Ground and Environmental Investigation Limited

8 Wapping Lane
Marton
Gainsborough
DN21 5AJ

01522 412058

Land at Mill Drove South
Cowbit
Spalding
PE12 6FS

Combined Phase 1 and 2 Geo-Environmental Investigation

On behalf of Mr B Dawson



Document Reference: 23-517

January 2024

Site: Land at Mill Drove South, Cowbit, Spalding, PE12 6FS

Document Reference No: 23-517

Quality Management

Authorised by:	
	Marc Pearson BSc MSc MIEnvSc - Director
Date	January 2024
Revision	0
Contact	Marc Pearson (marc@groundenvironmental.com)

Ground and Environmental Investigation Ltd is a specialist geo-environmental consultancy and ground investigation company operating nationally.

Our approach to all of projects is to provide our clients with cost-effective solution to potential geo-environmental hazards, essential considerations before site acquisition, or prior to final development scheme design.

We offer a full range of geo-environmental services from initial due diligence site assessments through to engineering and ground remediation design.

Table of Contents

1 INTRODUCTION 1

1.1 LIMITATIONS 1

2 SITE LOCATION AND LAYOUT 1

3 SITE HISTORY 5

4 ENVIRONMENTAL SETTING 6

4.1 GEOLOGY 6

4.2 GROUNDWATER 6

4.3 RADON 7

4.4 OTHER ENVIRONMENTAL INFORMATION 7

5 PRELIMINARY CONCEPTUAL SITE MODEL 8

6 INTRUSIVE INVESTIGATION 9

6.1 FIELDWORK 9

6.2 GROUNDWATER 9

7 LABORATORY TESTING 10

7.1 GENERAL 10

7.2 GEOTECHNICAL TESTING 10

7.3 ANALYTICAL TESTING 10

8 EVALUATION OF GROUND CONDITIONS 12

8.1 ENGINEERING PROPERTIES 12

9 ENGINEERING DESIGN 13

9.1 FOUNDATION DESIGN OPTIONS 13

9.2 GROUND FLOORS 13

9.3 TEMPORARY WORKS 13

9.4 CHEMICAL ATTACK ON BURIED CONCRETE 14

10 GROUND CONTAMINATION ASSESSMENT 15

10.1 SOIL QUALITY 15
10.1.1 Toxic Metals 16
10.1.2 Organic Compounds 16
10.1.3 Asbestos 16

10.2 WATCHING BRIEF AND DISCOVERY STRATEGY 17

11 CONTAMINATION RISK ASSESSMENT 18

11.1 CONTAMINANT SOURCES 19

11.2 RISK TO HUMAN HEALTH 19

11.3 RISKS TO WATER RESOURCES 20

11.4 RISKS TO BUILDINGS & SERVICES 20

12 CONCEPTUAL SITE MODEL 21

13 CONCLUSIONS AND RECOMMENDATIONS 24

Figures

1. Location Plan

Appendices

1. Limitations
2. Historical Mapping
3. Groundsure Report
4. Window Sampling Logs
5. Laboratory Test Results
6. Analytical Testing Results
7. Guidelines on Contamination Levels

1 INTRODUCTION

Ground and Environmental Investigation Ltd (GEI) was commissioned by Mr B Dawson to undertake a combined Phase 1 and 2 Geo-Environmental Investigation at a proposed development site on land at Mill Drove South, Cowbit, Spalding, PE12 6FS.

It was understood that the proposed development comprises the construction of three residential properties with associated car parking and private gardens.

The objectives of the Geo-Environmental Investigation were to provide outline recommendations for foundation design. Identification of environmental liabilities associated with the site and delineation of any potential areas of contamination resulting from the sites previous and current usage was also undertaken.

1.1 LIMITATIONS

The assessment is limited to the issues agreed within the proposal for the works. Notes on limitations associated with this assessment are provided in Appendix 1.

2 SITE LOCATION AND LAYOUT

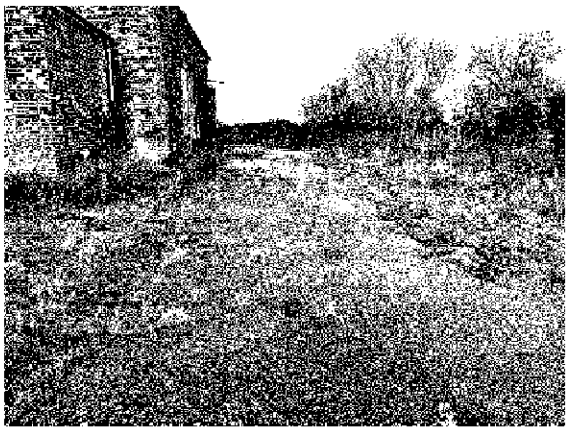
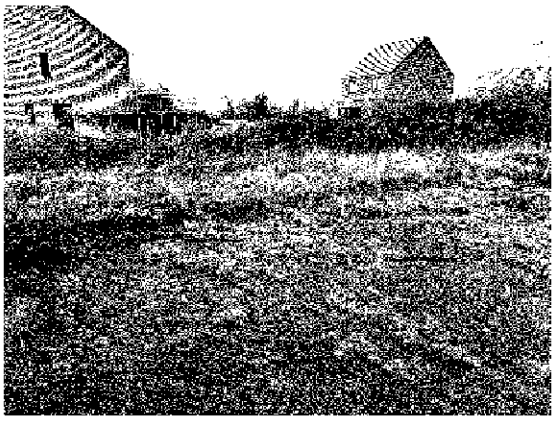
The site is situated to the west of Mill Drove South and to the north of Stonegate (B1357) in the village of Cowbit in a mixed residential, agricultural and industrial area.

The site is located at approximate Grid Reference TF 266 181 with the following features surrounding the site:

- To the north, residential properties and associated gardens;
- To the west, residential properties that were under construction at the time of this report;
- To the south, residential properties and associated gardens; and
- To the east, the site is bound by Mill Drove South beyond which are industrial properties.

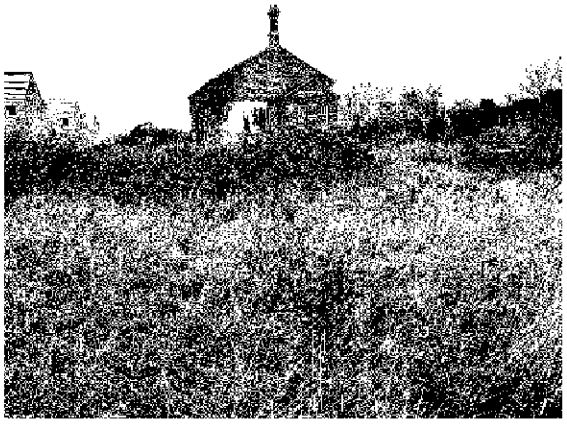
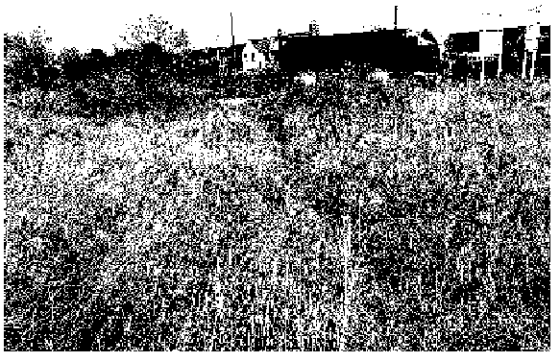
A site walkover was undertaken on the 12th December 2023 and was accessed via Mill Drove South.

At the time of the walkover, the site comprised a parcel of land comprising hardstanding along the eastern boundary with the remaining land being disused and comprising scrub vegetation of grass and brambles.





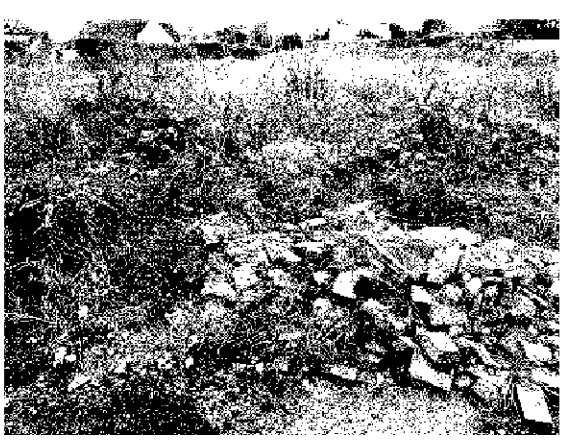



In the northern area of the site was a disused brick building which was mostly cleared. It is considered that this building relates to historic railway use and has more recently been used for maintenance of plant.

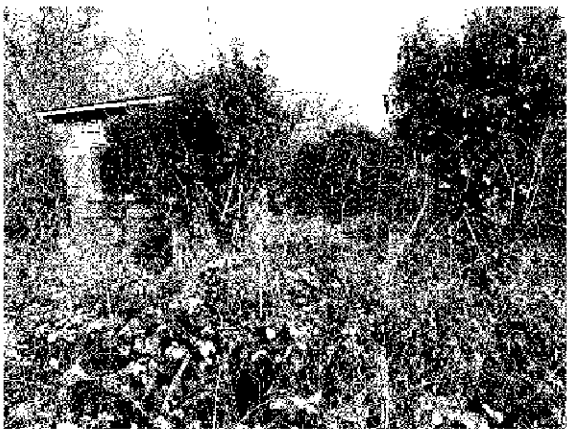




A number of stockpiles of inert materials were noted around the site.




A pumping station was noted to the eastern boundary of the site.

No visual or olfactory evidence of contamination were noted during the site walkover.

3 SITE HISTORY

A map search was carried out for the site covered by the planning application and extracts of the following Ordnance Survey maps were obtained covering the period between 1887 and 2023.

These are presented in Appendix 2 and the relevant historic details are summarised as follows:

Mapping Date Range	On Site	Surrounding Area
1887 - 1888	The site comprises the building currently present on site with a number of rail tracks in the western area of the site. A small building is located in the northeast of the site in the location of the present-day pumping station.	The Great Northern and Great Eastern Joint Railway is present across and to the northwest and southeast of the site. Surrounding land use is predominantly given over to agricultural use with limited residential properties. Cowbit Station is mapped approximately 75m to the southeast.
1903 – 1906	No significant development is noted on site.	No significant development is noted in surrounding area.
1938		
1950		Fairview Farm has been developed approximately 50m to the east.
1968		Croft House Nurseries are mapped approximately 50m to the east.
1974		Cowbit station is noted as disused although it is noted that the rail track remains.
1988	No rail tracks are mapped on the site. The building remains.	No rail tracks are mapped in the vicinity of the site. Trinity Nurseries are located approximately 100m to the north.
1992 - 1995	No significant development is noted on site.	No significant development is noted in surrounding area.
2003		A portion of Fairview Farm appears to have undergone residential development.
2010		No significant development is noted in surrounding area.
2042		

No further significant development is noted on site or in the surrounding area from the aerial mapping from 1999 to 2021.

4 ENVIRONMENTAL SETTING

4.1 GEOLOGY

Reference to the British Geological Survey online geological map of the area indicates that the geology underlying the site comprises superficial Tidal Flat Deposits over solid geology of the Oxford Clay Formation.

The geological memoir for the area described these strata as follows:

Tidal Flat Deposits

Tidal flat deposits, including mud flat and sand flat deposits, form extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. They consist of unconsolidated sediment, mainly mud and/or sand.

Oxford Clay Formation

Silicate-mudstone, grey, generally smooth to slightly silty, with sporadic beds of argillaceous limestone nodules. Over most of the outcrop (except the Cleveland Basin, where only the upper part is present) it comprises a tripartite succession: lower part (Peterborough Member) silicate-mudstone, mainly brownish-grey, fissile, organic-rich ("bituminous"), with subordinate beds of pale to medium grey, blocky mudstone; middle part (Stewartby Member) silicate-mudstone, mainly pale to medium grey, smooth to slightly silty, blocky, with subordinate beds of silty shell-debris-rich mudstone; upper part (Weymouth Member) mudstone, mainly pale grey, calcareous, smooth, blocky.

4.2 GROUNDWATER

Reference to the British Geological Survey 1:50,000 scale Aquifer Designation Dataset, shows the site to be set upon Unproductive strata with respect to the superficial and solid geology.

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

The site is not situated within an Environment Agency-designated Groundwater Source Protection Zone.

4.3 RADON

Reference to the National Radiological Protection Board's "Radon Atlas of England and Wales" indicated that the property is in a low probability radon area (less than 1% of properties are estimated to be at or above the Action Level of 200 Bq/m³). No special measures need be incorporated into new buildings.

4.4 OTHER ENVIRONMENTAL INFORMATION

Reference was made to the environmental database Groundsure, extracts from which are provided in Appendix 3. Relevant information relating to the sites environmental sensitivity is summarised as follows:

Dataset		**On site**	**Nearest significant off-site feature**
Past Land Use	Historical industrial land uses	Railway Building & Sidings	41m southeast. Nurseries.
	Historical tanks	None	171m south. Unspecified tank.
	Historical energy features	None	476m south. Gas Governor.
Waste and Landfill	Waste exemptions	None	285m south. Use of waste in construction.
Industrial Land Use	Recent industrial land uses	None	7m north. Pumping Station.
	Control of Major Accident Hazards (COMAH)	None	453m north. Turners Turkeys Ltd.
	Licensed Discharges to controlled waters	None	192m northwest. Sewage Discharges – Pumping Station – Water Company
Geological	Potential for Collapsible Ground Stability Hazards	Negligible	
	Potential for Compressible Ground Stability Hazards	Moderate	
	Potential for Ground Dissolution Stability Hazards	Negligible	
	Potential for Landslide Ground Stability Hazards	Very low	

Dataset		On site	Nearest significant off-site feature
	Potential for Running Sand Ground Stability Hazards	Moderate	
	Potential for Shrinking or Swelling Clay Ground Stability Hazards	Low	
	Artificial and Made Ground	None	None within 500m.
Mining, ground workings and natural cavities	Surface ground workings	None	6m south. Pond.
	Underground workings	None	902m south. Tunnel.
Sensitive land uses	Listed Buildings	None	175m south. Mill.
Hydrology and Hydrogeology	Surface Water Abstractions	None	980m southeast. Spray Irrigation – Direct.
	Groundwater Abstractions	None	None within 2000m.
	Potable Abstractions	None	None within 2000m.
	Source Protection Zones	None	None within 500m.
	Water Network	None	9m east. Inland river not influenced by normal tidal action.

5 PRELIMINARY CONCEPTUAL SITE MODEL

The site was noted to comprise a parcel of land in railway use since the earliest mapping available (1887) until the 1980s. The railway building currently present has been on site since before 1887.

On site potential sources of contamination include:

- Made Ground associated with the railway;
- Fuel/oil spills from railway vehicles/plant and maintenance.

No significant potential sources of contamination were identified in the surrounding area.

The Site overlies Unproductive strata with respect to the superficial and solid geology and is not located within a SPZ.

6 INTRUSIVE INVESTIGATION

6.1 FIELDWORK

The site works were carried out on the 5th January 2024 and comprised Window Sampling.

The positions of the above works on the site are indicated on Figure 1, Exploratory Hole Location Plan.

All intrusive fieldwork was generally executed in accordance with the recommendations given in British Standard BS 5930:1999, "Code of Practice for Site Investigations".

Contamination sampling was undertaken in accordance with BS 10175, "Code of Practice for the Investigation of Potentially Contaminated Sites".

Window Sample Holes

Eight window sample holes (BH1 to BH8) were excavated to depths of between 2.0m and 7.0m using a track mounted Premier Compact 110 window sampling rig.

The soils and materials encountered in the holes were logged and representative samples recovered for laboratory analysis. Standard penetration tests were also carried out in the window sample holes using the split spoon attachment.

All locations were backfilled with arisings upon completion.

Window sample logs are presented in Appendix 4.

6.2 GROUNDWATER

Groundwater was encountered in all locations during the intrusive investigation as detailed in the table below.

Location	Observations
BH1	Groundwater resting at 0.3m upon completion
BH2	Groundwater resting at 0.5m upon completion
BH3	Groundwater resting at ground level upon completion
BH4	Groundwater resting at 1.0m upon completion
BH5	Groundwater resting at 1.0m upon completion
BH6	Groundwater resting at 1.0m upon completion
BH7	Groundwater resting at 1.0m upon completion
BH8	Groundwater resting at 1.0m upon completion

It should be noted that groundwater levels may vary due to seasonal fluctuations in rainfall, but in the shorter term, can be affected by antecedent weather conditions or other causes.

7 LABORATORY TESTING

7.1 GENERAL

During the intrusive investigation, excavated soils were subjected to PID screening techniques in order to determine the presence of Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) which is considered an appropriate screen for organic contamination.

Confirmatory soil samples were taken from all window sample holes. Headspace analysis to determine VOC concentrations was carried out using a PID on all soil samples retrieved as part of this investigation. The results of the screening indicated that VOC concentrations were below the detection limit of 10 ppm in all samples.

Therefore, no significantly elevated VOCs or SVOCs were encountered and therefore the on-site soil elsewhere on site was deemed to not have been impacted by any potential VOC and SVOC contaminants. These soils would not be deemed to pose any significant risk of significant harm to human health as a result of the presence of volatile hydrocarbons. This is discussed in greater detail later in the report.

7.2 GEOTECHNICAL TESTING

The following range of laboratory tests were scheduled, and the results are presented in Appendix 5.

i. Determination of Natural Moisture Content (4 No.).
ii. Determination of Atterberg Limits (4 No.).
iii. Determination of pH (5 No.). See Appendix 6.
iv. Determination of water-soluble sulphate (5 No.). See Appendix 6.

7.3 ANALYTICAL TESTING

Five soil samples were selected and scheduled for chemical analysis which was undertaken by The Environmental Laboratory Ltd. All samples were analysed for a general screening suite of contaminants considered appropriate to the current usage and past history of the site and surrounding area.

Toxic Metals	Phytotoxic Metals	Inorganic Compounds	Organic Compounds
Arsenic Cadmium Chromium Lead Mercury Nickel Selenium	Water Soluble Boron Copper Nickel Zinc	Water Soluble Sulphate pH Asbestos	Total Polyaromatic Hydrocarbons (PAH) Mineral oils Total Petroleum Hydrocarbons (TPH) BTEX

Environmental samples were stored in appropriate containers as specified within BS10175. The soil sample containers comprised of 1 kg capacity plastic containers with fitted lids.

Where organic compounds were to be determined, inert containers, which prevent loss by absorption, or volatilization, i.e. wide-mouthed amber glass containers, were used.

Samples were stored in appropriately cooled cool boxes and were transported to the laboratory as quickly as possible in order to minimize any potential for chemical and biological changes to take place.

The results of the analytical testing are presented in Appendix 6.

8 EVALUATION OF GROUND CONDITIONS

The soils encountered during this investigation are described in the Window Sample logs presented in Appendix 4. The ground profile encountered at the site comprised Made Ground over superficial Tidal Flat Deposits.

Made Ground

Made Ground was found at all locations to depths of up between 0.2m and 1.1m below ground level and generally comprised soft brown clayey silt with red brick fragments, clayey gravelly sand and coarse sand and gravel.

No visual or olfactory evidence of contamination was noted in the window sampling logs.

Tidal Flat Deposits

Soils typical of Tidal Flat Deposits were encountered beneath the Made Ground at all locations and comprised greyish brown to reddish brown very soft sandy silty clay and clayey sandy silt.

The formation was determined to a maximum depth of 5.0m. In location BH1, the geology was drilled to a depth of 7m however no recovery of soils could be made from below 5m. The base of the formation was not encountered.

8.1 ENGINEERING PROPERTIES

The engineering properties of the principal strata, as discussed above, can be assessed based upon a combination of the in situ and laboratory test results. A summary of the engineering properties is given below:

Tidal Flat Deposits

In situ SPT's recorded N values in the range 0 to 4 in the upper 4m indicating this material to be very soft. In situ SPTs at 5 to 7m in locations BH1 were in the range 4 to 35 indicating this material to be very soft to stiff.

Classification testing indicated intermediate to high plasticity clay with plasticity indices of between 24% and 31%. This indicated the soils have a medium shrink/swell potential.

9 ENGINEERING DESIGN

9.1 FOUNDATION DESIGN OPTIONS

In deliberation of suitable foundation options consideration was given to the geotechnical hazards and risks as presented below:

Geotechnical Hazard	Qualitative Risk & Consequences	Possible Risk Reduction Measures
Existing underground structures such as service runs and old footings.	**Moderate** Implication for foundation depth and economic feasibility of shallow foundations.	New foundations to be constructed in undisturbed ground or alternatively disturbed ground to be removed and replaced with suitable engineering fill.
Variations in stiffness of ground below foundation depth that could give rise to unacceptable total and differential settlement.	**Moderate** Buildings particularly sensitive to differential settlement. Would result in cracking of superstructure if conventional brickwork or brick cladding.	Calculate likely magnitude of settlement and determine if within acceptable tolerances. Make foundations act as reinforced beams. Include movement joints if and where necessary.

Shallow Foundations

Due to the presence of very soft deposits to depths of greater than 4m, shallow foundations are not considered to be appropriate for the development.

Piled Foundations

The use of piles founded within the underlying Oxford Clay Formation soils are considered to be a suitable foundation solution for the development.

Final calculations for piles should be undertaken by a specialist piling contractor and further investigation using deeper drilling methods may be required.

9.2 GROUND FLOORS

As a piled foundation is recommended it is conventional that suspended ground floors be constructed.

9.3 TEMPORARY WORKS

Excavations in excess of 1.2 m depth may be required in connection with the proposed development on this site. If there is a requirement for personnel to enter into excavations, then the need for trench side support should be considered for any depth of excavation and, therefore, appropriate equipment should be available on site prior to excavation proceeding. A site-specific risk assessment should be carried out where man entry into excavations is required.

9.4 CHEMICAL ATTACK ON BURIED CONCRETE

The results of the chemical testing indicated a concentration of water-soluble sulphate in the Tidal Flat Deposits the range <20mg/l to 94mg/l as SO_4. pH values were neutral to alkaline with results in the range 8.1 to 8.6 pH units recorded.

In accordance with BRE Special Digest 1 entitled 'Concrete in Aggressive Ground' a design sulphate class for the site of DS-1 is recommended. Using SD1 an ACEC (Aggressive Chemical Environment for Concrete) class of AC-1 is recommended.

10 GROUND CONTAMINATION ASSESSMENT

The current guidelines used for this contamination assessment are presented within Appendix 7.

The contaminant concentrations encountered as part of this investigation have been compared against either Land Quality Management Generic Assessment Criteria (LQM GAC) for a residential development, the Chartered Institute of Environmental Health's (CIEH) Suitable for Use Levels (S4USL), or where available against newly published Category 4 Screening Levels (C4SLs) for a residential (with home grown produce) end use. Where neither guideline have limit values, Contaminated Land Exposure Assessment (CLEA) framework guideline limit values have been assessed.

Category 4 Screening Levels (C4SLs) have currently been published for six substances as per the table below.

Substance	Residential (with home-grown produce)	Residential (without home-grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37	40	49	640	79	170
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)Pyrene	5.0	5.3	5.7	77	10	21
Cadmium	22	150	3.9	410	220	880
Chromium VI	21	21	170	49	21	250
Lead	200	310	80	2300	630	1300

All concentrations expressed in mg/kg.

This table should be read in conjunction with the Final C4SL R&D Report

10.1 SOIL QUALITY

In terms of any proposed redevelopment of the site, the results of the analysis of the selected soil samples recovered during the site investigation indicated that the concentrations of *metals and metalloids* considered to be potentially toxic to humans were below the respective guideline values in all samples tested.

Organic contamination across the site was low and concentrations which may be considered to pose an unacceptable risk to human health should any viable pathway exist were not encountered.

Asbestos Containing Materials (ACM) were not encountered.

A comprehensive description of the soil quality as measured as part of the intrusive site investigation is given below.

10.1.1 Toxic Metals

Concentrations of toxic metals arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc were all below their respective soil guidance values for either a commercial land use under the CLEA/LQM GAC guidelines and the C4SL/S4USL guideline values for residential with plant uptake end use in all samples tested.

10.1.2 Organic Compounds

Polycyclic Aromatic Hydrocarbons (PAH)

Concentrations of PAH were found to be below the inert waste acceptance criteria of 100mg/kg as detailed in the Landfill (England and Wales) (Amended) Regulations 2004 in all samples tested.

Speciated PAH

No exceedances of the relevant guideline values for specific PAH compounds were noted across the site.

Total Petroleum Hydrocarbons

Concentrations of TPH were below the inert waste acceptance criteria of 500 mg/kg as detailed within the Landfill (England and Wales) Regulations 2004 and also within the UK Water Industry Research (UKWIR) in all soil samples tested.

Generic Assessment Criteria (GAC) for total petroleum hydrocarbons according to both their molecular weight and chemical structure and also for a range of soil organic matter (SOM) content values have been derived using CLEA software. The LQM CIEH GACs are presented according to their soil organic matter content and proposed end use of the land.

No TPH concentrations above the laboratory detection limits were noted across the site and therefore it is not considered that the soils present on site pose a significant risk of significant harm to human health.

10.1.3 Asbestos

Asbestos screening of the soil samples did not identify any Asbestos Containing Material (ACM).

10.2 WATCHING BRIEF AND DISCOVERY STRATEGY

Whilst no significantly elevated contaminant concentrations were encountered as part of this site investigation should discreet hotspots be encountered, which were not previously detected during the site clearance or groundworks, these should be dealt with accordingly, by informing all parties involved with the site and drafting new contamination proposals if necessary. A number of options are available for handling any such material, which include:

- The removal from site and disposal to a suitably licensed landfill of all material suspected of being contaminated.
- Short-term storage of the suspected material while undertaking verification testing for suspected contamination. The storage area should be a contained area to ensure that contamination does not migrate and affect other areas of the site. Depending upon the amounts of material under consideration, this could be either a skip or a lined area.
- Treatment of the identified contamination as discussed above.
- Having a suitably experienced Environmental Engineer either on-call or with a watching brief for the visual and olfactory assessment of the material, and sampling for verification purposes.

Should a new source of contamination be suspected or identified then the relevant local authorities would be informed. A report indicating the nature of contamination and how this is to be dealt with would be submitted to their department and for their agreement. Any necessary remediation would then be detailed and verified in a supplementary remediation statement.

GEI can confirm that such a watching brief should exist on this site during any demolition/construction works and should any contamination or potentially contaminative sources be discovered during the proposed demolition/enabling works all site works would cease and suitably competent consultants/engineers will attend site.

11 CONTAMINATION RISK ASSESSMENT

This risk assessment has been undertaken with due regard to the advice relating to groundwater as provided in the Environment Agency's "Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources", the advice provided in the Contaminated Land (England) Regulations 2000, and the associated statutory guidance. The guidance defines contaminated land as any land that is in such a condition that by reason of substances in, on or under the land:

- significant harm is being caused or there is a significant possibility of such harm being caused; or

- pollution of controlled water is being, or is likely to be, caused.

This definition is based on the principles of risk assessment defined as a combination of the probability (or frequency) of occurrence of a defined hazard and the magnitude (including the seriousness) of the consequences. Central to the risk assessment process is the concept of pollutant linkage, that is a linkage between a contaminant and a receptor by means of a pathway.

Statutory definitions relating to pollution linkage.	
Contaminant	"a substance which is in, on or under the land and which has the potential to cause harm or to cause pollution of controlled waters."
Receptor	"a living organism, a group of living organisms, and ecological system or a piece of property" which meets given criteria. "controlled waters which are, or could be, polluted by a contaminant".
Pathway	"one or more routes or means by, or through, which a receptor: • is being exposed to, or affected by, a contaminant, or • could be so exposed or affected".

The relationship between these components is discussed below in order to identify the existence of any source-pathway-receptor linkage on the site, and hence the potential risks associated with any contamination.

This risk assessment is based on the proposed development of the site comprising residential properties with private gardens.

The significance of the risks to the receptors/targets identified is based on an evaluation of the potential pathways between the contaminant source and receptors based on the most sensitive end use, i.e. a residential with home grown produce end use.

Potential receptors/targets at the site and in the area in which the site is located include:

- future occupants and the general public;
- construction/maintenance workers;
- groundwater resources; and
- underground services in and around the site.

11.1 CONTAMINANT SOURCES

The following general potential contaminant sources have been identified at the site and in the surrounding area:

Potential Source	Source Description	Principal Contaminants of Concern
Current and Historic Site Use	Near surface in-fill/ reworked material relating to historic railway.	PAH, TPH, Metals, ACM
	Fuel/oil leaks from vehicles/plant and maintenance	PAH, TPH
Surrounding land use	General railway use	PAH, TPH, Metals, ACM

The analytical testing of soils retrieved as part of the intrusive investigation did not reveal significantly elevated contaminant concentrations.

11.2 RISK TO HUMAN HEALTH

Toxic Metals

Concentrations of toxic metals arsenic, cadmium, chromium, lead, mercury, nickel, selenium, and zinc were all below their respective soil guidance values for a residential end use in all samples tested in this site investigation, therefore the risks to human health from these contaminants is considered to be low.

Organic Compounds

Concentrations of organic compounds were generally low across the site, therefore the risks to human health from these contaminants is considered to be low.

Inorganic Compounds

Asbestos containing material (ACM) was not encountered at the site.

The site would not be considered to pose a potential risk of significant harm to human health in the context of Part 2A.

11.3 RISKS TO WATER RESOURCES

The site is underlain by Unproductive strata in the superficial and solid geology. The site is not located within a groundwater Source Protection Zone.

Significant levels of potentially soluble and therefore mobile organic contaminant sources were not measured on site.

11.4 RISKS TO BUILDINGS & SERVICES

The risks to buried services from organic contamination such as TPH, which can degrade/permeate plastics and other polymer materials used to supply potable water is considered to be low.

12 CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a system diagram identifying contaminant sources, routes of exposure (pathways), and which receptors are affected by contaminants moving along those pathways.

The model is produced to identify the zones of the site with different potential contaminations characteristics (e.g. whether contaminants in the soil are likely to be on the surface or at depth, distributed over an entire area or in localised 'hot spots').

The conceptual site model presented in the table below is based on the findings of the site investigation undertaken.

Source	Pollutant		Pathway	Hazard		Receptor	Observations/ Recommendations	Assessed Risk
Contaminated ground	Metals, organic (hydrocarbons) could be present	→	Direct contact, ingestion, inhalation.	Health risks including skin irritation.	→	Humans: site workers and future occupants	Normal health and safety precautions. Elevated contaminant concentrations not present in soils.	Low
			Surface run off.	Lateral movement to surface watercourses.	→	Aquatic resources, ecology and subsequent users including humans.	No significantly elevated contaminant concentrations encountered.	Low
			Leaching/ Dispersion.	Downward migration to groundwater.	→	Aquatic resources – Groundwater, abstraction wells) / surface waters.	No significantly elevated contaminant concentrations encountered.	Low
			Direct contact	Aggressive chemical attack	→	Building structures and services	It is considered that protection of services is unlikely to be required on this site however advice should be sought from Statutory Providers especially as to whether potable water pipes should be protected.	Low

Source	Pollutant		Pathway	Hazard		Receptor	Observations/ Recommendations	Assessed Risk
Liquid contaminant sources	Diesel, Petrol and Oils.	→	Direct contact; ingestion, inhalation.	Health risks including skin irritation. Lateral and vertical migration of contaminants.	→	Humans: site workers. Groundwater and surface water.	Significantly elevated contaminant concentrations not encountered.	Low
Asbestos	Asbestos fibres within made ground and waste on site	→	Inhalation.	Health risks including asbestosis, mesothelioma, and lung cancer.	→	Humans: site workers and future occupants.	Appropriate PPE should be worn during site works. No ACM encountered within the samples.	Low
Redundant Waste, Demolition Waste		→	Dermal Contact/ingestion. Potential for migration via surface water run-off	Health Risks	→	Humans: Site workers	All waste on site is to be removed from site during site preparatory works and disposed of in accordance with current legislation.	Low

13 CONCLUSIONS AND RECOMMENDATIONS

Based on the desk study, site investigation, intrusive works and subsequent data assessment, the following conclusions and recommendations have been drawn in respect of the proposed development on land at Mill Drove South, Cowbit, Spalding, PE12 6FS.

