

**GEO SITE ASSESSMENT
LAND OFF WESTWOOD CLOSE
EMSWORTH
PO10 7QL****REPORT PREPARED FOR:****HAMPSHIRE HOMES
8 CHATMOHR ESTATE
CRAWLEY HILL NR ROMSEY
HAMPSHIRE
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1.0 EXECUTIVE SUMMARY

Site Address	Land off Westwood Close, Emsworth, PO10 7QL
Site Description	The site is linear in shape, measuring 5ha with maximum dimensions of ~800m N-S by ~110m E-W. Access to the site is via Westbourne Road on the northern boundary.
Surrounding Area	- Northern Boundary – Mixed commercial and residential properties - Eastern Boundary – Open land and River Ems - Southern Boundary – A27 dual carriageway, residential properties and open land - Western Boundary – Residential properties
Geology and Hydrology	- Published Bedrock geology: London Clay Formation (Unproductive) - Superficial deposits: Head and Alluvium (Secondary A Aquifer) - The site does not lie within a Source Protection Zone - The nearest surface water feature is the River Ems adjacent to the eastern boundary
Site History	The site comprises of open grassland and mature trees and appears to have never been developed. Residential properties have been built adjacent to the western site boundary and several historical industrial land uses are known surrounding the site.
Potential Areas of Concern	No potential areas of concern have been identified on site.
Intrusive Field Results	The average depths of geology encountered onsite are: - Topsoil: 0.00 – 0.30m bgl - Soft Gravelly Sandy Clay: 0.30m – 1.90m bgl - Stiff Clay: 1.90 – 5.00m bgl
Field Observations	No grossly contaminative, visual or olfactory evidence of contamination was encountered during the intrusive investigation.
Ground Water and Permeability	- Groundwater was encountered in two locations (BH1 and BH4) between ~1.20-1.50mbgl. - Trial pit soakage testing has returned a value of 4.29×10^{-5} m/sec (Moderately Permeable) in one location (TP4) and between 8.69×10^{-6} to $<10^{-6}$ m/sec (Poor Permeability) across the remaining portion of the site.
Ground Gas Observations	- Methane Gas Screening Value is characterised as Very Low (Max CH₄ = 0.0001%) - Carbon dioxide Gas Screening Value is characterised as Very Low (Max CO₂ = 0.0034%)
Contamination Assessment	- None of the soil samples exceeded the adopted target concentrations for residential land use. No additional actions are considered to be necessary associated with the proposed land use. - Any made ground material will likely be classified as non-hazardous and natural material as inert for offsite disposal.
Geotechnical Findings	- The deeper stiff clay materials have returned medium plasticity with the plasticity index indicating there is a high volume change potential (shrink/swell). - The shear stress values for the clay range from 78 to 126kPa indicating the clay is stiff.
Recommendations on Foundations/Drainage	- Potential for soakage to ground is moderate to poor and may require additional measures. - Shallow strip foundations viable for two/three storey buildings and will need to extend a minimum of 1m depth, proving 300mm of the gravelly sandy clay. An allowable bearing capacity of 150 to 200kN/m² can be adopted for the stiff gravelly sandy clay. - Dewatering may be necessary for excavations over 1.00m.
Recommendations	Additional long term groundwater monitoring required for design of drainage.

2.0 INTRODUCTION

WDE Consulting Limited (WDE) was appointed by Hampshire Homes (the Client) to conduct a Geo Site Assessment at Land off Westwood Close, Emsworth (Figure 1) to determine the ground conditions prior to development of the site for residential use and to comply with any associated conditions of planning.

The works described in this report are subject to the WDE Service Constraints presented in Appendix A. This report was finalised in November 2017 and should be read in the light of any subsequent changes in legislation, statutory requirements, statutory guidance, non-statutory guidance, relevant research and industry practices. This report is currently assigned only to the *Client* for their sole reliance.

2.1 RELEVANT GUIDANCE

WDE Consulting has duly taken account of the recommendation contained within relevant guidance documents and legislation during the preparation of this report.

British Standards has issued guidance for the Investigation of Potentially Contaminated Sites¹ and for undertaking Site Investigations² have duly been considered in the undertaking of this assessment. The methodology adopted for this report follows the Model Procedures for the Management of Land Contamination CLR-11 produced by DEFRA and the Agency³. The CLR-11 process provides a reasoned and structured mechanism to identify potential risk issues and, where necessary, provide a way forward to develop a robust risk management strategy to address potentially unacceptable risks in an appropriate manner. An update to the potential human health exposure pathways is provided in the Environment Agency Soil Science Report SR3⁴. In 2008 the Environment Agency and the National House-Building Council (NHBC), Chartered Institute of Environmental Health (CIEH) released a joint publication for the Safe Development of Housing on Land Affected by Contamination⁵.

The National Planning Policy Framework⁶ requires the following:

- The site is made suitable for its intended use, taking account of all ground conditions arising from natural and former activities, pollution arising from previous uses and proposals for mitigation including land remediation.
- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.
- Adequate site investigation information, prepared by a competent person, is presented.

¹ British Standards 2011. Investigation of Potentially Contaminated Sites-Codes of Practice. BS10175:2011

² British Standards. 2015. Code of Practice for Site Investigations. BS5930

³ Environment Agency. 2004. Model Procedures for the Management of Land Contamination. Contaminated Land Report 11

⁴ Environment Agency, August 2008, Updated technical background to the CLEA model, Science Report - SC050021/SR3

⁵ Environment Agency. 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D 66

⁶ Department of Communities and Local Government. March 2012

2.2 PROPOSED REDEVELOPMENT

It is understood that the development is to comprise construction of 35 residential units with associated access roads, car parking and private gardens (Figure 2). Consequently, there will be the requirement for the site to be made suitable for the intended use by complying with the conditions of planning.

2.3 AIMS AND OBJECTIVES

2.3.1 Aims

The aims of this report are as follows:

1. To identify whether there is any contamination onsite which is likely to cause significant harm to human health, the environment or other sensitive receptors
2. To identify the geotechnical properties of the ground to enable determining outline design parameters for foundations and drainage.

2.3.2 Objectives

In order to achieve the aims set out in Section 2.3.1 WDE proposes the following objectives:

1. Complete a Phase 1 desk based study of the site to ascertain information on the site geology, hydrology and surrounding land uses.
2. Complete walkover survey to identify any areas of potential contamination.
3. Investigate the nature of material that is present onsite through field investigations.
4. Investigate the nature and extent of any contamination onsite through field investigations.
5. Compare onsite soil and water concentrations with generic UK based assessment criteria.

2.4 WORK AND PROGRAMME

WDE Consulting's scope of work includes the following:

- Site walkover
- Intrusive site investigation
- Trial pit soakage test
- Groundwater and ground gas monitoring
- Laboratory analyses (contamination & geotechnical)
- Geo-site assessment report

The programme of work that was undertaken comprises the following elements presented in Table 1.

Table 1 – Programme of Works

Item	Description	Start Date	Completion Date
1	Site Walkover	24/10/2017	24/10/2017
2	Intrusive Investigation	24/10/2017	25/10/2017
4	Monitoring Visit	25/10/2017	25/10/2017
5	Analytical Laboratory analysis	27/10/2017	07/11/2017
6	Laboratory Geotechnical Testing	27/10/2017	14/11/2017
7	Geo Site Assessment Report	13/10/2017	17/11/2017

3.0 PHASE 1 DESK STUDY AND SITE WALKOVER

3.1 SOURCES OF INFORMATION

The sources of information that were used during the desk study included the following items:

- Site walkover (Photos presented in Appendix B)
- Environmental database information (Appendix C)

3.2 SITE LOCATION

The site is located in Emsworth, Hampshire at post code PO10 7QL and National Grid Reference 624969, 245802 (Figure 1). The site can be found in an area of predominantly residential and rural land use. A summary of the site surroundings are as follows:

- Northern Boundary – Small industrial estate and residential properties
- Eastern Boundary – Open land with River Ems
- Southern Boundary – A27 dual carriageway with residential properties and open land beyond
- Western Boundary – Residential properties

3.3 SITE DESCRIPTION AND WALKOVER

The site is linear in shape, measuring 5ha with maximum dimensions of ~800m N-S by ~110m E-W. Access to the site is via Westbourne Road on the northern boundary (Photo 1).

The site comprises open grassland with mature and semi-mature trees predominantly along the site boundaries and is currently used for grazing cattle (Photos 2 and 3).

Topography on site is slopes slightly downward from north to south. There was no evidence of any bulk tanks, surface staining or invasive plant species onsite.

3.4 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

Published geological information indicates that the bedrock is made up of the London Clay Formation (Clay, Silt and Sand) overlain by superficial deposits of Head (Sand, Silt and Clay) and Alluvium (Clay, Silt, Sand and Gravel).

The bedrock has been deemed Unproductive whilst the superficial deposits have been designated a Secondary A Aquifer.

The nearest surface water feature is the River Ems located adjacent to the eastern boundary in the northern-most portion of the site and up to 50m E along the remainder of the eastern boundary.

The site does not lie within any Environment Agency Source Protection Zones.

3.5 GEOLOGICAL HAZARD

The Groundsure Natural Hazards Findings has identified a number of potential hazards which are summarised in Table 2 below.

Table 2 – Natural Hazard Findings

Natural Hazard	Risk Rating
Shrink Swell	Low
Landslides	Very Low
Soluble Rocks	Negligible
Compressible Ground	Moderate
Collapsible Rocks	Low
Running Sand	Low

The property is in a Radon Affected Area as between 1 and 3% of properties are above the Action Level. No radon protective measures are likely to be necessary as a result.

3.6 LAND USES ADJACENT TO SITE

3.6.1 Industrial Land Use

There are a number of potentially contaminative industrial sites within 250m of the site boundaries, details of which are summarised below:

- Hopper (Farming) – 35m N
- Hallmarq Veterinary Imaging (Industrial Products) – 45m N
- The Wren Centre (Industrial Features) – 67m N
- Garden Karma (Consumer Products) – 67m N
- Hopper (Farming) – 68m N
- Douglas Knight (Consumer Products) – 77m N
- Sweetbriar Water Hygiene (Industrial Products) – 82m N
- CPA Upholstery Services (Consumer Products) – 82m N
- Touchscreens Direct (Industrial Products) – 85m NW
- JSG Engineering (Engineering Services) – 99m NW
- Gas Compound (Infrastructure and Facilities) – 163m SW
- Gas Governor Station (Infrastructure and Facilities) – 214m W
- Watercress Beds (Farming) – 235m E
- 1 Marine Surveys (Engineering Services) – 238m E

3.6.2 Historical Potentially Contaminative Uses

There are several historical potentially contaminative uses within 250m of the site boundaries, details of which are summarised below:

- Brick Field (1895) – On site
- Watercress Bed (1931) – 83m E
- Watercress Bed (1898) – 92m SE
- Grave Yard (1877) – 102m NE
- Corn Mill (1877, 1896, 1907, 1914) – 134m SE
- Watercress Beds (1898, 1931) – 176m E
- Unspecified Pit (1914) – 178m NW
- Laundry (1907, 1914, 1931, 1932, 1938, 1962) – 185m NW
- Nursery (1932) – 188m W
- Brick Works (1898, 1914) – 193m NW
- Brick Field (1895, 1896, 1907) – 194m NW
- Unspecified Ground Workings (1907) – 198m NW
- Brick Field (1895, 1896) – 209m NW
- Malthouse (1896) – 210m SE
- Brick Works (1907, 1910, 1914) – 219m NW
- Unspecified Pit (1910, 1914) – 238m NW
- Nursery (1931, 1938) – 240m W
- Smithy (1895) – 243m NE
- Nursery (1931, 1963, 1973) – 243m W

3.6.3 Potentially Infilled Land

There are several potentially infilled areas of land within 250m of the site boundaries, details of which are summarised below:

- Brick Field (1895) – On site
- Watercress Bed (1931) – 83m E
- Watercress Bed (1898) – 92m SE
- Grave Yard (1877) – 102m NE
- Mill Pond (1877, 1896, 1898, 1907, 1914, 1932) – 145m SE
- Pond (1898, 1931, 1973, 1990) – 150m E
- Watercress Beds (1898, 1931) – 176m E
- Unspecified Pit (1914) – 178m NW
- Brick Works (1898, 1914) – 193m NW
- Brick Field (1895, 1896, 1907) – 194m NW
- Unspecified Ground Workings (1907) – 198m NW
- Brick Field (1895, 1896) – 209m NW
- Brick Works (1907, 1910, 1914) – 219m NW
- Pond (1942) – 224m SE

3.6.4 Electrical Substations

There are several recorded electrical substations within 250m of the site boundaries, details of which are summarised below:

- 9m NW
- 68m NW
- 68m E
- 208m W
- 234m W

3.6.5 Fuel Station Entries

There is one fuel station entries within 500m of the site boundaries, details of which are summarised below:

- Collins Garage (Murco) – 376m NE

3.6.6 Historical Garage and Motor Vehicle Repair Database

There are no recorded historical garage and motor vehicle repair sites within 250m of the site boundaries. The closest historical garage is located 325m NE.

3.6.7 Historical/Current Landfill/Waste Sites

There are no current landfill sites that have been identified operating within 250m of the site boundaries. The closest recorded historical landfill site is East of Church Hall, Westbourne, Sussex at 130m E and which was last recorded on 31st December 1986.

3.6.8 Licensed Discharge Consents

There are two licensed discharge consents recorded within 250m of the site boundaries, details of which are summarised below in Table 3.

Table 3 – Summary of Licensed Discharge Consents

Address	Effluent Type	Status	Distance and Direction
Westbourne Osteopathic & Wellness, Westbourne Road, Westbourne, West Sussex, PO10 8UL	Sewage discharges – final/treated effluent	New Issued under EPR 2010	5m E
Bourne Bridge House, Westbourne Road, Emsworth, Hampshire, PO10 7RN	Sewage discharges – final/treated effluent	New Issued under EPR 2010	33m NE

3.6.9 Records of Part A(2) and Part B Activities

There are no Part A(2) or Part B Activities recorded within 250m of the site boundaries.

3.6.10 Substantiated Pollution Incident Register

There have been two pollution incidents recorded within 250m of the site boundaries, details of which are summarised in Table 4.

Table 4 – Summary of Reported Pollution Events

Incident Date	Pollutant	Water Impact	Land Impact	Air Impact	Location
23 rd June 2003	Contaminated Water	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	27m E
8 th October 2003	Contaminated Water	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	30m SE

3.6.11 Water Abstractions

There are no licensed groundwater or surface water abstraction licences recorded within 500m of the site boundaries. The nearest surface water abstraction point is 784m NE.

3.6.12 Historical Tank Database

There are several historical tanks recorded within 250m of the site boundaries, details of which are summarised below:

- Unspecified Tank (1932, 1940) – 99m W
- Gas Compound (1989, 1993) – 152m S
- Unspecified Tank (1898) – 157m W
- Unspecified Tank (1908) – 165m W
- Unspecified Tank (1969, 1976) – 204m NW

3.6.13 Historical Energy Features

There are several recorded historical energy features within 250m of the site boundaries, details of which are summarised below:

- Electricity Substation (1952, 1976, 1980, 1982, 1984, 1989) – 3m NW
- Electricity Substation (1969, 1976, 1980, 1993) – 58m E
- Electricity Substation (1969, 1976, 1980, 1982, 1984, 1989) – 66m NW
- Gas Compound (1989, 1993) – 152m SW
- Electricity Substation (1952) – 189m S
- Gas Governor (1989, 1996) – 214m W
- Electricity Substation (1968, 1981, 1996) – 231m W
- Electricity Substation (1969, 1976) – 232m W

3.7 HISTORICAL LAND USE ON SITE AND IN SURROUNDING AREA

The historical ordnance survey maps indicate the following historical land uses on site and in the surrounding area, and is summarised in Table 5.

Table 5 – Summary of Historical Land Use

Date	On Site	Off Site
1866	Site comprises open land.	Hampshire Farm located 50m N and various other farms 200-400m S and W. Station with railway line located 300m SW and Gas Works 400m S-SW. River flows adjacent to north eastern boundary then 100m & 150m W. Map incomplete.
1874	No significant change.	Westbourne village (residential houses, vicarage and grave yard) located from 100m N-NE.
1877	No significant change.	Corn Mill labelled 150m SE. Map incomplete.
1896	No significant change.	Construction of residential properties fronting Westbourne Road parallel to length of site 250m W. Brick Field located 250m NW. Watercress Bed labelled 250m NE.
1898	No significant change.	Watercress Bed labelled 100m E and Goods Shed adjacent to station 400m SW. Map Incomplete.
1907	Footpath labelled onsite.	Further construction of residential houses 250m W on New Brighton Road (previously labelled Westbourne Road) and Westbourne Avenue 50m W with private gardens adjacent to western boundary in southern portion of the site. Brick Works and Kiln labelled 250m NW and Laundry labelled 200m W. Map incomplete.
1914	No significant change.	No significant change.
1932	No significant change.	Allotments labelled 350m W and further construction of residential properties adjacent to western boundary and up to 300m W. Brick Works, Gas Works and Corn Mill no longer labelled.
1942	No significant change.	Construction of a possible commercial building 10m NW and further construction north of existing residential properties 0-300m W.
1952	No significant change.	Further construction of residential properties fronting New Brighton Road and Westbourne Avenue, plus Lewis Road and Ward Crescent on former Brick Works site 250m NW.
1963	No significant change.	Commercial building no longer present 10m NW and construction of an unknown building adjacent to northern-most section of western boundary. Two residential properties constructed fronting Westbourne Road 200m W of northern-most portion of site with Well labelled 50m W of these.
1975	No significant change.	Further construction of residential properties from southern portion of western boundary to 500m W and S.
1980	No significant change.	Building adjacent to northern-most point of site labelled Electricity Sub Station, plus second substation labelled 60m NW. Two Hoppers and Silo associated with Hampshire Farm from 30m N.
1981	No significant change.	Works labelled 240m E. Electricity substation labelled 250m SE.
1989	No significant change.	Construction of A27 road adjacent to southern boundary. Electricity Sub Station located 90m NW.
1991	No significant change.	Construction of residential properties from northern half of western boundary to 200m W. Construction of more commercial buildings associated with Hampshire Farm 20m N and further construction of residential properties in Westbourne, from 20m N-NE.
2002, 2010 and 2014	No significant change.	No significant change.

