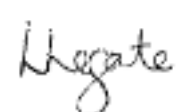


GROUND INVESTIGATION REPORT
for the land at
PHASE 8A BEREWOOD,
LONDON ROAD, WATERLOOVILLE,
HAMPSHIRE, PO7 5ST
on behalf of
BLOOR HOMES SOUTHERN

Report:	GROUND INVESTIGATION REPORT
Site:	PHASE 8A BEREWOOD, LONDON ROAD, WATERLOOVILLE, HAMPSHIRE, PO7 5ST
Client:	BLOOR HOMES SOUTHERN
Date:	20/03/2023
Reference:	GE21512/GIR/MAR23
Version:	1.0
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AMENDMENT RECORD

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Site Details	Site Address	Phase 8A Berewood, London Road, Waterlooville, Hampshire, PO7 5ST
	National Grid Reference	467663, 108921
	Site Area	12.18Ha (approx.)
	Form of Development	It is understood that the site is proposed to be developed with a residential development, private gardens, access roads and associated development infrastructure.
	Scope of works	The investigation included undertaking a desk study, coupled with intrusive investigation and laboratory testing to inform a geotechnical and geo-environmental assessment. Intrusive investigation works were undertaken on 16 th and 17 th February 2023.
Encountered Conditions	Ground Conditions	The ground conditions encountered comprised a thickness of Topsoil overlying clay and sand strata considered characteristic of the London Clay Formation. Made Ground was encountered within the low-level bund running around the perimeter of the site and comprised firm brown and orangish brown slightly sandy CLAY with rare glass fragments, tile fragments and polystyrene (TP09 and TP10). Whilst a previous third party investigation reportedly encountered Made Ground soils at shallow depth in locations within the site, no such soils were encountered within the exploratory holes (except for those into the bunds) constructed as part of the investigation reported herein.
	Groundwater	Groundwater was encountered within a number of the exploratory holes during the intrusive investigation works and was noted to be in the sandier and more gravelly horizons of the London Clay Formation. Groundwater was encountered during the intrusive investigation at depths of between 1.80m and 10.50m bgl.
Geotechnical Considerations	Foundations	Based on the ground and groundwater conditions encountered in the exploratory holes, it is considered that conventional shallow foundations may be suitable for the proposed low rise development (2 – 2.5 storey buildings) within areas of the site, subject to considerations of the variability of soil strength recorded from in-situ testing and soil logging and subject to tree influence. On the basis of the results of the Atterberg Limit tests in conjunction with the field observations it is considered that the cohesive soils of the London Clay Formation should be classified ‘en-masse’ as medium volume change potential, for which a minimum founding depth of 0.90m bgl would be required. However, a previous third party investigation recorded the presence of clay soils of high volume change potential which would thus require a minimum founding depth of 1.00m bgl. Given the findings of both phases of investigation, it is recommended that foundation design assumes the presence of soils of high volume change potential. In addition, due to the presence of soft clays in exploratory holes at depths between 1.10m and 1.70m bgl the minimum founding depth based on volume change potential will need to be increased in areas where soft strength soils are encountered or where tree influence impacts proposed foundations. Foundations terminating in, on or loading soft clay will not be suitable. Where conventional foundations are proposed, a preliminary net allowable bearing capacity of 75kPa is considered appropriate for the firm to very stiff clay soils and loose sand soils of the London Clay Formation, this being limited to reflect the variability in the presence of firm clay at or below the anticipated founding depth.
	Floor Slabs	Given the presence of shrinkable soils, suspended floor slabs are recommended throughout. The minimum void height should be determined in accordance with NHBC Standards and account for the volume change potential of the underlying soils.
	Excavations	Excavations within the clay soils are likely to be stable in the short to medium term provided they remain free of water and are not surcharged. The stability of excavations will also be reduced where sand lenses or gravel bands are present and particularly where

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		exposed to water. Large scale excavations and those left unsupported for long time periods are likely to become rapidly unstable. The stability of excavations will also be reduced where exposed to surface water or perched water. Long and/or deep excavations across sloping ground should be avoided due to their potential to initiate instability of the ground upslope of the excavation and possible catastrophic collapse. The need for entry into excavations should, where possible, be designed out. However, where this cannot be achieved a robust risk assessment must be undertaken and entry of any personnel only permitted in accordance with an approved risk assessment, method statement and safe system of work.
	Pavements	In-situ CBR testing using a Dynamic Cone Penetrometer (DCP) was undertaken at 6No. locations across the site, so as to provide general coverage. The results of the testing were generally in the range of 3% to 19%. This was supported by laboratory testing of shallow clay soils encountered across the site. With reference to Table C1 of TRRL LR1132, a CBR value of between 3% and 5% would be recommended depending on construction conditions. Based on the results, a preliminary CBR of 3% is recommended for the shallow soils across the site or further testing may be required. This also accords with Appendix 3, Table A of Hampshire County Council's Companion document to Manual for Streets. Based on lower bound Plasticity Index results at 0.50m bgl, the shallow soils should be assumed to be frost susceptible thus requiring a minimum pavement construction thickness of 450mm. Any hard or soft spots in the formation level may induce reflective cracking in the pavement and allowance should be made for removing hard or soft spots that may be present.
	Drainage	Trial pit soakage testing was undertaken within 3No. trial pits, TP03, TP04 and TP08. The water level was observed to rise within pits TP03 and TP04 over the course of the soakage testing. There was an insufficient fall in head to calculate an infiltration rate for the test undertaken within location TP08 over the testing period and as such the test is deemed to have failed. The results of the soakage testing indicate that the use of soakaways would not be suitable and therefore an alternative drainage solution will need to be considered.
	Buried Concrete	Buried concrete for shallow foundations should be designed to Class DS4 (AC3s).
	Human Health	No soil-based contamination has been identified from the testing undertaken and as such it is considered that remedial action would not be warranted to protect end users of the proposed residential development. As at any site, the presence of asbestos in other locations on site, including as localised cache burial, bonded to concrete slabs, or entrained within Made Ground (if present elsewhere on site) and disturbed soils cannot be completely ruled out. As such, provision for encountering asbestos should be made and a discovery strategy put in place for the groundworks and construction phases. Made Ground was recorded as being present within the low-level bund which runs around the majority of the perimeter of the site. The nature of the Made Ground identified within this low-level bund, was such that it is unlikely to be suitable to be retained within the upper portion of proposed garden areas and areas of soft landscaping as subsoil (or Topsoil).
Environmental Considerations	Groundwater	It is considered that no risk mitigation measures are required with respect to groundwater in the context of contamination or environmental considerations.
	Radon Gas	No radon protection measures are required.

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	Built Environment	It is anticipated that specific measures for water supply pipes installed within the natural soils on this site will not be required. This should be confirmed by the Local Water Supplier.
	Waste Disposal	The soil analyses from the site were assessed using HazWasteOnline software. None of the samples assessed were indicated to represent potentially hazardous waste. Natural soils on site are likely to be classified as inert waste if they are to be disposed of. Once any soils for disposal have been identified on the site it may be prudent to undertake further waste testing to enable categorisation of the materials for disposal.
Further Action: • Maintain a Discovery Strategy throughout the course of development such that if abnormal conditions are encountered, an appropriate course of action can be followed and required remedial action determined. • If abnormal conditions are encountered, Geotechnical/Geo-Environmental advice must be sought as soon as reasonably practicable to determine a suitable source of action.		
<i>This Executive Summary is intended to provide a brief summary of the main findings and conclusions of the investigation. For detailed information, the reader is referred to the main report ref. GE21512/GIR/MAR23.</i>		



1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by Bloor Homes Southern (the Client) to undertake an investigation of the geotechnical and geo-environmental factors pertaining to proposed development at Phase 8A Berewood, London Road, Waterlooville, Hampshire, PO7 5ST (herein referred to as 'the site'). The site's location is presented in Figure 1.

1.2 Form of Development

It is understood that the site is proposed to be developed for new residential dwellings with private gardens, access roads and associated development infrastructure. However, no formal development layout had been provided for review at the time of writing.

1.3 Objectives

The data from the geotechnical investigation was to form the basis of an interpretation with respect to foundation design, pavement construction, concrete specification, excavation stability and other pertinent construction issues.

A Preliminary Risk Assessment (PRA) was undertaken as part of the desk study in accordance with Land Contamination Risk Management (LCRM), in order to identify any specific requirement for and scope of any further assessment. The objective of the risk assessments was to evaluate the risks posed to the proposed redevelopment, adjacent land uses and the wider environment, in the context of likely planning requirements, immediate liabilities under the Environmental Protection Act 1990 and risks posed to Controlled Waters under the Water Resources Act from the current status of the site and in line with the proposed redevelopment.

1.4 Standards and References

Where practicable, the ground investigation and subsequent geotechnical and environmental assessments were undertaken in accordance with the following documents and guidance.

- National Planning Policy Framework – July 2021;
- Land Contamination Risk Management (LCRM), Environment Agency, updated April 2021;
- Environment Agency Guidance on Requirements for Land Contamination Reports, Version 1 dated July 2005;
- BS10175:2011+A2:2017 - Investigation of Potentially Contaminated Sites - Code of Practice, BSI 2017;
- BS5930: 2015+A1:2020 - Code of Practice for Site Investigations, BSI 2020;
- EN ISO 14688 Geotechnical Investigation and Testing Part 1-2002 and Part 2-2004;
- BS1377: 1990 - Soils for Civil Engineering Purposes, BSI1990;
- NHBC Standards Chapter 4.1 Land Quality - Managing Ground Conditions;
- NHBC Standards Chapter 4.2 Building Near Trees;
- CIRIA C665 – Assessing risks posed by hazardous ground gases to buildings (2007);
- NHBC 10627-R01(04) - Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (2007);
- BS8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings;
- Department of Environment - Industry Profiles (1995 - 1996);
- BS3882:2015 Specification for Topsoil, BSI 2015.



1.5 Conditions

This report does not purport to be a “Geotechnical Design Report” as defined in Clause 2.8 of Eurocode 7 (Geotechnical Design BS EN 1997-1:2004) and some of the data used to support this preliminary geotechnical assessment may not be fully compliant with that design code. It is considered possible that further detailed ground investigations could be required to facilitate the detailed geotechnical design process and should be carried out on a structure specific basis if necessary.

The desk study data obtained for the site is assumed to be factually correct and up to date at the point of purchase. No liability is taken for any omissions or inaccuracies in the data purchased. It should also be noted that changes to the desk study data may occur following the production of this report, Geo-Environmental accept no liability where this subsequently affects the assessment presented herein.

The data collected from the investigations have been used to provide an interpretation of the geotechnical and/or environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that either have not been revealed in the available records, or that occur between or under points of physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

It should be noted that in particular the concentrations and levels of mobile liquid and gaseous materials are likely to vary with time. The results obtained may therefore only be representative of the conditions at the time of sampling. The absence of asbestos within soil samples analysed does not guarantee the absence of asbestos within buildings, within or bonded to concrete, as discrete burials, or within the soil mass elsewhere within a site. This report should not be taken as any guarantee that a site is free of hazardous or potentially contaminative materials.

The absence of asbestos noted during the site walkover or within any soil samples analysed does not guarantee the absence of asbestos within buildings, within or bonded to concrete, as discrete burials, or within the soil mass elsewhere within a site. This report must not be taken as, or assumed to imply any guarantee that a site is free of hazardous or potentially contaminative materials.

Information contained in this report is intended for the use of the Client and Geo-Environmental can take no responsibility for the use of this information by any party for uses other than that described in this report. Geo-Environmental makes no warranty or representation whatsoever express or implied with respect to the use of this information by any third party. Geo-Environmental does not indemnify the Client or any third parties against any dispute or claim arising from any finding or other result of this investigation report or any consequential losses.

Assessment criteria or other parameters developed for the evaluation of contamination on this site are based on a number of assumptions regarding exposure and toxicology. Exposure to contaminants and levels of adverse effects may therefore vary. Whilst reasonable care and expertise has been employed in the development of such criteria, no liability is accepted in this respect. Other criteria or guidance on the development of assessment criteria may be published in the future and no liability is accepted in this respect.

This report remains the property of Geo-Environmental and the Client has no rights to, or reliance upon this document or supporting documents until such time as payment has been received in full for all invoices for works undertaken in connection with this report.



2.0 DESK STUDY

The findings of the Phase I desk study are presented in the following section. A copy of the information obtained as part of the desk study is presented in Appendix A.

The desk study data obtained is assumed to be factually correct at the time of writing and no liability is accepted for any inaccuracies in the data acquired or changes in the data that may occur following production of this report.

Comments made in the following sections regarding possible ground conditions on the site are based purely on the desk study assessment undertaken.

2.1 Site Description

The site comprised a roughly rectangular shaped parcel of land located at NGR 396721, 134096 and extended to approximately 0.31Ha.

At the time of the investigation works in February 2023, the site comprised former farmland which at the time of the investigation formed part of an area of publicly accessible land, the wider extents of which included paved pathways, a skate park, basketball court and a car park.

Ground levels varied across the site, with a general fall in level towards the north and north-west. The site was bounded to the east by a hedgerow with London Road beyond; to the north and west by footpaths; and to the south by a skate park and area of public open space with housing beyond.

During a site visit undertaken in late January, water was observed to be standing within a ditch located along the site's northern and western boundary, with some overtopping onto the adjacent footpath at the lowest point of the ditch.

2.2 Geology

British Geological Survey (BGS) geological mapping indicated the geology underlying the site to comprise London Clay Formation for the extent of the site with sands, silts and clays of Wittering Formation on the southern boundary of site. The Wittering Formation overlies the London Clay Formation and thus where London Clay Formation strata were mapped, these were anticipated to be strata at or towards the top of the Formation and these often comprise more sandy and more gravelly clay sub-units. In addition, given the previous and current use of the site and adjacent land, it is considered possible that Made Ground may be present in some areas of the site. In addition, Head Deposits were mapped approximately 216m southwest of site.

BS5930:2015+A1:2019 defines **Made Ground** as anthropogenic ground in which the material has been placed without engineering control and/or manufactured by man in some way, such as through crushing or washing, or arising from an industrial process. Great variations in material type, thickness and degree of compaction invariably occur and there can be deleterious or harmful matter, as well as potentially methanogenic organic material. In addition, on Sites which have undergone several phases of historic development it is not uncommon for asbestos to be present within Made Ground soils.

Head Deposits are drifts produced by solifluction, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted soils of local derivation.

Wittering Formation greyish brown laminated clay; wavy- to lenticular-bedded sand interbedded with clay in equal proportions; and fine- to medium-grained sparsely glauconitic sand.



London Clay comprises a stiff grey fissured clay, weathering to brown near surface. Concretions of argillaceous limestone in nodular form (Claystones) occur throughout the formation. Crystals of gypsum (Selenite) are often found within the weathered part of the London Clay, and precautions against sulphate attack to concrete are sometimes required. The lowest part of the formation is a sandy bed with black rounded gravel and occasional layers of sandstone and is known as the Basement Beds.

In the Hampshire Basin area, in which the site is located, the London Clay Formation can also include variable strata such as discrete bands/beds of sand, sandy clay, limestone, claystone and sandstone. If bands of more competent strata such as limestone, sandstone or claystone are present, these can require breaking up in-situ or coring through to facilitate the construction of piles. Water can also be present in association with some of these strata variations and can affect construction.

2.3 Hydrogeology

With reference to Groundsure data, the London Clay Formation was classified as 'Unproductive Strata'. The overlying Wittering Formation was classified as Secondary 'A' Aquifer. A Secondary Undifferentiated Aquifer was identified c.216m SW of the site for superficial deposits (presumed Head Deposits).

Unproductive Strata are defined as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Secondary 'A' aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Secondary Undifferentiated aquifer is the assigned in cases where it has not been possible to attribute either category 'A' or 'B' to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

According to Groundsure Data the site was indicated to be within a Source Protection Zone (confined aquifer), Inner catchment within confined aquifer (SPZ1). It is anticipated that the confined aquifer relates to the Chalk which is located at depth (below the London Clay and underlying Lambeth Group strata, both aquitards) beneath the site.

The environmental dataset did not identify any groundwater abstraction points within 1km of the Site.

The Groundsure data did not identify any discharge consents to land/soakaway within 500m of the Site.

No pollution incidents to groundwater were recorded within 500m of the Site.

The site was identified as being located within an area recorded as negligible for groundwater flooding to occur, however it should be noted that within c.125m to the north of site this risk increases from negligible to low.

2.4 Hydrology

With reference to the Groundsure dataset, the closest surface water feature identified was located c.3m west running parallel to the western boundary of site. This is likely to comprise a ditch or similar minor watercourse and was labelled on mapping as a 'Drain'.

Ground Investigation Report

The Groundsure data did not indicate the subject site to be located in an area of risk from flooding from rivers and the sea.

Groundsure data identified one surface water abstractions within of 1km of the site as detailed below:

- River Wallington, West of Waterlooville, transfer between sources, start date: 14/08/2019, expiry date: 31/03/2028, status; active, 673m north.

