include:
- Centre for Diary Research.

2.2.5 NE Area

2.2.1 The area generally comprises a mix of agricultural land, areas of woodland, farm/residential properties, barns, and commercial premises.

2.2.6 Site Walk Over

2.2.1 A targeted site walkover was undertaken at the Application Site following review of the available data, on 5th and 6th of May 2022. The walkover targeted the following features:

- Shinfield Grange complex (SW Area). Includes tree research laboratory (with poly tunnels), scaffolder's yard (with Ad blu drums, IBCs), landscape services. See Plates 1 to 6 and 14.
- Upperwood Farm complex (NW Area). Includes compounds with skips, containers, fencing, builder's rubble, IBCs. See Plates 1 to 6.
- Gravel pit (NW Area) – east of TVSP. Indicated to be located within the Shinfield Studios construction site (Feature not evident during walk over).
- Gravel pit (NE Area) – north of Julkes Lane. Indicated to be located within heavily overgrown area (inaccessible - feature not evident during walk over). See Plates 15 and 16.
- Old House Farm complex (SW Area). Indicated to include vehicle repair facilities (not accessed). See Plate 7.
- Arborfield Hall Farm complex (SW Area). Includes Arborfield graveyard. Gravel pits (Feature not evident during walk over). See Plate 8.
- Historical landfill (NE Area). (Feature not evident during walk over). See Plate 19.
- Centre for Dairy Research (SE Area). Includes three slurry tanks and slurry pits, chemical store (acid/alkalis within blockwork building), chemical store (agricultural chemicals within metal storage container) and fuel tank (11,300 litre capacity metal storage container). See Plates 9 to 13.

2.2.2 Photos taken during the site walkover are presented in Appendix C.

2.2.3 A number of other small farm properties / commercial properties were present across the Application Site, but were considered to present limited potential for contamination. These were not inspected.

The Surrounding Area

2.2.4 The Application Site is located in an area of mixed rural and industrial land uses. At the time of the site inspection, neighbouring land consisted of the following:

Table 2-1 – Neighbouring Land Uses

Direction	Description
North:	M4 motorway and B3270 with Lower Earley residential area beyond.
East:	Predominantly agricultural land with farm properties and residential properties and commercial premises.
South:	Agricultural land, Arborfield residential areas and commercial premises.
West:	Agricultural land, and Shinfield residential area and commercial premises.

2.3 Site History

2.3.1 Historical Map Review

2.3.1 The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500, 1:10,560 and 1:10,000 dated 1875 to 2021.

Table 2-2 – Historical Site Uses

On-site Land Use and Features	Approximate Dates
Generally undeveloped land comprising fields with sporadic areas of woodland and a number of drains/ditches, ponds, and marshy ground. A number of farm properties and lodges, footpaths and roads are shown. The River Loddon is shown flowing approximately SW-NE through the Application Site.	1898 - 1900
A series of electricity pylons trend approximately NE-SW and N-S through the Application Site.	1961 - Current
A motorway (M4) forms much of the northern boundary (and cuts through NE Area) in embankments and cuttings.	1979 - Current
<u>SW Area</u> Disused Mill Gravel pits (Unknown if backfilled) Oldhouse Farm and well Auto bodyshop (Oldhouse Farm) Arborfield Hall Farm Pumping station Graveyard Ponds	1898 1913 – 1938/1961 1900 Current Current 1900 - Current 1969 - Current 1872 – Current 1898 - 1988
<u>NW Area</u> Old gravel pits (part of construction site) Upperwood Farm/Upperwood House with tanks Sheepfolds (Lane End Farm) Tanks	1898 – 1956 1898 - 2010 1973 – 2001 1872 – 1994
<u>NE Area</u> Sewage works Lower Earley Farm (Lowerwood Farm) Newland Farm (Carter's Hill Farm) Ponds (Unknown if backfilled)	1969 - 1978 1898 - 1938 1898 – 2001 1961 - 1988
<u>SE Area</u> Research centre (with tanks) Tanks	1988 – Current 1872 - 1993

Table 2-3 – Historical Neighbouring Site Uses

Surrounding Land Uses (250 m radius)	Orientation	Approximate Distance (m)	Dates	
			From	To
Nursery	E	5	1969	1978
Gas works	E	6	1898	1909
Sewage works	NE	10	1975	
Horticultural station	SW	34	1969	1983
Nursery	NE	69	1898	
Nursery	SE	70	1988	
Gravel pit	N	80	1932	1961

Surrounding Land Uses (250 m radius)	Orientation	Approximate Distance (m)	Dates	
			From	To
Sewage beds	NE	85	1932	1938
Sawmill	E	114	1898	1938
Gravel pit	S	116	1900	1909
Mill	E	117	1961	
Sawmill	E	143	1932	
Old gravel pit	SW	150	1900	
Smithy	SW	152	1898	1938
Horticultural station	S	181	1956	
Filter beds	NW	190	1909	1938
Nursery	NW	212	1913	1983
Filter beds	E	221	1938	1969
Horticultural research station	NW	228	1975	1988
Graveyard	SE	Adjacent	1872	2022

2.3.2 Site Planning History

2.3.1 Review of available planning records indicates the Application Site has been subject to a number of planning applications, many of which relate to minor works. Those considered of relevance are discussed below:

NW Area

- Application Reference 211841: Science Park Creative Hub at the Thames Valley Science Park including erection of film stages, workshops and office space. A Contamination assessment identified that no significant soil contamination exceeding human health criteria was found in the north parcel and it was found that there was no significant risk from bacterial pathogens. Asbestos fibres with a concentration of <0.001% were found in the south parcel. Gas and vapour sampling was carried out due to the presence of a filled gravel pit/pond on the site. For the majority of the site CIRIA characteristic situation (CS1) was considered appropriate meaning that gas protection measures were not deemed necessary. In the vicinity of the infilled pond CS2 gas protection measures were considered to potentially be required, subject to further ground gas sampling in this area. Status: Approved December 2021.
- Application Reference 210387: Erection of film studio stages and workshops. Status: Approved March 2021.
- Application Reference 163609: Outline planning application for Phase 2 of the Thames Valley Science Park. Status: Approved July 2017.
- Application Reference O/2009/1027: Outline application for phase 1 development of Science & Innovation Park plus full application for the construction of access road, foot and cycle ways, M4 overbridge and associated works for Phase 1. Reserved Matters application 151988 (Status: Approved August 2015).
- Application Reference 140603: includes construction of four wind turbines on land at Rushy Mead south of Lower Early Way (Upperwood Farm). It was proposed that ground contamination be scoped out of the EIA. Status: Refused April 2011.

2.1 Interviews

2.1.1 Correspondence with University of Reading personnel and other land holders was undertaken to obtain further information regarding the current and historical uses associated with the Application Site.

2.1.2 The following information was provided:

- SE Area – Research Centre. Three slurry lagoons, chemical store (acids/alkalis), diesel tank and agricultural chemical store (pesticides). One or two potential discharge consents for waste of Hall Farm House.
- NE Area – area of Made Ground (builder's rubble from a demolished building at the main university campus).
- Asbestos / Asbestos Containing Materials (ACMs) have been identified within buildings located across the Application Site.

2.2 Previous Reports

2.2.1 A number of reports have been submitted as part of the above planning applications. These are discussed in the remainder of this section.

2.2.2 MLM Group, Shinfield Studios, Tier 2 Contamination Assessment, May 2012

2.2.1 This investigation was undertaken in relation to planning (Application Reference 211841) within the NW area of the Application Site.

2.2.2 Figure 2-1 shows the site boundary for the investigation works.

Figure 2-1: Site Boundary



Ground Investigation

2.2.3 The ground investigation undertaken on two parcels of land, north and south of Cutbush Lane East comprised:

Southern Parcel

- One cable percussion borehole;
- Three windowless sampler boreholes; and
- Twelve trial pits.

Norther Parcel

- Thirteen cable percussion boreholes;
- Eleven windowless sampler boreholes; and
- Sixty-two trial pits.

Ground conditions

2.2.4 Ground conditions encountered the following strata and proven depths:

Southern Parcel

- Topsoil up to 0.60 meters below ground level (mbgl).
- River Terrace Deposits (up to 3.60 mbgl).

Northern Parcel

- Topsoil up to 0.75 mbgl.

-
- Made Ground up to 3.00 mbgl;
 - Possible infilled pond up to 3.40 mbgl.
 - River Terrace Deposits up to 4.90 mbgl).
 - London Clay Formation up to 5.00 mbgl.

Soil contamination

Southern Parcel

- 2.2.5 Asbestos fibres were identified in one sample of topsoil. However, quantification indicated a concentration in soil of <0.001% and therefore asbestos was not considered present a risk to human health during either the construction or operation of the development.

Northern Parcel

- 2.2.6 Soil contamination exceeding human health criteria was not identified.
- 2.2.7 Laboratory testing for bacterial pathogens, recorded *Clostridium perfringens* at concentrations ranging from 430 cfu/g to 900 cfu/g at depths between 0.10 m and 0.20 m bgl in the historical gravel pit area, however at such levels they not considered to present a risk.

Groundwater contamination

Southern Parcel

- 2.2.8 Contamination in groundwater was not recorded above water quality standards.

Northern Parcel

- 2.2.9 Groundwater was considered to be impacted by low levels of selenium above Drinking Water Standards, including perched water within the area of the infilled pond and marginally elevated in the River Terrace Deposits.

The groundwater monitoring indicated that the groundwater flow direction is towards the southeast.

Gas/Vapour contamination

Southern Parcel

- 2.2.10 Gas screening values for methane and carbon dioxide indicated that the site should be designated CIRIA Characteristic Situation CS1. Although carbon dioxide was recorded above the 5% Carbon Dioxide (CO₂) threshold, the exceedance was marginal, gas flows were negligible and made ground is minimal, therefore it was considered that the designation should not be increased.

Northern Parcel

- 2.2.11 Gas screening values for methane and carbon dioxide indicated that the majority of the site should fall within CIRIA Characteristic Situation CS1 and gas protection measures were not deemed to be required. Carbon dioxide was elevated in the area of the infilled pond and following the gas risk assessment is locally CIRIA CS2.

Remediation

Southern Parcel

- 2.2.12 Remediation not required.

Northern Parcel

- 2.2.13 Remediation was considered necessary to address the potential risk from ground gas as part of the permanent development in the northern parcel. Recommended remediation and mitigation included:

- Gas protection achieving a BS8485:2015+A1:2019 solution score of 3.5 for Type B buildings and 1.5 for Type D buildings locally in the vicinity of the infilled pond in the northern parcel and potentially in the southern parcel.

2.2.3 WSP, Thames Valley Science Park, Ground Investigation Report, February 2015

- 2.2.1 This investigation was undertaken in relation to planning (Application Reference 151988) within the NW area of the Application Site.
- 2.2.2 Figure 2-2 details the site boundary for the investigation works.

Figure 2-2: Site Boundary



Ground Investigation

- 2.2.3 The ground investigation comprised:

- Twenty-two rotary cored boreholes.
- Fifteen trial pits.

Ground conditions

- 2.2.4 Ground conditions encountered the following strata and thicknesses:

- Made Ground (where present) 0 to 1.7 m.
- Alluvium (where present) 0.3 to 2.7 m.
- River Terrace Deposits (where present) 0 to 4.2 m.
- London Clay (unproven depth exceeding 25 mbgl).

Groundwater

- 2.2.5 Subsequent monitoring recorded groundwater levels between 0.24 mbgl and 3.57 mbgl.

2.2.4 WSP, Thames Valley Science Park, Generic Quantitative Risk Assessment, March 2015

- 2.2.1 This report is for same application as the previously summarised report (Application Reference: 151988) and relates to the same area of the Application Site.
- 2.2.2 No significant Made Ground was identified. The area of the former gravel pits identified the presence of natural deposits with no anthropogenic material
- 2.2.3 No significant concentrations of contaminants or significant risks to human health or controlled waters were identified.

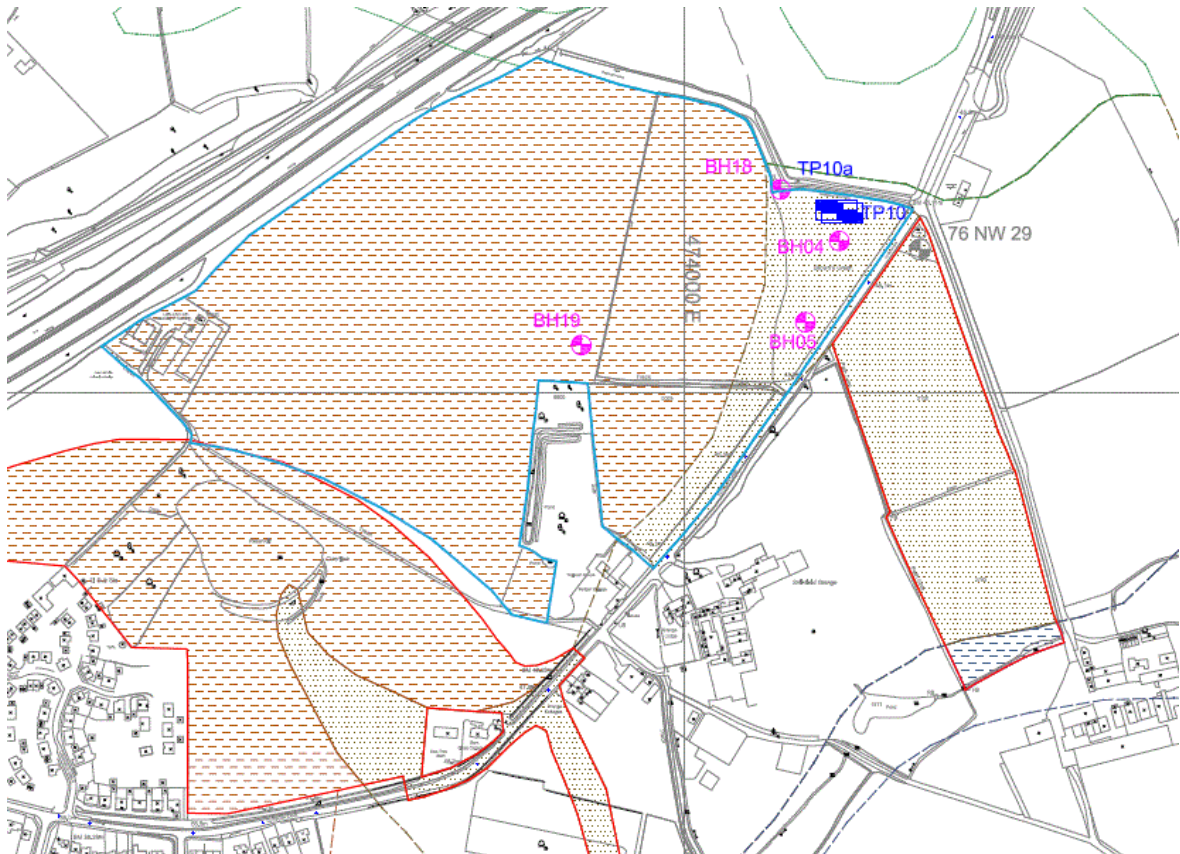
2.2.5 WSP, Thames Valley Science Park, Ground Gas Risk Assessment, May 2015

- 2.2.1 This report is for same application as the previously summarised report (Application Reference: 151988) and an additionally planning application (210387) and relates to the same area of the Application Site.
- 2.2.2 Works comprised seven gas monitoring rounds of nine monitoring wells installed as part of the WSP ground investigation. Boreholes targeted potential ground gas sources including a filled gravel pit and spoil from construction of the M4.
- 2.2.3 The site was classified in terms of ground gas as Characteristic Situation 2. The GSV threshold of 0.07 of Characteristic Situation 1 had been exceeded and maximum carbon dioxide concentrations of 19.2 % were recorded. It was noted that hydrogen sulphide was also detected on three occasions at concentrations between 1 and 166 ppm.

2.2.6 RPS, Science and Innovation Park, Ground Conditions Report, November 2008

- 2.2.1 This investigation was undertaken in relation to planning (Application Reference O/2009-1027) within the NW area of the Application Site.
- 2.2.2 Figure 2-3 details the extent of the investigation works.

Figure 2-3: Site Boundary



Ground Investigation

2.2.3 The ground investigation comprised:

- Four window sample boreholes.
- One trial pit.

Ground conditions

2.2.4 Ground conditions encountered the following strata and thicknesses:

- Topsoil 0.2 to 0.5 m.
- Made Ground (where present) 0.9 m.
- River Terrace Deposits (unproven).
- London Clay (unproven).

Groundwater

2.2.5 Subsequent monitoring recorded groundwater levels between 1.4 mbgl and 2.85 mbgl, and one borehole flooded on one occasion).

Soil Contamination

2.2.6 No contaminants were recorded exceeding the relevant screening values.

Groundwater Contamination

2.2.7 Slight hydrocarbon contamination was recorded within the perched groundwater within the old gravel pit.

2.3 Environmental Setting

2.3.1 Geology

2.3.1 Based on British Geological Survey (BGS) mapping (1:50,000 and 1:10,000 scale), the stratigraphic sequence beneath the Application Site is indicated to be as follows:

Table 2-4 – Descriptions of Geological Strata

Strata	Description	Approximate Thickness (m)*
Superficial Deposits		
Possible Head	Very clayey pebbly sand silty clay with fine flint (Borehole SU76NE27).	1.10
Brickearth	Large discrete areas of clay, silt and sand (NW, NE and SW Area only). Borehole descriptions: Silty clay.	0.40 - 0.80
River Terrace Deposits 2, 3, 4	Large discrete areas of sand and gravel. Borehole descriptions: Clayey pebbly sand, and gravel, clayey sandy gravel with very clayey sand, clayey gravel. Gravel of flint.	1.30 – 6.60
Alluvium	Clay, silt, sand and gravel associated with areas flanking the River Loddon and tributaries.	-
Bedrock		
London Clay Formation	Clay, silt and sand. Borehole descriptions: Firm silty clay becoming stiff bluish grey clay.	28.00

*BGS borehole log references: SU76NE27, SU76NE16, SU76NW30, SU76NW29, SU76NW57 and SU76NW33.

2.3.2 Geological mapping indicates localised areas of Made Ground, infilled ground or worked ground to be present within Areas SW, NW and NE.

2.3.2 Hydrogeology

2.3.1 Environment Agency (EA) data including Groundwater Vulnerability mapping (1:100,000-scale) indicates the following:

2.3.2 The superficial deposits which cover the majority of the Application Site are designated a Secondary A Aquifer (River Terrace Deposits and Alluvium) or Secondary B Aquifer (Brickearth).

- Secondary A Aquifer: These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.
- Secondary B Aquifer: These formations are formed of lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

2.3.3 These deposits are described as having high or medium groundwater vulnerability.

- High – Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.

2.3.4 The site bedrock is designated as an Unproductive Aquifer.

- **Unproductive Aquifer:** These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

2.3.5 According to EA data³, the Application Site is not located in a groundwater Source Protection Area (SPZ).

2.3.6 Information provided by the EA indicates that there are three records of active licensed groundwater abstractions within 500 m of the Application Site.

Table 2-5 – Licensed Groundwater Abstractions

Licence Holder	Approx. Distance and Direction from Site	Source	Use
Thames Water Utilities Ltd (Licence no. 28/39/24/0014)	On site (SW Area)	Thames groundwater. Arborfield pumping Station Point A	Potable Water Supply
University of Reading (Licence no. 28/39/24/0255/R01)	On site (SE Area)	Thames groundwater. Hall Farm, Arborfield, Reading – Borehole.	General Farming & Domestic Non-Evaporative Cooling
RFC Bearwood Ltd (Licence no. TH/039/0024/036)	53 m East	Thames groundwater. Abstraction Point Bearwood Park	Spray irrigation

2.3.3 Surface Water

2.3.1 There are two watercourses located within the Application Site which are classified within a River Basin Management Plan published by the EA under the European Water Framework Directive (2000). A list of readily identifiable nearby watercourses and water bodies is as follows:

Table 2-6 – Nearby Watercourses

Watercourse	Quality Classification	Approx. Distance and Direction from Site (m)
Barkham Brook	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)	On Site (NE and SE Area)
River Loddon	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)	On Site (NE, SW and SE Area)

2.3.2 Information provided by the EA indicates that there are records of two active licensed surface water abstractions within 500 m of the Application Site. The details of these are as follows:

³ MAGIC. Groundsure. [online] Available at: <https://magic.defra.gov.uk/> [Accessed 7th April 2022].