3.8 SENSITIVE LAND USE

The site lies within a Nitrate Vulnerable Zone. There is one recorded sensitive land use within 250m of the site boundaries, details of which are summarised below:

- Brook Meadow Local Nature Reserve – 222m S

3.9 POTENTIAL AREAS OF CONCERN

No potential areas of concern have been identified on site.

4.0 PRELIMINARY RISK ASSESSMENT

4.1.1 Identification of Critical Receptors

Based on future commercial land use, the potentially sensitive receptors are considered to be:

- Residential Human Health: Future occupants onsite
- Residential Human Health: Current occupants offsite
- Groundwater: Secondary A Aquifer
- Surface Water: River Ems
- Onsite workers*

*The risks to onsite workers can be minimised by following appropriate health and safety guidance on site (i.e. wearing protective clothing and washing).

4.1.2 Identification of Contaminant Sources

The list of potential sources of contamination on site and in the surrounding area are summarised in Table 6.

Table 6 – Identification of Potential Sources of Contamination

Type of Land Use	Potential Source	Potential Contaminants
Onsite source	Potential made ground and potentially infilled land	Hydrocarbons (TPH, BTEX, PAH), Heavy Metals, inorganics, asbestos, ground gas
Offsite source	Active and inactive industrial land uses, electricity sub stations potentially infilled land and potential historical made ground	Hydrocarbons (TPH, BTEX, PAH), Heavy Metals, inorganics, ground gas, PCBs

The potential contaminants of PCBs arising from the identified electricity substation located 108m north east have been discounted as PCBs are not considered to be sufficiently mobile or soluble⁷.

Human Health Pathways

The potential human health exposure pathways, based on the Agency Soil Science Report SR3⁸, for a residential receptor are indicated in Table 7.

⁷ Department of the Environment, 1996, Industry Profile: Engineering works. P.14 Sect 3.2.1

⁸ Environment Agency, August 2008, Updated technical background to the CLEA model, Science Report - SC050021/SR3

Table 7 – Identification of Potentially Active Human Health Exposure Pathways

Potential Pathway	Active/ Inactive	Notes
Ingestion of fruit/home-grown produce	Active	Qualitative Risk Assessment required
Ingestion of soil and dusts	Active	Qualitative Risk Assessment required
Dermal contact with soils and dust	Active	Qualitative Risk Assessment required
Inhalation of dusts	Active	Qualitative Risk Assessment required
Inhalation of organic vapours (generated by shallow soils) in external areas or inside buildings	Active	Qualitative Risk Assessment required
Inhalation of organic vapours generated by dissolved phase groundwater migrating offsite to neighbouring residential properties	Active	Qualitative Risk Assessment required
Inhalation of organic vapours generated by dissolved phase groundwater migrating onto site from surrounding offsite sources	Active	Qualitative Risk Assessment required
Contaminants from site entering groundwater and migrating into public water abstraction borehole for human consumption	Inactive	No water abstraction points within 250m – no further assessment required

Controlled Waters Pathways

The potentially active controlled waters migration pathways are indicated in Table 8.

Table 8 – Identification of Potentially Active Controlled Water Pathways

Potential Pathway	Active/ Inactive	Notes
Impacted soils leaching to groundwater within Secondary A Aquifer	Active	Qualitative Risk Assessment required
Impacted soils leaching to groundwater and migration to adjacent surface water	Active	Qualitative Risk Assessment required

Ground Gas Pathways

The potentially active migration pathways for ground gas are indicated in Table 9.

Table 9 – Identification of Potentially Active Ground Gas Pathways

Potential Pathway	Active/ Inactive	Notes
Ground gas generated from current/historical landfills within 250m radius	Inactive	Qualitative Risk Assessment required
Ground gas generated from current/ historical buried land within 250m radius	Active	Qualitative Risk Assessment required

4.1.3 Qualitative Risk Assessment

To assess the potential for risk, the Source → Pathway → Receptor relationships have been evaluated to determine whether there are potentially active pollutant linkages between sources and receptors. It is only when there is an active pollutant linkage, can there be a potential risk to a receptor from a source via a particular pathway. Each active pathway has been assigned a qualitative assessment as to the level of risk as explained in Table 10 as per R&D 66⁵. A summary of the relevant pollutant linkages based on a source-pathway-receptors analysis is provided in Table 11.

Table 10 – Qualitative Risk Classification Scheme

		CONSEQUENCE			
		Severe	Medium	Mild	Minor
PROBABILITY (Likelihood)	High likelihood	Very High Risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table 11 – Summary of Potentially Active Source-Pathway-Target Assessment

Sources	Potential Pathway	Potential Receptor	Risk Classification
Onsite Sources	Dermal Contact, Outdoor inhalation and Indoor inhalation	Human Health (Onsite Residential)	Moderate/Low Risk
Onsite Sources	Vapour inhalation from dissolved phase groundwater migrating from site to neighbouring properties	Human Health (Offsite Residential)	Low Risk
Onsite Sources	Impacted soil leaching to groundwater within Secondary A Aquifer	Controlled Waters (Groundwater)	Low Risk
Onsite Sources	Impacted soil leaching to groundwater and migration to surface water	Controlled Waters (Surface Water)	Moderate/Low Risk
Offsite Sources	Vapour inhalation from dissolved phase migration from offsite sources	Human Health (Offsite Residential)	Moderate/Low Risk
Ground gas generation from historically infilled land	Inhalation of organic vapours and ground gas	Human Health (Onsite Residential)	Moderate/Low Risk

5.0 INVESTIGATION WORKS

5.1 FIELD METHODS USED

The locations of the intrusive investigation are presented on Figure 3 and comprised the following:

- 4no. boreholes (BH1 to BH4) were drilled to 5.00m bgl depths, with monitoring well installations in each of them.
- 4no. dynamic probes (DP1 to DP4) were drilled to a depth of 5.00m bgl
- 4no. trial pits (TP1 to TP4) were dug with trial pit soakage tests performed on all.

Boreholes were drilled using a mechanically driven window sampler (Photo 4) to investigate the ground conditions. Dynamic probes were also completed to establish the engineering properties of the underlying geology. Trial pits were dug using a JCB 3CX to investigate ground conditions and perform soakage tests (Photos 5 and 6).

All of the fieldwork was completed under the supervision of a WDE site engineer. Logs for each of the intrusive locations are presented in Appendix D. Organic Vapour Concentrations (OVCs) were measured during the fieldwork on recovered soil samples using a Photo-ionisation Detector (PID).

Monitoring wells (BH1-BH4) were installed to 5.00m depth using 50mm diameter well material, gas valve and lockable cover, which were monitored for groundwater and ground gas levels (oxygen, carbon dioxide and methane).

5.2 RATIONALE ADOPTED FOR INTRUSIVE LOCATIONS

The intrusive locations are indicated on Figure 3, with rationale used for the selection of locations presented in Table 12.

Table 12 – Rationale for Exploratory Hole Locations

Sample Location	Use
BH1 – BH4, TP1 – TP4 and DP1 – DP4	Contamination, geotechnical, groundwater & ground gas
BH1 – BH4, TP1 – TP4 and DP1 – DP4	Contamination, geotechnical, groundwater & ground gas

5.3 CONSTRAINTS ON INTRUSIVE LOCATIONS

The presence of overgrown vegetation and areas of potential wildlife habitats restricted access to some area of the site, predominantly around the site boundary. The presence of an underground service (water pipe) prevented sampling along the north western boundary of the site.

5.4 FIELD RESULTS

5.4.1 Geology

A summary of the geology encountered during the intrusive investigation is summarised in Table 13 and are presented in full in logs for the boreholes in Appendix D.

Table 13 – Summary of Geology Proved Onsite

Description	Min – Max Depth (m bgl)	Average Depth (m bgl)
Topsoil	0.00 – 0.50	0.00 – 0.30
Gravelly Sandy Clay	0.30 – 2.80	0.30 – 1.90
Clay	1.40 – 5.00	1.90 – 5.00+

Topsoil: Dark brown sandy clay was encountered at the top of all intrusive locations, proven to a maximum depth of 0.50m bgl.

Gravelly Sandy Clay: Soft to very stiff brown very gravelly sandy clay was observed beneath the topsoil in all locations and proven to a maximum depth of 2.80m bgl. Gravels are fine to coarse subangular flints. Medium dense clayey fine to coarse subangular gravel with occasional cobbles was encountered beneath the topsoil in TP4 only.

Clay: Stiff brown and grey clay was observed at the base of all locations, becoming more grey with depth and proven to a maximum depth of 5.00m bgl.

5.4.2 Dynamic Probing Results

Dynamic Probe testing was carried out in four locations (DP1 to DP4) to a maximum depth of 5.00m bgl. A copy of the Dynamic Probe logs are provided in Appendix D and a summary of the calculated N-values are provided in Table 14.

Table 14 – Summary of Dynamic Probe Results

DP Depth (m)	DP1 Calculated N Value	DP2 Calculated N Value	DP3 Calculated N Value	DP4 Calculated N Value
0.0-0.3	3	3	3	3
0.3-0.6	6	8	3	5
0.6-0.9	3	19	3	15
0.9-1.2	9	16	18	26
1.2-1.5	22	3	31	19
1.5-1.8	25	6	15	16
1.8-2.1	14	4	4	5
2.1-2.4	3	6	6	6

2.4-2.7	3	6	5	6
2.7-3.0	4	5	8	6
3.0-3.3	5	6	10	5
3.3-3.6	6	6	10	5
3.6-3.9	6	6	10	6
3.9-4.2	8	7	10	6
4.2-4.5	8	8	9	6
4.5-4.8	9	9	8	8

5.4.3 Groundwater Encountered During the Intrusive Investigation

Groundwater was encountered between ~1.20 - 1.50m bgl in BH1, BH4 and TP4 during the intrusive investigation.

5.4.4 Contamination Observations

No grossly contaminative, visual or olfactory evidence of contamination was encountered during the intrusive investigation.

5.4.5 Potential Source of Ground Gas

There was no organic debris of high organic content identified during the investigation that would give rise to ground gas generation from on-site sources.

5.4.6 Groundwater Monitoring Results

A summary of the groundwater monitoring results conducted on 25th October 2017 are presented in Table 15.

Table 15 – Groundwater Field Monitoring Results – 25.10.17

Monitoring Well Reference	Product Thickness (mm)	Depth to Water (m bgl)	Depth to Base of Well (m bgl)	Comments
BH1	-	1.461	4.636	
BH2	-	-	5.000	Dry
BH3	-	-	5.000	Dry
BH4	-	1.178	4.821	

5.4.7 Ground gas monitoring results

A summary of the ground as monitoring results obtained on 25th October 2017 are presented in Table 16 and are presented in full in Appendix E.

Table 16 – Ground Gas Field Monitoring Results

Location Reference	O ₂ (%)	CO ₂ (%)	CH ₄ (%)	Atmospheric Pressure (mB)	Flow rate (ml/hr)
BH1	17.4	2.6	0.1	1021	-0.0
BH2	17.1	2.4	0.0	1021	-0.0
BH3	16.9	2.5	0.1	1021	+0.1
BH4	13.7	3.4	0.1	1021	-0.1

5.4.8 Permeability Tests

A summary of the field permeability results obtained on 25th October 2017 are presented in Table 17 and are presented in full in Appendix E. The trial pit permeability results are calculated in line with BRE 365 algorithms.

Table 17 – Permeability Field Results

Location	Test Type	No of Fills	Drainage (m/sec)	Comments
TP1	Trial Pit Soakage	1	$< 10^{-6}$	Poor permeability
TP2	Trial Pit Soakage	1	8.69×10^{-6}	Poor permeability
TP3	Trial Pit Soakage	1	9.64×10^{-6}	Poor permeability
TP4	Trial Pit Soakage	2	4.29×10^{-5} & 4.37×10^{-5}	Moderate Permeability

6.0 GROUND GAS ASSESSMENT

6.1 PUBLISHED GUIDANCE

A ground gas assessment has been undertaken to assess risks associated with carbon dioxide and methane to new buildings and their users by following the below relevant guidance

- Assessing risks posed by hazardous ground gases to buildings, CIRIA C665, 2007
- Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, NHBC, 2007
- The Building Regulations 2000, Approved Document C, Site Preparation and resistance to contaminants and moisture. 2004 Edition
- British Standard. BS8576.2013. Guidance on Investigations for Ground Gas

The 2007 CIRIA guidance calculates a gas screening value to identify a characteristic situation for the individual site, the methodology show in Table 18.

Table 18 – Summary of CIRIA 2007 Guidance

Characterisation Situation	Risk Classification	Gas Screening Value	Typical Factors	Protective Measure
1	Very Low	<0.07	Methane <1% or carbon dioxide <5%; otherwise increase to Situation 2	No special precautions
2	Low	<0.7	Air Flow rate <70l/hr; otherwise increase to Situation 3	Block and beam with 2,000g Cast insitu with 1,200g All joints and penetrations sealed
3	Moderate	<3.5	-	As above but with gas resistant membranes and passively ventilated or positive pressured sub-floor void
4	Moderate to High	<15	QRA recommended	As above but with oversite capping, in-ground venting layer and in ground wells or barriers
5 – 6	High to Very High	<70		Not suitable unless gas regime is reduced first and QRA completed

6.2 COMPARISON WITH SITE DATA

Taking a conservative viewpoint, the highest readings from the monitoring wells have been selected for the determination of the relevant gas screening values. If the readings were <0.01 a value of 0.01 is used in line with CIRIA, 2007 guidelines. A summary of gas screening calculations and the associated characterisation of the site are identified below in Table 19.

Table 19 – Summary of Gas Screening Values

Gas	Screening Value	Characterisation Situation
Methane (CH ₄)	$((0.1/100) \times 0.1) = 0.0001$	1 (Very Low)
Carbon Dioxide (CO ₂)	$((3.4/100) \times 0.1) = 0.0034$	1 (Very Low)

No source materials for the generation of ground gas have been identified during the ground investigation and the monitoring visit has not identified any concentrations of concern. It is therefore considered that further monitoring visits for ground gases are not required.

7.0 CONTAMINATION ASSESSMENT

7.1 ANALYTICAL LABORATORY TEST RESULTS

The results from the WDE laboratory analyses of the soil samples are presented in full in Appendix F. Below detection limit is abbreviated to BDL in all subsequent tables.

The Generic Assessment Criteria (GACs) that have been adopted are based on the Land Quality Management (LQM) Suitable for Use Levels (S4UL)⁹. These published values are available for residential with/without home grown produce, commercial, allotment and public open space land use scenarios. In the absence of any UK published value, the detection limits (DL) for free cyanide and MTBE have been adopted as the GAC. The C4SL for lead will be adopted in the absence of any published GAC. As it is proposed to reuse the subject site for residential purposes, residential with home grown produce GACs have been adopted as a conservative assumption.

Table 20 is a comparison with the adopted GACs compared against the minimum and maximum site concentrations.

Table 20 – Comparison of Soil Laboratory Results with Adopted GACs (mg/kg)

Contaminant of Concern	No. of Samples	GAC	Source	BH1.2	BH2.3	BH3.2	BH4.1	No. Samples > GAC	Samples Exceeded
				1.20	2.00	0.20	1.00		
Asbestos	4	DL	WDE	Absent	Absent	Absent	Absent	0	-
Total Phenols	4	280	LQM	BDL	BDL	BDL	BDL	0	-
Cyanide	4	DL	WDE	BDL	BDL	BDL	BDL	0	-
Naphthalene	4	2.3	LQM	BDL	BDL	BDL	BDL	0	-
Acenaphthylene	4	170	LQM	BDL	BDL	BDL	BDL	0	-
Acenaphthene	4	210	LQM	BDL	BDL	BDL	BDL	0	-
Fluorene	4	170	LQM	BDL	BDL	BDL	BDL	0	-
Phenanthrene	4	95	LQM	BDL	BDL	BDL	BDL	0	-
Anthracene	4	2400	LQM	BDL	BDL	BDL	BDL	0	-
Fluoranthene	4	280	LQM	BDL	BDL	BDL	BDL	0	-
Pyrene	4	620	LQM	0.36	BDL	BDL	BDL	0	-
Benzo(a)anthracene	4	7.2	LQM	0.32	BDL	BDL	BDL	0	-
Chrysene	4	15	LQM	0.21	BDL	BDL	BDL	0	-
Benzo(b)fluoranthene	4	2.6	LQM	0.19	BDL	BDL	BDL	0	-
Benzo(k)fluoranthene	4	77	LQM	0.26	BDL	BDL	BDL	0	-
Benzo(a)pyrene	4	2.2	LQM	0.16	BDL	BDL	BDL	0	-
Indeno(1,2,3-cd)pyrene	4	27	LQM	BDL	BDL	BDL	BDL	0	-
Dibenz(a,h)anthracene	4	0.24	LQM	BDL	BDL	BDL	BDL	0	-
Benzo(ghi)perylene	4	320	LQM	BDL	BDL	BDL	BDL	0	-
Arsenic	4	37	LQM	6.7	12	5.0	5.9	0	-
Boron	4	290	LQM	0.5	0.9	1.3	0.7	0	-
Cadmium	4	11	LQM	0.2	BDL	0.3	BDL	0	-
Chromium	4	910	LQM	31	35	27	36	0	-
Copper	4	2400	C4SL	17	24	17	14	0	-
Lead	4	210	LQM	19	16	27	16	0	-

⁹ LQM/CIEH 2014. The LQM/CIEH S4ULs for Human Health Risk Assessment.

Mercury	4	40	LQM	BDL	BDL	BDL	BDL	0	-
Nickel	4	180	LQM	20	34	16	22	0	-
Selenium	4	250	LQM	BDL	BDL	BDL	BDL	0	-
Zinc	4	3700	LQM	69	71	63	73	0	-
Benzene	4	0.087	LQM	BDL	BDL	BDL	BDL	0	-
Toluene	4	130	LQM	BDL	BDL	BDL	BDL	0	-
Ethylbenzene	4	47	LQM	BDL	BDL	BDL	BDL	0	-
Xylenes (sum)	4	56	LQM	BDL	BDL	BDL	BDL	0	-
MTBE	4	DL	WDE	BDL	BDL	BDL	BDL	0	-
TPH - Aliphatic >C5 - C6	4	42	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aliphatic >C6 - C8	4	100	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aliphatic >C8 - C10	4	27	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aliphatic >C10 - C12	4	130	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aliphatic >C12 - C16	4	1100	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aliphatic >C16 - C21	4	65000	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aliphatic >C21 - C35	4	65000	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aromatic >C5 - C7	4	70	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aromatic >C7 - C8	4	130	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aromatic >C8 - C10	4	34	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aromatic >C10 - C12	4	74	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aromatic >C12 - C16	4	140	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aromatic >C16 - C21	4	260	LQM	BDL	BDL	BDL	BDL	0	-
TPH - Aromatic >C21 - C35	4	1100	LQM	BDL	BDL	BDL	BDL	0	-

7.2 GROUNDWATER ANALYTICAL LABORATORY TEST RESULTS

The results from laboratory analysis of the soil groundwater samples are presented in full in Appendix F. Below detection limit is abbreviated to BDL in all subsequent tables.