The Groundsure data set identified 3No. discharge consents to controlled waters within a radius of 500m of the site. Details are summarised below:

- Forest End, Waterlooville, Hampshire. Miscellaneous (P00032), surface water Freshwater River, issue date: 27/09/1985, revocation date: 23/08/1999, 263m NE.
- Farhjem [sic], Southwick, Fareham, Hampshire. Sewage discharge – unspecified – not water company (H01599), Freshwater River, issue date: 05/04/1963, Revocation date: 31/03/1997, 384m S.
- West Quadrant, Hambledon Rd/London Rd, Waterlooville, Hampshire. Miscellaneous discharge – surface water (NO1251). Freshwater River, issue date: 06/12/1978, revocation date: 31/03/1997, 471m NE.

Groundsure data identified 3No. pollution incidents to controlled waters within 500m of the site. Details are summarised below:

- Sewage material, incident date: 24/07/2001 (ID18736), Water impact: category 4 (no impact), Land impact: category 3 (minor impact), Air impact: category 3 (minor impact), 58m NW.
- Sewage materials, incident date: 07/09/2001 (ID29602), Water impact: category 3 (minor impact), Land impact: category 3 (minor impact), Air impact: category 4 (no impact), 84m NW.
- Sewage materials, incident date: 22/06/2001 (ID10749), Water impact: category 4 (no impact), Land impact: category 3 (minor impact), Air impact: category 4 (no impact), 336m N.

Given the locations and dates of these pollution incidents identified, in relation to the site it is considered that these are unlikely to have resulted in a detrimental impact on the subject site and have such have not been considered further as part of the assessment..

Groundsure data identified the site as negligible risk for surface water flooding. Within 50m of the site to the west of the site the highest risk for surface water flooding was identified to be 1 in 30 years, 0.30 – 1.00m.

2.5 Sensitive Land Uses

A search was made of environmentally sensitive areas, including areas of green belt, scenic or natural beauty, parks, reserves, nitrate zones, protected conservation and scientific areas.

Groundsure data identified the site as being located within a Nitrate Vulnerable Zone (NVZ); Chichester, Langstone and Portsmouth Harbours Eutrophic Nitrate Vulnerable Zone (NVZ) (TraC), Eutrophic Water, NVZ ID:2, status: existing.

The site is also identified to be located in a Site of Special Scientific Interest (SSSI) Impact Risk Zone.

The agricultural land classification for this site varies from Grade 2 (Very good quality) to Urban land.



2.6 Radon

The Groundsure report states that the site lies in an area where <1% of homes are above the Action Level for Radon as defined by Public Health England and the BGS. In addition, the BGS assessment states that no radon protective measures are required in the construction of new houses or extensions on the site.

2.7 Environmental Data

Searches of other various environmental databases were made as part of the desk study, including air pollution control sites, Part IIA contaminated land, Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC) sites, registered radioactive substances, COMAH sites, explosives sites, Notification of Installations Handling Hazardous Substances (NIHHS) sites, planning permissions for sites involving hazardous substances and fuel station registers. Additional detail is referenced in Appendix A.

The desk study did not identify any Integrated and Pollution Prevention and control site within 500m of the Site.

The desk study has identified 14No. recent industrial land uses entry within 250m of the site, as summarised in Table 2.1 below.

Type	Direction and Distance from site
Electricity Substation – Electrical Feature	Onsite
Electricity Substation – Electrical Feature	27m South
Innovate Projects Ltd - Building and Component suppliers, construction services	81m South East
Tank – Industrial feature	113m South
Electricity Substation – Electrical Feature	128m East
Saw Mill - Wood products	129m South
Telephone Exchange - Telecommunications Features	142m East
Gas Governor – Gas Feature	144m North East
Crane - Travelling Cranes and Gantries	149m South
Electricity Substation – Electrical Feature	163m South
Electricity Substation – Electrical Feature	168m South East
S Drayton Car Sales - Second-hand Vehicles	184m South
Electricity Substation – Electrical Feature	214m North East
CIA - Electronic equipment	229m North East

Table 2.1 Summary of recent industrial land use entries within 250m of the site

The desk study has identified 17No. historic industrial land uses entry within 250m of the site, as summarised in Table 2.2. below.

Type	Date Mapped	Distance and Direction from Site
Sawmill	1895	On-site
Sawmill	1907-1938	20m South
Sawmill	1930	35m South
Saw Pit	1866	42m South
Unspecified Mill	1963	49m South
Timber Yard	1980-1991	53m South
Sawmill	1898	75m South
Nursery	1930	76m South
Nursery	1930-1938	80m South



Type	Date Mapped	Distance and Direction from Site
Nursery	1963	80m South
Windmill	1866	81m South
Telephone Exchange	1980-1991	126m East
Unspecified Tank	1963	160m South
Smithy	1866	174m South West
Nursery	1963	196m East
Smithy	1866	228m North East

Table 2.2 Summary of historic industrial land use entries within 250m of the site

A further 6 historic industrial land uses were identified within 500m of site, please refer to Appendix A for further details.

The environmental dataset identified 12No. records of tanks within 500m of the Site:

- 109m S, Unspecified Tank, 1989 mapping
- 109m S, Unspecified Tank, 1973 mapping
- 110m S, Unspecified Tank, 1993 mapping
- 138m S, Unspecified Tank, 1989 mapping
- 139m S, Unspecified Tank, 1973 mapping
- 140m S, Unspecified Tank, 1993 mapping
- 263m E, Unspecified Tank, 1952-1954 mapping
- 284m NE, Unspecified Tank, 1984-1993 mapping
- 331m E, Unspecified Tank, 1932-1939 mapping
- 337m E, Unspecified Tank, 1984 mapping
- 339m E, Unspecified Tank, 1952-1965 mapping
- 349m E, Unspecified Tank, 1954 mapping

Two current petrol stations were identified within 500m of the subject site:

- 261m NE, Shell Petrol Filling Station on London Road
- 438m NE, ASDA off Maurepass [*sic*] Way

Given the locations and general activities of the industrial land use entries identified as part of the desk study and taking into consideration the underlying strata, in relation to the site, it is considered that these are unlikely to have resulted in a detrimental impact on the subject site.

2.8 Soil Chemistry

Data obtained as part of the desk study provides details on the estimated soil chemistry for the natural soils in the vicinity of the site. The estimated soil quality on the subject site is presented Table 2.3.

Contaminant	Estimated Concentration
Arsenic	15 mg/kg
Cadmium	1.8 mg/kg
Chromium	60-90 mg/kg
Lead	100 mg/kg
Nickel	15-30 mg/kg

Table 2.3 Estimated Soil Concentrations on site



The natural background concentrations (where available) were below respective published Soil Guideline Values, Generic Assessment Criteria and Category 4 Screening Levels for the protection of human health under a residential land use, i.e. the most conservative end use.

However, these values are not necessarily representative of the site's soil chemistry and do not take account of current or historic activities on the site, nor the presence or composition of Made Ground soils. Furthermore, some screening criteria are dependent on pH and soil organic matter content. Therefore, concentrations of specific determinands and the utilised SGV/GAC/C4SL cannot be determined without site specific investigation and analysis.

2.9 Geotechnical Data

National databases for a number of different geological hazards have been compiled by the BGS, and a summary of the hazard data pertaining to the site itself is presented in Table 2.4.

Hazard	Designation
Non-coal mining	Rare (Localised small scale underground mining possible in the area but none identified within the site boundary)
Collapsible ground	Very Low Hazard
Compressible ground	Negligible Hazard
Ground dissolution	Negligible Hazard
Landslide	Very Low Hazard
Running sand	Very Low Hazard *
Shrinking and Swelling clay	Moderate Hazard

NOTES: * Low Hazard 9m SW

Table 2.4 Summary of BGS Geological Hazards

The Groundsure data did not identify any non-coal mineral commodities within 500m of the site.

The Groundsure data identified 11No. surface ground workings within 250m of site. Details are listed below:

- 31m NW, Pond, 1895
- 31m NW, Pond, 1866
- 31m NW, Pond, 1938
- 31m NW, Pond, 1930
- 31m NW, Pond, 1907
- 32m NW, Pond, 1963
- 38m NW, Pond, 1991
- 38m NW, Pond, 1980
- 42m S, Saw pit, 1866
- 82m E, Pond, 1938
- 82m E, Pond, 1930

2.10 Landfill and Ground Workings

A search of BGS recorded landfill sites, IPC registered waste sites, licensed waste management facilities, local authority recorded landfill sites, other registered landfill sites, waste transfer stations and other waste treatment or disposal sites was undertaken as part of the desk study. Such sites may form an artificial source of ground gases, such as carbon dioxide and methane, where wastes are buried or disposed of to landfill.



Groundsure data recorded one historic/current landfill site within 500m of the site:

- Fielders Park, Purbrook, site ref: FHA13, type: Household Environmental Permitting Regulation (Waste), 396m S.

Given the distance from the site, the underlying ground conditions and that fact that a number of other residential dwellings are located between this identified historic landfill and the subject site, Fielders Park is not considered to be a plausible potential source that would impact on the subject site.

Groundsure data also identified 3No. waste exemptions within 500m of the subject site. Details summarised below:

- Timber Centre, 154, London Road, Waterloooville, PO7 5SR, Ref: WEX123040, using waste exemption, not on farm, use of waste in construction, 83m S.
- Security House, 212-218 London Road, Waterloooville, PO7 7AJ, ref: WEX236431, Storing Waste exemption, not on farm, storage of waste in source containers, 159m E.
- Security House, 212-218 London Road, Waterloooville, PO7 7AJ, ref: WEX236431, Storing Waste exemption, not on farm, storage of waste in secure place, 159m E.

2.11 Historical Mapping

Historical maps dating back to 1859 were obtained as part of the desk study. A summary of the apparent key features observed on the map extracts both on the site and within the local area is presented within Table 2.5.

Date	On-site	Off-site
1859 (1:2,500)	The site comprised an irregularly shaped parcel of land consisting of open fields. A boundary line trended through the centre of the site in a north/northeast to south/southwest trend.	Plant Farm was mapped immediately northwest of the site. Cox Coppice, a forested area, was mapped north/northeast of site from c.50m to the extent of mapping area from site. To the south of the site, Mill Cottage, Flint Mill and Purbrook Wind Mill were mapped between c.40 to 100m from site. A Smithy was mapped c.175m southwest from site. A school and another unidentified structure, were mapped c.60 to c.125m east of site. The remaining surrounding area comprised open fields with two roads, one trending north south in the western portion of mapping area and another trending northeast and southwest in the south-eastern portion of the map.
1867 (1:10,560)	No significant changes identified.	Waitland End Farm was mapped c.90m east of site. Further wooded/forested areas were mapped c.400m north, northwest and south of site. Waterloo (subsequently becoming Waterloooville) was mapped c.250m to the mapping extent with residential dwellings, well, smithy, church and associated infrastructure. The village of Stakes was mapped c.+750m east of site with a few residential dwellings and several wells. Purbrook Heath was mapped c.500 to c.1000m south/southwest of site with residential dwellings and associated infrastructure.



Date	On-site	Off-site
1868 x2 (1:2,500)	Mapping incomplete. No significant changes identified.	Mapping incomplete. No significant changes identified.
1869 x3 (1:2,500)	Mapping incomplete. No significant changes identified.	Mapping incomplete. No significant changes identified.
1895-1897 (1:10,560)	No significant changes identified.	Waterloo was now mapped as Waterlooville and mapped further development in the form of residential dwellings and a school. Stakes and Purbrook also mapped similar further development.
1897 (1:2,500)	No significant changes identified.	Flint Mill and Purbrook Wind Mill were no longer mapped instead Saw Mill and Mill House were mapped in their place.
1907 (1:10,560)	No significant changes identified.	Purbrook mapped development in the form of nurseries c.600-700m south/southwest from site. A sewage works was mapped c.800m northeast from site near Waterlooville, where further development was mapped. The previously mapped road trending northeast and southwest was now labelled as Portsdown & Horndean Light railway (from local knowledge, this related to a tramway which ran alongside the main road and connected Portsmouth to the south with Waterlooville and villages to the north).
1909 (1:2,500)	No significant changes identified.	An additional unidentified structure was mapped c.125m south of site near Sawmills. No other significant changes noted.
1930 (1:10,560)	No significant changes identified.	Mapping incomplete. Extensive residential dwellings were mapped along the south-eastern border of the site from Waterlooville connecting to Purbrook. Allotment Gardens were mapped c.100m to c.150m, and c.300m to c.500m north/northeast of site. A nursery was mapped c. 150m south of site. Sewage Disposal works were mapped c.750m east/northwest of site. Within Purbrook and Waterlooville residential developments was mapped along with associated infrastructure.
1932 (1:2,500)	No significant changes identified.	No significant changes identified.
1933 (1:10,560)	No significant changes identified.	No significant changes identified.
1939 (1:2,500)	No significant changes identified.	Previously mapped Allotments to the northeast (c.100 to c.150m) were no longer mapped and residential dwellings were mapped in their place. The map made no reference to the Light Railway (1907 map) but labelled the road along the site's eastern boundary as London Road.
1963 (1:10,560)	No significant changes identified.	Further extensive residential development was mapped east of site connecting Waterlooville to



Date	On-site	Off-site
		Stakes as well as south/southeast of site in Purbrook.
1965 (1:2,500)	No significant changes identified.	Additional structures were mapped south of the site near Sawmill.
1972 (1:2,500)	Mapping incomplete.	Mapping incomplete. No significant changes identified.
1974 (1:1,250)	No significant changes identified.	Allotment Gardens were mapped c.50m northeast from site. A telephone exchange was mapped c.150m east/northeast of site.
1977 (1:2,500)	Mapping incomplete.	Mapping incomplete. No significant changes identified.
1980 (1:10,000)	No significant changes identified.	The eastern portion of the map showed extensive residential development, with schools and associated infrastructure from c.100m to mapping extent. Neither sewage works to the northeast of site were mapped, with one being mapped as a Council Depot and Cemetery. Previously mapped nursery and mills south of the site were mapped as a timber yard.
1989 (1:2,500)	Mapping incomplete.	Mapping incomplete. No significant changes identified.
1990 (1:2,500)	Mapping incomplete.	Mapping incomplete. No significant changes identified.
1992 (1:10,000)	No significant changes identified.	Further residential development and associated infrastructure was mapped across the central and eastern portion of the search area (1km).
2001 (1:10,000)	No significant changes identified.	No significant changes identified.
2010 (1:10,000)	No significant changes identified.	No significant changes identified.
2023 (1:10,000)	No significant changes identified.	Plant Farm was no longer mapped to the northwest of the site. Residential development and associated infrastructure were mapped c.200m to c.1000m north and northwest of site. Similar development was mapped c.300m to c.750m southwest of site.

Table 2.5 Summary of historic map extracts

Historic mapping from 1859 showed the site to have comprised an irregularly shaped parcel of land made up of open fields. The earliest mapping showed that the only nearby buildings were mills and Plant Farm, with two roads along the southeast and western borders of site. The road to the southeast of site was also labelled as Portsdown & Horndean Light Railway (a local tramway connecting Portsmouth with settlements as far north as Horndean) from mapping in 1907, before being labelled as London Road from 1939 mapping onwards. No development was shown within the site over the mapping period reviewed.

The surrounding land was also shown mainly to comprise open fields with small villages of Waterlooville (mapped as Waterloo until 1985-1987 mapping), Stakes and Purbrook, which showed gradual development from the earliest mapping and which formed a broadly urbanised area by the 2023 mapping. More extensive development of the eastern portion of mapping was noted in mapping from 1963 onwards. Allotment gardens were mapped in



close proximity to site to the north/northeast from 1930 mapping onwards to 1992 mapping. Several mills and nurseries were mapped across the period of mapping with some c.<250m south of site before being mapped as a Timber Yard from 1980 mapping onwards. At the time of the investigation, the Timber Yard was observed to comprise a timber merchants.

2.12 Asbestos

Consideration for the potential for asbestos and/or asbestos containing material (ACM) to be present within the shallow soils or entrained within or below concrete on the site should be given when designing any site investigations, therefore asbestos identification should be included within the suite of testing of contaminants on site. The absence of asbestos in soil samples analysed is not a guarantee of the absence of asbestos elsewhere on a site.

In line with current best practice, asbestos and ACM should be assumed to be present until proven otherwise, this includes the consideration of the potential for asbestos to be present within the shallow soils on the site as well as beneath or entrained within areas of hardstanding.

Removal of any ACM noted on the site surface should be undertaken prior to any clearance of de vegetation works (mowing, strimming, flailing etc.) to avoid damaged and spreading asbestos across areas of the site. All work from asbestos should be carried out in line with the Control of Asbestos Regulations 2012.