Table 2-7 – Licensed Surface Water Abstractions

Licence Holder	Approx. Distance and Direction from Site	Source	Use
The Environment Agency (Licence no. TH/039/0024/008)	On site (SW Area)	Thames Surface Water. Arborfield Off-Take Structure.	Transfer between sources
RFC Bearwood Ltd (Licence no. 28/39/24/0200)	199 East	Thames Surface Water. Bearwood Lake at Bearwood Golf Course.	Spray irrigation.

2.3.3 It should be noted that for each abstraction, no end date of permit has been provided.

2.3.4 Ecologically Sensitive Sites

2.3.1 Environment Agency data indicates that there is one ecologically sensitive site, that constitutes environmental receptors as defined within Table 1 of the DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012), located within a 500 m radius of the Application Site. This relates to Pearman's Copse a Local Nature Reserve located approximately 73 m northwest of the Application Site.

2.3.5 Radon

2.3.1 According to the Indicative Atlas of Radon in England and Wales published by the Health Protection Agency (part of Public Health England) and the British Geological Survey, the Application Site is not located within a radon affected area.

2.3.2 It is indicated that basic radon protective measures are not considered necessary in the construction of new dwellings or extensions based on the available information.

2.3.6 Coal Authority

2.3.1 The Interactive Map Viewer on the Coal Authority website indicates that the Application Site is not located within a Development High Risk Area.

2.3.7 Non-Coal Mining

2.3.1 In accordance with the Groundsure Report, the Application Site has been rated as No Hazard in terms of a non-coal mining area.

2.3.8 BGS Ground Stability Hazard Ratings

2.3.1 British Geological Survey Ground Stability Hazard ratings for the Application Site are summarised as follows:

Table 2-8 – BGS Ground Stability Hazard Ratings

Ground Stability Hazard	BGS Risk rating (highest pertaining to site)
Collapsible ground	Very Low
Compressible ground	Moderate (associated with Alluvium)
Ground dissolution	No Hazard
Landslide	Very Low (Small features of Low within Areas NW and NE)

Ground Stability Hazard	BGS Risk rating (highest pertaining to site)
Running sand	Low
Shrinking or swelling clay	Low

2.4 Authorised Processes and Pollution Incidents

2.4.1 Landfills and Waste Sites

2.4.1 Information provided by a number of sources (detailed below) shows that there is one recorded licensed or known historical landfill site, recorded within the Application Site. There are six other historical landfills within 500 m of the Assessment Site.

2.4.2 Waste site records derived from Local Authority planning records show that there is one historical waste site.

Table 2-9 – Landfill / Waste Transfer / Waste Treatment Sites

Licence Holder	Approx. Distance and Direction (m)	Licence Details	Waste Type and Details
Historical Landfills			
Unknown	On site (NE Area)	Reference WOK66.	Unknown
D Harding	1 m NW	Reference WOK14. 54/12/4/251. 30/04/1990 to 31/12/1993	Inert, Industrial 31/12/1990 to 31/12/1993
Unknown	80 m N	Reference WOK46, WOK52.	Inert 31/12/1950 to 31/12/1959
Unknown	100 m SW	Reference WOK71.	Unknown
Unknown	172 m NW	Reference WOK11, WOK17.	Inert, Industrial
Unknown	179 m E	Reference WOK20, WOK17.,	Inert, Industrial 01/01/1970 to 31/12/1973
Reading University	445 m NW	Reference 54/12/4/224, WOK9 31/12/1980	Inert, Commercial, Household 31/12/1980 to 31/12/1990
Historical Waste Sites			
	On site (SW Area)	Planning application reference: F/2004/1791	Scheme comprises proposed agricultural engineering works and small structures for pollution control of farm waste

2.4.2 Environmental Permits

2.4.1 EA and Local Authority data indicates that there are three processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2016) within 500 m of the Application Site. These are outlined in the table below:

Table 2-10 – Environmental Permits

Licence Holder	Approx. Distance and Direction from Site (m)	Permitted Activity
Shinfield Service Station	328 NW	Unloading of petrol into storage at service stations.
Asda Lower Earley Filling Station	386 m N	Unloading of petrol into storage at service stations.
BP Oil UK Ltd	432 m N	Unloading of petrol into storage at service stations.

2.4.3 COMAH/NIHHS Sites

- 2.4.1 There are no records of any operations under the Control of Major Accident Hazards (COMAH) Regulations, 1999 or the Notifications of Installations Handling Hazardous Substances, 1982 (amended 2002) (NIHHS), located within 500 m of the Application Site.

2.4.4 Radioactive Substances

- 2.4.1 A radioactive substance authorisation (permission no. ZB3596DC) is indicated to be active on the Application Site. This relates to Rutherford Cancer Care Ltd.

2.4.5 Pollution Incidents

- 2.4.1 Environment Agency data indicates that there are eight records of ‘major’ or ‘significant’ pollution incidents to water or land within 500 m of the Application Site. None of these are identified as being on the Application Site or originating from the Application Site. These are outlined in the following table:

Table 2-11 – Pollution Incidents and significant incidents within 500 m

Severity of Incident and Type	Approx. Distance and Direction from Site (m)	Receiving Medium and Date
Sewage sludge, Category 2 – Significant Water Impact	82 m SW	Unknown 07/03/2003
Crude sewage, Category 1 – Major Water Impact	95 m NE	Unknown 29/09/2013
Unknown, Category 2 – Significant Water Impact	344 m S	Unknown 11/07/2005
Unknown, Category 2 – Significant Water Impact	351 m S	Unknown 17/10/2006
Storm sewage, Category 2 – Significant Water Impact	363 m S	Unknown 01/09/2010

2.5 Unexploded Ordnance

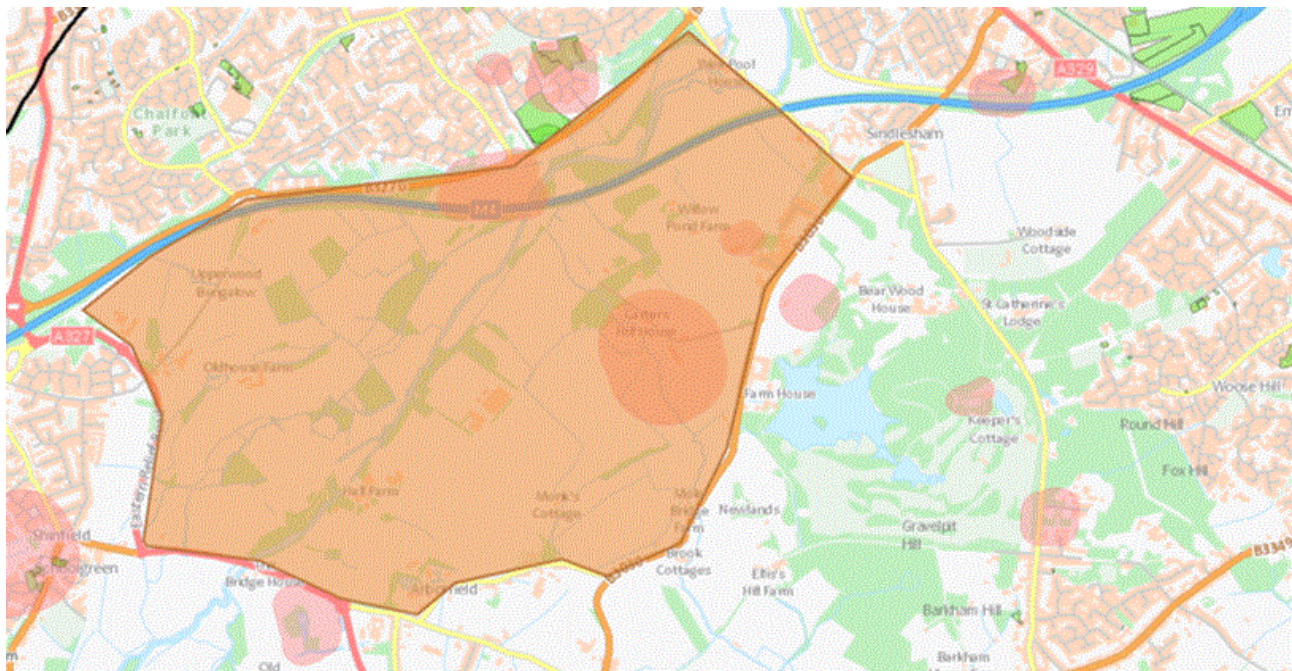
- 2.5.1 CIRIA Report C681 (Stone et al 2009) outlines recommendations for dealing with the potential risk associated with the legacy of Unexploded Ordnance Risk, largely relating the WWII bombing and military sites.

- 2.5.2 Reference to the Zetica⁴ Unexploded Bomb Risk mapping indicates that a Decoy site is located within the SE Area, however the Application Site is in an area of low potential risk from Unexploded Bombs. As the Application Site is not within an area of known military history, in general accordance with CIRIA Report no further consideration of Unexploded Ordnance is considered necessary.

2.6 Regulatory Consultations

- 2.6.1 Wokingham Borough Council's (WBC) Contaminated Land Strategy⁵ identifies approximately 840 potentially contaminated sites within the borough. The Environmental Health Department at WBC was consulted regarding any known contamination issues at the Application Site. The response is provided within Appendix E.
- 2.6.2 The following sites are indicated to fall within Area SW located around Arborfield Hall Farm:
- Arborfield Mill (Paper).
 - Gravel Pit.
 - Old Gravel Pit.
 - Tank.
- 2.6.3 No further sites were identified within the remaining areas.
- 2.6.4 Gas consultation zones (red bubbles detailed within Figure 2-4) are indicated to fall within Areas NE and SE based on nearby areas of current/historical landfilling.

Figure 2-4: Gas Consultation Zones



⁴ <https://zeticauxo.com/downloads-and-resources/risk-maps/>

⁵ Wokingham Borough Council Contaminated Land Strategy (4th Revision) October 2015.

3 SITE DESCRIPTION AND DESK STUDY: ADDITIONAL LAND WITHIN THE SDL

3.1 Introduction

- 3.1.1 This section describes the setting, ground conditions and potential for contamination within the Additional Land with the SDL Boundary. Within this section this area is herein referred to as the 'Application Site'. Particular features of interest are identified, referencing the zones set out on Drawing JSL4456-102 where appropriate.

3.2 Site Description

- 3.2.1 The designated location of the Application Site is on land parcels including highways between the areas of Lower Earley, Shinfield, Arborfield and Sindlesham.

- 3.2.2 The general topography for each zone is indicated from OS mapping as follows:

- Zone 1 – slopes gradually from approximately 50 mAOD in the north to 40 mAOD in the south.
- Zone 2 – between approximately 40 mAOD and 50 mAOD.
- Zone 3 – majority of the zone lies at approximately 50 mAOD rising to the southwest to approximately 60 mAOD.
- Zone 4 – relatively flat at approximately 60 mAOD.
- Zone 5 – relatively flat at approximately 50 mAOD.
- Zone 6 - relatively flat at approximately 40 mAOD.
- Zone 7 – slopes gradually from approximately 55 mAOD in the north to 40 mAOD in the south.
- Zone 8 - slopes from approximately 70 mAOD in the west to 40 mAOD in the east.
- Zone 9 – relatively flat along Arborfield Road at approximately 40 mAOD sloping upwards to approximately 70 mAOD along the Eastern Relief Road.

3.2.2 Zone 1

- 3.2.1 The zone generally comprises fields, areas of woodland, farm/residential properties. Land use / features include:

- Hotel and public house located in the northwestern corner.
- Health spa in the southeaster corner.

3.2.3 Zone 2

- 3.2.1 The zone generally comprises fields, areas of woodland, farm/residential properties, and commercial / leisure / hospitality premises. Land use / features include:

- Stables located in the central part of the Application Site.

3.2.4 Zone 3

- 3.2.1 The zone generally comprises fields, areas of woodland, and farm/residential properties.

3.2.5 Zone 4

3.2.1 The zone generally comprises a church / graveyard, and areas of woodland.

3.2.6 Zone 5

3.2.1 The zone generally comprises residential/farm properties, and areas of woodland and a large pond.

3.2.7 Zone 6

3.2.1 The zone generally comprises areas of woodland alongside the River Loddon.

3.2.8 Zone 7

3.2.1 The zone generally comprises fields, areas of woodland, residential/farm properties and large pond.

3.2.9 Zone 8

3.2.1 The zone generally comprises part of the M4 motorway and B3270 and adjacent fields, and areas of woodland.

3.2.10 Zone 9

3.2.1 The zone generally comprises the Eastern Relief Road and part of the A327.

3.2.11 Site Walk Over

3.2.1 A targeted site walkover was undertaken at the Application Site following review of the available data, on 5th and 6th of May 2022. The walkover targeted the following features:

- Historical landfill (Zone 2). (Feature not evident during walk over).
- Historical landfill and gravel pit (Zone 1) – north of Gipsy Lane. Gated area (inaccessible - Feature not evident during walk over).
- Large area of worked ground (Zone 1). Flattened bowl topography (see Plate 1).
- Gravel pit – south of Mill Lane (Zone 1). Large pond (see Plate 2).

3.2.2 Photos taken during the site walkover are presented in Appendix D.

3.2.3 A number of other small farm properties / commercial properties were present across the Application Site, but were considered to present limited potential for contamination. These were not inspected.

3.2.12 The Surrounding Area

3.2.1 The Application Site is located in an area of mixed rural and commercial / light industrial land uses. At the time of the site inspection, neighbouring land consisted of the following:

Table 3-1 – Neighbouring Land Uses

Direction	Description
Zone 1	

Direction	Description
North:	Woodland with the river Loddon following through and into the site boundary. Potential construction works. A meadow field with a park play area. Agricultural land.
East:	Agricultural land and a forest parallel to Hatch Farm way road. The potential construction works extends alongside residential homes.
South:	Undeveloped fields and residential land as well as a spa complex.
West:	The M4 runs directly through the Zone. More agricultural land either side of the M4 with sparse residential properties.
Zone 2	
North:	Agricultural land with farm/residential properties.
East:	Agricultural land with farm/residential properties.
South:	Agricultural land with farm/residential properties.
West:	Agricultural land with farm properties and Centre for Dairy Research.
Zone 3	
North:	Agricultural land and isolated woodland areas.
East:	Undeveloped land and isolated residential homes.
South:	Agricultural land, residential homes and a horse farm with stables.
West:	Agricultural land and St Bartholomew Church.
Zone 4	
North:	Woodland/agricultural land and isolated farm complexes.
East:	Woodland and agricultural land and farm/residential properties.
South:	Woodland and Church Lane with residential properties beyond.
West:	Agricultural land and isolated farm complexes.
Zone 5	
North:	Woodland/agricultural land and isolated farm complexes.
East:	Woodland/fields and farm/residential properties.
South:	Undeveloped fields and sporadic areas of woodland. Residential and commercial premises.
West:	Agricultural land.
Zone 6	
North:	Agricultural land and isolated farm complexes.
East:	Agricultural land and farm complexes.
South:	Agricultural land and isolated farm/residential properties.
West:	Agricultural land and isolated farm/residential properties.
Zone 7	
North:	Shinfield Studios construction site and TVSP.
East:	Agricultural land and farm complex. Shinfield Studios.
South:	Agricultural land.
West:	Tree research laboratory, fields and Eastern Relief Road.
Zone 8	
North:	Woodland, agricultural land, offices and residential homes. Immediately north of the B3270 there is a BMX track.
East:	Undeveloped fields.
South:	Undeveloped fields and sporadic isolated warehouse/small industrial sites off access routes.
West:	Continuation of the M4. Isolated undeveloped woodland and residential homes.
Zone 9	
North:	Agricultural land and isolated farm complexes.
East:	Agricultural land and isolated farm/residential properties.
South:	Agricultural land and isolated farm/residential properties and commercial premises.

Direction	Description
West:	Agricultural land with Shinfield town beyond with Petrol Filling Station.

3.3 Site History

3.3.1 Historical Map Review

3.3.1 The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500, 1:10,560 and 1:10,000 dated 1875 to 2021. Particular features of interest are identified with reference to each zone.

Table 3-2 – Historical Site Uses

On-site Land Use and Features	Dates
Generally undeveloped land comprising fields with sporadic areas of woodland and a number of drains/ditches, ponds, and marshy ground. A number of farm properties and lodges, footpaths and roads are shown. The River Loddon is shown flowing through Zones .1, 6, 8 and 9.	1872 - 1900
A series of electricity pylons trend approximately NE-SW through Zones 8, 9, and N-S through Zones 3 and 8.	1961 - Current
A motorway (M4) forms much of Zone 8 and cuts through Zone 1 in embankments and cuttings.	1979 - Current
<u>Zone 7</u> Badger Farm with moat (Unknown if backfilled) Tank Water body	1872 - 1994 1967 1898 - 1988
<u>Zone 5</u> Large pond	1872 - Current
<u>Zone 6</u> Arborfield Mill (pumping station 1936) Water works (pumping station)	1898 1988
<u>Zone 4</u> Graveyard	1872 - 1993
<u>Zone 2</u> Old gravel pit (becomes Gravelpit wood) (Unknown if backfilled) Newland Farm (Carters Hill Farm which includes Park Farm stables)	1872 1872 - 1993
<u>Zone 1</u> Mill Old gravel pit (Unknown if backfilled) Sewage works Vehicle repair, testing and servicing Tank Electricity substations Ponds	1898 - 1986 1932 - 1961 1969 - 1978 Current 1912 – 1933 1975 – 1994 1909 - 1988
<u>Zone 9</u> Pumping station Gas regulator Pond	1969 - 1975 1987 - 1997 1969 - 1988
<u>Zone 8</u> Sewage works Heaps (unspecified)	1969 – 1978 1988

Table 3-3 – Historical Neighbouring Site Uses

Surrounding Land Uses (250 m radius)	Orientation	Approximate Distance (m)	Dates	
			From	To
Nursery	S	1	1988	
Horticultural station	SW	10	1969	1983
Old gravel pits	N	53	1898	1956
Gas works	NE	54	1898	1938
Nursery	NE	74	1978	
Smithy	SW	96	1898	1938
Gravel pit	SW	99	1900	1909
Horticultural station	S	113	1956	
Filter beds	N	120	1909	1938
Gravel pit	NE	123	1913	1938
Horticultural research station	NW	138	1975	1988
Nursery	NW	141	1969	1983
Sawmill	E	157	1932	
Old gravel pit	E	157	1913	1938
Sawmill	NE	163	1898	1961
Filter beds	SE	197	1932	1969
Nursery	NE	244	1969	

3.3.2 Site Planning History

3.3.1 Review of available planning records indicates the Application Site has been subject to a number of planning applications, many of which relate to minor extensions. Those considered of relevance are discussed below:

Zone 2

- Application Reference 211585: includes construction of new dwelling and outbuildings located on Julkes Lane, Carters Hill. Environmental Health Officer (EHO) correspondence indicates presence of filled ground known as Park Farm Carters Hill located approximately 140 m from the Application Site. Status: Approved July 2021.
- Application Reference 101315: includes construction of a new dwelling located at Park Farm Stables, Carters Hill Lane. Planning conditions included a requirement for a landfill gas risk assessment. The assessment included drilling of boreholes and gas monitoring. It was identified that the site had been raised with inert waste fill (though noted to included wood and plastic) which overlies London Clay. Gas protection measures were considered necessary for all new buildings. Status: Split Decision September 2010.
- Application Reference 131355: includes construction of new dwelling at Park Farm Stables, Carters Hill. It was noted that the site was subject of land filling operations (include wire from tyres) with insufficient cover. Status: Refused March 2014.

3.4 Interviews

3.4.1 Correspondence with University of Reading personnel and other land holders was undertaken to obtain further information regarding the current and historical uses associated with the Application Site.