Geotechnical

- The ground investigation found the anticipated geology with soils typical of Tidal Flat Deposits encountered beneath a limited Made Ground horizon.
- The Tidal Flat deposits were not considered to be suitable for the construction of shallow foundations.
- A piled foundation solution founded within the underlying Oxford Clay Formation is recommended. Further investigation using deeper drilling techniques may be required to be undertaken in order to a develop pile design.
- As a piled foundation is recommended it is conventional that suspended ground floors be constructed.
- A design sulphate class of DS-1 and an ACEC class of AC-1 was recommended for buried concrete within the Tidal Flat Deposits.

Environmental

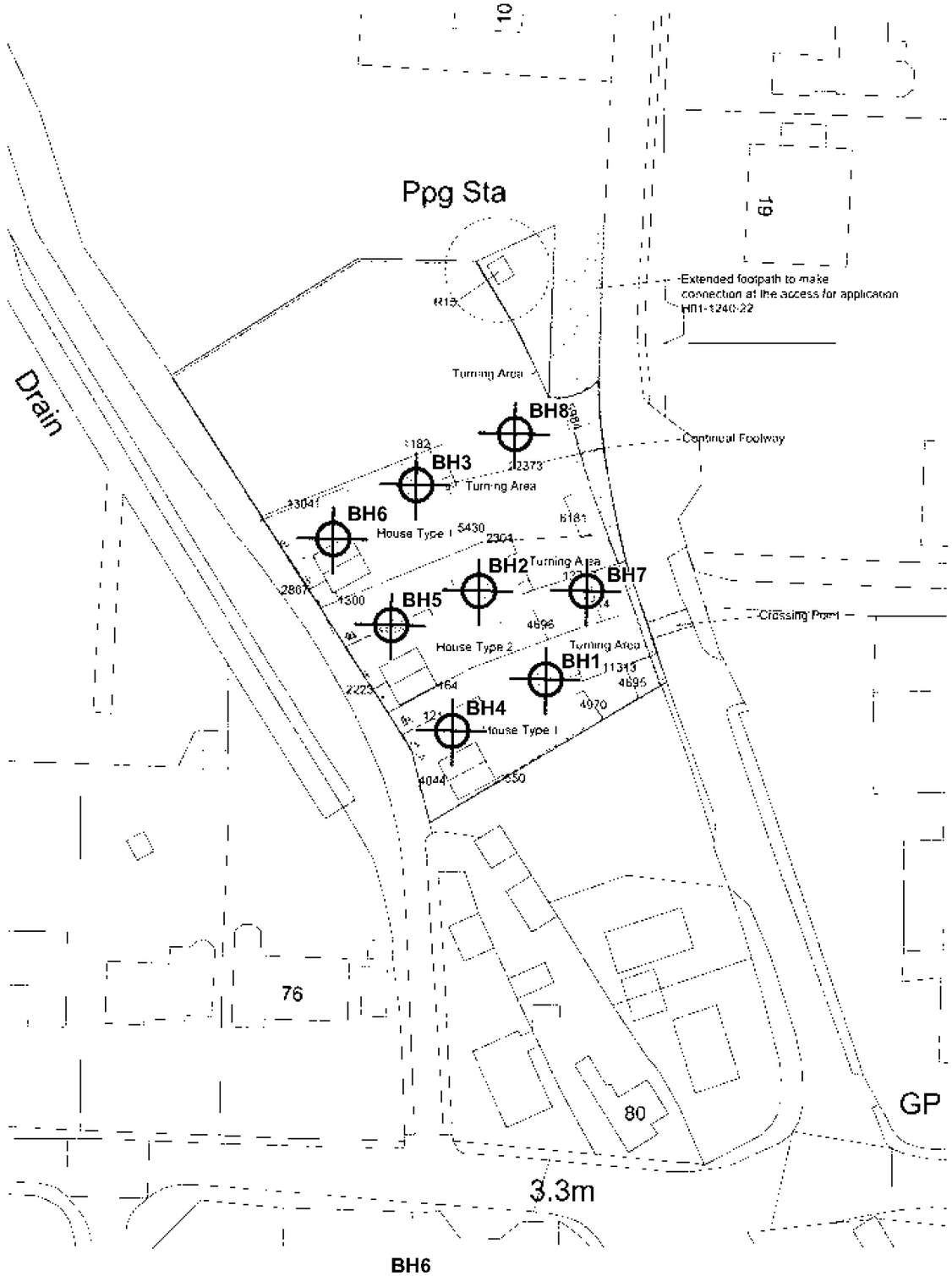
- The site is located above Unproductive strata with respect to the superficial and solid geology and is not located within a Source Protection Zone.
- No significant sources of on-going contamination were noted during the site walkover. It was considered that the primary potential sources of contamination were the site's historical railway use.
- Concentrations of toxic metals were found to be consistently below their respective soil guideline values.
- Concentrations of organic compounds were consistently low within soil across the site and would therefore not be considered to pose a significant risk of significant harm to human health.
- Asbestos containing material (ACM) has not been encountered on site.
- The risks posed to human health in any future redevelopment of the site are not considered significant providing standard health and hygiene practices are adopted.
- The risks to groundwater and surface water are considered to be low due to the lack of any significant mobile organic contamination.

Based on the principles and definitions outlined under section 57 of the Environment Act 1995, the site would not be considered "Contaminated Land" based on a residential with

plant uptake end use and no further investigation is considered necessary with regard to potential contamination.

FIGURES

1. Location Plan



BH6

WS - Window Sample BH - Borehole TP - Trial Pit HDTP - Hand Dug Trial Pit DCP - Dynamic Cone Penetration Test HA - Hand Auger	DP - Dynamic Probe GM - Gas Monitoring Standpipe SP - Soakage Pit PT - Percolation Test S - Sample Location	Site: **Mill Drove South, Cowbit**	Client: **Mr B Dawson**	Drawn:	Rev.: **A**
		Title: **Exploratory Hole Location Plan**	Project: **23-517**	Date:**05/01/2024**	Scale: **N.T.S.**

APPENDIX 1

LIMITATIONS

The recommendations contained in this Report represent GEI's professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant.

GEI does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

GEI obtained, reviewed and evaluated information in preparing this Report from the Client and others. GEI's conclusions, opinions and recommendations has been determined using this information. GEI does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which GEI has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by GEI for the sole and exclusive use of the Client and for the specific purpose for which GEI was instructed.

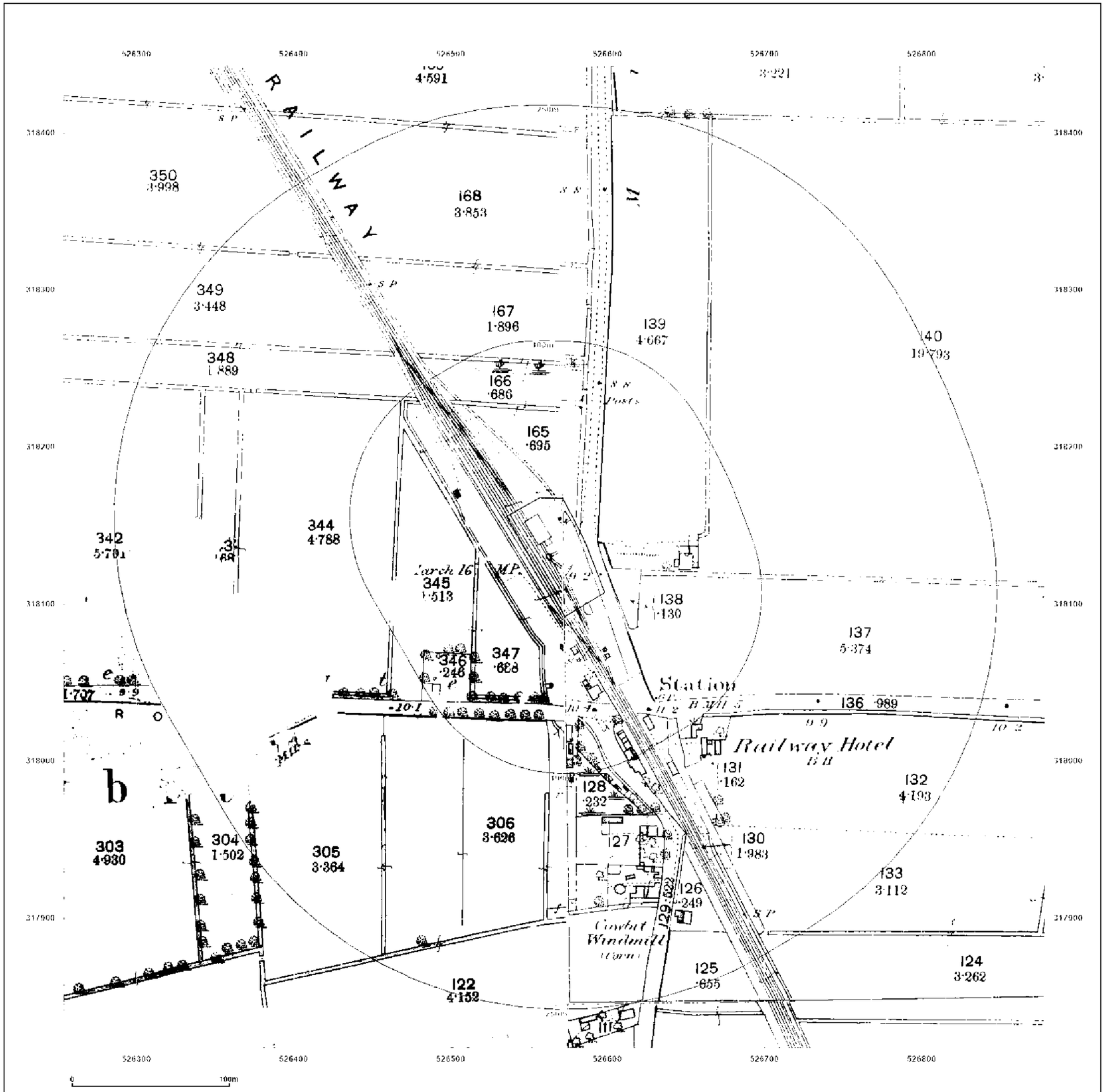
Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and GEI, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party.

In particular, GEI does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client.

Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless GEI from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of / or resulting from the performance of the work by the Consultant.

APPENDIX 2

HISTORICAL MAPPING



Groundsure INSIGHTS

Site Details:

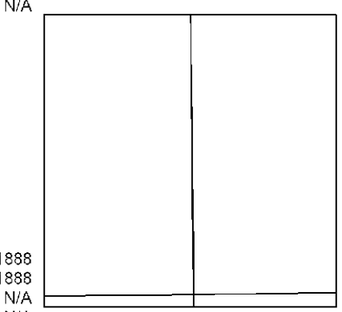
MILL DROVE SOUTH, COWBIT,
SPALDING, PE12 6FS

Client Ref: 23-517
Report Ref: GS-2TL-CUR-3TO-PDL
Grid Ref: 526566, 318130

Map Name: County Series
Map date: 1888
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1888
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1888
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1888
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1888
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A

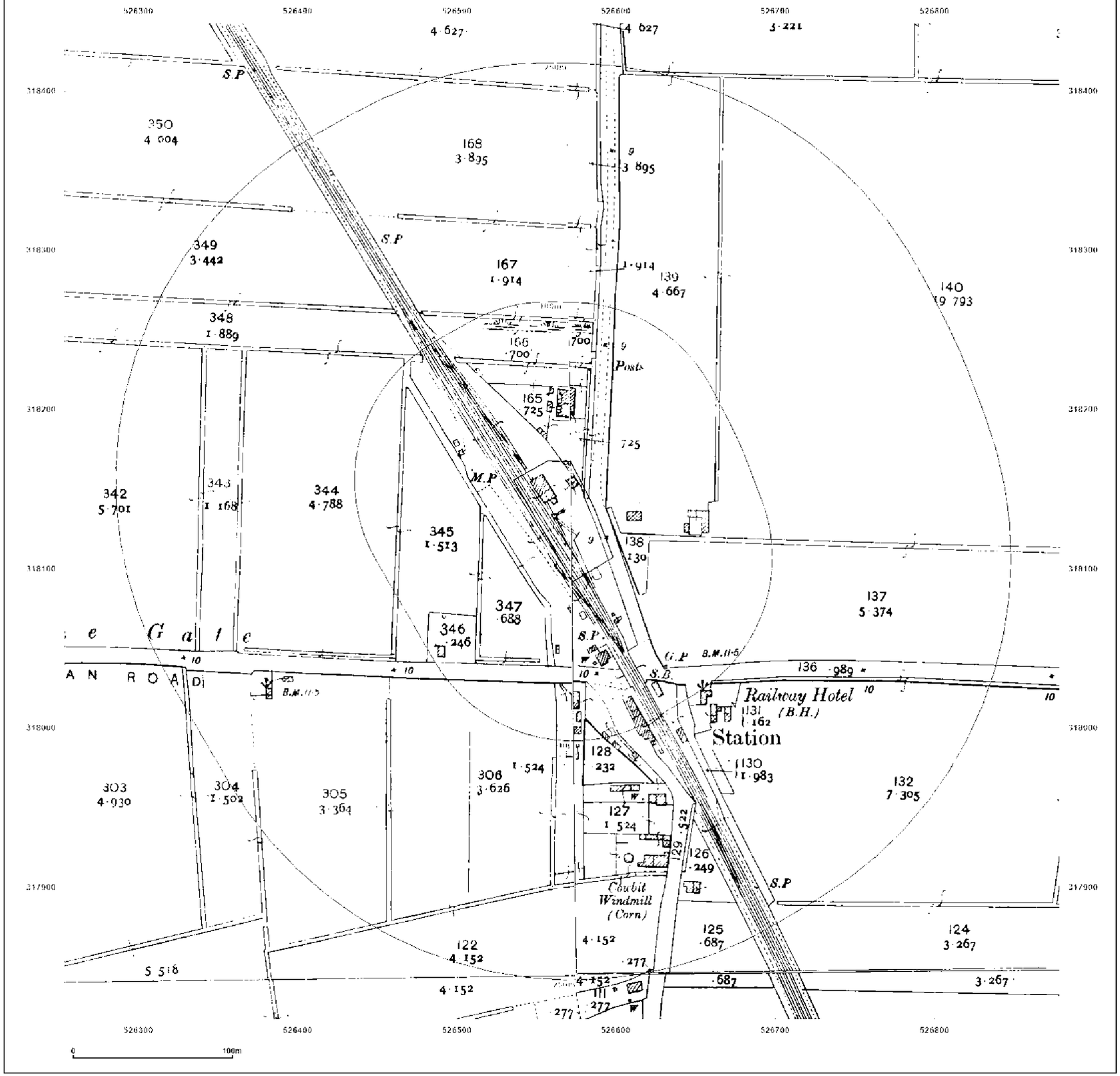
Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2018 Ordnance Survey 100035207

Production date: 03 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

MILL DROVE SOUTH, COWBIT,
SPALDING, PE12 6FS

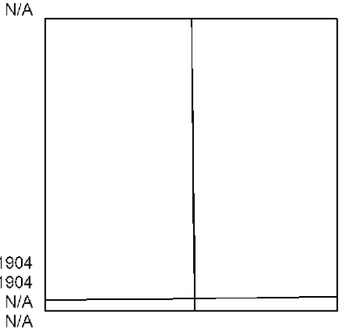
Client Ref: 23-517
Report Ref: GS-2TL-CUR-3TO-PDL
Grid Ref: 526566, 318130

Map Name: County Series
Map date: 1904
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1904
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1904
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1904
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1904
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

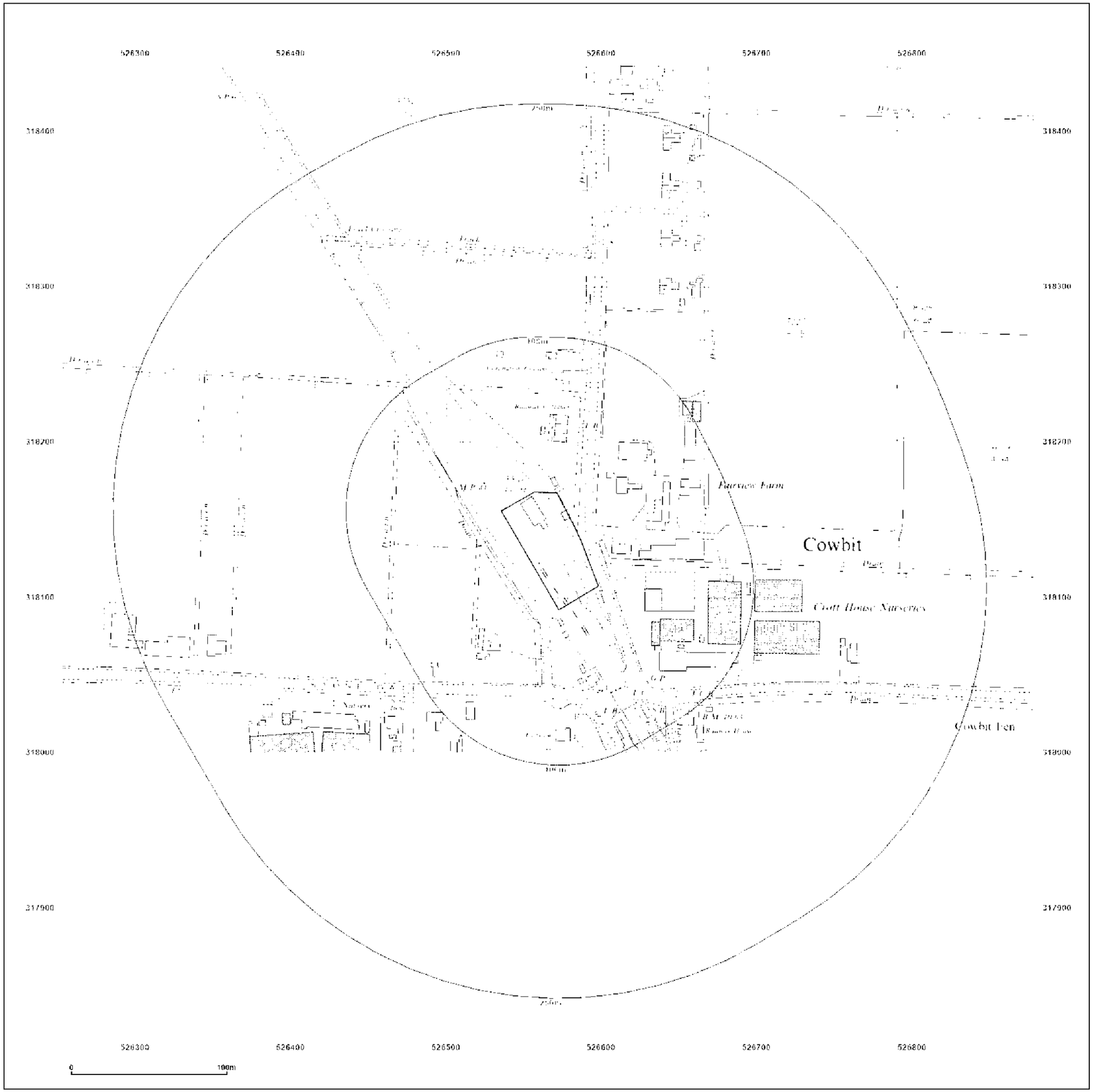
Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2018 Ordnance Survey 100035207

Production date: 03 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

MILL DROVE SOUTH, COWBIT,
SPALDING, PE12 6FS

Client Ref: 23-517
Report Ref: GS-2TL-CUR-3TO-PDL
Grid Ref: 526566, 318130

Map Name: National Grid

Map date: **1968**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1968
Revised 1968
Edition N/A
Copyright 1969
Levelled 1965

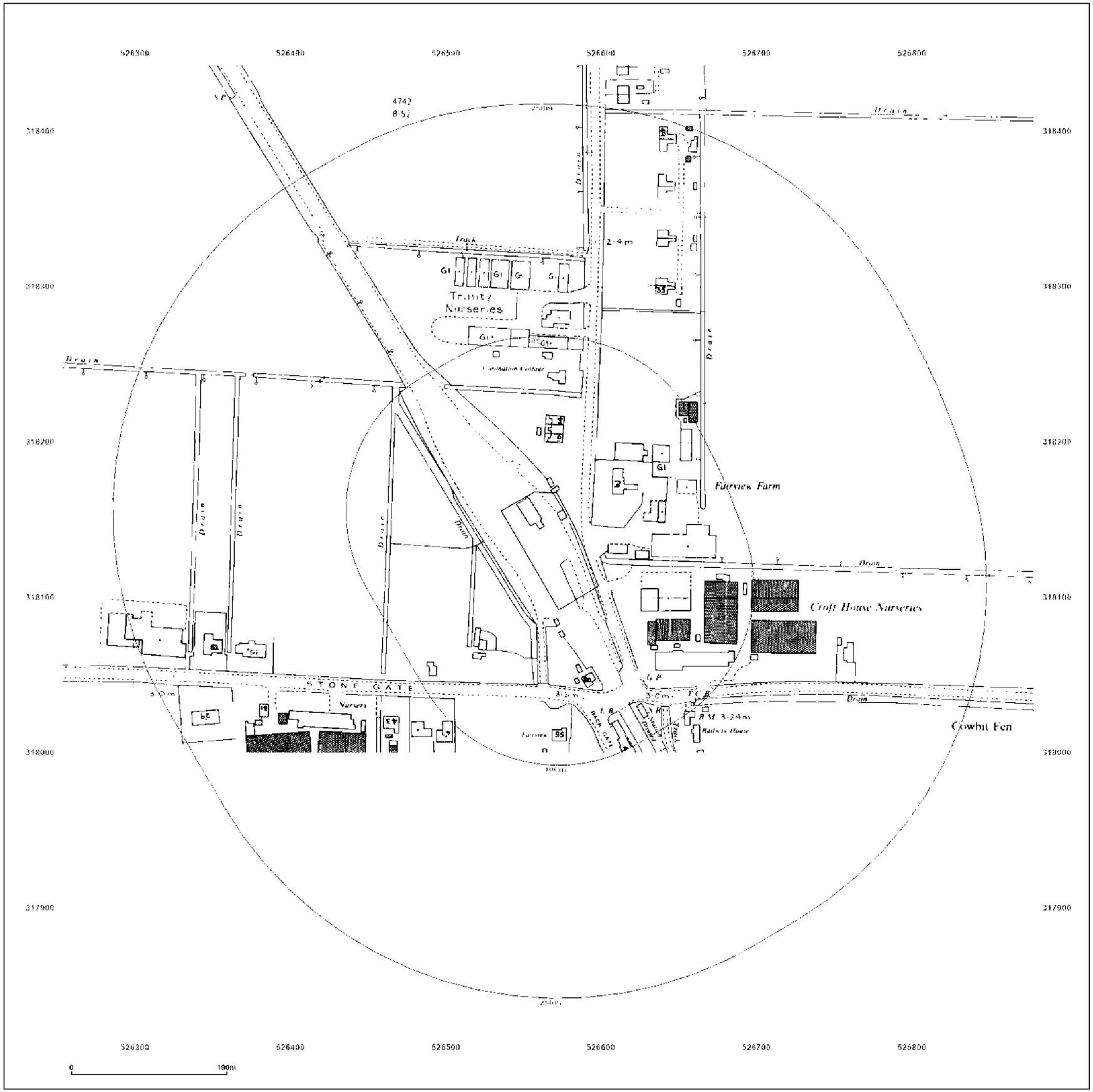
Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2018 Ordnance Survey 100035207

Production date: 03 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

MILL DROVE SOUTH, COWBIT,
SPALDING, PE12 6FS

Client Ref: 23-517
Report Ref: GS-2TL-CUR-3TO-PDL
Grid Ref: 526566, 318130

Map Name: National Grid
Map date: **1988**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1988
Revised 1988
Edition N/A
Copyright 1988
Levelled N/A

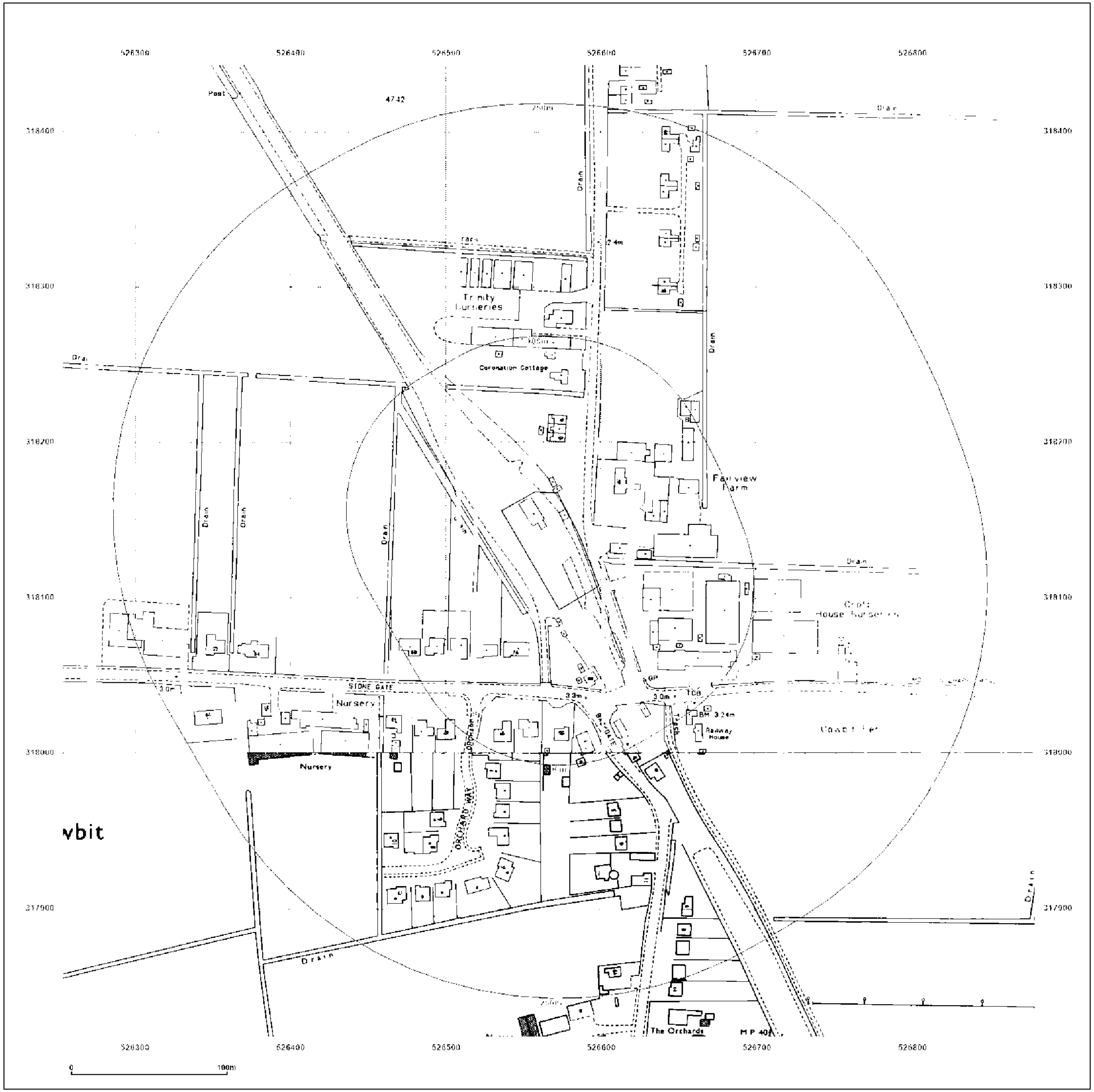
Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2018 Ordnance Survey 100035207

Production date: 03 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

MILL DROVE SOUTH, COWBIT,
SPALDING, PE12 6FS

Client Ref: 23-517
Report Ref: GS-2TL-CUR-3TO-PDL
Grid Ref: 526566, 318130

Map Name: National Grid

Map date: **1992-1995**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

Surveyed 1992
Revised 1992
Edition N/A
Copyright 1992
Levelled N/A

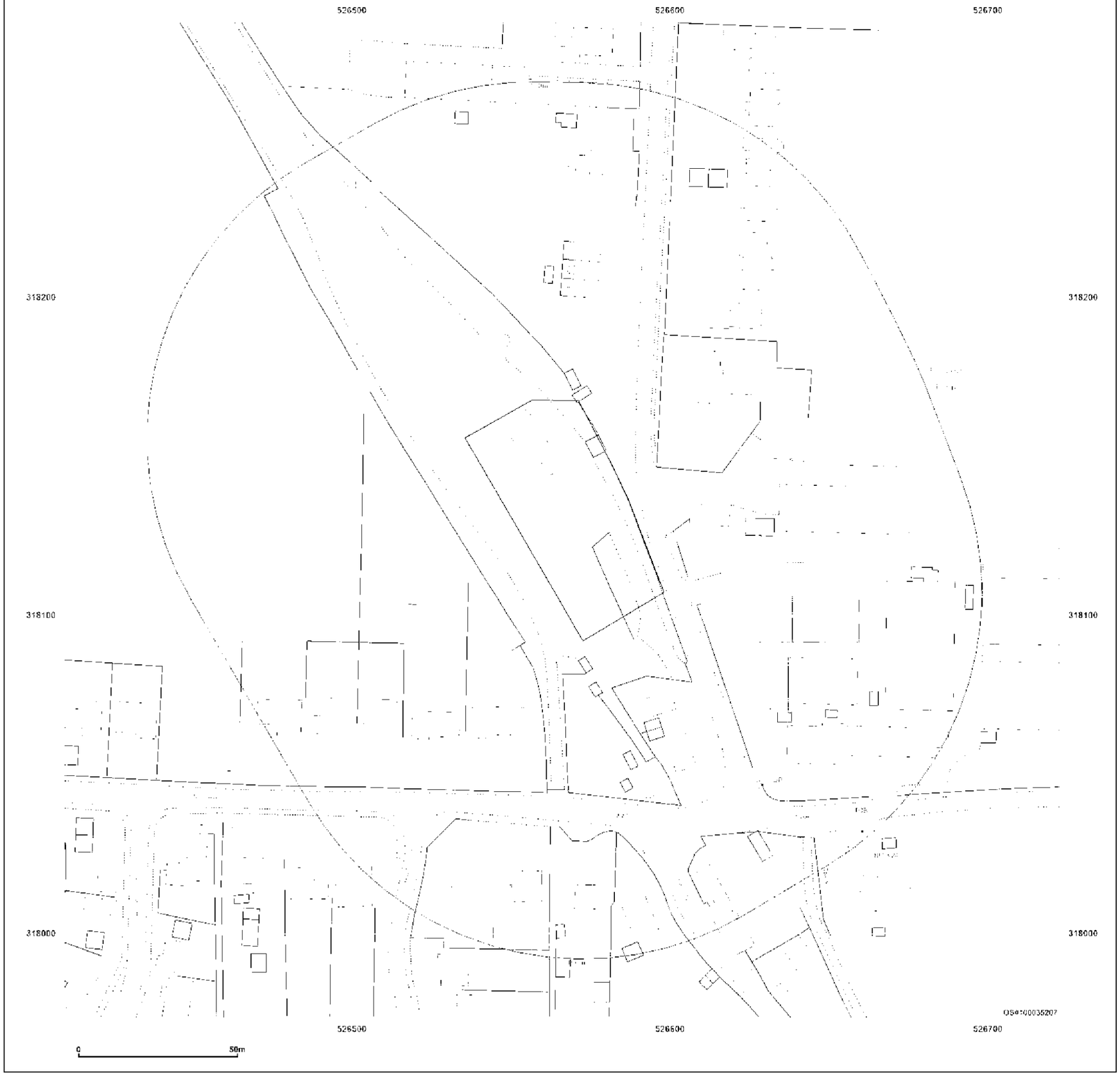
Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2018 Ordnance Survey 100035207

Production date: 03 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

MILL DROVE SOUTH, COWBIT,
SPALDING, PE12 6FS

Client Ref: 23-517
Report Ref: GS-2TL-CUR-3TO-PDL
Grid Ref: 526566, 318130

Map Name: LandLine
Map date: **2003**
Scale: 1:1,250
Printed at: 1:1,250

N
W E
S

2003

Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2018 Ordnance Survey 100035207

Production date: 03 January 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