2.13 Previous Ground Investigations

A ground investigation report including desk study was undertaken for Phase 8 Berewood, by T&P Regeneration Ltd report reference 2018Dec_BER1808G_GI on behalf of White Young Green PLC dated 20/12/2018. This report also included investigation and assessment of another Parcel on the wider Berewood site, Parcel 3b. A brief summary of the findings relevant to the Phase 8A area is presented below.

Ground Investigation

Made Ground was encountered to the southern extent of Parcel 8. It was found to a maximum depth of 0.90m in the vicinity of TP19, but more generally to 0.50m bgl. The Made Ground was reported to comprise slightly sandy gravelly friable CLAY/clayey SAND, which included red brick, glass, ceramic, asphalt and concrete. Topsoil was encountered in the majority of exploratory locations with a typical thickness ranging between 0.20 and 0.40m. In general, the Topsoil was found to comprise light brown slightly gravelly SAND/silty CLAY. Soils reported as Head Deposits generally comprised a sandy CLAY/clayey SAND. The base of this unit was not proven. No visible or olfactory evidence of significant contamination was reported during the ground investigation.

Contamination Assessment

From the analytical results all soil concentrations analysed in Topsoil, natural soils and Made Ground were recorded below adopted screening levels for residential use with vegetable uptake. However, with consideration of the physical composition of on-site Made Ground, which reportedly included glass, ceramic and asphalt, this may be unsuitable to remain within areas of soft landscaping. The risk to controlled waters was considered to be low.

Radon protection measures were not considered necessary for the proposed development. The site was assessed to have a low ground gas generating potential. Made Ground was not reported to include any significant putrescible or organic content. Further to this, the potential for lateral migration from off-site sources was considered limited by the low permeability nature of the underlying geology. It was considered that ground gases present a low risk to future residents.



Engineering Design

The cohesive soils were reported to be of high volume change potential and as a result will be susceptible to the influence of trees. Based on the test results a design CBR value of <2.5% was recommended. Sulphate testing indicated that a suitable design mix for concrete for buried structures was likely to be DS1-AC-1. Based upon calculated infiltration rates results, soakaways were considered unlikely to offer a viable method of surface water drainage.

2.14 Potential Contamination

The site's previous and current land use was shown to have comprised agricultural land from the earliest mapping period, up until the most recent mapping.

A review of the land uses covered by the National House Building Council (NHBC), Environment Agency (EA) and Chartered Institute of Environmental Health (CIEH) publication 'Guidance for the Safe Development of Housing on Land Affected by Contamination' (2008), which provides a summary of industrial profiles (1995 - 1996) published by the former Department of the Environment (DoE) (now part of the Department for Environment, Food and Rural Affairs [DEFRA]) has been undertaken. Whilst, no profiles relating to the previous and current land use of the site have been identified, the historic tramway beyond the site's southeastern/eastern boundary could be considered to fall within the profile for railway land.

- Railway land - Potential contaminants may include metals, sulphate, asbestos, Polyaromatic Hydrocarbons (PAH), Volatile Organic Contaminants (VOC) and Polychlorinated biphenyls (PCBs).

Given the years elapsed since dismantling of the line, the likelihood of VOCs being present is considered negligible and moreover VOCs tend to be associated more with yards/maintenance than old trackbed. In addition, PCBs would generally be associated with electrical switchgear and given the date by which the line closed and presence of clay rich shallow soils (PCBs adhere to clay soils inhibiting migration potential), it is considered unlikely that electrical signalling and switchgear would have been common, if used at all. As such, VOCs and PCBs whilst listed in the Industry Profile for railway land are not considered plausible contaminants of concern in the context of the subject site.

In addition, it remains possible that the surrounding land uses may have resulted in the deposition of airborne contaminants on the surface and shallow soils on site including heavy metals, organic pollutants such as polyaromatic hydrocarbons (PAH), petroleum hydrocarbons/oils, inorganic compounds, albeit the risk in relation to the site is considered to be low.

There is the possibility that Made Ground is present in the area of the site and on the peripheries of the site boundary associated with adjacent land use. Made Ground or shallow soils may contain contaminants of concern, including metals, non-metal, inorganic pollutants, organic pollutants (including PAH/TPH) and asbestos.

The on-site and surrounding land, historic and current usage, may have included the use of pesticides/herbicides which may be present in shallow soils. Possible airborne contaminants could be present on the surface and shallow soils on site including heavy metals, organic pollutants such as polyaromatic hydrocarbons (PAH), petroleum hydrocarbons/oils, inorganic compounds.

2.15 Ground Gas and Vapour Summary

The desk study has not identified any potential sources of ground gas on the site itself. However, if Made Ground is present and contains a significant amount of organic matter or organic contamination, it could have the potential to represent a source of ground gases/vapours.

The anticipated geology underlying the site comprises bedrock geology of London Clay Formation across the majority of the site with the overlying Wittering Formation mapped in the southern portion of the site.

Ground gas monitoring is therefore only considered necessary should Made Ground be present and contain a significant amount of organic matter or organic contamination.

3.0 PRELIMINARY ASSESSMENT

Based on the findings of the desk study, the following sections summarise the anticipated geotechnical and environmental factors likely to impact the site.

3.1 Geotechnical Constraints

3.1.1 Potential Geotechnical Issues

The following factors that might impact the geotechnical condition of the site were identified as part of the desk study:

- The possible presence of Made Ground (e.g. varying depth and/or composition) on site, which if encountered may affect the foundation design and construction.
- The presence of laterally and vertically variable strata and the impact these could have on further construction.
- Consideration of the volume change potential change of any cohesive soils and the affect this could have on foundations.
- The suitability of shallow soils as bearing stratum for conventional foundations.
- The possible presence of aggressive ground conditions (sulphates) which may affect the foundation design and construction.
- The presence of trees and/or vegetation on the site and the associated foundation design if/where shrinkable soils are encountered.
- The possible presence of perched and/or shallow groundwater beneath the site which may affect foundation design and construction.
- The suitability of the shallow soils for the use of soakaways on the site as part of the proposed development.

3.2 Preliminary Environmental Conceptual Site Model & Risk Assessment

3.2.1 Methodology

A Preliminary Risk Assessment ('PRA') and Conceptual Site Model ('CSM') have been prepared in accordance with LCRM based on information obtained as part of the desk study. Possible risks associated with potential sources of contamination and sensitive receptors identified have been qualitatively assessed following a source-pathway-receptor ('Pollutant Linkage') approach in accordance with current UK protocols. The Conceptual Site Model for the proposed end use (Residential with plant uptake) is presented in Figure 2.

A risk of harm may only exist where a plausible pollutant linkage is present, and where the quantity or concentration of a contaminant is sufficient so as to pose harm. Under the statutory definition, "Contamination" may only strictly exist where contaminants pose a risk of harm to a receptor. The risk classification has been assessed in accordance with CIRIA C552 (Rudland et al., 2001). A summary of how the risks are derived and their definitions are presented in Tables 3.1 and 3.2.

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table 3.1 Risk Ratings Matrix

Risk Rating	Definitions
Very high risk	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 already undertaken) and remediation are likely to be required.
High risk	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 already undertaken) is required and remediation works may be necessary in the short term and are likely over the longer term.
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either 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.
Moderate to low risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is unlikely that any such harm would be severe, or if any harm were to occur it is probable that the harm would be relatively mild.
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk	There is low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Table 3.2 Risk Rating Definitions

3.2.2 Summary of Plausible Sources

Possible sources of contamination identified from the desk study are summarised in Table 3.3.



Source	Description	Contaminants
Made Ground and shallow soils	The general quality of Made Ground and shallow soils could be impacted by the presence of contamination where Made Ground is located and associated with the former on site and surrounding land use.	Possible elevated concentrations of metals, metalloids, TPH and PAH compounds and asbestos in Made Ground (if present) and near surface soils.
Naturally occurring aggressive ground conditions	Naturally occurring compounds in the ground which could damage buried concrete.	Possible elevated sulphate concentrations.
Ground gases	Possible presence of Made Ground beneath the site, (only considered a viable source of ground gas if significant proportions of organic material).	Methane, carbon dioxide, depleted oxygen and trace gases.
Previous land use (agricultural)	Possible presence of pesticides and herbicides in shallow soils due to site previous land use.	Possible elevated concentrations of pesticides and herbicides.

Table 3.3 Possible Sources of Contamination**3.2.3 Summary of Plausible Pathways**

The plausible pathways are summarised in Table 3.4. These pathways are based on the proposed end use, comprising residential end (with plant uptake) use.

Pathway	Description
Direct Contact	Ingestion of soil particles, inhalation of soil derived dust (including tracked back dust), dermal contact. Bioaccumulation in home grown vegetation.
Inhalation	Inhalation of soil dust both inside and outside of buildings.
Vertical & Lateral Migration	Contaminant movement both vertically through leaching/gravity and horizontally along preferential pathways, e.g. services trenches, more permeable bedded strata or with groundwater.
Shallow Groundwater	Shallow groundwater or perched water may be present within the underlying deposits which could result in the vertical and lateral migration of contaminants.
Chemical Attack	Attack of buried plastics and concrete by aggressive ground conditions.
Root Uptake	Uptake of soil and waterborne contaminants by plants.
Flooding	The majority of site was indicated to be located in an area of low potential flooding from rivers. It should be noted that the risk of 1 to 30 year return was identified on the western boundary of site in association with the watercourse.

Table 3.4 Possible Contamination Pathways**3.2.4 Summary of Plausible Receptors**

Potential receptors associated with the site and its development are summarised in Table 3.5.

Receptor	Description	Comments
End Users	Residents/occupants of the proposed development.	The development will include a residential development with private gardens and associated infrastructure.
Soft Landscaping	Possible areas of planting including possible lawns, shrubs, trees, etc.	Soft landscaped areas are proposed as part of the redevelopment proposals.



Receptor	Description	Comments
Built Environment	Buried concrete for foundations and plastics for potable water supply pipes may be laid in contact with contaminated soils.	Aggressive ground conditions may be present beneath the site.
Adjacent Land Users	Sensitive land uses identified within the immediate vicinity.	Adjacent land use is primarily residential to the north, south and east, with agricultural to the west.
Groundwater	Controlled waters contained within the aquifer(s) beneath the site.	The majority of site overlies unproductive strata however a Secondary 'A' aquifer underlies the site on the southern border (and overlies the Unproductive Strata). The site is located within the inner catchment of a Source Protection Zone (SPZ1) (confined aquifer – presumed Chalk located beneath a succession of London Clay Formation and Lambeth Group strata, both aquitards).
Surface Water	Controlled Waters within lakes, rivers, and ponds, etc., or coastal waters.	The nearest surface water body identified was a ditch (mapped as a 'Drain') located c.3m west of site.
Ecological Receptors	Sensitive areas of ecological significance.	No environmentally sensitive receptor areas in terms of contamination within 500m. As such, this has not been considered further as part of this assessment.

Table 3.5 Possible receptors of contamination

Site workers involved in the preparation and construction of the development have not been considered further in this assessment as the Principal Contractor is duty bound under the current CDM Regulations to undertake their own risk assessments with respect to their employees.

Whilst the above sources and receptors have been identified, Table 3.6 summarises the identified plausible pollution linkages and a qualitative assessment of the risks based on the desk study research. A conceptual site model (proposed end use) is presented in Figure 2.

Ground Investigation Report

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Severity	Risk and Justification
Contaminants of Concern (Made Ground and shallow soils impacted by former and current site and off-site usage, including aerial deposition)	End users	Direct contact	Likely	Minor	Low Future occupiers may to come into direct contact with soils where soft landscaping is present. Where soft landscaping is proposed it will be completed with uncontaminated soils in the near surface root zone which will reduce the risk.
	Soft Landscaping	Root uptake	Likely	Minor	Low Soft landscaping is proposed on the site and thus, root uptake is possible. However, landscaping would be completed with uncontaminated soils in the near surface root zone. Furthermore, no clear evidence of harm to existing vegetation was noted/identified from the site walkover. Where soft landscaping is proposed it will be completed with uncontaminated soils in the near surface root zone.
	Adjacent land users	Direct contact	Unlikely	Minor	Very Low Adjacent site users are unlikely to come into contact with the soils at the site.
	Water supply pipes	Direct contact	Low	Mild	Low Water supply pipes could come into contact with impacted soils depending upon depth of installation and extent of any soil impact. Barrier pipe may be required (subject to intrusive investigation and testing).
	Buildings and infrastructure	Direct contact	Likely	Minor	Low Foundations and utilities may be placed within potentially aggressive soils, any Made Ground present is only expected at shallow depths.
	Surface Water	Vertical & Lateral Migration	Low	Mild	Low Significant mobile contamination is not expected. The majority of site lies in an area of low potential for flooding from rivers. It should be noted that the water course trending north and south along the western boundary of site was identified with a risk of 1 in 30 year return.

Ground Investigation Report

Potential Source/media	Potential Receptors	Potential Pathways	Likelihood	Severity	Risk and Justification
	Groundwater	Vertical migration	Unlikely	Mild	Very Low The superficial strata beneath the site are classified as Unproductive Strata with an overlying Secondary 'A' Aquifer in the southern portion of the site. Although areas of perched water could be present. Fluctuations in groundwater levels are possible and could result in migration of any mobile contaminants (if present). However, significant mobile contamination or continuous groundwater beneath the site is not anticipated.
Naturally occurring aggressive ground conditions	End users	Direct contact and inhalation / ingestion of soil derived dust	Unlikely	Minor	Very Low No naturally occurring potential sources which could harm human health have been identified.
	Soft Landscaping	Root Uptake	Unlikely	Minor	Very Low Gardens and amenity soft landscaping are proposed but are unlikely to be affected by naturally occurring aggressive ground conditions.
	Adjacent land users	Direct contact	Unlikely	Minor	Very Low No potential sources which could harm human health have been identified.
	Water supply pipes	Direct contact	Unlikely	Minor	Very Low No potential sources which could harm human health have been identified.
	Buildings and Infrastructure	Direct contact	Likely	Minor	Low Foundations will be placed within soils which may be an aggressive environment for concrete.

Table 3.6 Plausible Pollutant Linkages & Qualitative Risk Assessment

3.3 Preliminary Risk Assessment Summary

The Preliminary Risk Assessment (PRA) and Conceptual Site Model (CSM) developed from the information gathered as part of the desk study process have identified several plausible pollutant linkages that exist in relation to the proposed development of the site and the preliminary risk rating for most of the pollution linkages have been classified as low or very low.

The potential pollutant linkages established within this preliminary risk assessment are not considered to prevent development on the subject site but could require investigation and assessment to support further characterisation, calibration of the CSM and where/if necessary, determine a remedial strategy to reduce, remove or otherwise control any risk within the site to key receptors.

In order to progress this assessment in line with the National Planning Policy Framework, to provide further characterisation of the site and refinement of the PRA and CSM, it was recommended that intrusive investigation and associated testing is undertaken to confirm the findings of the desk study report and to provide a robust risk assessment for the site and proposed redevelopment. As such, it was recommended that geochemical and geotechnical investigation be carried out on the site to include analysis of soil and groundwater (if encountered) samples for the range of potential contaminants identified within the desk study.

3.4 Scope of Works

In summary, the following scope of works for the intrusive investigation was agreed with the Client.

- Attendance of a specialist surveyor to capture the co-ordinates and levels of exploratory holes using GPS surveying where possible.
- Construction of 2No. cable percussive boreholes to a depth of 20m bgl together with in-situ testing and sampling at regular intervals. (BH01-BH02).
- Construction of 6No. dynamic sampler boreholes to depths of up to 5.45m bgl together with in-situ testing. (WS01-WS06).
- The excavation of 8No. machine dug trial pits (TP01-TP08) to a maximum depth of 3.10m bgl, 3No. trial pits were excavated for the purpose of trial pit soakage testing (TP03, TP04 and TP08).
- The excavation of 2No. machine dug shallow trial pits (TP09 and TP10) located within the low level bund around the perimeter of the site to establish its composition and to enable chemical testing.
- Attendance of a 4x4 water bowser to supply water for trial pit soakage tests. Undertake trial pit soakage tests within trial pits (TP03, TP04 and TP08) in general accordance with BRE Digest 365.
- Undertake Dynamic Cone Penetrometer (DCP) testing to assist in determining CBR values for access road and parking area design (DCP01-DCP06). Testing positions were based on general coverage in the absence of a development layout plan.
- Geotechnical laboratory testing to support the geotechnical assessment for foundations, ground floor construction and road design.
- Geochemical laboratory testing for a suite of commonly occurring brownfield contaminants and for buried concrete classification.

3.5 Investigation Strategy

The positioning of exploratory holes was determined on site to provide general coverage and to target specific areas. Table 3.7 sets out the investigation strategy adopted.