3.4.2 The following information was provided:

- Asbestos / Asbestos Containing Materials (ACMs) have been identified within buildings located across the Application Site.

3.5 Previous Reports

3.5.1 RPS has not identified any previous reports relevant to the Application Site.

3.6 Environmental Setting

3.6.1 Geology

3.6.1 Based on British Geological Survey (BGS) mapping (1:50,000 and 1:10,000 scale), the stratigraphic sequence beneath the Application Site is indicated to be as follows:

Table 3-4 – Descriptions of Geological Strata

Strata	Description	Approximate Thickness (m)*
Superficial Deposits		
Made Ground	Zone 1, Cohesive and granular (Boreholes SU76NE39, SU76NE234, SU76NE236, SU77SE335, SU76NW81, SU76NW82).	1.40 - >5.60
Brickearth	Zone 1, 8 - discrete areas of clay, silt and sand. Borehole descriptions: Silty clay.	0.40 - 0.80
River Terrace Deposits 2, 3, 4, 5	Zone 1, 2, 5, 7, 8, 9 - discrete areas of sand and gravel. Borehole descriptions: Clayey gravel, clayey sand, clayey sandy gravel, sand and gravel. Gravel of flint and quartz.	0.95 – 6.60
Alluvium	Zone 1, 2, 3, 6, 7, 8, 9 - Clay, silt, sand and gravel associated with areas flanking the River Loddon and tributaries. Borehole descriptions: Very soft and soft silty and sandy clay, organic clay.	0.10 - >2.20
Bedrock		
London Clay Formation	Clay, silt and sand. Borehole descriptions: Firm sandy / silty clay becoming stiff fissured bluish grey clay.	59.00

*BGS borehole log references: SU77SE45, SU76NE20, SU77SE5, SU76NE39, SU76NE16, SU76NW30, SU76NW29, SU76NE22 and SU76NW33.

3.6.2 Made Ground was encountered within boreholes drilled as part of the M4 widening works.

3.6.3 Geological mapping also indicates localised areas of Made Ground or worked ground to be present within Zones 1, 2, 8, and 9. Larger areas of Made Ground or worked ground are indicated within Zones 1 and 8 associated with the M4 motorway (as supported by the aforementioned borehole information) and a large area of worked ground within the southern part of Zone 1.

3.6.2 Hydrogeology

3.6.1 Environment Agency (EA) data including Groundwater Vulnerability mapping (1:100,000-scale) indicates the following:

3.6.2 The superficial deposits which cover the majority of the Application Site are designated a Secondary A Aquifer (River Terrace Deposits and Alluvium) or Secondary B Aquifer (Brickearth).

- Secondary A Aquifer: These formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.
- Secondary B Aquifer: These formations are formed of lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

3.6.3 These deposits are described as having high or medium groundwater vulnerability.

- High – Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.

3.6.4 The site bedrock is designated as an Unproductive Aquifer.

- Unproductive Aquifer: These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

3.6.5 According to EA data⁶, the site is not located in a groundwater SPZ.

3.6.6 Information provided by the EA indicates that there are four records of active licensed groundwater abstractions within 500 m of the Application Site.

Table 3-5 – Licensed Groundwater Abstractions

Licence Holder	Approx. Distance and Direction from Site	Source	Use
Nirvana Spa and Leisure Ltd (Licence no. 28/39/24/00236/R01)	On site (Zone 1)	Thames groundwater. Nirvana Spa – Borehole B	General use relating to secondary category
Nirvana Spa and Leisure Ltd (Licence no. 28/39/24/00236/R01)	On site (Zone 1)	Thames groundwater. Nirvana Spa – Borehole A	General use relating to secondary category
Thames Water Utilities Ltd (Licence no. 28/39/24/0014)	29 m NE	Thames groundwater. Arborfield Pumping Station Point A	Potable water supply
RFC Bearwood Ltd	115 m S	Thames groundwater. Abstraction point Bearwood Park.	Spray irrigation.

3.6.3 Surface Water

3.6.1 There are two watercourses within 500 m of the Application Site which are classified within a River Basin Management Plan published by the EA under the European Water Framework Directive (2000). A list of readily identifiable nearby watercourses and water bodies is as follows:

⁶ MAGIC. Groundsure. [online] Available at: <https://magic.defra.gov.uk/> [Accessed 7th April 2022].

Table 3-6 – Nearby Watercourses and Water Bodies

Watercourse / Body	Quality Classification	Approx. Distance and Direction from Site (m)
Barkham Brook	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)	On site (Zone 1, 2, 3, 8)
River Loddon	Overall – Moderate (2019) Chemical – Fail (2019) Ecological – Moderate (2019)	On site (Zone 1, 6, 8, 9)

3.6.2 Information provided by the EA indicates that there are records of two active licensed surface water abstractions within 500 m of the Application Site. The details of these are as follows:

Table 3-7 – Licensed Surface Water Abstractions

Licence Holder	Approx. Distance and Direction from Site	Source	Use
The Environment Agency (Licence no. TH/039/0024/008)	1 SE	Thames Surface Water. Arborfield Off-Take Structure.	Transfer between sources
RFC Bearwood Ltd (Licence no. 28/39/24/0200)	354 NE	Thames Surface Water. Bearwood Lake at Bearwood Golf Course.	Spray irrigation.

3.6.3 It should be noted that for each abstraction, no end date of permit has been provided.

3.6.4 Ecologically Sensitive Sites

3.6.1 Environment Agency data indicates that there is one ecologically sensitive site, that constitutes environmental receptors as defined within Table 1 of the DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012), located within a 500 m radius of the Application Site. This relates to Pearman's Copse a Local Nature Reserve located approximately 12 m northwest of Zone 8.

3.6.5 Radon

3.6.1 According to the Indicative Atlas of Radon in England and Wales published by the Health Protection Agency (part of Public Health England) and the British Geological Survey, the Application Site is not located within a radon affected area.

3.6.2 It is indicated that basic radon protective measures are not considered necessary in the construction of new dwellings or extensions based on the available information.

3.6.6 Coal Authority

3.6.1 The Interactive Map Viewer on the Coal Authority website indicates that the Application Site is not located within a Development High Risk Area.

3.6.7 Non-Coal Mining

3.6.1 In accordance with the Groundsure Report, the Application Site has been rated as No Hazard in terms of a non-coal mining area.

3.6.8 BGS Ground Stability Hazard Ratings

3.6.1 British Geological Survey Ground Stability Hazard ratings for the Application Site are summarised as follows:

Table 3-8 – BGS Ground Stability Hazard Ratings

Ground Stability Hazard	BGS Risk rating (highest pertaining to site)
Collapsible ground	Very Low
Compressible ground	Moderate (Negligible Zones 4, 5)
Ground dissolution	No Hazard
Landslide	Very Low (Small features of Low within Zones 1, 2, 8)
Running sand	Low (Very Low Zones 4, 5)
Shrinking or swelling clay	Low

3.7 Authorised Processes and Pollution Incidents

3.7.1 Landfills and Waste Sites

3.7.1 Information provided by a number of sources (detailed below) shows that there are three recorded licensed or known historical landfill site, recorded within the Application Site. There are five other historical landfills within 500 m of the Application Site.

3.7.2 Waste site records derived from Local Authority planning records show that there is one historical waste site.

Table 3-9 – Landfill / Waste Transfer / Waste Treatment Sites

Licence Holder	Approx. Distance and Direction (m)	Licence Details	Waste Type and Details
Historical Landfills			
Unknown	On site (Zone 8)	Reference WOK66.	Unknown
D Harding	On site (Zone 2)	Reference WOK14. 54/12/4/251. 30/04/1990 to 31/12/1993	Inert, Industrial 31/12/1990 to 31/12/1993
Unknown	On site (Zone 1)	Reference WOK46, WOK52.	Inert 31/12/1950 to 31/12/1959
Unknown	82 m S	Reference WOK71.	Unknown
Unknown	132 m NW	Reference WOK11, WOK17.	Inert, Industrial
Unknown	175 m E	Reference WOK20, WOK17.,	Inert, Industrial 01/01/1970 to 31/12/1973
Reading University	373m N	Reference 54/12/4/224, WOK9 31/12/1980	Inert, Commercial, Household 31/12/1980 to 31/12/1990
Unknown	431m NE	Reference 54/12/4/98, WOK18, WOK22	Inert 01/01/1980 to 31/12/1983
Historical Waste Sites			
	61m E	Planning application reference: F/2004/1791	Scheme comprises proposed agricultural engineering works and small structures for pollution control of farm waste

3.7.2 Environmental Permits

- 3.7.1 EA and Local Authority data indicates that there are three active processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2016) within 500 m of the subject Application Site. These are outlined in the table below:

Table 3-10 – Environmental Permits

Licence Holder	Approx. Distance and Direction from Site (m)	Permitted Activity
Asda Lower Earley Filling Station	243 N	Unloading of petrol into storage at service stations.
Shinfield Service Station	295 NW	Unloading of petrol into storage at service stations.
BP Oil UK Ltd	299 N	Unloading of petrol into storage at service stations.

3.7.3 COMAH/NIHHS Sites

- 3.7.1 There are no records of any operations under the Control of Major Accident Hazards (COMAH) Regulations, 1999 or the Notifications of Installations Handling Hazardous Substances, 1982 (amended 2002) (NIHHS), located within 500 m of the Application Site.

3.7.4 Radioactive Substances

- 3.7.1 A radioactive substance authorisation (permission no. ZB3596DC) is indicated to be active located 101 m northeast of the Application Site. This relates to Rutherford Cancer Care Ltd.

3.7.5 Pollution Incidents

- 3.7.1 Environment Agency data indicates that there are eight records of 'major' or 'significant' pollution incidents to water or land within 500 m of the Application Site. Two of these are identified as being on the Application Site or originating from the Application Site. These are outlined in the following table:

Table 3-11 – Pollution Incidents and significant incidents within 500 m

Severity of Incident and Type	Approx. Distance and Direction from Site (m)	Receiving Medium and Date
Sewage sludge, Category 2 – Significant Water Impact	On site (Zone 2)	Unknown 07/03/2003
Crude sewage, Category 1 – Major Water Impact	On site (Zone 2)	Unknown 29/09/2013
Unknown, Category 2 – Significant Water Impact	89 m SE	Unknown 11/07/2005
Unknown, Category 2 – Significant Water Impact	93 m SE	Unknown 17/10/2006
Storm sewage, Category 2 – Significant Water Impact	98 m SE	Unknown 01/09/2010
Suspended solids, Category 2 – Significant Water Impact	283 m NE	Unknown 26/04/2004

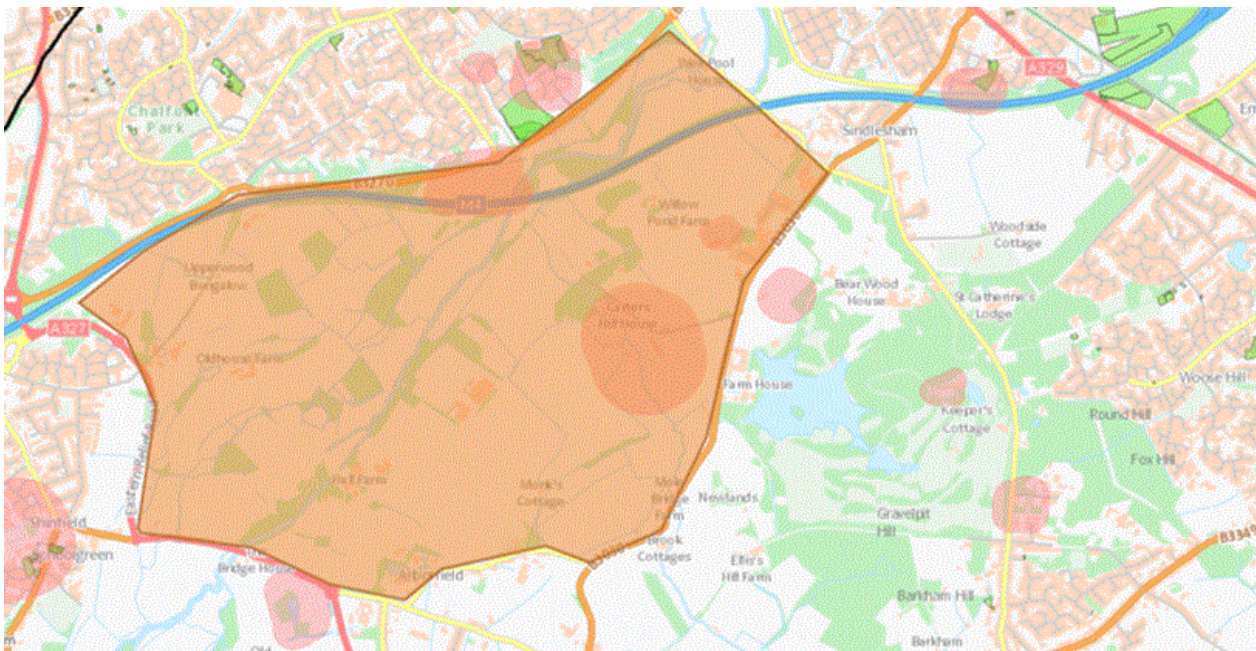
3.8 Unexploded Ordnance

- 3.8.1 CIRIA Report C681 (Stone et al 2009) outlines recommendations for dealing with the potential risk associated with the legacy of Unexploded Ordnance Risk, largely relating the WWII bombing and military sites.
- 3.8.2 Reference to the Zetica⁷ Unexploded Bomb Risk mapping indicates that the Application Site is in an area of low potential risk from Unexploded Bombs. As the Application Site is not within an area of known military history, in general accordance with CIRIA Report no further consideration of Unexploded Ordnance is considered necessary.

3.9 Regulatory Consultations

- 3.9.1 Wokingham Borough Council's (WBC) Contaminated Land Strategy⁸ identifies approximately 840 potentially contaminated sites within the borough. The Environmental Health Department at WBC was consulted regarding any known contamination issues at the Application Site. The response is provided within Appendix E.
- 3.9.2 The following sites are indicated to fall within the Application Site:
- Sewage Works – Zone 1 and 8.
 - Sindlesham Flour Mill – Zone 1
 - Gravel Pits – Zone 1.
 - Sewage Bed – Zone 1.
 - Old Gravel Pit – Zone 2.
- 3.9.3 Gas consultation zones (red bubbles detailed within Figure 3-1) are indicated to fall within Zones 1, 2 and 8 based on nearby areas of current/historical landfilling.

Figure 3-1: Gas Consultation Zones



⁷ <https://zeticauxo.com/downloads-and-resources/risk-maps/>

⁸ Wokingham Borough Council Contaminated Land Strategy (4th Revision) October 2015.

4 OUTLINE CONCEPTUAL SITE MODEL: UOR OWNERSHIP BOUNDARY

4.1 Background

- 4.1.1 An outline conceptual site model (CSM) consists of an appraisal of the *source-pathway-receptor* 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.
- **Source** referring to the source of contamination (Hazard).
 - **Pathway** for the contaminant to move/migrate to receptor(s).
 - **Receptor (Target)** that could be affected by the contaminant(s).
- 4.1.2 Receptors include human beings, controlled waters and buildings / structures. The National Planning Policy Framework, used to address contaminated land through the planning process, follows the same principles as those set out under Part 2A. Further details on the Part 2A regime are presented within Appendix F.
- 4.1.3 As part of the assessment the potential risks to receptors for potential source is given one of the following classifications:
- Low risk – it is considered unlikely that issues within the category will give rise to significant harm to identified receptors;
 - Moderate risk – it is possible, but not certain that issues within the category will give rise to significant harm to receptors; or
 - High risk – there is a high potential that issues within the category will give rise to significant harm to identified receptors.
- 4.1.4 The risk assessment considers the development proposals set out within Section 1.5.

4.2 Potential Pollutant Linkages

- 4.2.1 Each stage of the potential pollutant linkage sequence has been assessed individually on the basis of information obtained during the site reconnaissance and desk study exercise and are discussed in the following section.

4.2.2 Potential Contamination Sources

On Site – Current

- 4.2.1 The Application Site is generally in agricultural use with farm properties and horticultural research facilities which represent potential sources for ground contamination:
- localised hydrocarbon contamination from leaks/spills from farm equipment, machinery and fuel storage tanks;
 - localised chemical leaks/spills from chemical stores;
 - asbestos from deterioration and demolition of buildings / structures containing asbestos containing materials; and
 - herbicides/pesticide treatment of land.

-
- 4.2.2 A vehicle repair facility located within the NW Zone may also be a potential source of contamination including hydrocarbons, solvents and glycols.

On Site - Historical

- 4.2.3 Historical maps indicate potentially contaminative historical sources including:
- Potentially backfilled gravel pits and ponds;
 - Tanks;
 - Spoil associated with construction of the motorway;
 - Sewage works;
 - Historical landfill; and
 - Mill.
- 4.2.4 Old gravels pits and an infilled pond located within the NW Zone have been previously investigated as part of the Thames Valley Science Park development. These were identified as potential sources of elevated ground gases recorded during monitoring rounds.
- 4.2.5 Made Ground may also be present across the Application Site in areas subject to demolition/construction activities associated with farm properties, electricity pylons and road construction.
- 4.2.6 Alluvium containing peat or other organic material may be a source of ground gas.

Off-Site – Current

- 4.2.7 None identified.

Off-Site – Historical

- 4.2.8 Historical maps indicate the following potential off-site historical sources:
- Gas works;
 - Sewage works;
 - Nurseries;
 - Sawmills;
 - Smithy;
 - Historical landfills; and
 - Gravels pits.

4.2.3 Potential Pathways

- 4.2.1 Made Ground encountered within previous ground investigations at the Application Site (restricted to NW Zone) has indicated relatively limited horizontal and vertical extent with the absence of highly leachable contaminants. Made Ground where present elsewhere may however be a source of leachable contaminant concentrations.
- 4.2.2 Groundwater levels are recorded as being relatively high, and variable within the underlying superficial deposits which include more permeable materials which may allow lateral and vertical migration of contaminants. Granular horizons also provide preferential pathways for ground gas migration.

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- 4.2.3 There is potential for disturbance and mobilisation of ground gas and contaminants of concern in soil and / or groundwater during groundworks.
- 4.2.4 Post development it is likely that there will be pathways for infiltration of rainfall runoff in non-hardstanding areas. Foundations or below ground excavations could create preferential pathways for currently contained or low mobility contaminations to migrate through leaching into underlying groundwater or through granular horizons or fissures either vertically or laterally or allow ground gases to migrate.
- 4.2.5 In any areas of the Application Site to be covered by hardstanding, the risks to future site users via the pathways of dermal contact and ingestion will be mitigated. However, in areas of soft landscaping, the pathways of dermal contact and ingestion could still be active. In addition, there would be potential for the airborne migration of soil derived dusts from these areas during any ground disturbance. Inhalation pathways for volatile contaminants and ground gas may also be active upon development.

4.2.4 Potential Receptors

Controlled Waters

- 4.2.1 The main anticipated controlled waters receptor is considered to be the underlying superficial deposits designated a Secondary A Aquifer, although given the absence of source protection zones or abstractions in the vicinity of the Application Site this receptor is not considered to be highly sensitive.
- 4.2.2 A network of drains/watercourses across the Application site ultimately draining into primary watercourses namely the River Loddon and Barkham Brook also present on the Applications Site are considered sensitive receptors.

Human Health

- 4.2.3 Potential post development human health receptors include future site users and off-site human health receptors.
- 4.2.4 The preliminary masterplan indicates future users will include residents, school children and workers as well as members of the public using recreational facilities.
- 4.2.5 Off site setting receptors include residents and workers.
- 4.2.6 The assessment does not consider the risk to construction workers during redevelopment. These risks will be managed through appropriate Health and Safety legislation including the Health and Safety at Work Act and CDM regulations.

4.3 Outline Conceptual Site Model

- 4.3.1 An outline CSM has been developed on the basis of the site reconnaissance and desk study. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site post development and is summarised in the table below. Should the development layout plan vary from that reviewed and included as a part of this PRA or should occupied structures be proposed then the Conceptual Site Model and derived risk ratings should be reviewed accordingly.

