



**PRELIMINARY GROUND
CONTAMINATION RISK
ASSESSMENT REPORT**

**LAND AT STATION ROAD
WARNHAM
WEST SUSSEX**

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EXECUTIVE SUMMARY

The following presents a summary of the main findings of the report. It is emphasised that no reliance should be placed on any individual point until the whole of the report has been read as other sections of the report may put into context the information contained herein.

It is proposed to construct up to 22 no. new houses with associated private gardens on the site which lies to the north of Station Road, Warnham, West Sussex.

The site contains an RV maintenance garage in the east, with other buildings in the north-east and centre of the site used as a workshop/forge and vehicle repair garages. A large above ground fuel storage tank was present in the north of the site. Other parts of the site contain animal enclosures and relic agricultural machinery.

The site comprised open agricultural land at the time of the earliest inspected historical map, dated 1876-78, which became part of a brick works in the late 1800s. The brick works was no longer labelled on the 1912 map. The garage buildings appear to have been constructed in the last 20-25 years.

Reference to geological datasets indicates that the site is expected to be underlain by the Weald Clay Formation, which is classed as an unproductive stratum. The site does not lie within a SPZ.

The preliminary contamination risk assessment has identified a number of potential pollutant linkages with regard to proposed end users of the site.

An intrusive ground investigation is recommended in order to allow a quantitative risk assessment of the potential contamination sources that have been identified to be made.

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1. INTRODUCTION

It is proposed to construct up to 22 no. new houses with associated private gardens on the site which lies to the north of Station Road, Warnham, West Sussex.

Ashdown Site Investigation Ltd was requested to provide a preliminary ground contamination risk assessment to assist with a future planning application.

The specific objectives of the works were to:

- a) Establish the expected geology, hydrogeology and hydrology at the site;
- b) Ascertain the development history and current site use; and
- c) Develop a preliminary conceptual model of the site identifying potential pollutant linkages relating to end users of the proposed development works, to controlled waters beneath and in the vicinity of the site, or to other off-site sensitive receptors, if identified.

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q15111, dated 20th March. The instruction to proceed was received from DHA Planning on behalf of the client, Weinerberger UK & Ireland.

Copies of the historical maps and geo-environmental data referred to in this report are presented within Appendix D.

2. SITE CONTEXT

2.1 Walkover Survey

The site is located to the north of Station Road, Warnham, West Sussex, and is centred on the approximate Ordnance Survey national grid reference 516976, 134006. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

The site is accessed at its south-eastern extent via a concrete and compacted gravel driveway which leads between two houses. The driveway runs along the southern edge of the main part of the site, providing vehicle access to the rear of a row of houses which front Station Road to the south.

Immediately to the rear of the houses, on the east of the entrance, is a rectangular building, thought to be used for vehicle maintenance. The building is associated with "The American RV Centre" which also includes a storage compound to the north of the driveway in the east of the site. A large number of RVs and other vehicles were observed in this area, though no access to the compound or building was available at the time of the walkover.

Site Photographs

American RV Centre building.



Associated yard with several RVs and vehicles.



To the north of the storage compound is a concrete slab, indicating the presence of a former building, adjacent to a yard and a rectangular building used as a workshop/forge fronting an open area.

Site Photographs

Forge/workshop building



Open area with plant storage



Northern extent of the American RV Centre



Concrete slab of a former structure



To the west of the storage compound area is an open area of bare ground, currently used for vehicle parking.



In the central part of the site, to the west of the workshop/forge and open parking area, are a series of sheds, a large barn and a number of geese, chicken, and duck pens.

The barn was open sided and appeared to be in use for vehicle/plant maintenance. Numerous fuel/oil containers were being stored inside the barn. No floor slab was present and significant areas of staining were visible on the bare ground. Two scrap metal containers are located near the barn, one of which appeared to contain burnt material, and an above ground 2000l fuel tank was located adjacent to a shipping container, on the eastern side of the barn. Bonfire remnants were observed on the ground to the north- west of the barn.

In the western part of the site, the ground level was uneven suggesting it had been historically reworked, and various items of relic agricultural machinery were being stored. Beehives are present in the far north-western corner of the site and a small pond is located part way along the northern boundary.

Site Photographs

Animal enclosures



Western extent with reworked ground levels and relic agricultural equipment.



Internals of the barn for vehicle/plant maintenance



Burnt material within a metal container.



2000l [red] fuel container adjacent to a shipping container.



In the south-west of the site a strip of grass runs along the western edge of the housing, linking the main part of the site to Station Road. Some mounds of vegetation and compost were noted in this area.

2.2 Geological Data Review

2.2.1 Expected Geology and Aquifer Designation

The stratigraphic unit that may be expected to underlie the site has been established by reference to British Geological Survey (BGS) mapping and the BGS Lexicon of Named Rock Units. The expected stratigraphy is presented in the following table.

Table 1. Expected Strata and Aquifer Designation

Type	Stratum	Aquifer Designation
Bedrock	Weald Clay Formation	Unproductive Stratum

The Weald Clay Formation forms part of the Wealden Group. The formation is of Hauterivian to Barremian age (126.3 to 133.9 million years old; Early Cretaceous). The Weald Clay Formation comprises dark grey thinly-bedded mudstones (shales) and mudstones with subordinate siltstones, fine to medium grained sandstones, including calcareous sandstone (e.g. Horsham Stone Member), shelly limestones (the so called "Paludina Limestones") and clay ironstones. The formation is recorded by the BGS to range in thickness up to 460m.

2.2.2 BGS Borehole

Several boreholes are recorded in close proximity to the site with the deepest, 19m deep, located 14m to the south-west of the site [TQ13SE33]. The soils encountered within that borehole comprise stiff silty clay with shale to a depth of 6.70m, with interbedded clay and siltstone to around 11m depth, followed by siltstone with fissured shaley clay to the base at 19m depth. Groundwater seepages were first encountered at 3.95m, standing at depths of between 1.20m and 1.85m at the beginning and end of the three shifts required to complete the borehole. A copy of the borehole record can be found in Appendix C.