In the UK there are two published values available for comparison with drinking water, namely UK Drinking Water Standards (UK DWS) and Environmental Quality Standards (EQS). Detection Limit (DL) is used where a standard has not been derived. World Health Guidance has been adopted for TPH fractions in the absence of any UK published target value.

A comparison of the site concentrations with the appropriate target value is presented in Table 21.

Table 21 – Comparison of Groundwater Results with Adopted Target Values (mg/l)

Contaminant of Concern	No. of Samples	GAC	Source	BH1	BH4	No. Samples > TV	Samples Exceeded
pH	2	6 to 8.5	UK EQS	7.2	7.2	0	
Total Phenols	2	0.0005	UK DWS	BDL	BDL	0	
Total Cyanide	2	0.05	UK EQS	BDL	BDL	0	
Naphthalene	2	0.0024	UK EQS	BDL	BDL	0	
Acenaphthylene	2	0.00001	UK DWS	BDL	BDL	0	
Acenaphthene	2	0.00001	UK DWS	BDL	BDL	0	
Fluorene	2	0.00001	UK DWS	BDL	BDL	0	
Phenanthrene	2	0.00001	UK DWS	BDL	BDL	0	
Anthracene	2	0.0001	UK EQS	BDL	BDL	0	

Fluoranthene	2	0.0001	UK EQS	BDL	BDL	0	
Pyrene	2	0.00001	UK DWS	BDL	BDL	0	
Benzo(a)anthracene	2	0.00001	UK DWS	BDL	BDL	0	
Chrysene	2	0.00001	UK DWS	BDL	BDL	0	
Benzo(b)fluoranthene	2	0.00003	UK EQS	BDL	BDL	0	
Benzo(k)fluoranthene	2	0.00003	UK EQS	BDL	BDL	0	
Benzo(a)pyrene	2	0.00001	UK DWS	BDL	BDL	0	
Indeno(1,2,3-cd)pyrene	2	0.000002	UK EQS	BDL	BDL	0	
Dibenz(a,h)anthracene	2	0.00001	UK DWS	BDL	BDL	0	
Benzo(ghi)perylene	2	0.000002	UK EQS	BDL	BDL	0	
Arsenic	2	0.01	UK DWS	0.00037	0.00029	0	
Boron	2	0.5	WHO	0.074	0.091	0	
Cadmium	2	0.005	UK DWS	0.00003	BDL	0	
Chromium	2	0.05	UK DWS	BDL	BDL	0	
Copper	2	2	UK DWS	0.0006	0.0006	0	
Lead	2	0.01	UK DWS	BDL	BDL	0	
Mercury	2	0.001	UK DWS	BDL	BDL	0	
Nickel	2	0.02	UK DWS	0.002	0.002	0	
Selenium	2	0.01	UK DWS	0.0007	0.0019	0	
Zinc	2	3	UK DWS	0.0038	0.0006	0	
Benzene	2	0.001	UK DWS	BDL	BDL	0	
Toluene	2	0.05	UK EQS	BDL	BDL	0	
Ethylbenzene	2	0.02	UK EQS	BDL	BDL	0	
Xylenes (sum)	2	0.03	UK EQS	BDL	BDL	0	
MTBE	2	DL	WDE	BDL	BDL	0	
TPH - Aliphatic (>C5- C6)	2	0.01	UK DWS	BDL	BDL	0	
TPH - Aliphatic (>C6- C8)	2	0.01	UK DWS	BDL	BDL	0	
TPH - Aliphatic (>C8- C10)	2	0.3	WHO	BDL	BDL	0	
TPH - Aliphatic (>C10 - C12)	2	0.3	WHO	BDL	BDL	0	
TPH - Aliphatic (>C12 - C16)	2	0.3	WHO	BDL	BDL	0	
TPH - Aliphatic (>C16 - C21)	2	0.01	UK DWS	BDL	BDL	0	
TPH - Aliphatic (>C21 - C34)	2	0.01	UK DWS	BDL	BDL	0	
TPH - Aromatic (>C5 – C7)	2	0.01	UK DWS	BDL	BDL	0	
TPH - Aromatic (>C7 – C8)	2	0.01	UK DWS	BDL	BDL	0	
TPH - Aromatic (>C8 –10)	2	0.3	WHO	0.130	BDL	0	
TPH - Aromatic (>C10 – C12)	2	0.1	WHO	BDL	BDL	0	
TPH - Aromatic (>C12 – C16)	2	0.1	WHO	BDL	BDL	0	
TPH - Aromatic (>C16 - C21)	2	0.09	WHO	BDL	BDL	0	
TPH - Aromatic (>C21 - C35)	2	0.01	UK DWS	BDL	BDL	0	

7.3 WASTE CLASSIFICATION

A summary of the waste classification for the materials is provided in Appendix F, which includes a Waste Checker and WAC test on the encountered materials. Results from the Waste Checker indicate that it is likely the natural materials are below the hazardous waste threshold. The WAC results presented in Table 22 indicate that the materials fall within the inert criteria for offsite disposal.

Table 22 – Waste Acceptance Criteria Results

Contaminant of Concern	Landfill Waste Acceptance Criteria Limits			BH1.1	BH3.2
	Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous landfill	Hazardous Waste Landfill	0.20m (bgl)	0.80m (bgl)
TOC (%)	3%	5%	6%	1.0	0.7
Loss on Ignition (%)	-	-	10%	2.8	2.4
BTEX (µg/kg)	6000	-	-	< 10	BDL
Sum of PCBs (mg/kg)	1	-	-	BDL	BDL
Mineral Oil (mg/kg)	500	-	-	BDL	BDL
Total PAH (WAC-17) (mg/kg)	100	-	-	BDL	BDL
pH (units)	-	>6	-	6.5	6.8
Acid Neutralisation Capacity (mol/kg)	-	-	-	-2.3	-1.1
Arsenic	0.5	2	25	BDL	BDL
Barium	20	100	300	0.0437	0.0657
Cadmium	0.04	1	5	BDL	BDL
Chromium	0.5	10	70	0.012	0.023
Copper	2	50	100	0.065	0.045
Mercury	0.01	0.2	2	BDL	BDL
Molybdenum	0.5	10	30	BDL	BDL
Nickel	0.4	10	40	0.014	0.016
Lead	0.5	10	50	BDL	0.018
Antimony	0.06	0.7	5	BDL	BDL
Selenium	0.1	0.5	7	BDL	BDL
Zinc	4	50	200	0.028	0.040
Chloride	800	4000	25000	7.7	6.8
Fluoride	10	150	500	3.3	1.8
Sulphate	1000	20000	50000	22	20
TDS	4000	60000	100000	80	84
Phenol Index (Monhydric Phenols)	1	-	-	BDL	BDL
DOC	500	800	1000	34.5	32.4

7.4 CONCLUSIONS ON CONTAMINATION

None of the soil or groundwater samples exceeded the adopted target concentrations. There is not therefore considered to be a requirement for any remedial works or additional protective measures required for the proposed redevelopment.

The naturally occurring materials can be retained for reuse on the new development in areas of soft standing, with the excess removed as inert materials.

It is recommended that WDE be consulted should any unexpected contamination be encountered during the redevelopment as part of the Discovery Strategy.

A revised *source-pathway-receptor* assessment is presented in Table 23.

Table 23 – Summary of Revised Source-Pathway-Receptor Assessment

Sources	Potential Pathway	Potential Receptor	Risk Classification
Onsite Sources	Dermal Contact, Outdoor inhalation and Indoor inhalation	Human Health (Onsite Commercial)	Low
Onsite Sources	Vapour inhalation from dissolved phase groundwater migrating from site to neighbouring properties	Human Health (Offsite Residential)	Low
Onsite Sources	Impacted soil leaching to groundwater within Principal Aquifer	Controlled Waters (Groundwater)	Low
Onsite Sources	Impacted soil leaching to groundwater and migration to surface water	Controlled Waters (Surface Water)	Low
Offsite Sources	Vapour inhalation from dissolved phase migration from offsite sources	Human Health (Onsite Commercial)	Low
Ground gas generation from historically infilled land	Inhalation of organic vapours and ground gas	Human Health (Onsite Commercial)	Low

8.0 GEOTECHNICAL ASSESSMENT

8.1 FIELD TESTING RESULTS

An appraisal of the dynamic probing results are summarised below in Table 24. The full results and graphs plotting the N-values are presented in Appendix G.

Table 24 – Field Geotechnical Results

Description	Av Depth (m)	N Value	Cu kPa
Topsoil	0.00 – 0.30	3	-
Soft to very stiff Gravelly Clay	0.30-1.90	3 - 31	15.4 – 159.3
Stiff Clay	1.90 – 5.00+	3 - 14	15.4 – 72.0

8.2 GEOTECHNICAL LABORATORY TESTING

Moisture content, atterberg limits, shear strength and Particle size distribution laboratory testing were carried out on representative soil samples collected during the intrusive investigation. A copy of the test results are presented in Appendix G and are summarised in Table 25.

Table 25 – Summary of Geotechnical Properties

Description	Min -Max Depth To-From (m)	Moisture Content (%)	Plasticity Index (%)	Shear Strength (kPa)	PSD's (%)		
					Gravel	Sand	Silt and Clay
Gravelly Sandy Clay	0.30 – 1.90	-	-	109	75	6.80	18.30
Clay	1.90 – 5.00+	26 - 30	43 - 48	78 - 126	-	-	-

Results from the testing indicate that the clay returned moderate plasticity values. The plasticity index (30 – 36%) indicates there is a high volume change potential of the clay (shrink/swell).

A shear strength value of 109 kPa indicates the gravelly sandy clay is stiff. Shear strength values of between 78 – 126 kPa indicates the deeper clay from 1.90m is stiff.

8.3 CONCRETE DESIGN PARAMETERS

A summary of the sulphate, pH and corresponding BRE concrete in aggressive ground parameters¹⁰ for concrete design are presented in Table 26.

¹⁰ BRE 2005. Concrete in Aggressive Ground. Special Digest 1.

Table 26 – Summary of BRE Concrete in Aggressive Ground Parameters

Location	Concrete Parameters
pH (pH Units)	3.8 to 6.5
Water Soluble Sulphate as (2:1 Leachate Equivalent) (mg/l)	4.5 to 50
ACEC Classification	DS-1
Design Sulphate Class	AC-4z

Concentrations have been analysed in line with BRE Special Digest 1: 2005¹¹

8.4 EXCAVATIONS, GROUNDWATER CONTROL AND SERVICES

Groundwater was encountered at ~1.2m bgl in BH4 and special provisions may be required for dewatering of excavations within the upper 2m of the soil profile due to the high level of the groundwater onsite. Consideration should be made for the potential of a rising water table due to the area being the floodplain for the nearby River Ems.

8.5 PRELIMINARY ROAD DESIGN PARAMETERS

CBR values obtained from the dynamic probes with the upper 1m outside of the footprint of the proposed development can be calculated using the following equation:

$$\log \text{CBR} = 2.628 - 1.273 \log (\text{DCP})^{11}$$

Table 27 – Summary of CBR Values in the Upper 1m

Location	Proposed Location	CBR %
DP1	Road	1.21 – 4.89
DP2	Road	1.21 – 14.38
DP3	Building	1.21 – 4.89
DP4	Driveway	1.21 – 11.82

Laboratory CBR testing of the clay material was undertaken, results of which are summarised below in Table 28. A copy of the laboratory test results are available in Appendix G

Table 28 – Summary of Laboratory CBR Values (%)

Sample Ref	Depth (m bgl)	Proposed Location	CBR Value (%)	Comments
BH2.2	1.00 – 2.00	Road	5.7 – 7.2	-

¹¹ Building Research Establishment (BRE) Special Digest 1: 2005 Third Edition, Concrete in aggressive Ground"

8.6 PRELIMINARY FLOOR DESIGN

It is advised that a suspended block and beam floor design is adopted with passive air vents to remove any build-up of residual ground/gas or vapours and to allow for shrink/swell movements. There is no requirement for the enhancement of the membrane above the standard specification.

8.7 SOAKAGE POTENTIAL

Trial pit soakage tests have been performed on the encountered geology within the upper 1.5m of the soil profile and indicate poor permeability in TP1 to TP3 (8.69×10^{-6} to $< 10^{-6}$ m/sec). These areas of the site are not considered suitable for the discharge of surface water.

Moderate permeability was encountered in TP4 (4.29×10^{-5} m/sec) therefore, the ground in this area of the site may be suitable to facilitate discharge of surface water.

8.8 PRELIMINARY FOUNDATION DESIGN

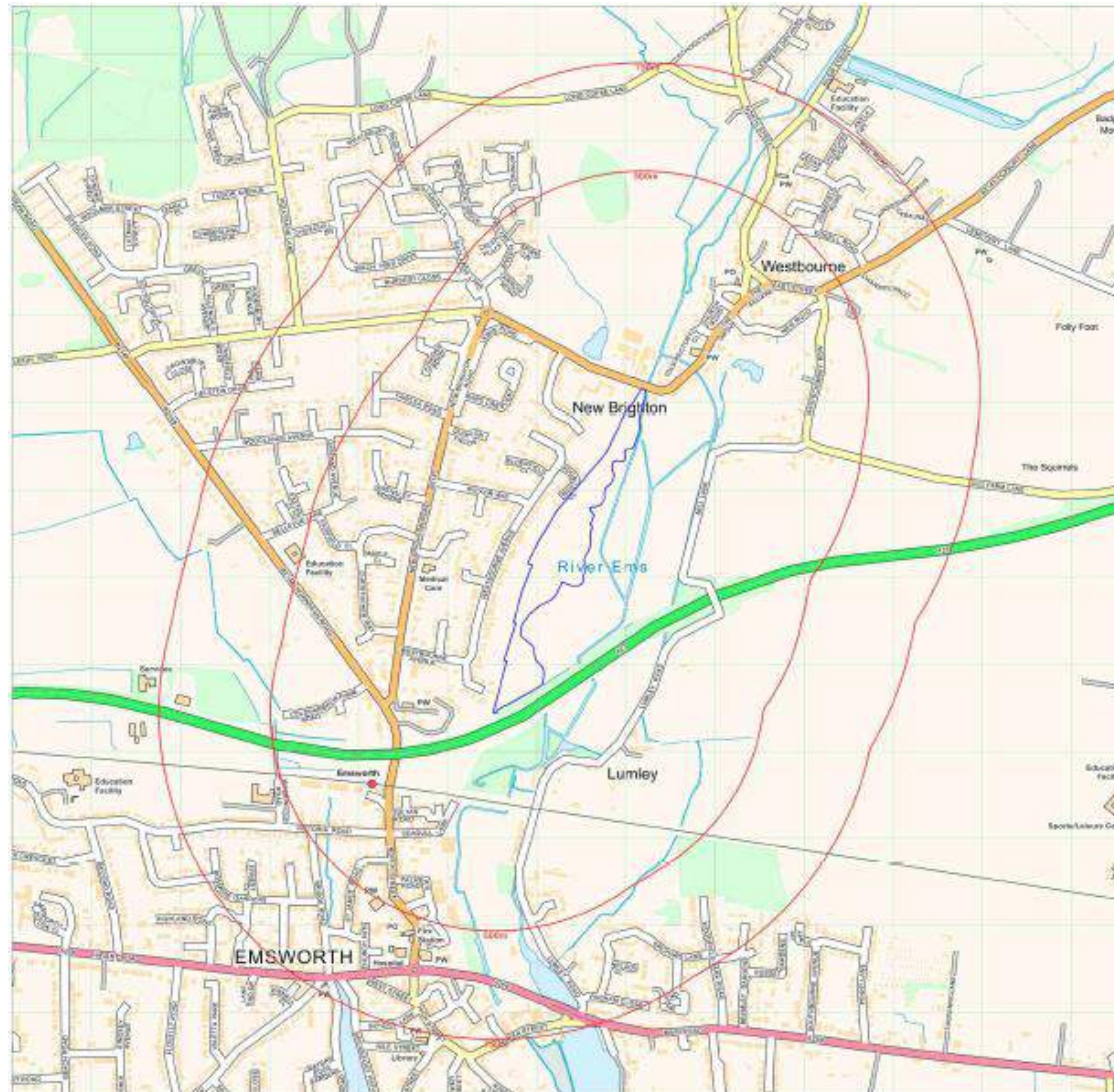
Given the identified ground conditions, traditional strip foundations may be a viable option for two to three storey buildings. Excavations for foundations will need to extend 300mm into the natural sandy gravelly clay materials to a minimum depth of 1.00m bgl. An allowable bearing capacity of 150 to 200kN/m² can be adopted for the stiff gravelly clay materials.