Table 4-1 – Outline Conceptual Site Model

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors	Qualitative Risk Rating	Notes
On site – current: Made Ground / farmland and vehicle repairs. Fuel tanks and chemical stores. Buildings / structures containing ACMs. On site – historical: Backfilled gravels pits and ponds, sewage works, landfills, construction spoil, tanks	Metals, hydrocarbons, solvents, glycols pathogens, herbicides/pesticides and asbestos.	Soil	Direct contact/ingestion	✓	Future site users	Moderate	Masterplan includes residential garden plots and large areas of open space.
			Inhalation of volatiles	✓	Future site users	Moderate if accumulation in buildings Low for outdoor exposure	Areas of the Application Site and surrounding land are indicated to have been subject to infilling / landfill, many of which the nature of deposited waste materials is unknown however the likelihood of volatile contaminants may be reduced due to age of deposition.
			Airborne migration of soil or dust	✓	Off-site users	Moderate	Masterplan includes residential garden plots and large areas of open space.
			Leaching of mobile contaminants	✓	Groundwater	Low to Moderate	Proposed end use includes soft cover which will permit high infiltration and subsequent leaching of potential contaminants.
			Direct contact	✓	Water supply pipes	Moderate	Potentially deleterious Made Ground from past activities may present a significant risk to buried structures or services.
	Metals, hydrocarbons, solvents, glycols, cyanides pathogens, herbicides/pesticides and asbestos.	Groundwater	Direct contact/ingestion	✓	Future site users	Low	High water table is identified beneath the Application Site however no significant widespread gross contamination is anticipated.

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors	Qualitative Risk Rating	Notes
			Vertical and lateral migration in permeable strata	✓ ✓	Secondary A aquifer Surface waters	Low to Moderate Low to Moderate	Infiltration and mobilisation of potential contaminants through underlying permeable superficial deposits.
Off site – historical: Gas works, nurseries, mills, smithy, backfilled gravels pits, sewage works, landfills, horticultural centres	Metals, hydrocarbons, solvents, glycols, cyanides, pathogens, herbicides/pesticides and asbestos	Groundwater	Direct contact/ingestion	✓	Future site users	Low to Moderate	High water table is identified beneath the Application Site along with underlying permeable superficial deposits.
			Inhalation of volatiles	✓	Future site users	Low to Moderate	Masterplan includes indoor building space.
On and off-site – Made Ground / landfills / Alluvium containing peat and other organic material	Carbon dioxide and methane	Ground Gas	Inhalation of ground gas	✓	Future site users Off-site users	Moderate in buildings. Low – outdoor exposure.	Significant Made Ground is not indicated from ground investigation and BGS records however there is potential for deeper Made Ground to be present especially backfill of old pits and ponds. Significant Alluvial Deposits have not been encountered within the Application Site.
			Explosive risks	✓	Future site users Off-site users	Moderate in buildings. Low – outdoor exposure.	
				✓	Off-site buildings.		

Note The Qualitative Risk Rating does not consider the potential for the pathway to be active. In the event that a Moderate or High Qualitative Risk Rating is identified further assessment is recommended.

4.3.2 Based on the identified potential sources and the site setting, there is not considered to be a significant risk to ecological receptors, crops/vegetation or archaeological receptors.

5 OUTLINE CONCEPTUAL SITE MODEL: ADDITIONAL LAND WITHIN THE SDL

5.1 Background

- 5.1.1 An outline conceptual site model (CSM) consists of an appraisal of the *source-pathway-receptor* 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.
- **Source** referring to the source of contamination (Hazard).
 - **Pathway** for the contaminant to move/migrate to receptor(s).
 - **Receptor (Target)** that could be affected by the contaminant(s).
- 5.1.2 Receptors include human beings, controlled waters and buildings / structures. The National Planning Policy Framework, used to address contaminated land through the planning process, follows the same principles as those set out under Part 2A. Further details on the Part 2A regime are presented within Appendix F.
- 5.1.3 As part of the assessment the potential risks to receptors for potential source is given one of the following classifications:
- Low risk – it is considered unlikely that issues within the category will give rise to significant harm to identified receptors;
 - Moderate risk – it is possible, but not certain that issues within the category will give rise to significant harm to receptors; or
 - High risk – there is a high potential that issues within the category will give rise to significant harm to identified receptors.
- 5.1.4 The risk assessment considers the development proposals set out within Section 1.5.

5.2 Potential Pollutant Linkages

- 5.2.1 Each stage of the potential pollutant linkage sequence has been assessed individually on the basis of information obtained during the site reconnaissance and desk study exercise and are discussed in the following section.

5.2.2 Potential Contamination Sources

On Site – Current

- 5.2.1 The Additional Land within the SDL is generally in agricultural use with farm properties with Zones 8 and 9 primarily restricted to highway infrastructure. These represent potential sources for ground contamination including:
- localised hydrocarbon contamination from leaks/spills from farm equipment, machinery and fuel storage tanks;
 - asbestos from deterioration and demolition of buildings / structures containing asbestos containing materials; and
 - herbicides/pesticide treatment.

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- 5.2.2 A vehicle repair facility located within Zone 1 may also be a potential source of contamination including hydrocarbons, solvents and glycols.

On Site - Historical

- 5.2.3 Historical maps indicate potentially contaminative historical sources:
- Potentially backfilled gravel pits and ponds;
 - Tanks;
 - Electricity substations;
 - Spoil associated with construction of the motorway;
 - Historical landfills;
 - Sewage works; and
 - Mill.
- 5.2.4 An area of land raising has been identified from review of historical planning records within Zone 2 (site of a historical landfill). A historical gravel pit is also identified as a historical landfill within Zone 1.
- 5.2.5 Made Ground may also be present across the Additional Land within the SDL in areas subject to demolition/construction activities associated with farm properties, electricity pylons and road construction.
- 5.2.6 Alluvium containing peat or other organic material may be a source of ground gas.

Off-Site – Current

- 5.2.7 None identified.

Off-Site – Historical

- 5.2.8 Historical maps indicate of the following potential off-site historical sources:
- Gas works;
 - Sewage works;
 - Nurseries;
 - Sawmills;
 - Smithy;
 - Historical landfills; and
 - Gravels pits.

5.2.3 Potential Pathways

- 5.2.1 High groundwater levels are anticipated within the Additional Land within the SDL and variable underlying superficial deposits which include permeable deposits may permit lateral and vertical migration of contaminants. Granular horizons also provide preferential pathways for ground gas migration.
- 5.2.2 There is potential for disturbance and mobilisation of ground gas and contaminants of concern in soil and / or groundwater during groundworks.

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- 5.2.3 Post development it is likely that there will be pathways for infiltration of rainfall runoff in non-hardstanding areas. Foundations or below ground excavations could create preferential pathways for currently contained or low mobility contaminations to migrate through leaching into underlying groundwater or through granular horizons or fissures either vertically or laterally or allow ground gases to migrate.
- 5.2.4 In any areas of the Additional Land to be covered by hardstanding post development, the risks to future site users via the pathways of dermal contact and ingestion will be mitigated. However, in areas of soft landscaping, the pathways of dermal contact and ingestion could still be active. In addition, there would be potential for the airborne migration of soil derived dusts from these areas during any ground disturbance. Inhalation pathways for volatile contaminants and ground gas may also be active upon development.

5.2.4 Potential Receptors

Controlled Waters

- 5.2.1 The main anticipated controlled waters receptor is considered to be the underlying superficial deposits designated a Secondary A Aquifer, although given the absence of source protection zones or abstractions in the vicinity of the Application Site this receptor is not considered to be highly sensitive.
- 5.2.2 A network of drains/watercourses across the Additional Land within the SDL ultimately draining into primary watercourses namely the River Loddon and Barkham Brook also present on the Additional Land within the SDL are considered sensitive receptors.

Human Health

- 5.2.3 Potential post development human health receptors include future site users and off-site human health receptors.
- 5.2.4 The preliminary masterplan indicates future users will include residents, school children and workers as well as members of the public using recreational facilities.
- 5.2.5 Off site setting receptors include residents and workers.
- 5.2.6 The assessment does not consider the risk to construction workers during redevelopment. These risks will be managed through appropriate Health and Safety legislation including the Health and Safety at Work Act and CDM regulations.

5.3 Outline Conceptual Site Model

- 5.3.1 An outline CSM has been developed on the basis of the site reconnaissance and desk study. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site post development and is summarised in the table below. Should the development layout plan vary from that reviewed and included as a part of this PRA or should occupied structures be proposed then the Conceptual Site Model and derived risk ratings should be reviewed accordingly.
- .

Table 5-1 – Outline Conceptual Site Model

Potential Source	Contaminants of Concern	Via	Potential Pathways	Linkage Potentially Active?	Receptors	Qualitative Risk Rating	Notes
On site – current: Made Ground / farmland and vehicle repairs. Fuel tanks and chemical stores. Buildings / structures containing ACMs.	Metals, hydrocarbons, solvents, glycols pathogens, herbicides/pesticides and asbestos.	Soil	Direct contact/ingestion	✓	Future site users	Moderate	Masterplan includes residential garden plots and large areas of open space.
			Inhalation of volatiles	✓	Future site users	Moderate if accumulation in buildings Low for outdoor exposure	Areas of the Application Site and surrounding land are indicated to have been subject to infilling / landfill, many of which the nature of deposited waste materials is unknown however the likelihood of volatile contaminants may be reduced due to age of deposition.
On site – historical: Backfilled gravels pits and ponds, sewage works, landfills, construction spoil, tanks	Metals, hydrocarbons, solvents, glycols, cyanides pathogens, herbicides/pesticides and asbestos.		Airborne migration of soil or dust	✓	Off-site users	Moderate	Masterplan includes residential garden plots and large areas of open space.
			Leaching of mobile contaminants	✓	Groundwater	Low to Moderate	Proposed end use includes soft cover which will permit high infiltration and subsequent leaching of potential contaminants.
			Direct contact	✓	Water supply pipes	Moderate	Potentially deleterious Made Ground from past activities may present a significant risk to buried structures or services.
		Groundwater	Direct contact/ingestion	✓	Future site users	Low	High water table is identified beneath the Application Site however no significant widespread gross contamination is anticipated.
	✓		Secondary A aquifer	Low to Moderate			

			Vertical and lateral migration in permeable strata	✓	Surface waters	Low to Moderate	Infiltration and mobilisation of potential contaminants through underlying permeable superficial deposits.
Off site – historical: Gas works, nurseries, mills, smithy, backfilled gravels pits, sewage works, landfills, horticultural centres	Metals, hydrocarbons, solvents, glycols, cyanides, pathogens, herbicides/pesticides and asbestos	Groundwater	Direct contact/ingestion	✓	Future site users	Low to Moderate	High water table is identified beneath the Application Site along with underlying permeable superficial deposits.
			Inhalation of volatiles	✓	Future site users	Low to Moderate	Masterplan includes indoor building space.
On and off-site – Made Ground / landfills / Alluvium containing peat and other organic material	Carbon dioxide and methane	Ground Gas	Inhalation of ground gas	✓	Future site users Off-site users	Moderate in buildings. Low – outdoor exposure.	Significant Made Ground is not indicated from ground investigation and BGS records however there is potential for deeper Made Ground to be present especially backfill of old pits and ponds. Significant Alluvial Deposits have not been encountered within the Application Site.
			Explosive risks	✓	Future site users Off-site users	Moderate in buildings. Low – outdoor exposure.	
				✓	Off-site buildings.		

Note The Qualitative Risk Rating does not consider the potential for the pathway to be active. In the event that a Moderate or High Qualitative Risk Rating is identified further assessment is recommended.

5.3.2 Based on the identified potential sources and the site setting, there is not considered to be a significant risk to ecological receptors, crops/vegetation or archaeological receptors.

6 PRELIMINARY GEOTECHNICAL RISK REGISTER: UOR OWNERSHIP BOUNDARY

6.1 Introduction

- 6.1.1 It is understood the proposed development is to comprise a mixed used development. As the proposals include construction of new on-site buildings/structures, the following section provides a preliminary assessment of potential geotechnical constraints. It should be emphasised that the comments listed below are based solely on the Desk Top Study data available. Intrusive ground investigation together with geotechnical testing will provide further confirmatory information on ground conditions and the significance of these potential constraints

6.2 Preliminary Geotechnical Risk Register

- 6.2.1 The following table summarises the potential geotechnical hazards associated with the proposed development based on freely available published information. Preliminary information relating to the hazard and associated engineering considerations are provided.

Table 6-1 - Preliminary Geotechnical Risk Register

Hazard Description	Potential for Hazard	Comments / Possible Engineering Requirements
Sudden lateral / vertical changes in ground conditions	M	It is indicated that there will be a discontinuous extent of superficial deposits across the Application Site of variable composition both cohesive and granular in nature. There is therefore potential for differential settlement and further intrusive investigation and/or assessment will be required to confirm a suitable depth for any foundations on an area / plot basis. Alluvium where present is not considered a suitable founding stratum. It is likely that other superficial deposits will provide a suitable bearing stratum for shallow spread foundations supporting lightly loaded structures. There is potential for shallow bedrock of the London Clay Formation, which will provide a suitable bearing stratum in some areas of the site.
Highly compressible / low bearing capacity soils, (including peat and soft clay)	M	A limited thickness of Made Ground is generally anticipated across the Assessment Site although previous intrusive investigation has indicated localised thicknesses of up to 3 m. Superficial deposits include cohesive materials. The Groundsure report indicates a moderate hazard of compressible ground associated with the Alluvium. The London Clay may be considered of medium volume change potential and may lead to a requirement for heave protection / deepening of foundations.
Ground dissolution features / natural cavities	L	Ground conditions beneath the site are not consistent with these conditions.
Shrinking and swelling clays	L	The BGS database indicates that there is a low hazard from shrinking and swelling clays.
Slope stability issues	L	Whilst no significant slopes are present on site, any temporary slopes created as part of the development should be subject to appropriate geotechnical design based on site-specific site investigation information.
High groundwater table (including waterlogged ground)	M	Intrusive investigation has indicated the Application Site is within an area liable to flooding with a shallow perched groundwater table within the superficial deposits. Shallow excavations may be unstable and excavation support as well as groundwater control measures may be required.

Hazard Description	Potential for Hazard	Comments / Possible Engineering Requirements
Filled and Made Ground (including embankments)	M	A number of gravel pits and ponds are located within the Application Site, many of which the nature and composition of any backfill is currently unknown. Embankments/spoil heaps associated with construction of the highways are known to be present on the northern boundaries.
Obstructions (including foundations, services, basements, tunnels and adjacent sub-structures)	L	Relic foundations could be encountered within the footprint of former buildings/structures, which may require removal to enable the construction of the proposed development. It is likely these obstructions, if encountered may be removed using standard construction plant. A historical graveyard is also indicated within SE Zone.
Underground mining	L	Aside from gravel pits identified above the site is not indicated to be within a known area of underground mining.
Concrete classification	M	Both Made Ground and the London Clay have the potential for low pH and/or the presence of sulphates that could impact on selection of concrete for any foundations. Site-specific testing will be required to confirm this.
Chemical Attack of Water Supply Pipes	M	Made ground at the Application Site has the potential to contain elevated contaminant concentrations generating the requirement for upgraded water supply pipes.
Trees	M	There are a significant number of trees and hedgerows at the site and the site is underlain by cohesive strata. These conditions may generate the requirement for heave protection and deeper foundation solutions in certain areas of the site.

6.2.2 The potential risks are given one of the following classifications:

- **Low risk** - it is considered unlikely that issues within the category will give rise to significant abnormal construction activities in relation to the proposed development.
- **Moderate risk** - it is possible, but not certain that issues within the category will give rise to significant abnormal construction activities in relation to the proposed development.
- **High risk** - there is a high potential that issues within the category will give rise to significant abnormal construction activities in relation to the proposed development..
- **N/A** - The anticipated ground conditions are not consistent with this hazard.

7 PRELIMINARY GEOTECHNICAL RISK REGISTER: ADDITIONAL LAND WITHIN THE SDL

7.1 Introduction

- 7.1.1 It is understood the proposed development is to comprise a mixed used development. As the proposals include construction of new on-site buildings/structures, the following section provides a preliminary assessment of potential geotechnical constraints. It should be emphasised that the comments listed below are based solely on the Desk Top Study data available. Intrusive ground investigation together with geotechnical testing will provide further confirmatory information on ground conditions and the significance of these potential constraints.

7.2 Preliminary Geotechnical Risk Register

- 7.2.1 The following table summarises the potential geotechnical hazards associated with the proposed development based on freely available published information. Preliminary information relating to the hazard and associated engineering considerations are provided.

Table 7-1 - Preliminary Geotechnical Risk Register

Hazard Description	Potential for Hazard	Comments / Possible Engineering Requirements
Sudden lateral / vertical changes in ground conditions	M	It is indicated that there will be a discontinuous extent of superficial deposits across the Application Site of variable composition both cohesive and granular in nature. There is therefore potential for differential settlement and further intrusive investigation and/or assessment will be required to confirm a suitable depth for any foundations on an area / plot basis. Alluvium where present (geology mapping indicates presence within Zones 1, 2, 3, 6, 7, 8, 9) is not considered a suitable founding stratum. It is likely that other superficial deposits will provide a suitable bearing stratum for shallow spread foundations supporting lightly loaded structures. There is potential for shallow bedrock of the London Clay Formation, which will provide a suitable bearing stratum in some areas of the site.
Highly compressible / low bearing capacity soils, (including peat and soft clay)	M	A limited thickness of Made Ground is generally anticipated across the Assessment Site although BGS boreholes drilled as part of the M4 construction indicated a thickness > 5.6 m. Superficial deposits include cohesive materials. The Groundsure report indicates a moderate hazard of compressible ground associated with the Alluvium. The London Clay may be considered of medium volume change potential and may lead to a requirement for heave protection / deepening of foundations.
Ground dissolution features / natural cavities	L	Ground conditions beneath the site are not consistent with these conditions.
Shrinking and swelling clays	L	The BGS database indicates that there is a low hazard from shrinking and swelling clays.
Slope stability issues	L	Whilst no significant slopes are present on site, any temporary slopes created as part of the development should be subject to appropriate geotechnical design based on site-specific site investigation information.
High groundwater table (including waterlogged ground)	M	Intrusive investigation in the surrounding area indicates the area is liable to flooding with a shallow perched groundwater table within the superficial deposits. Shallow excavations may be unstable and excavation support as well as groundwater control measures may be required.

Hazard Description	Potential for Hazard	Comments / Possible Engineering Requirements
Filled and Made Ground (including embankments)	M	A number of gravel pits and ponds/moat are located within the Additional Land within the SDL, of which the nature and composition of any backfill is currently unknown. Embankments/spoil heaps associated with construction of the highways are known to be present in Zones 1 and 8. Previous planning applications have indicated landfilling operations have occurred within Zone 2 and geological mapping indicates a large area of worked ground within the southern part of Zone 1.
Obstructions (including foundations, services, basements, tunnels and adjacent sub-structures)	L	Relic foundations could be encountered within the footprint of former buildings/structures, which may require removal to enable the construction of the proposed development. It is likely these obstructions, if encountered may be removed using standard construction plant. A historical graveyard is also indicated within Zone 4.
Underground mining	L	Aside from gravel pits identified above the site is not indicated to be within a known area of underground mining.
Concrete classification	M	Both Made Ground and the London Clay have the potential for low pH and/or the presence of sulphates that could impact on selection of concrete for any foundations. Site-specific testing will be required to confirm this.
Chemical Attack of Water Supply Pipes	M	Made ground at the Application Site has the potential to contain elevated contaminant concentrations generating the requirement for upgraded water supply pipes.
Trees	M	There are a significant number of trees and hedgerows at the site and the site is underlain by cohesive strata. These conditions may generate the requirement for heave protection and deeper foundation solutions in certain areas of the site.