2.2.3 Natural Ground Subsidence

Table 2. Natural Ground Subsidence from Groundsure Data

Section	Groundsure Comment (Hazard Rating)
Soil Volume Change Potential (Shrink-Swell)	Low
Running Sands	Negligible
Compressible Deposits	Negligible
Collapseable Deposits	Very Low
Landslides	Very Low
Ground Dissolution of Soluble Rocks	Negligible

It is noted that whilst the data indicates a low hazard rating associated with the anticipated Weald Clay Formation, this stratum can typically exhibit a medium to high volume change potential. A site-specific ground investigation would be required to determine the volume change potential of the soils beneath the site.

2.2.4 Ground Cavities and Sinkholes

Table 3. Ground Cavities and Sinkholes from Groundsure Data

Section	Groundsure Comment
Natural Cavities	No records are identified within 500m of the site.
Mining Cavities	One record is shown 345m to the east of the site for magnetite, marcasite, siderite and ironstone.
Reported Recent Incidents	No records are identified within 500m of the site.
Historical Incidents	No records are identified within 500m of the site.
National Karst Database	No records are identified within 500m of the site.

2.2.5 Mining and Ground Workings

Table 4. Mining and Ground Workings from Groundsure Data

Section	Groundsure Comment
BritPits	Three BritPit location records are shown 30m to the west, 341m to the north and 404m to the north-east. All three records are associated with the large Warnham Brick Works and are recorded as ceased.
Surface Ground Workings	The site is located within and in close proximity to a number of large areas identified as brick works, unspecified ground workings and sewage works.
Underground Workings	No underground workings are identified within 1km of the site.
Historical Mineral Planning Areas	One record for surface mineral workings is shown 60m to the north-east associated with the brick works in this location.
Non-Coal Mining	The site is identified to be in an area where underground mine workings for iron ore are uncommon.
JPB Mining Areas	No records are identified within 500m of the site.
The Coal Authority – Non-Coal Mining	No records are identified within 500m of the site.
Researched Mining	No records are identified within 500m of the site.
Mining Record Office Plans	No records are identified within 500m of the site.
BGS Mine Plans	No records are identified within 500m of the site.
Coal Mining	No records are identified on the site.
Brine Areas	No records are identified on the site.
Gypsum Areas	No records are identified on the site.
Tin Mining	No records are identified on the site.
Clay Mining	No records are identified on the site.

The geological units of the Wealden Group, including the Weald Clay Formation, were locally mined for iron during the early Roman period, the Medieval period and significantly between the 15th and 18th centuries. The mining activities were associated with hammer and furnace ponds, and forges. The locations of many of the workings are unknown, the works mostly having been dismantled and sites overgrown with woodland. Many of the old ponds in the Weald may be representative of old hammer or furnace ponds.

The historical extraction was mostly from open pits excavated from surface, but during the Medieval period,

extraction in the eastern Weald was increasingly from mine pits. These mine pits were typically five metres in diameter and up to twelve metres deep. The pits were worked in sequence with spoil from one pit used to in-fill the one before. In the western part of the Weald, the principal method of extracting iron ore was also the mine pit but smaller in scale; the pits consisted of a vertical shaft up to 2.5 metres in diameter and the base of the shaft would have been widened out.

The British Geological Survey GeoIndex Onshore viewer records the presence of Warnham Brick Yard 30m to the west and five records for Warnham Brick Works (one for Warnham Stock Brick Works) between 350m and 950m to the north-east. A search of the Wealden Iron Research Group database revealed no records of iron workings within 1km of the site. The risk posed to the development is considered to be moderate.

Further assessment of the natural ground and mining hazards can be undertaken, if required, to provide more detailed comment specific to the site.

2.2.6 Radon

Table 5. Radon

Section	Groundsure Comment
Radon Affected Areas	The site is reported to be within an area where less than 1% of properties are at or above the action level requiring radon gas protection measures to be installed in new buildings.
Radon Protection Measures	No radon protection measures are reported by the British Geological Survey to be necessary in the construction of new dwellings or extensions.

2.2.7 Soil Chemistry

Table 6. BGS Estimated Background Soil Chemistry

Contaminant	Estimated Value (mg/kg)
Arsenic	15 -35
Bioaccessible Arsenic	No data
Lead	100
Bioaccessible Lead	60
Cadmium	1.8
Chromium	60 – 90
Nickel	15 - 45

2.3 Hydrogeological and Hydrological Data

2.3.1 Groundwater Abstractions

No groundwater abstraction licences are indicated within 2km of the site.

2.3.2 Surface Water Abstractions

The closest surface water abstraction licence is recorded to lie 385m to the north-east of the site and is used for general use relating to secondary category (medium loss) at Warnham Brick Works (Weinerberger Limited).

2.3.3 Potable Abstractions

No potable abstraction licences are indicated within 2km of the site.

2.3.4 Groundwater Vulnerability

The level of groundwater vulnerability, as reported within the Groundsure data, is Low/Negligible.

2.3.5 Groundwater Source Protection Zones (SPZ)

The Environment Agency defines SPZs as those areas where groundwater supplies are at risk from potentially polluting activities and accidental releases of pollutants. SPZs are primarily a policy tool used to control activities close to water supplies intended for human consumption.

The site does not lie within a SPZ.

2.3.6 Surface Water Features

A small pond was observed along the northern boundary during the walkover survey. The data also identified an inland river, Boldings Brook, some 43m to the south of the site.

2.3.7 Flood Risk

The table below summarises the flood risk data provided by the Groundsure report. It is noted that this does not constitute a flood risk assessment.