Area of Concern	Investigation	Positions
General ground conditions	Exploratory holes located across the site, coupled with sampling and laboratory analysis.	All
Ground conditions at depth	Cable percussion boreholes with in-situ testing and disturbed sampling.	BH01 and BH02
Potential contamination of near surface soils	Exploratory holes located to provide coverage of the site, coupled with sampling and laboratory analysis.	All
Historic off-site light railway	Exploratory holes located close to the site's eastern and south-eastern boundary coupled with sampling and laboratory analysis.	TP03, TP05, TP07, TP08, WS02 and BH02
Suitability of the ground for onsite drainage/soakaways	Trial pits located within natural strata to facilitate trial pit soakage testing.	TP03, TP04 and TP08
Composition and potential contamination of low-level bund surrounding the site	Trial pits located within the low-level bund, coupled with sampling and laboratory analysis.	TP09 and TP10
CBR testing of shallow soils	In-situ DCPs located across the site.	DCP01-DCP06

Table 3.7 Summary of the Investigation Strategy

Soil samples were collected and placed into amber jars and cool boxes on site for transit to the office, where they were stored under chilled conditions (<4°C) prior to final transportation in cool boxes to the laboratory by their in-house courier. Both the geotechnical and contamination testing were undertaken by UKAS and MCERTS (where relevant) accredited laboratories. Samples were stored in temperature controlled conditions from sampling until receipt at the laboratory from which time sample preparation and storage was determined by testing requirements and in line with laboratory's protocols.

4.0 ENCOUNTERED CONDITIONS

A factual record of the conditions encountered during the physical investigation of the site is presented in the following sections.

For further details of the ground conditions, reference should be made to the exploratory hole logs and in situ testing presented in Appendix B, the geotechnical testing results in Appendix C, geochemical testing results in Appendix D, the HazWasteOnline results in Appendix E, the in-situ DCP test results in Appendix F and the soakage testing results in Appendix G.

The physical ground investigation works were undertaken on 16th and 17th February 2023.

Unless stated otherwise, all depths are reported as metres below ground level (m bgl).

4.1 Soils

With reference to British Geological Survey (BGS) mapping, the geology of the site was anticipated to comprise a thickness of Made Ground and/or Topsoil over the London Clay Formation, with soils of the Wittering Formation (overlying London Clay Formation) possibly present within the far southern portion of the site.

The ground conditions encountered within the exploratory holes undertaken were broadly consistent with those anticipated, i.e. a thickness of Topsoil overlying clay and sand of the London Clay Formation. Made Ground soils were encountered within the low-level bund located around the perimeter of the site. Strata characteristic of the Wittering Formation were not encountered. A generalised summary of the encountered shallow ground conditions is presented in Table 4.1.

It is noted that whilst a previous third party investigation reportedly encountered Made Ground soils in exploratory holes within the main site area, such soils were not encountered within exploratory holes (apart from in the bunds) as part of this phase of investigation. Whilst the third party report referenced inclusion of anthropogenic materials such as brick and concrete, some underlying strata were also reported as Made Ground but their descriptions did not include any anthropogenic inclusions. It is unknown whether ground levels have been altered within the site between the two phases of investigation. It would be prudent to review historic and recent topographic surveys to determine if any level changes (increase or reduction) might have taken place.

Top (m bgl)	Base (m bgl)	Geology	Positions
0.00	0.10 – 0.60	TOPSOIL: Brown sandy gravelly clayey SILT with frequent rootlets.	BH01-BH02, TP01-TP08, WS01-WS06
0.00	0.50 – 1.00	MADE GROUND: Firm brown and orangish brown slight sandy CLAY with frequent rootlets. Glass and tile fragments noted to be present	TP09, TP10
0.10 – 0.60	20.45+ (base of hole)	LONDON CLAY FORMATION: Firm to stiff (but locally soft) brown to orangish brown mottled grey sandy CLAY; Loose to medium dense brown and grey mottled clayey SAND; Stiff to very stiff grey sandy CLAY; Stiff grey silty CLAY.	BH01-BH02, TP01-TP08, WS01-WS06

Table 4.1 Ground condition summary

Trial pits TP09 and TP10 were located within the low-level bund that runs along the perimeter of the site and encountered Made Ground.



For more detailed descriptions at specific locations, reference should be made to the exploratory hole logs presented in Appendix B and the exploratory hole location plan is presented in Figure 3.

4.2 Groundwater

Groundwater was encountered within a number of exploratory holes during the intrusive investigation works and was generally noted to be present within the sandier and gravelly horizons of the London Clay Formation. Water strikes are summarised in Table 4.2 below.

Hole ID	Strike Depth (m bgl)	Standing Depth* (m bgl)	Geology and Inflow Details
BH01	10.50	10.00	London Clay - Fast
BH02	9.50	8.90	London Clay - Fast
TP02	1.80	-	London Clay - Seepage
TP03	2.20	-	London Clay - Seepage
TP04	3.00	-	London Clay - Seepage
TP05	2.40	-	London Clay - Seepage
TP06	3.10	-	London Clay - Seepage
TP08	3.10	3.00	London Clay - Slow
WS01	2.90	2.90	London Clay - Fast
WS02	2.06	2.06	London Clay - Fast
WS05	3.44	3.07	London Clay - Fast

Note: * standing depth recorded after drilling suspended for 20 minutes

Table 4.2 Summary of Water Strikes during Intrusive Investigation Works

It is possible that groundwater could be present at differing depths over time, e.g. during or following prolonged wet periods. The presence of groundwater in excavations could influence suitability and constructability of foundations, services and the like.

It should be noted that changes in groundwater and perched water levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a series of standpipes or piezometers installed within appropriate response zones.

4.3 Obstructions

No obstructions were encountered during the intrusive investigation works undertaken. The presence of natural and/or manmade obstructions elsewhere on site cannot be discounted.

4.4 Geotechnical Testing

The results of geotechnical testing undertaken as part of the ground investigation are summarised in Table 4.3, with test results presented in Appendix C.

Parameter	London Clay Formation
Natural Moisture Content (%)	15 – 35
Liquid Limit (%)	31 – 65
Plastic Limit (%)	18 – 26
Plasticity Index Ip (%)	12 – 40
Modified Plasticity Index Ip' (%)	11 – 39
pH	6.4 – 8.1
Water soluble sulphate (mg/l)	100 - 210

Table 4.3 Summary of Geotechnical Laboratory Test Results

In-situ Standard Penetration Tests (SPTs) were taken within the cable percussive boreholes (BH01-BH02) and within the window sampler boreholes (WS01-WS06). These results ranged between SPT 'N' values of N=8 (firm/stiff) to N=62 (very stiff) within the cable percussive boreholes and between SPT 'N' value of N=3 (soft) to N=20 (stiff) within the window sampler boreholes corresponding with a general increase in inferred strength with depth, as shown on Figure 4.

The Modified Plasticity Indices showed the cohesive soils of the London Clay Formation to be of Low to Medium Volume Change Potential as defined in NHBC guidance. However, it must also be noted that the previous third party investigation identified the presence of soils of High Volume Change Potential and this must also be accounted for in any foundation design.

4.5 Chemical Analysis

In order to assess the general chemical quality of the strata encountered, samples of soils recovered from the exploratory holes were submitted for analysis for a range of potential contaminants selected on the basis of the findings of the desk study and supported by CLR publication CLR8 and Environment Agency R&D66 publication.

The testing rationale included sampling and analysis to provide a general coverage of the subject site. Testing was undertaken for a broad range of commonly occurring contaminants including metals, metalloids, inorganic compounds, speciated TPH, PAH, asbestos and pesticides.



5.0 ENGINEERING CONSIDERATIONS

Subsequent to intrusive investigation of the site and receipt of the laboratory test results, the following geotechnical assessments have been made.

5.1 Conventional Foundations

Based on the ground and groundwater conditions encountered in the exploratory holes, it is considered that conventional shallow foundations may be suitable for the proposed low rise development (2 – 2.5 storey buildings) within areas of the site, subject to considerations of the variability of soil strength recorded from in-situ testing and soil logging and subject to tree influence. Foundations should be taken below any, root zones, and disturbed ground and into or onto the medium to high strength (firm to very stiff) clay, sandy clay or sand of the London Clay Formation. However, the presence of soft clays and tree influence could require deepening of foundations and possibly require piled foundations for some plots (subject to results of tree survey and detailed design).

On the basis of the results of the Atterberg Limit tests from this and the previous third party investigation it is considered that the cohesive soils of the London Clay Formation should be classified '*en-masse*' as High Volume Change Potential, as defined by NHBC Standards, Chapter 4.2, for which a minimum founding depth of 1.00m bgl is required. However, it is also likely that localised deepening of foundations would be required if/where variable strength soils are present and for foundations constructed within the zone of influence of trees (up to c. 20-25m from high water demand trees) and that piled foundations could be required within 5-10m of high water demand trees, or in areas where shallow groundwater has been identified due to the potential for constructability issues.

Minimum recommended foundation depths (below existing ground level) where soft strength soils have been recorded from either in-situ testing or soil logging below the already recommended 1.0m bgl minimum founding depth are presented in Table 5.1 and take into account observations, in-situ and laboratory testing results. These depths are indicative minimum depths and do not take account of tree influence depths which could require localised deepening, if/once the species of removed trees have been confirmed. If such confirmation is not possible then they should be assumed to comprise high water demand species.

Location	Minimum foundation depth (m bgl)
BH01	1.10*
TP02	1.10*
TP05	1.70*
TP08	1.20*
WS01	1.10*
WS02	1.50*
WS06	1.20*

Note: * assumes soft clays are not present at the stated depth; this table is provided for indicative purposes and does not negate a requirement for detailed foundation design

Table 5.1 Summary of minimum foundation depths based on the presence of soft clay soil

It is noted conventional foundations are often constructed to a depth of 1.2-1.5m bgl on many sites to accommodate services and the like and thus if also adopted for this site would result in foundations terminating below the minimum recommended depth for several of the locations listed in Table 5.1. This also assumes that the development level is consistent with the existing ground level. Changes (increase or reduction) in ground level will affect the recommendations presented herein and must be considered as part of the detailed foundation design. Foundations terminating in, on or loading soft clay will not be suitable.

Groundwater levels on site would be expected to be higher during winter months and following periods of wet weather and could result in instability, or significant constructability issues where encountered. If groundwater is



present within the foundation construction depth zone and cannot adequately be controlled, then conventional foundations are unlikely to be constructable and an alternative foundation solution could be required. It is possible that summer construction might help to alleviate or mitigate constructability risks, albeit this is subject to prevailing weather conditions at the time.

Foundations which are proposed in proximity to trees should be designed in accordance with NHBC Standards Chapter 4.2. In addition, foundation depths should be designed to account for the presence and/or removal of trees.

Where conventional foundations are proposed, a preliminary net allowable bearing capacity of 75kPa is considered appropriate for the firm to very stiff clay soils and loose sand soils of the London Clay Formation, this being limited to reflect the variability in the presence of firm clay at or below the anticipated founding depth. Total settlement should remain within tolerable limits for the recommended allowable bearing capacity. Foundations terminating in, on or loading soft clay will not be suitable.

It is recommended that foundation excavations be concreted or blinded as soon after excavation as possible. Where concreting could take place the following day it is recommended that excavations are not taken to full depth overnight and that the final 0.5m of cover is only removed immediately prior to concreting. Long, deep excavations should be avoided in order to mitigate the risk of trench side collapse prior to concrete pour. Any abutting sections of foundation which are formed as separate pours should be reinforced, e.g. with mesh, rods, dowels or the like, to tie-in the adjoining sections.

Minimum recommended foundation depths have been derived taking into account observations, in-situ and laboratory testing results, including the recorded variability in soil strength. These depths do not take account of tree influence depths which could also require localised deepening once the species of trees have been identified and considered in relation to the proposed development plan.

Foundations greater than 2.50m deep would require structure-specific design by a structural engineer. Alternatively, piled foundations could be constructed in lieu of deep strip foundations.

Heave protection measures in accordance with NHBC Standards will be required where foundation depths exceed 1.50m and where foundations pass through desiccated ground. Foundations should be a minimum 450mm in width.

Tree influence (remaining, removed or proposed) on foundation depth should be determined during the design of foundations. The requirement for, specification and inclusion of void former to the sides of foundations should also be determined during foundation design.

Where foundations are proposed to be constructed within the zone of influence of trees It is possible that foundations would need to be deepened to account for the presence and influence of trees. It is possible that foundation bases would require to be stepped and as such, it is recommended that steps do not exceed 0.50m in height at any point and are at least 1.00m (lateral distance) away from any corner or node point on the foundations. Where this cannot be accommodated, the foundation should be formed at the greater depth.

Where constructability is an issue due to the presence of shallow groundwater, ground instability or proposed loadings cannot be accommodated on conventional foundations, a piled foundation for the site may be more appropriate with piles terminating within competent strata at depth. Piled foundations are considered further in Section 5.2 below.

Given the variability in ground conditions, it is recommended that reinforcement is included in all foundations.



5.2 Piled Foundations

On the basis of the ground conditions encountered, including the presence of variable strength soils beneath the site, or for structures in excess of two storeys it is considered that a piled foundation solution may be required.

The construction of a piled foundation is a specialist job and the advice of a reputable contractor familiar with the type of ground and groundwater conditions encountered on this site should be sought prior to finalising the design. The actual working load for proposed piles will depend on the particular type of pile and method of installation adopted.

Preliminary load capacities calculated for single, vertically loaded continuous flight auger piles taken into the London Clay Formation are given in Table 5.2. The values should be used for preliminary purposes only, as the actual working load is dependent on the type of pile and method of installation. Piles should be taken at least five times the pile diameter into the founding strata.

Pile Type	Pile Diameter (m)	Pile Depth (m)	Working Load (kN)
CFA	0.30	6.00	50
		8.00	80
		10.00	120
		12.00	170
		15.00	250
	0.40	6.00	70
		8.00	120
		10.00	170
		12.00	240
		15.00	350
	0.60	6.00	140
		8.00	210
		10.00	300
		12.00	400
		15.00	570

Table 5.2 Preliminary geotechnical load capacities (BH01-BH02)

These working loads have been calculated on the basis of the ground and groundwater conditions encountered in the boreholes and assume the following:

- The contribution to the working load on the upper 3.00m has been ignored.
- For the calculation of Safe Working Load, factors of safety of 3 were used on the skin friction and end bearing working loads.
- No allowance has been made for additional forces acting on the pile shaft, such as negative skin friction, or loading due to desiccation or heave forces.

Settlement of single piles is generally assumed to be less than 10mm where pile diameters do not exceed 600mm. For piles of larger diameter, settlement can become a critical factor.

The bearing values given are applicable to single vertically loaded piles. BRE Research indicates that where groups of piles are to be constructed at 2* pile diameter centre to centre spacing or less, the bearing value of each individual pile should be reduced by a factor of 0.8 and a calculation made to check for the factor of safety against block failure.



The piling contractor should be aware that the boreholes were cased during drilling to a depth of 15.00m bgl and thus might have masked water inflows at depths other than those recorded. Any requirement for casing during pile construction will ultimately depend on the method of construction, i.e. casing might be required for a cast in-situ bored pile but not for a driven pile. Continuous Flight Auger (CFA) piles do not generally require casing as the auger supports the pile bore during formation and concreting. The piling contractor should ensure that the piles are constructed satisfactorily and that necking or other damage to the pile shaft does not arise during construction.

A working platform may be required for the piling plant to traverse and operate on. This should be clarified once piling plant and relevant load cases have been confirmed. The design of a temporary working platform should be undertaken in accordance with BRE Report BR470, or similar good practice guidance.

5.3 Floor Slabs

Given the presence of shrinkable soils, suspended floor slabs are recommended. The minimum void height should be determined in accordance with NHBC Standards and account for the volume change potential of the underlying soils. Preliminary assessment indicates a minimum void of 300mm but this should be verified during detailed design.

5.4 Excavations

Excavations within the clay soils at the site are likely to be stable in the short to medium term provided they remain free of water and are not surcharged. The stability of excavations will also be reduced where sand lenses or gravel bands are present and where exposed to water. Large scale excavations and those left unsupported for long time periods are likely to become rapidly unstable. The stability of excavations will also be reduced where exposed to surface water or perched water.

Long and/or deep excavations across sloping ground should be avoided due to their potential to initiate instability of the ground upslope of the excavation and possible catastrophic collapse.

The need for entry into excavations should, where possible, be designed out. However, where this cannot be achieved a full risk assessment should be undertaken and entry of any personnel only permitted in accordance with an approved risk assessment, method statement and safe system of work.

5.5 Pavements

In-situ CBR testing using a Dynamic Cone Penetrometer (DCP) was undertaken at 6No. locations across the site, so as to provide general coverage. The results of the testing were generally in the range of 3% to 19%. This was supported by laboratory testing of shallow clay soils encountered across the site. With reference to Table C1 of TRRL LR1132, a CBR value of between 3% and 5% would be recommended depending on construction conditions. Based on the results, a preliminary CBR of 3% is recommended for the shallow soils across the site or further testing may be required. This also accords with Table A, Appendix A of HCC's Companion Document to Manual for Streets.