7.2.2 The potential risks are given one of the following classifications:

- **Low risk** - it is considered unlikely that issues within the category will give rise to significant abnormal construction activities in relation to the proposed development.
- **Moderate risk** - it is possible, but not certain that issues within the category will give rise to significant abnormal construction activities in relation to the proposed development.
- **High risk** - there is a high potential that issues within the category will give rise to significant abnormal construction activities in relation to the proposed development..
- **N/A** - The anticipated ground conditions are not consistent with this hazard.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Planning UoR Ownership Boundary

8.1.1 Conclusions

- 8.1.1 The outline CSM produced upon completion of the desk top study assessment has identified potential pollutant linkages that may be active upon the development of the site. Those identified relate to the presence of contamination within infilled and Made Ground present beneath the Application Site and as a result of historical use that could be released through groundworks. A number of the identified potential contamination sources are identified on the Local Authorities priority sites to be investigated under their contaminated land strategy and are linked to the Local Authority Gas Consultation Zones.

8.1.2 Recommendations

- 8.1 It is therefore recommended that the potential for these linkages to be active is assessed through targeted intrusive Site Investigation works. The scope of this investigation should include the following:
- Drilling of a number of boreholes and trial pits across the site targeting identified potential sources and pollutant linkages;
 - Collection of soil and groundwater samples with chemical analysis of these samples for contaminants of concern;
 - Installation and monitoring of groundwater and ground gas monitoring wells;
 - Assessment of ground conditions and generic quantitative risk assessment of soil and groundwater chemical analysis results to determine the potential for the identified potential pollutant linkages to remain active upon redevelopment of the site; and
 - Provision of recommendations (where necessary) for remediation/mitigation measures to ensure that any identified potential pollutant linkages are not active upon redevelopment of the site.
- 8.2 The site investigation may include technical testing, to facilitate preliminary foundation and pavement design.

8.2 Additional Land within the SDL

8.2.1 Conclusions

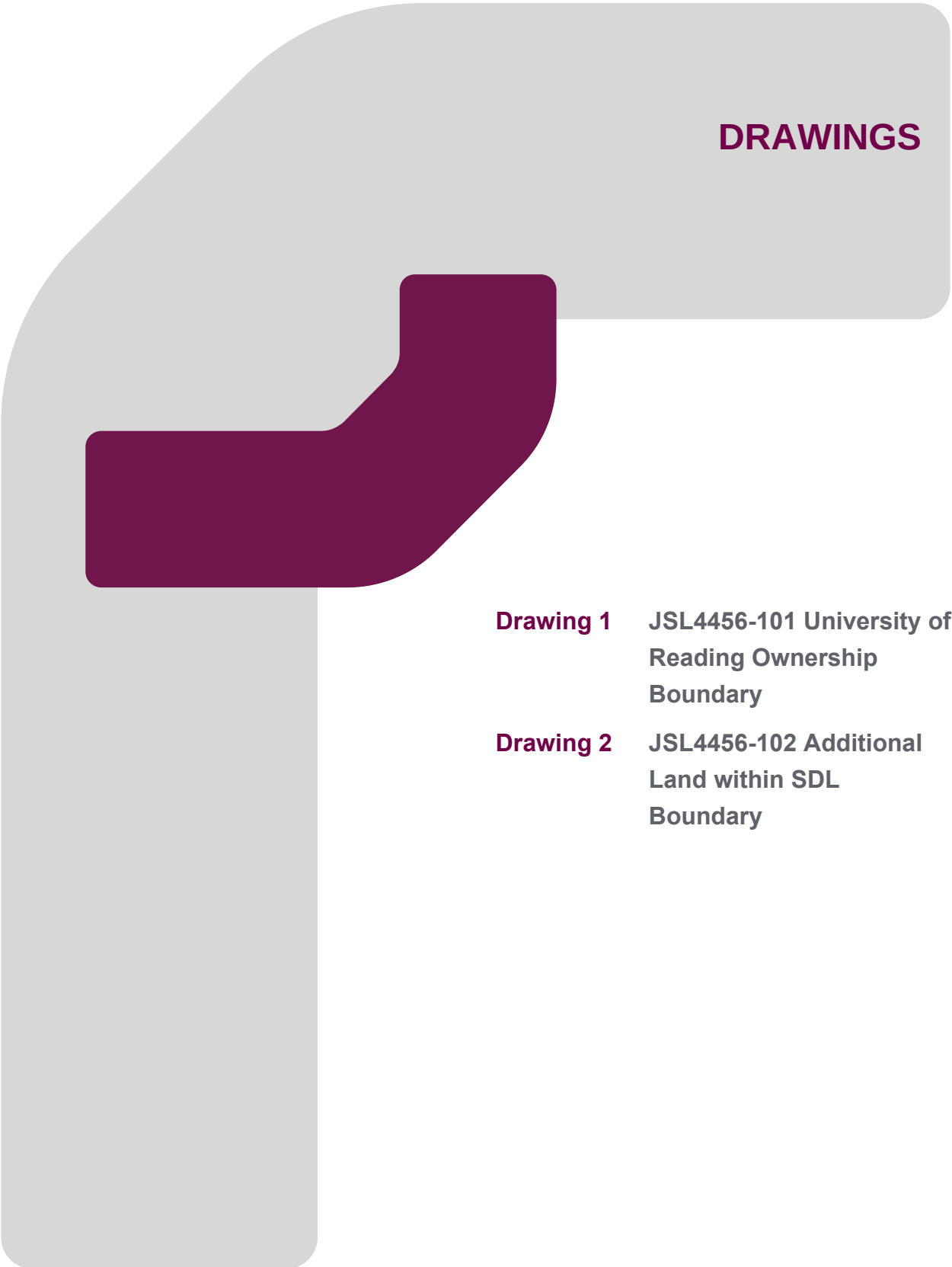
- 8.2.1 The outline CSM produced upon completion of the desk top study assessment has identified potential pollutant linkages that may be active upon the development of the site. Those identified relate to the presence of contamination within infilled and Made Ground present beneath the Application Site and as a result of historical use that could be released through groundworks. A number of the identified potential contamination sources are identified on the Local Authorities priority sites to be investigated under their contaminated land strategy and are linked to the Local Authority Gas Consultation Zones.

8.2.2 Recommendations

- 8.1 It is therefore recommended that the potential for these linkages to be active is assessed through a Phase 2 Site Investigation. The scope of this investigation should include the following:

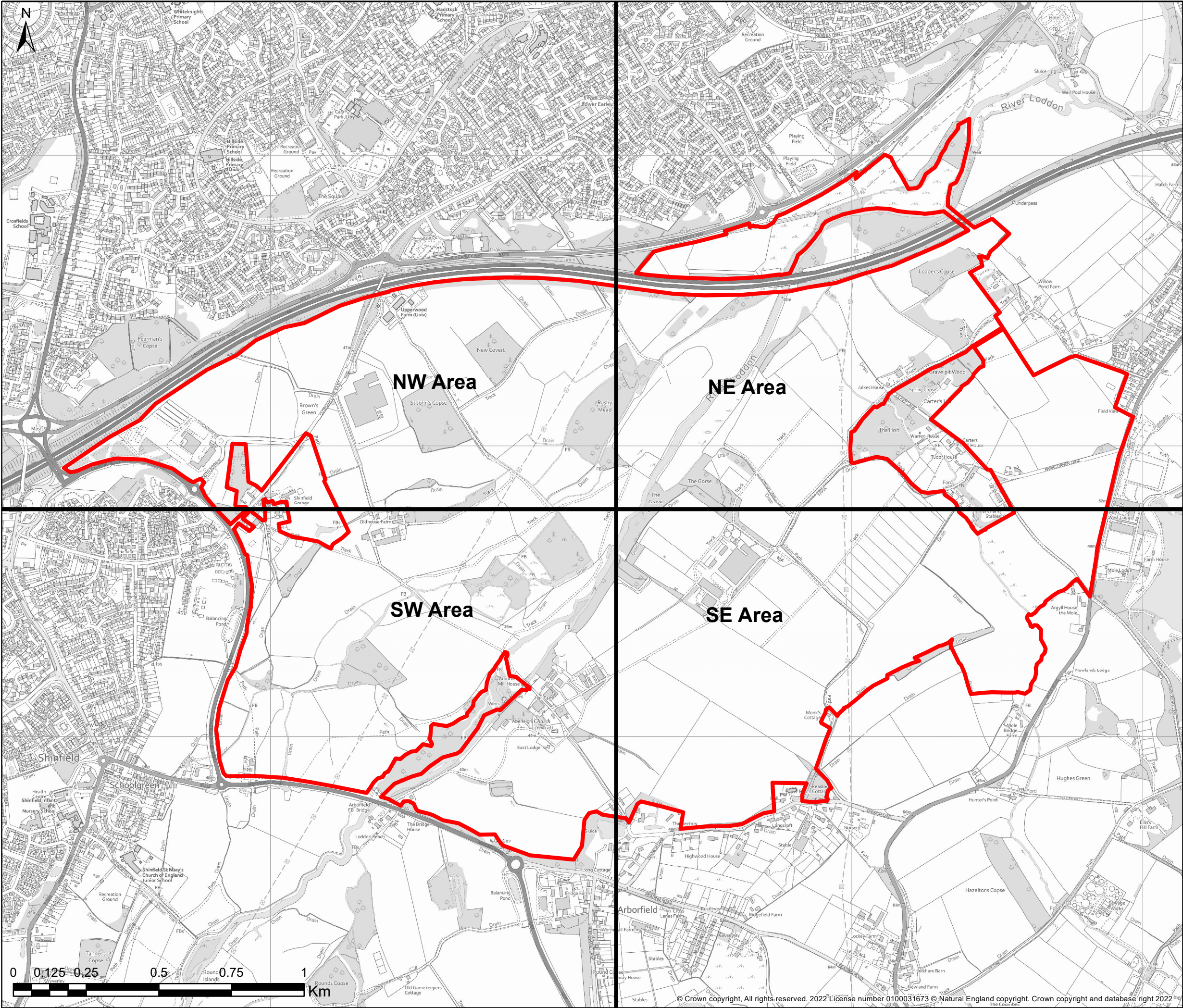
-
- Drilling of a number of boreholes and trial pits across the site targeting identified potential sources and pollutant linkages;
 - Collection of soil and groundwater samples with chemical analysis of these samples for contaminants of concern;
 - Installation and monitoring of groundwater and ground gas monitoring wells;
 - Assessment of ground conditions and generic quantitative risk assessment of soil and groundwater chemical analysis results to determine the potential for the identified potential pollutant linkages to remain active upon redevelopment of the site; and
 - Provision of recommendations (where necessary) for remediation/mitigation measures to ensure that any identified potential pollutant linkages are not active upon redevelopment of the site.

8.2 The site investigation may include technical testing, to facilitate preliminary foundation and pavement design.



DRAWINGS

- Drawing 1** JSL4456-101 University of Reading Ownership Boundary
- Drawing 2** JSL4456-102 Additional Land within SDL Boundary



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Notes

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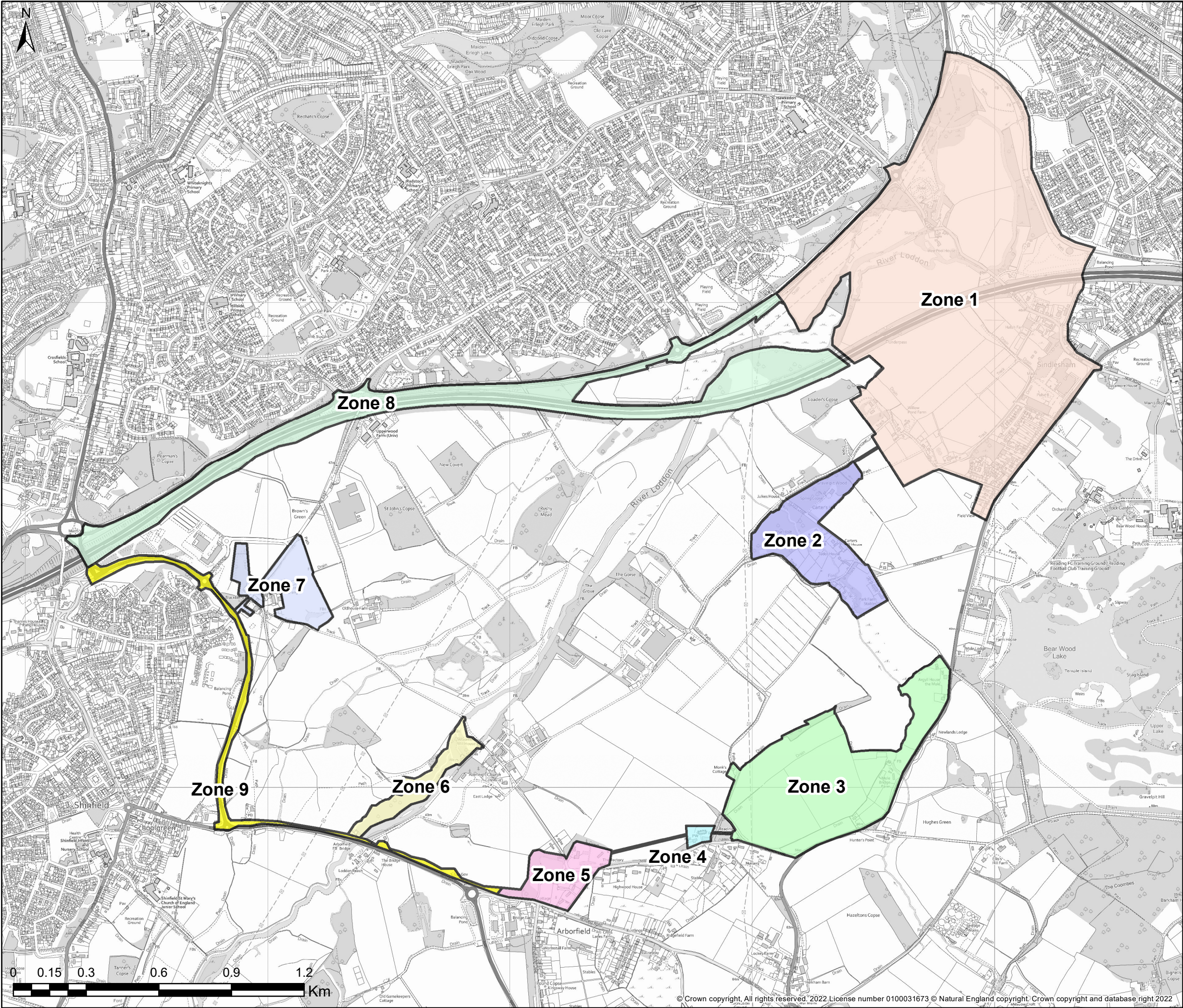
Client **RPS**

Project **Land south of M4 and TVSP**

Title **University of Reading Ownership Boundary**

Status	Drawn By	PM/Checked By
Final	SH	DC
Project Number	Scale @ A3	Date Created
JSL4456	1:12,500	MAY 2022
Figure Number		Rev
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- Legend**
- Zone 1
 - Zone 2
 - Zone 3
 - Zone 4
 - Zone 5
 - Zone 6
 - Zone 7
 - Zone 8
 - Zone 9

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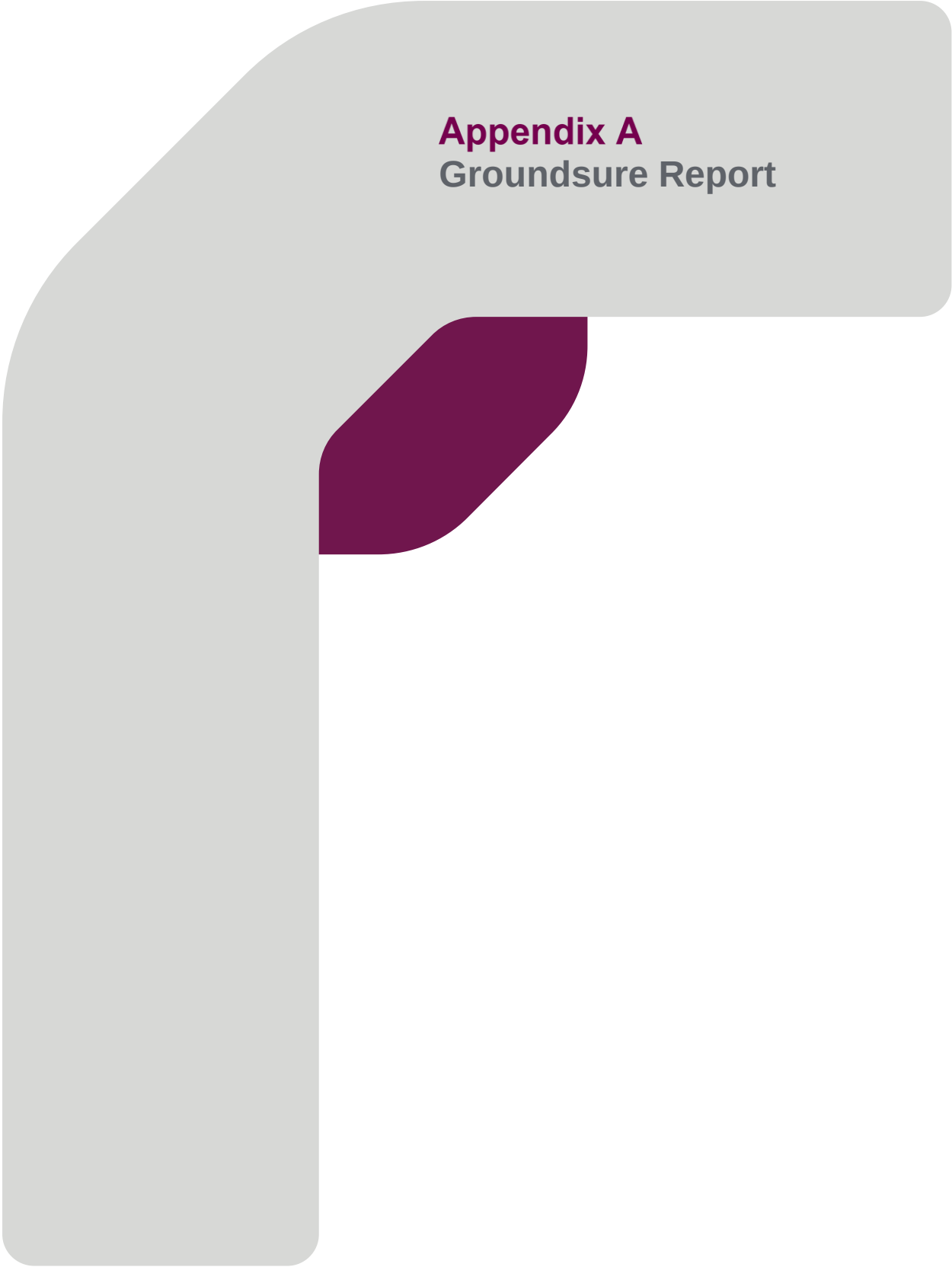
Client RPS

Project Land south of M4 and TVSP

Title Additional Land within SDL Boundary

Status	Drawn By	PM/Checked By
Final	SH	DC
Project Number	Scale @ A3	Date Created
JSL4456	1:15,000	MAY 2022
Figure Number		Rev
101		-