Table 7. Flood Risk

Section	On Site	Within 50m of the Site
Risk of Flooding from Rivers and Seas (RoFRaS)	None Identified	High
Historical Flood Events	None Identified	None Identified
Flood Defences	None Identified	None Identified
Areas Benefitting from Flood Defences	None Identified	None Identified
Flood Storage Areas	None Identified	None Identified
Environment Agency Flood Zone 2	None Identified	20m south-west
Environment Agency Flood Zone 3	None Identified	30m south-west
Surface Water Flooding	Highest Risk: Negligible	Highest Risk: 1 in 30 year, 0.3m to 1.0m
Groundwater Flooding	Highest Risk: Negligible	Highest Risk: Low

3. GEO-ENVIRONMENTAL DATA

3.1 Historical Industrial Sites

The following table summarises past land uses of the site and the surrounding area extracted by Groundsure from historical maps.

Table 8. *Historical Industrial Sites*

Section	Remarks
Historical Industrial Land Uses	Past land uses on site include railway sidings, unspecified pit and brick yard, unspecified ground workings and a sewage works. A railway station is mapped adjacent to the east of the site with other associated railway buildings. Further unspecified pits, ground workings and unspecified heaps are recorded within 100m of the site, along with an area of cuttings 12m to the north-east.
Historical Tank Database	No historical tanks are identified within 100m of the site.
Historical Energy Features	No energy features are identified within 100m of the site.
Historical Petrol Stations	No historical petrol stations are identified within 100m of the site.
Historical Garages	No historical garages are identified within 100m of the site.
Historical Military Sites	No historical military sites are identified within 100m of the site.

3.2 Landfill and Other Waste Sites

The following table summarises the location of waste sites either on the site or within the surrounding area (within 250m of the site).

Table 9. *Landfill and Other Waste Sites*

Section	Groundsure Comments
Active or Recent Landfills	No active or recent landfills are identified within 250m of the site.
Historical Landfill (BGS Records/LA/Mapping Records EA Records)	No historical landfills are identified within 250m of the site.
Historical Waste Sites	No historical waste sites are identified within 250m of the site.
Licensed Waste Sites	No licensed waste sites are identified within 250m of the site.
Waste Exemptions	Waste exemptions for storage of sludge are recorded 235m and 246m to the west of the site.

3.3 Current Industrial Land Use

The relevant current industrial land uses are discussed in the table below.

Table 10. Current Industrial Land Uses

Section	Groundsure Comments
Recent Industrial Land Use	Two masts are shown 10m to the south-east and 49m to the north-east. Warnham Rail Station is mapped 29m to the east with a chimney 92m to the north-east.
Current or Recent Petrol stations	No current or recent petrol stations are identified within 100m of the site.
Electricity Cables / Gas Pipelines	No underground high voltage cables or high-pressure pipes are identified within 100m of the site.
Sites determined as Contaminated Land	No sites determined as contaminated land are identified within 100m of the site.
Control of Major Accident Hazards (COMAH) Sites	Redlands Bricks Ltd is shown 14m to the east as a historical NIHHS Site.
Regulated Explosive Sites	No regulated explosive sites are identified within 100m of the site.
Hazardous Substance Storage/Usage	No consents have been granted for hazardous substance storage/usage within 100m of the site.
Historical Licensed Industrial Activities (IPC)	No records are identified within 100m of the site.
Licensed Industrial Activities (Part A(1))	No records are identified within 100m of the site.
Licensed Pollutant Release (Part A(2)/B)	No records are identified within 100m of the site.
Radioactive Substance Authorisations	No records are identified within 100m of the site.
Licensed Discharges to Controlled Waters	Two records for non-water company effluent discharge, most likely septic tanks, are located 57m to the south-east and 98m to the north-east.
Pollutant Release to Surface Water / Public Sewer	No records are identified within 100m of the site.
List 1 / List 2 Dangerous Substances	No records are identified within 100m of the site.
Pollution Incidents (EA/NRW)	No pollution incidents are identified within 100m of the site.
Pollution Inventory Substances / Waste Transfers / Radioactive Waste	No records are identified within 100m of the site.

3.4 Sensitive Land Use

The site is located within a nitrate vulnerability zone and lies within a SSSI Impact Zone.

3.5 Railway Infrastructure and Projects

Historical railway sidings have been present on site, whilst the present-day railway line lies off site to the east.

4. HISTORICAL MAP AND IMAGERY REVIEW

Historical Ordnance Survey maps and imagery covering the area of the site have been reviewed and are summarised in the following table.

It is noted that maps and images present information applicable at the time of production of the maps or image captures, that maps are subject to surveying and cartographic errors and images to atmospheric conditions at the time of their capture. It is possible that significant developments may have taken place on or within the vicinity of the site that are not shown on the inspected maps and images.

'In the Vicinity of the Site' generally refers to features of relevance within approximately 250m of the site boundary but may also include more distant features if considered to be pertinent to the assessment of the development history.

Table 11. Summary of Significant Features Identified on Historical Maps and Images