The shallow soils should be assumed to be frost susceptible thus requiring a minimum pavement thickness of 450mm. Any hard or soft spots in the formation level may induce reflective cracking in the pavement and allowance should be made for removing hard or soft spots that may be present.

5.6 Sub-Surface Concrete

The results of the water soluble sulphate and pH analyses indicate buried concrete should be designed in accordance with Class DS-4 of BRE Special Digest 1, with an ACEC class of AC-3s. The advice of this publication should be taken for the design and specification of all sub surface concrete.

5.7 Soakaways

Trial pit soakage testing was undertaken within 3No. trial pits, TP03, TP04 and TP08. The water level was observed to have risen within pits TP03 and TP04 over the course of the soakage testing. There was an insufficient fall in head to calculate an infiltration rate for the test undertaken within location TP08 over the testing period and as such the test is deemed to have failed.

As such, only one round of testing was undertaken within each of the pits and all three pits were abandoned and backfilled after the first soakage test. The detailed results presented in Appendix G.

The results of the soakage testing indicate that the use of soakaways within the cohesive London Clay Formation would not be suitable and therefore an alternative drainage solution will need to be considered.

In addition, given the sloping condition of the site and presence of clay-rich strata, overland flow across the construction surface could occur during construction and measures should be incorporated to intercept and divert any such overland flow, including prevention of sediment laden waters entering the watercourse network.

6.0 ENVIRONMENTAL CONSIDERATIONS

A Generic Quantitative Risk Assessment (GQRA) incorporating the results of the desk study and ground investigation was undertaken, the findings of which are presented in the following sections.

As stated in Section 3, site workers involved in the preparation and construction of the development have not been considered further in this assessment as the Principal Contractor is duty bound under the current CDM Regulations to undertake their own risk assessments with respect to their employees.

6.1 Outline Risk Assessment

A number of plausible pollutant linkages were identified as part of the desk study. The investigation did not encounter conditions that warranted a revision of the preliminary Conceptual Site Model.

6.2 Soil Contamination vs. End Users

The presence of a possible contaminant does not necessarily imply that a site or area is contaminated or that there is any unacceptable risk to human health. A Preliminary Quantitative Risk Assessment has been undertaken in order to evaluate any unacceptable risks posed to human health with respect to the proposed redevelopment. It should be noted that this assessment is protective of the chronic long-term effects of contaminants, which is also likely to be protective of any possible immediate acute effects.

A quantitative risk assessment has been undertaken by comparing the results of the laboratory chemical testing of shallow soils against Tier 1 screening criteria in the first instance. These criteria comprise the Atkins ATRISK soil screening values (SSVs), the Suitable for Use Levels (S4ULs) published by LQM (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3453. All rights reserved) and the Category 4 Screening Levels (C4SLs) published by DEFRA. Although the C4SLs were released for Part 2A use, the associated policy companion document for the C4SLs indicated that they may also be used for planning. Although the C4SLs represent a marginally higher risk level than the SSACs (low risk rather than minimal risk) it is considered that the risk levels remain very low. Therefore, the final C4SLs are considered to be suitable to assess soils under the planning regime.

The exploratory holes were located to provide general coverage of the site in line with the proposed development use and soils conditions encountered within exploratory hole positions. Samples were selected to target shallow soils and underlying natural ground and to provide coverage of the site. Analysis was undertaken on soil samples collected from these exploratory holes.

In the first instance the results of the sample analysis were compared to the Tier 1 screening criteria, for a residential with plant uptake use, where available. All of the results were noted to be below the respective assessment criteria, therefore further assessment was not considered necessary.

In addition, samples submitted for laboratory testing were also screened for asbestos. Geochemical testing of the shallow soils across the site has not returned any positive identification for asbestos. Nonetheless, the absence of asbestos in samples analysed does not mean that asbestos might not be present at locations remote from exploratory holes. If/where any such materials are encountered, or suspected, further assessment will be required in accordance with the Discovery Strategy presented in Section 7 of this report.

As such, it is considered that remedial action would not be warranted to protect end users of the proposed residential development.



With regards to the Topsoil encountered across the site, no anthropogenic materials were recorded as being present within the Topsoil material encountered during the Geo-Environmental investigation works. Therefore, the encountered upper soils as encountered have been recorded as Topsoil. With reference to the T&P Regeneration 2018 report, Made Ground was recorded at shallow depths within a number of investigation locations across the Phase 8A area. A review of the T&P exploratory hole logs and associated photographs has been undertaken and the materials logged as Made Ground appear to have been logged as Made Ground due to the occasional and rare presence of brick, ceramic and concrete fragments. As the site's former use is primarily agricultural it is considered likely that this anthropogenic material may have been deposited at surface to enable access across the site in wet and soft conditions during wetter periods and winter months. Chemical testing of the demonstrated that the soils encountered on the site would be suitable (from a geochemical perspective) for the proposed residential end use.

Made Ground was recorded as being present within the low-level bund which runs around the majority of the perimeter of the site. The nature of the Made Ground identified within this low-level bund, was such that it is unlikely to be suitable to be retained within the upper portion of proposed garden areas and areas of soft landscaping as subsoil (or Topsoil). The Made Ground was noted to include extraneous materials such as glass, tile and polystyrene. Therefore, it is recommended that the material within the low-level bund is not utilised within any proposed garden areas or areas of soft landscaping across the site.

Should Topsoil need to be imported onto site, for use within private gardens and soft landscaped areas of the site, prior to importation, the chemical, physical and nutritional suitability should be verified. Importation of Topsoil or subsoil from unverified or unsuitable sources would require their removal from site and replacement with suitable materials. As a matter of good practice, it is recommended that the location, approximate extent and thickness of any imported Topsoil are recorded and presented in the Validation/Verification Report to be prepared by the Environmental Consultant.

6.3 Soil Contamination vs. Soft Landscaping

British Standard BS3882:2015 *Specification for topsoil and requirements for use* provides assessment criteria for a number of potentially phytotoxic contaminants in terms of new planting.

The results of the chemical analysis for determinands known to pose a potential phytotoxic risk to plant growth are summarised in Table 6.1, together with the respective adopted Generic Assessment Criteria (GAC) for plant growth. The compliance criteria set out in BS3882:2015 are pH dependent and thus the GAC used relate to the pH range measured on samples recovered from the site.

Determinand	Phytotoxicity GAC (mg/kg)			GAC Exceedances
	pH <6.0	pH 6.0-7.0	pH >7.0	
Zinc	200	200	300	No
Copper	100	135	200	No
Nickel	60	75	110	No

Table 6.1 Summary of Plant Phytotoxicity Assessment

The phytotoxicity assessment did not identify any exceedance against the relevant phytotoxicity criteria. As such it is considered that no specific measures are required in this respect.

6.4 Soil Contamination vs. Built Environment

Recommendations with respect to pH and sulphate in relation to buried concrete are made in Section 5.6.

The current guidance on the selection of materials for water supply pipes to be laid in contaminated land is



contained in UK Water Industry Research's (UKWIR) report reference 10/WM/03/21 (re-issued 2010). However, the guidance is not mandatory and there have been concerns raised by various industry technical associations regarding the document and the methodologies proposed.

Although there are concerns regarding the document, in lieu of any further guidance, in the first instance the results of the investigation have been compared with the proposed thresholds published in UKWIR Table 3.1. As such, the utility company should be consulted in order to confirm their specific requirements in this respect, at this time subject to further confirmation it is considered that specific protection measures are unlikely to be required for potable water supply. As a matter of good practice and to maximise the protection to maintenance workers, it is recommended that clean, granular backfill is used in service runs and that marker tapes are used for all buried services.

6.5 Soil Contamination vs. Adjacent Land Users

Accounting for the recommendations set out in Section 6.2 with respect to end users, it is considered that no long-term exposure scenarios exist and thus no specific remedial action is warranted in relation to adjacent land users.

However, short term risks to adjacent land users may arise in relation to the generation of soil derived dust and particles as fugitive emissions from the site during the construction phase. Therefore, it is recommended that dust suppression techniques, e.g. damping down exposed soils, are employed during the ground works and construction phases on site in order to minimise and manage potential nuisance issues for adjacent land users.

6.6 Soil Contamination vs. Groundwater

The investigation did not identify any mobile contamination and thus in the absence of a pollutant linkage, no further action is warranted.

6.7 Groundwater Contamination vs. Human Health

The desk study did not identify any potential sources of highly mobile contamination on the site and the intrusive investigation works have not identified any mobile contamination within the soils analysed on the site.

Due diligence should be undertaken as a part of the site clearance and development works and if any currently unidentified potential sources of mobile contamination are identified these should then be further assessed in line with the discovery strategy for the site.

End users would not come in to contact with groundwater and thus in the absence of a plausible pollutant linkage between groundwater and end-users, no specific protection measures are considered likely to be required in this respect.

6.8 Groundwater Contamination vs. Soft Landscaping

Shallow continuous groundwater has not been identified beneath the site to date. As such, it is considered that no specific action is warranted with respect to soft landscaping.

6.9 Groundwater Contamination vs. Built Environment

Protection measures for the Built Environment as discussed in Section 6.4 are considered appropriate.



6.10 Groundwater Contamination vs. Controlled Waters

In the absence of any evidence of mobile contamination and the absence of shallow groundwater beneath the site, no remedial action is considered to be warranted in this respect.

However, should dewatering be required as part of the proposed development then water pumped out will need to be disposed of under the appropriate duty of care and should not be discharge to any watercourses or ditches without an appropriate permission.

6.11 Waste Disposal

The soil analyses from the site were assessed using HazWasteOnline software. None of the samples assessed were indicated to comprise properties attributable to hazardous waste. The HazWasteOnline results are included within Appendix E.

Natural soils at the site are considered likely be classified as Inert Waste (under the respective EWC codes), suitable for disposal at an inert landfill facility, where they are free for asbestos or mobile contaminants. Any soils identified as containing asbestos or mobile contaminants e.g. hydrocarbon may be classified as Hazardous waste.

It must be noted that any waste classification assessment is indicative only and actual classification would depend on permit status of the final disposal facility. Once soils for disposal have been identified it is recommended that further testing of these specific soils be undertaken in order to confirm the above assessment.

In accordance with the CL:AIRE Definition of Waste Code of Practice (2011) materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded by the holder'.

The Code of Practice therefore allows soils to be reused on site where the following criteria are met:

- The re-use of the soils will not present an unacceptable or increased risk to controlled waters, the environment and human health;
- The soils are suitable both in terms of chemical and geotechnical properties for the intended use without prior treatment;
- Only the required volume is used and no more;
- There is a required use and a certainty of use not just a possibility.

In order to comply with the Code of Practice, a Materials Management Plan (MMP) that confirms the above criteria are met must be prepared. The MMP must be reviewed by a 'Qualified Person' who then issues a declaration to the Environment Agency. The MMP and declaration must be in place before soils are excavated and it cannot be applied retrospectively. Geo-Environmental can provide this service should it be required.

Where materials do not meet the required criteria, it may be possible to treat them under an environmental permit so that they may be re-used on site. In addition, where material is discarded as waste, it may still be possible to reuse the waste on site under a standard rules environmental permit or a U1 waste exemption. However, strict limits on the volumes that can be reused apply in these cases.

Under current legislation, where wastes are to be disposed of to landfill, they may, depending on their classification, require pre-treatment. Pre-treatment shall comprise a chemical, physical (including sorting), thermal or biological process. The pre-treatment is required to change the characteristics of the waste, reduce its volume, reduce its hazardous nature, and facilitate its handling and enhance its recovery.

Other materials disposed of from site as part of the development of the site may require disposal separately. All materials containing dangerous substances e.g. tar or bitumen, asbestos, mercury, hydrocarbons, PCBs and asbestos are likely to be classified as Hazardous Waste and therefore susceptible to the relevant legislative controls.



7.0 DISCOVERY STRATEGY

Whilst an intrusive investigation has been undertaken on the site, it remains possible that unexpected ground and/or groundwater conditions may be encountered during the process of construction.

Should previously undiscovered contamination or unforeseen ground conditions be encountered during construction by the ground workers, this must be reported to the Site Manager immediately in order that the Consultant is notified.

Where deemed necessary, the Consultant shall attend the site to inspect the discovery and provide recommendations on the further actions required, if any. Where necessary the regulatory authority shall be informed. Post any additional investigation or laboratory testing the results and any proposed remedial measures shall be reported to the regulatory authority or other appropriate organisation for consent, before proceeding or implementing the remedial measures.

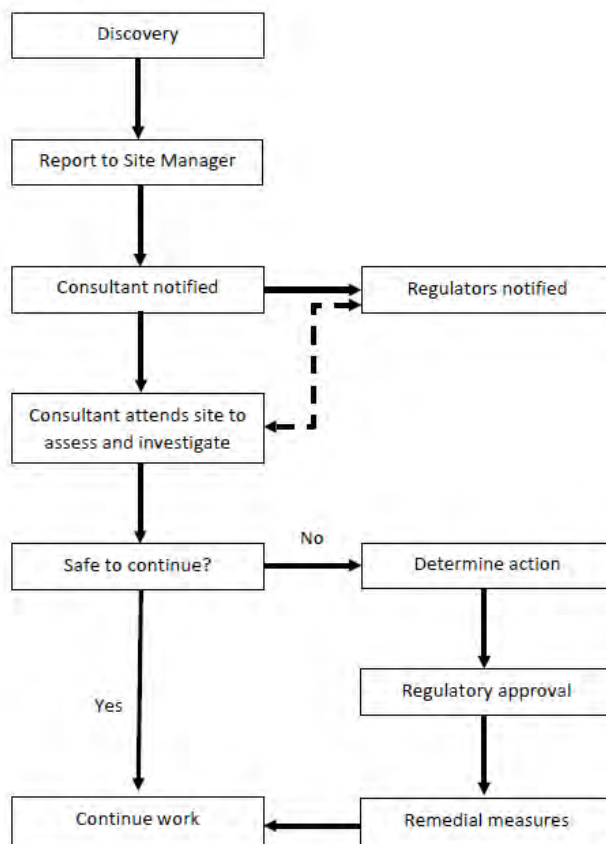
A copy of the discovery strategy must be lodged on site, and provisions made to ensure that all workers are made aware of their responsibility to observe, report, and act on any potentially suspicious, abnormal, unforeseen or contaminated ground and/or groundwater conditions they may encounter.

Depending on the type, nature and extent of any such 'discovery', it may be necessary to halt works in that location until such time as the assessment has been completed. This shall be reviewed on a 'discovery' specific basis and in conjunction with consultation with the client, other technical personnel and/or regulatory/approval organisations.

As a general guide, where such unexpected conditions are encountered the following approach is required as a minimum:

- All discoveries are to be reported to the Site Manager immediately and works at that location are to halt until further notice;
- The Site Manager is to report any such discoveries to the Client and the Consultant;
- Following notification from the Site Manager, the Consultant shall discuss the discovery with the Local Authority and/or other relevant parties and if considered necessary, arrange to meet on site to view the discovery;
- The Consultant shall attend the site to record the location, extent and nature of the discovery and implement an appropriate sampling and analysis regime, taking due account of the type and nature of the discovery, known and probable land uses in that area of the site;
- Where remedial action is required, regulatory consultation and approval will be sought;
- A record will be produced by the Consultant and held on site (with copies held by the Consultant, Client and Local Authority/other relevant organisation), detailing the discovery, assessment works undertaken, findings thereof, confirmation either of no action required or detailing the remedial action taken and validation thereof.