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Appendix A

Groundsure Report



A1. Additional Land With SDL

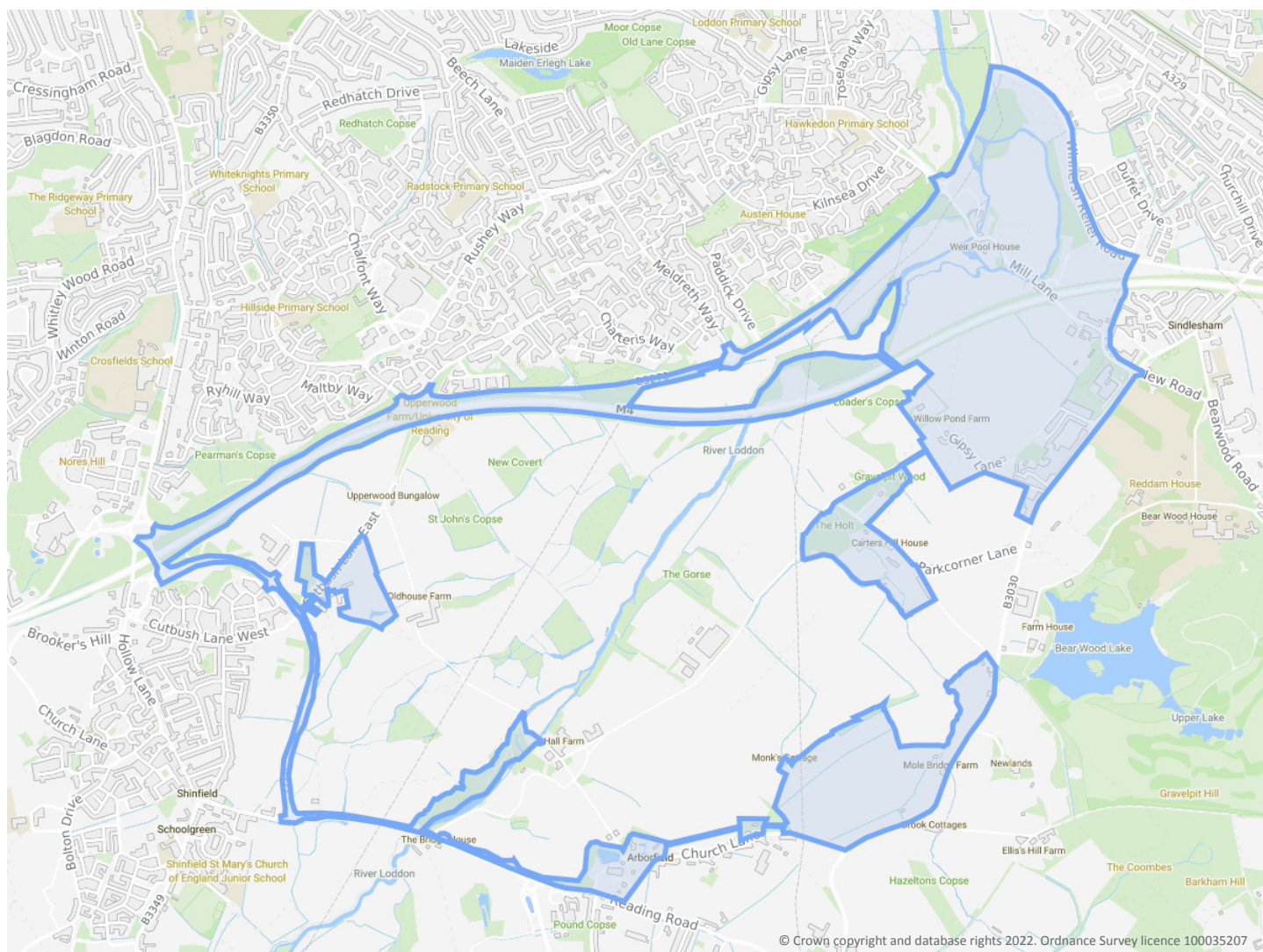
JER9482 Blue area

Order Details

Date: 29/03/2022
Your ref: JER9482 Blue area
Our Ref: GSIIP-2022-12621-9899
Client: RPS Consulting Services Ltd

Site Details

Location: 475371 168858
Area: 243.72 ha
Authority: [Wokingham Borough Council](#)



Summary of findings

p. 2

Aerial image

p. 8

OS MasterMap site plan

N/A: >10ha

groundsure.com/insightuserguide

Contact us with any questions at:

info@groundsure.com

08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
12	1.1	Historical industrial land uses	36	13	50	36	-
17	1.2	Historical tanks	3	7	38	24	-
20	1.3	Historical energy features	6	3	22	27	-
23	1.4	Historical petrol stations	0	0	0	0	-
23	1.5	Historical garages	0	0	0	2	-
23	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
24	2.1	Historical industrial land uses	43	16	66	52	-
31	2.2	Historical tanks	6	9	57	34	-
35	2.3	Historical energy features	12	8	48	64	-
40	2.4	Historical petrol stations	0	0	0	0	-
40	2.5	Historical garages	0	0	0	2	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
41	3.1	Active or recent landfill	0	0	0	0	-
41	3.2	Historical landfill (BGS records)	0	0	0	0	-
42	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
42	3.4	Historical landfill (EA/NRW records)	3	0	3	2	-
43	3.5	Historical waste sites	0	0	1	0	-
44	3.6	Licensed waste sites	0	0	0	0	-
44	3.7	Waste exemptions	14	11	49	26	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
54	4.1	Recent industrial land uses	26	17	47	-	-
60	4.2	Current or recent petrol stations	0	0	0	3	-
60	4.3	Electricity cables	0	0	0	0	-
60	4.4	Gas pipelines	0	0	0	0	-
60	4.5	Sites determined as Contaminated Land	0	0	0	0	-



61	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
61	4.7	Regulated explosive sites	0	0	0	0	-
61	4.8	Hazardous substance storage/usage	0	0	0	0	-
61	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
61	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
62	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	0	1	4	-
62	4.12	<u>Radioactive Substance Authorisations</u>	0	0	1	10	-
64	4.13	<u>Licensed Discharges to controlled waters</u>	14	2	3	12	-
69	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
69	4.15	Pollutant release to public sewer	0	0	0	0	-
69	4.16	List 1 Dangerous Substances	0	0	0	0	-
69	4.17	List 2 Dangerous Substances	0	0	0	0	-
70	4.18	<u>Pollution Incidents (EA/NRW)</u>	6	4	6	10	-
73	4.19	Pollution inventory substances	0	0	0	0	-
73	4.20	Pollution inventory waste transfers	0	0	0	0	-
73	4.21	<u>Pollution inventory radioactive waste</u>	0	0	1	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
74	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
77	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
79	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
90	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
90	5.5	Groundwater vulnerability- local information	None (within 0m)				
91	5.6	<u>Groundwater abstractions</u>	6	1	3	5	12
98	5.7	<u>Surface water abstractions</u>	3	1	0	3	6
102	5.8	<u>Potable abstractions</u>	0	1	1	2	1
103	5.9	<u>Source Protection Zones</u>	2	0	0	0	-
104	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
105	6.1	<u>Water Network (OS MasterMap)</u>	229	136	204	-	-



<u>149</u>	<u>6.2</u>	<u>Surface water features</u>	1	55	91	-	-
<u>150</u>	<u>6.3</u>	<u>WFD Surface water body catchments</u>	3	-	-	-	-
<u>150</u>	<u>6.4</u>	<u>WFD Surface water bodies</u>	2	0	0	-	-
151	6.5	WFD Groundwater bodies	0	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
<u>152</u>	<u>7.1</u>	<u>Risk of flooding from rivers and the sea</u>	High (within 50m)				
<u>153</u>	<u>7.2</u>	<u>Historical Flood Events</u>	18	9	12	-	-
155	7.3	Flood Defences	0	0	0	-	-
156	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
156	7.5	Flood Storage Areas	0	0	0	-	-
<u>157</u>	<u>7.6</u>	<u>Flood Zone 2</u>	Identified (within 50m)				
<u>158</u>	<u>7.7</u>	<u>Flood Zone 3</u>	Identified (within 50m)				
Page	Section	Surface water flooding					
<u>159</u>	<u>8.1</u>	<u>Surface water flooding</u>	1 in 30 year, Greater than 1.0m (within 50m)				
Page	Section	Groundwater flooding					
<u>161</u>	<u>9.1</u>	<u>Groundwater flooding</u>	High (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
162	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
163	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
163	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
163	10.4	Special Protection Areas (SPA)	0	0	0	0	0
163	10.5	National Nature Reserves (NNR)	0	0	0	0	0
<u>164</u>	<u>10.6</u>	<u>Local Nature Reserves (LNR)</u>	0	1	0	0	2
<u>164</u>	<u>10.7</u>	<u>Designated Ancient Woodland</u>	5	2	6	3	68
169	10.8	Biosphere Reserves	0	0	0	0	0
169	10.9	Forest Parks	0	0	0	0	0
169	10.10	Marine Conservation Zones	0	0	0	0	0
170	10.11	Green Belt	0	0	0	0	0
170	10.12	Proposed Ramsar sites	0	0	0	0	0



170	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
170	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
170	10.15	Nitrate Sensitive Areas	0	0	0	0	0
171	10.16	<u>Nitrate Vulnerable Zones</u>	2	0	0	0	2
172	10.17	<u>SSSI Impact Risk Zones</u>	6	-	-	-	-
174	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
175	11.1	World Heritage Sites	0	0	0	-	-
176	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
176	11.3	National Parks	0	0	0	-	-
176	11.4	<u>Listed Buildings</u>	10	2	9	-	-
177	11.5	<u>Conservation Areas</u>	1	0	0	-	-
178	11.6	<u>Scheduled Ancient Monuments</u>	0	0	1	-	-
178	11.7	<u>Registered Parks and Gardens</u>	1	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
179	12.1	<u>Agricultural Land Classification</u>	Grade 3a (within 250m)				
183	12.2	<u>Open Access Land</u>	1	0	0	-	-
184	12.3	<u>Tree Felling Licences</u>	26	0	4	-	-
185	12.4	<u>Environmental Stewardship Schemes</u>	1	2	1	-	-
186	12.5	<u>Countryside Stewardship Schemes</u>	12	2	3	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
188	13.1	<u>Priority Habitat Inventory</u>	136	46	89	-	-
198	13.2	<u>Habitat Networks</u>	9	5	4	-	-
199	13.3	Open Mosaic Habitat	0	0	0	-	-
199	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
201	14.1	<u>10k Availability</u>	Identified (within 500m)				
203	14.2	<u>Artificial and made ground (10k)</u>	25	4	5	9	-
206	14.3	<u>Superficial geology (10k)</u>	23	3	5	6	-



208	14.4	Landslip (10k)	0	0	0	0	-
209	14.5	<u>Bedrock geology (10k)</u>	3	1	0	1	-
210	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
211	15.1	<u>50k Availability</u>	Identified (within 500m)				
212	15.2	<u>Artificial and made ground (50k)</u>	3	2	2	4	-
213	15.3	<u>Artificial ground permeability (50k)</u>	0	1	-	-	-
214	15.4	<u>Superficial geology (50k)</u>	15	4	4	3	-
216	15.5	<u>Superficial permeability (50k)</u>	Identified (within 50m)				
217	15.6	Landslip (50k)	0	0	0	0	-
217	15.7	Landslip permeability (50k)	None (within 50m)				
218	15.8	<u>Bedrock geology (50k)</u>	1	1	0	0	-
219	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
219	15.10	Bedrock faults and other linear features (50k)	0	0	0	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
220	16.1	<u>BGS Boreholes</u>	60	16	35	-	-
Page	Section	Natural ground subsidence					
225	17.1	<u>Shrink swell clays</u>	Low (within 50m)				
227	17.2	<u>Running sands</u>	Low (within 50m)				
229	17.3	<u>Compressible deposits</u>	Moderate (within 50m)				
231	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
233	17.5	<u>Landslides</u>	Low (within 50m)				
235	17.6	<u>Ground dissolution of soluble rocks</u>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
237	18.1	Natural cavities	0	0	0	0	-
238	18.2	<u>BritPits</u>	1	0	5	2	-
239	18.3	<u>Surface ground workings</u>	63	12	69	-	-
245	18.4	Underground workings	0	0	0	0	0
245	18.5	Historical Mineral Planning Areas	0	0	0	0	-



245	18.6	Non-coal mining	0	0	0	0	0
245	18.7	Mining cavities	0	0	0	0	0
245	18.8	<u>JPB mining areas</u>	Identified (within 0m)				
246	18.9	Coal mining	None (within 0m)				
246	18.10	Brine areas	None (within 0m)				
246	18.11	Gypsum areas	None (within 0m)				
246	18.12	Tin mining	None (within 0m)				
247	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
248	19.1	<u>Radon</u>	Less than 1% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
249	20.1	<u>BGS Estimated Background Soil Chemistry</u>	140	35	-	-	-
259	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
259	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
260	21.1	Underground railways (London)	0	0	0	-	-
260	21.2	Underground railways (Non-London)	0	0	0	-	-
260	21.3	Railway tunnels	0	0	0	-	-
260	21.4	Historical railway and tunnel features	0	0	0	-	-
260	21.5	Royal Mail tunnels	0	0	0	-	-
261	21.6	Historical railways	0	0	0	-	-
261	21.7	Railways	0	0	0	-	-
261	21.8	Crossrail 1	0	0	0	0	-
261	21.9	Crossrail 2	0	0	0	0	-
261	21.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 29/06/2019

Site Area: 243.72ha



Contact us with any questions at:

info@groundsure.com

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Date: 29 March 2022

Recent site history - 2013 aerial photograph



Capture Date: 11/07/2013

Site Area: 243.72ha



Recent site history - 2010 aerial photograph



Capture Date: 22/09/2010

Site Area: 243.72ha



Recent site history - 1999 aerial photograph

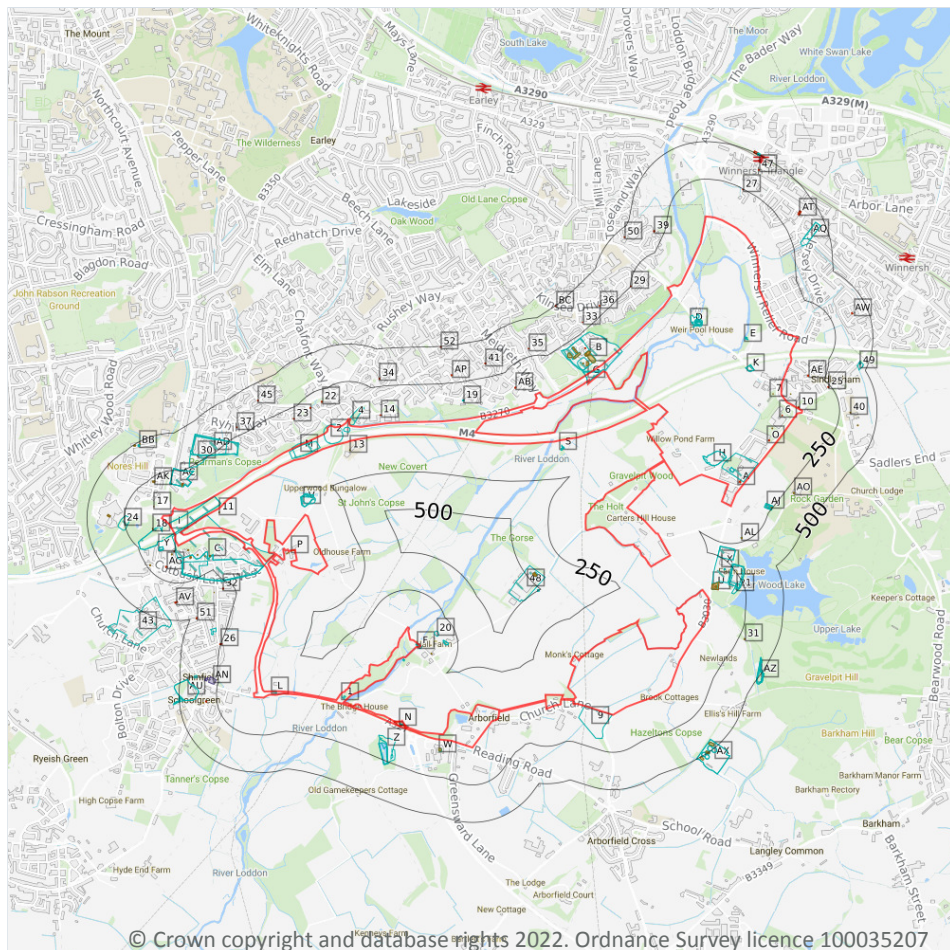


Capture Date: 04/09/1999

Site Area: 243.72ha



1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features
- Historical garages

1.1 Historical industrial land uses

Records within 500m

135

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
1	On site	Pumping Station	1988	1859585



ID	Location	Land use	Dates present	Group ID
2	On site	Gas Valve Compound	1988	1863869
3	On site	Nursery	1898	1867827
4	On site	Unspecified Heap	1988	1869777
5	On site	Unspecified Heap	1988	1869778
B	On site	Sewage Works	1975	1861437
C	On site	Unspecified Station	1988	1864272
D	On site	Boat House	1909	1867497
D	On site	Boat House	1898	1867498
D	On site	Unspecified Mill	1960 - 1975	1905108
D	On site	Unspecified Mill	1986	1911548
D	On site	Unspecified Mill	1909	1919004
D	On site	Unspecified Mill	1898	1933456
D	On site	Unspecified Mill	1932	1942242
D	On site	Unspecified Mill	1938	1954228
E	On site	Boat House	1898	1867499
E	On site	Boat House	1938 - 1960	1899527
E	On site	Boat House	1909	1960249
E	On site	Boat House	1932	1963267
F	On site	Disused Mill	1898	1871180
F	On site	Unspecified Disused Mill	1898	1872768
G	On site	Sewage Works	1969	1861436
G	On site	Disused Sewage Works	1978	1872207
H	On site	Gravel Pit	1932	1886941
H	On site	Gravel Pit	1938 - 1961	1937908
I	On site	Cuttings	1975	1897357
I	On site	Cuttings	1983 - 1988	1964704
J	On site	Sewage Beds	1938	1908827
J	On site	Sewage Beds	1932	1918692



ID	Location	Land use	Dates present	Group ID
K	On site	Cuttings	1975	1923157
K	On site	Cuttings	1986	1957866
L	On site	Pumping Station	1983 - 1988	1927214
L	On site	Pumping Station	1969 - 1975	1954082
M	On site	Cuttings	1988	1936119
M	On site	Cuttings	1975	1941045
N	On site	Gas Regulator	1975	1860046
9	1m S	Nursery	1988	1867826
Q	10m SW	Horticultural Station	1983	1888873
Q	10m SW	Horticultural Station	1969 - 1975	1959732
R	12m SE	Boat House	1913 - 1938	1951110
R	13m SE	Boat House	1956	1908357
B	35m NW	Unspecified Works	1960	1860399
S	36m S	Boat Houses	1961	1904518
B	38m NW	Unspecified Tanks	1960 - 1975	1893103
B	42m NW	Unspecified Tanks	1975	1870905
S	47m S	Boat Houses	1932	1938716
S	48m S	Boat Houses	1938	1945669
S	48m S	Boat Houses	1909	1953754
S	49m S	Boat House	1898	1867422
V	53m N	Old Gravel Pits	1956	1968554
U	54m NE	Unspecified Commercial/Industrial	1938	1874665
U	54m NE	Gas Works	1898 - 1909	1887285
V	55m N	Old Gravel Pits	1913	1931121
V	56m N	Old Gravel Pits	1938	1932749
S	57m S	Boat Houses	1961	1916227
W	60m S	Unspecified Tank	1988	1931906
W	60m S	Unspecified Tank	1969 - 1978	1959008



ID	Location	Land use	Dates present	Group ID
V	72m N	Old Gravel Pit	1898	1918466
X	74m NE	Nursery	1978	1947427
U	82m NE	Unspecified Tank	1938	1858207
U	82m NE	Gasometer	1898 - 1909	1959592
Y	96m SW	Smithy	1913 - 1938	1946881
Y	96m SW	Smithy	1898	1887096
Z	99m SW	Gravel Pit	1900 - 1909	1947369
Y	106m SW	Smithy	1898	1965819
B	107m NW	Unspecified Tanks	1975	1870906
AA	113m S	Horticultural Station	1956	1962564
19	120m N	Filter Beds	1909 - 1938	1895540
20	123m NE	Gravel Pit	1913 - 1938	1892913
V	124m N	Old Gravel Pits	1956	1914541
Z	129m SW	Old Gravel Pit	1900	1873981
B	134m NW	Unspecified Tanks	1975	1921930
B	135m NW	Unspecified Tanks	1960	1885862
AC	138m NW	Horticultural Research Station	1975	1853659
AC	138m NW	Unspecified Station	1988	1864270
AC	138m NW	Research Station	1983	1883803
AD	141m NW	Nursery	1969 - 1975	1922872
AD	141m NW	Nursery	1983	1929464
AD	143m NW	Nursery	1913 - 1938	1957750
Z	145m SW	Unspecified Pit	1909	1879457
Z	152m SW	Unspecified Ground Workings	1956	1852433
B	153m NW	Unspecified Tanks	1975	1870907
AF	153m E	Unspecified Pit	1961	1879464
B	153m NW	Unspecified Tanks	1960 - 1975	1931424
21	157m E	Sawmill	1932	1968856