Map/Image Details	On-Site	In the Vicinity of the Site
1876-78 1:2,500	A majority of the site comprises an open field with a pond in the north/north-east that encroaches into the site boundary. The edge of a railway cutting encroaches onto the eastern boundary.	A railway line flanks the eastern boundary of the site, with <i>Warnham Station</i> some 20m to the east. A road bounds the southernmost edge of the site.
1897 1:2,500	The site is now located within <i>Warnham Brick Yard</i> . A cutting is shown running from the western boundary to around the centre of the site. A pond now encroaches onto the southern end of the south-westernmost point of the site. A building is located in the north-eastern corner of the site, and a railway siding now extends onto the eastern part of the site.	Warnham Brick Yard extends off site to the north and west. Some of the existing houses to the south of the site are now shown fronting Station Road. Filter beds are shown some 200m to the west of the site, on the far side of Boldings Brook.
1912 1:2,500	Warnham Brick Yard is no longer labelled but further areas of ground workings are shown which encroach into the northern part of the site. The pond on the northern boundary and the railway siding are no longer shown. A building is now present towards the centre of the site and further small buildings are present in the south-east.	The remaining houses that currently exist to the south of the site are now shown. Two ponds are present off site to the north-west, with what appears to be a heap/mound to the west. Cuttings remain to the north and west from the previous brick yard. There appears to be a large area of ground working ~150m to the north-east on the opposite side of the railway line. A Tank and an Engine Shed are shown within the area just over 250m from the site.
1932 1:2,500	The building to the centre of the site is no longer present but some additional small buildings are shown in the south-east.	The filter beds are now labelled as a sewage works.
1961 1:10,560		The smaller scale map shows a significant area of ground working to the north-east, with a large number of what appear to be industrial buildings. The area of excavation appears to extend to around 200m from the site.

Map/Image Details	On-Site	In the Vicinity of the Site
1976-77 1:2,500	A larger building is present in the south-east of the site at the location of the existing RV workshop. Further buildings are shown in the north-east of the site.	The industrial development has been extended significantly to the south and areas that may be heaps and cuttings are now shown some 50m to the east on the opposite side of the railway line. The small-scale historical maps from this time period identify the industrial area as a <i>Brick Works</i> . A <i>filter bed</i> also flanks the east of the railway line, to the north-east of the site.
1999 Aerial Photograph	A series of vehicles are shown in the south-east of the site in the area of the RV garage.	
2003 1:1,250	Buildings are shown in the location of the workshop/forge and the floor slab in the east of the site.	
2012 Aerial Photograph	A clearing is shown in the centre/south of the site in the location of the present-day animal enclosure. The open sided barn is now shown along with various outbuildings in that area.	

5. PRELIMINARY CONTAMINATION RISK ASSESSMENT

5.1 Introduction

The risk assessment considers the potential sources of contamination identified, the receptors that may be present in view of the development proposals and the contaminant pathways by which these may be linked. A complete pollutant linkage is only deemed to exist where all three are present and a site is considered suitable for use where no complete pollutant linkages are identified.

Where a complete pollutant linkage is deemed to be present, an assessment of the level of risk associated with the pollutant linkage has been carried out in line with current guidance¹.

The level of risk is determined using the risk matrix presented in the following table. Classifications of probability, consequence and risk are presented in Appendix A.

Table 12. Risk Assessment Matrix

		Probability			
		Very Low	Low	Moderate	High
Consequence	Very Minor	Negligible	Very Low	Low	Low/Moderate
	Minor	Very Low	Low	Low/Moderate	Moderate
	Moderate	Low	Low/Moderate	Moderate	High
	Severe	Low/Moderate	Moderate	High	Very High

5.2 Contaminant Pathways Identified

Although a specific development layout is not yet available, it is understood that the proposed development will include new residential buildings with areas of private garden.

Pathways associated with gas and vapour intrusion into new buildings are considered to be valid, along with direct contact and dust related pathways, and pathways associated with the consumption of home grown produce.

The site is expected to underlain by the Weald Clay Formation which is classed as an Unproductive Stratum. The Weald Clay Formation is likely to yield a very low to negligible infiltration with any leachable contaminants unlikely to come into contact with sensitive groundwater receptors. No potable drinking water abstraction points are noted within 2km of the site and the site is not located within a SPZ. As such, there are not considered to be viable pathways linking potential contamination on the site with sensitive groundwater.

Should the proposed development plans be altered, a revised risk assessment may be required.

It is noted that an asbestos survey of existing structures and infrastructure² was beyond the brief of this report. The risk assessment assumes that, should asbestos be identified within buildings or infrastructure, any such materials will be managed in accordance with current legislation and guidance, to ensure this does not represent an ongoing risk to end users and, specifically, to ensure that asbestos materials are not introduced into the underlying soils.

¹ Contaminated Land Risk Assessment: A guide to good practice, CIRIA C552, 2001.

² As defined under Section 5(a) of the Control of Asbestos Regulations, 2012.

5.3 Potential Contamination Sources Identified

The following potential sources of contamination have been identified by the preliminary contamination risk assessment:

- Ground gases arising from extensive ground workings on and in the vicinity of the site.
- Made ground on site from the historical brick works, railway sidings and from historical and ongoing light industrial use.
- Petroleum hydrocarbon contamination from fuel storage, vehicle maintenance workshops and vehicle storage.

The potential contaminants associated with these sources are set out in the conceptual model.

5.4 Preliminary Conceptual Model

The preliminary conceptual model for the proposed development is presented in Appendix B.