The process is summarised overleaf:



Discovery Strategy Process



FIGURES



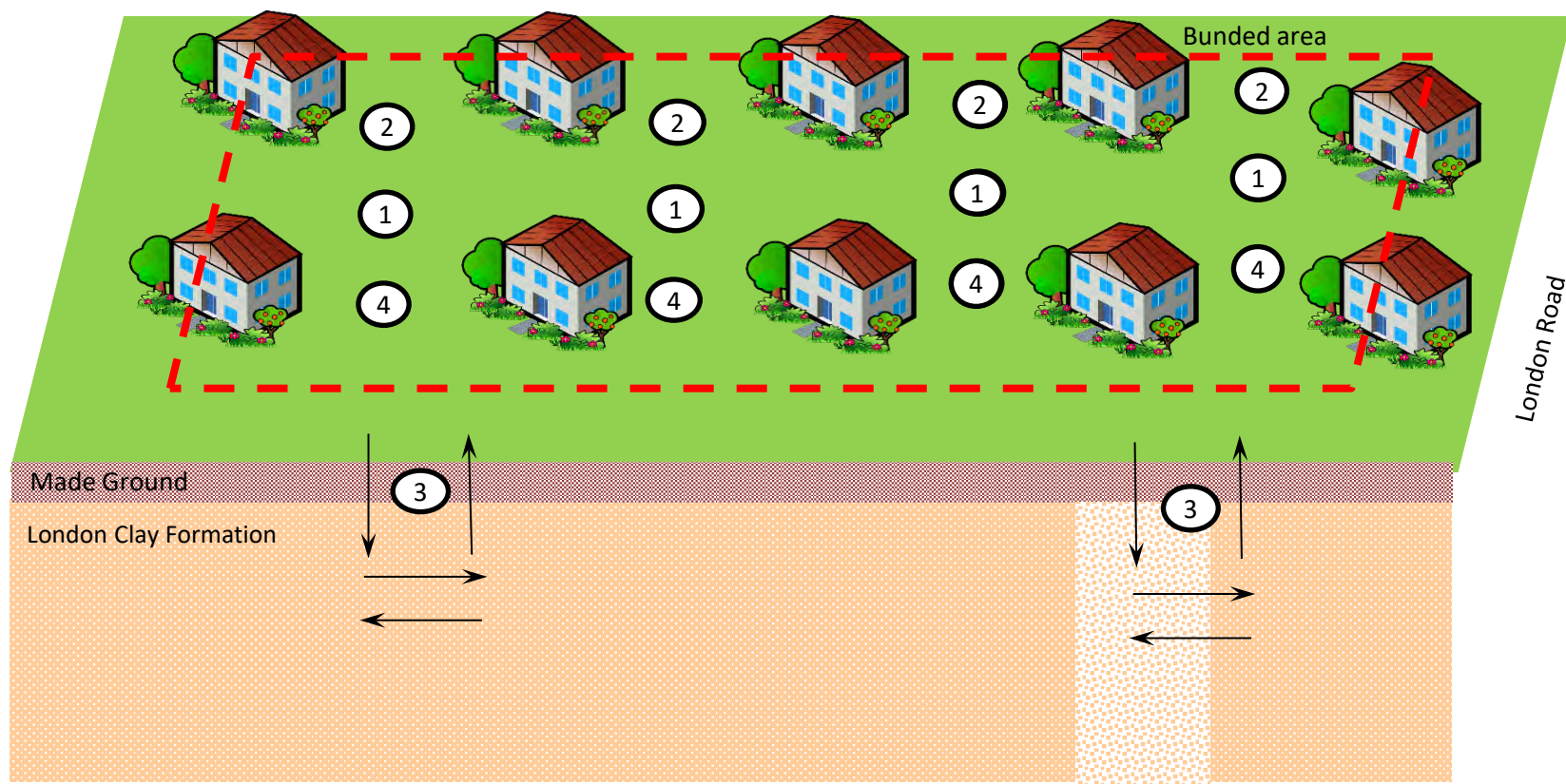


Project:	Phase 8A - Berewood			Title	Site Location Plan	
Client:	Bloor Homes Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	 Geo-Environmental	
Ref No:	GE21512	Revision:	1.0			
Drawn:	TM	Date:	12/02/2023			
Figure:	1	Scale:	Not To Scale			



Possible Pollutant Linkages:

1. Direct contact with contaminated soils, ingestion/inhalation of contaminated soils
2. Inhalation of soil dusts indoor and outdoor, and inhalation of gases/vapours within buildings
3. Vertical and lateral migration through permeable strata and with groundwater
4. Chemical attack of buried plastic and concrete by aggressive ground conditions



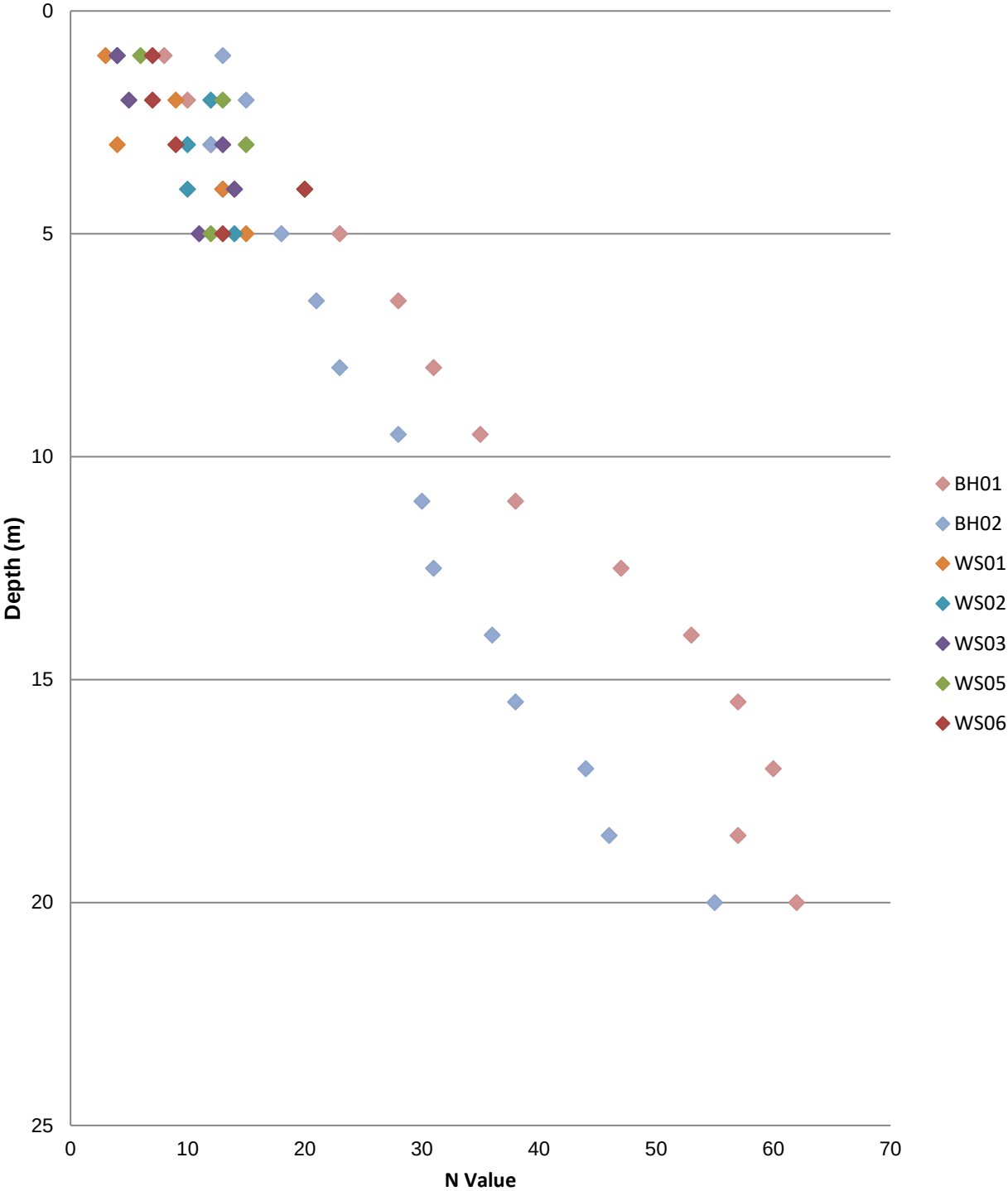
Project:	Phase 8A Berewood			Title	Conceptual Site Model	
Client:	Bloor Homes Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net  Geo-Environmental		
Ref No:	GE21512	Revision:	1			
Drawn:	TU	Date:	16/02/2023			
Figure:	2	Scale:	Not To Scale			



Project:	Phase 8A - Berewood			Title	Exploatory Hole Location Plan	
Client:	Bloor Homes Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net  Geo-Environmental		
Ref No:	GE21512	Revision:	1.0			
Drawn:	TM	Date:	27/02/2023			
Figure:	3	Scale:	Not To Scale			



 Geo-Environmental Services Limited www.gesl.net +44 (0)1273 832 972	SPT N Value Vs Depth
Project ID: GE21512	Project Title: Phase 8A - Berewood
Client: Bloor Homes Southern	Location: Waterloooville



APPENDIX A

Desk Study Information



148, LONDON ROAD, WATERLOOVILLE, PO7 5ST

Order Details

Date: 08/02/2023

Your ref: GE21512

Our Ref: GS-9345318

Site Details

Location: 467714 108874

Area: 6.22 ha

Authority: [Havant Borough Council](#)



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Summary of findings

p. 2 **Aerial image**

p. 8

OS MasterMap site plan

p.13 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
14	1.1	<u>Historical industrial land uses</u>	1	4	11	6	-
15	1.2	<u>Historical tanks</u>	0	0	6	6	-
16	1.3	<u>Historical energy features</u>	0	1	11	16	-
18	1.4	Historical petrol stations	0	0	0	0	-
18	1.5	<u>Historical garages</u>	0	0	4	4	-
19	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
20	2.1	<u>Historical industrial land uses</u>	1	6	14	7	-
22	2.2	<u>Historical tanks</u>	0	0	6	12	-
23	2.3	<u>Historical energy features</u>	0	3	25	43	-
25	2.4	Historical petrol stations	0	0	0	0	-
26	2.5	<u>Historical garages</u>	0	0	5	8	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
27	3.1	Active or recent landfill	0	0	0	0	-
27	3.2	Historical landfill (BGS records)	0	0	0	0	-
28	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
28	3.4	<u>Historical landfill (EA/NRW records)</u>	0	0	0	1	-
28	3.5	Historical waste sites	0	0	0	0	-
28	3.6	Licensed waste sites	0	0	0	0	-
29	3.7	<u>Waste exemptions</u>	0	0	3	0	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
30	4.1	<u>Recent industrial land uses</u>	1	1	12	-	-
31	4.2	<u>Current or recent petrol stations</u>	0	0	0	2	-
32	4.3	Electricity cables	0	0	0	0	-
32	4.4	Gas pipelines	0	0	0	0	-
32	4.5	Sites determined as Contaminated Land	0	0	0	0	-



32	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
32	4.7	Regulated explosive sites	0	0	0	0	-
33	4.8	Hazardous substance storage/usage	0	0	0	0	-
33	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
33	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
33	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	0	0	2	-
34	4.12	Radioactive Substance Authorisations	0	0	0	0	-
34	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	0	3	-
34	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
35	4.15	Pollutant release to public sewer	0	0	0	0	-
35	4.16	List 1 Dangerous Substances	0	0	0	0	-
35	4.17	List 2 Dangerous Substances	0	0	0	0	-
35	4.18	<u>Pollution Incidents (EA/NRW)</u>	0	0	3	3	-
36	4.19	Pollution inventory substances	0	0	0	0	-
36	4.20	Pollution inventory waste transfers	0	0	0	0	-
37	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
38	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
40	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
41	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
42	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
42	5.5	Groundwater vulnerability- local information	None (within 0m)				
43	5.6	Groundwater abstractions	0	0	0	0	0
44	5.7	<u>Surface water abstractions</u>	0	0	0	0	1
44	5.8	Potable abstractions	0	0	0	0	0
44	5.9	Source Protection Zones	0	0	0	0	-
45	5.10	<u>Source Protection Zones (confined aquifer)</u>	1	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
46	6.1	<u>Water Network (OS MasterMap)</u>	0	5	19	-	-



48	6.2	<u>Surface water features</u>	0	3	10	-	-
49	6.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
49	6.4	<u>WFD Surface water bodies</u>	0	0	0	-	-
49	6.5	WFD Groundwater bodies	0	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
51	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
51	7.2	Historical Flood Events	0	0	0	-	-
51	7.3	Flood Defences	0	0	0	-	-
52	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
52	7.5	Flood Storage Areas	0	0	0	-	-
53	7.6	Flood Zone 2	None (within 50m)				
53	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
54	8.1	<u>Surface water flooding</u>	1 in 30 year, 0.3m - 1.0m (within 50m)				
Page	Section	Groundwater flooding					
56	9.1	<u>Groundwater flooding</u>	Negligible (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
57	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
58	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
58	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
58	10.4	Special Protection Areas (SPA)	0	0	0	0	0
58	10.5	National Nature Reserves (NNR)	0	0	0	0	0
59	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
59	10.7	<u>Designated Ancient Woodland</u>	0	0	0	1	27
60	10.8	Biosphere Reserves	0	0	0	0	0
60	10.9	Forest Parks	0	0	0	0	0
61	10.10	Marine Conservation Zones	0	0	0	0	0
61	10.11	Green Belt	0	0	0	0	0
61	10.12	Proposed Ramsar sites	0	0	0	0	0



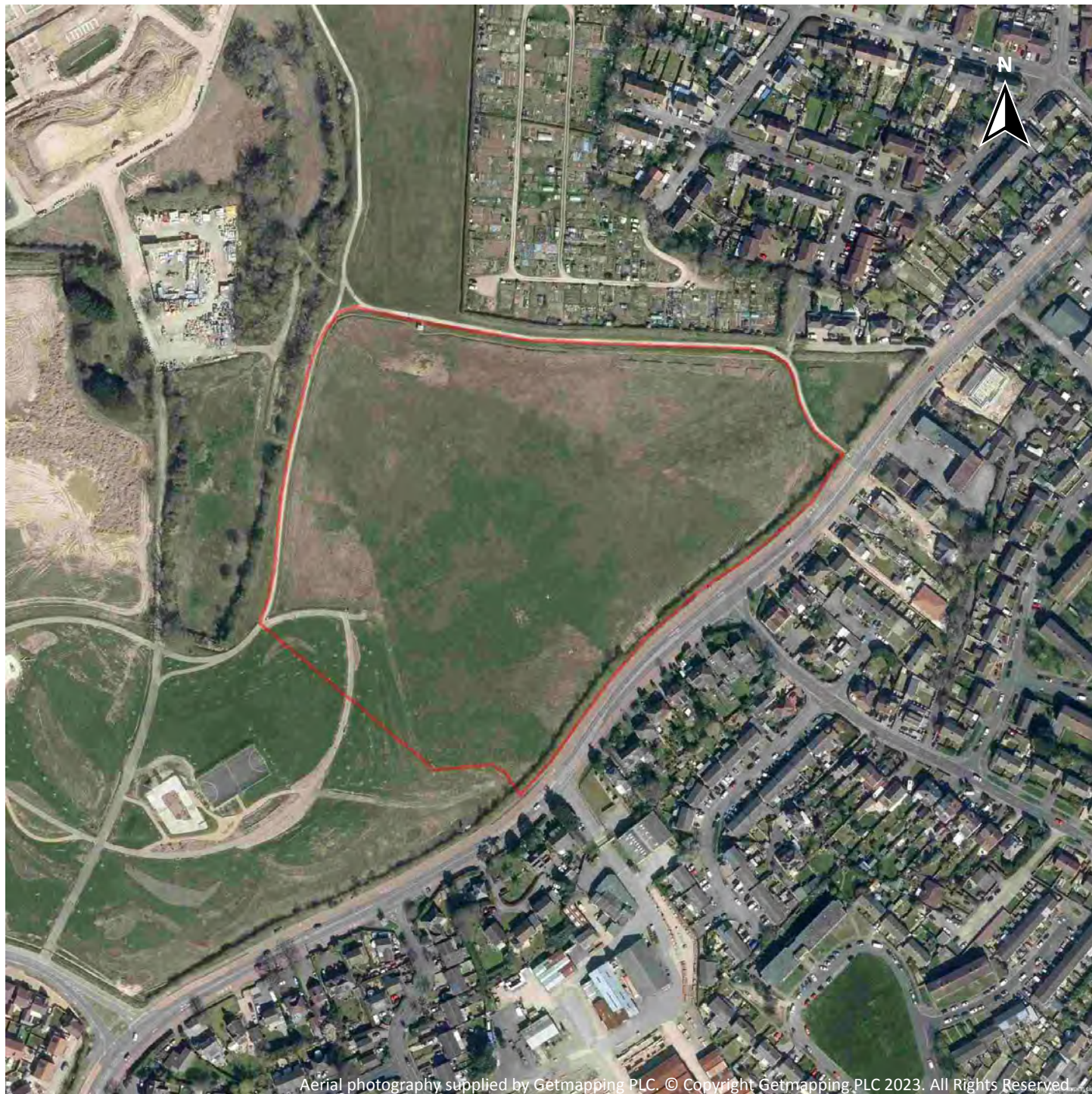
61	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
61	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
62	10.15	Nitrate Sensitive Areas	0	0	0	0	0
62	10.16	<u>Nitrate Vulnerable Zones</u>	1	0	0	0	1
63	10.17	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
64	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
65	11.1	World Heritage Sites	0	0	0	-	-
65	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
65	11.3	National Parks	0	0	0	-	-
65	11.4	Listed Buildings	0	0	0	-	-
66	11.5	Conservation Areas	0	0	0	-	-
66	11.6	Scheduled Ancient Monuments	0	0	0	-	-
66	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
67	12.1	<u>Agricultural Land Classification</u>	Grade 3a (within 250m)				
68	12.2	Open Access Land	0	0	0	-	-
68	12.3	Tree Felling Licences	0	0	0	-	-
69	12.4	Environmental Stewardship Schemes	0	0	0	-	-
69	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
70	13.1	Priority Habitat Inventory	0	0	0	-	-
70	13.2	Habitat Networks	0	0	0	-	-
71	13.3	<u>Open Mosaic Habitat</u>	0	0	1	-	-
71	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
72	14.1	<u>10k Availability</u>	Identified (within 500m)				
73	14.2	Artificial and made ground (10k)	0	0	0	0	-
74	14.3	<u>Superficial geology (10k)</u>	0	0	1	2	-