APPENDIX 3

GROUNDSURE REPORT

Groundsure Enviro+Geo Insight

MILL DROVE SOUTH, COWBIT, SPALDING, PE12 6FS

Order Details

Date: 03/01/2024

Your ref: 23-517

Our Ref: GS-SN1-PYR-FAX-X3G

Site Details

Location: 526568 318131

Area: 0.25 ha

Authority: South Holland District Council ↗

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

Summary of findings p. 2 >

OS MasterMap site plan p.14 >

Aerial image p. 9 >

groundsure.com/insightuserguide ↗

Contact us with any questions at:
info@groundsure.com ↗
01273 257 755

Certified B Corporation

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
15 >	1.1 >	Historical industrial land uses >	15	5	12	6	
17 >	1.2 >	Historical tanks >			1	1	
17 >	1.3 >	Historical energy features >				1	
18	1.4	Historical petrol stations					
18	1.5	Historical garages					
18	1.6	Historical military land					
Page	Section	Past land use - un-grouped >	On site	0-50m	50-250m	250-500m	500-2000m
19 >	2.1 >	Historical industrial land uses >	15	7	15	8	
21 >	2.2 >	Historical tanks >			1	2	
22 >	2.3 >	Historical energy features >				1	
22	2.4	Historical petrol stations					
22	2.5	Historical garages					
Page	Section	Waste and landfill >	On site	0-50m	50-250m	250-500m	500-2000m
23	3.1	Active or recent landfill					
23	3.2	Historical landfill (BGS records)					
24	3.3	Historical landfill (LA/mapping records)					
24	3.4	Historical landfill (EA/NRW records)					
24	3.5	Historical waste sites					
24	3.6	Licensed waste sites					
24 >	3.7 >	Waste exemptions >				53	
Page	Section	Current industrial land use >	On site	0-50m	50-250m	250-500m	500-2000m
29 >	4.1 >	Recent industrial land uses >		1	3		
30	4.2	Current or recent petrol stations					
30	4.3	Electricity cables					
30	4.4	Gas pipelines					
30	4.5	Sites determined as Contaminated Land					

31 >	**4.6 >**	**Control of Major Accident Hazards (COMAH) >**				1	
31	4.7	Regulated explosive sites					
31	4.8	Hazardous substance storage/usage					
31	4.9	Historical licensed industrial activities (IPC)					
32	4.10	Licensed industrial activities (Part A(1))					
32	4.11	Licensed pollutant release (Part A(2)/B)					
32	4.12	Radioactive Substance Authorisations					
32 >	**4.13 >**	**Licensed Discharges to controlled waters >**			6	13	
36	4.14	Pollutant release to surface waters (Red List)					
36	4.15	Pollutant release to public sewer					
36	4.16	List 1 Dangerous Substances					
36	4.17	List 2 Dangerous Substances					
36	4.18	Pollution Incidents (EA/NRW)					
37	4.19	Pollution inventory substances					
37	4.20	Pollution inventory waste transfers					
37	4.21	Pollution inventory radioactive waste					
Page	Section	**Hydrogeology >**	On site	0-50m	50-250m	250-500m	500-2000m
38 >	**5.1 >**	**Superficial aquifer >**	Identified (within 500m)				
39 >	**5.2 >**	**Bedrock aquifer >**	Identified (within 500m)				
40 >	**5.3 >**	**Groundwater vulnerability >**	Identified (within 50m)				
41	5.4	Groundwater vulnerability- soluble rock risk					
41	5.5	Groundwater vulnerability- local information					
42	5.6	Groundwater abstractions					
43 >	**5.7 >**	**Surface water abstractions >**					12
45	5.8	Potable abstractions					
46	5.9	Source Protection Zones					
46	5.10	Source Protection Zones (confined aquifer)					
Page	Section	**Hydrology >**	On site	0-50m	50-250m	250-500m	500-2000m
47 >	**6.1 >**	**Water Network (OS MasterMap) >**		4	23		

50 >	6.2 >	Surface water features >		2	9		
50 >	6.3 >	WFD Surface water body catchments >	1				
50 >	6.4 >	WFD Surface water bodies >					
51	6.5	WFD Groundwater bodies					
Page	Section	River and coastal flooding >	On site	0-50m	50-250m	250-500m	500-2000m
52 >	7.1 >	Risk of flooding from rivers and the sea >	Medium (within 50m)				
53	7.2	Historical Flood Events					
53	7.3	Flood Defences					
53	7.4	Areas Benefiting from Flood Defences					
53	7.5	Flood Storage Areas					
54 >	7.6 >	Flood Zone 2 >	Identified (within 50m)				
55 >	7.7 >	Flood Zone 3 >	Identified (within 50m)				
Page	Section	Surface water flooding >					
56 >	8.1 >	Surface water flooding >	1 in 30 year, 0.1m - 0.3m (within 50m)				
Page	Section	Groundwater flooding >					
58 >	9.1 >	Groundwater flooding >	Negligible (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
59	10.1	Sites of Special Scientific Interest (SSSI)					
59	10.2	Conserved wetland sites (Ramsar sites)					
59	10.3	Special Areas of Conservation (SAC)					
59	10.4	Special Protection Areas (SPA)					
60	10.5	National Nature Reserves (NNR)					
60	10.6	Local Nature Reserves (LNR)					
60	10.7	Designated Ancient Woodland					
60	10.8	Biosphere Reserves					
61	10.9	Forest Parks					
61	10.10	Marine Conservation Zones					
61	10.11	Green Belt					
61	10.12	Proposed Ramsar sites					

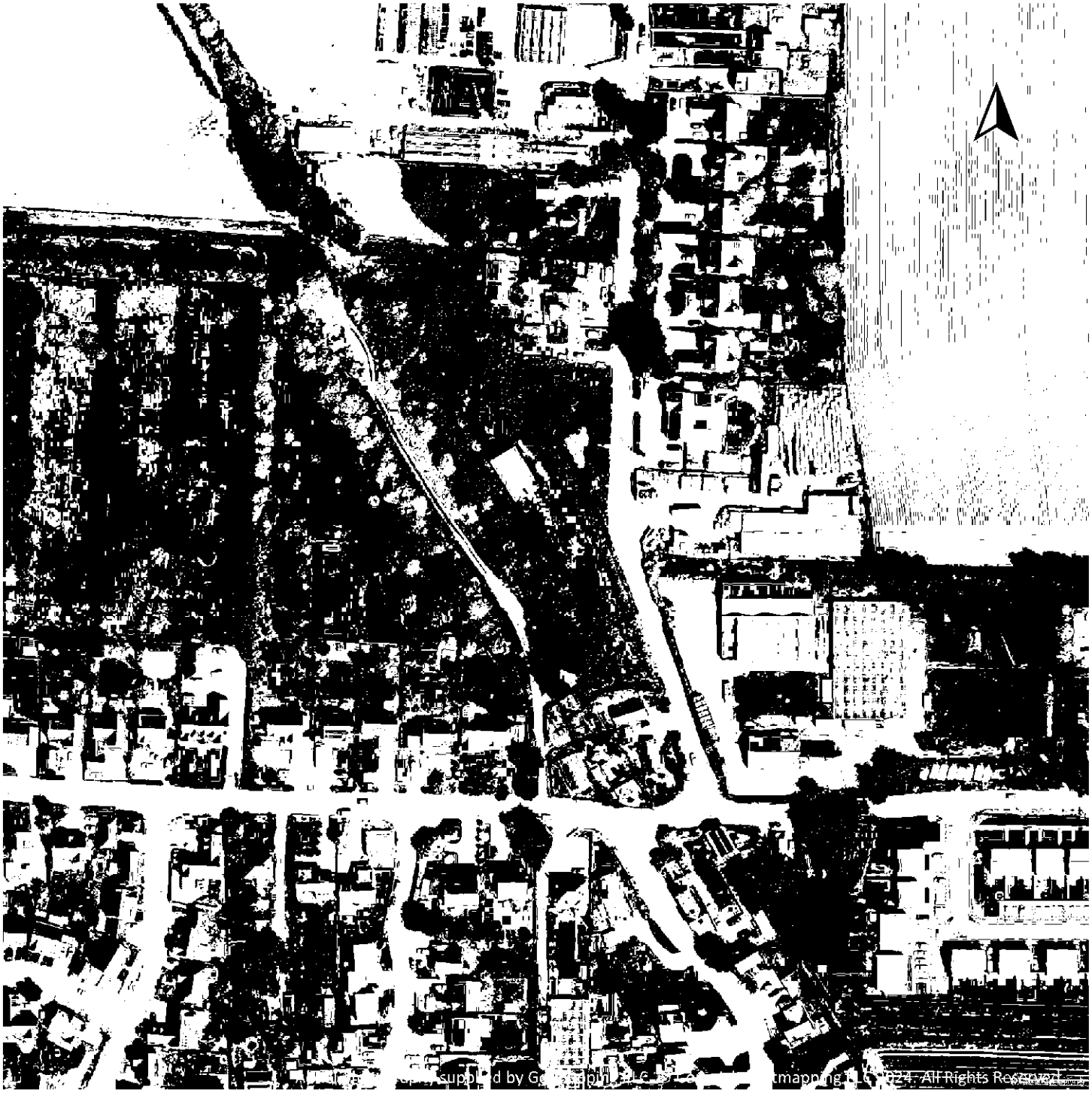
61	10.13	Possible Special Areas of Conservation (pSAC)					
62	10.14	Potential Special Protection Areas (pSPA)					
62	10.15	Nitrate Sensitive Areas					
62 >	**10.16 >**	**Nitrate Vulnerable Zones >**					2
63 >	**10.17 >**	**SSSI Impact Risk Zones >**	1				
64	10.18	SSSI Units					
Page	Section	**Visual and cultural designations >**	On site	0-50m	50-250m	250-500m	500-2000m
65	11.1	World Heritage Sites					
66	11.2	Area of Outstanding Natural Beauty					
66	11.3	National Parks					
66 >	**11.4 >**	**Listed Buildings >**			1		
67	11.5	Conservation Areas					
67	11.6	Scheduled Ancient Monuments					
67	11.7	Registered Parks and Gardens					
Page	Section	**Agricultural designations >**	On site	0-50m	50-250m	250-500m	500-2000m
68 >	**12.1 >**	**Agricultural Land Classification >**	Grade 1 (within 250m)				
69	12.2	Open Access Land					
69	12.3	Tree Felling Licences					
69	12.4	Environmental Stewardship Schemes					
69	12.5	Countryside Stewardship Schemes					
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
70	13.1	Priority Habitat Inventory					
70	13.2	Habitat Networks					
70	13.3	Open Mosaic Habitat					
70	13.4	Limestone Pavement Orders					
Page	Section	**Geology 1:10,000 scale >**	On site	0-50m	50-250m	250-500m	500-2000m
71 >	**14.1 >**	**10k Availability >**	Identified (within 500m)				
72	14.2	Artificial and made ground (10k)					
73 >	**14.3 >**	**Superficial geology (10k) >**	1				

74	14.4	Landslip (10k)					
75 >	**14.5 >**	**Bedrock geology (10k) >**	1				
76	14.6	Bedrock faults and other linear features (10k)					
Page	Section	**Geology 1:50,000 scale >**	On site	0-50m	50-250m	250-500m	500-2000m
77 >	**15.1 >**	**50k Availability >**	Identified (within 500m)				
78	15.2	Artificial and made ground (50k)					
78	15.3	Artificial ground permeability (50k)					
79 >	**15.4 >**	**Superficial geology (50k) >**	1				
80 >	**15.5 >**	**Superficial permeability (50k) >**	Identified (within 50m)				
80	15.6	Landslip (50k)					
80	15.7	Landslip permeability (50k)					
81 >	**15.8 >**	**Bedrock geology (50k) >**	1				
82 >	**15.9 >**	**Bedrock permeability (50k) >**	Identified (within 50m)				
82	15.10	Bedrock faults and other linear features (50k)					
Page	Section	**Boreholes >**	On site	0-50m	50-250m	250-500m	500-2000m
83 >	**16.1 >**	**BGS Boreholes >**		1	2		
Page	Section	**Natural ground subsidence >**					
85 >	**17.1 >**	**Shrink swell clays >**	Low (within 50m)				
86 >	**17.2 >**	**Running sands >**	Moderate (within 50m)				
87 >	**17.3 >**	**Compressible deposits >**	Moderate (within 50m)				
88 >	**17.4 >**	**Collapsible deposits >**	Negligible (within 50m)				
89 >	**17.5 >**	**Landslides >**	Very low (within 50m)				
90 >	**17.6 >**	**Ground dissolution of soluble rocks >**	Negligible (within 50m)				
Page	Section	**Mining and ground workings >**	On site	0-50m	50-250m	250-500m	500-2000m
92	18.1	BritPits					
93 >	**18.2 >**	**Surface ground workings >**		2	1		
93 >	**18.3 >**	**Underground workings >**					4
93	18.4	Underground mining extents					
94	18.5	Historical Mineral Planning Areas					

94	18.6	Non-coal mining					
94	18.7	JPB mining areas					
94	18.8	The Coal Authority non-coal mining					
95	18.9	Researched mining					
95	18.10	Mining record office plans					
95	18.11	BGS mine plans					
95	18.12	Coal mining					
95	18.13	Brine areas					
96	18.14	Gypsum areas					
96	18.15	Tin mining					
96	18.16	Clay mining					
Page	Section	Ground cavities and sinkholes	On site	0-50m	50-250m	250-500m	500-2000m
97	19.1	Natural cavities					
97	19.2	Mining cavities					
97	19.3	Reported recent incidents					
97	19.4	Historical incidents					
98	19.5	National karst database					
Page	Section	**Radon** >					
99 >	**20.1** >	**Radon** >	Less than 1% (within 0m)				
Page	Section	**Soil chemistry** >	On site	0-50m	50-250m	250-500m	500-2000m
101 >	**21.1** >	**BGS Estimated Background Soil Chemistry** >	1	1			
101	21.2	BGS Estimated Urban Soil Chemistry					
101	21.3	BGS Measured Urban Soil Chemistry					
Page	Section	**Railway infrastructure and projects** >	On site	0-50m	50-250m	250-500m	500-2000m
102	22.1	Underground railways (London)					
102	22.2	Underground railways (Non-London)					
103	22.3	Railway tunnels					
103 >	**22.4** >	**Historical railway and tunnel features** >	6	1	1		
103	22.5	Royal Mail tunnels					

104 >	**22.6 >**	**Historical railways >**	1	1
104	22.7	Railways		
104	22.8	Crossrail 1		
104	22.9	Crossrail 2		
105	22.10	HS2		

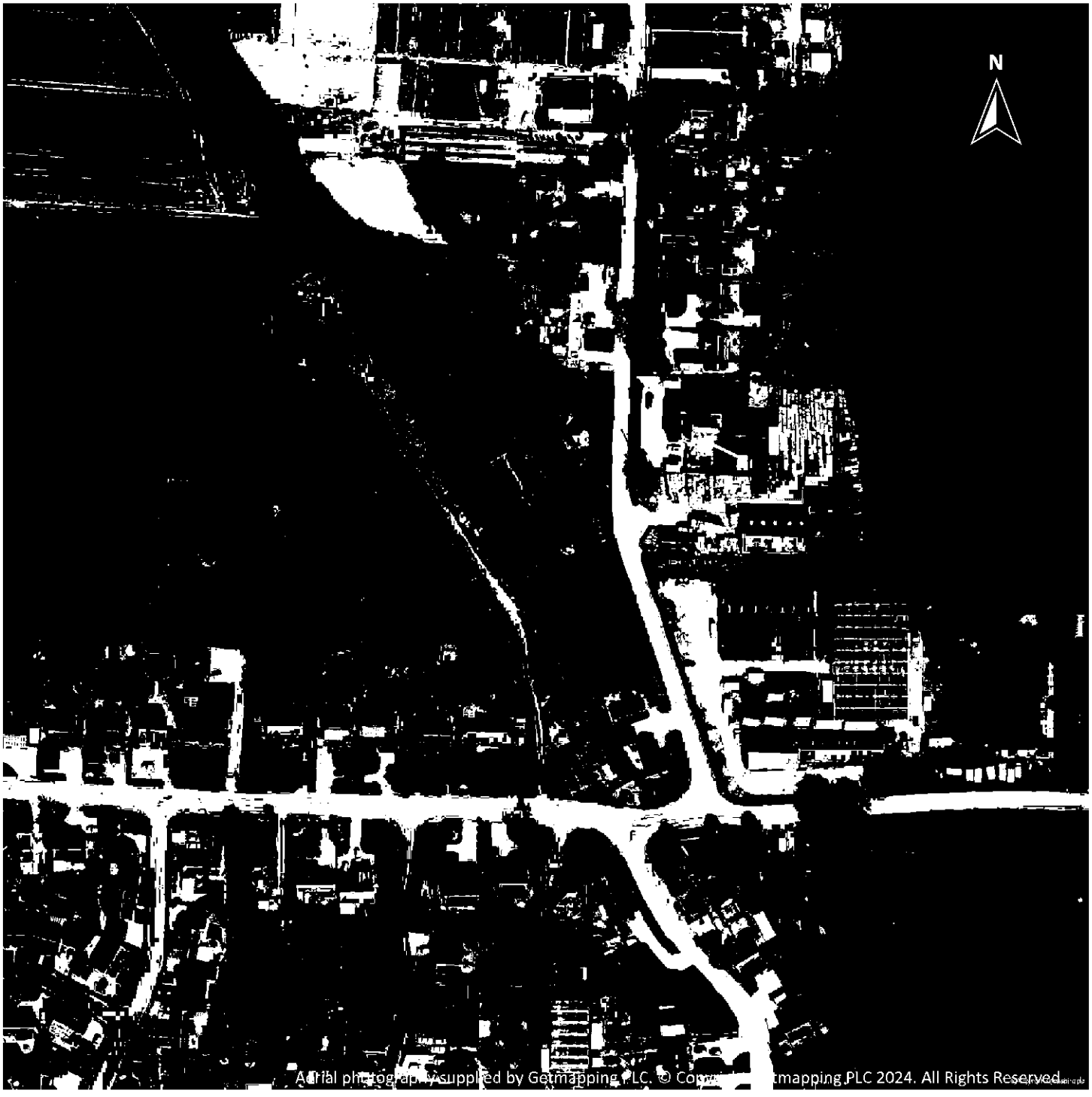
Recent aerial photograph



Capture Date: 29/05/2021

Site Area: 0.25ha

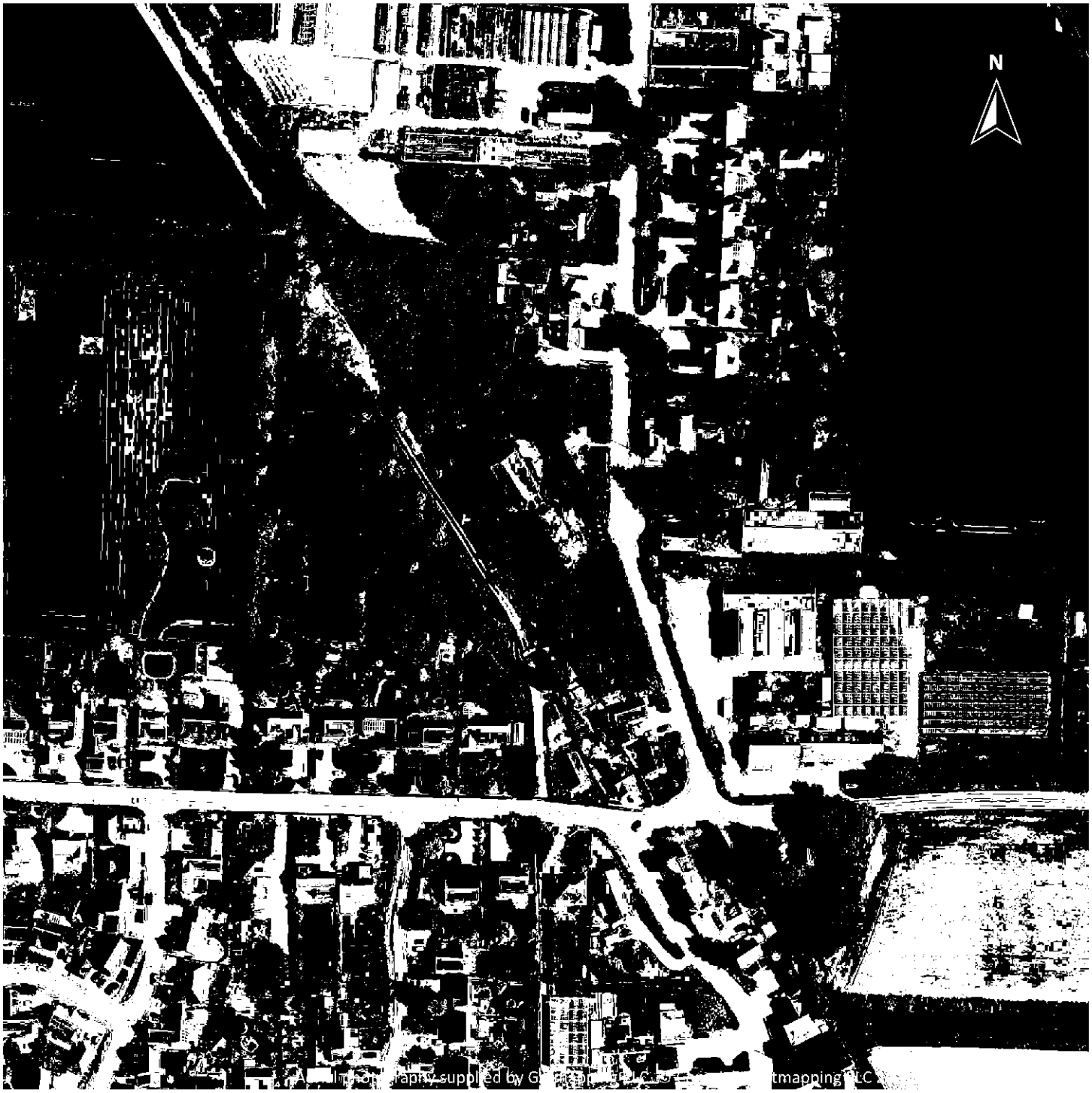
Recent site history - 2018 aerial photograph



Capture Date: 20/04/2018

Site Area: 0.25ha

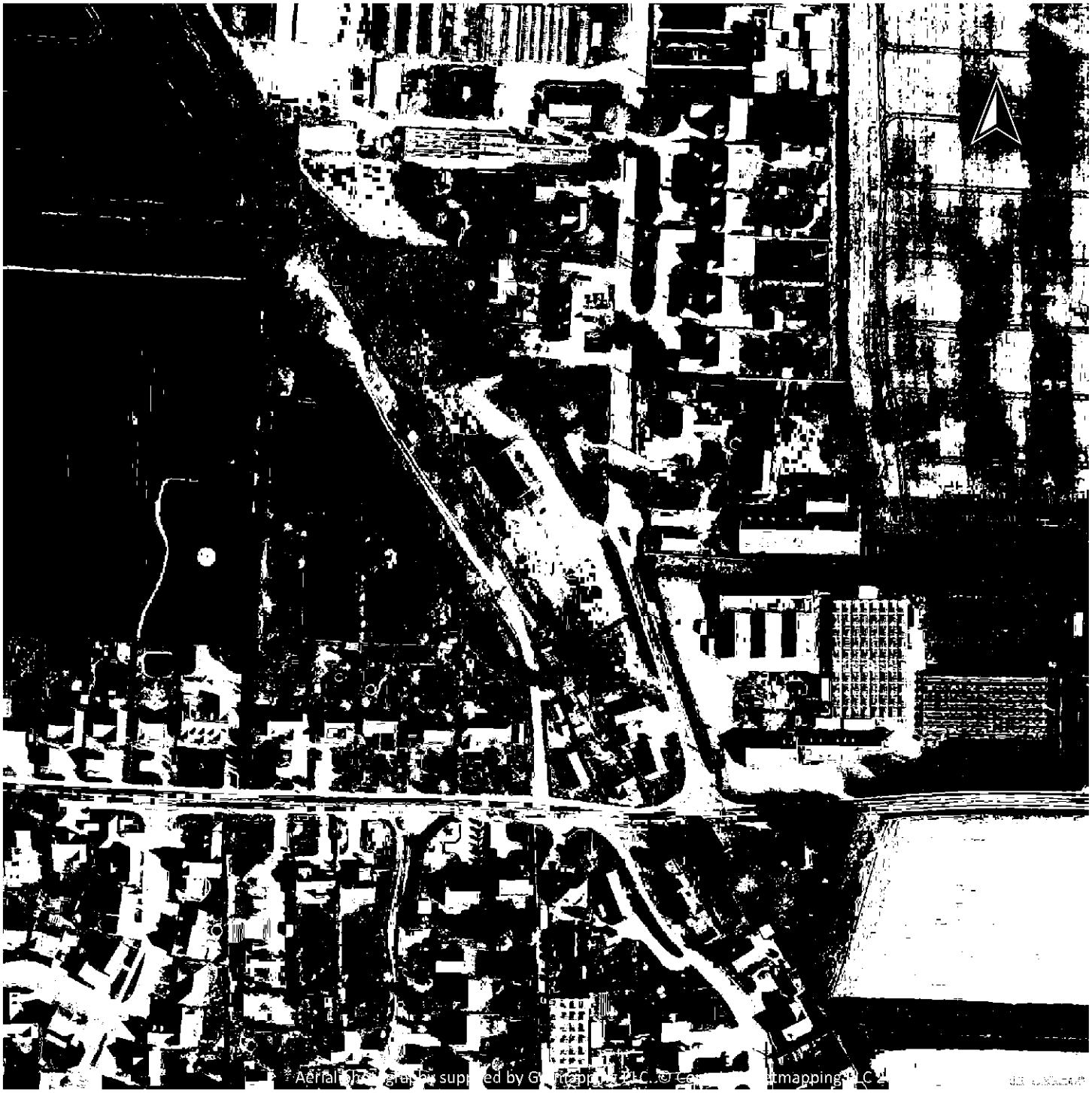
Recent site history - 2013 aerial photograph



Capture Date: 27/05/2013

Site Area: 0.25ha

Recent site history - 2007 aerial photograph



Capture Date: 19/04/2007

Site Area: 0.25ha

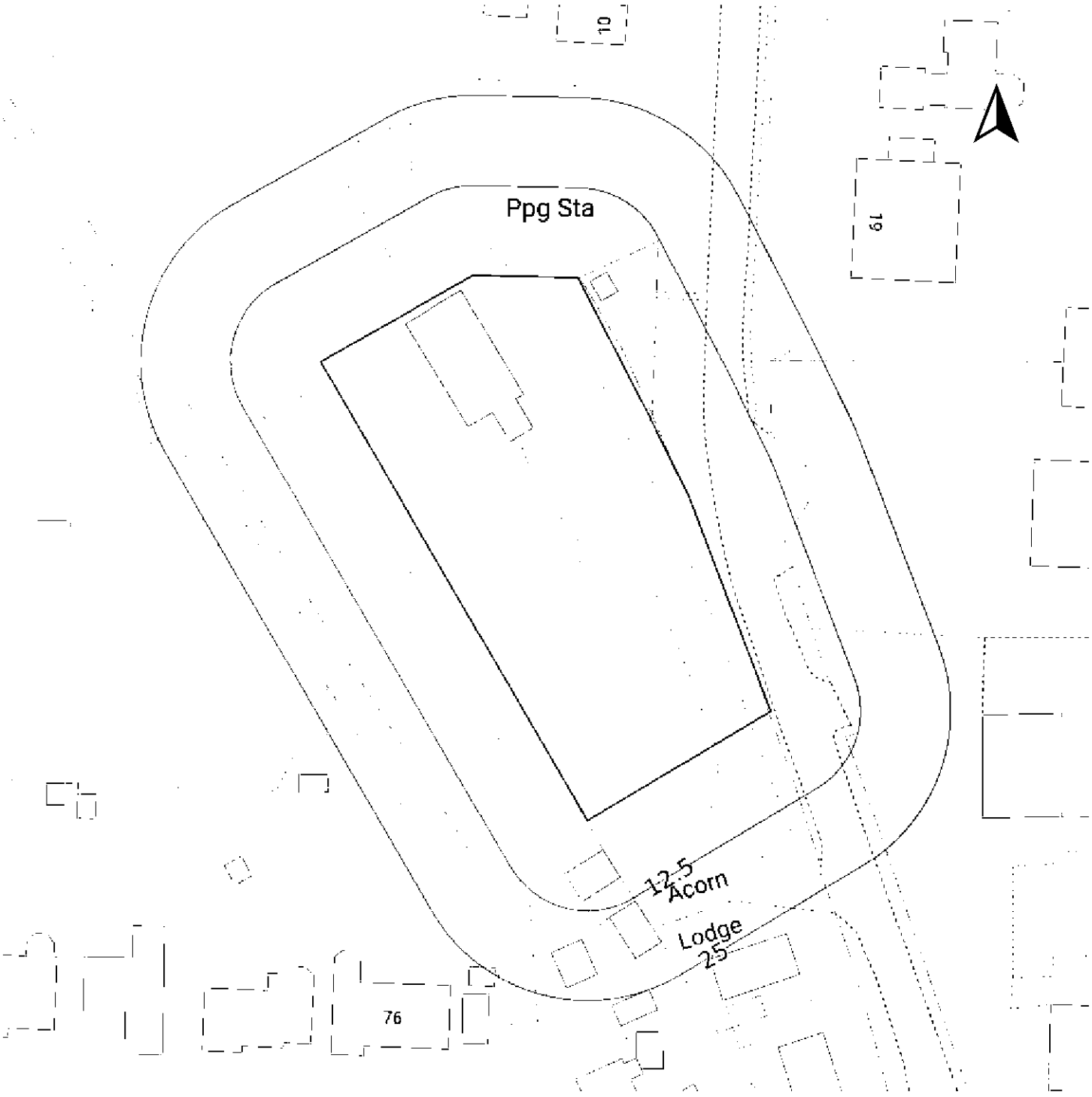
Recent site history - 1999 aerial photograph



Capture Date: 18/06/1999

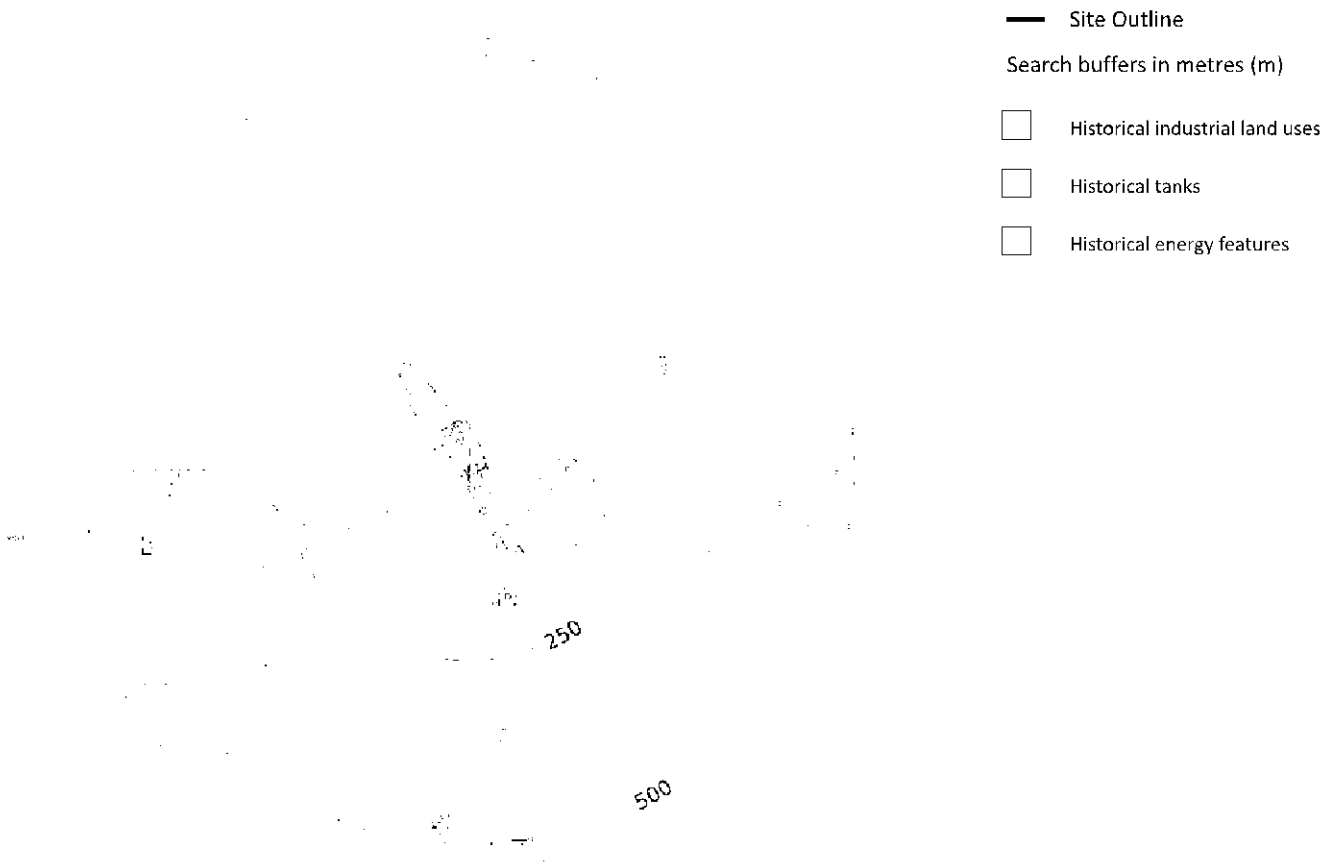
Site Area: 0.25ha

OS MasterMap site plan



Site Area: 0.25ha

1 Past land use



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

1.1 Historical industrial land uses

Records within 500m **38**

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 15** >

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Railway Building**	**1938**	**2007573**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Railway Sidings**	**1938**	**2012328**
A	**On site**	**Railway Sidings**	**1903**	**2014195**
A	**On site**	**Railway Building**	**1977**	**2018524**
A	**On site**	**Railway Building**	**1887**	**2021875**
A	**On site**	**Railway Sidings**	**1887**	**2023076**
A	**On site**	**Railway Building**	**1951**	**2027857**
A	**On site**	**Railway Sidings**	**1951**	**2028099**
A	**On site**	**Railway Sidings**	**1951**	**2029616**
A	**On site**	**Railway Building**	**1951**	**2031009**
A	**On site**	**Railway Sidings**	**1887**	**2031399**
A	**On site**	**Railway Building**	**1906**	**2031682**
A	**On site**	**Railway Sidings**	**1903**	**2031766**
A	**On site**	**Railway Sidings**	**1903 - 1906**	**2034356**
A	**On site**	**Railway Sidings**	**1950**	**2039320**