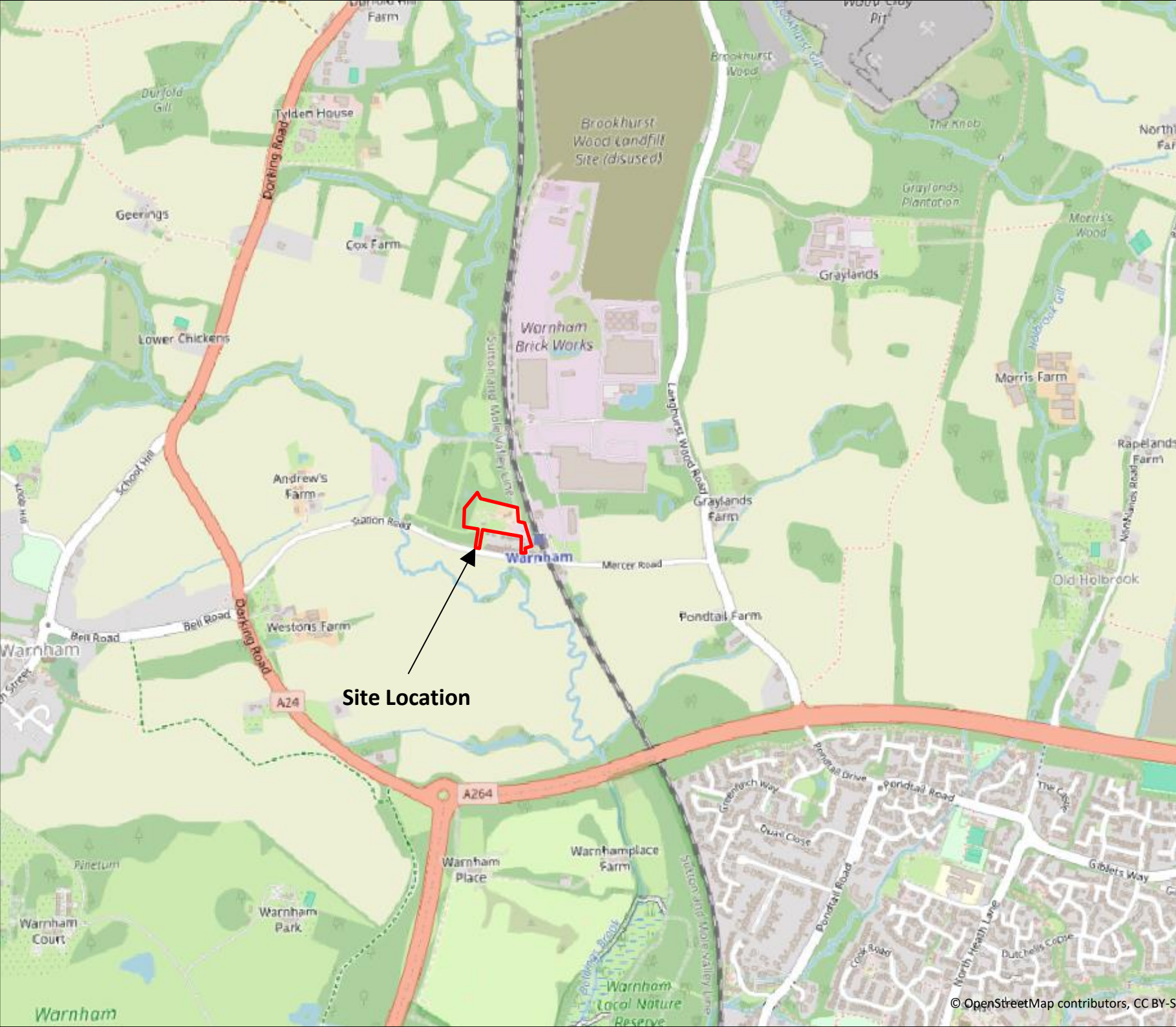
5.5 Recommendations

Potential pollutant linkages are considered to be present. It is therefore recommended that a suitably comprehensive intrusive ground investigation should be undertaken to allow a quantitative assessment to be made of the risks posed to end users and controlled waters. The requirement for such an investigation would be expected to form part of the planning conditions, should planning be granted.

The investigation should include a suitable density of testing of the shallow soils from across the site, in line with the recommendations of BS10175. Gas standpipes should be installed and monitored for a suitable period to allow an appropriate assessment of the gas regime beneath the site.

FIGURES

- Figure 1 Site Location Plan
- Figure 2 Site Walkover Plan



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Not To Scale



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Site

Land at Station Road
Warnham
West Sussex

Project Ref

P17133

Figure No

2

Drawing Title

Site Walkover Plan

Scale

Not To Scale

APPENDIX A

Classification of Probability, Consequence and Risk

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

Consequence Of Risk Being Realised		
Classification	Category	Definition
Severe	Human Health	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA.
	Controlled Waters	Short term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource.
	Property	Catastrophic damage to buildings/property.
	Ecological Systems	A short term risk to a particular ecosystem or organisation forming part of such ecosystem.
Moderate	Human Health	Chronic damage to Human Health.
	Controlled Waters	Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution).
	Ecological System	A significant change in a particular ecosystem or organism forming part of such ecosystem.
Minor	Controlled Waters	Pollution of non-sensitive water resources.
	Property	Significant damage to crops, buildings, structures and services.
	Ecological Systems	Damage to sensitive buildings/structures/services or the environment.
Very Minor	Human Health	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc).
	Property	Easily repairable effects of damage to buildings, structures and services.
	Project	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve.

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

APPENDIX B

Preliminary Conceptual Model

Site: Land at Station Road, Warnham, West Sussex

Project Ref: P17133

Potential Source	Potential Receptor	Potential Contaminants	Potential Pathway	Complete Linkage Present?	Probability	Consequence	Risk
• Ground gases arising from extensive ground workings on and in the vicinity of the site	End Users	Land Gases	Dermal contact with soil and dust (indoor & outdoor)	Identified contaminant(s) do not pose a risk via this pathway			N/A
			Ingestion of soil and indoor dust	Identified contaminant(s) do not pose a risk via this pathway			N/A
			Consumption of home-grown produce and attached soil	Identified contaminant(s) do not pose a risk via this pathway			N/A
			Inhalation of soil dust (indoor and outdoor)	Identified contaminant(s) do not pose a risk via this pathway			N/A
			Inhalation of soil vapours	Identified contaminant(s) do not pose a risk via this pathway			N/A
			Inhalation of soil gases/ Risk of explosion	Yes	P2: Low	C3: Moderate	Low/Moderate
	End Users (via Water Supply Pipework)		Contamination of incoming services	Identified contaminant(s) do not pose a risk via this pathway			N/A
	Groundwater		Migration to groundwater	No significant pathway to groundwater exists			N/A
• Made ground on site from the historical brick works, railway sidings and from historical and ongoing light industrial use	End Users	Asbestos, Heavy Metals and PAH Compounds	Dermal contact with soil and dust (indoor & outdoor)	Yes	P4: High	C3: Moderate	High
			Ingestion of soil and indoor dust	Yes	P4: High	C4: Severe	Very High
			Consumption of home-grown produce and attached soil	Yes	P4: High	C3: Moderate	High
			Inhalation of soil dust (indoor and outdoor)	Yes	P4: High	C3: Moderate	High
			Inhalation of soil vapours	Identified contaminant(s) do not pose a risk via this pathway			N/A
			Inhalation of soil gases/ Risk of explosion	No potential gas source identified			N/A
	End Users (via Water Supply Pipework)		Contamination of incoming services	Identified contaminant(s) do not pose a risk via this pathway			N/A
	Groundwater		Migration to groundwater	No significant pathway to groundwater exists			N/A