9.0 RECOMMENDATIONS

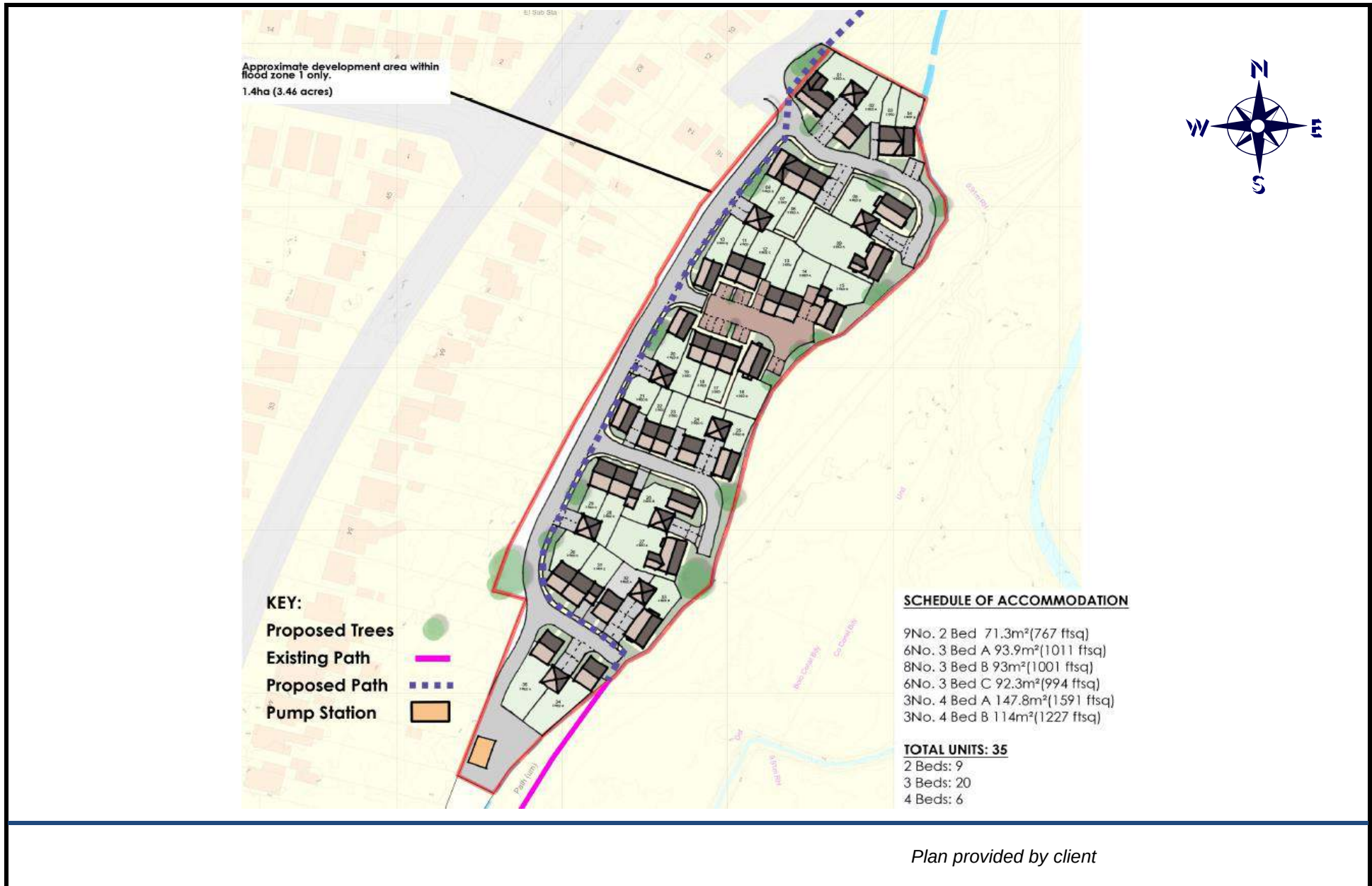
WDE recommends that the following actions are undertaken as part of the redevelopment programme:

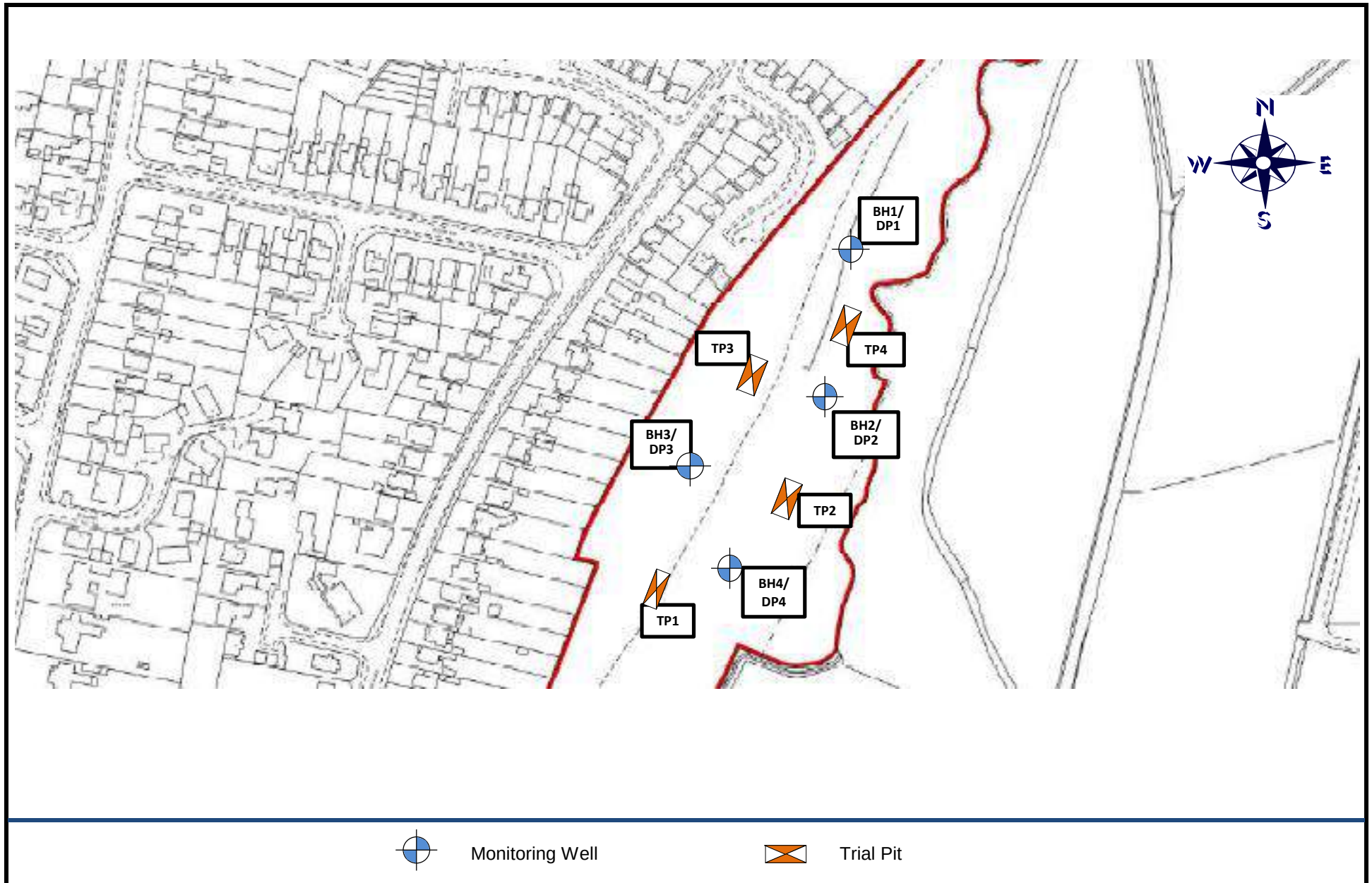
- Additional long term groundwater monitoring should be conducted to determine the potential fluctuations in the water table on site.

FIGURES



Site Location Plan obtained from Groundsure Report WDE-4345131





APPENDIX A

Limitations and Exceptions

LIMITATIONS AND EXCEPTIONS OF ASSESSMENT

Hampshire Homes (the client) has requested that a Geo Site Assessment be performed for Land off Westwood Close, Emsworth, PO10 7QL to provide information to permit formulation of an opinion as to the potential for risks to human health & controlled waters posed by identified substances of concern.

The Geo Site Assessment was conducted and this report has been prepared for the sole use and reliance of the Client. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WDE Consultancy Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this Geo Site Assessment report are based on information obtained from a variety of sources as detailed within this report, and which WDE Consultancy Limited believes are reliable. Nevertheless, WDE Consultancy limited cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The report represents the findings and opinions of experienced geo-environmental consultants. WDE Consultancy Limited does not provide legal advice and the advice of lawyers may also be required.

The Client is advised that the conditions stated within reports supplied to WDE Consultancy limited are subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance and may subsequently have become observable.

It is possible that WDE Consultancy's research, while fully appropriate for an Geo Site Assessment, failed to indicate the existence of important information sources. Assuming such sources actually exist, their information could not have been considered in the formulation of WDE Consultancy's findings and opinions.

Certain indicators or evidence of hazardous substances may have been outside the very limited portion of the subsurface investigated or monitored, latent at the time of this work or only partially intercepted by the works and thus their full significance could not have been appreciated. Groundwater levels are particularly susceptible to variations due to seasonal or other effects. Any comments on groundwater conditions are based on observations and analyses made by third parties at the time the site work was carried out. Accordingly, it is possible that WDE Consultancy's work, whilst fully appropriate for an Geo Site Assessment failed to indicate the presence or significance of hazardous substances. Assuming such materials present a hazard, their presence could not have been considered in the formulation of WDE Consultancy's findings and opinions. The subsurface geological profiles and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

Any interpretation of the results of the Geo Site Assessment have been based on the proposed site usage and the findings are not valid should the proposed land use and/or the regulatory regime/guidance change. Where interpretation is based on public domain guidance/protocols/models/software/code, WDE Consultancy Limited is not liable for errors in the guidance/protocols/models/software/code.

WDE Consultancy Limited believes that providing information about limitations is essential to help the client identify and thereby manage their risks. These risks can be mitigated, but they cannot be eliminated, through additional research. WDE Consultancy Limited will on request, advise the client of the additional research opportunities available, their impact on risk, and their cost.

In preparing this report, it has been assumed that all past and present occupants have provided all relevant and other information, especially relating to known or potential hazards. This report is not required to identify insufficiencies or mistakes in the information provided by the user/owner or from any other source, but has sought to compensate for these where obvious in the light of other information.

The work is also subject to WDE Consultancy's standard terms and conditions.

APPENDIX B

Site Photos

Photo 1: Access gained via Westbourne Road.



Photo 2: Open land across the site. Looking from the north.



Photo 3: Semi-mature trees predominantly around site boundary.



Photo 4: Window Sampling at BH2.



Photo 5: JCB used to excavate trial pits.



Photo 6: BRE 365 soakage tests performed



APPENDIX C

Environmental Database Information



WDE Consulting Ltd
62a, WESTERN ROAD,
TRING, HP23 4BB

Groundsure Reference: WDE-4345131

Your Reference: 17-515

Report Date 13 Oct 2017

Report Delivery Method: Email - pdf

Enviro Insight

Address: WESTWOOD CLOSE, EMSWORTH, PO10 7QL

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on (T) 08444 159 000 quoting the above report reference number.

Yours faithfully,

WDE Consulting

Enc.
Groundsure Enviroinsight

Address: WESTWOOD CLOSE, EMSWORTH, PO10 7QL

Date: 13 Oct 2017

Reference: WDE-4345131

Client: WDE Consulting Ltd

NW

N

NE

W

E



SW

S

SE

Aerial Photograph Capture date: 20-Aug-2013

Grid Reference: 475256,106859

Site Size: 4.93ha

Report Reference: WDE-4345131

Client Reference: 17-515

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	1	0	54	89
1.2 Additional Information – Historical Tank Database	0	0	9	22
1.3 Additional Information – Historical Energy Features Database	0	6	20	48
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	5
1.6 Potentially Infilled Land	1	0	39	18

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	2
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	2	3	11
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	1
2.2 Records of COMAH and NIHHS sites	0	0	0	1
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	2	6	2
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
---	---------	-------	--------	---------	----------	-----------

3.1 Landfill Sites

3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	1	0	1	1
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0

3.2 Landfill and Other Waste Sites Findings

3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
-----------------------------	---------	-------	--------	---------

4.1 Current Industrial Sites Data	0	4	22	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	1
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology

5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?

No

5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?

Yes

5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.

Section 6: Hydrogeology and Hydrology

0-500m

6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?

Yes

6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?

Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	9
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	1
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	7
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	2	0	1	2	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

0-500m

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	Yes	No
6.10 Detailed River Network entries within 500m of the site	0	6	30	18	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Environment Agency Zone 2 floodplains within 250m of the study site?	Yes					
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Yes					
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	High					
7.4 Are there any Flood Defences within 250m of the study site?	Yes					
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No					
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No					
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface					
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Moderate					

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	1	2
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	1	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	1	0
8.5 Records of Ramsar sites	0	0	0	0	1	0
8.6 Records of Ancient Woodlands	0	0	0	0	1	16
8.7 Records of Local Nature Reserves (LNR)	0	0	2	2	0	2
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	1

Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	1	0
8.11 Records of National Parks	0	0	0	0	1	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	1	0	0	1	1	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Moderate
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Moderate
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	Yes
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

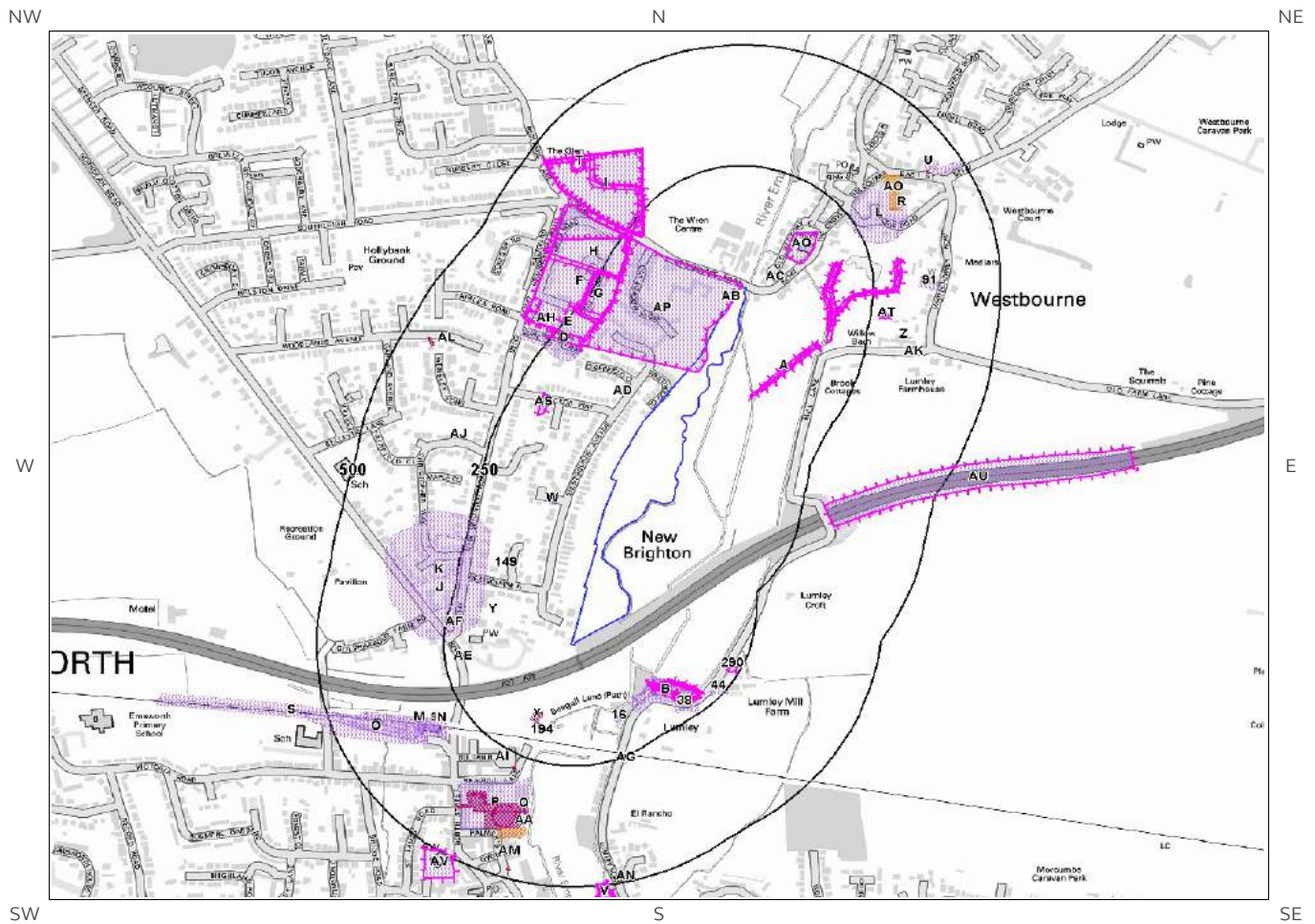
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



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Historical 1:10,000 and 1:10,560 scale mapping



Site Outline



Industrial Land Use



Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping



Search Buffers (m)



Energy Features



Petrol Stations



Tanks



Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 144

ID	Distance [m]	Direction	Use	Date
1AP	0	On Site	Brick Field	1895
2A	83	E	Watercress Bed	1931
3A	83	E	Watercress Bed	1931
4A	92	SE	Watercress Bed	1898
5A	92	SE	Watercress Bed	1898
6AQ	102	NE	Grave Yard	1877
7B	134	SE	Corn Mill	1877
8B	136	SE	Corn Mill	1914
9B	139	SE	Corn Mill	1896
10B	144	SE	Corn Mill	1907
11B	149	SE	Mill Pond	1898
12B	149	SE	Corn Mill	1898
13B	150	SE	Mill Pond	1896
14B	152	SE	Mill Pond	1914
15B	152	SE	Corn Mill	1896
16	165	SE	Corn Mill	1896
17C	176	E	Watercress Beds	1931
18C	176	E	Watercress Beds	1931
19AS	178	NW	Unspecified Pit	1914
20C	183	E	Watercress Bed	1898
21C	183	E	Watercress Bed	1898
22D	185	NW	Laundry	1938
23D	185	NW	Laundry	1907
24K	188	W	Nursery	1932
25D	188	NW	Laundry	1914
26D	188	NW	Laundry	1932
27D	189	NW	Laundry	1962
28D	192	NW	Laundry	1931
29D	192	NW	Laundry	1931
30F	193	NW	Brick Works	1914
31E	194	NW	Brick Field	1898
32E	194	NW	Brick Field	1898
33F	195	NW	Brick Works	1907
34D	195	NW	Laundry	1931