ID	Location	Land use	Dates present	Group ID
AF	157m E	Old Gravel Pit	1913 - 1938	1959787
AH	163m NE	Sawmill	1938	1939758
AH	163m NE	Sawmill	1898 - 1909	1968936
AH	183m NE	Unspecified Mill	1961	1872616
X	197m NE	Unspecified Tank	1909	1885243
X	197m NE	Unspecified Tank	1938	1926143
AJ	197m SE	Filter Beds	1969	1956507
AD	198m NW	Nursery	1956	1932840
X	199m NE	Unspecified Tank	1932	1942820
AJ	201m SE	Filter Beds	1938	1923458
AJ	209m SE	Filter Beds	1932	1913580
24	213m W	Cuttings	1988	1882443
AL	220m S	Unspecified Tank	1909	1858208
28	244m NE	Nursery	1969	1949123
AQ	304m E	Nursery	1960	1913477
38	309m W	Gravel Pit	1913 - 1938	1935925
AQ	328m E	Nursery	1932 - 1938	1942371
AU	369m W	Builders Yard	1969	1868666
AU	369m W	Unspecified Yard	1975	1882874
43	374m SW	Research Institute	1988	1930828
46	388m W	Police Station	1983 - 1988	1918875
48	419m SW	Research Centre	1988	1868690
49	437m SE	Smithy	1898 - 1909	1911118
AX	439m SE	Sewage Works	1988	1885648
AX	439m SE	Sewage Works	1969 - 1978	1945136
AY	439m SW	Unspecified Tanks	1988	1870901
AZ	442m SE	Gravel Pit	1898	1955567
AZ	445m SE	Unspecified Ground Workings	1909 - 1938	1890986



ID	Location	Land use	Dates present	Group ID
AZ	445m SE	Unspecified Pit	1961 - 1978	1930760
AZ	445m SE	Unspecified Pit	1988	1932561
AX	451m SE	Unspecified Tanks	1969 - 1978	1901095
AX	451m SE	Unspecified Tanks	1988	1933222
AX	467m SE	Unspecified Tanks	1969 - 1978	1888351
AX	467m SE	Unspecified Tanks	1988	1964001
BA	468m W	Unspecified Heap	1913	1941288
BB	472m NW	Unspecified Tank	1938 - 1956	1885130
BB	473m NW	Unspecified Tank	1913	1919978
AZ	473m SE	Unspecified Ground Workings	1938	1889165
AZ	473m SE	Unspecified Ground Workings	1909	1962552
BA	474m W	Unspecified Ground Workings	1938	1852455
AX	481m SE	Unspecified Tanks	1969 - 1978	1968481
AX	481m SE	Unspecified Tanks	1988	1968725
AX	485m SE	Unspecified Tanks	1969 - 1978	1910275
AX	485m SE	Unspecified Tanks	1988	1968345
AZ	486m SE	Gravel Pit	1932	1948178
AZ	487m SE	Unspecified Ground Workings	1938	1852454
AZ	487m SE	Old Gravel Pit	1909	1874027
53	493m NW	Meteorological Station	1988	1872969
BD	496m NE	Railway Building	1960	1906854
BD	499m NE	Railway Building	1986	1907328

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

72

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or



succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
7	On site	Unspecified Tank	1912 - 1933	327286
8	On site	Unspecified Tank	1899 - 1933	320702
P	On site	Unspecified Tank	1967	305667
P	2m S	Unspecified Tank	1994	305668
P	8m S	Unspecified Tank	1967	305669
P	16m SW	Unspecified Tank	1994	305670
11	22m SE	Unspecified Tank	1987 - 1994	328035
B	40m NW	Tanks	1986	310548
B	47m NW	Unspecified Tank	1986	305661
12	50m NE	Unspecified Tank	1912 - 1933	323125
U	53m NE	Gas Works	1872 - 1911	323032
C	54m SE	Unspecified Tank	1989 - 1997	326953
13	55m S	Unspecified Tank	1967 - 1994	321594
W	58m S	Unspecified Tank	1967 - 1997	323293
15	68m E	Unspecified Tank	1872	305671
T	71m SW	Unspecified Tank	1989	316119
T	71m SW	Unspecified Tank	1989	318314
T	72m SW	Unspecified Tank	1974	315666
B	73m NW	Unspecified Tank	1965	305659
T	74m SW	Unspecified Tank	1997	305655
U	81m NE	Unspecified Tank	1933	305672
U	81m NE	Gasometer	1872 - 1911	321109
16	84m SE	Tank or Trough	1872	312009
17	87m NW	Unspecified Tank	1872	305656
18	91m SW	Tanks	1965	310529
C	102m SE	Unspecified Tank	1989	317195

ID	Location	Land use	Dates present	Group ID
C	103m SE	Unspecified Tank	1997	325740
C	104m SE	Tanks	1974	310528
B	105m NW	Tanks	1986	315828
B	105m NW	Tanks	1967	313264
B	107m NW	Unspecified Tank	1965	305660
C	111m SE	Unspecified Tank	1989	324481
C	112m SE	Unspecified Tank	1997	314193
B	133m NW	Tanks	1965	310549
C	143m SE	Unspecified Tank	1965	305654
B	151m NW	Settling Tanks	1965	309220
C	151m S	Unspecified Tank	1974 - 1997	323430
AC	152m N	Unspecified Tank	1959 - 1965	322289
B	158m NW	Tanks	1965	310550
AC	162m NW	Unspecified Tank	1973 - 1975	325556
AC	163m N	Unspecified Tank	1994	305658
B	183m NW	Tanks	1965	310551
AK	214m NW	Tanks	1994	316093
AL	221m S	Unspecified Tank	1911	305673
AK	222m NW	Tanks	1989	322522
AM	225m SW	Unspecified Tank	1974 - 1989	315813
AM	228m SW	Unspecified Tank	1997	305653
AJ	240m SE	Unspecified Tank	1967	305666
31	285m SE	Unspecified Tank	1997	305674
AO	298m SE	Unspecified Tank	1994	322133
AO	298m SE	Unspecified Tank	1994	312751
AO	298m SE	Unspecified Tank	1993	320424
AO	300m SE	Unspecified Tank	1967	316157
AO	300m SE	Unspecified Tank	1975	324153



ID	Location	Land use	Dates present	Group ID
40	319m E	Unspecified Tank	1967 - 1993	322616
AR	340m W	Unspecified Tank	1967	315543
AR	341m W	Unspecified Tank	1983	321451
AR	341m W	Unspecified Tank	1994	326539
AS	344m W	Unspecified Tank	1965	319725
AS	346m W	Unspecified Tank	1959 - 1973	323621
42	353m SW	Unspecified Tank	1965	305652
44	380m E	Unspecified Tank	1933	305664
AY	444m SW	Tanks	1987 - 1993	327194
AY	445m SW	Unspecified Tank	1987 - 1993	316670
AY	445m SW	Tanks	1987 - 1993	321320
AY	447m SW	Tanks	1987	317771
AX	450m SE	Tanks	1967 - 1993	315548
AY	459m SW	Unspecified Tank	1987 - 1993	323612
BB	484m NW	Unspecified Tank	1911 - 1936	319070
AX	485m SE	Tanks	1967 - 1993	322864
BB	487m NW	Tanks	1994	310547
AX	499m SE	Tanks	1993	310523

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

58

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**



ID	Location	Land use	Dates present	Group ID
6	On site	Electricity Substation	1994	210814
A	On site	Electricity Substation	1994	189569
A	On site	Electricity Substation	1975 - 1994	204450
N	On site	Gas Regulator	1987 - 1997	195749
O	On site	Electricity Substation	1975	196034
O	On site	Electricity Substation	1993 - 1994	199035
10	5m NE	Electricity Substation	1975 - 1994	200584
T	42m SW	Electricity Substation	1974 - 1989	211135
T	45m SW	Electricity Substation	1997	197771
U	53m NE	Gas Works	1872 - 1911	211612
14	59m N	Electricity Substation	1986 - 1988	198274
U	81m NE	Gasometer	1872 - 1911	196988
AB	131m N	Electricity Substation	1988	189567
AB	131m N	Electricity Substation	-	187690
AE	142m SE	Electricity Substation	1993 - 1994	196002
AE	143m SE	Electricity Substation	1975	197511
B	151m NW	Electricity Substation	1989 - 1999	210328
AG	158m SW	Electricity Substation	1974 - 1989	199797
AG	163m SW	Electricity Substation	1997	209099
AC	165m NW	Electricity Substation	1989 - 1994	201038
22	165m N	Electricity Substation	1986 - 1995	201834
AI	174m NW	Gas Governor	1986	206815
AI	174m NW	Gas Governor	1988	202355
23	175m NW	Electricity Substation	1986 - 1995	196546
AI	175m NW	Gas Governor	1995	206699
AA	197m SE	Electricity Substation	1974 - 1989	210466
AA	199m SE	Electricity Substation	1997	202373
25	232m NE	Electricity Substation	1967 - 1994	208374



ID	Location	Land use	Dates present	Group ID
26	242m W	Electricity Substation	1974 - 1989	210426
27	243m NE	Electricity Substation	1995	189720
29	245m W	Electricity Substation	1987 - 1993	203147
30	284m NW	Electricity Substation	1989 - 1994	195571
32	298m SW	Electricity Substation	1974 - 1997	207891
33	298m NW	Electricity Substation	1996 - 1999	200445
AP	298m N	Electricity Substation	1992	203175
AP	298m N	Electricity Substation	1989 - 1993	207379
34	300m N	Electricity Substation	1986 - 1988	204801
35	301m N	Electricity Substation	1989 - 1999	204077
36	301m NW	Electricity Substation	1988 - 1996	204553
37	303m NW	Electricity Substation	1987 - 1988	206427
39	310m NW	Electricity Substation	1987 - 1993	209128
AR	318m W	Electricity Substation	1967 - 1994	207956
41	340m N	Electricity Substation	1988 - 1993	212113
AT	368m NE	Electricity Substation	1977 - 1995	200638
AV	373m S	Electricity Substation	1989 - 1997	198144
AT	376m NE	Electricity Substation	1980 - 1988	211642
AV	377m S	Electricity Substation	1974	210535
45	388m NW	Electricity Substation	1987 - 1988	203603
AW	392m NE	Electricity Substation	1987	203763
AW	393m NE	Electricity Substation	1978 - 1996	208763
47	409m NE	Electricity Substation	1989 - 1995	211252
50	442m NW	Electricity Substation	1987 - 1993	211228
51	455m W	Electricity Substation	1974 - 1997	201928
52	493m N	Electricity Substation	1992 - 1993	198002
BC	496m NW	Electricity Substation	1989	198791
BD	496m NE	Electricity Substation	1989	201987



ID	Location	Land use	Dates present	Group ID
BC	497m NW	Electricity Substation	1996 - 1999	205514
BD	497m NE	Electricity Substation	1977 - 1995	204234

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m

2

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 12**

ID	Location	Land use	Dates present	Group ID
AN	263m W	Garage	1983	60807
AN	316m W	Garage	1967	60808

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m

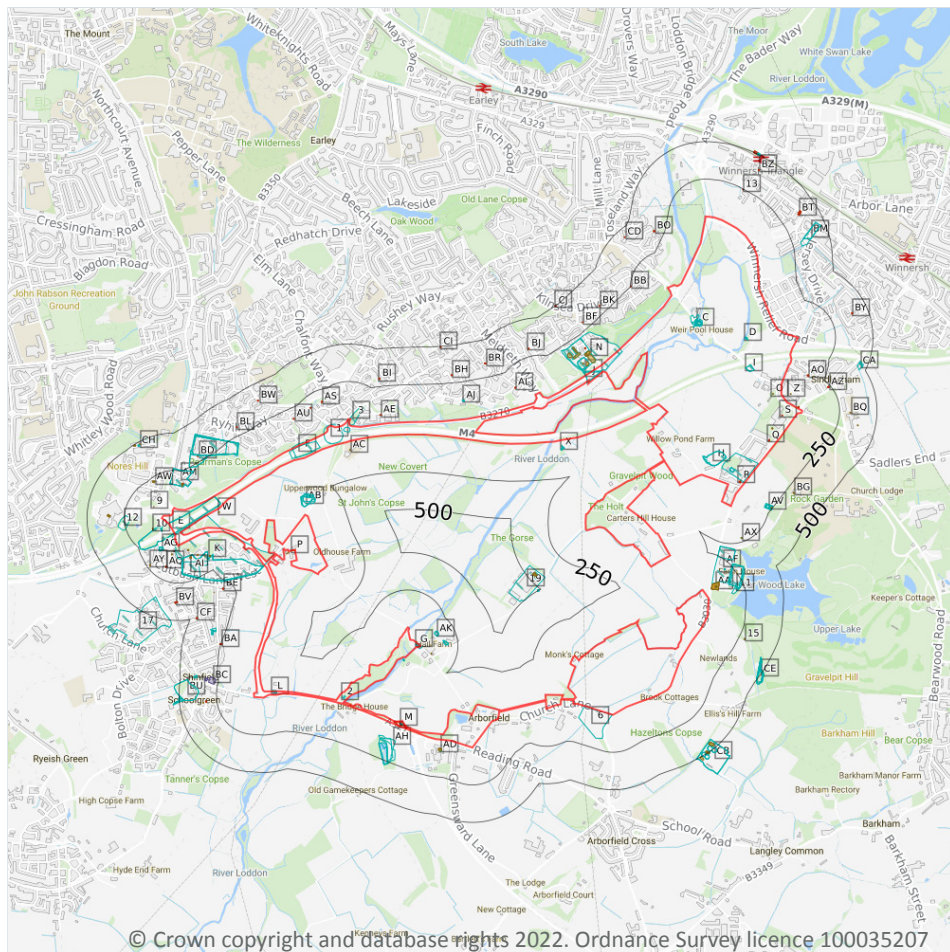
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Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.



2 Past land use - un-grouped



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features
- Historical garages

2.1 Historical industrial land uses

Records within 500m

177

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 24**

ID	Location	Land Use	Date	Group ID
1	On site	Gas Valve Compound	1988	1863869
2	On site	Pumping Station	1988	1859585
3	On site	Unspecified Heap	1988	1869777



ID	Location	Land Use	Date	Group ID
4	On site	Unspecified Heap	1988	1869778
5	On site	Nursery	1898	1867827
A	On site	Sewage Beds	1938	1908827
A	On site	Sewage Beds	1932	1918692
A	On site	Sewage Beds	1932	1918692
C	On site	Unspecified Mill	1938	1954228
C	On site	Unspecified Mill	1909	1919004
C	On site	Boat House	1909	1867497
C	On site	Boat House	1898	1867498
C	On site	Unspecified Mill	1898	1933456
C	On site	Unspecified Mill	1960	1905108
C	On site	Unspecified Mill	1986	1911548
C	On site	Unspecified Mill	1975	1905108
C	On site	Unspecified Mill	1932	1942242
D	On site	Boat House	1938	1899527
D	On site	Boat House	1909	1960249
D	On site	Boat House	1898	1867499
D	On site	Boat House	1960	1899527
D	On site	Boat House	1932	1963267
E	On site	Cuttings	1988	1964704
E	On site	Cuttings	1975	1897357
E	On site	Cuttings	1983	1964704
F	On site	Cuttings	1988	1936119
F	On site	Cuttings	1975	1941045
G	On site	Unspecified Disused Mill	1898	1872768
G	On site	Disused Mill	1898	1871180
H	On site	Gravel Pit	1961	1937908
H	On site	Gravel Pit	1938	1937908



ID	Location	Land Use	Date	Group ID
H	On site	Gravel Pit	1932	1886941
I	On site	Cuttings	1986	1957866
I	On site	Cuttings	1975	1923157
J	On site	Sewage Works	1969	1861436
J	On site	Disused Sewage Works	1978	1872207
K	On site	Unspecified Station	1988	1864272
L	On site	Pumping Station	1988	1927214
L	On site	Pumping Station	1975	1954082
L	On site	Pumping Station	1983	1927214
L	On site	Pumping Station	1969	1954082
M	On site	Gas Regulator	1975	1860046
N	On site	Sewage Works	1975	1861437
6	1m S	Nursery	1988	1867826
U	10m SW	Horticultural Station	1975	1959732
U	10m SW	Horticultural Station	1983	1888873
U	10m SW	Horticultural Station	1969	1959732
V	12m SE	Boat House	1938	1951110
V	13m SE	Boat House	1956	1908357
V	15m SE	Boat House	1913	1951110
N	35m NW	Unspecified Works	1960	1860399
X	36m S	Boat Houses	1961	1904518
N	38m NW	Unspecified Tanks	1960	1893103
N	42m NW	Unspecified Tanks	1975	1870905
N	44m NW	Unspecified Tanks	1975	1893103
X	47m S	Boat Houses	1932	1938716
X	48m S	Boat Houses	1938	1945669
X	48m S	Boat Houses	1909	1953754
X	49m S	Boat House	1898	1867422



ID	Location	Land Use	Date	Group ID
AB	53m N	Old Gravel Pits	1956	1968554
AA	54m NE	Unspecified Commercial/Industrial	1938	1874665
AA	54m NE	Gas Works	1909	1887285
AA	55m NE	Gas Works	1898	1887285
AB	55m N	Old Gravel Pits	1913	1931121
AB	56m N	Old Gravel Pits	1938	1932749
X	57m S	Boat Houses	1961	1916227
AD	60m S	Unspecified Tank	1988	1931906
AD	60m S	Unspecified Tank	1969	1959008
AD	60m S	Unspecified Tank	1978	1959008
AB	72m N	Old Gravel Pit	1898	1918466
AF	74m NE	Nursery	1978	1947427
AA	82m NE	Gasometer	1909	1959592
AA	82m NE	Unspecified Tank	1938	1858207
AA	83m NE	Gasometer	1898	1959592
AB	90m N	Old Gravel Pit	1898	1918466
AG	96m SW	Smithy	1938	1946881
AG	96m SW	Smithy	1898	1887096
AG	97m SW	Smithy	1913	1946881
AH	99m SW	Gravel Pit	1909	1947369
AH	103m SW	Gravel Pit	1900	1947369
AG	106m SW	Smithy	1898	1965819
N	107m NW	Unspecified Tanks	1975	1870906
AI	113m S	Horticultural Station	1956	1962564
AJ	120m N	Filter Beds	1938	1895540
AJ	120m N	Filter Beds	1909	1895540
AJ	121m N	Filter Beds	1932	1895540
AJ	121m N	Filter Beds	1932	1895540



ID	Location	Land Use	Date	Group ID
AK	123m NE	Gravel Pit	1913	1892913
AK	124m NE	Gravel Pit	1938	1892913
AB	124m N	Old Gravel Pits	1956	1914541
AH	129m SW	Old Gravel Pit	1900	1873981
N	134m NW	Unspecified Tanks	1975	1921930
N	135m NW	Unspecified Tanks	1960	1885862
AM	138m NW	Unspecified Station	1988	1864270
AM	138m NW	Horticultural Research Station	1975	1853659
AM	138m NW	Research Station	1983	1883803
AN	141m NW	Nursery	1975	1922872
AN	141m NW	Nursery	1983	1929464
AN	141m NW	Nursery	1969	1922872
AN	143m NW	Nursery	1938	1957750
AN	144m NW	Nursery	1913	1957750
AH	145m SW	Unspecified Pit	1909	1879457
AH	152m SW	Unspecified Ground Workings	1956	1852433
N	153m NW	Unspecified Tanks	1975	1870907
AP	153m E	Unspecified Pit	1961	1879464
N	153m NW	Unspecified Tanks	1960	1931424
11	157m E	Sawmill	1932	1968856
AP	157m E	Old Gravel Pit	1938	1959787
AP	159m E	Old Gravel Pit	1913	1959787
N	161m NW	Unspecified Tanks	1975	1931424
AR	163m NE	Sawmill	1938	1939758
AR	163m NE	Sawmill	1909	1968936
AR	166m NE	Sawmill	1898	1968936
AR	183m NE	Unspecified Mill	1961	1872616
AF	197m NE	Unspecified Tank	1938	1926143