Site: Land at Station Road, Warnham, West Sussex		Project Ref: P17133					
Potential Source	Potential Receptor	Potential Contaminants	Potential Pathway	Complete Linkage Present?	Probability	Consequence	Risk
• Petroleum hydrocarbon contamination from fuel storage, vehicle maintenance workshops and vehicle storage	End Users	VOC Compounds and Petroleum Hydrocarbons	Dermal contact with soil and dust (indoor & outdoor)	Yes	P4: High	C3: Moderate	High
			Ingestion of soil and indoor dust	Yes	P4: High	C3: Moderate	High
			Consumption of home-grown produce and attached soil	Yes	P4: High	C3: Moderate	High
			Inhalation of soil dust (indoor and outdoor)	Yes	P4: High	C3: Moderate	High
			Inhalation of soil vapours	Yes	P2: Low	C3: Moderate	Low/Moderate
			Inhalation of soil gases/ Risk of explosion	No potential gas source identified			N/A
	End Users (via Water Supply Pipework)	VOC Compounds and Petroleum Hydrocarbons	Contamination of incoming services	Yes	P3: Moderate	C3: Moderate	Moderate
	Groundwater		Migration to groundwater	No significant pathway to groundwater exists			N/A

APPENDIX C

BGS Borehole Record

TQ13 SE/33

1691.3394 1" 302

Location : **A24-WARNHAM**

Contract No. : **F69/660/5**

Type of Boring : **shell & Auger**

Date (started) : **22.2.71**

RECORD OF BOREHOLE No: 26

Borehole Dia : **0.20m**

Casing : **0.20m to 3.0m**

Ground Level : **43.15m A.O.D**

(sheet 1 of 2)

Depth of Casing	Water Level	SAMPLES			STRATA		DESCRIPTION OF STRATA	
		Depth	Type	No.	Legend	Depth		Thickness
						0.25m	0.25m	sandy TOPSOIL
		0.75m - 1.21m	U	1	X	0.25m	1.70m	Stiff mottled brown grey silty CLAY, clayey shale
		1.50m	D	2	X	0.25m	1.95m	
		2.30m - 2.61m	U	3	X		2.50m	Stiff molt. brown grey silty CLAY
		3.05m	D	4				
		3.95m (N=35/init 150mm)	D	5	X			
		4.45m	D	6	X	4.45m	1.49m	Hard blue grey shaley CLAY
					X			
		5.94m (N=62/init 150mm)	D	7	X	5.94m	0.76m	Stiff blue grey shaley CLAY + shaley siltstone
		6.70m	D	8	X	6.70m	0.93m	Hard blue grey SILTSTONE with silty clay
					X			
		7.63m (N=40/init 150mm)	D	9	X	7.63m	1.52m	Stiff blue grey fissured silty CLAY + grey siltstone
		8.38m	D	10	X			
					X			
		9.15m (N=86)	D	11	X	9.15m	0.75m	Stiff brown grey fissured silty CLAY
					X			
		9.90m	D	12	X	9.90m		Hard grey clayey SILTSTONE with shaley clay
22.2.71	3.0m	1.85m						
18.60	3.0m	1.20m						
23.2.71								
08.00								

MARKS: Ground water seepage first encountered at 3.95m.

Foundation Engineering Ltd.

ALE 1 50



TQ13 SE/33
1691-3394 1":302
Location : A24- WARMHAM
Contract No. : F69/660/5
Type of Boring : shell + Auger
Date (started) :

RECORD OF BOREHOLE No: 26

Borehole Dia : 0.20m
Casing : 0.20m to 3.0m
Ground Level : 43.15m A.O.D

(sheet 2 of 2)

Depth of Casing	Water Level	SAMPLES			STRATA		DESCRIPTION OF STRATA
		Depth	Type	No.	Legend	Depth Thickness	
					(10.0m)	0.77m	Hard grey clayey SILTSTONE with shaley clay
		10.67m (N=35/ init 75mm)	D	13		0.67m 0.33m	Hard grey SILTSTONE with stiff shaley clay
		11.43m	B	14		1.95m	Hard grey SILTSTONE with stiff shaley clay
		12.20m (N=50/ init 75mm)	D	15			
		12.95m	D	16		12.95m	Hard grey SILTSTONE with fissured clayey shale
						153m	
		13.72m (N=36/ init 75mm)	D	17			
		14.48m	D	18		4.48m	Hard grey SILTSTONE with fissured shaley clay
						1.97m	
		15.23m (N=40/ init 75mm)	D	19			
		15.85m	D	20			
						16.45m	Hard grey SILTSTONE with stiff shaley clay
		16.45m (N=40/ init 75mm)	D	21		0.77m	
		17.22m	D	22		17.22m	Hard grey laminated SILTSTONE
						170m	
		18.15m (N=39/ init 12mm)	D	23			
		19.0m (N=40/ init 75mm)	D	24		19.0m	
						Borehole Terminated	

MARKS:

Foundation Engineering Ltd.