35G	197	NW	Unspecified Heap	1914
36G	198	NW	Unspecified Ground Workings	1907
37H	209	NW	Brick Field	1896
38	210	SE	Malthouse	1898
39H	216	NW	Brick Field	1895
40I	219	NW	Brick Works	1914
41I	219	NW	Brick Works	1914
42I	220	NW	Brick Works	1910
43I	221	NW	Brick Works	1907
44	223	SE	Malthouse	1896
45I	238	NW	Unspecified Pit	1914
46I	238	NW	Unspecified Pit	1914
47I	240	NW	Unspecified Pit	1910
48J	240	W	Nursery	1938
49J	242	W	Nursery	1931
50I	242	NW	Unspecified Ground Workings	1907
51L	243	NE	Smithy	1895
52K	243	W	Nursery	1973
53K	244	W	Nursery	1963
54K	247	W	Nursery	1931
55K	247	W	Nursery	1931
56AG	252	S	Pumping Station	1990
57H	261	NW	Unspecified Kiln	1907
58M	286	SW	Railway Station	1931
59P	288	S	Gas Works	1907
60AU	291	E	Cuttings	1990
61L	291	NE	Smithy	1895
62M	293	SW	Railway Station	1898
63M	294	SW	Railway Station	1896
64N	295	SW	Railway Building	1896
65N	302	SW	Railway Station	1896
66M	305	SW	Railway Station	1866
67N	307	SW	Railway Building	1907
68O	311	SW	Railway Sidings	1963
69M	311	SW	Railway Station	1963
70M	311	SW	Railway Station	1973
71M	311	SW	Railway Station	1914
72M	312	SW	Railway Station	1907
73M	313	SW	Railway Station	1932
74M	314	SW	Railway Station	1942
75M	314	SW	Railway Station	1931
76O	326	SW	Railway Sidings	1914
77M	326	SW	Railway Buildings	1914
78M	328	SW	Railway Station	1991

79M	331	SW	Goods Shed	1898
80O	332	SW	Railway Sidings	1896
81M	332	SW	Goods Shed	1896
82M	334	SW	Railway Building	1973
83M	335	SW	Railway Building	1931
84M	335	SW	Railway Sidings	1866
85M	335	SW	Railway Building	1866
86M	337	SW	Railway Building	1932
87P	338	S	Gas Works	1898
88O	338	SW	Railway Sidings	1896
89O	338	SW	Railway Sidings	1907
90M	338	SW	Railway Building	1907
91	338	E	Police Station	1877
92P	339	S	Gas Works	1896
93O	340	SW	Railway Sidings	1898
94M	340	SW	Railway Building	1963
95P	341	S	Gas Works	1914
96P	341	S	Gas Works	1896
97Q	342	S	Gasometer	1898
98R	344	NE	Smithy	1907
99Q	345	S	Unspecified Tank	1942
100Q	345	S	Gasometer	1896
101R	345	NE	Smithy	1898
102R	345	NE	Smithy	1898
103Q	345	S	Gasometer	1932
104Q	345	S	Gasometer	1914
105Q	345	S	Gasometer	1896
106S	347	SW	Railway Sidings	1942
107S	347	SW	Railway Sidings	1931
108P	348	SW	Gas Works	1866
109Q	350	S	Gasometer	1907
110S	351	SW	Railway Sidings	1931
111P	354	SW	Gasometer	1898
112P	355	SW	Unspecified Tank	1896
113P	355	SW	Unspecified Tank	1896
114S	357	SW	Railway Sidings	1932
115P	357	S	Unspecified Tank	1991
116P	357	S	Unspecified Tank	1973
117P	357	S	Unspecified Tank	1963
118P	358	SW	Gasometer	1866
119O	359	SW	Railway Buildings	1973
120O	359	SW	Railway Buildings	1991
121M	362	SW	Unspecified Tank	1866
122P	363	S	Gasometer	1914
123P	363	SW	Gasometer	1907
124P	369	S	Unspecified Tank	1942

125T	395	NW	Refuse Heap	1931
126T	395	NW	Refuse Heap	1931
127T	396	NW	Refuse Heap	1931
128T	398	NW	Gravel Pit	1938
129O	418	SW	Railway Building	1914
130U	424	NE	Police Station	1962
131U	426	NE	Police Station	1973
132U	426	NE	Police Station	1990
133U	439	NE	Smithy	1875
134AV	495	SW	Grave Yard	1866
135V	496	S	Mill Pond	1962
136V	497	S	Mill Pond	1914
137V	497	S	Mill Pond	1896
138V	497	S	Mill Pond	1932
139V	498	S	Mill Pond	1931
140V	498	S	Mill Pond	1898
141V	498	S	Mill Pond	1931
142V	498	S	Mill Pond	1907
143V	498	S	Mill Pond	1942
144V	498	S	Mill Pond	1896

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary:

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ID	Distance (m)	Direction	Use	Date
145W	99	W	Unspecified Tank	1940
146W	99	W	Unspecified Tank	1932
147X	152	SW	Gas Compound	1993
148X	154	S	Gas Compound	1989
149	157	W	Unspecified Tank	1898
150Y	165	W	Unspecified Tank	1908
151Y	165	W	Unspecified Tank	1908
152D	204	NW	Unspecified Tank	1969
153D	205	NW	Unspecified Tank	1976
154Z	319	E	Unspecified Tank	1980
155Z	330	E	Unspecified Tank	1980
156P	342	S	Gas Works	1908
157P	342	S	Gas Works	1897
158P	342	S	Gas Works	1898
159P	344	S	Gas Works	1951

160Q	347	S	Gasometer	1897
161Q	347	S	Gasometer	1908
162P	348	SW	Gas Works	1869
163Q	348	S	Unspecified Tank	1932
164Q	348	S	Gasometer	1898
165P	355	S	Gas Holder	1968
166P	356	S	Gasholder	1980
167P	356	S	Gasholder	1989
168P	356	S	Gasholder	1996
169P	356	SW	Gasometer	1869
170P	357	SW	Gasometer	1897
171P	357	SW	Gasometer	1898
172P	362	SW	Gasometer	1908
173AA	380	S	Unspecified Tank	1989
174AA	380	S	Unspecified Tank	1993
175AM	449	S	Unspecified Tank	1968

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary:

74

ID	Distance (m)	Direction	Use	Date
176AB	3	NW	Electricity Substation	1976
177AB	4	NW	Electricity Substation	1952
178AB	5	NW	Electricity Substation	1980
179AB	5	NW	Electricity Substation	1989
180AB	5	NW	Electricity Substation	1982
181AB	5	NW	Electricity Substation	1984
182AC	58	E	Electricity Substation	1993
183AC	64	NE	Electricity Substation	1980
184AC	64	NE	Electricity Substation	1969
185AC	64	NE	Electricity Substation	1976
186AD	66	NW	Electricity Substation	1980
187AD	66	NW	Electricity Substation	1989
188AD	66	NW	Electricity Substation	1969
189AD	66	NW	Electricity Substation	1982
190AD	66	NW	Electricity Substation	1984
191AD	66	NW	Electricity Substation	1976
192X	152	SW	Gas Compound	1993
193X	154	S	Gas Compound	1989
194	189	S	Electricity Substation	1952

195AE	214	W	Gas Governor	1996
196AE	215	W	Gas Governor	1989
197AF	231	W	Electricity Substation	1968
198AF	232	W	Electricity Substation	1981
199AF	233	W	Electricity Substation	1996
200E	249	NW	Electricity Substation	1969
201E	249	NW	Electricity Substation	1976
202AG	252	S	Electricity Substation	1993
203AI	275	SW	Electricity Substation	1996
204AH	276	NW	Electricity Substation	1980
205AH	276	NW	Electricity Substation	1989
206AH	276	NW	Electricity Substation	1982
207AH	276	NW	Electricity Substation	1984
208AI	277	SW	Electricity Substation	1980
209AI	277	SW	Electricity Substation	1989
210AI	278	SW	Electricity Substation	1996
211AJ	307	W	Electricity Substation	1968
212AJ	308	W	Electricity Substation	1981
213AJ	308	W	Electricity Substation	1996
214AK	342	E	Electricity Substation	1976
215AK	342	E	Electricity Substation	1969
216P	342	S	Gas Works	1908
217P	342	S	Gas Works	1897
218P	342	S	Gas Works	1898
219AK	342	E	Electricity Substation	1993
220AK	343	E	Electricity Substation	1980
221P	344	S	Gas Works	1951
222Q	347	S	Gasometer	1908
223Q	347	S	Gasometer	1897
224P	348	SW	Gas Works	1869
225Q	348	S	Gasometer	1898
226P	355	S	Gas Holder	1968
227P	356	S	Gasholder	1980
228P	356	S	Gasholder	1989
229P	356	S	Gasholder	1996
230P	356	SW	Gasometer	1869
231P	357	SW	Gasometer	1897
232P	357	SW	Gasometer	1898
233P	360	SW	Electricity Substation	1968
234P	360	SW	Electricity Substation	1980
235P	361	SW	Electricity Substation	1996
236P	361	SW	Electricity Substation	1989
237P	362	SW	Gasometer	1908
238AL	417	NW	Electricity Substation	1969
239U	427	NE	Electricity Substation	1993
240U	427	NE	Electricity Substation	1980

241U	428	NE	Electricity Substation	1976
242AL	435	NW	Electricity Substation	1981
243AL	436	NW	Electricity Substation	1970
244AM	476	S	Electricity Substation	1989
245AM	477	S	Electricity Substation	1996
246AN	492	S	Electricity Substation	1968
247AN	492	S	Electricity Substation	1978
248AN	492	S	Electricity Substation	1989
249AN	493	S	Electricity Substation	1993

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 5

ID	Distance (m)	Direction	Use	Date
250R	325	NE	Garage	1969
251R	325	NE	Garage	1976
252AO	326	NE	Garage	1980
253AO	326	NE	Garage	1993
254AA	388	S	Coach Works	1968

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 58

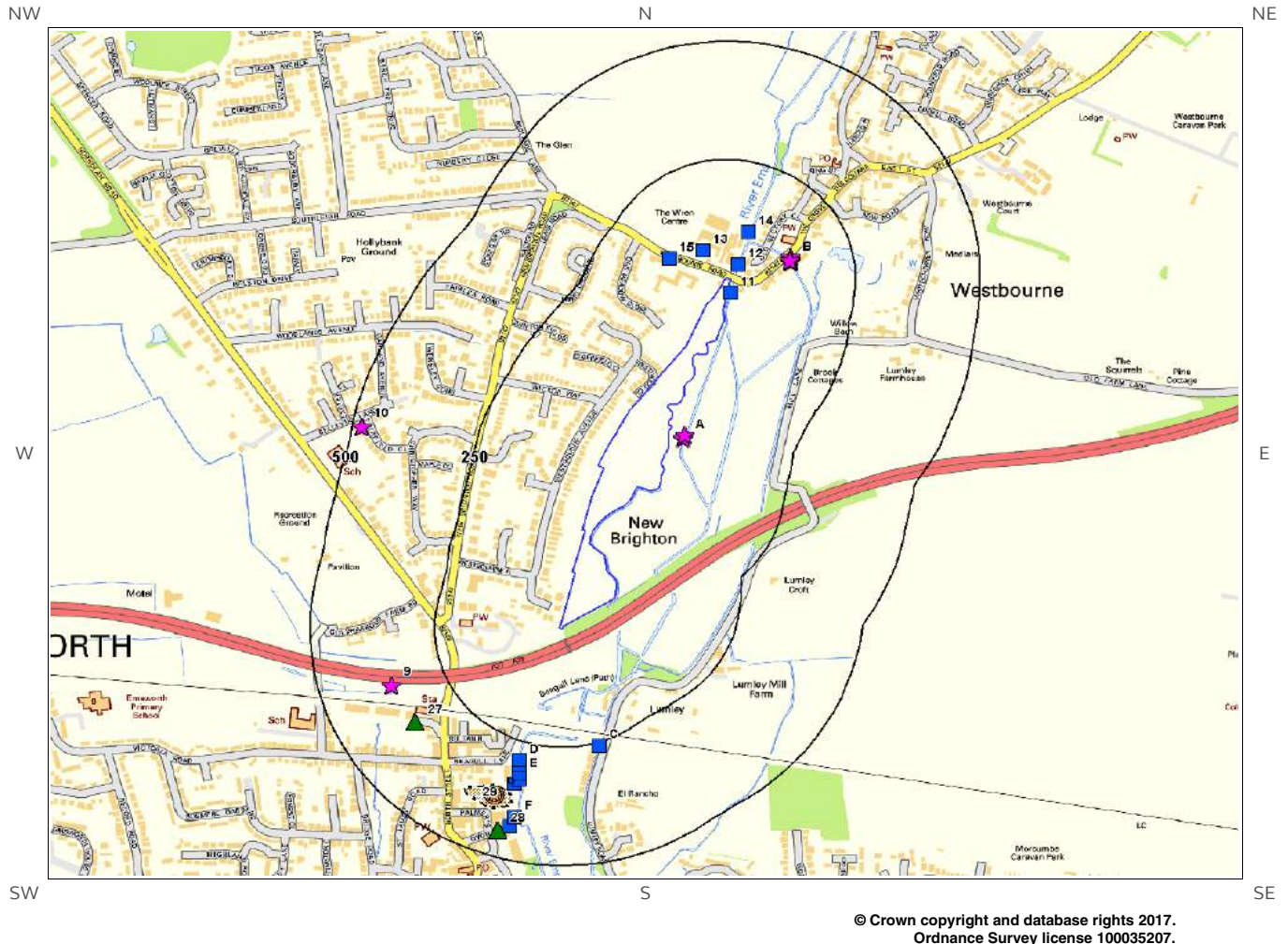
The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
255AP	0	On Site	Brick Field	1895
256A	83	E	Watercress Bed	1931
257A	83	E	Watercress Bed	1931
258A	92	SE	Watercress Bed	1898

259A	92	SE	Watercress Bed	1898
260AQ	102	NE	Grave Yard	1877
261B	145	SE	Pond	1932
262B	149	SE	Mill Pond	1898
263AR	150	E	Pond	1931
264AR	150	E	Pond	1931
265B	150	SE	Mill Pond	1896
266AR	152	E	Pond	1990
267AR	152	E	Pond	1973
268B	152	SE	Pond	1907
269B	152	SE	Mill Pond	1914
270B	153	SE	Pond	1877
271AR	156	E	Pond	1898
272AR	156	E	Pond	1898
273C	176	E	Watercress Beds	1931
274C	176	E	Watercress Beds	1931
275AS	178	NW	Unspecified Pit	1914
276C	183	E	Watercress Bed	1898
277C	183	E	Watercress Bed	1898
278F	193	NW	Brick Works	1914
279E	194	NW	Brick Field	1898
280E	194	NW	Brick Field	1898
281F	195	NW	Brick Works	1907
282F	197	NW	Unspecified Heap	1914
283G	198	NW	Unspecified Ground Workings	1907
284H	209	NW	Brick Field	1896
285H	216	NW	Brick Field	1895
286I	219	NW	Brick Works	1914
287I	219	NW	Brick Works	1914
288I	220	NW	Brick Works	1910
289I	221	NW	Brick Works	1907
290	224	SE	Pond	1942
291I	238	NW	Unspecified Pit	1914
292I	238	NW	Unspecified Pit	1914
293I	240	NW	Unspecified Pit	1910
294I	242	NW	Unspecified Ground Workings	1907
295AT	273	E	Pond	1907
296AT	273	E	Pond	1938
297AU	291	E	Cuttings	1990
298T	395	NW	Refuse Heap	1931
299T	395	NW	Refuse Heap	1931
300T	396	NW	Refuse Heap	1931
301T	398	NW	Gravel Pit	1938
302AV	495	SW	Grave Yard	1866

303V	496	S	Mill Pond	1962
304V	497	S	Mill Pond	1914
305V	497	S	Mill Pond	1896
306V	497	S	Mill Pond	1932
307V	498	S	Mill Pond	1931
308V	498	S	Mill Pond	1898
309V	498	S	Mill Pond	1942
310V	498	S	Mill Pond	1907
311V	498	S	Mill Pond	1896
312V	498	S	Mill Pond	1931

2. Environmental Permits, Incidents and Registers Map



- | | | |
|-------------------------------|---|--|
| Site Outline | Recorded Pollution Incident | RAS 3 & 4 Authorisations |
| Dangerous Substances (List 1) | Dangerous Substances (List 2) | Part A(1) Authorised Processes and Historic IPC Authorisations |
| Water Industry Referrals | Licenced Discharge Consents | Part A(2) and Part B Authorised Processes |
| Red List Discharge Consents | Sites Determined as Contaminated Land | COMAH / NIHHS Sites |
| | Hazardous Substance Consents and Enforcements | |

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

2

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
27	354	SW	474810 106287	Address: Weldrite Engineering Ltd, 98 North Street, Emsworth, PO10 7PN Process: Waste Oil Burner Status: New Legislation Applies Permit Type: Part B Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
28	447	S	474976 106058	Address: A. D. Williams Coachworks Ltd, Units 3 & 4, 24 Palmers Road Industrial Estate, Palmers Road, Emsworth, Hampshire, PO10 7DH Process: Respraying of Road Vehicles Status: Current Permit Permit Type: Part B Enforcement: Enforcement Notified Date of Enforcement: 04/11/2007 Comment: Breach/Likely Breach of Condition No.'s 6, 7, 9, 11, 13, 20, 28, 29 & 42

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

16

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
11	5	E	475444 107198	Address: WESTBOURNE OSTEOPATHIC & WELLNESS, WESTBOURNE ROAD, WESTBOURNE, WEST SUSSEX, PO10 8UL Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: EPRFB3199DN Permit Version: 1 Receiving Water: THE RIVER EMS Status: NEW ISSUED UNDER EPR 2010 Issue date: 14/03/2017 Effective Date: 14-Mar-2017 Revocation Date: -
12	33	NE	475458 107257	Address: BOURNE BRIDGE HOUSE, WESTBOURNE ROAD, EMSWORTH, HAMPSHIRE, PO10 7RN Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: EPRVB3232AT Permit Version: 1 Receiving Water: RIVER EMS Status: NEW ISSUED UNDER EPR 2010 Issue date: 14/06/2013 Effective Date: 14-Jun-2013 Revocation Date: -