ID	Location	Land use	Dates present	Group ID

1.2 Historical tanks

Records within 500m **2**

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 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 15 >**

ID	Location	Land use	Dates present	Group ID

1.3 Historical energy features

Records within 500m **1**

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 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 15** >

ID	Location	Land use	Dates present	Group ID

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 un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

1.5 Historical garages

Records within 500m **0**

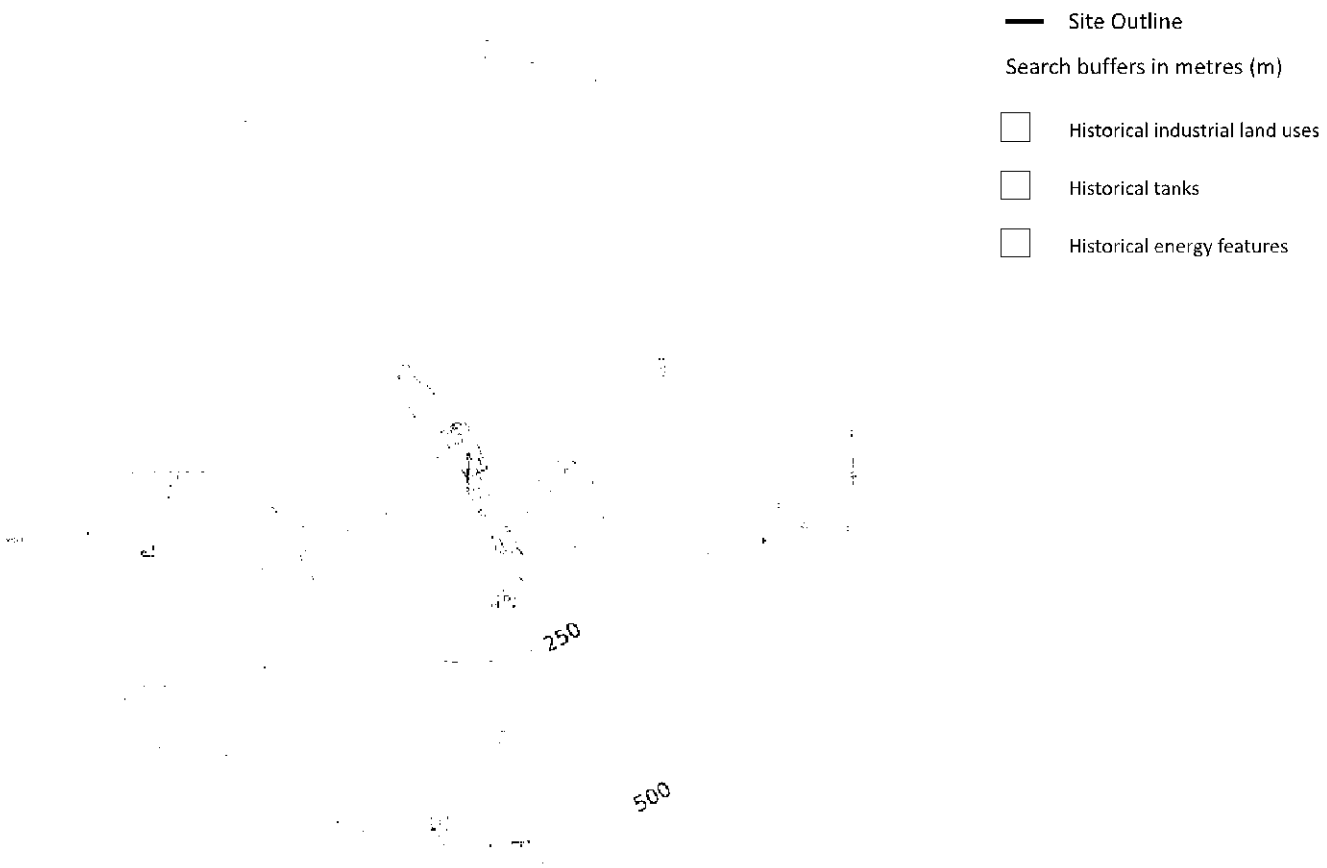
Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately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

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.

2 Past land use - un-grouped



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

2.1 Historical industrial land uses

Records within 500m **45**

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 19 >**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Railway Sidings**	**1903**	**2014195**
A	**On site**	**Railway Sidings**	**1903**	**2031766**
A	**On site**	**Railway Sidings**	**1938**	**2012328**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Railway Building**	**1938**	**2007573**
A	**On site**	**Railway Sidings**	**1887**	**2031399**
A	**On site**	**Railway Sidings**	**1951**	**2029616**
A	**On site**	**Railway Building**	**1951**	**2027857**
A	**On site**	**Railway Building**	**1887**	**2021875**
A	**On site**	**Railway Sidings**	**1887**	**2023076**
A	**On site**	**Railway Building**	**1977**	**2018524**
A	**On site**	**Railway Sidings**	**1950**	**2039320**
A	**On site**	**Railway Building**	**1906**	**2031682**
A	**On site**	**Railway Sidings**	**1906**	**2034356**
A	**On site**	**Railway Sidings**	**1951**	**2028099**
A	**On site**	**Railway Building**	**1951**	**2031009**

ID	Location	Land Use	Date	Group ID

2.2 Historical tanks

Records within 500m **3**

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 19 >**

ID	Location	Land Use	Date	Group ID

2.3 Historical energy features

Records within 500m **1**

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 19** >

ID	Location	Land Use	Date	Group ID

2.4 Historical petrol stations

Records within 500m **0**

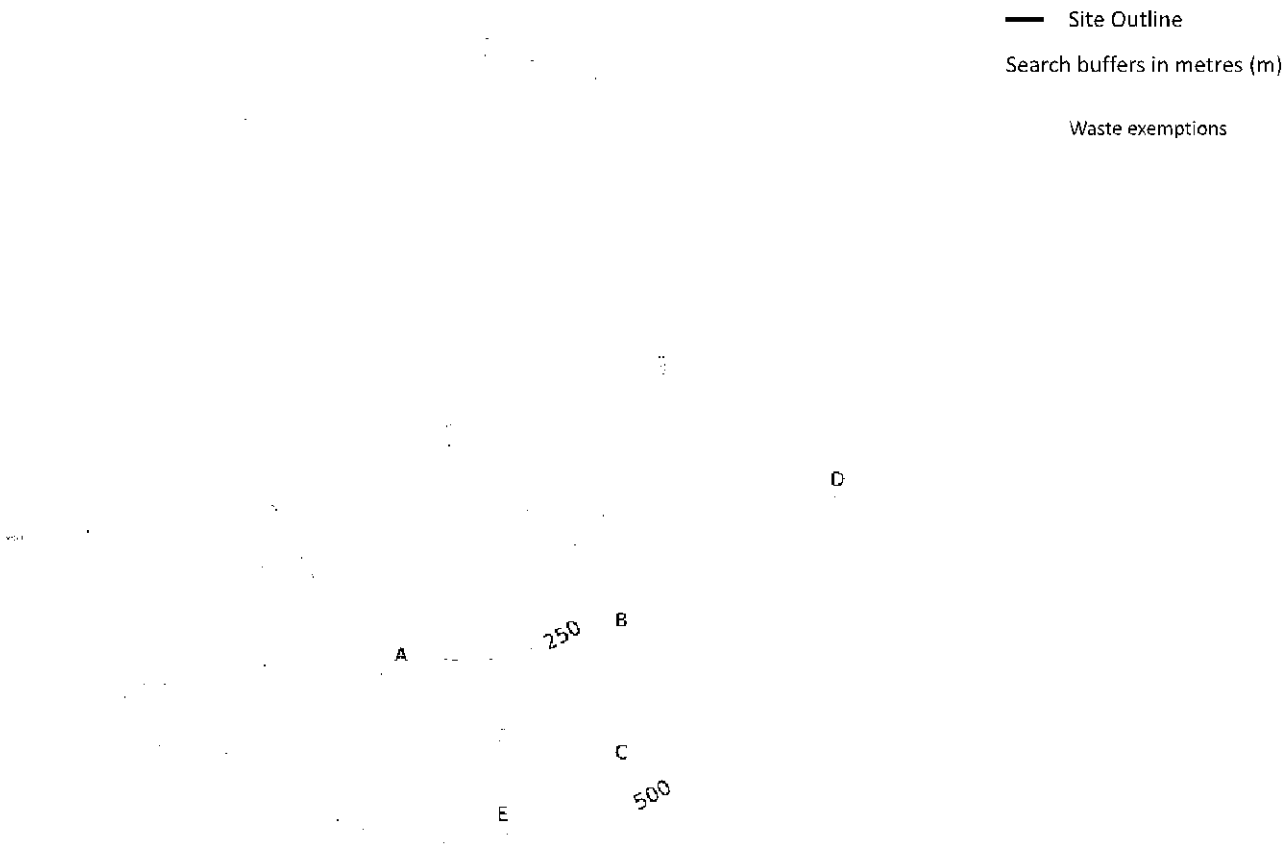
Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

2.5 Historical garages

Records within 500m **0**

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'.

3 Waste and landfill



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

3.1 Active or recent landfill

Records within 500m	**0**

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

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.

3.3 Historical landfill (LA/mapping records)

Records within 500m **0**

Landfill sites identified from Local Authority records and high detail historical mapping.

3.4 Historical landfill (EA/NRW records)

Records within 500m **0**

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.

3.5 Historical waste sites

Records within 500m **0**

Waste site records derived from Local Authority planning records and high detail historical mapping.

3.6 Licensed waste sites

Records within 500m **0**

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

3.7 Waste exemptions

Records within 500m **53**

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 23** >

ID	Location	Site	Reference	Category	Sub-Category	Description

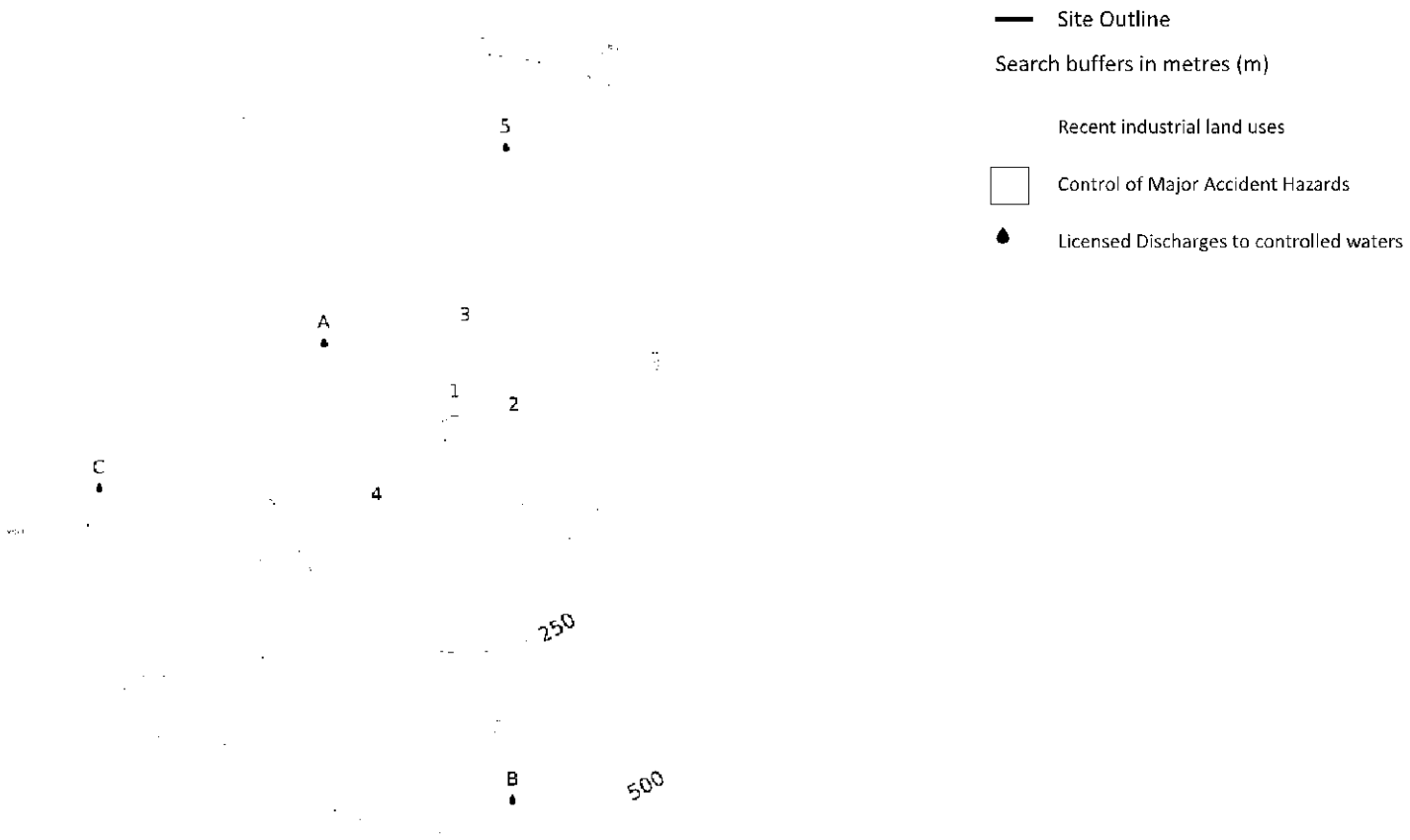
ID	Location	Site	Reference	Category	Sub-Category	Description

ID	Location	Site	Reference	Category	Sub-Category	Description

ID	Location	Site	Reference	Category	Sub-Category	Description

ID	Location	Site	Reference	Category	Sub-Category	Description

4 Current industrial land use



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

4.1 Recent industrial land uses

Records within 250m **4**

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 29** >

ID	Location	Company	Address	Activity	Category

ID	Location	Company	Address	Activity	Category

4.2 Current or recent petrol stations

Records within 500m **0**

Open, closed, under development and obsolete petrol stations.

4.3 Electricity cables

Records within 500m **0**

High voltage underground electricity transmission cables.

4.4 Gas pipelines

Records within 500m **0**

High pressure underground gas transmission pipelines.

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.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m **1**

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.

Features are displayed on the Current industrial land use map on **page 29** >

ID	Location	Company	Address	Operational status	Tier

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.

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.

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.

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.

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

Records within 500m **0**

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.

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.

4.13 Licensed Discharges to controlled waters

Records within 500m **19**

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 29** >

ID	Location	Address	Details

ID	Location	Address	Details

ID	Location	Address	Details

ID	Location	Address	Details

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.

4.15 Pollutant release to public sewer

Records within 500m **0**

Discharges of Special Category Effluents to the public sewer.

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.

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.

4.18 Pollution Incidents (EA/NRW)

Records within 500m **0**

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

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.

4.20 Pollution inventory waste transfers

Records within 500m **0**

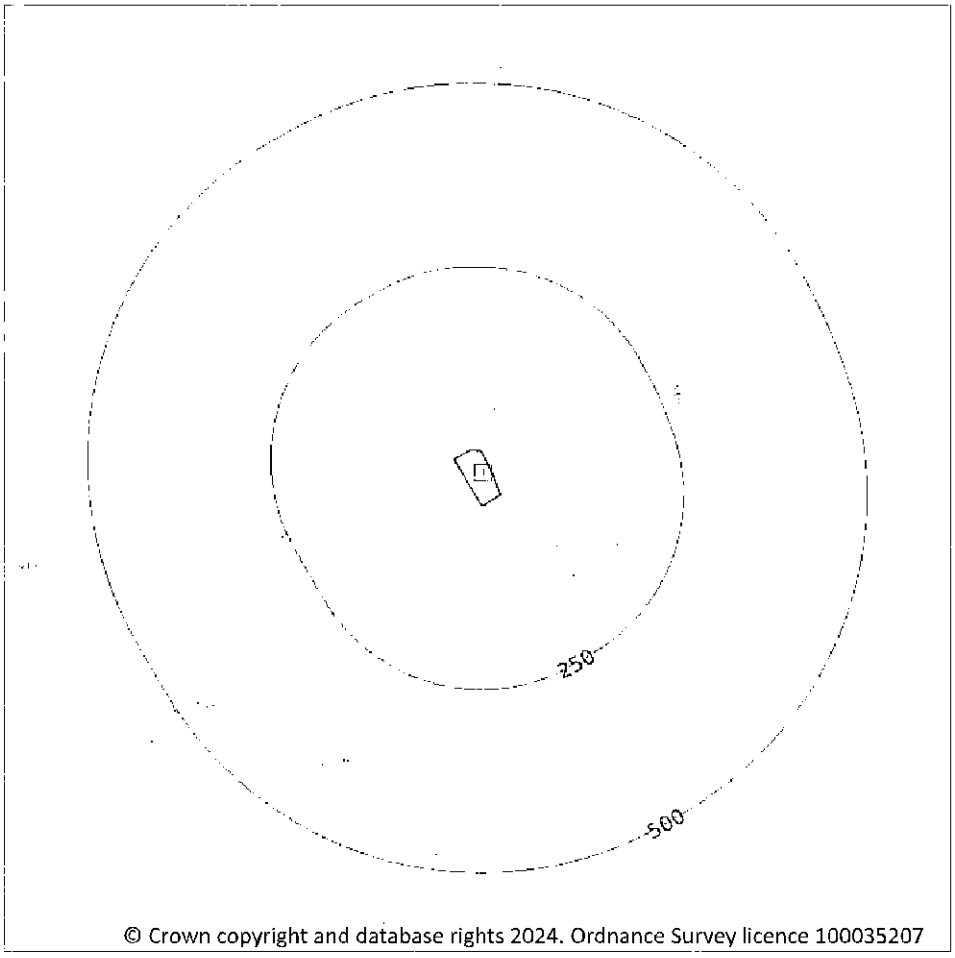
The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most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

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.

5 Hydrogeology - Superficial aquifer



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive
- Unknown

5.1 Superficial aquifer

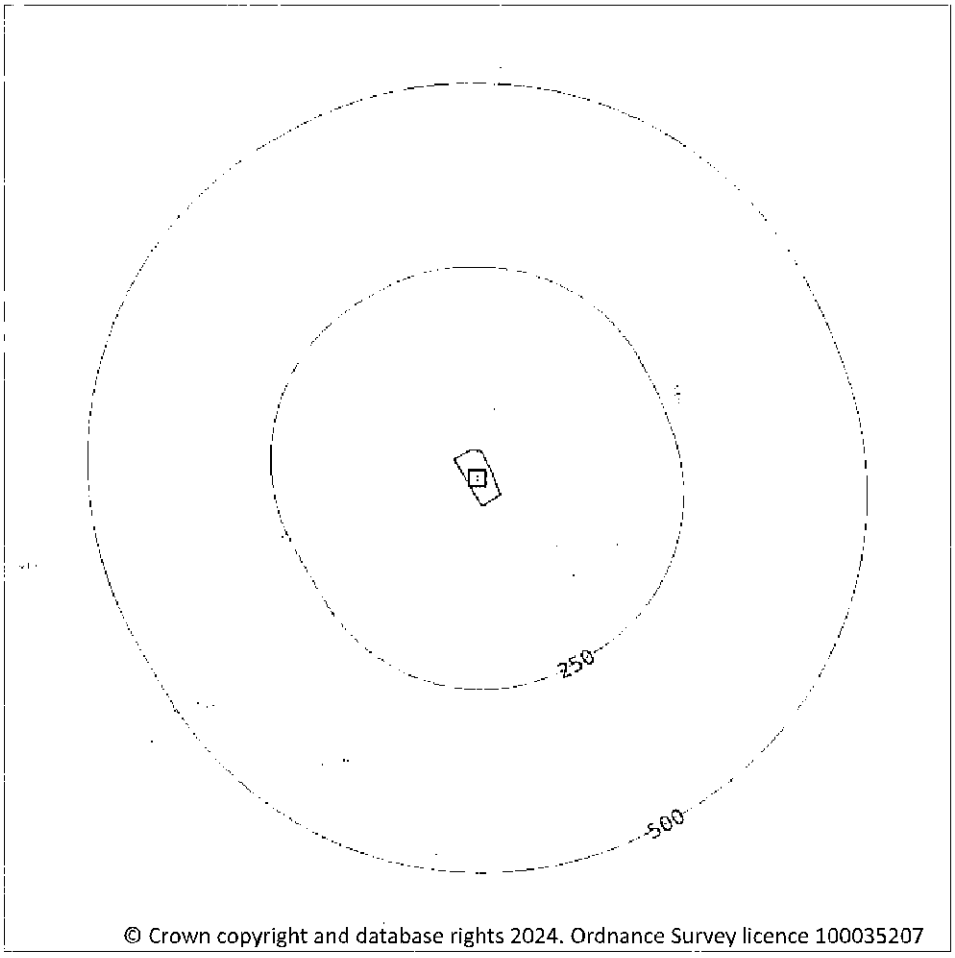
Records within 500m **1**

Aquifer status of groundwater held within superficial geology.

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

ID	Location	Designation	Description
1	**On site**	**Unproductive**	**These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow**

Bedrock aquifer



Site Outline

Search buffers in metres (m)

- Principal
- Secondary A
- Secondary B
- Secondary Undifferentiated
- Unproductive

5.2 Bedrock aquifer

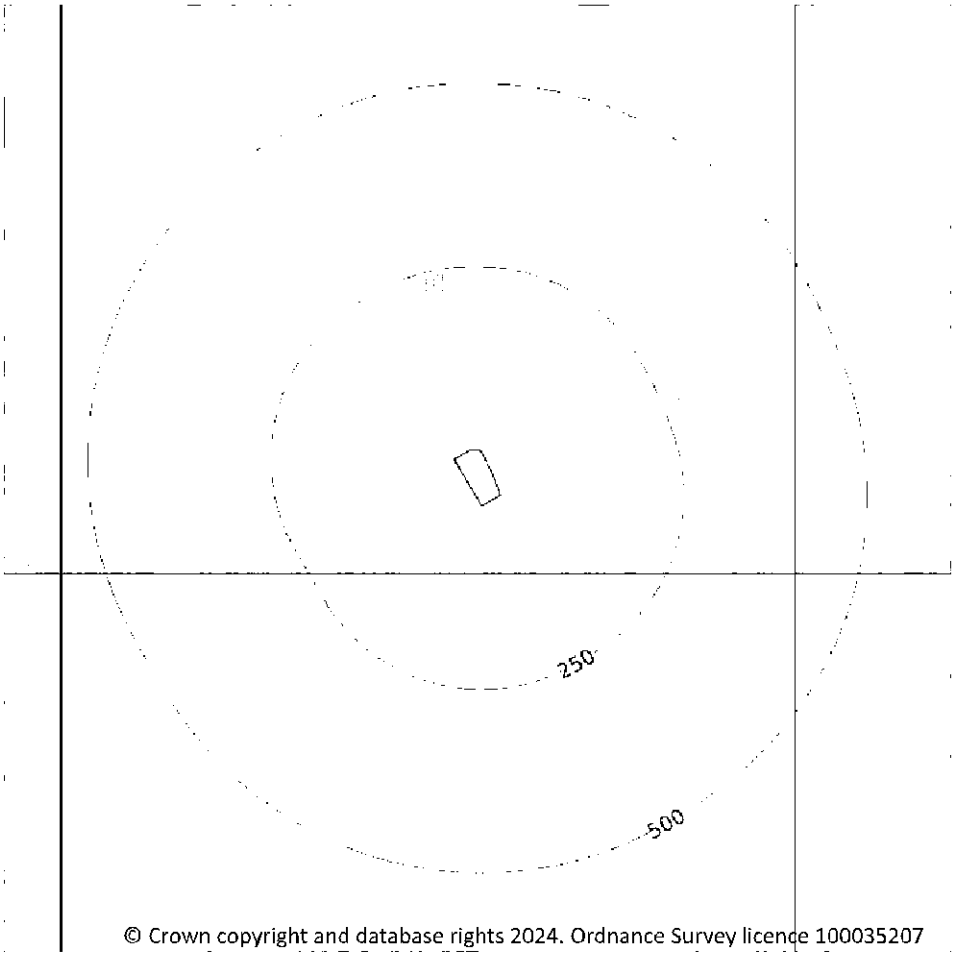
Records within 500m **1**

Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 39** >

ID	Location	Designation	Description
1	**On site**	**Unproductive**	**These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow**

Groundwater vulnerability



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

Site Outline

Search buffers in metres (m)

Superficial vulnerability

- Principal superficial aquifer, high vulnerability
- Secondary superficial aquifer, high vulnerability
- Principal superficial aquifer, medium vulnerability
- Secondary superficial aquifer, medium vulnerability
- Principal superficial aquifer, low vulnerability
- Secondary superficial aquifer, low vulnerability

Bedrock vulnerability

- Principal bedrock aquifer, high vulnerability
- Secondary bedrock aquifer, high vulnerability
- Principal bedrock aquifer, medium vulnerability
- Secondary bedrock aquifer, medium vulnerability
- Principal bedrock aquifer, low vulnerability
- Secondary bedrock aquifer, low vulnerability

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m **1**

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
Medium - Intermediate between high and low vulnerability.
Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 40 >**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	**On site**	**Summary Classification: Unproductive aquifer (may have productive aquifer beneath) Combined classification: Unproductive Bedrock Aquifer, Unproductive Superficial Aquifer**	**Leaching class: High Infiltration value: >70% Dilution value: <300mm/year**	**Vulnerability: Unproductive Aquifer type: Unproductive Thickness: >10m Patchiness value: >90% Recharge potential: Low**	**Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Well connected fractures**

5.4 Groundwater vulnerability- soluble rock risk

Records on site **0**

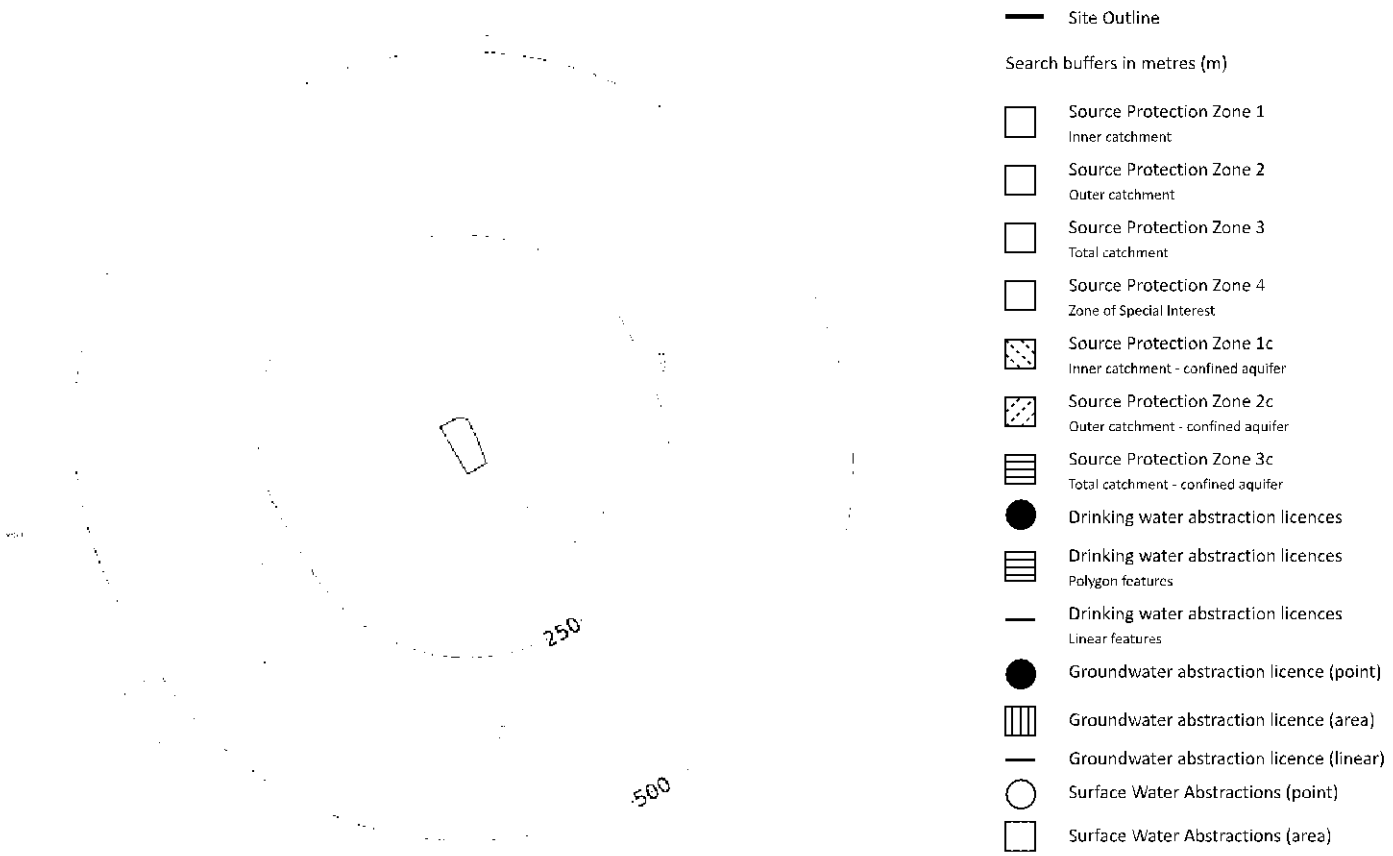
This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

5.5 Groundwater vulnerability- local information

Records on site **0**

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk ↗.