APPENDIX D

Groundsure Enviro+Geo Insight Report
Historical Maps



STATION ROAD, WARNHAM, WEST SUSSEX, RH12 3SR

Order Details

Date: 27/03/2025
Your ref: P17133
Our Ref: GS-1BP-LQT-DX6-TMA

Site Details

Location: 516976 134006
Area: 1.03 ha
Authority: [Horsham District Council](#) ↗



Summary of findings

[p. 2 >](#) **Aerial image**

[p. 9 >](#)

OS MasterMap site plan

[p.14 >](#) [Insight User Guide](#) ↗

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
15 >	1.1 >	Historical industrial land uses >	11	18	36	12	-
18 >	1.2 >	Historical tanks >	0	0	8	5	-
19 >	1.3 >	Historical energy features >	0	0	1	2	-
20	1.4	Historical petrol stations	0	0	0	0	-
20	1.5	Historical garages	0	0	0	0	-
20	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
21 >	2.1 >	Historical industrial land uses >	15	29	46	15	-
25 >	2.2 >	Historical tanks >	0	0	11	8	-
26 >	2.3 >	Historical energy features >	0	0	2	2	-
27	2.4	Historical petrol stations	0	0	0	0	-
27	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill >	On site	0-50m	50-250m	250-500m	500-2000m
28	3.1	Active or recent landfill	0	0	0	0	-
28	3.2	Historical landfill (BGS records)	0	0	0	0	-
29	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
29	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
29 >	3.5 >	Historical waste sites >	0	0	0	3	-
30 >	3.6 >	Licensed waste sites >	0	0	0	4	-
32 >	3.7 >	Waste exemptions >	0	0	2	9	-
Page	Section	Current industrial land use >	On site	0-50m	50-250m	250-500m	500-2000m
34 >	4.1 >	Recent industrial land uses >	0	3	6	-	-
35	4.2	Current or recent petrol stations	0	0	0	0	-
35	4.3	Electricity cables	0	0	0	0	-
35	4.4	Gas pipelines	0	0	0	0	-
36	4.5	Sites determined as Contaminated Land	0	0	0	0	-



36 >	4.6 >	Control of Major Accident Hazards (COMAH) >	0	2	0	0	-
36	4.7	Regulated explosive sites	0	0	0	0	-
36 >	4.8 >	Hazardous substance storage/usage >	0	0	1	0	-
37	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
37 >	4.10 >	Licensed industrial activities (Part A(1)) >	0	0	0	3	-
38 >	4.11 >	Licensed pollutant release (Part A(2)/B) >	0	0	3	0	-
38	4.12	Radioactive Substance Authorisations	0	0	0	0	-
39 >	4.13 >	Licensed Discharges to controlled waters >	0	0	30	3	-
44	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
44	4.15	Pollutant release to public sewer	0	0	0	0	-
45	4.16	List 1 Dangerous Substances	0	0	0	0	-
45	4.17	List 2 Dangerous Substances	0	0	0	0	-
45 >	4.18 >	Pollution Incidents (EA/NRW) >	0	0	1	1	-
45	4.19	Pollution inventory substances	0	0	0	0	-
46	4.20	Pollution inventory waste transfers	0	0	0	0	-
46	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology >	On site	0-50m	50-250m	250-500m	500-2000m
47 >	5.1 >	Superficial aquifer >	Identified (within 500m)				
49 >	5.2 >	Bedrock aquifer >	Identified (within 500m)				
51 >	5.3 >	Groundwater vulnerability >	Identified (within 50m)				
53	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
53	5.5	Groundwater vulnerability- local information	None (within 0m)				
54 >	5.6 >	Groundwater abstractions >	0	0	0	1	0
55 >	5.7 >	Surface water abstractions >	0	0	0	3	1
56	5.8	Potable abstractions	0	0	0	0	0
56	5.9	Source Protection Zones	0	0	0	0	-
57	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology >	On site	0-50m	50-250m	250-500m	500-2000m
58 >	6.1 >	Water Network (OS MasterMap) >	0	1	15	-	-



60 >	6.2 >	Surface water features >	0	1	6	-	-
60 >	6.3 >	WFD Surface water body catchments >	1	-	-	-	-
61 >	6.4 >	WFD Surface water bodies >	0	1	0	-	-
61	6.5	WFD Groundwater bodies	0	-	-	-	-
Page	Section	River and coastal flooding >	On site	0-50m	50-250m	250-500m	500-2000m
62 >	7.1 >	Risk of flooding from rivers and the sea >	High (within 50m)				
63	7.2	Historical Flood Events	0	0	0	-	-
63	7.3	Flood Defences	0	0	0	-	-
63	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
63	7.5	Flood Storage Areas	0	0	0	-	-
64 >	7.6 >	Flood Zone 2 >	Identified (within 50m)				
65 >	7.7 >	Flood Zone 3 >	Identified (within 50m)				
Page	Section	Surface water flooding >					
66 >	8.1 >	Surface water flooding >	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Groundwater flooding >					
68 >	9.1 >	Groundwater flooding >	Low (within 50m)				
Page	Section	Environmental designations >	On site	0-50m	50-250m	250-500m	500-2000m
69 >	10.1 >	Sites of Special Scientific Interest (SSSI) >	0	0	0	0	1
70	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
70	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
70	10.4	Special Protection Areas (SPA)	0	0	0	0	0
70	10.5	National Nature Reserves (NNR)	0	0	0	0	0
71 >	10.6 >	Local Nature Reserves (LNR) >	0	0	0	0	1
71 >	10.7 >	Designated Ancient Woodland >	0	0	2	1	44
73	10.8	Biosphere Reserves	0	0	0	0	0
73	10.9	Forest Parks	0	0	0	0	0
73	10.10	Marine Conservation Zones	0	0	0	0	0
74	10.11	Green Belt	0	0	0	0	0
74	10.12	Proposed Ramsar sites	0	0	0	0	0