ID	Distance (m)	Direction	NGR	Details
13	75	NW	475387 107287	Address: STABLE COTTAGE, WESTBOURNE ROAD, EMSWORTH, HAMPSHIRE, PO10 7RN Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: EPRUB3432AC Permit Version: 1 Receiving Water: RIVER EMS Status: NEW ISSUED UNDER EPR 2010 Issue date: 13/06/2013 Effective Date: 13-Jun-2013 Revocation Date: -
14	105	NE	475479 107326	Address: FISH TANKS AT HEALTHY KOI LIMITED, UNIT 21 THE WREN CENTRE, WESTBOURNE ROAD, EMSWORTH, HAMPSHIRE, PO10 7SU Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - WATER COMPANY (WTW) Permit Number: EPRUB3399NR Permit Version: 1 Receiving Water: THE RIVER EMS Status: NEW ISSUED UNDER EPR 2010 Issue date: 12/04/2016 Effective Date: 12-Apr-2016 Revocation Date: -
15	119	NW	475320 107270	Address: SHELTERED FLATS DEVELOPMENT, SHELTERED FLATS DEVELOPMENT, WESTBOURNE ROAD, EMSWORTH, HAMPSHIRE Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: N01524 Permit Version: 1 Receiving Water: FRESHWATER RIVER Status: REVOKED UNDER EPR 2010 Issue date: 04/06/1980 Effective Date: 04-Jun-1980 Revocation Date: 14/08/2013
16C	258	S	475180 106240	Address: SEWAGE PUMPING STATION, SEWAGE PUMPING STATION, LUMLEY ROAD, EMSWORTH, HAMPSHIRE Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: S02125 Permit Version: 1 Receiving Water: RIVER EMS Status: SURRENDERED UNDER EPR 2010 Issue date: 15/11/1972 Effective Date: 15-Nov-1972 Revocation Date: 12/12/2011
17C	258	S	475180 106240	Address: LUMLEY ROAD PUMPING STATION, LUMLEY ROAD P.S, EMSWORTH, WEST SUSSEX Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: A00291 Permit Version: 3 Receiving Water: RIVER EMS Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 08/07/1993 Effective Date: 01-Jun-1994 Revocation Date: -
18C	258	S	475180 106240	Address: LUMLEY ROAD PUMPING STATION, LUMLEY ROAD P.S, EMSWORTH, WEST SUSSEX Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: A00291 Permit Version: 2 Receiving Water: RIVER EMS Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 08/07/1993 Effective Date: 08-Jul-1993 Revocation Date: 31/05/1994
19C	258	S	475180 106240	Address: LUMLEY ROAD PUMPING STATION, LUMLEY ROAD P.S, EMSWORTH, WEST SUSSEX Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: A00291 Permit Version: 1 Receiving Water: RIVER EMS Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 30/10/1989 Effective Date: 30-Oct-1989 Revocation Date: 07/07/1993
20D	290	S	475020 106210	Address: HIGHWAY - SEAGULL LANE, HIGHWAY - SEAGULL LANE, EMSWORTH HAMPSHIRE Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: S01711 Permit Version: 1 Receiving Water: FRESHWATER RIVER Status: LAPSED UNDER SCHEDULE 23 ENVIRONMENT ACT 1995 Issue date: 17/04/1968 Effective Date: 17-Apr-1968 Revocation Date: 31/03/1997

ID	Distance (m)	Direction	NGR	Details	
21D	300	S	475020 106200	Address: 71 NORTH STREET, 71 NORTH STREET, EMSWORTH, HAMPSHIRE Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: S01081 Permit Version: 1	Receiving Water: FRESHWATER RIVER Status: LAPSED UNDER SCHEDULE 23 ENVIRONMENT ACT 1995 Issue date: 21/11/1963 Effective Date: 21-Nov-1963 Revocation Date: 31/03/1997
22E	319	S	475020 106180	Address: YARD & OFFICES AT NORTH STREET, YARD & OFFICES AT NORTH STREET, EMSWORTH, HAMPSHIRE Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: S01011 Permit Version: 1	Receiving Water: SALINE ESTUARY Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 31/03/1965 Effective Date: 31-Mar-1965 Revocation Date: 11/05/1995
23E	329	S	475020 106170	Address: 71 NORTH STREET, 71 NORTH STREET, EMSWORTH, HAMPSHIRE Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: S01081 Permit Version: 1	Receiving Water: FRESHWATER RIVER Status: LAPSED UNDER SCHEDULE 23 ENVIRONMENT ACT 1995 Issue date: 21/11/1963 Effective Date: 21-Nov-1963 Revocation Date: 31/03/1997
24E	341	S	475010 106160	Address: NORTH STREET, NORTH STREET, EMSWORTH, HAMPSHIRE Effluent Type: UNSPECIFIED Permit Number: D01028 Permit Version: 1	Receiving Water: FRESHWATER RIVER Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 01/04/1991 Effective Date: 01-Apr-1991 Revocation Date: 06/11/2001
25F	409	S	475010 106090	Address: UNIT 24, PALMERS ROAD INDUSTRIAL, UNIT 24, PALMERS ROAD INDUSTRIAL ESTATE, EMSWORTH, HAMPSHIRE, PO10 7DH Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: P10880 Permit Version: 1	Receiving Water: THE RIVER EMS Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 07/04/2003 Effective Date: 01-Apr-2004 Revocation Date: -
26F	430	S	475000 106070	Address: 13-23 NORTH STREET, 13-23 NORTH STREET, EMSWORTH HAMPSHIRE Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: N01498 Permit Version: 1	Receiving Water: SALINE ESTUARY Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 27/05/1981 Effective Date: 27-May-1981 Revocation Date: 01/07/1991

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

1

The following records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
31G	377	S	00/53484/002	474969 106136	Approved	06/06/2000	Transco Plc, Emsworth Gasholder Station, Palmer Road, Emsworth, Hants, PO10 7DL	Storage of natural gas (32000 tonnes maximum).	Enforcement: No Enforcement Notified Date of Enforcement: Data requested, not received. Comment: Data requested, not received.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site:

1

The following COMAH & NIHHS Authorisation records provided by the Health and Safety Executive are represented as polygons or buffered points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Company	Address	Operational Status	Tier
29	355	S	British Gas	British Gas, Emsworth Holder Station, North Street, Emsworth, Havant, PO10 7DL	Historical NIHHS Site	-

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

10

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
1A	27	E	475347 106891	Incident Date: 23-Jun-2003 Incident Identification: 168033 Pollutant: Contaminated Water Pollutant Description: Urban Run-Off Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
2A	30	SE	475350 106898	Incident Date: 08-Oct-2003 Incident Identification: 195067 Pollutant: Contaminated Water Pollutant Description: Suspended Solids Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

ID	Distance (m)	Direction	NGR	Details	
3B	123	E	475560 107267	Incident Date: 03-Oct-2002 Incident Identification: 112412 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
4B	123	E	475561 107264	Incident Date: 04-Oct-2002 Incident Identification: 112550 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
5B	123	E	475561 107266	Incident Date: 04-Oct-2002 Incident Identification: 112496 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
6B	124	E	475562 107264	Incident Date: 03-Oct-2002 Incident Identification: 112267 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
7B	125	E	475563 107266	Incident Date: 04-Oct-2002 Incident Identification: 112584 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
8B	128	E	475563 107273	Incident Date: 03-Oct-2002 Incident Identification: 112240 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
9	359	W	474763 106368	Incident Date: 15-Apr-2006 Incident Identification: 391081 Pollutant: Oils and Fuel Pollutant Description: Gas and Fuel Oils	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
10	483	W	474703 106914	Incident Date: 26-Apr-2004 Incident Identification: 232315 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Landfill Odour	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 2 (Significant)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

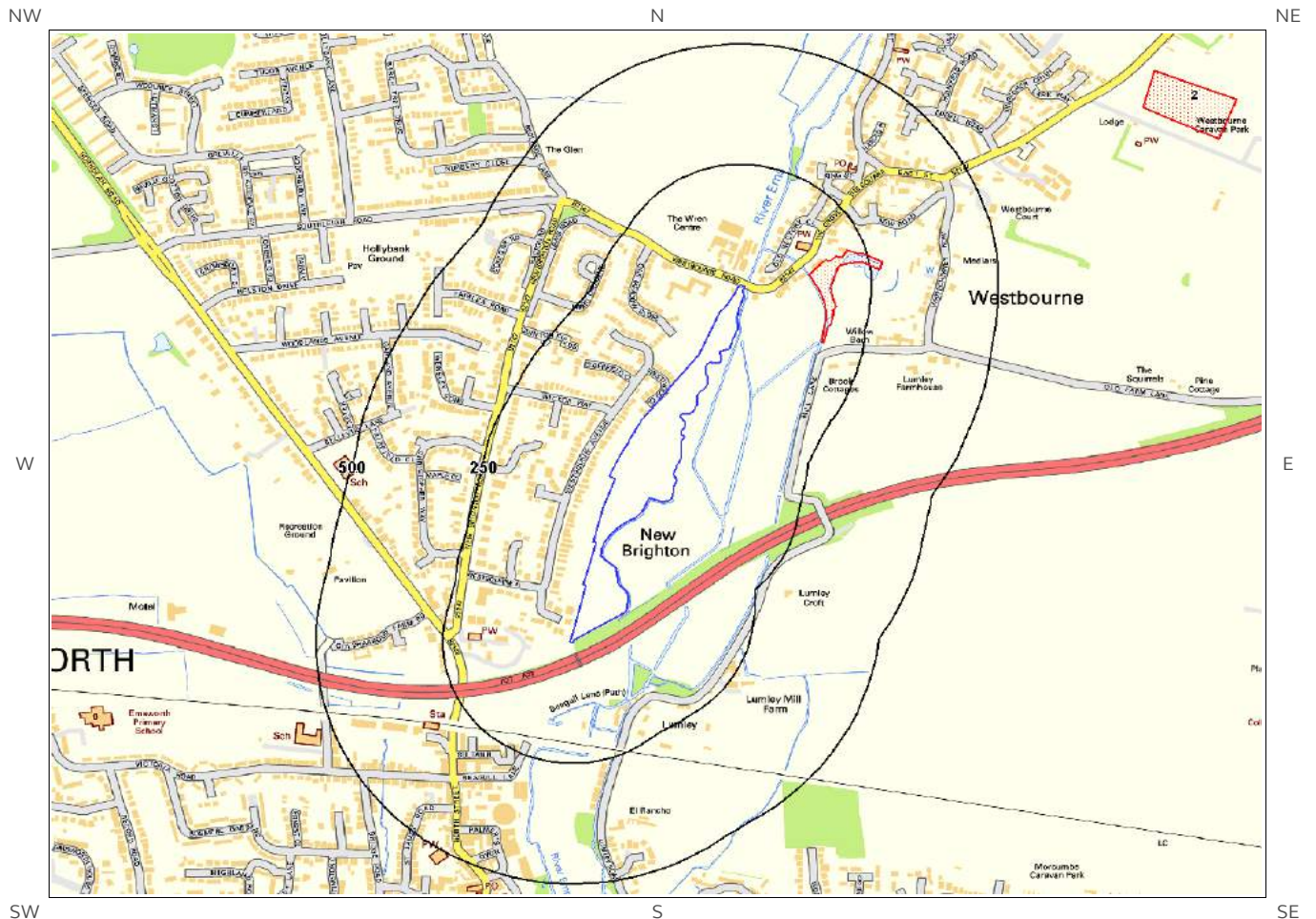
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site?

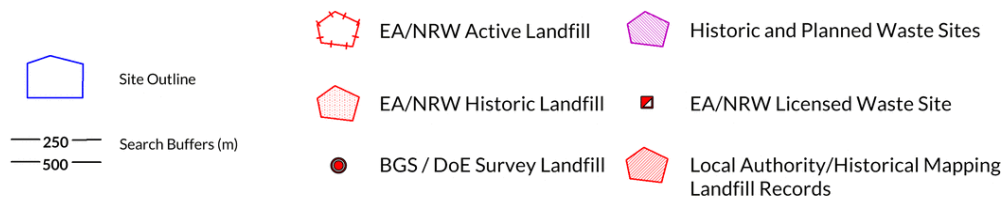
0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

3

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details
1	130	E	475600 107200	Site Address: East of Church Hall, Westbourne, Sussex Waste Licence: Yes Site Reference: WD27/231, WD27/023 Waste Type: Inert, Industrial Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 01-Jan-1976 Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 31-Dec-1986 Last Recorded: 31-Dec-1986
2	868	NE	476300 107600	Site Address: Cemetery Land, Cemetery Lane, Westbourne, Sussex Waste Licence: - Site Reference: WD27/340 Waste Type: Waste unknown Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1124	S	475500 105300	Site Address: Emsworth Yacht Harbour, Emsworth, Sussex Waste Licence: Yes Site Reference: WD13/48, WD27/101 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 21-Feb-1986 Licence Surrendered: 12-Feb-1987 Licence Holder Address: - Operator: - Licence Holder: Emsworth Yacht Harbour Limited First Recorded: 21-Feb-1986 Last Recorded: 15-Aug-1986

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

0

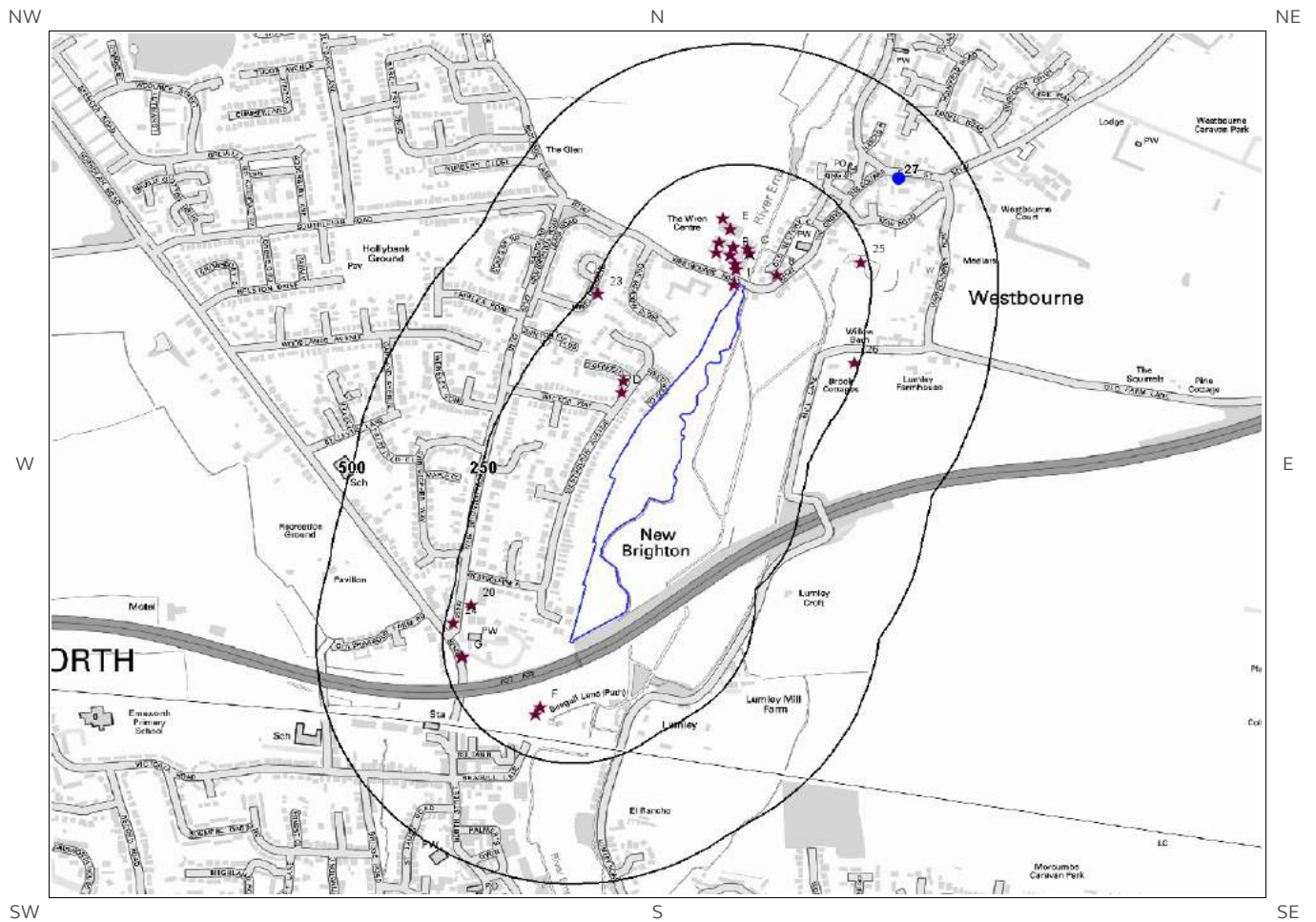
Database searched and no data found.

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

0

Database searched and no data found.