Abstractions and Source Protection Zones



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

5.6 Groundwater abstractions

Records within 2000m **0**

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

5.7 Surface water abstractions

Records within 2000m **12**

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 42** >

ID	Location	Details

ID	Location	Details

ID Location Details

5.8 Potable abstractions

Records within 2000m **0**

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

5.9 Source Protection Zones

Records within 500m	**0**

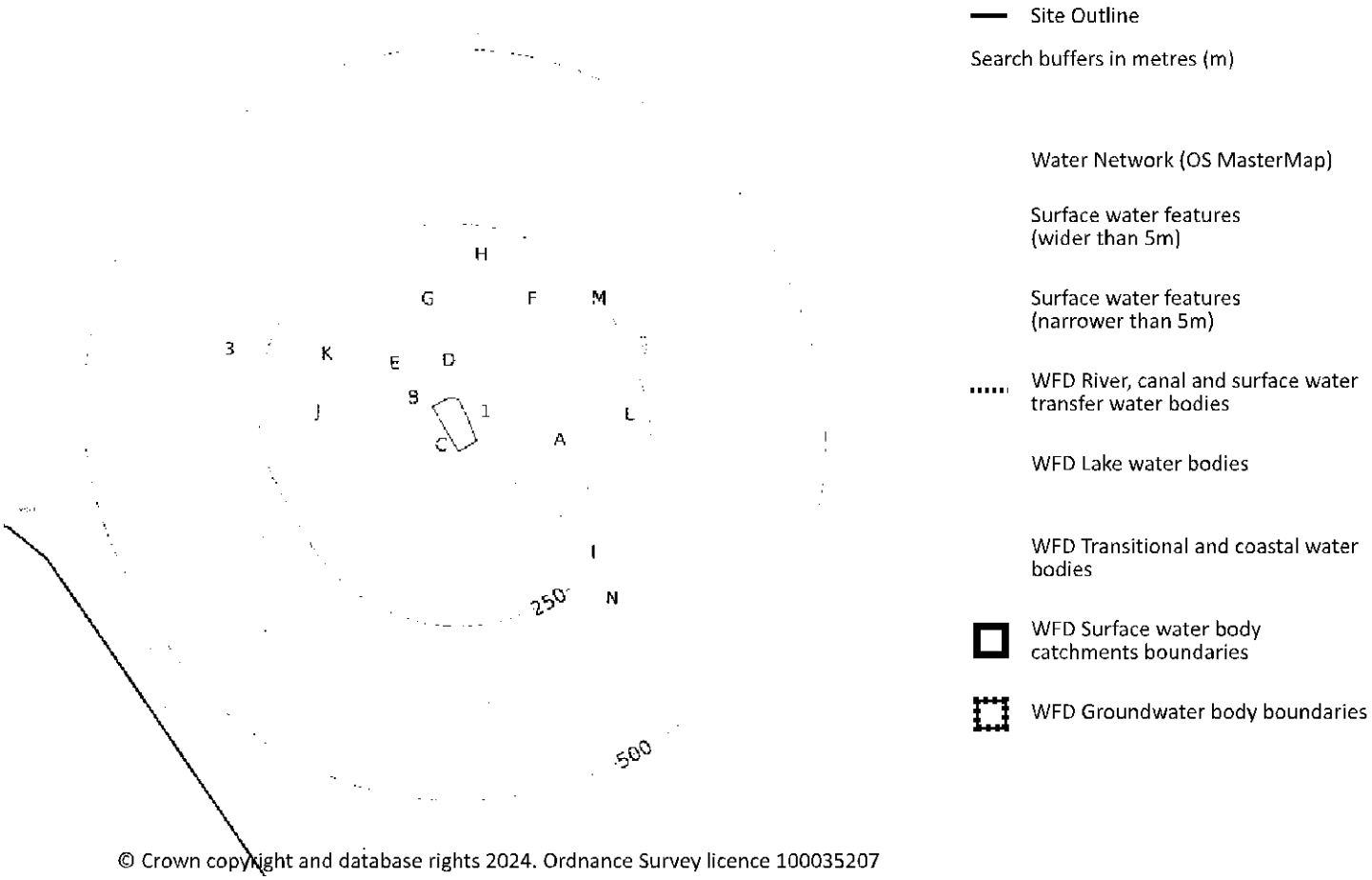
Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

5.10 Source Protection Zones (confined aquifer)

Records within 500m	**0**

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

6 Hydrology



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

6.1 Water Network (OS MasterMap)

Records within 250m **27**

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 47 >**

ID	Location	Type of water feature	Ground level	Permanence	Name

ID	Location	Type of water feature	Ground level	Permanence	Name

ID	Location	Type of water feature	Ground level	Permanence	Name

6.2 Surface water features

Records within 250m **11**

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 47** >

6.3 WFD Surface water body catchments

Records on site **1**

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 47** >

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	**On site**	**River**	**South Holland Main Drain**	**GB205032050405**	**Nene Lower**	**Nene**

6.4 WFD Surface water bodies

Records identified **1**

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

Features are displayed on the Hydrology map on **page 47** >

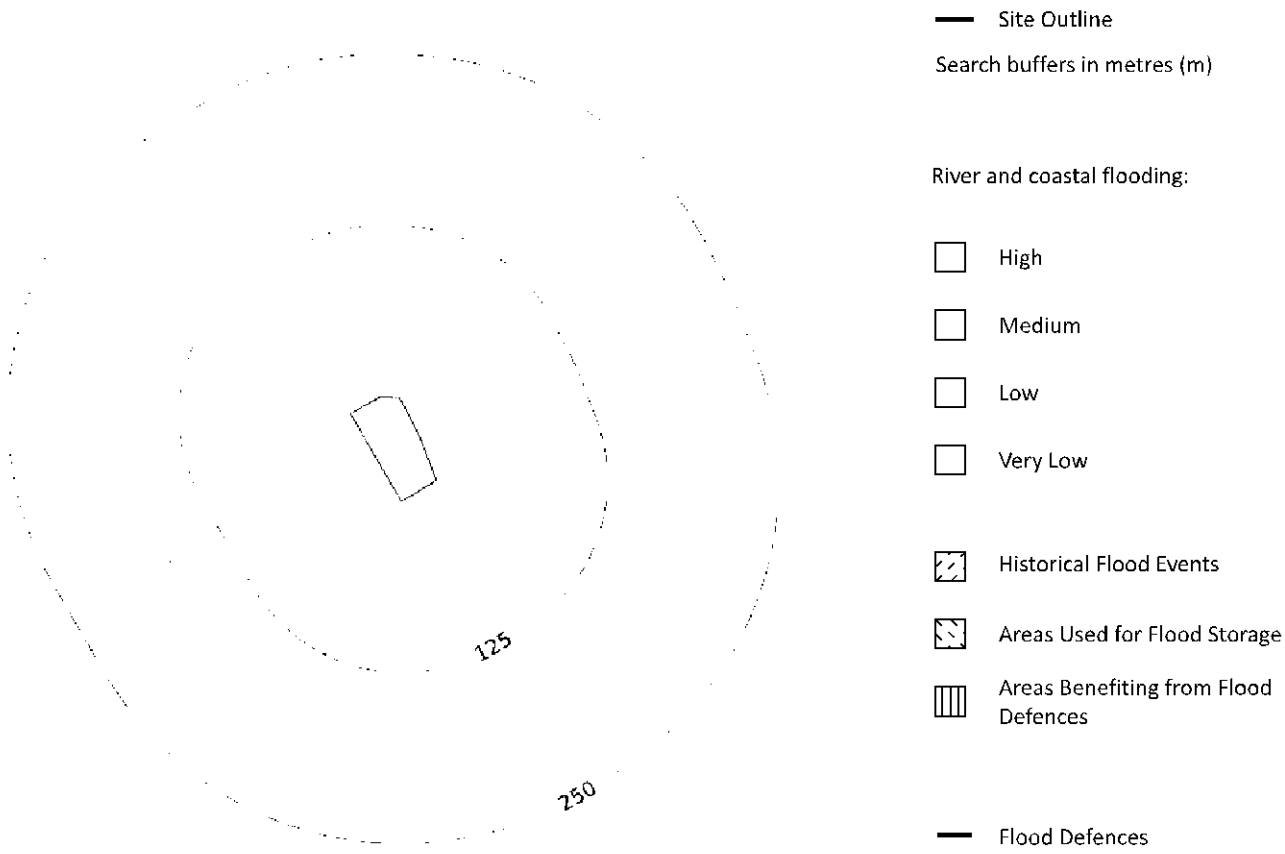
ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
				GB205032050405 ↗				

6.5 WFD Groundwater bodies

Records on site	**0**

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

7 River and coastal flooding



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

7.1 Risk of flooding from rivers and the sea

Records within 50m **3**

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

Features are displayed on the River and coastal flooding map on **page 52** >

Distance	Flood risk category
On site	**Medium**

7.2 Historical Flood Events

Records within 250m **0**

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

7.3 Flood Defences

Records within 250m **0**

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

7.4 Areas Benefiting from Flood Defences

Records within 250m **0**

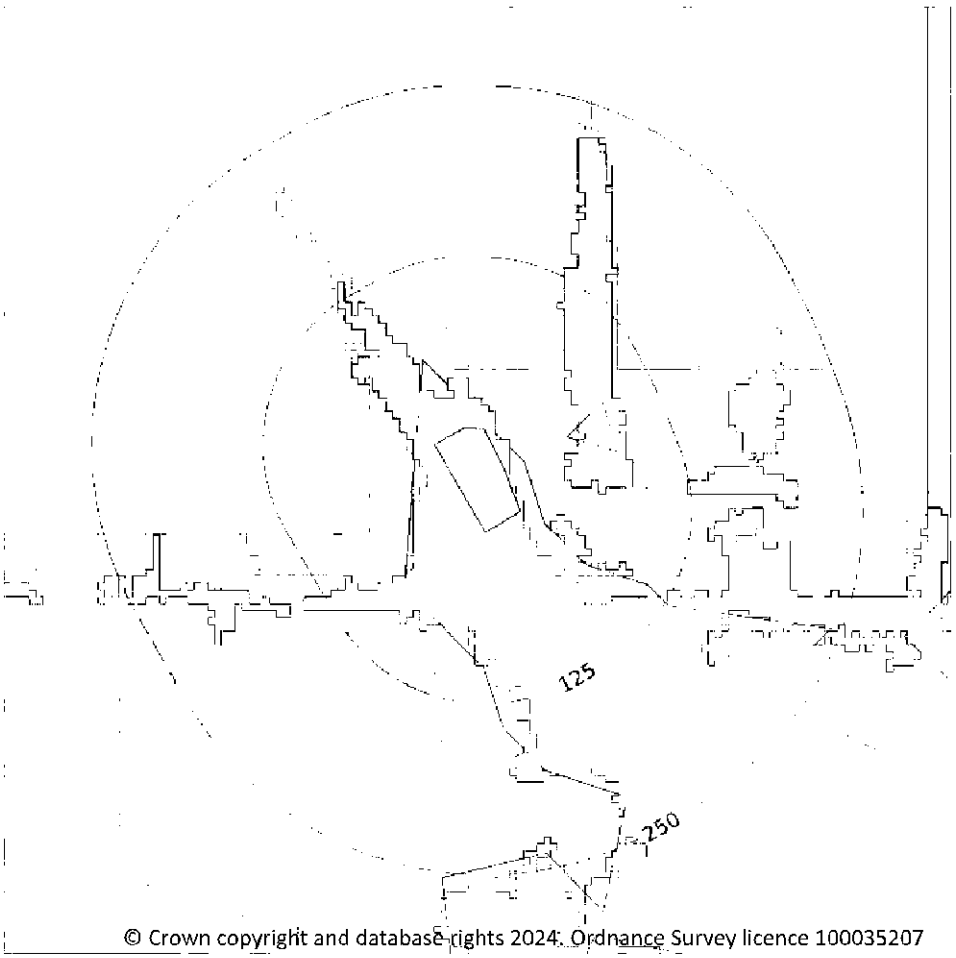
Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

7.5 Flood Storage Areas

Records within 250m **0**

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

River and coastal flooding - Flood Zones



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

Site Outline

Search buffers in metres (m)

Flood zone 2

Flood zone 3

7.6 Flood Zone 2

Records within 50m **1**

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

Features are displayed on the River and coastal flooding map on **page 52 >**

Location	Type
On site	**Zone 2 - (Fluvial /Tidal Models)**

7.7 Flood Zone 3

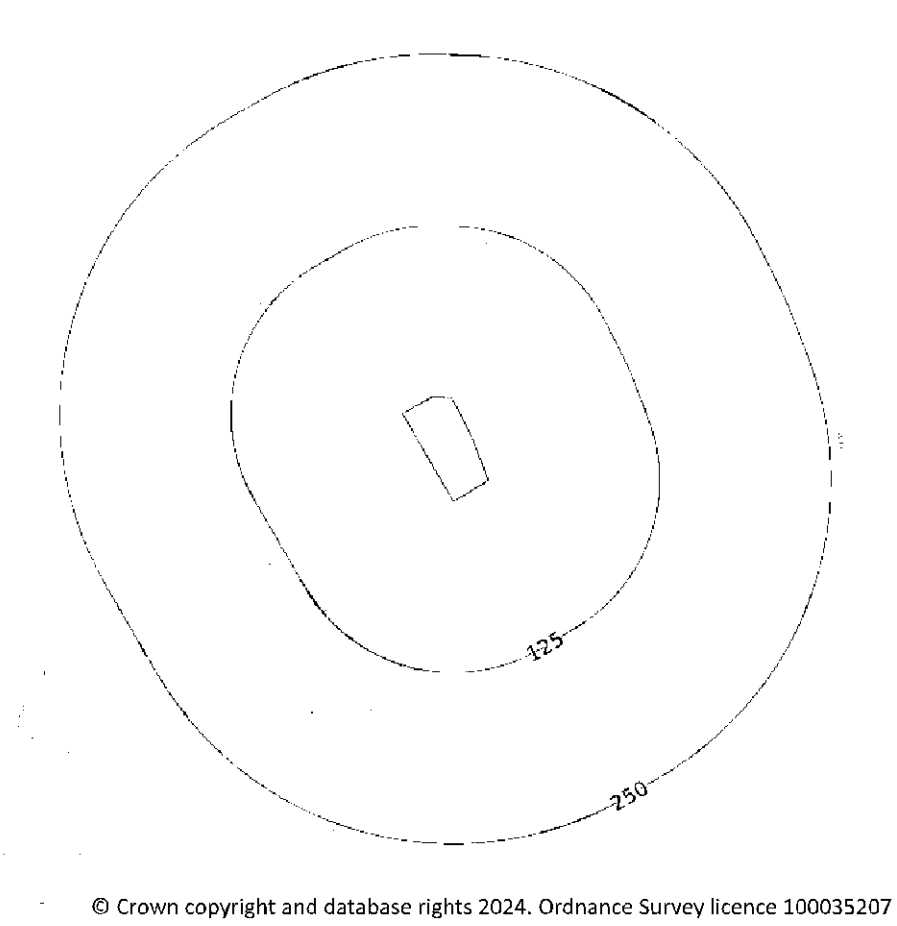
Records within 50m **1**

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

Features are displayed on the River and coastal flooding map on **page 52 >**

Location	Type

8 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period

- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

8.1 Surface water flooding

Highest risk on site	**1 in 1000 year, 0.1m - 0.3m**
Highest risk within 50m	**1 in 30 year, 0.1m - 0.3m**

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 56 >**

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth

9 Groundwater flooding



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

9.1 Groundwater flooding

Highest risk on site	**Negligible**
Highest risk within 50m	**Negligible**

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 58 >**

10 Environmental designations

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m **0**

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m **0**

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

10.3 Special Areas of Conservation (SAC)

Records within 2000m **0**

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

10.4 Special Protection Areas (SPA)

Records within 2000m **0**

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

10.5 National Nature Reserves (NNR)

Records within 2000m **0**

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

10.6 Local Nature Reserves (LNR)

Records within 2000m **0**

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

10.7 Designated Ancient Woodland

Records within 2000m **0**

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

10.8 Biosphere Reserves

Records within 2000m **0**

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

10.9 Forest Parks

Records within 2000m **0**

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

10.10 Marine Conservation Zones

Records within 2000m **0**

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

10.11 Green Belt

Records within 2000m **0**

Areas designated to prevent urban sprawl by keeping land permanently open.

10.12 Proposed Ramsar sites

Records within 2000m **0**

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m **0**

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m **0**

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

10.15 Nitrate Sensitive Areas

Records within 2000m **0**

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

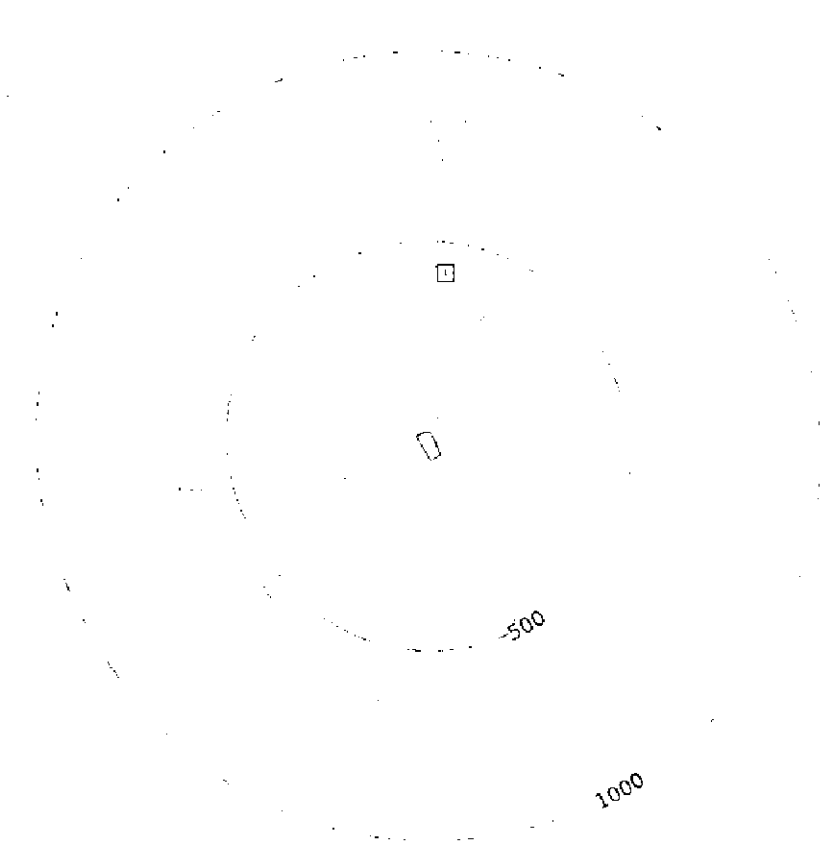
10.16 Nitrate Vulnerable Zones

Records within 2000m **2**

Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

Location	Name	Type	NVZ ID	Status

SSSI Impact Zones and Units



Site Outline

Search buffers in metres (m)

SSSI Impact Risk Zones

SSSI Units

Not recorded

Favourable

Unfavourable - Recovering

Unfavourable - No change

Unfavourable - Declining

Partially destroyed

Destroyed

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

10.17 SSSI Impact Risk Zones

Records on site **1**

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 63** >

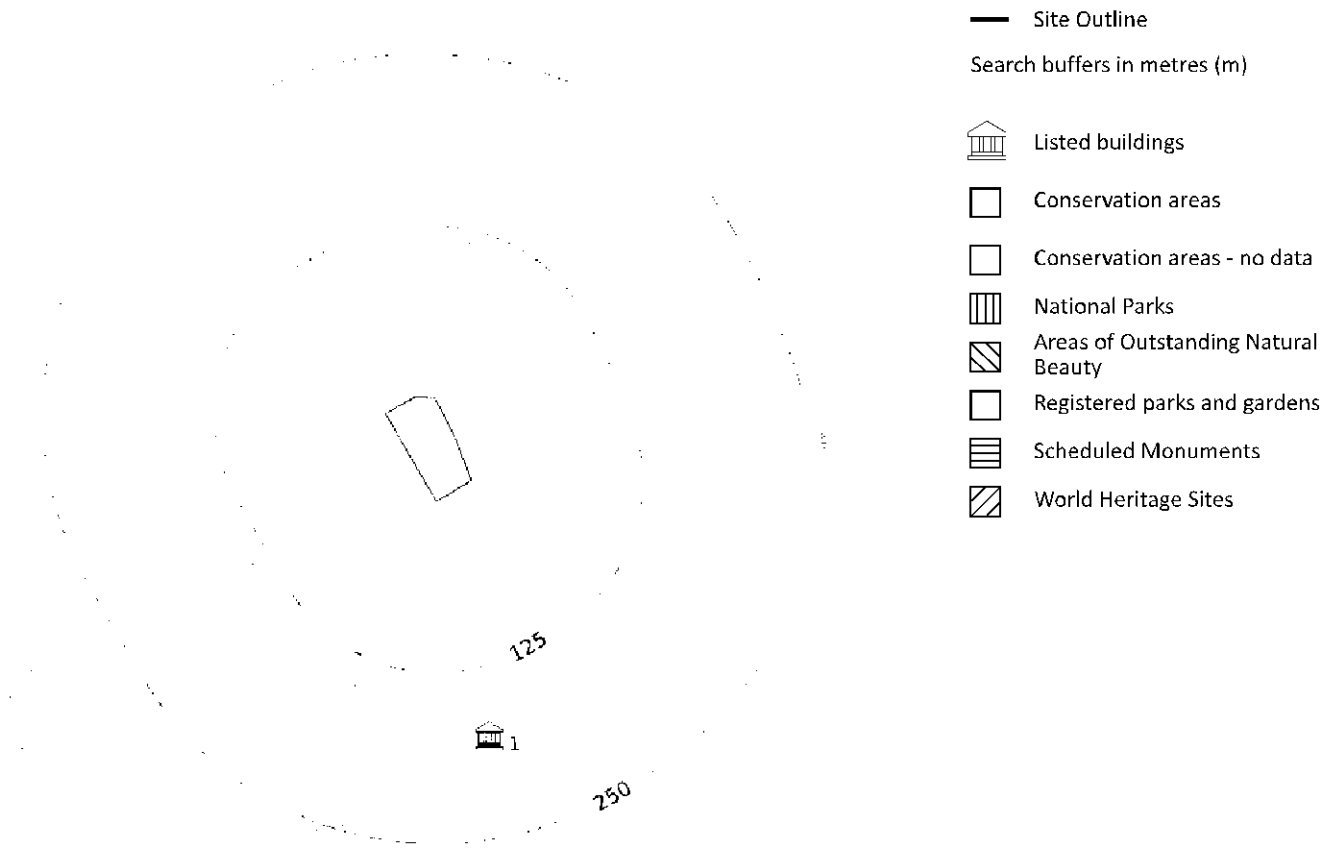
ID	Location	Type of developments requiring consultation
1	**On site**	**Minerals, Oil and Gas - Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction.**

10.18 SSSI Units

Records within 2000m **0**

Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

11 Visual and cultural designations



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

11.1 World Heritage Sites

Records within 250m **0**

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

11.2 Area of Outstanding Natural Beauty

Records within 250m **0**

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

11.3 National Parks

Records within 250m **0**

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

11.4 Listed Buildings

Records within 250m **1**

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

Features are displayed on the Visual and cultural designations map on **page 65** >

ID	Location	Name	Grade	Reference Number	Listed date

11.5 Conservation Areas

Records within 250m **0**

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

11.6 Scheduled Ancient Monuments

Records within 250m **0**

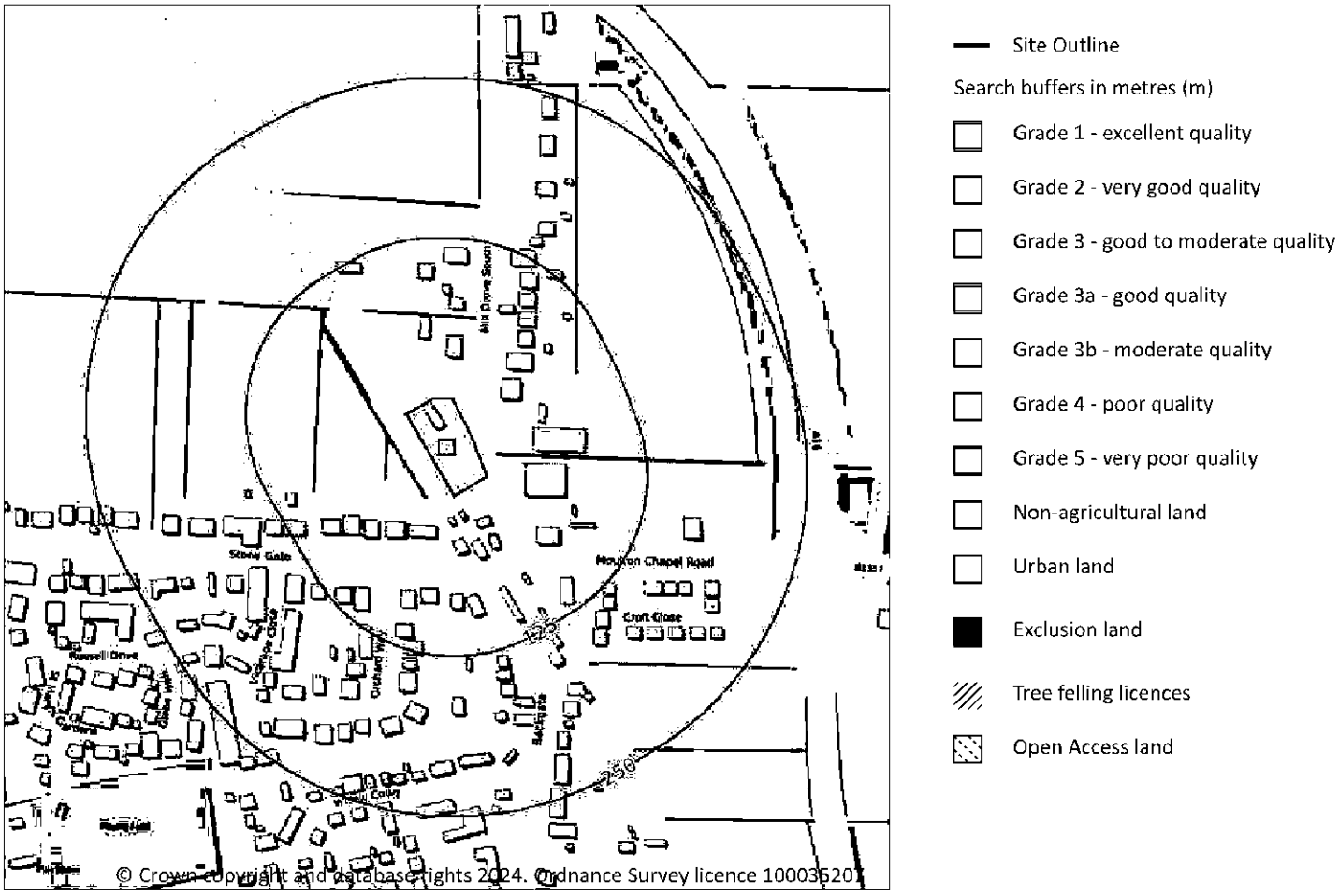
A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

11.7 Registered Parks and Gardens

Records within 250m **0**

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

12 Agricultural designations



12.1 Agricultural Land Classification

Records within 250m **1**

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 68** >

ID	Location	Classification	Description
1	**On site**	**Grade 1**	**Excellent quality agricultural land. Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.**

12.2 Open Access Land

Records within 250m **0**

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

12.3 Tree Felling Licences

Records within 250m **0**

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

12.4 Environmental Stewardship Schemes

Records within 250m **0**

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

12.5 Countryside Stewardship Schemes

Records within 250m **0**

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m **0**

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

13.2 Habitat Networks

Records within 250m **0**

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

13.3 Open Mosaic Habitat

Records within 250m **0**

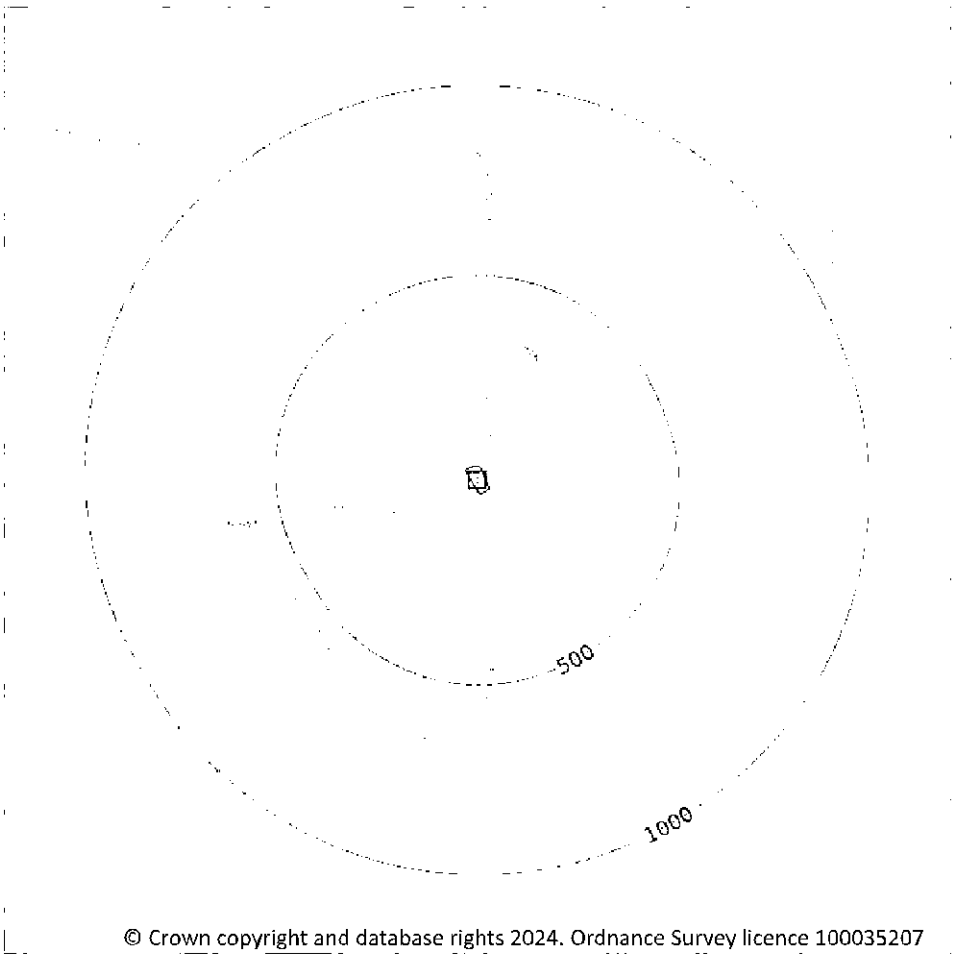
Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

13.4 Limestone Pavement Orders

Records within 250m **0**

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

14 Geology 1:10,000 scale - Availability



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

14.1 10k Availability

Records within 500m **1**

An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 71 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**No coverage**	**Full**	**Full**	**No coverage**	**TF21NE**

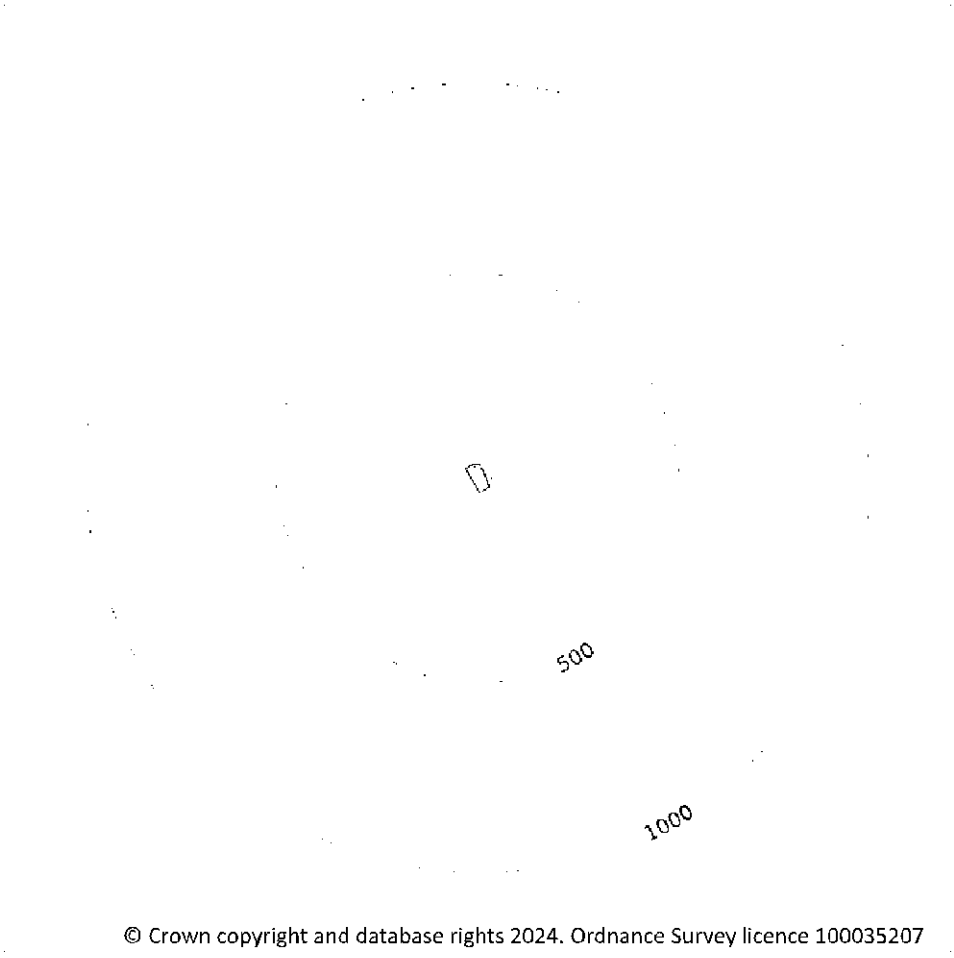
Geology 1:10,000 scale - Artificial and made ground