74	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
74	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
74	10.15	Nitrate Sensitive Areas	0	0	0	0	0
75 >	10.16 >	Nitrate Vulnerable Zones >	1	0	0	0	1
76 >	10.17 >	SSSI Impact Risk Zones >	1	-	-	-	-
77 >	10.18 >	SSSI Units >	0	0	0	0	1
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
78	11.1	World Heritage Sites	0	0	0	-	-
78	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
78	11.3	National Parks	0	0	0	-	-
78	11.4	Listed Buildings	0	0	0	-	-
79	11.5	Conservation Areas	0	0	0	-	-
79	11.6	Scheduled Ancient Monuments	0	0	0	-	-
79	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations >	On site	0-50m	50-250m	250-500m	500-2000m
80 >	12.1 >	Agricultural Land Classification >	Grade 4 (within 250m)				
81	12.2	Open Access Land	0	0	0	-	-
81	12.3	Tree Felling Licences	0	0	0	-	-
81	12.4	Environmental Stewardship Schemes	0	0	0	-	-
82 >	12.5 >	Countryside Stewardship Schemes >	0	0	1	-	-
Page	Section	Habitat designations >	On site	0-50m	50-250m	250-500m	500-2000m
83 >	13.1 >	Priority Habitat Inventory >	5	5	8	-	-
84	13.2	Habitat Networks	0	0	0	-	-
84	13.3	Open Mosaic Habitat	0	0	0	-	-
85	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
86 >	14.1 >	10k Availability >	Identified (within 500m)				
87	14.2	Artificial and made ground (10k)	0	0	0	0	-
88 >	14.3 >	Superficial geology (10k) >	0	1	2	2	-

89	14.4	Landslip (10k)	0	0	0	0	-
90 >	14.5 >	Bedrock geology (10k) >	1	1	1	1	-
91 >	14.6 >	Bedrock faults and other linear features (10k) >	0	0	0	1	-
Page	Section	Geology 1:50,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
92 >	15.1 >	50k Availability >	Identified (within 500m)				
93 >	15.2 >	Artificial and made ground (50k) >	0	0	0	1	-
94	15.3	Artificial ground permeability (50k)	0	0	-	-	-
95 >	15.4 >	Superficial geology (50k) >	0	1	2	2	-
96 >	15.5 >	Superficial permeability (50k) >	Identified (within 50m)				
96	15.6	Landslip (50k)	0	0	0	0	-
96	15.7	Landslip permeability (50k)	None (within 50m)				
97 >	15.8 >	Bedrock geology (50k) >	1	1	1	1	-
98 >	15.9 >	Bedrock permeability (50k) >	Identified (within 50m)				
98 >	15.10 >	Bedrock faults and other linear features (50k) >	0	0	0	1	-
Page	Section	Boreholes >	On site	0-50m	50-250m	250-500m	500-2000m
99 >	16.1 >	BGS Boreholes >	0	7	5	-	-
Page	Section	Natural ground subsidence >					
101 >	17.1 >	Shrink swell clays >	Low (within 50m)				
102 >	17.2 >	Running sands >	Low (within 50m)				
104 >	17.3 >	Compressible deposits >	Moderate (within 50m)				
106 >	17.4 >	Collapsible deposits >	Very low (within 50m)				
107 >	17.5 >	Landslides >	Very low (within 50m)				
108 >	17.6 >	Ground dissolution of soluble rocks >	Negligible (within 50m)				
Page	Section	Mining and ground workings >	On site	0-50m	50-250m	250-500m	500-2000m
110 >	18.1 >	BritPits >	0	1	0	2	-
111 >	18.2 >	Surface ground workings >	8	11	55	-	-
114	18.3	Underground workings	0	0	0	0	0
114	18.4	Underground mining extents	0	0	0	0	-
115 >	18.5 >	Historical Mineral Planning Areas >	0	0	1	0	-



115 >	18.6 >	Non-coal mining >	1	0	0	0	1
116	18.7	JPB mining areas	None (within 0m)				
116	18.8	The Coal Authority non-coal mining	0	0	0	0	-
116	18.9	Researched mining	0	0	0	0	-
116	18.10	Mining record office plans	0	0	0	0	-
117	18.11	BGS mine plans	0	0	0	0	-
117	18.12	Coal mining	None (within 0m)				
117	18.13	Brine areas	None (within 0m)				
117	18.14	Gypsum areas	None (within 0m)				
117	18.15	Tin mining	None (within 0m)				
118	18.16	Clay mining	None (within 0m)				
Page	Section	Ground cavities and sinkholes >	On site	0-50m	50-250m	250-500m	500-2000m
119	19.1	Natural cavities	0	0	0	0	-
120 >	19.2 >	Mining cavities >	0	0	0	1	0
120	19.3	Reported recent incidents	0	0	0	0	-
120	19.4	Historical incidents	0	0	0	0	-
Page	Section	Radon >					
121 >	20.1 >	Radon >	Less than 1% (within 0m)				
Page	Section	Soil chemistry >	On site	0-50m	50-250m	250-500m	500-2000m
123 >	21.1 >	BGS Estimated Background Soil Chemistry >	6	6	-	-	-
124	21.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
124	21.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects >	On site	0-50m	50-250m	250-500m	500-2000m
125	22.1	Underground railways (London)	0	0	0	-	-
125	22.2	Underground railways (Non-London)	0	0	0	-	-
126	22.3	Railway tunnels	0	0	0	-	-
126 >	22.4 >	Historical railway and tunnel features >	10	4	5	-	-
127	22.5	Royal Mail tunnels	0	0	0	-	-
127	22.6	Historical railways	0	0	0	-	-



127 >	22.7 >	Railways >	0	6	3	-	-
128	22.8	Crossrail 2	0	0	0	0	-
128	22.9	HS2	0	0	0	0	-

Recent aerial photograph



Capture Date: 24/04/2021

Site Area: 1.03ha