75	14.4	Landslip (10k)	0	0	0	0	-
76	14.5	<u>Bedrock geology (10k)</u>	2	1	0	1	-
77	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
78	15.1	<u>50k Availability</u>	Identified (within 500m)				
79	15.2	Artificial and made ground (50k)	0	0	0	0	-
79	15.3	Artificial ground permeability (50k)	0	0	-	-	-
80	15.4	<u>Superficial geology (50k)</u>	0	0	1	1	-
81	15.5	Superficial permeability (50k)	None (within 50m)				
81	15.6	Landslip (50k)	0	0	0	0	-
81	15.7	Landslip permeability (50k)	None (within 50m)				
82	15.8	<u>Bedrock geology (50k)</u>	2	1	0	1	-
83	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
83	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
84	16.1	<u>BGS Boreholes</u>	4	6	25	-	-
Page	Section	Natural ground subsidence					
87	17.1	<u>Shrink swell clays</u>	Moderate (within 50m)				
89	17.2	<u>Running sands</u>	Low (within 50m)				
91	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
92	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
93	17.5	<u>Landslides</u>	Very low (within 50m)				
94	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
95	18.1	Natural cavities	0	0	0	0	-
96	18.2	BritPits	0	0	0	0	-
96	18.3	<u>Surface ground workings</u>	0	9	2	-	-
97	18.4	Underground workings	0	0	0	0	0
97	18.5	Historical Mineral Planning Areas	0	0	0	0	-



97	18.6	Non-coal mining	0	0	0	0	0
97	18.7	Mining cavities	0	0	0	0	0
97	18.8	JPB mining areas	None (within 0m)				
98	18.9	Coal mining	None (within 0m)				
98	18.10	Brine areas	None (within 0m)				
98	18.11	Gypsum areas	None (within 0m)				
98	18.12	Tin mining	None (within 0m)				
98	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
99	19.1	<u>Radon</u>	Less than 1% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
101	20.1	<u>BGS Estimated Background Soil Chemistry</u>	5	4	-	-	-
101	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
102	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
103	21.1	Underground railways (London)	0	0	0	-	-
103	21.2	Underground railways (Non-London)	0	0	0	-	-
104	21.3	Railway tunnels	0	0	0	-	-
104	21.4	<u>Historical railway and tunnel features</u>	0	0	1	-	-
104	21.5	Royal Mail tunnels	0	0	0	-	-
104	21.6	Historical railways	0	0	0	-	-
105	21.7	Railways	0	0	0	-	-
105	21.8	Crossrail 1	0	0	0	0	-
105	21.9	Crossrail 2	0	0	0	0	-
105	21.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 05/04/2020

Site Area: 6.22ha



Recent site history - 2017 aerial photograph



Capture Date: 21/06/2017

Site Area: 6.22ha



Recent site history - 2013 aerial photograph



Capture Date: 20/08/2013

Site Area: 6.22ha



Recent site history - 2005 aerial photograph



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Capture Date: 16/05/2005

Site Area: 6.22ha



Recent site history - 1999 aerial photograph



Capture Date: 04/09/1999

Site Area: 6.22ha



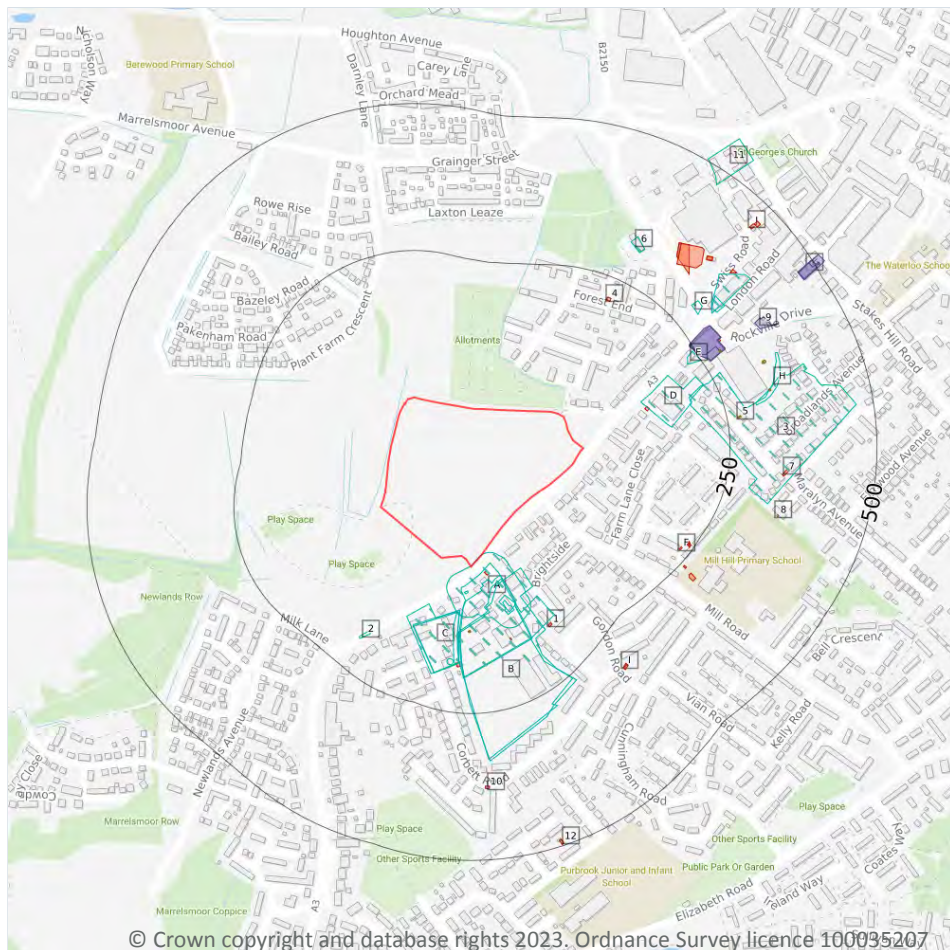
OS MasterMap site plan



Site Area: 6.22ha



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

22

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 14**

ID	Location	Land use	Dates present	Group ID
A	On site	Sawmills	1895	1957780



ID	Location	Land use	Dates present	Group ID
A	20m S	Sawmills	1907 - 1938	1957709
A	35m S	Sawmills	1930	1908604
A	42m S	Saw Pit	1866	1862606
B	49m S	Unspecified Mills	1963	1870342
B	53m S	Timber Yard	1980 - 1991	1945767
A	75m S	Sawmills	1898	1953303
C	76m S	Nursery	1930	1901782
C	80m S	Nursery	1930 - 1938	1960084
C	80m S	Nursery	1963	1930044
A	81m S	Windmill	1866	1873050
D	126m E	Telephone Exchange	1980 - 1991	1963873
C	160m S	Unspecified Tank	1963	1859091
2	174m SW	Smithy	1866	1876073
3	196m E	Nursery	1963	1867648
E	228m NE	Smithy	1866	1876074
G	288m NE	Fire Station	1980	1874268
H	303m E	Unspecified Ground Workings	1898	1853230
6	307m NE	Fire Station	1991	1874267
G	308m NE	Smithy	1898 - 1907	1963930
G	314m NE	Smithy	1895	1907281
11	473m NE	Brick Field	1866	1884675

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

12

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 14**

ID	Location	Land use	Dates present	Group ID
A	109m S	Unspecified Tank	1989	322036
A	109m S	Unspecified Tank	1973	315658
A	110m S	Unspecified Tank	1993	322480
A	138m S	Unspecified Tank	1989	316767
A	139m S	Unspecified Tank	1973	319898
A	140m S	Unspecified Tank	1993	325605
5	268m E	Unspecified Tank	1952 - 1954	321546
E	284m NE	Unspecified Tank	1984 - 1993	313042
H	331m E	Unspecified Tank	1932 - 1939	313723
H	337m E	Unspecified Tank	1984	318878
H	339m E	Unspecified Tank	1952 - 1965	318325
8	349m E	Unspecified Tank	1954	308201

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

28

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 14**

ID	Location	Land use	Dates present	Group ID
A	23m S	Electricity Substation	1973 - 1993	200421
D	125m E	Electricity Substation	1972 - 1993	202910
C	164m S	Electricity Substation	1973 - 1993	205345
1	165m SE	Electricity Substation	1973	191088
4	210m NE	Electricity Substation	1972 - 1993	199284



ID	Location	Land use	Dates present	Group ID
F	232m E	Electricity Substation	1989	191089
F	238m E	Electricity Substation	1973	193721
F	238m E	Electricity Substation	1993	194582
F	239m E	Electricity Substation	1973	195657
F	239m E	Electricity Substation	1987	192487
F	239m E	Electricity Substation	1990	193552
F	239m E	Electricity Substation	1990	193891
F	256m SE	Electricity Substation	1973 - 1993	207995
F	273m SE	Electricity Substation	1983	191090
E	293m NE	Electricity Substation	1989 - 1993	209361
I	307m SE	Electricity Substation	1989	209082
I	308m SE	Electricity Substation	1973 - 1993	208114
G	324m NE	Electricity Substation	1993	193098
G	324m NE	Electricity Substation	1972 - 1990	209971
G	333m NE	Electricity Substation	1982 - 1990	196187
7	342m E	Electricity Substation	1973 - 1990	196956
G	362m NE	Electricity Substation	1974 - 1989	199621
G	362m NE	Electricity Substation	1993	195285
10	374m S	Electricity Substation	1974 - 1993	206912
G	375m NE	Electricity Substation	1974 - 1993	206151
J	452m NE	Electricity Substation	1952	191091
J	461m NE	Electricity Substation	1974 - 1993	202412
12	488m S	Electricity Substation	1974 - 1993	196246

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

8

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 14**

ID	Location	Land use	Dates present	Group ID
E	245m NE	Garage	1965	63250
E	246m NE	Garage	1974	61567
E	246m NE	Garage	1984 - 1989	63371
E	247m NE	Garage	1993	62238
9	361m NE	Garage	1974 - 1984	63460
K	468m NE	Garage	1984 - 1989	64874
K	469m NE	Garage	1974 - 1993	64241
K	469m NE	Garage	1960 - 1965	64983

This data is sourced from Ordnance Survey / Groundsure.



1.6 Historical military land

Records within 500m

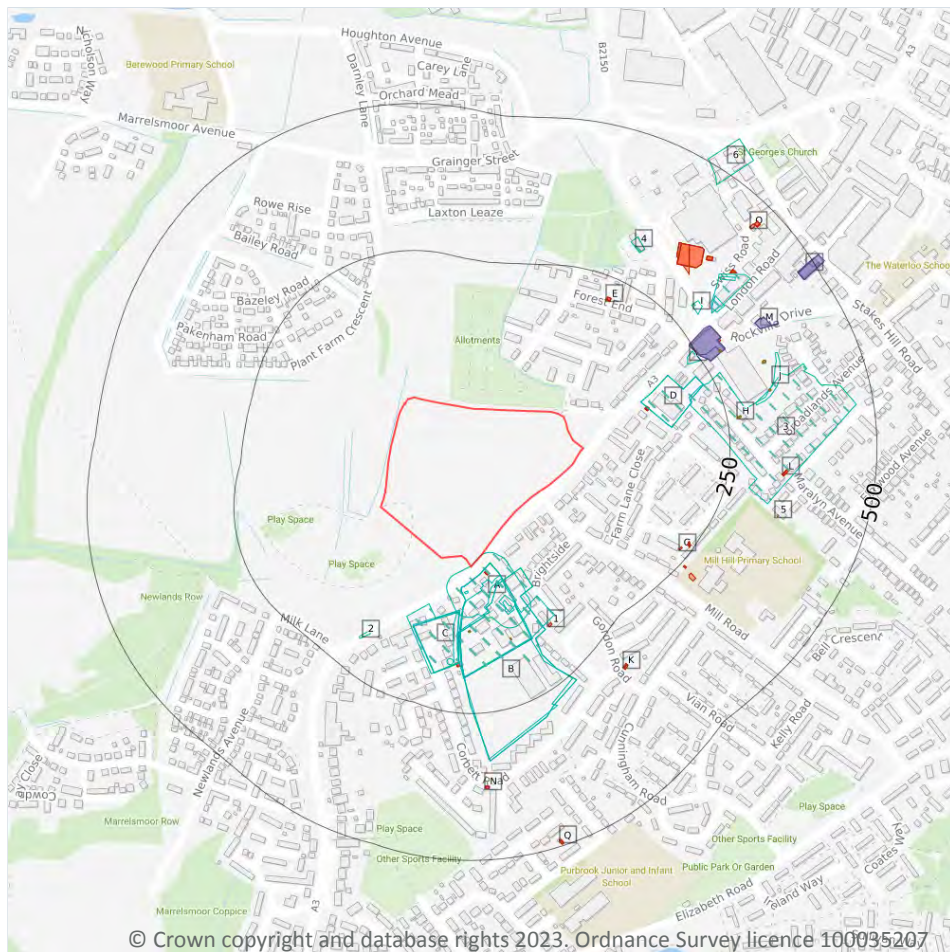
0

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

28

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 20**

ID	Location	Land Use	Date	Group ID
A	On site	Sawmills	1895	1957780
A	20m S	Sawmills	1938	1957709
A	20m S	Sawmills	1930	1957709



ID	Location	Land Use	Date	Group ID
A	20m S	Sawmills	1907	1957709
A	35m S	Sawmills	1930	1908604
A	42m S	Saw Pit	1866	1862606
B	49m S	Unspecified Mills	1963	1870342
B	53m S	Timber Yard	1991	1945767
B	53m S	Timber Yard	1980	1945767
A	75m S	Sawmills	1898	1953303
C	76m S	Nursery	1930	1901782
C	80m S	Nursery	1938	1960084
C	80m S	Nursery	1930	1960084
C	80m S	Nursery	1963	1930044
A	81m S	Windmill	1866	1873050
D	126m E	Telephone Exchange	1991	1963873
D	126m E	Telephone Exchange	1980	1963873
C	160m S	Unspecified Tank	1963	1859091
2	174m SW	Smithy	1866	1876073
3	196m E	Nursery	1963	1867648
F	228m NE	Smithy	1866	1876074
I	288m NE	Fire Station	1980	1874268
J	303m E	Unspecified Ground Workings	1898	1853230
4	307m NE	Fire Station	1991	1874267
I	308m NE	Smithy	1907	1963930
I	314m NE	Smithy	1895	1907281
I	355m NE	Smithy	1898	1963930
6	473m NE	Brick Field	1866	1884675

This data is sourced from Ordnance Survey / Groundsure.



2.2 Historical tanks

Records within 500m

18

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 20**

ID	Location	Land Use	Date	Group ID
A	109m S	Unspecified Tank	1989	322036
A	109m S	Unspecified Tank	1973	315658
A	110m S	Unspecified Tank	1993	322480
A	138m S	Unspecified Tank	1989	316767
A	139m S	Unspecified Tank	1973	319898
A	140m S	Unspecified Tank	1993	325605
H	268m E	Unspecified Tank	1952	321546
H	269m E	Unspecified Tank	1954	321546
F	284m NE	Unspecified Tank	1984	313042
F	284m NE	Unspecified Tank	1989	313042
F	285m NE	Unspecified Tank	1993	313042
J	331m E	Unspecified Tank	1932	313723
J	331m E	Unspecified Tank	1939	313723
J	337m E	Unspecified Tank	1984	318878
J	339m E	Unspecified Tank	1952	318325
J	339m E	Unspecified Tank	1965	318325
J	339m E	Unspecified Tank	1960	318325
5	349m E	Unspecified Tank	1954	308201

This data is sourced from Ordnance Survey / Groundsure.