14.2 Artificial and made ground (10k)

Records within 500m **0**

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Geology 1:10,000 scale - Superficial



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

14.3 Superficial geology (10k)

Records within 500m **1**

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 73 >**

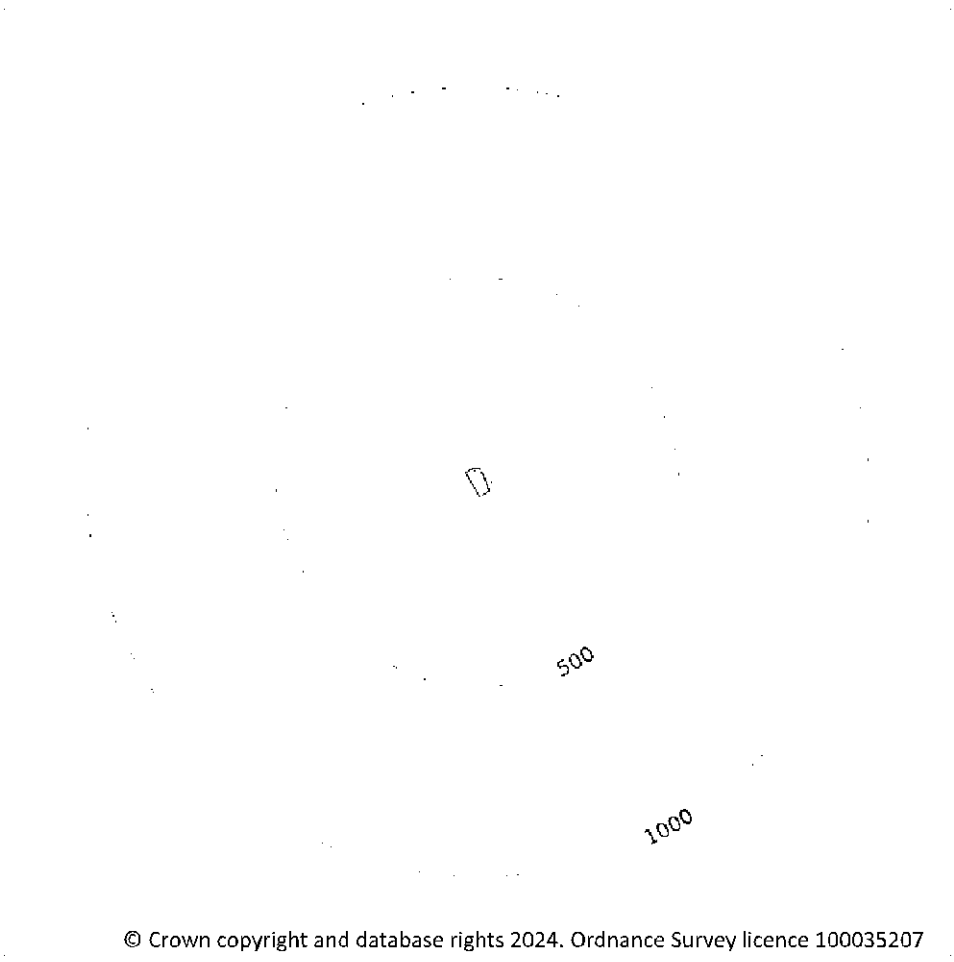
ID	Location	LEX Code	Description	Rock description
1	**On site**	**SUPNM-UKNOWN**	**Superficial Theme Not Mapped [for Digital Map Use Only] - Unknown/unclassified Entry**	**Unknown/unclassified Entry**

14.4 Landslip (10k)

Records within 500m	**0**

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

Geology 1:10,000 scale - Bedrock



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

14.5 Bedrock geology (10k)

Records within 500m **1**

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 75 >**

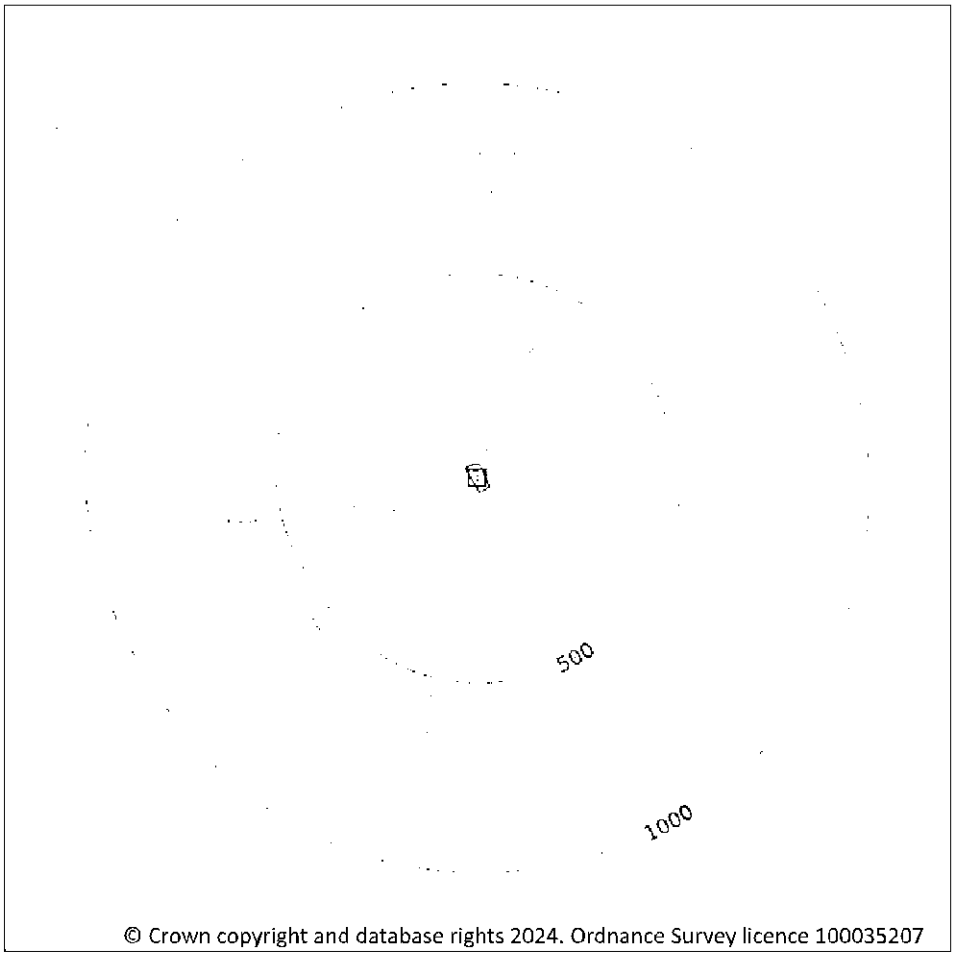
ID	Location	LEX Code	Description	Rock age
1	**On site**	**BEDNM-UKNOWN**	**Bedrock Theme Not Mapped [for Digital Map Use Only] - Unknown/unclassified Entry**	**No Details**

14.6 Bedrock faults and other linear features (10k)

Records within 500m	**0**

Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m **1**

An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 77 >**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**No coverage**	**EW144_spalding_v4**

Geology 1:50,000 scale - Artificial and made ground

15.2 Artificial and made ground (50k)

Records within 500m **0**

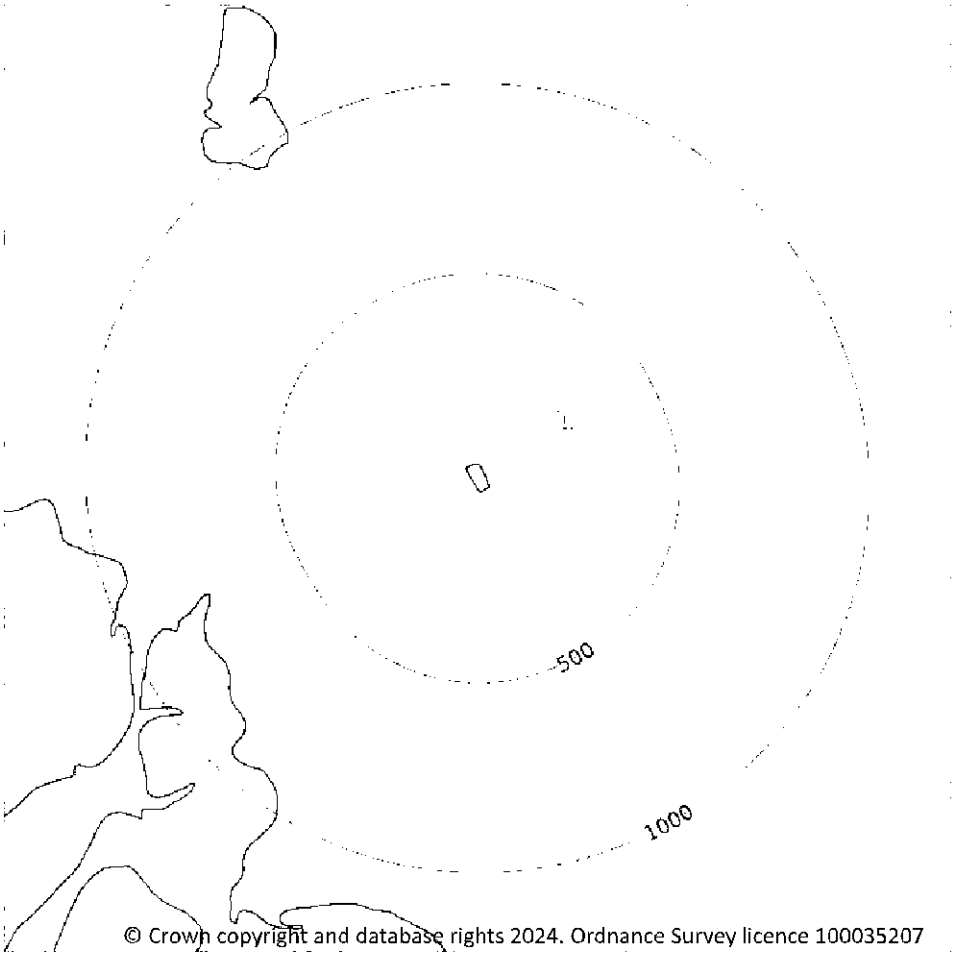
Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

15.3 Artificial ground permeability (50k)

Records within 50m **0**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

Geology 1:50,000 scale - Superficial



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

Site Outline

Search buffers in metres (m)

Landslip (50k)

Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m **1**

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 79 >**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**TFD-XCZ**	**TIDAL FLAT DEPOSITS**	**CLAY AND SILT**

15.5 Superficial permeability (50k)

Records within 50m **1**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Intergranular**	**Low**	**Very Low**

15.6 Landslip (50k)

Records within 500m **0**

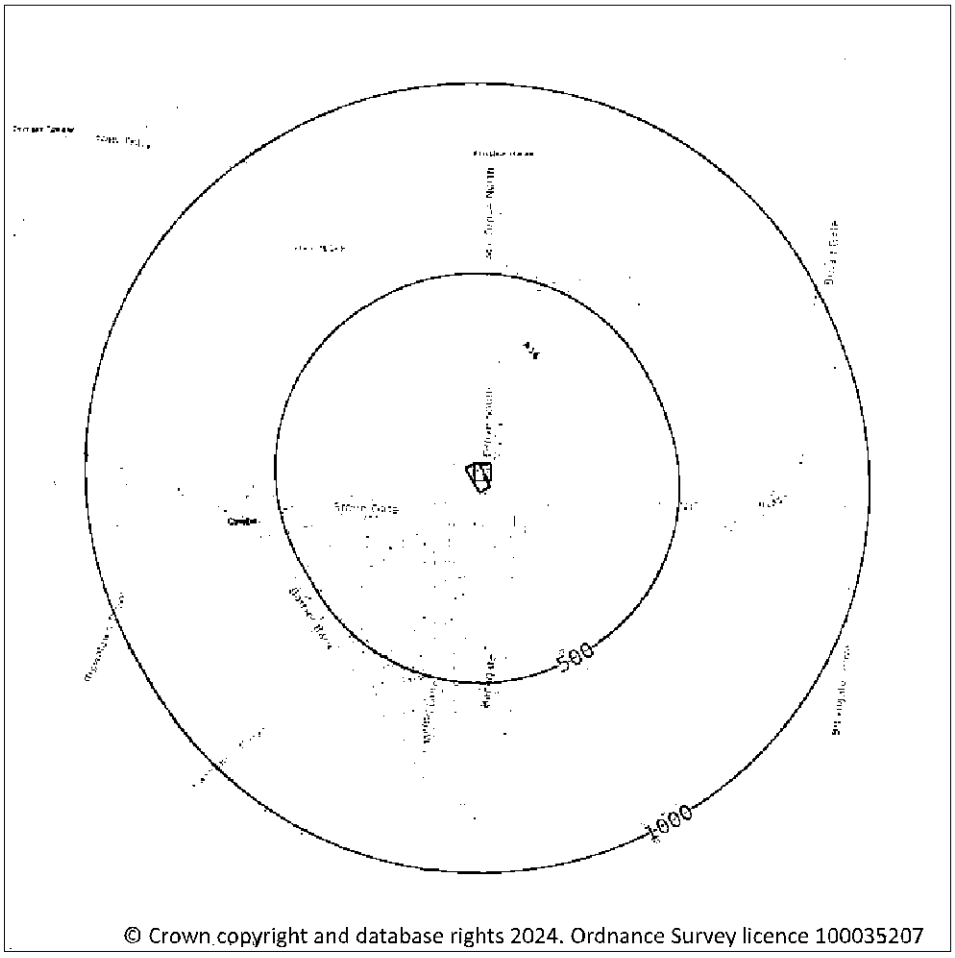
Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

15.7 Landslip permeability (50k)

Records within 50m **0**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

Geology 1:50,000 scale - Bedrock



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m **1**

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 81 >**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**OXC-MDST**	**OXFORD CLAY FORMATION - MUDSTONE**	**CALLOVIAN**

15.9 Bedrock permeability (50k)

Records within 50m **1**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

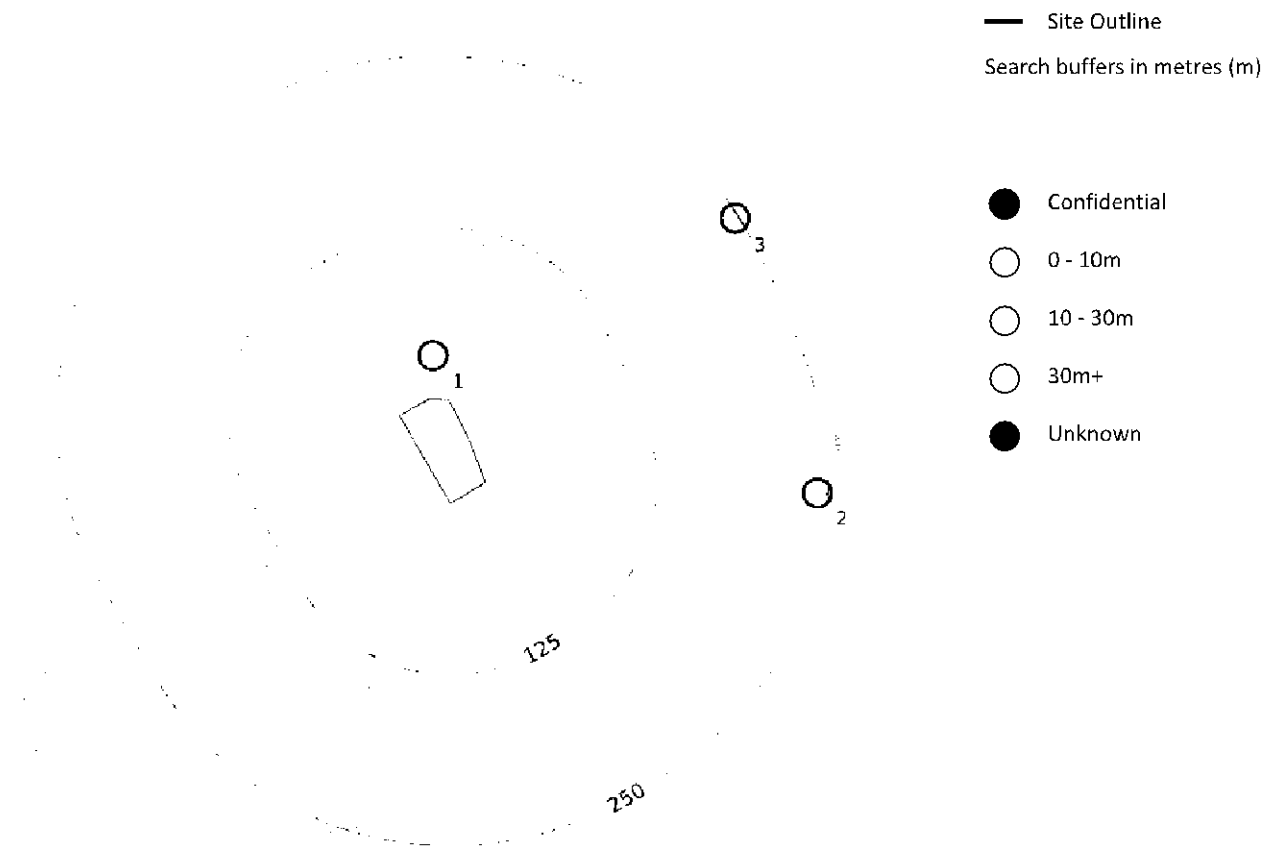
Location	Flow type	Maximum permeability	Minimum permeability
On site	**Fracture**	**Low**	**Very Low**

15.10 Bedrock faults and other linear features (50k)

Records within 500m **0**

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

16 Boreholes



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

16.1 BGS Boreholes

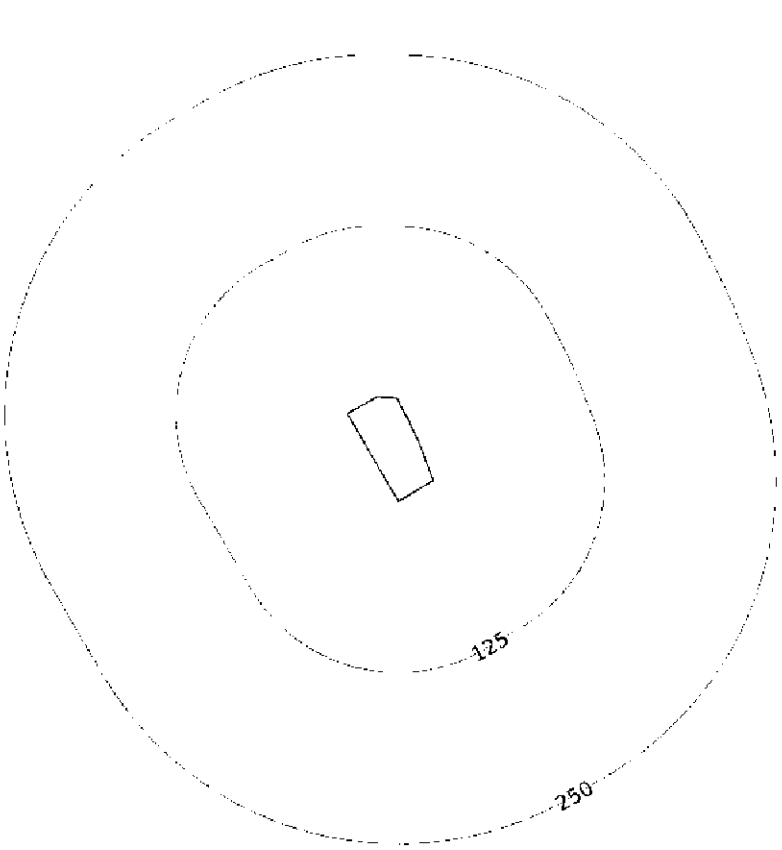
Records within 250m **3**

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

Features are displayed on the Boreholes map on **page 83** >

ID	Location	Grid reference	Name	Length	Confidential	Web link
						473366 ↗
						473400 ↗
						473399 ↗

17 Natural ground subsidence - Shrink swell clays



Site Outline

Search buffers in metres (m)

- ☐ No data
- ☐ Negligible
- ☐ Very low
- ☐ Low
- ☐ Moderate
- ☐ High

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

17.1 Shrink swell clays

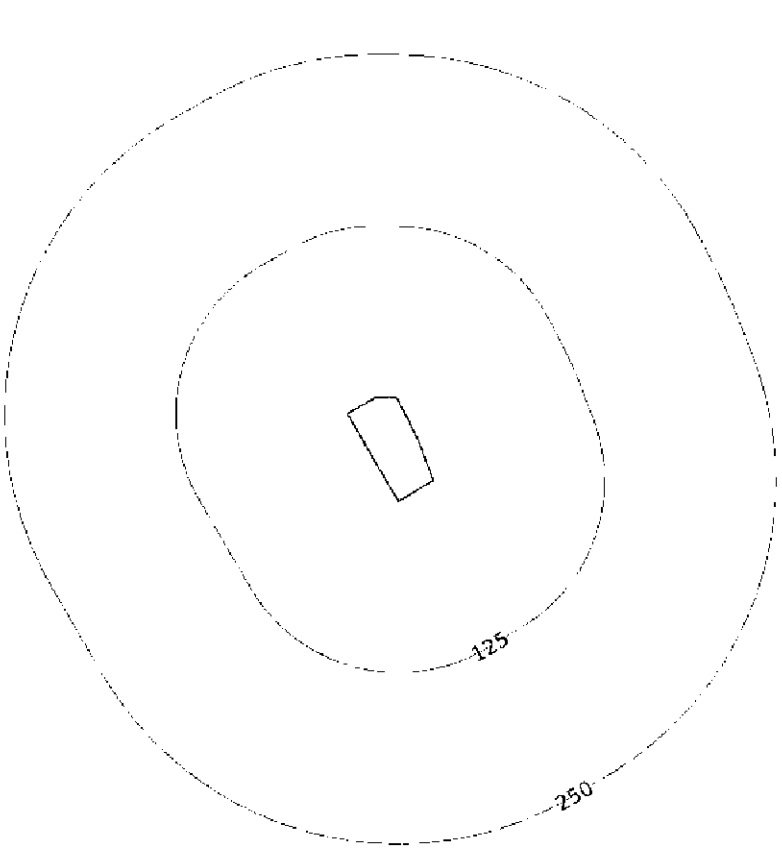
Records within 50m **1**

The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 85** >

Location	Hazard rating	Details
On site	**Low**	**Ground conditions predominantly medium plasticity.**

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

- ☐ No data
- ☐ Negligible
- ☐ Very low
- ☐ Low
- ☐ Moderate
- ☐ High

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

17.2 Running sands

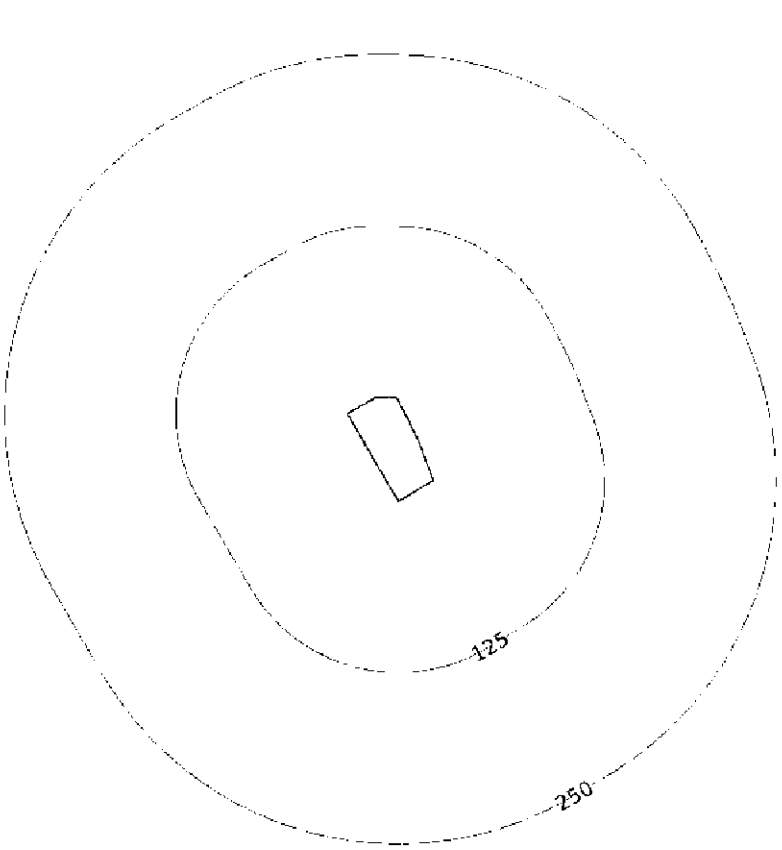
Records within 50m **1**

The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 86 >**

Location	Hazard rating	Details
On site	**Moderate**	**Running sand conditions are probably present. Constraints may apply to land uses involving excavation or the addition or removal of water.**

Natural ground subsidence - Compressible deposits



Site Outline

Search buffers in metres (m)

- ☐ No data
- ☐ Negligible
- ☐ Very low
- ☐ Low
- ☐ Moderate
- ☐ High

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

17.3 Compressible deposits

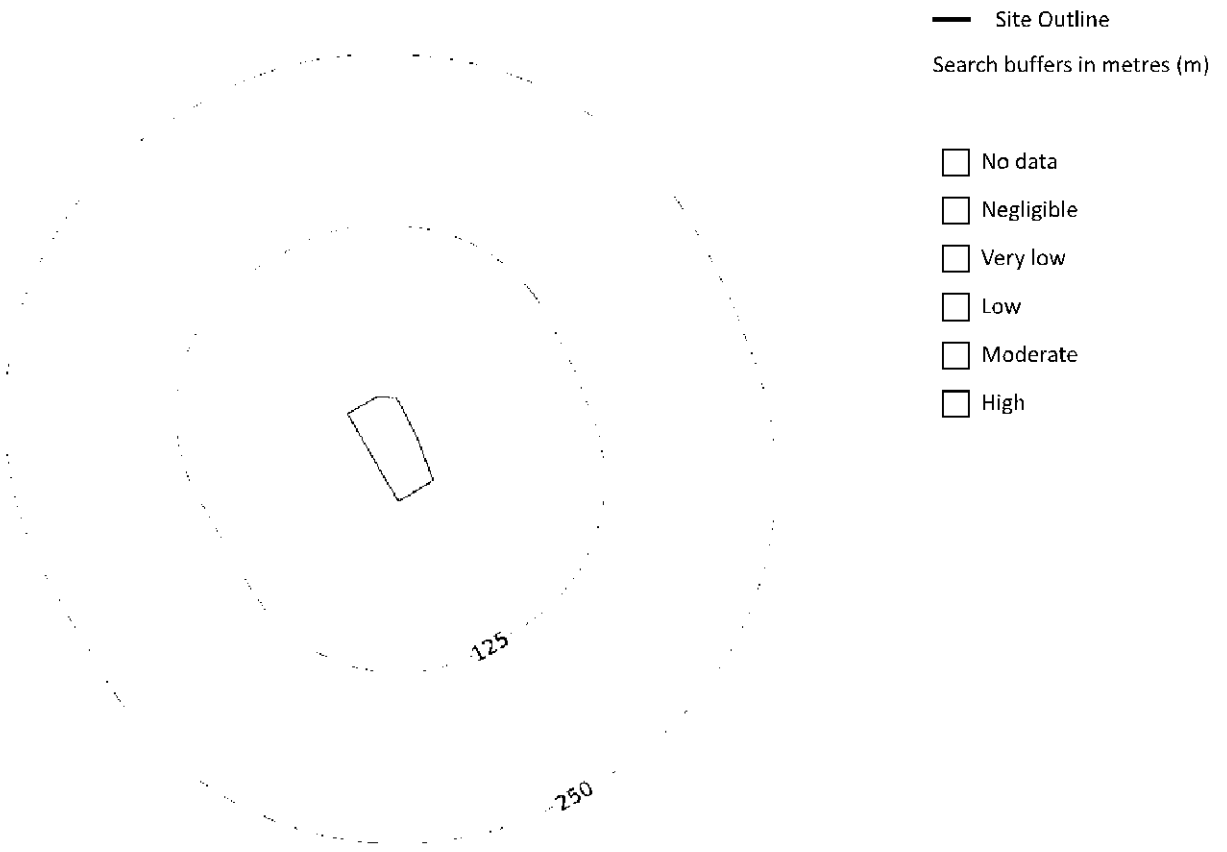
Records within 50m **1**

The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 87 >**

Location	Hazard rating	Details
On site	**Moderate**	**Compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site.**

Natural ground subsidence - Collapsible deposits



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

17.4 Collapsible deposits

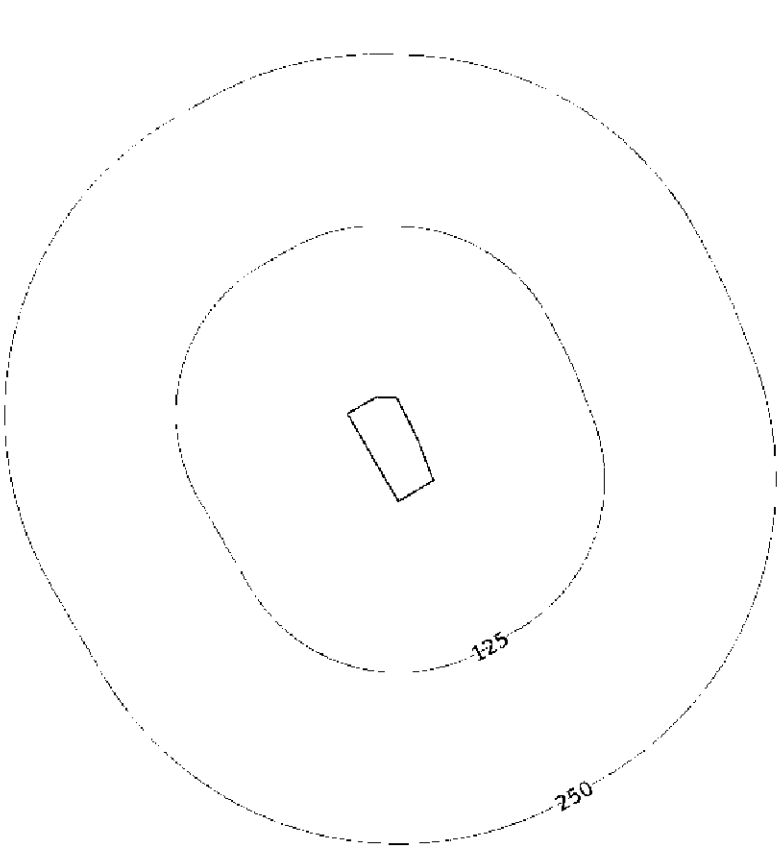
Records within 50m **1**

The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 88 >**

Location	Hazard rating	Details
On site	**Negligible**	**Deposits with potential to collapse when loaded and saturated are believed not to be present.**

Natural ground subsidence - Landslides



Site Outline

Search buffers in metres (m)

- ☐ No data
- ☐ Negligible
- ☐ Very low
- ☐ Low
- ☐ Moderate
- ☐ High

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

17.5 Landslides

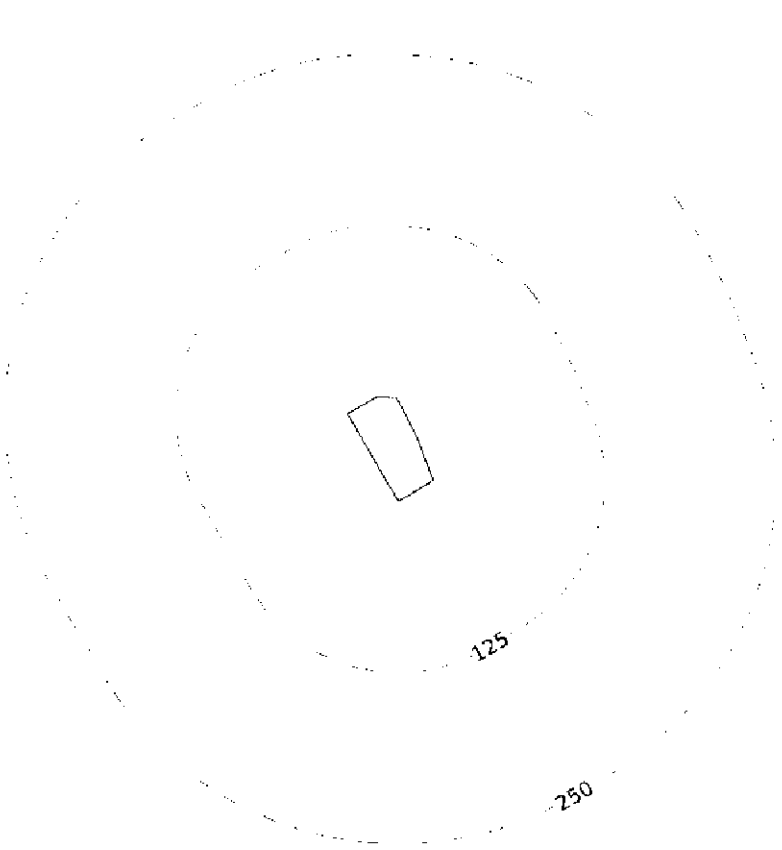
Records within 50m **1**

The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on **page 89 >**

Location	Hazard rating	Details
On site	**Very low**	**Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.**