ID	Location	Land Use	Date	Group ID
AF	197m NE	Unspecified Tank	1909	1885243
AV	197m SE	Filter Beds	1969	1956507
AN	198m NW	Nursery	1956	1932840
AF	199m NE	Unspecified Tank	1932	1942820
AV	201m SE	Filter Beds	1938	1923458
AV	209m SE	Filter Beds	1932	1913580
AV	209m SE	Filter Beds	1932	1913580
12	213m W	Cuttings	1988	1882443
AX	220m S	Unspecified Tank	1909	1858208
14	244m NE	Nursery	1969	1949123
BM	304m E	Nursery	1960	1913477
BN	309m W	Gravel Pit	1913	1935925
BN	311m W	Gravel Pit	1938	1935925
BM	328m E	Nursery	1932	1942371
BM	330m E	Nursery	1938	1942371
BU	369m W	Unspecified Yard	1975	1882874
BU	369m W	Builders Yard	1969	1868666
17	374m SW	Research Institute	1988	1930828
BX	388m W	Police Station	1988	1918875
BX	388m W	Police Station	1983	1918875
19	419m SW	Research Centre	1988	1868690
CA	437m SE	Smithy	1898	1911118
CB	439m SE	Sewage Works	1988	1885648
CB	439m SE	Sewage Works	1969	1945136
CB	439m SE	Sewage Works	1978	1945136
CC	439m SW	Unspecified Tanks	1988	1870901
CA	441m E	Smithy	1909	1911118
CE	442m SE	Gravel Pit	1898	1955567



ID	Location	Land Use	Date	Group ID
CE	445m SE	Unspecified Ground Workings	1938	1890986
CE	445m SE	Unspecified Ground Workings	1909	1890986
CE	445m SE	Unspecified Pit	1988	1932561
CE	445m SE	Unspecified Pit	1969	1930760
CE	445m SE	Unspecified Pit	1978	1930760
CE	445m SE	Unspecified Pit	1961	1930760
CE	445m SE	Unspecified Ground Workings	1932	1890986
CE	445m SE	Unspecified Ground Workings	1932	1890986
CB	451m SE	Unspecified Tanks	1988	1933222
CB	451m SE	Unspecified Tanks	1969	1901095
CB	451m SE	Unspecified Tanks	1978	1901095
CB	467m SE	Unspecified Tanks	1988	1964001
CB	467m SE	Unspecified Tanks	1969	1888351
CB	467m SE	Unspecified Tanks	1978	1888351
CG	468m W	Unspecified Heap	1913	1941288
CG	468m W	Unspecified Heap	1913	1941288
CH	472m NW	Unspecified Tank	1938	1885130
CH	473m NW	Unspecified Tank	1956	1885130
CH	473m NW	Unspecified Tank	1913	1919978
CE	473m SE	Unspecified Ground Workings	1938	1889165
CE	473m SE	Unspecified Ground Workings	1909	1962552
CG	474m W	Unspecified Ground Workings	1938	1852455
CB	481m SE	Unspecified Tanks	1988	1968725
CB	481m SE	Unspecified Tanks	1969	1968481
CB	481m SE	Unspecified Tanks	1978	1968481
CB	485m SE	Unspecified Tanks	1988	1968345
CB	485m SE	Unspecified Tanks	1969	1910275
CB	485m SE	Unspecified Tanks	1978	1910275



ID	Location	Land Use	Date	Group ID
CE	486m SE	Gravel Pit	1932	1948178
CE	487m SE	Unspecified Ground Workings	1938	1852454
CE	487m SE	Old Gravel Pit	1909	1874027
20	493m NW	Meteorological Station	1988	1872969
CK	496m NE	Railway Building	1960	1906854
CK	499m NE	Railway Building	1986	1907328

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m

106

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 24**

ID	Location	Land Use	Date	Group ID
B	On site	Unspecified Tank	1899	320702
B	On site	Unspecified Tank	1912	320702
B	On site	Unspecified Tank	1933	320702
O	On site	Unspecified Tank	1912	327286
O	On site	Unspecified Tank	1933	327286
P	On site	Unspecified Tank	1967	305667
P	2m S	Unspecified Tank	1994	305668
P	8m S	Unspecified Tank	1967	305669
P	16m SW	Unspecified Tank	1994	305670
W	22m SE	Unspecified Tank	1994	328035
W	22m SE	Unspecified Tank	1987	328035
N	40m NW	Tanks	1986	310548
N	47m NW	Unspecified Tank	1986	305661
Z	50m NE	Unspecified Tank	1912	323125



ID	Location	Land Use	Date	Group ID
Z	50m NE	Unspecified Tank	1933	323125
AA	53m NE	Gas Works	1872	323032
AA	53m NE	Gas Works	1899	323032
AA	53m NE	Gas Works	1911	323032
K	54m SE	Unspecified Tank	1989	326953
K	54m SE	Unspecified Tank	1989	326953
K	54m SE	Unspecified Tank	1997	326953
AC	55m S	Unspecified Tank	1974	321594
AC	55m S	Unspecified Tank	1967	321594
AC	55m S	Unspecified Tank	1994	321594
AD	58m S	Unspecified Tank	1997	323293
AD	58m S	Unspecified Tank	1993	323293
AD	59m S	Unspecified Tank	1967	323293
7	68m E	Unspecified Tank	1872	305671
Y	71m SW	Unspecified Tank	1989	316119
Y	71m SW	Unspecified Tank	1989	318314
Y	72m SW	Unspecified Tank	1974	315666
N	73m NW	Unspecified Tank	1965	305659
Y	74m SW	Unspecified Tank	1997	305655
AA	81m NE	Gasometer	1872	321109
AA	81m NE	Gasometer	1899	321109
AA	81m NE	Gasometer	1911	321109
AA	81m NE	Unspecified Tank	1933	305672
8	84m SE	Tank or Trough	1872	312009
9	87m NW	Unspecified Tank	1872	305656
10	91m SW	Tanks	1965	310529
K	102m SE	Unspecified Tank	1989	317195
K	102m SE	Unspecified Tank	1989	317195



ID	Location	Land Use	Date	Group ID
K	103m SE	Unspecified Tank	1997	325740
K	104m SE	Tanks	1974	310528
N	105m NW	Tanks	1986	315828
N	105m NW	Tanks	1967	313264
N	107m NW	Unspecified Tank	1965	305660
K	111m SE	Unspecified Tank	1989	324481
K	111m SE	Unspecified Tank	1989	324481
K	112m SE	Unspecified Tank	1997	314193
N	133m NW	Tanks	1965	310549
K	143m SE	Unspecified Tank	1965	305654
N	151m NW	Settling Tanks	1965	309220
K	151m S	Unspecified Tank	1974	323430
K	152m S	Unspecified Tank	1989	323430
K	152m S	Unspecified Tank	1989	323430
AM	152m N	Unspecified Tank	1959	322289
AM	153m N	Unspecified Tank	1965	322289
K	155m S	Unspecified Tank	1997	323430
N	158m NW	Tanks	1965	310550
AM	162m NW	Unspecified Tank	1975	325556
AM	162m NW	Unspecified Tank	1973	325556
AM	163m N	Unspecified Tank	1994	305658
N	183m NW	Tanks	1965	310551
AW	214m NW	Tanks	1994	316093
AX	221m S	Unspecified Tank	1911	305673
AW	222m NW	Tanks	1989	322522
AW	222m NW	Tanks	1989	322522
AY	225m SW	Unspecified Tank	1989	315813
AY	226m SW	Unspecified Tank	1974	315813



ID	Location	Land Use	Date	Group ID
AY	228m SW	Unspecified Tank	1997	305653
AV	240m SE	Unspecified Tank	1967	305666
15	285m SE	Unspecified Tank	1997	305674
BG	298m SE	Unspecified Tank	1994	312751
BG	298m SE	Unspecified Tank	1993	320424
BG	298m SE	Unspecified Tank	1994	322133
BG	300m SE	Unspecified Tank	1975	324153
BG	300m SE	Unspecified Tank	1967	316157
BQ	319m E	Unspecified Tank	1993	322616
BQ	321m E	Unspecified Tank	1975	322616
BQ	321m E	Unspecified Tank	1967	322616
BP	340m W	Unspecified Tank	1967	315543
BP	341m W	Unspecified Tank	1983	321451
BP	341m W	Unspecified Tank	1994	326539
BS	344m W	Unspecified Tank	1965	319725
BS	346m W	Unspecified Tank	1973	323621
BS	346m W	Unspecified Tank	1959	323621
16	353m SW	Unspecified Tank	1965	305652
18	380m E	Unspecified Tank	1933	305664
CC	444m SW	Tanks	1993	327194
CC	444m SW	Tanks	1987	327194
CC	445m SW	Unspecified Tank	1993	316670
CC	445m SW	Unspecified Tank	1987	316670
CC	445m SW	Tanks	1993	321320
CC	445m SW	Tanks	1987	321320
CC	447m SW	Tanks	1987	317771
CB	450m SE	Tanks	1993	315548
CB	452m SE	Tanks	1967	315548



ID	Location	Land Use	Date	Group ID
CC	459m SW	Unspecified Tank	1993	323612
CC	459m SW	Unspecified Tank	1987	323612
CH	484m NW	Unspecified Tank	1911	319070
CH	484m NW	Unspecified Tank	1936	319070
CB	485m SE	Tanks	1993	322864
CB	485m SE	Tanks	1967	322864
CH	487m NW	Tanks	1994	310547
CB	499m SE	Tanks	1993	310523

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m

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Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 24**

ID	Location	Land Use	Date	Group ID
M	On site	Gas Regulator	1987	195749
M	On site	Gas Regulator	1997	195749
Q	On site	Electricity Substation	1975	196034
Q	On site	Electricity Substation	1994	199035
Q	On site	Electricity Substation	1993	199035
Q	On site	Electricity Substation	1994	199035
R	On site	Electricity Substation	1975	204450
R	On site	Electricity Substation	1994	189569
R	On site	Electricity Substation	1993	204450
R	On site	Electricity Substation	1994	204450
S	On site	Electricity Substation	1994	210814
S	On site	Electricity Substation	1994	210814



ID	Location	Land Use	Date	Group ID
T	5m NE	Electricity Substation	1975	200584
T	7m NE	Electricity Substation	1994	200584
T	7m NE	Electricity Substation	1993	200584
T	7m NE	Electricity Substation	1994	200584
Y	42m SW	Electricity Substation	1989	211135
Y	42m SW	Electricity Substation	1989	211135
Y	43m SW	Electricity Substation	1974	211135
Y	45m SW	Electricity Substation	1997	197771
AA	53m NE	Gas Works	1872	211612
AA	53m NE	Gas Works	1899	211612
AA	53m NE	Gas Works	1911	211612
AE	59m N	Electricity Substation	1986	198274
AE	60m N	Electricity Substation	1988	198274
AE	60m N	Electricity Substation	1986	198274
AA	81m NE	Gasometer	1872	196988
AA	81m NE	Gasometer	1899	196988
AA	81m NE	Gasometer	1911	196988
AL	131m N	Electricity Substation	1988	189567
AL	131m N	Electricity Substation	-	187690
AO	142m SE	Electricity Substation	1994	196002
AO	142m SE	Electricity Substation	1993	196002
AO	142m SE	Electricity Substation	1994	196002
AO	143m SE	Electricity Substation	1975	197511
N	151m NW	Electricity Substation	1989	210328
N	152m NW	Electricity Substation	1996	210328
N	152m NW	Electricity Substation	1999	210328
AQ	158m SW	Electricity Substation	1989	199797
AQ	158m SW	Electricity Substation	1989	199797



ID	Location	Land Use	Date	Group ID
AQ	160m SW	Electricity Substation	1974	199797
AQ	163m SW	Electricity Substation	1997	209099
AM	165m NW	Electricity Substation	1989	201038
AM	165m NW	Electricity Substation	1989	201038
AS	165m N	Electricity Substation	1988	201834
AS	166m N	Electricity Substation	1986	201834
AM	166m NW	Electricity Substation	1994	201038
AS	167m N	Electricity Substation	1995	201834
AT	174m NW	Gas Governor	1986	206815
AT	174m NW	Gas Governor	1988	202355
AU	175m NW	Electricity Substation	1988	196546
AU	175m NW	Electricity Substation	1986	196546
AT	175m NW	Gas Governor	1995	206699
AU	176m NW	Electricity Substation	1995	196546
AI	197m SE	Electricity Substation	1974	210466
AI	197m SE	Electricity Substation	1989	210466
AI	197m SE	Electricity Substation	1989	210466
AI	199m SE	Electricity Substation	1997	202373
AZ	232m NE	Electricity Substation	1975	208374
AZ	232m NE	Electricity Substation	1967	208374
AZ	233m NE	Electricity Substation	1994	208374
AZ	233m NE	Electricity Substation	1993	208374
AZ	233m NE	Electricity Substation	1994	208374
BA	242m W	Electricity Substation	1989	210426
BA	243m W	Electricity Substation	1974	210426
13	243m NE	Electricity Substation	1995	189720
BB	245m W	Electricity Substation	1987	203147
BB	245m W	Electricity Substation	1993	203147



ID	Location	Land Use	Date	Group ID
BD	284m NW	Electricity Substation	1989	195571
BD	285m NW	Electricity Substation	1994	195571
BE	298m SW	Electricity Substation	1974	207891
BF	298m NW	Electricity Substation	1996	200445
BF	298m NW	Electricity Substation	1999	200445
BE	298m SW	Electricity Substation	1989	207891
BE	298m SW	Electricity Substation	1989	207891
BH	298m N	Electricity Substation	1992	203175
BE	298m SW	Electricity Substation	1997	207891
BH	298m N	Electricity Substation	1989	207379
BH	299m N	Electricity Substation	1993	207379
BI	300m N	Electricity Substation	1986	204801
BI	300m N	Electricity Substation	1988	204801
BI	300m N	Electricity Substation	1986	204801
BJ	301m N	Electricity Substation	1989	204077
BJ	301m N	Electricity Substation	1996	204077
BJ	301m N	Electricity Substation	1999	204077
BK	301m NW	Electricity Substation	1988	204553
BK	302m NW	Electricity Substation	1996	204553
BL	303m NW	Electricity Substation	1988	206427
BL	304m NW	Electricity Substation	1987	206427
BO	310m NW	Electricity Substation	1987	209128
BO	310m NW	Electricity Substation	1993	209128
BP	318m W	Electricity Substation	1967	207956
BP	319m W	Electricity Substation	1994	207956
BP	320m W	Electricity Substation	1983	207956
BR	340m N	Electricity Substation	1993	212113
BR	340m N	Electricity Substation	1988	212113



ID	Location	Land Use	Date	Group ID
BR	340m N	Electricity Substation	1988	212113
BR	340m N	Electricity Substation	1992	212113
BT	368m NE	Electricity Substation	1984	200638
BT	368m NE	Electricity Substation	1989	200638
BV	373m S	Electricity Substation	1989	198144
BV	373m S	Electricity Substation	1989	198144
BV	375m S	Electricity Substation	1997	198144
BT	375m NE	Electricity Substation	1989	200638
BT	375m NE	Electricity Substation	1977	200638
BT	376m NE	Electricity Substation	1995	200638
BT	376m NE	Electricity Substation	1980	211642
BT	376m NE	Electricity Substation	1987	211642
BT	376m NE	Electricity Substation	1988	211642
BV	377m S	Electricity Substation	1974	210535
BW	388m NW	Electricity Substation	1987	203603
BW	388m NW	Electricity Substation	1988	203603
BY	392m NE	Electricity Substation	1987	203763
BY	393m NE	Electricity Substation	1978	208763
BY	394m NE	Electricity Substation	1996	208763
BZ	409m NE	Electricity Substation	1989	211252
BZ	410m NE	Electricity Substation	1989	211252
BZ	411m NE	Electricity Substation	1995	211252
CD	442m NW	Electricity Substation	1987	211228
CD	443m NW	Electricity Substation	1993	211228
CF	455m W	Electricity Substation	1989	201928
CF	456m W	Electricity Substation	1997	201928
CF	457m W	Electricity Substation	1974	201928
CI	493m N	Electricity Substation	1993	198002



ID	Location	Land Use	Date	Group ID
CI	493m N	Electricity Substation	1992	198002
CJ	496m NW	Electricity Substation	1989	198791
CK	496m NE	Electricity Substation	1989	201987
CJ	497m NW	Electricity Substation	1996	205514
CJ	497m NW	Electricity Substation	1999	205514
CK	497m NE	Electricity Substation	1989	204234
CK	497m NE	Electricity Substation	1977	204234
CK	498m NE	Electricity Substation	1995	204234

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m

2

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

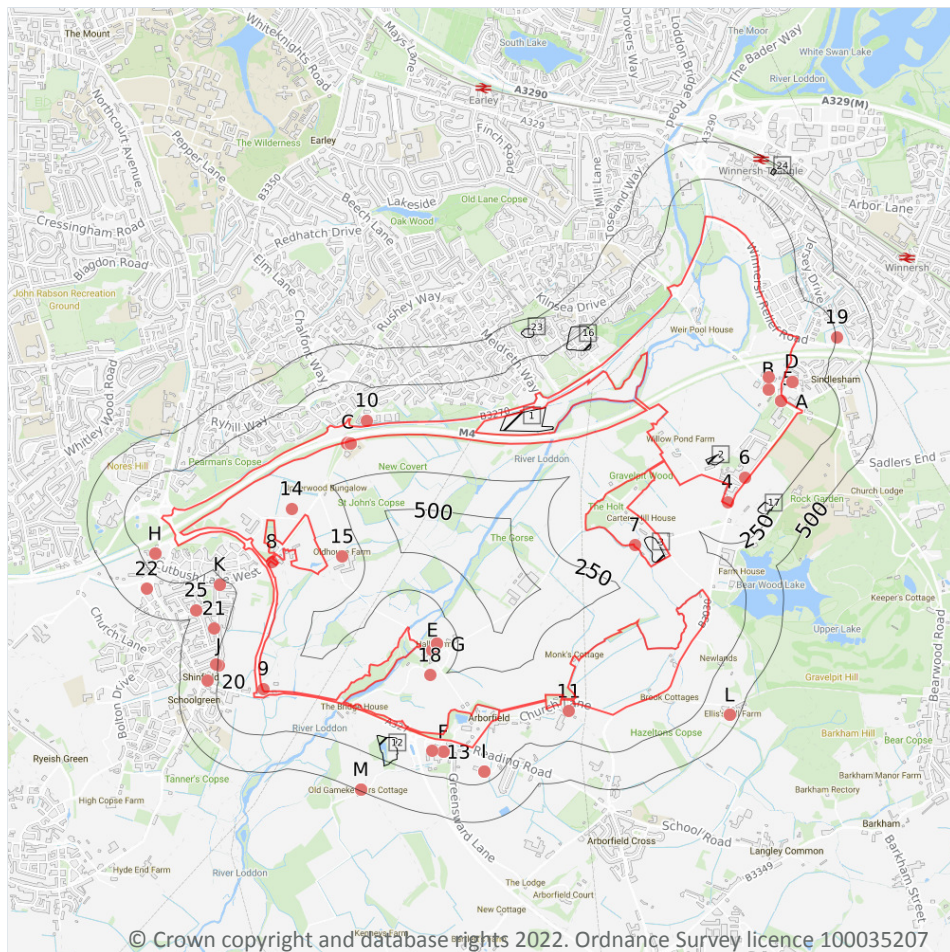
Features are displayed on the Past land use - un-grouped map on **page 24**

ID	Location	Land Use	Date	Group ID
BC	263m W	Garage	1983	60807
BC	316m W	Garage	1967	60808

This data is sourced from Ordnance Survey / Groundsure.



3 Waste and landfill



- Site Outline
- Search buffers in metres (m)
- Historical landfill (EA/NRW)
- Historical waste sites
- Waste exemptions

3.1 Active or recent landfill

Records within 500m

0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m

0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.