2.3 Historical energy features

Records within 500m

71

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 20**

ID	Location	Land Use	Date	Group ID
A	23m S	Electricity Substation	1989	200421
A	24m S	Electricity Substation	1973	200421
A	25m S	Electricity Substation	1993	200421
D	125m E	Electricity Substation	1993	202910
D	125m E	Electricity Substation	1989	202910
D	125m E	Electricity Substation	1990	202910
D	125m E	Electricity Substation	1982	202910
D	125m E	Electricity Substation	1989	202910
D	125m E	Electricity Substation	1990	202910
D	125m E	Electricity Substation	1973	202910
D	126m E	Electricity Substation	1972	202910
C	164m S	Electricity Substation	1989	205345
C	164m S	Electricity Substation	1973	205345
1	165m SE	Electricity Substation	1973	191088
C	165m S	Electricity Substation	1993	205345
E	210m NE	Electricity Substation	1993	199284
E	211m NE	Electricity Substation	1972	199284
E	211m NE	Electricity Substation	1982	199284
E	211m NE	Electricity Substation	1989	199284
E	211m NE	Electricity Substation	1990	199284
E	211m NE	Electricity Substation	1973	199284
G	232m E	Electricity Substation	1989	191089
G	238m E	Electricity Substation	1973	193721



ID	Location	Land Use	Date	Group ID
G	238m E	Electricity Substation	1993	194582
G	239m E	Electricity Substation	1973	195657
G	239m E	Electricity Substation	1987	192487
G	239m E	Electricity Substation	1990	193891
G	239m E	Electricity Substation	1990	193552
G	256m SE	Electricity Substation	1989	207995
G	257m SE	Electricity Substation	1973	207995
G	257m SE	Electricity Substation	1993	207995
G	273m SE	Electricity Substation	1983	191090
F	293m NE	Electricity Substation	1989	209361
F	293m NE	Electricity Substation	1993	209361
K	307m SE	Electricity Substation	1989	209082
K	308m SE	Electricity Substation	1973	208114
K	309m SE	Electricity Substation	1993	208114
I	324m NE	Electricity Substation	1993	193098
I	324m NE	Electricity Substation	1989	209971
I	324m NE	Electricity Substation	1990	209971
I	324m NE	Electricity Substation	1972	209971
I	325m NE	Electricity Substation	1973	209971
I	333m NE	Electricity Substation	1982	196187
I	333m NE	Electricity Substation	1989	196187
I	333m NE	Electricity Substation	1990	196187
I	334m NE	Electricity Substation	1974	209971
I	334m NE	Electricity Substation	1984	209971
I	334m NE	Electricity Substation	1989	209971
L	342m E	Electricity Substation	1987	196956
L	342m E	Electricity Substation	1990	196956
L	342m E	Electricity Substation	1990	196956

ID	Location	Land Use	Date	Group ID
L	342m E	Electricity Substation	1973	196956
I	362m NE	Electricity Substation	1974	199621
I	362m NE	Electricity Substation	1984	199621
I	362m NE	Electricity Substation	1989	199621
I	362m NE	Electricity Substation	1993	195285
N	374m S	Electricity Substation	1989	206912
N	374m S	Electricity Substation	1974	206912
N	375m S	Electricity Substation	1993	206912
I	375m NE	Electricity Substation	1984	206151
I	375m NE	Electricity Substation	1989	206151
I	376m NE	Electricity Substation	1974	206151
I	376m NE	Electricity Substation	1993	206151
O	452m NE	Electricity Substation	1952	191091
O	461m NE	Electricity Substation	1993	202412
O	462m NE	Electricity Substation	1974	202412
O	462m NE	Electricity Substation	1984	202412
O	462m NE	Electricity Substation	1989	202412
Q	488m S	Electricity Substation	1989	196246
Q	489m S	Electricity Substation	1974	196246
Q	491m S	Electricity Substation	1993	196246

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

13

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 20**

ID	Location	Land Use	Date	Group ID
F	245m NE	Garage	1965	63250
F	246m NE	Garage	1974	61567
F	246m NE	Garage	1984	63371
F	246m NE	Garage	1989	63371
F	247m NE	Garage	1993	62238
M	361m NE	Garage	1984	63460
M	362m NE	Garage	1974	63460
P	468m NE	Garage	1984	64874
P	468m NE	Garage	1989	64874
P	469m NE	Garage	1974	64241
P	469m NE	Garage	1965	64983
P	469m NE	Garage	1960	64983
P	469m NE	Garage	1993	64241

This data is sourced from Ordnance Survey / Groundsure.



3 Waste and landfill



- Site Outline
- Search buffers in metres (m)
- Historical landfill (EA/NRW)
- 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.



3.3 Historical landfill (LA/mapping records)

Records within 500m	0
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Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m	1
---------------------	---

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

Features are displayed on the Waste and landfill map on **page 27**

ID	Location	Details		
2	396m S	Site Address: Fielders Park, Purbrook Licence Holder Address: -	Waste Licence: - Site Reference: FHA13 Waste Type: Household Environmental Permitting Regulations (Waste) Reference: - Licence Issue: - Licence Surrender: -	Operator: - Licence Holder: - First Recorded - Last Recorded: -

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

3.5 Historical waste sites

Records within 500m	0
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Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m	0
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Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

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

3.7 Waste exemptions

Records within 500m

3

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

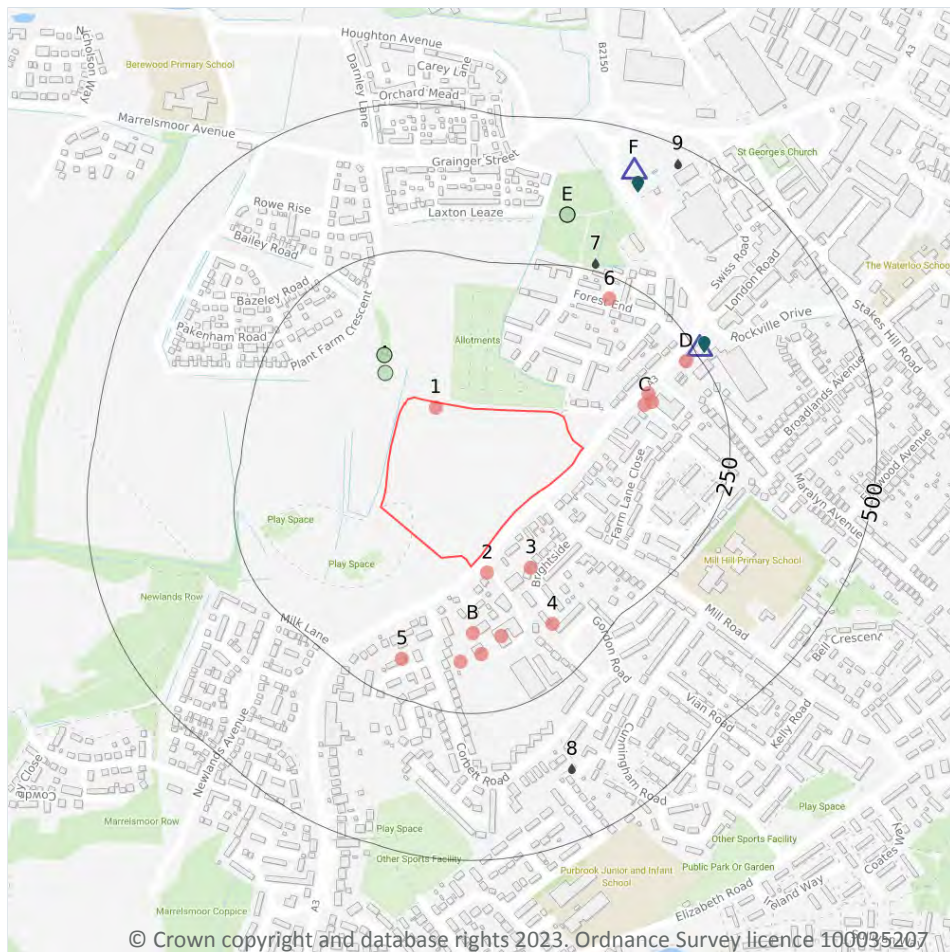
Features are displayed on the Waste and landfill map on **page 27**

ID	Location	Site	Reference	Category	Sub-Category	Description
1	83m S	TIMBER CENTRE, 154, LONDON ROAD, WATERLOOVILLE, PO7 5SR	WEX123040	Using waste exemption	Not on a farm	Use of waste in construction
A	159m E	Security House, 212-218 London Road, Waterloooville, PO7 7AJ	WEX236431	Storing waste exemption	Not on a farm	Storage of waste in secure containers
A	159m E	Security House, 212-218 London Road, Waterloooville, PO7 7AJ	WEX236431	Storing waste exemption	Not on a farm	Storage of waste in a secure place

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



4 Current industrial land use



- Site Outline
- Search buffers in metres (m)
- Recent industrial land uses
- ▲ Current or recent petrol stations
- Licensed pollutant release (Part A(2)/B)
- Licensed Discharges to controlled waters
- Pollution Incidents (EA/NRW)

4.1 Recent industrial land uses

Records within 250m

14

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 30**

ID	Location	Company	Address	Activity	Category
1	On site	Electricity Sub Station	Hampshire, PO7	Electrical Features	Infrastructure and Facilities
2	27m S	Electricity Sub Station	Hampshire, PO7	Electrical Features	Infrastructure and Facilities
3	81m SE	Innovate Projects Ltd	16, Brightside, Waterlooville, Hampshire, PO7 7BA	Building and Component Suppliers	Construction Services



ID	Location	Company	Address	Activity	Category
B	113m S	Tank	Hampshire, PO7	Tanks (Generic)	Industrial Features
C	128m E	Electricity Sub Station	Hampshire, PO7	Electrical Features	Infrastructure and Facilities
B	129m S	Saw Mill	Hampshire, PO7	Wood Products Including Charcoal, Paper, Card and Board	Industrial Products
C	142m E	Telephone Exchange	Hampshire, PO7	Telecommunications Features	Infrastructure and Facilities
C	144m NE	Gas Governor	Hampshire, PO7	Gas Features	Infrastructure and Facilities
B	149m S	Crane	Hampshire, PO7	Travelling Cranes and Gantries	Industrial Features
B	163m S	Electricity Sub Station	Hampshire, PO7	Electrical Features	Infrastructure and Facilities
4	168m SE	Electricity Sub Station	Hampshire, PO7	Electrical Features	Infrastructure and Facilities
5	184m S	Drayton Car Sales	4, Mountbatten Drive, Waterlooville, Hampshire, PO7 5TS	Secondhand Vehicles	Motoring
6	214m NE	Electricity Sub Station	Hampshire, PO7	Electrical Features	Infrastructure and Facilities
D	229m NE	C I A	212-218, London Road, Waterlooville, Hampshire, PO7 7AJ	Electronic Equipment	Industrial Products

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m

2

Open, closed, under development and obsolete petrol stations.

Features are displayed on the Current industrial land use map on **page 30**

ID	Location	Company	Address	LPG	Status
D	261m NE	SHELL	222, London Road, Rockville Drive, Waterlooville, Hampshire, PO7 7AA	No	Open
F	438m NE	ASDA	Maurepass Way, Waterlooville, Hampshire, PO7 7XR	No	Open



This data is sourced from Experian.

4.3 Electricity cables

Records within 500m

0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m

0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m

0

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m

0

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m

0

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.



4.8 Hazardous substance storage/usage

Records within 500m

0

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m

0

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

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

4.10 Licensed industrial activities (Part A(1))

Records within 500m

0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

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

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m

2

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 30**

ID	Location	Address	Details	
D	267m NE	Shell UK Ltd, 222 London Road, WaterlooVille, PO7 7AA	Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified
F	413m NE	ASDA Stores Ltd, ASDA WaterlooVille, Portland Road, WaterlooVille, PO7 7XR	Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified

This data is sourced from Local Authority records.



4.12 Radioactive Substance Authorisations

Records within 500m

0

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

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

4.13 Licensed Discharges to controlled waters

Records within 500m

3

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 30**

ID	Location	Address	Details	
7	263m NE	FOREST END, WATERLOOVILLE HAMPSHIRE	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: P00032 Permit Version: 1 Receiving Water: FRESHWATER RIVER	Status: PRE NRA LEGISLATION WHERE ISSUE DATE 01-SEP-89 (HISTORIC ONLY) Issue date: 27/03/1985 Effective Date: 27/03/1985 Revocation Date: 23/08/1999
8	384m S	FARHJEM, SOUTHWICK, FAREHAM, HAMPSHIRE	Effluent Type: SEWAGE DISCHARGES - UNSPECIFIED - NOT WATER COMPANY Permit Number: H01599 Permit Version: 1 Receiving Water: FRESHWATER RIVER	Status: LAPSED UNDER SCHEDULE 23 ENVIRONMENT ACT 1995 Issue date: 05/04/1963 Effective Date: 05/04/1963 Revocation Date: 31/03/1997
9	471m NE	WEST QUADRANT, HAMBLEDON RD/LONDON RD, WATERLOOVILLE HAMPSHIRE	Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: N01251 Permit Version: 1 Receiving Water: FRESHWATER RIVER	Status: LAPSED UNDER SCHEDULE 23 ENVIRONMENT ACT 1995 Issue date: 06/12/1978 Effective Date: 06/12/1978 Revocation Date: 31/03/1997

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

4.14 Pollutant release to surface waters (Red List)

Records within 500m

0

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

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



4.15 Pollutant release to public sewer

Records within 500m

0

Discharges of Special Category Effluents to the public sewer.

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

4.16 List 1 Dangerous Substances

Records within 500m

0

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

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

4.17 List 2 Dangerous Substances

Records within 500m

0

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

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

4.18 Pollution Incidents (EA/NRW)

Records within 500m

6

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 30**

ID	Location	Details	
A	58m NW	Incident Date: 24/07/2001 Incident Identification: 18736 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Effects on Humans	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
A	84m NW	Incident Date: 07/09/2001 Incident Identification: 29602 Pollutant: Sewage Materials Pollutant Description: Other Sewage Material	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)



ID	Location	Details	
A	84m NW	Incident Date: 07/09/2001 Incident Identification: 29602 Pollutant: Sewage Materials Pollutant Description: Other Sewage Material	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
E	336m N	Incident Date: 22/06/2001 Incident Identification: 10749 Pollutant: Inert Materials and Wastes Pollutant Description: Other Inert Material or Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
E	336m N	Incident Date: 22/06/2001 Incident Identification: 10749 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
E	336m N	Incident Date: 22/06/2001 Incident Identification: 10749 Pollutant: Inert Materials and Wastes:Sewage Materials Pollutant Description: Other Inert Material or Waste:Crude Sewage	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

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

4.19 Pollution inventory substances

Records within 500m

0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m

0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.



4.21 Pollution inventory radioactive waste

Records within 500m

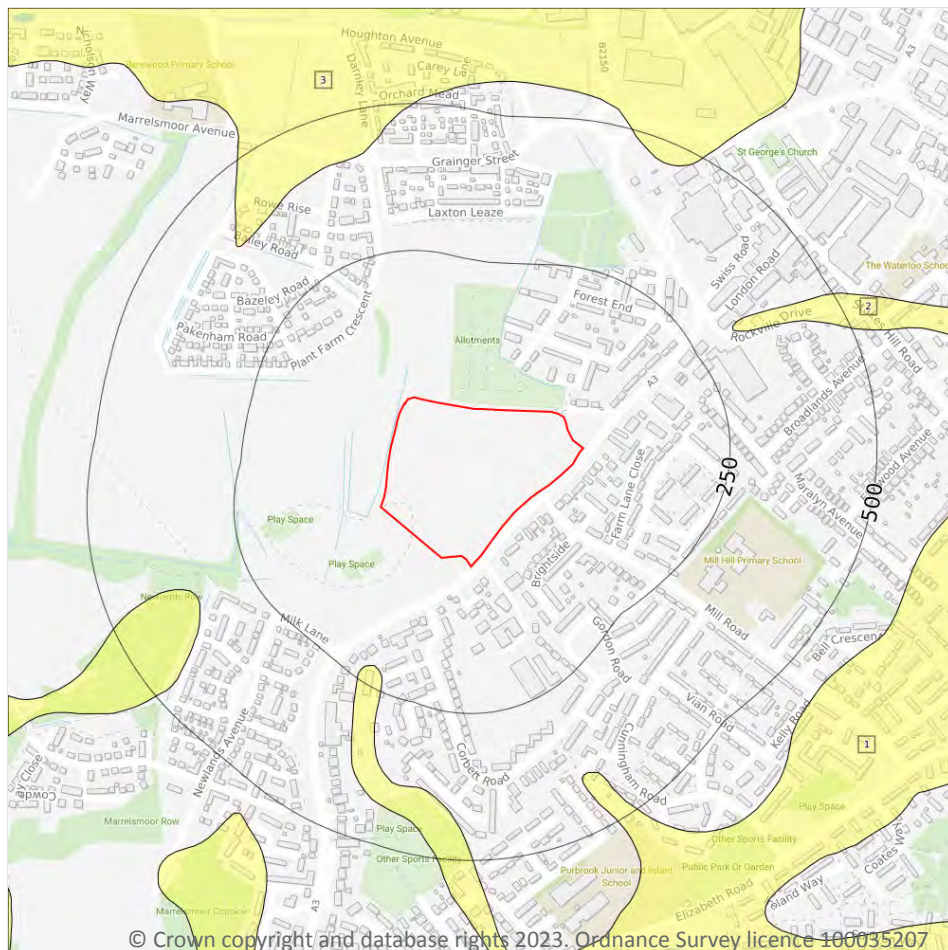
0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.



5 Hydrogeology - Superficial aquifer



- Site Outline**
- Search buffers in metres (m)**
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive
 - Unknown

5.1 Superficial aquifer

Records within 500m

3

Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 38**

ID	Location	Designation	Description
1	216m SW	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
2	324m NE	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