Natural ground subsidence - Ground dissolution of soluble rocks



Site Outline

Search buffers in metres (m)

- ☐ No data
- ☐ Negligible
- ☐ Very low
- ☐ Low
- ☐ Moderate
- ☐ High

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

17.6 Ground dissolution of soluble rocks

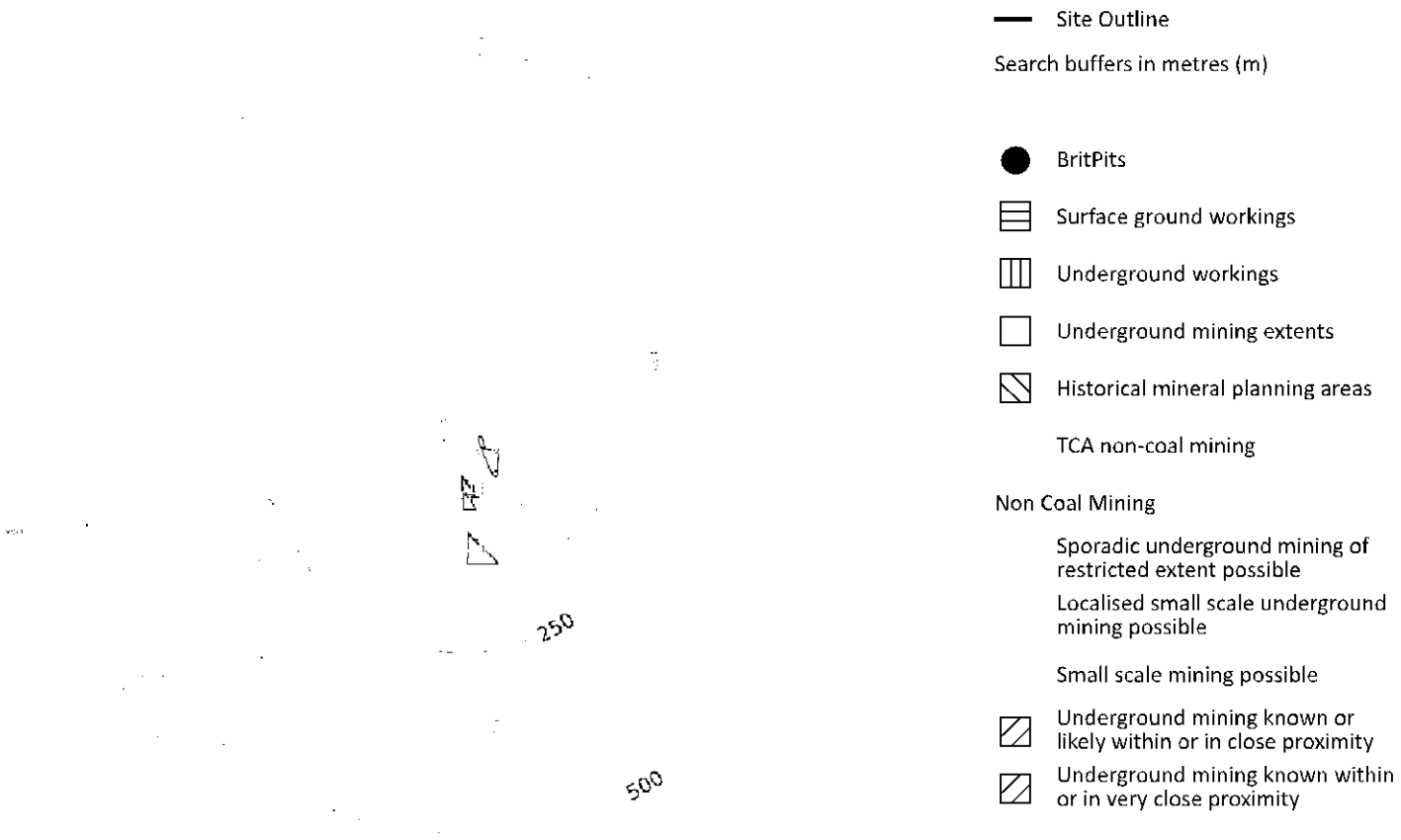
Records within 50m **1**

The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 90** >

Location	Hazard rating	Details
On site	**Negligible**	**Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.**

18 Mining and ground workings



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

18.1 BritPits

Records within 500m **0**

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

18.2 Surface ground workings

Records within 250m **3**

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining and ground workings map on **page 92** >

ID	Location	Land Use	Year of mapping	Mapping scale

18.3 Underground workings

Records within 1000m **4**

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

Features are displayed on the Mining and ground workings map on **page 92** >

ID	Location	Land Use	Year of mapping	Mapping scale

18.4 Underground mining extents

Records within 500m **0**

This data identifies underground mine workings that could present a potential risk, including adits and seam workings. These features have been identified from BGS Geological mapping and mine plans sourced from the BGS and various collections and sources.

18.5 Historical Mineral Planning Areas

Records within 500m **0**

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

18.6 Non-coal mining

Records within 1000m **0**

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

18.7 JPB mining areas

Records on site **0**

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

18.8 The Coal Authority non-coal mining

Records within 500m **0**

This data provides an indication of the potential zone of influence of recorded underground non-coal mining workings. Any and all analysis and interpretation of Coal Authority Data in this report is made by Groundsure, and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure prior to any re-use.

18.9 Researched mining

Records within 500m	**0**

This data indicates areas of potential mining identified from alternative or archival sources, including; BGS Geological paper maps, Lidar data, aerial photographs (from World War II onwards), archaeological data services, websites, Tithe maps, and various text/plans from collected books and reports. Some of this data is approximate and Groundsure have interpreted the resultant risk area and, where possible, specific areas of risk have been captured.

18.10 Mining record office plans

Records within 500m	**0**

This dataset is representative of Mining Record Office and/or plan extents held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

18.11 BGS mine plans

Records within 500m	**0**

This dataset is representative of BGS mine plans held by Groundsure and should be considered approximate. Where possible, plans have been located and any specific areas of risk they depict have been captured.

18.12 Coal mining

Records on site	**0**

Areas which could be affected by past, current or future coal mining.

18.13 Brine areas

Records on site	**0**

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

18.14 Gypsum areas

Records on site	**0**

Generalised areas that may be affected by gypsum extraction.

18.15 Tin mining

Records on site	**0**

Generalised areas that may be affected by historical tin mining.

18.16 Clay mining

Records on site	**0**

Generalised areas that may be affected by kaolin and ball clay extraction.

19 Ground cavities and sinkholes

19.1 Natural cavities

Records within 500m **0**

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

19.2 Mining cavities

Records within 1000m **0**

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

19.3 Reported recent incidents

Records within 500m **0**

This data identifies sinkhole information gathered from media reports and Groundsure's own records. This data goes back to 2014 and includes relative accuracy ratings for each event and links to the original data sources. The data is updated on a regular basis and should not be considered a comprehensive catalogue of all sinkhole events. The absence of data in this database does not mean a sinkhole definitely has not occurred during this time.

19.4 Historical incidents

Records within 500m **0**

This dataset comprises an extract of 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale historical Ordnance Survey maps held by Groundsure, dating back to the 1840s. It shows shakeholes, deneholes and other 'holes' as noted on these maps. Dene holes are medieval chalk extraction pits, usually comprising a narrow shaft with a number of chambers at the base of the shaft. Shakeholes are an alternative name for suffusion sinkholes, most commonly found in the limestone landscapes of North Yorkshire but also extensively noted around the Brecon Beacons National Park.

Not all 'holes' noted on Ordnance Survey mapping will necessarily be present within this dataset.

19.5 National karst database

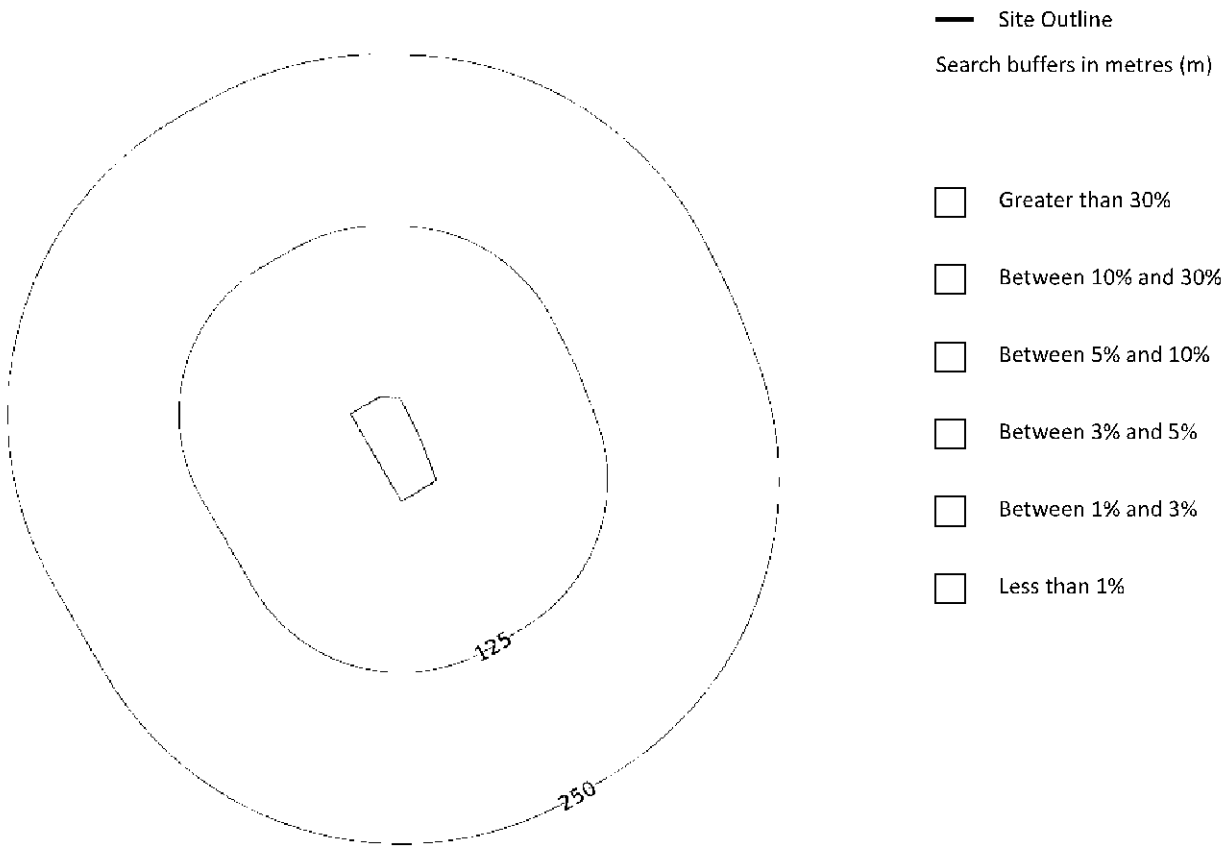
Records within 500m	**0**

This is a comprehensive database of national karst information gathered from a wide range of sources. BGS have collected data on five main types of karst feature: Sinkholes, stream links, caves, springs, and incidences of associated damage to buildings, roads, bridges and other engineered works.

Since the database was set up in 2002 data covering most of the evaporite karst areas of the UK have now been added, along with data covering about 60% of the Chalk, and 35% of the Carboniferous Limestone outcrops. Many of the classic upland karst areas have yet to be included. Recorded so far are: Over 800 caves, 1300 stream sinks, 5600 springs, 10,000 sinkholes.

The database is not yet complete, and not all records have been verified. The absence of data does not mean that karst features are not present at a site. A reliability rating is included with each record.

20 Radon



© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

20.1 Radon

Records on site **1**

The Radon Potential data classifies areas based on their likelihood of a property having a radon level at or above the Action Level in Great Britain. The dataset is intended for use at 1:50,000 scale and was derived from both geological assessments and indoor radon measurements (more than 560,000 records). A minimum 50m buffer should be considered when searching the maps, as the smallest detectable feature at this scale is 50m. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain (1:100,000 scale).

Features are displayed on the Radon map on **page 99** >

Location	Estimated properties affected	Radon Protection Measures required
On site	**Less than 1%**	**None**

21 Soil chemistry

21.1 BGS Estimated Background Soil Chemistry

Records within 50m **2**

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km^2. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km^2; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**

21.2 BGS Estimated Urban Soil Chemistry

Records within 50m **0**

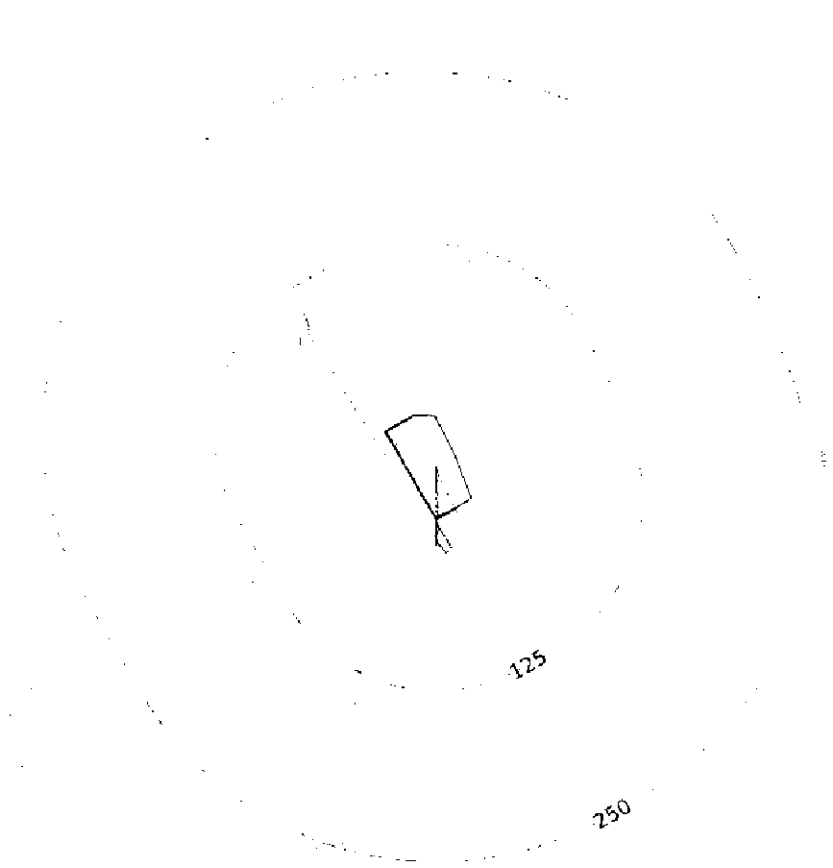
Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km^2).

21.3 BGS Measured Urban Soil Chemistry

Records within 50m **0**

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km^2.

22 Railway infrastructure and projects



Site Outline
Search buffers in metres (m)
Crossrail 1 Stations
Crossrail 1 Route
Crossrail 2 Stations
Crossrail 2 Route
Crossrail 2 Worksites
Crossrail 2 Safeguarding
Crossrail 2 Headhouses
Railway stations
Active railways
Active tunnels
Abandoned railways
Historic railways
Historic tunnels
Underground stations
Underground Lines
Royal Mail tunnels
HS2 optimised route
HS2 Stations
HS2 Depots
HS2 Surface Safeguarding
HS2 Subsurface Safeguarding

© Crown copyright and database rights 2024. Ordnance Survey licence 100035207

22.1 Underground railways (London)

Records within 250m **0**

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

22.2 Underground railways (Non-London)

Records within 250m **0**

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

22.3 Railway tunnels

Records within 250m **0**

Railway tunnels taken from contemporary Ordnance Survey mapping.

22.4 Historical railway and tunnel features

Records within 250m **8**

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

Features are displayed on the Railway infrastructure and projects map on **page 102 >**

Location	Land Use	Year of mapping	Mapping scale
On site	**Railway Sidings**	**1938**	**10560**
On site	**Railway Sidings**	**1887**	**10560**
On site	**Railway Sidings**	**1951**	**10560**
On site	**Railway Sidings**	**1903**	**10560**
On site	**Railway Sidings**	**1950**	**10560**
On site	**Railway Sidings**	**1906**	**10560**

22.5 Royal Mail tunnels

Records within 250m **0**

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.

22.6 Historical railways

Records within 250m **2**

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

Features are displayed on the Railway infrastructure and projects map on **page 102** >

Location	Description
On site	**Abandoned**

22.7 Railways

Records within 250m **0**

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

22.8 Crossrail 1

Records within 500m **0**

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

22.9 Crossrail 2

Records within 500m **0**

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

22.10 HS2

Records within 500m **0**

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference ↗.

Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: www.groundsure.com/terms-and-conditions-april-2023/ ↗.

APPENDIX 4

WINDOW SAMPLING LOGS

ge

Ground and Environmental Investigation Ltd

BH1

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526587.0	Date Started: 05/01/2024
Y; 318103.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Soft mid brown clayey silt. Red brick at 0.9m.		0.2
0.4							0.4
0.6	0.7 - 0.9	D			Greyish brown very soft sandy silty CLAY and clayey sandy SILT.		0.6
0.8							0.8
1.0			(s)4				1.0
1.2							1.2
1.4							1.4
1.6	1.7 - 1.9	D					1.6
1.8							1.8
2.0			(s)1				2.0
2.2							2.2
2.4							2.4
2.6	2.7 - 2.9	D					2.6
2.8							2.8
3.0			(s)0				3.0
3.2							3.2
3.4							3.4
3.6	3.7 - 3.9	D					3.6
3.8							3.8
4.0			(s)2				4.0
4.2							4.2
4.4							4.4
4.6	4.7 - 4.9	D					4.6
4.8							4.8
5.0			(s)4		NO RECOVERY.		5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8
			(s)12				

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 0.3m upon completion.

ge

Ground and Environmental Investigation Ltd

BH1

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526587.0	Date Started: 05/01/2024
Y; 318103.0	Date Completed: 05/01/2024
Z; mAOD	

Depth m	Samples Depth (m)	Samples Type	N	SPT	Description	Lithology	Depth m
6.2			(s)12				6.2
6.4							6.4
6.6							6.6
6.8							6.8
7.0			(s)35				7.0
7.2							7.2
7.4							7.4
7.6							7.6
7.8							7.8
8.0							8.0
8.2							8.2
8.4							8.4
8.6							8.6
8.8							8.8
9.0							9.0
9.2							9.2
9.4							9.4
9.6							9.6
9.8							9.8
10.0							10.0
10.2							10.2
10.4							10.4
10.6							10.6
10.8							10.8
11.0							11.0
11.2							11.2
11.4							11.4
11.6							11.6
11.8							11.8
12.0							12.0

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 0.3m upon completion.

ge

Ground and Environmental Investigation Ltd

BH2

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526580.0	Date Started: 05/01/2024
Y; 318115.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Soft mid brown clayey silt.		0.2
0.4							0.4
0.6	0.7 - 0.9	D			Greyish brown very soft sandy silty CLAY and clayey sandy SILT.		0.6
0.8							0.8
1.0			(s)4				1.0
1.2							1.2
1.4							1.4
1.6	1.7 - 1.9	D					1.6
1.8							1.8
2.0			(s)2				2.0
2.2							2.2
2.4							2.4
2.6	2.7 - 2.9	D					2.6
2.8							2.8
3.0			(s)0				3.0
3.2							3.2
3.4							3.4
3.6							3.6
3.8							3.8
4.0			(s)0				4.0
4.2							4.2
4.4							4.4
4.6							4.6
4.8							4.8
5.0							5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 0.5m upon completion.

ge

Ground and Environmental Investigation Ltd

BH3

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526570.0	Date Started: 05/01/2024
Y; 318134.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Orange brown coarse SAND AND GRAVEL.		0.2
0.4							0.4
0.6	0.7 - 0.9	D			MADE GROUND. Soft greyish brown clayey SILT with red brick fragments.		0.6
0.8							0.8
1.0			(s)4				1.0
1.2					Soft mid brown mottled grey clayey SILT/silty CLAY.		1.2
1.4							1.4
1.6	1.7 - 1.9	D					1.6
1.8							1.8
2.0			(s)0				2.0
2.2							2.2
2.4							2.4
2.6	2.7 - 2.9	D					2.6
2.8							2.8
3.0			(s)2				3.0
3.2							3.2
3.4							3.4
3.6							3.6
3.8							3.8
4.0			(s)3				4.0
4.2							4.2
4.4							4.4
4.6							4.6
4.8							4.8
5.0			(s)10				5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8
			(s)15				

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at ground level upon completion.

ge

Ground and Environmental Investigation Ltd

BH3

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526570.0	Date Started: 05/01/2024
Y; 318134.0	Date Completed: 05/01/2024
Z; mAOD	

Depth m	Samples Depth (m)	Samples Type	N	SPT	Description	Lithology	Depth m
6.2			(s)15				6.2
6.4							6.4
6.6							6.6
6.8							6.8
7.0			(s)27				7.0
7.2							7.2
7.4							7.4
7.6							7.6
7.8							7.8
8.0							8.0
8.2							8.2
8.4							8.4
8.6							8.6
8.8							8.8
9.0							9.0
9.2							9.2
9.4							9.4
9.6							9.6
9.8							9.8
10.0							10.0
10.2							10.2
10.4							10.4
10.6							10.6
10.8							10.8
11.0							11.0
11.2							11.2
11.4							11.4
11.6							11.6
11.8							11.8
12.0							12.0

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at ground level upon completion.

ge

Ground and Environmental Investigation Ltd

BH4

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526573.0	Date Started: 05/01/2024
Y; 318104.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Dark brown clayey gravelly sand.		0.2
0.4							0.4
0.6					MADE GROUND. Orangeish brown coarse SAND AND GRAVEL.		0.6
0.8					Soft reddish brown to greyish brown clayey SILT to silty CLAY.		0.8
1.0							1.0
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2.0							2.0
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3.0							3.0
3.2							3.2
3.4							3.4
3.6							3.6
3.8							3.8
4.0							4.0
4.2							4.2
4.4							4.4
4.6							4.6
4.8							4.8
5.0							5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 1.0m upon completion.

ge

Ground and Environmental Investigation Ltd

BH5

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526565.0	Date Started: 05/01/2024
Y; 318120.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Dark brown clayey gravelly sand.		0.2
0.4	0.5 - 0.6	D			MADE GROUND. Orangeish brown coarse SAND AND GRAVEL.		0.4
0.6					Soft reddish brown to greyish brown clayey SILT to silty CLAY.		0.6
0.8							0.8
1.0							1.0
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2.0							2.0
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3.0							3.0
3.2							3.2
3.4							3.4
3.6							3.6
3.8							3.8
4.0							4.0
4.2							4.2
4.4							4.4
4.6							4.6
4.8							4.8
5.0							5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 1.0m upon completion.

ge

Ground and Environmental Investigation Ltd

BH6

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526558.0	Date Started: 05/01/2024
Y; 318133.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Dark brown clayey gravelly sand.		0.2
0.4							0.4
0.6	0.7 - 0.9	D			MADE GROUND. Orangeish brown coarse SAND AND GRAVEL.		0.6
0.8					Soft reddish brown to greyish brown clayey SILT to silty CLAY.		0.8
1.0							1.0
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2.0							2.0
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3.0							3.0
3.2							3.2
3.4							3.4
3.6							3.6
3.8							3.8
4.0							4.0
4.2							4.2
4.4							4.4
4.6							4.6
4.8							4.8
5.0							5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 1.0m upon completion.

ge

Ground and Environmental Investigation Ltd

BH7

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526577.0	Date Started: 05/01/2024
Y; 318137.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Soft mid brown clayey silt. Red brick at 0.9m.		0.2
0.4					Greyish brown very soft sandy silty CLAY and clayey sandy SILT.		0.4
0.6							0.6
0.8							0.8
1.0							1.0
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2.0							2.0
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3.0							3.0
3.2							3.2
3.4							3.4
3.6							3.6
3.8							3.8
4.0							4.0
4.2							4.2
4.4							4.4
4.6							4.6
4.8							4.8
5.0							5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 1.0m upon completion.

ge

Ground and Environmental Investigation Ltd

BH8

Client: Mr B Dawson	Plant Used: Premier Compact 110
Project: Mill Drove South	Backfill: Arisings
Location: Cowbit	Job Number: 23-517
X: 526585.0	Date Started: 05/01/2024
Y; 318115.0	Date Completed: 05/01/2024
Z; mAOD	

Depth (m)	Samples: Depth (m)	Samples: Type	N	SPT	Description	Lithology	Depth (m)
0.2	0.3 - 0.4	T&J			MADE GROUND. Soft mid brown clayey silt. Red brick at 0.9m.		0.2
0.4					Greyish brown very soft sandy silty CLAY and clayey sandy SILT.		0.4
0.6							0.6
0.8							0.8
1.0							1.0
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2.0							2.0
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3.0							3.0
3.2							3.2
3.4							3.4
3.6							3.6
3.8							3.8
4.0							4.0
4.2							4.2
4.4							4.4
4.6							4.6
4.8							4.8
5.0							5.0
5.2							5.2
5.4							5.4
5.6							5.6
5.8							5.8

Remarks: Boreholes logged in general accordance with BS5930:2015. Co-ordinates estimated. Groundwater resting at 1.0m upon completion.

APPENDIX 5

LABORATORY TESTING RESULTS

REPORT NUMBER:
GEI008

CLIENT :
Ground and Environmental Investigation Ltd

SITE ADDRESS:
Mill Drove South
Cowbit

DATE OF SITE VISIT:
05 January 2024

DATE RECEIVED BY LABORATORY:
12 January 2024

Complied By:.....
J. Garrett - Director

Approved By:.....
J. Garrett - Director

DATE REPORTED:
19 January 2024

22 Francis Road, Braintree, Essex, CM7 2NR
Tel : 07778442814
Registered in England Company Reg. No. 14487335

www.Flawless-Soils.com
Email - Enquiries@flawless-soils.com
VAT No: 443 1025 40

Laboratory Summary Results

Our Ref : GEI008 Date Sampled: 05/01/2024

Location : Mill Drove South, Cowbit Date Received : 12/01/2024

Client: Ground and Environmental Investigation Ltd Date Tested : 15/01/2024

Address: 8 Wapping Lane, Marton, Gainsborough, Lincs DN21 5AJ Date of Report : 19/01/2024

Sample Ref		Type	Moisture Content	Soil Fraction	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Modified Plasticity Index	Soil Class	Filter Paper Contact Time	Soil Sample Suction	Roots Present or Below	In situ Shear Vane Strength	Organic Content L.O.I	pH Value	Sulphate Content (g/l)		Class
TP/BH No	Depth (m)		(%) *[1]*	>0.425mm (%) *[2]*	(%) *[3]*	(%) *[4]*	(%) *[5]*	*[5]*	(%) [6]	*[7]*	(d)	(kPa) [8]	*[9]*	(kPa) *[10]*	(%) *[11]*	*[12]*	SO_3 *[13]*	SO_4 *[14]*	*[15]*
BH1	(0.7-0.9m) 0.8	D	38	<5	55	24	31	0.45	31	CH									

Test Methods / Notes

[1] BS 1377 : Part 2 : 1990, Test No 3.2

[2] Estimated if <5%, otherwise measured

[3] BS 1377 : Part 2 : 1990, Test No 4.4

[4] BS 1377 : Part 2 : 1990, Test No 5.3

[5] BS 1377 : Part 2 : 1990, Test No 5.4

[6] BRE Digest 240 : 1993

[7] BS 5930 : 2018 : Figure 8 - Plasticity Chart for the classification of fine soils

[8] S9a adapted from BRE IP 4 93

[9] Roots present at depth or below. Info taken from logs provided

[10] Values of shear strength were determined in situ by client using a Pilcon hand vane or Geonor vane (GV).

[11] BS 1377 : Part 3 : 1990, Test No 4

[12] BS 1377 : Part 3 : 2018. PII testing is completed by K4 Soils Ltd. Full reports can be provided upon written request.

[13] BS 1377 : Part 3 : 2018. Sulphate testing is completed by K4 Soils Ltd. Full reports can be provided upon written request.

[14] $SO_4 = 1.2 \times SO_3$

[15] BRE Special Digest One (Concrete in Aggressive Ground) August 2005 Note that if the SO4 content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4M or DS-5M class respectively unless water soluble magnesium testing is undertaken to prove otherwise.

Full reports can be provided upon request.

Key

D	Disturbed sample (small)
B	Disturbed sample (bulk)
U	Undisturbed sample
W	Groundwater sample
ENP	Essentially Non-Plastic by inspection
U/S	Underside of Foundation
H&F	Hair & Fibrous
D&D	Dead & Decomposing

Test results reported relate only to the items tested.

This report shall not be reproduced except in full without approval of the laboratory.

Version: V1 - 12.12.22

Our Ref : GEI008

Laboratory Testing Results

Date Sampled : 05/01/2024

Location : Mill Drove South, Cowbit

Date Received : 12/01/2024

Client: Ground and Environmental Investigation Ltd

Date Tested : 15/01/2024

Address: 8 Wapping Lane, Marton, Gainsborough, Lincs DN21 5AJ

Date of Report : 19/01/2024

Sample Ref.		Type	Moisture Content (%) *[1]*	Soil Fraction >0.425mm (%) *[2]*	Liquid Limit (%) *[3]*	Plastic Limit (%) *[4]*	Plasticity Index (%) *[5]*	Liquidity * Index *[5]*	Modified * Plasticity Index (%) [6]	Soil * Class *[7]*	Filter Paper Contact Time (d)	Soil Sample Suction (kPa) [8]	Roots Present or Below *[9]*	In situ Shear Vane Strength (kPa) *[10]*	Organic Content L.O.I (%) *[11]*	pH Value *[12]*	Sulphate Content (g/l)		Class *[15]*
TP/BH No.	Depth (m)																SO_3 *[13]*	SO_4 *[14]*	
BH2	(1.7-1.9m) 1.8	D	35	<5	50	22	28	0.45	28	CH									

Test Methods / Notes

[1] BS 1377 : Part 2 : 1990, Test No 3.2

[2] Estimated if <5%, otherwise measured

[3] BS 1377 : Part 2 : 1990, Test No 4.4

[4] BS 1377 : Part 2 : 1990, Test No 5.3

[5] BS 1377 : Part 2 : 1990, Test No 5.4

[6] BRE Digest 240 : 1993

[7] BS 5930 : 2018 : Figure 8 - Plasticity Chart for the classification of fine soils

[8] S9a adapted from BRE IP 4 93

[9] Roots present at depth or below. Info taken from logs provided

[10] Values of shear strength were determined in situ by client using a Pilcon hand vane or Geonor vane (GV).

[11] BS 1377 : Part 3 : 1990, Test No 4

[12] BS 1377 : Part 3 : 2018. PH testing is completed by K4 Soils Ltd. Full reports can be provided upon written request.

[13] BS 1377 : Part 3 : 2018. Sulphate testing is completed by K4 Soils Ltd. Full reports can be provided upon written request.

[14] $SO_4 = 1.2 \times SO_3$

[15] BRE Special Digest One (Concrete in Aggressive Ground) August 2005 Note that if the SO4 content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4M or DS-5M class respectively unless water soluble magnesium testing is undertaken to prove otherwise.

Full reports can be provided upon request.

Key

D	Disturbed sample (small)
B	Disturbed sample (bulk)
U	Undisturbed sample
W	Groundwater sample
ENP	Essentially Non-Plastic by inspection
U/S	Underside of Foundation
H&F	Hair & Fibrous
D&D	Dead & Decomposing

Test results reported relate only to the items tested.

This report shall not be reproduced except in full without approval of the laboratory.

Version: V1 - 12.12.22

Laboratory Testing Results

Our Ref : GEI008

Location : Mill Drove South, Cowbit

Client: Ground and Environmental Investigation Ltd

Address: 8 Wapping Lane, Marton, Gainsborough, Lincs DN21 5AJ

Date Sampled : 05/01/2024

Date Received : 12/01/2024

Date Tested : 15/01/2024

Date of Report : 19/01/2024

Sample Ref. TP/BH No.	Depth (m)	Type	Moisture Content (%) *[1]*	Soil Fraction > 0.425mm (%) *[2]*	Liquid Limit (%) *[3]*	Plastic Limit (%) *[4]*	Plasticity Index (%) *[5]*	Liquidity * Index *[5]*	Modified * Plasticity Index (%) [6]	Soil * Class *[7]*	Filter Paper Contact Time (d)	Soil Sample Suction (kPa) [8]	Roots Present or Below *[9]*	In situ Shear Vane Strength (kPa) *[10]*	Organic Content (%)*[11]*	pH Value *[12]*	Sulphate Content (g / l) SO_3 *[13]*	Sulphate Content (g / l) SO_4 *[14]*	Class *[15]*
BH3	(0.7-0.9m) 0.8	D	33	<5	52	26	26	0.27	26	CH									
	(1.7-1.9) 1.8	D	31	<5	43	19	24	0.50	24	CI									

Test Methods / Notes

[1] BS 1377 : Part 2 : 1990, Test No 3.2

[2] Estimated if <5%, otherwise measured

[3] BS 1377 : Part 2 : 1990, Test No 4.4

[4] BS 1377 : Part 2 : 1990, Test No 5.3

[5] BS 1377 : Part 2 : 1990, Test No 5.4

[6] BRE Digest 240 : 1993

[7] BS 5930 : 2018 : Figure 8 - Plasticity Chart for the classification of fine soils

[8] S9a adapted from BRE IP 4/93

[9] Roots present at depth or below. Info taken from logs provided

[10] Values of shear strength were determined in situ by client using a Pilcon hand vane or Geonor vane (GV).

[11] BS 1377 : Part 3 : 1990, Test No 4

[12] BS 1377 : Part 3 : 2018. PH testing is completed by K4 Soils Ltd. Full reports can be provided upon written request.

[13] BS 1377 : Part 3 : 2018. Sulphate testing is completed by K4 Soils Ltd. Full reports can be provided upon written request.

[14] $SO_4 = 1.2 \times SO_3$

[15] BRE Special Digest One (Concrete in Aggressive Ground) August 2005

Note that if the SO4 content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4M or DS-5M class respectively unless water soluble magnesium testing is undertaken to prove otherwise.

Full reports can be provided upon request.

Key

D	Disturbed sample (small)
B	Disturbed sample (bulk)
U	Undisturbed sample
W	Groundwater sample
ENP	Essentially Non-Plastic by inspection
U/S	Underside of Foundation
H&F	Hair & Fibrous
D&D	Dead & Decomposing

Test results reported relate only to the items tested.

This report shall not be reproduced except in full without approval of the laboratory.

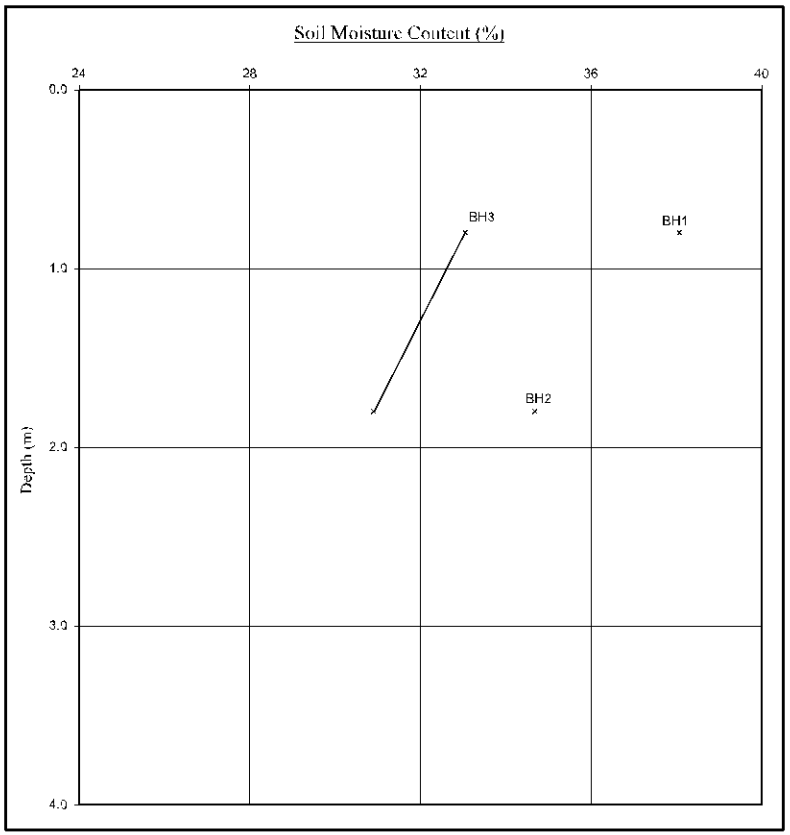
Version: V1 - 12.12.22

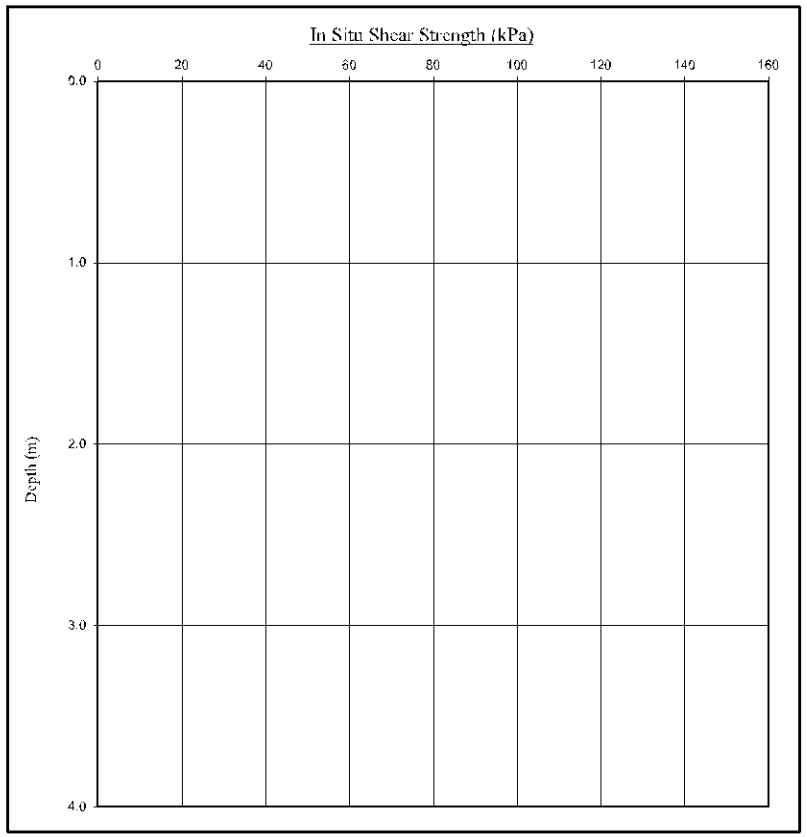
Moisture Content Profiles

Shear Strength Profiles

Our Ref :	GEI008
Location :	Mill Drove South, Cowbit
Work carried out for:	Ground and Environamental Investigation Ltd
	8 Wapping Lane, Marton, Gainsborough, Lincs DN21 5AJ

Date Sampled :	05/01/2024
Date Received :	12/01/2024
Date Tested :	15/01/2024
Date of Report :	19/01/2024





Notes

1. If plotted, 0.4 LL and PI=2 (after Driscoll, 1983) should only be applied to London Clay f and similarly over consolidated clay) at shallow depths.

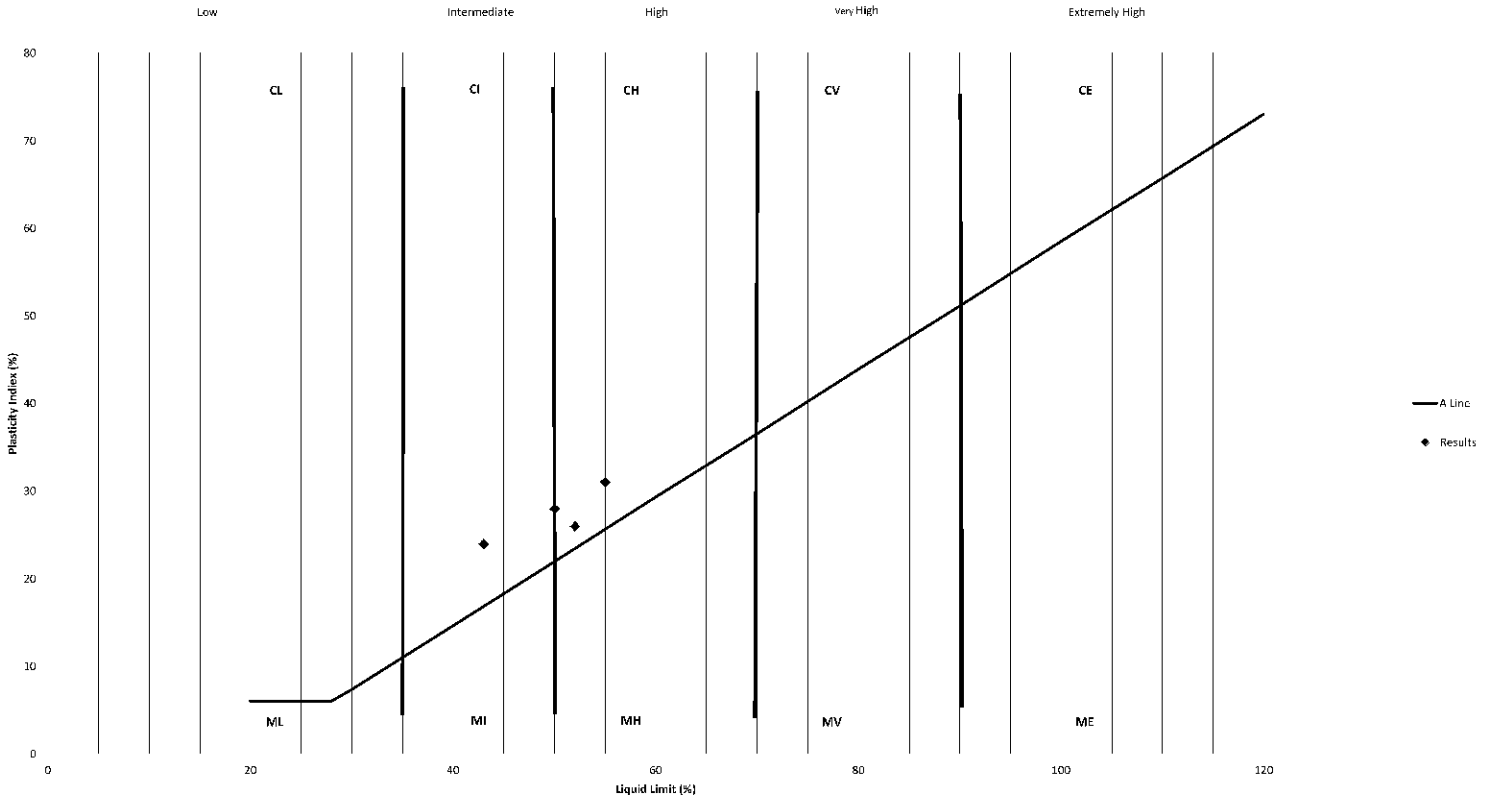
Note

1. Unless otherwise stated, values of Shear Strength were determined in situ by the client using a Pilcon Hand Vane the calibration of which is limited to a maximum reading of 140 kPa.

Plasticity Chart

Our Ref : GBI008
Location : Mill Drove South
Work carried out for: Ground and Environmental Investigation Ltd
8 Wapping Lane, Marton, Gainsborough, Lincs DN21 5AJ

Date Sampled : 05/01/2024
Date Received : 12/01/2024
Date Tested : 15/01/2024
Date of Report : 19/01/2024



APPENDIX 6

ANALYTICAL TESTING RESULTS

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

UKAS TESTING 2683

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Certificate of Analysis

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	24-51907
Issue:	1
Date of Issue:	22/01/2024
Contact:	Marc Pearson
Customer Details:	Ground and Environmental Investigation Limited 8 Wapping Lane Marton GainsboroughDN21 5AL
Quotation No:	Q22-03536
Order No:	Not Supplied
Customer Reference:	23-517
Date Received:	17/01/2024
Date Approved:	22/01/2024
Details:	Mill Drive South, Cowbit
Approved by:	

Tim Reeve, Technical Coordinator

ELAB

Sample Summary

Report No.: 24-51907, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Schedulec	Description	Deviations
350276	BH4 0.30 - 0.40	Not Provided	17/01/2024	Silty clayey loam	
350277	BH5 0.30 - 0.40	Not Provided	17/01/2024	Silty loam	
350278	BH6 0.30 - 0.40	Not Provided	17/01/2024	Silty clayey loam	
350279	BH7 0.30 - 0.40	Not Provided	17/01/2024	Silty clayey loam	
350280	BH8 0.30 - 0.40	Not Provided	17/01/2024	Silty loam	

ELAB

UKAS TESTING 2683

mCERTS

Results Summary

Report No.: 24-51907, issue number 1

	ELAB Reference	350276	350277	350278	350279	350280
	Customer Reference					
	Sample ID					
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
	Sample Location	BH4	BH5	BH6	BH7	BH8
	Sample Depth (m)	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40
	Sampling Date	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Determinand	**Codes**	**Units**	**LOD**			
Soil sample preparation parameters						
Moisture Content	N	%	0.1	20.5	18.5	20.0	22.2	22.9
Stones Content	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None	None	None
Metals								
Arsenic	M	mg/kg	1	10.0	9.4	11.2	13.0	9.6
Barium	U	mg/kg	10	108	105	86.2	84.5	87.6
Beryllium	U	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	mg/kg	0.5	4.1	4.6	3.9	< 0.5	< 0.5
Chromium	M	mg/kg	5	24.3	23.4	21.7	22.7	21.3
Copper	M	mg/kg	5	38.3	31.7	23.7	19.4	23.7
Lead	M	mg/kg	5	140	188	158	37.4	33.8
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	23.4	22.5	22.2	24.7	23.1
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	34.5	35.4	33.5	37.2	33.8
Zinc	M	mg/kg	5	667	731	618	113	179
Anions								
Water Soluble Sulphate	M	mg/l	20	94	44	34	< 20	< 20
Inorganics								
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	3.0	2.9	3.1	2.4	5.1
Miscellaneous								
pH	M	pH units	0.1	8.4	8.6	8.4	8.4	8.1
Soil Organic Matter	U	%	0.1	2.9	3.0	1.9	1.2	3.0
Polyaromatic hydrocarbons								
Naphthalene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	N	mg/kg	0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	N	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	N	mg/kg	0.1	1.4	< 0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	N	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total PAH(16)	N	mg/kg	0.4	2.0	< 0.4	< 0.4	< 0.4	< 0.4

ELAB

UKAS TESTING 2683

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Results Summary

Report No.: 24-51907, issue number 1

	ELAB Reference	350276	350277	350278	350279	350280
	Customer Reference					
	Sample ID					
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
	Sample Location	BH4	BH5	BH6	BH7	BH8
	Sample Depth (m)	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40
	Sampling Date	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Determinand	**Codes**	**Units**	**LOD**					
BTEX								
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
MTBE	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
TPH CWG								
>C5-C6 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C35 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C5-C7 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C35-C40 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons								
Mineral Oil w Florisil (EH_CU_1D_Total)	N	mg/kg	5	< 5	< 5	< 5	< 5	< 5

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 24-51907, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

In accordance with procedures, a 1kg soil sample should be analysed. For amounts less than this caution should be used when analysing the data as sample size is smaller than the recommended amount, therefore samples could be deemed as not being representative of the materials present on site.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)	F/mm2 (I)
350276	0.30 - 0.40	BH4	Brown Soil, Stones	No asbestos detected	n/t	n/t	n/t	n/t	n/t
350277	0.30 - 0.40	BH5	Brown Soil, Stones, Clinker, Organics	No asbestos detected	n/t	n/t	n/t	n/t	n/t
350278	0.30 - 0.40	BH6	Brown Soil, Stones, Clinker	No asbestos detected	n/t	n/t	n/t	n/t	n/t
350279	0.30 - 0.40	BH7	Brown Soil, Stones, Clinker	No asbestos detected	n/t	n/t	n/t	n/t	n/t
350280	0.30 - 0.40	BH8	Brown Soil, Stones, Clinker, Brick	No asbestos detected	n/t	n/t	n/t	n/t	n/t

Method Summary

Report No.: 24-51907, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	18/01/2024	110	Colorimetry
pH	M	Air dried sample	18/01/2024	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	18/01/2024	300	ICPMS
PAH (GC-FID)	N	As submitted sample	18/01/2024	133	GC-FID
Water soluble anions	M	Air dried sample	18/01/2024	172	Ion Chromatography
Low range Aliphatic hydrocarbons soil	N	As submitted sample	19/01/2024	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	19/01/2024	181	GC-MS
BTEX in solids	M	As submitted sample	19/01/2024	181A	GC-MS
Water soluble boron	N	Air dried sample	18/01/2024	202	Colorimetry
Aliphatic hydrocarbons in soil	N	As submitted sample	22/01/2024	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	22/01/2024	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	22/01/2024	214	GC-FID
Asbestos identification	U	Air dried sample	19/01/2024	281	Microscopy
Soil organic matter	U	Air dried sample	18/01/2024	BS1377:P3	Titrimetry
TPH with Florisil clean up solids	N	As submitted sample	18/01/2024	GCL117	GC-FID

Tests marked N are not UKAS accredited

ELAB

UKAS TESTING 2683

mCERTS

Report Information

Report No.: 24-51907, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.

ELAB are unable to provide an interpretation or opinion on the content of this report.

The results relate only to the sample received.

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

End of Report

APPENDIX 7

GUIDELINES ON CONTAMINATION LEVELS

Human Health

CLEA Soil Guideline values (SGV)

The UKs primary contaminated land guidance is contained within the Contaminated Land Exposure Assessment (CLEA) framework. Within this framework a number of Soil Guideline Values (SGVs) were published for key contaminants along with toxicological guideline values relating to intake thresholds. The soil guideline values provided by the CLEA model represent intervention values for end uses based upon potential human exposure and soil concentrations of a contaminant above these values might represent an unacceptable risk to the health of the site users. The Environment Agency had an ongoing programme of SGV publication with associated toxicological information for key contaminants. Where SGVs are available then they should be used as the basis for any human health risk assessment.

All CLEA SGVs were withdrawn for use by the Environment Agency in 2008 whilst they are under review and pending the availability of new toxicological data. To date, new SGV values have been set for benzene, toluene, ethylbenzene and xylene and mercury and selenium. In the absence of the new SGVs and toxicological report data, GEI have used appropriate screening tools or Generic Assessment Criteria Levels as assessment criteria guidelines for those determinands not currently assigned SGVs. It should be noted that the former SGVs for metals were in general agreement with those site specific levels generated by RBCA and other similar computer model based risk assessment tools.

The GEI screening assessment of contaminants within samples has been carried out using these model generated values in the absence of any other values or guidelines. The version of the CLEA model, v1.06, was used. The published SGVs are shown below. Nickel SGV has been withdrawn (2015) pending an assessment of the toxicological data used in the model for nickel. Published SGV values.

	Soil Guideline Value (mg kg^{-1})		
Land use	**Residential**	**Allotment**	**Commercial**
Inorganic arsenic	32	43	640
Nickel	130	230	1,800
Cadmium	10	1.8	230
Phenol	420	280	3200
Elemental Hg	1	26	26
Inorganic Hg	170	80	3600
Methyl Hg	11	8	410
Selenium	350	120	13,000
Benzene	0.33	0.07	95
Toluene	610	120	4400
Ethylbenzene	350	90	2800
o-Xylene	250	160	2600
r-Xylene	240	180	3500
m-Xylene	230	160	3200

Based on a sandy loam soil as defined in Environment Agency (2009b) and 6% SOM.

DEFRA Category four screening level (C4SL)

In addition to the SGVs, guideline screening values proposed in the DEFRA document SP1010-Development of Category 4 Screening Levels for Assessment of Land affected by Contamination Final Project Report (C4SL) are considered along with the suitable for use levels (S4USL) derived by the Chartered Institute of Environmental Health (CIEH) in partnership with the Land Quality Management Organization (LQM). The screening levels are given for residential, commercial, allotment or public open space end uses.

PARAMETER	Residential		Commercial	Allotment	Public open Space near residential POS_{resi}	Public park land POS_{park}	Sources
	With Plant uptake	Without Plant uptake					
Inorganics - mg/kg unless stated							
Arsenic (inorganic)	37	40	640	49	79	170	DEFRA C4SL
Beryllium	1.7	1.7	12	35	2.2	63	LQM/S4USL
Boron	290	11,000	240,000	45	21,000	46,000	LQM/CIEH
Cadmium	22	150	410	3.9	220	880	LQM/S4USL
Chromium III	910	910	8,600	18,000	1,500	33,000	LQM/CIEH
Chromium VI	21	21	49	170	21	250	LQM/S4USL
Copper	2,400	7,100	68,000	520	12,000	44,000	LQM/CIEH
lead	200	310	2,300	80	630	1,300	DEFRA C4SL
Mercury (Inorganic)	40	56	1,100	19	120	240	LQM/CIEH
Nickel	180	180	980	230	230	3,400	LQM/CIEH
Selenium	250	430	12,000	88	1,100	1,800	LQM/CIEH
Vanadium	410	1,200	9,000	91	2,000	5,000	LQM/CIEH
Zinc	3,700	40,000	730,000	620	81,000	170,000	LQM/CIEH
Total sulphate	2400	2400	2400	2400	2400	2400	BRE (2005)
Water-soluble sulphate (g/l)	0.5	0.5	0.5	0.5	0.5	0.5	BRE (2005)
pH	<5	<5	<5	<5	<5	<5	-

CLEA does not currently provide guidance for total Polycyclic Aromatic Hydrocarbons (PAHs). A standalone Defra C4SL for benzo(a)pyrene has been assigned and is shown below. In addition, the Chartered Institute of Environmental Health (CIEH) in partnership with the Land Quality Management Organization (LQM) used CLEA software to derive Generic Assessment Criteria (GAC) and Assessment Sub Criteria (ASC) for the following PAH compounds:

PARAMETER	Residential						Commercial			Allotment			PO S resi	PO S park	Source
	With Plant uptake			Without Plant uptake											
SOM %	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Organics - mg/kg unless stated															
Acenaphthene	200	490	1080	2000	3600	5200	75000	92000	100000	34	85	202			CLEA/LQM CIEH
Acenaphthylene	170	400	900	2000	3600	5200	76000	92000	100000	28	68	163			CLEA/LQM CIEH
Anthracene	2300	5400	10700	30000	34000	36000	520000	530000	540000	380	947	2230			CLEA/LQM CIEH
Benzo(a)anthracene	7.5	11	13	12	14	15	170	170	180	2.9	6.5	13			CLEA/LQM CIEH
Benzo(a)pyrene C4SL			5			5.3			77			5.7	10	21	DEFRA C4SL
Benzo(a)pyrene	2.2	2.7	3	3.2	3.2	3.2	35	35	36	3.6	3.7	3.7			CLEA/LQM CIEH
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4	4	44	45	45	1	2.2	3.9			CLEA/LQM CIEH
Benzo(g,h,i)perylene	315	340	350	360	360	360	3900	4000	4000	290	480	646			CLEA/LQM CIEH
Benzo(k)fluoranthene	77	93	100	110	110	110	1200	1200	1200	37	76	129			CLEA/LQM CIEH
Chrysene	15	22	27	30	31	32	350	350	350	4.1	9.5	19			CLEA/LQM CIEH
Dibenzo(a,h)anthracene	0.24	0.28	0.3	0.31	0.32	0.32	3.5	3.6	3.6	0.14	0.27	0.44			CLEA/LQM CIEH
Fluoranthene	280	560	890	1500	1600	1600	23000	23000	23000	52	127	288			CLEA/LQM CIEH
Fluorene	165	390	850	2200	3400	4200	60000	67000	70000	27	67	158			CLEA/LQM CIEH
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	500	510	510	9.5	21	40			CLEA/LQM CIEH
Naphthalene	1	2.3	5.5	1	2.4	6	100	260	600	4	9.8	23			CLEA/LQM CIEH
Phenanthrene	95	220	440	1300	1400	1500	22000	22000	23000	15	38	90			CLEA/LQM CIEH
Pyrene	620	1200	2000	3700	3800	3800	54000	54000	55000	11	271	620			CLEA/LQM CIEH

Petroleum Hydrocarbons represent a complex situation being a mixture of a range of compounds, the relative concentrations of which may change over time.

As discussed above, Generic Assessment Criteria (GAC) for total petroleum hydrocarbons according to both their molecular weight and chemical structure and also for a range of soil organic matter (SOM) content values have been derived using CLEA software.

The LQM CIEH GACs are again presented according to their soil organic matter content and proposed end use of the land. The generic assessment criteria for a 1%, 2.5% and 6% SOM content are tabulated below and presented according to the proposed end use.

	LQM CIEH Generic Assessment Criteria (mg/kg dry weight soil)											
	Residential						Allotment Land Use			Commercial Land Use		
	With Plant Uptake			Without Plant Uptake								
SOM %	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6
Aliphatic												
EC 5 – 6	24	40	80	24	40	80	752	1730	3900	2400	4000	8000
EC > 6 – 8	52	110	250	52	110	250	2304	5580	13000	5200	11000	25000
EC > 8 – 10	13	30	70	13	30	70	321	770	1700	1300	3000	7000
EC > 10 – 12	60	150	360	60	150	360	2153	4300	7150	6000	15000	32000
EC > 12 – 16	500	1200	2600	500	1200	2600	10800	12400	13200	42000	72000	90000
EC > 16 – 35	41000	69000	94000	41000	69000	94000	240000	260000	260000	140000	160000	180000
EC > 35 – 44	41000	69000	94000	41000	69000	94000	240000	260000	260000	140000	160000	180000
Aromatic												
EC 5 – 7 (benzene)	50	110	240	155	300	630	12	25	57	15000	28000	55000
EC > 7 – 8 (toluene)	100	240	550	370	800	1800	21	50	117	33000	68000	130000
EC > 8 – 10	20	50	110	20	53	125	8.6	21	50	2000	5000	120000
EC > 10 – 12	63	150	340	120	280	650	12.5	31	74	11000	22000	31000
EC > 12 – 16	140	320	660	1100	1900	2300	23	57	134	35000	37000	38000
EC > 16 – 21	260	540	930	1800	1900	1900	47	112	260	28000	28000	28000
EC > 21 – 35	1100	1400	1700	1900	1900	1900	370	820	1500	28000	28000	28000
EC > 35 – 44	1100	1400	1700	1900	1900	1900	370	820	1500	28000	28000	28000

													POS_{rc} si	POS_p ark
Benzene DEFRA C4SL	0.06	0.13	0.3 (0.87)	0.16	0.3	0.64 (3.3)	0.016	0.033	0.073 (0.18)	15	28	57 (98)	140	230
Toluene	104	240	550	370	830	1800	22	50	117	33000	68000	130000		
Ethylbenzene	30	62	150	34	81	190	16	38	91	3200	7000	16000		
o-xylene	30	70	170	40	90	200	28	67	160	3700	8000	19000		
m-xylene	30	70	160	34	80	190	30	74	170	3400	8000	18000		
p-xylene	30	70	160	33	80	180	28	69	160	3200	8000	17000		

TPH values calculated using CLEA v1.06 with parameter changes in accord with DEFRA (2014) C4SL and LQM/CIEH (2015)

Inert Material

The limit values for inert waste are given in the EC Landfill Directive 1999/31/EC as applied under the Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019 (*SI 2019/39*) and as defined by the council decision establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC(2003/33/EC).

The regulations and associated guidance provide waste acceptance criteria, which set the limits of contaminants permitted in various waste categories going to landfill. These criteria are of particular use where CLEA guidance or DEFRA Screening values has not yet been provided.

Inert waste is defined as waste which contains insignificant potential for pollution and does not endanger the quality of surface water or groundwater. The Landfill Directive states that inert waste will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health.

For risk assessment purposes we would consider that any materials (soils) containing concentrations of potential contaminants that would result in them being classified as inert would be considered as uncontaminated and therefore representing a low risk to human health.

Similarly, such material would not be considered to represent a significant risk to water resources.

Where CLEA or Defra screening values exist, these would always be used in preference to inert waste values when assessing risks to human health.

Selected inert waste acceptance criteria as given in Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills for the Landfill Directive are given below.

Landfill acceptance criteria for inert waste (mg/kg)	
Total organic carbon (TOC)	30,000
BTEX compounds	6
Mineral oils (C10 – C40)	500
PCBs	1
PAH	100

Risks to Plants

The CLEA framework does not provide a method for the assessment of phytotoxic risks to plants. However maximum permissible concentrations have been published in the Sludge (Use in Agriculture) Regulations 1989 (SI 1989, No. 1263). This legislation enforces the provisions of the EC Directive 86/278/EEC for potentially toxic elements (PTEs) on soils for agricultural use where sewage sludge has been applied (see table below). These limits relate to the potential risk to plants and not human health for which CLEA is the overriding risk assessment model.

Maximum permissible concentration in agricultural soils following sewage sludge application (mg/kg).				
	pH 5.0<5.5	**pH 5.5<6.0**	**pH 6.0-7.0**	**pH >7.0**
Zinc	200	250	300	450
Copper	80	100	135	200
Nickel	50	60	75	110

Risks to buried concrete

The potential risks to buried concrete can be assessed by reference to the BRE Special Digest 1 (SD1) entitled 'Concrete in Aggressive Ground'. This document provides a methodology for the specification of concrete based on the ground conditions encountered and is based upon chemical analysis and associated factors (e.g. groundwater). The guidance provides a Design Sulphate Class (DS) based upon the ground conditions and it is considered that a low concentration of sulphate and pH (i.e. DS – 1 and DS – 2) is considered to represent a low risk to buildings.

Risks to buried services

In addition, where water is supplied in plastic pipes which could come into contact with contaminated ground then this can lead to premature failures, resulting in leakage and loss of water quality. Risks to water supply pipes are assessed using guidance published by the UK Water Industry Research (UKWIR) entitled '*Guidance for the Selection of Water Pipes to be used in Brownfield Sites'* (Report Ref. No. 10/WM/03/21). This is known as the UKWIR guidance.

Previous guidance from WRAS has been withdrawn but may still be in use by certain water supply companies. In general water companies have adopted a common set of guidelines as given in the ***Contaminated Land Assessment Guidance from January 2014.***

Additional threshold values for determining pipe material have also been published by certain water supply companies. If these threshold values are exceeded then consideration should be given to the selection of pipe material or to the use of barrier pipes. The UKWIR threshold values, together with those of certain water supply companies are presented in the table below for a range of potential hazards.

Substance[1]	Water UK Guidance	Thames Water
Total VOC	0.5	-
Total BTEX & MTBE	0.1	0.1 or either
Total SVOC	2	-
EC5-EC10 aliphatic and aromatic hydrocarbons	2	-
EC5-EC12 aliphatic hydrocarbons		0.5
EC5-EC12 aromatic hydrocarbons		0.5
EC10-EC16 aliphatic and aromatic hydrocarbons	10	-
EC12-EC21 aliphatic hydrocarbons		10
EC12-EC21 aromatic hydrocarbons		10
EC16-EC40 aliphatic and aromatic hydrocarbons	500	-
EC21-EC35 aliphatic hydrocarbons		500
EC21-EC35 aromatic hydrocarbons		500
Phenols	2	5*
Cresols and chlorinated phenols	2	2
Naphthalene	-	**5**
Ethers	0.5	-
Nitrobenzene	0.5	-
Ketones	0.5	-
Aldehydes	0.5	-
Amines	0	-
Corrosives pH and EC	# ##	

All units mg kg-1 in soil;
pH <7 for wrapped steel, pH <5 wrapped ductile iron and copper and ##EC >400µS/cm;
*Phenol limit at 2mg/kg in presence of BTEX.