4. Current Land Use Map



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Site Outline

★ Current Industrial Sites

— Electricity Transmission Cables

— 250 — Search Buffers (m)
— 500 —

● Petrol & Fuel Sites

— Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

26

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	9	NW	Electricity Sub Station	475424 107231	PO10	Electrical Features	Infrastructure and Facilities
2A	35	N	Hopper	475426 107264	PO10	Hoppers and Silos	Farming
3A	45	N	Hallmarq Veterinary Imaging	475425 107274	Unit 16a Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Medical Equipment, Supplies and Pharmaceuticals	Industrial Products
4A	45	N	Waypoint Life Rafts	475425 107274	Unit 16 Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Marine Equipment Including Boats and Ships	Industrial Products
5B	67	N	The Wren Centre	475416 107294	Westbourne Road, Emsworth, PO10 7SU	Business Parks and Industrial Estates	Industrial Features
6B	67	N	Garden Karma	475415 107294	Unit 9 Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Baby, Nursery and Playground Equipment	Consumer Products
7D	68	NW	Electricity Sub Station	475201 107008	PO10	Electrical Features	Infrastructure and Facilities
8	68	E	Electricity Sub Station	475507 107253	PO10	Electrical Features	Infrastructure and Facilities
9C	68	N	Hopper	475452 107297	PO10	Hoppers and Silos	Farming
10C	77	N	Douglas Knight	475448 107306	Unit 12d Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Curtains and Blinds	Consumer Products
11D	81	NW	Emsworth Computers	475204 107032	51, Westbourne Avenue, Emsworth, PO10 7QN	Electrical Equipment Repair and Servicing	Repair and Servicing
12B	82	N	Sweetbriar Water Hygiene	475421 107310	Unit 6a Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Air and Water Filtration	Industrial Products
13B	82	N	C P A Upholstery Services	475421 107310	Unit 6a Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Furniture	Consumer Products
14B	85	NW	Touchscreens Direct	475387 107299	Unit B3 Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Electronic Equipment	Industrial Products
15B	99	NW	J S G Engineering	475394 107320	Unit 3-4 Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Precision Engineers	Engineering Services
16E	120	N	Dynamic Sails	475415 107348	Unit 21 Wren Centre, Westbourne Road, Emsworth, PO10 7SU	Marine Equipment Including Boats and Ships	Industrial Products

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
17E	145	N	Hopper	475400 107370	PO10	Hoppers and Silos	Farming
18F	146	SW	Pylon	475041 106356	PO10	Electrical Features	Infrastructure and Facilities
19F	163	SW	Gas Compound	475033 106341	PO10	Gas Features	Infrastructure and Facilities
20	208	W	Electricity Sub Station	474906 106567	PO10	Electrical Features	Infrastructure and Facilities
21G	214	W	Gas Governor Station	474889 106459	PO10	Gas Features	Infrastructure and Facilities
22G	215	W	Gas Governor Station	474888 106459	PO10	Gas Features	Infrastructure and Facilities
23	234	NW	Scaffs-Crew	475154 107212	24, Ward Crescent, Emsworth, PO10 7RR	Construction and Tool Hire	Hire Services
24	234	W	Electricity Sub Station	474870 106530	PO10	Electrical Features	Infrastructure and Facilities
25	235	E	Watercress Bed	475673 107279	PO10	Fruit, Flower and Vegetable Growers	Farming
26	238	E	1 Marine Surveys	475658 107070	4 Brook Cottages, Mill Lane, Emsworth, PO10 8RT	Marine Engineers and Services	Engineering Services

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

1

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
27	376	NE	475747 107452	Murco	Collins Garage, East Street, East Street, Westbourne, Emsworth, West Sussex, PO10 8SE	No	Open

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site:

0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
HEAD-XCV	HEAD	CLAY AND GRAVEL
ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
RTDU-XSZC	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	SAND, SILT AND CLAY

5.3 Bedrock and Solid Geology

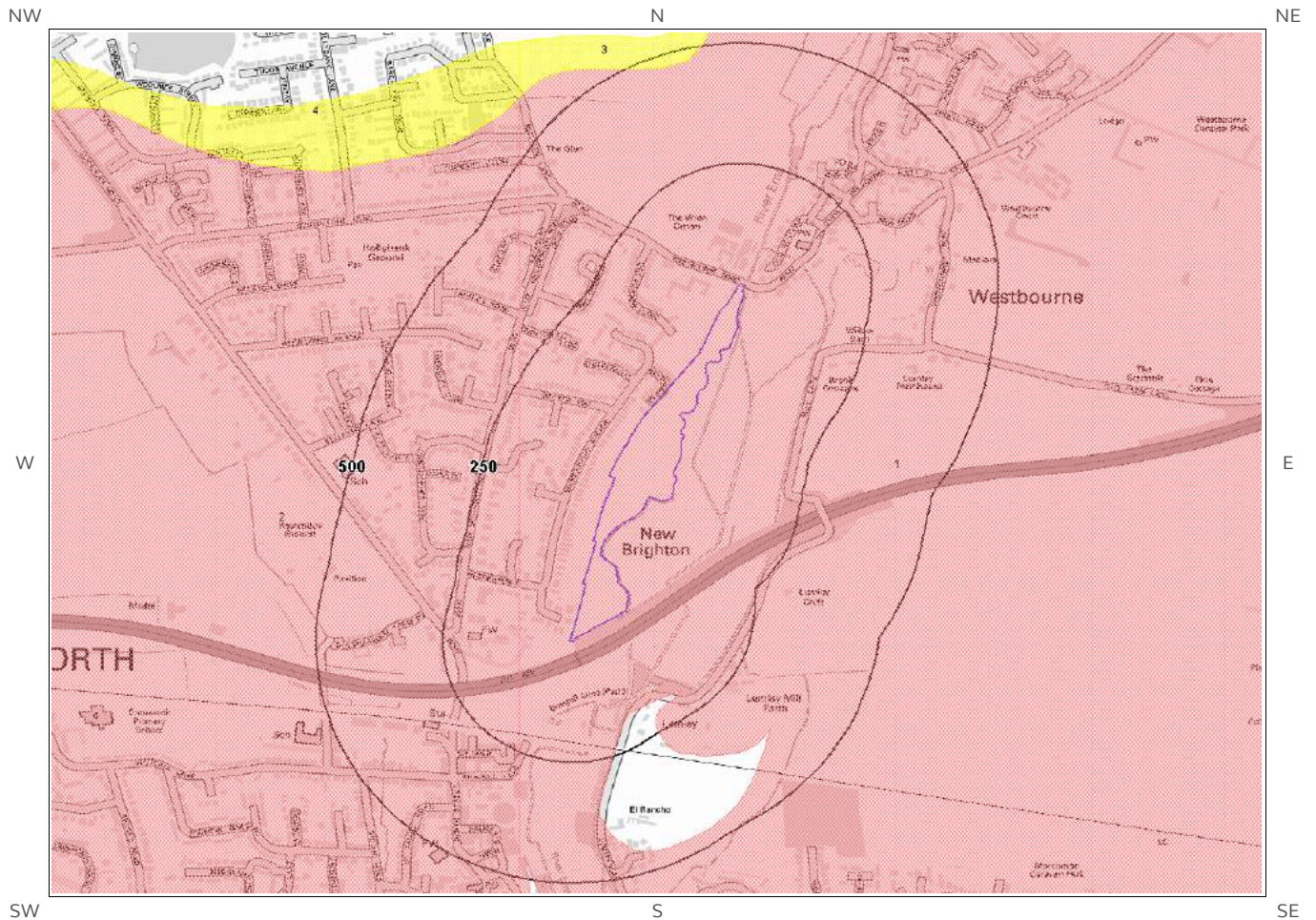
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
LC-XCZS	LONDON CLAY FORMATION	CLAY, SILT AND SAND

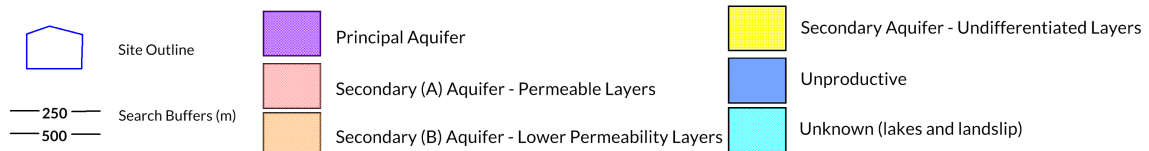
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



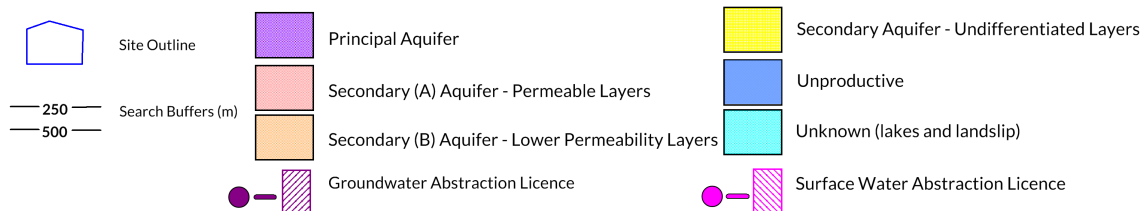
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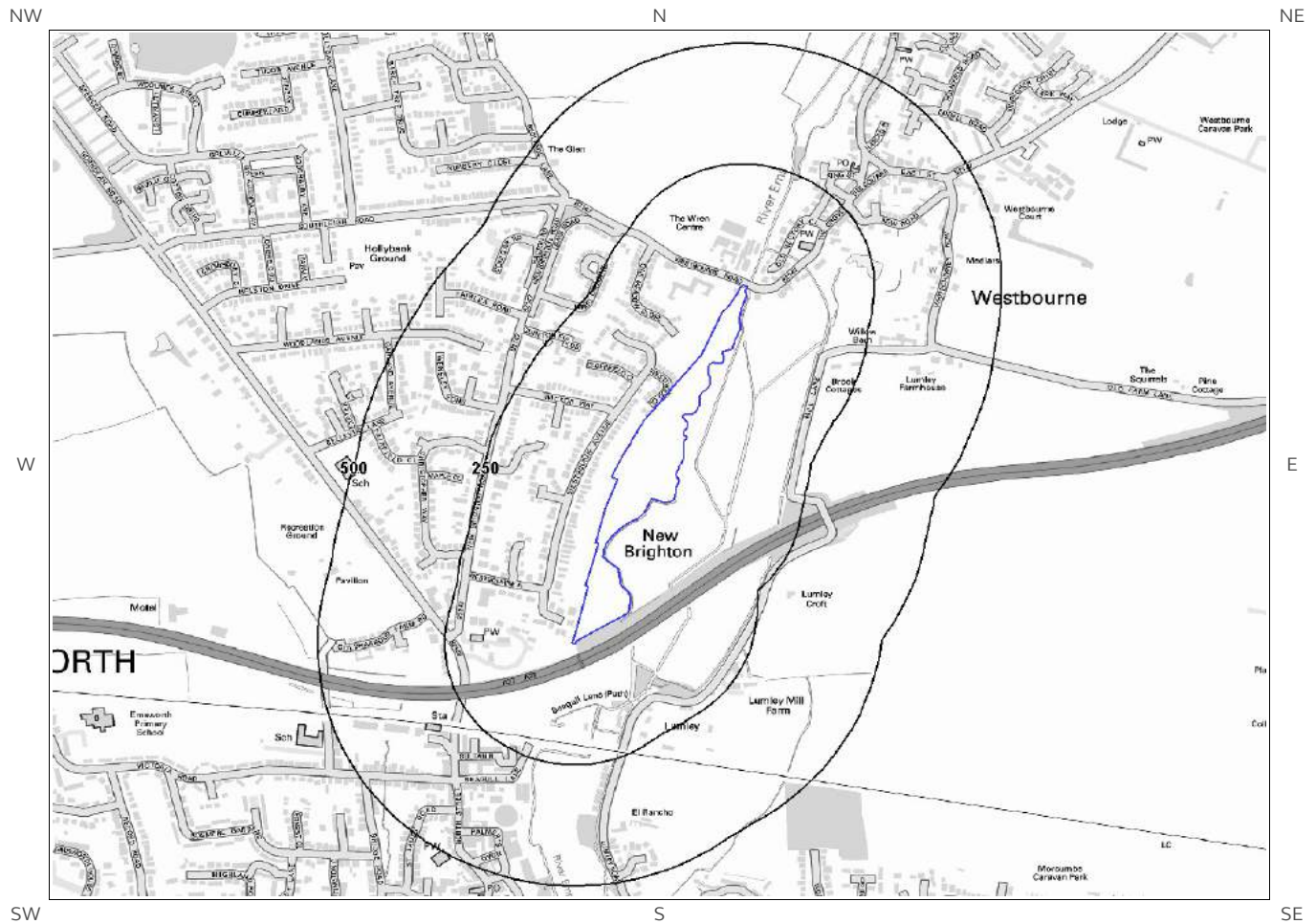
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



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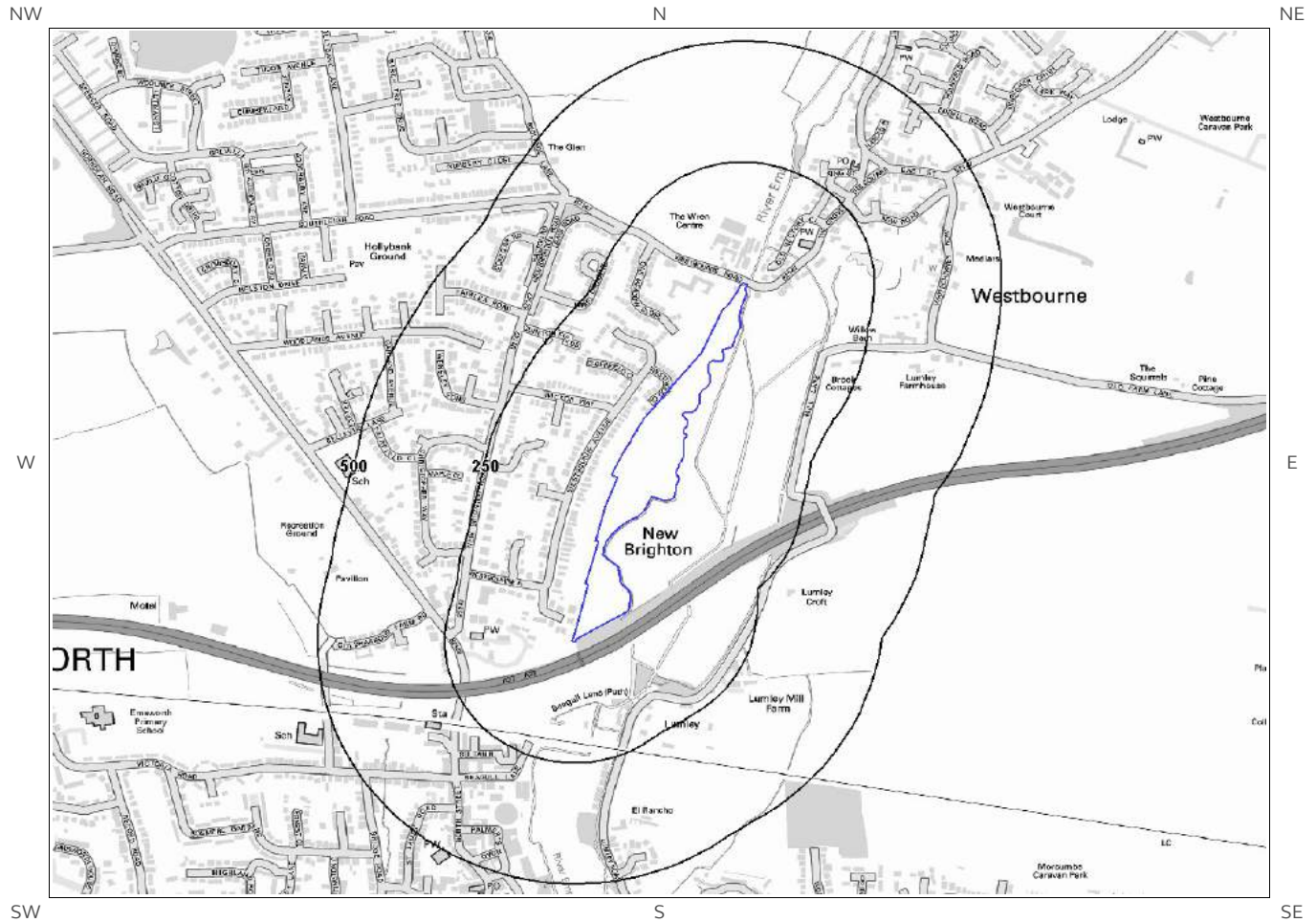


6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences

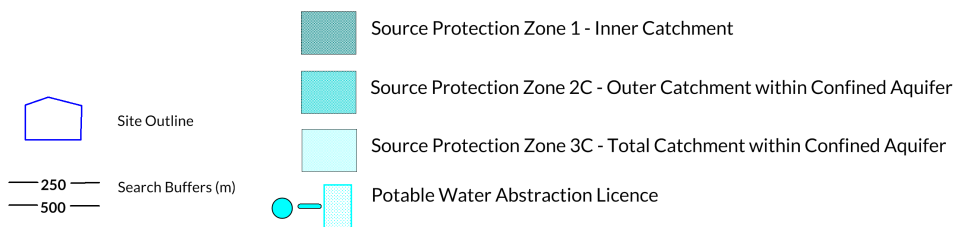


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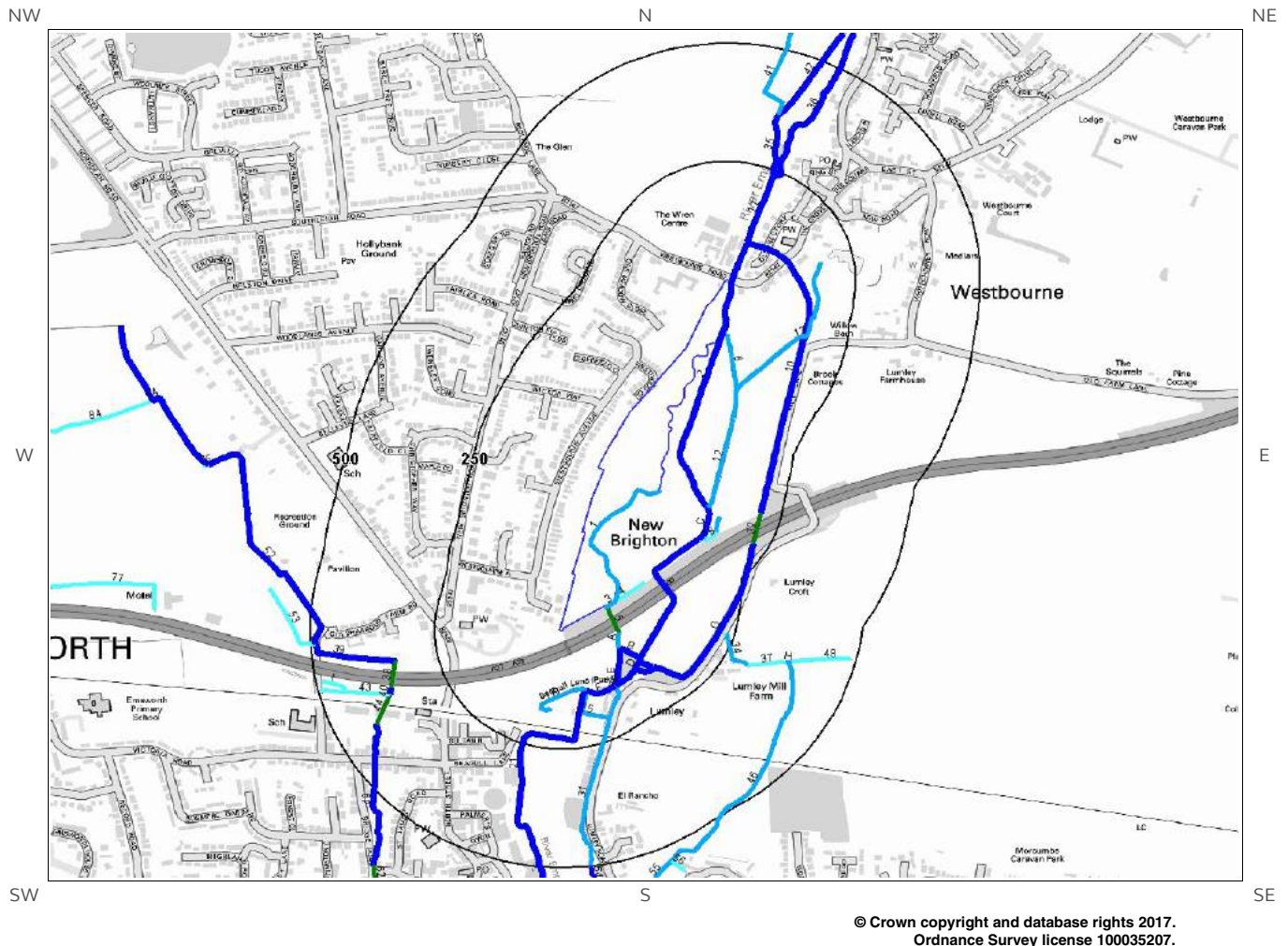
6d. Hydrogeology – Source Protection Zones within confined aquifer



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6e. Hydrology – Detailed River Network and River Quality



- | | | | |
|--|---------------------------------------|--|-------------------------------------|
| | Primary River | | Canal |
| | Secondary River | | Canal Tunnel |
| | Tertiary River | | Culvert |
| | Lake/Reservoir | | Multiple Channel Culvert |
| | Underground River (inferred) | | Underground River (Potential Sewer) |
| | General Quality Assessment: Biology | | Underground River (local knowledge) |
| | General Quality Assessment: Chemistry | | |
-
- | | |
|--|------------------------|
| | Site Outline |
| | 250 Search Buffers (m) |
| | 500 Search Buffers (m) |

6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	101	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
3	474	N	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
6	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
7	101	W	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
3	404	N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site?

Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
Not shown	1449	SE	476730 106490	Status: Historical Licence No: 27/169 Details: Water Bottling Direct Source: Southern Region Groundwater Point: Borehole At Point A, Southbourne Data Type: Point Name: Windsor Annual Volume (m³): 45000 Max Daily Volume (m³): 140 Original Application No: 169/1187 Original Start Date: 8/4/1992 Expiry Date: 31/3/2016 Issue No: 102 Version Start Date: 26/8/2004 Version End Date:
Not shown	1455	SE	476742 106502	Status: Active Licence No: 27/169/R01 Details: Water Bottling Direct Source: Southern Region Groundwater Point: Borehole At Point A, Southbourne Data Type: Point Name: Windsor Annual Volume (m³): 45000 Max Daily Volume (m³): 140 Original Application No: NPS/WR/019250 Original Start Date: 1/4/2016 Expiry Date: 31/3/2028 Issue No: 1 Version Start Date: 1/4/2016 Version End Date:
Not shown	1467	SE	476750 106490	Status: Historical Licence No: 27/169 Details: Water Bottling Direct Source: Southern Region Groundwater Point: Borehole At Point A, Southbourne Data Type: Point Name: WCR Property Ltd Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 169/1187 Original Start Date: - Expiry Date: - Issue No: 101 Version Start Date: 3/7/2002 Version End Date:
Not shown	1863	NE	477135 108008	Status: Active Licence No: 10/41/520101 Details: Make-Up Or Top Up Water Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole A Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1103760 Max Daily Volume (m³): 3024 Original Application No: NPS/WR/020922 Original Start Date: 7/7/1966 Expiry Date: - Issue No: 103 Version Start Date: 13/4/2016 Version End Date:
Not shown	1863	NE	477135 108008	Status: Active Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole A Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1103760 Max Daily Volume (m³): 3024 Original Application No: NPS/WR/020922 Original Start Date: 7/7/1966 Expiry Date: - Issue No: 103 Version Start Date: 13/4/2016 Version End Date:
Not shown	1863	NE	477130 108020	Status: Historical Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole No 1 Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1363800 Max Daily Volume (m³): 4546 Original Application No: WR.0156E Original Start Date: - Expiry Date: - Issue No: 101 Version Start Date: 9/6/2009 Version End Date:

ID	Distance (m)	Direction	NGR	Details
Not shown	1863	NE	477130 108020	Status: Historical Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole No 2 Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1363800 Max Daily Volume (m³): 4546 Original Application No: WR.0156E Original Start Date: - Expiry Date: - Issue No: 101 Version Start Date: 9/6/2009 Version End Date:
Not shown	1870	NE	477145 108005	Status: Active Licence No: 10/41/520101 Details: Make-Up Or Top Up Water Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole B Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1103760 Max Daily Volume (m³): 3024 Original Application No: NPS/WR/020922 Original Start Date: 7/7/1966 Expiry Date: - Issue No: 103 Version Start Date: 13/4/2016 Version End Date:
Not shown	1870	NE	477145 108005	Status: Active Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole B Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1103760 Max Daily Volume (m³): 3024 Original Application No: NPS/WR/020922 Original Start Date: 7/7/1966 Expiry Date: - Issue No: 103 Version Start Date: 13/4/2016 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? Yes

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
Not shown	784	NE	475810 107920	Status: Active Licence No: 10/41/511005 Details: Fish Farm/Cress Pond Throughflow Direct Source: Southern Region Surface Waters Point: Watercourse At Mill House, Westbourne Data Type: Line Name: Rule Annual Volume (m³): 3410 Max Daily Volume (m³): 45.5 Application No: WR.0759 Original Start Date: 22/8/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2016 Version End Date:
Not shown	1783	NE	476320 108780	Status: Active Licence No: 10/41/511202 Details: Spray Irrigation - Direct Direct Source: Southern Region Surface Waters Point: Aldsworth Pond At Sindles Farm, Aldsworth Data Type: Line Name: Mr J O Veltom, Mr C J Veltom and Mr D R Veltom Annual Volume (m³): 45460 Max Daily Volume (m³): 818.3 Application No: - Original Start Date: 29/3/1966 Expiry Date: - Issue No: 101 Version Start Date: 9/6/2009 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site?

Yes

The following Potable Water Abstraction Licences records are represented as points, lines and regions on the SPZ and Potable Water Abstraction Licences Map (6c):

ID	Distance (m)	Direction	NGR	Details
Not shown	1449	SE	476730 106490	Status: Historical Licence No: 27/169 Details: Water Bottling Direct Source: Southern Region Groundwater Point: Borehole At Point A, Southbourne Data Type: Point Name: Windsor Annual Volume (m³): 45000 Max Daily Volume (m³): 140 Original Application No: 169/1187 Original Start Date: 8/4/1992 Expiry Date: 31/3/2016 Issue No: 102 Version Start Date: Version End Date:
Not shown	1455	SE	476742 106502	Status: Active Licence No: 27/169/R01 Details: Water Bottling Direct Source: Southern Region Groundwater Point: Borehole At Point A, Southbourne Data Type: Point Name: Windsor Annual Volume (m³): 45000 Max Daily Volume (m³): 140 Original Application No: NPS/WR/019250 Original Start Date: 1/4/2016 Expiry Date: 31/3/2028 Issue No: 1 Version Start Date: Version End Date:
Not shown	1467	SE	476750 106490	Status: Historical Licence No: 27/169 Details: Water Bottling Direct Source: Southern Region Groundwater Point: Borehole At Point A, Southbourne Data Type: Point Name: WCR Property Ltd Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: 169/1187 Original Start Date: - Expiry Date: - Issue No: 101 Version Start Date: Version End Date:
Not shown	1863	NE	477135 108008	Status: Active Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole A Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1103760 Max Daily Volume (m³): 3024 Original Application No: NPS/WR/020922 Original Start Date: 7/7/1966 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:
Not shown	1863	NE	477130 108020	Status: Historical Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole No 1 Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1363800 Max Daily Volume (m³): 4546 Original Application No: WR.0156E Original Start Date: - Expiry Date: - Issue No: 101 Version Start Date: Version End Date:
Not shown	1863	NE	477130 108020	Status: Historical Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole No 2 Data Type: Point Name: Portsmouth Water Ltd Annual Volume (m³): 1363800 Max Daily Volume (m³): 4546 Original Application No: WR.0156E Original Start Date: - Expiry Date: - Issue No: 101 Version Start Date: Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1870	NE	477145 108005	Status: Active Licence No: 10/41/520101 Details: Potable Water Supply - Direct Direct Source: Southern Region Groundwater Point: Woodmancote Ps Borehole B Data Type: Point Name: Portsmouth Water Ltd	Annual Volume (m ³): 1103760 Max Daily Volume (m ³): 3024 Original Application No: NPS/WR/020922 Original Start Date: 7/7/1966 Expiry Date: - Issue No: 103 Version Start Date: Version End Date:

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site?

No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site?

No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
0	On Site	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
233	E	Minor Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
282	SE	Minor Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
440	W	Minor Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Database searched and no data found.

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAH). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Chemical Quality Grade				
					2005	2006	2007	2008	2009
Not shown	679	S	475230 105820	River Name: R. Ems Reach: Emsworth - Westbourne End/Start of Stretch: Sample Point NGR	B	B	A	A	A
Not shown	873	NE	475850 108000	River Name: R. Ems Reach: Emsworth - Westbourne End/Start of Stretch: Start of Stretch NGR	B	B	A	A	A
Not shown	892	S	475200 105600	River Name: R. Ems Reach: Emsworth - Westbourne End/Start of Stretch: End of Stretch NGR	B	B	A	A	A

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1	1	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
2	2	E	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
3	2	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
4	2	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
5	8	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
6	15	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
7A	62	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
8	81	E	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
9A	86	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
10	87	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
11	87	NE	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
12	89	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
13	89	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
14B	92	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
15E	92	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
16C	104	SE	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
17	127	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
18	131	SE	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
19B	132	SE	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
20C	133	SE	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
21	134	S	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
22F	134	S	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
23D	137	SE	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
24D	137	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
25	140	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
26E	146	SE	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
27D	146	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
28F	156	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
29	156	SE	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
30G	163	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
31	207	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
32	208	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
33G	228	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
34	234	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
35	237	NE	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
36	237	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
37	301	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
38	336	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
39	337	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
40	359	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
41	364	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
42	364	N	River Name: River Ems Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
43	366	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
44	366	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
45H	367	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
46	370	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
47H	370	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
48	377	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
49	417	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
50I	449	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
51I	451	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
52	478	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
53	489	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
54	500	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Lake/Reservoir Main River Status: Currently Undefined

6.11 Surface Water Features

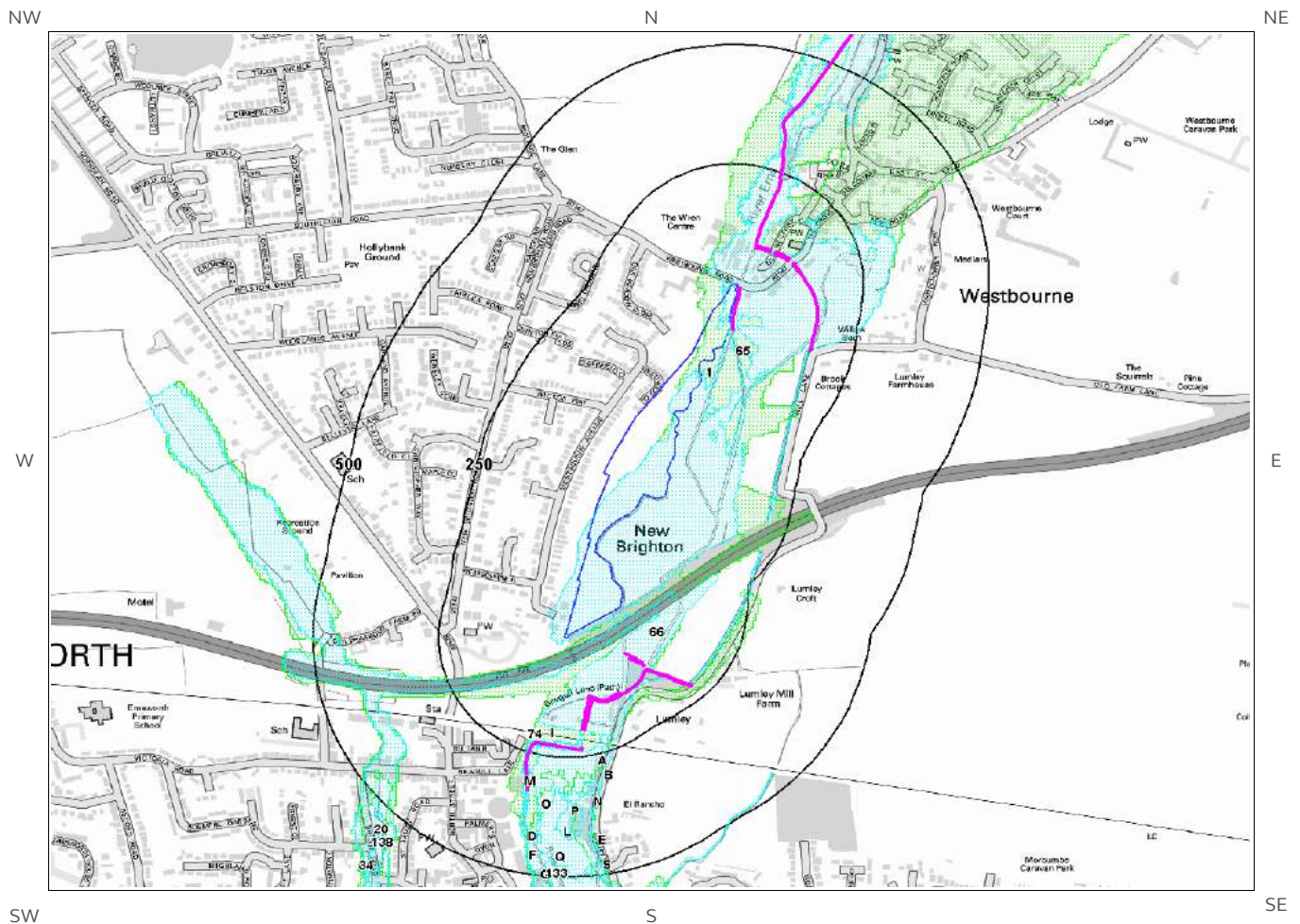
Are there any surface water features within 250m of the study site?

Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	E
3	SE
8	NE
62	SE
78	E
90	SE
98	NE
101	SE
113	NW
117	E
125	S
140	SE
152	S
157	SE
161	E
161	NW
165	E
183	SE
201	E
206	E
211	SE
220	S
234	E

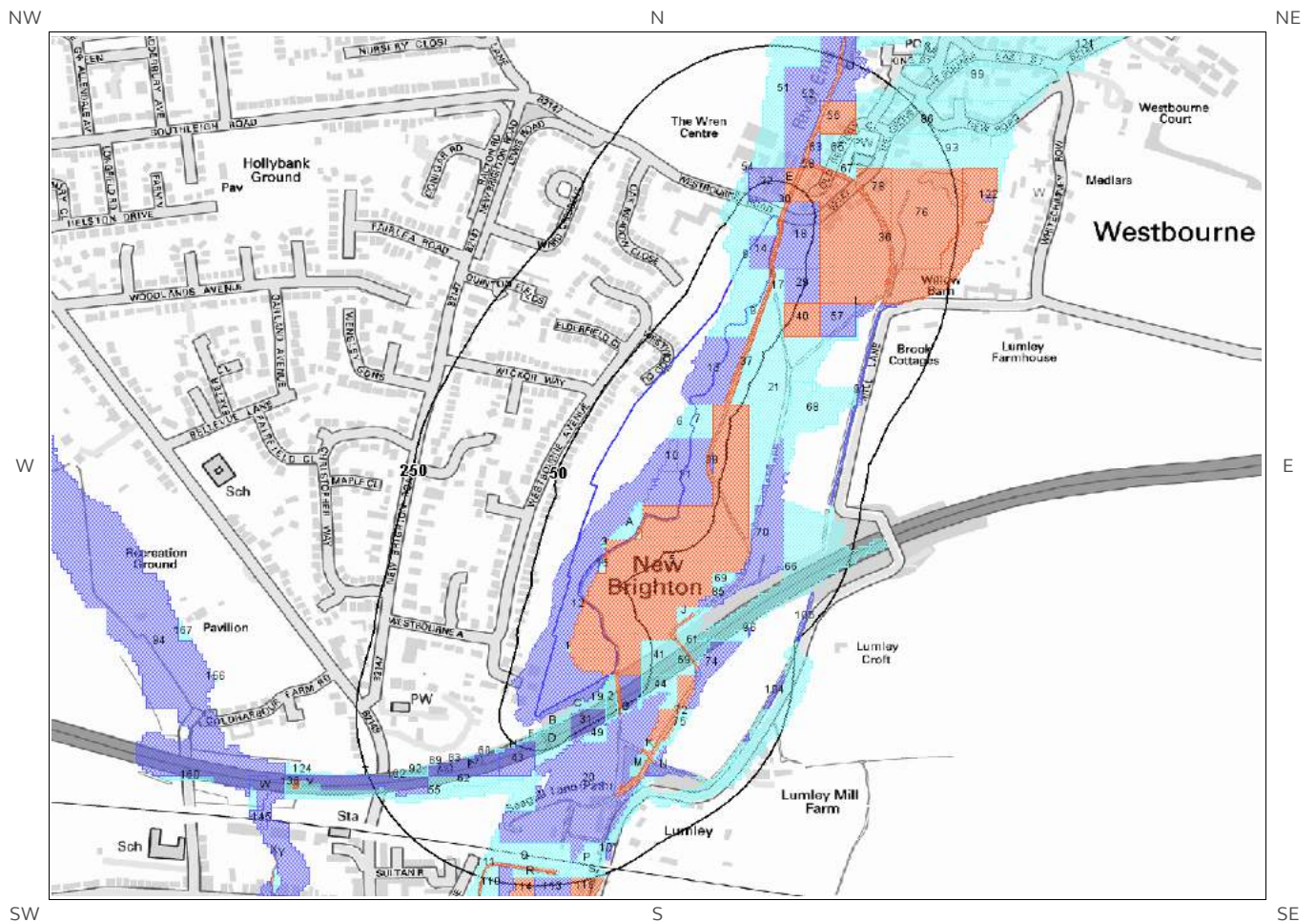
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



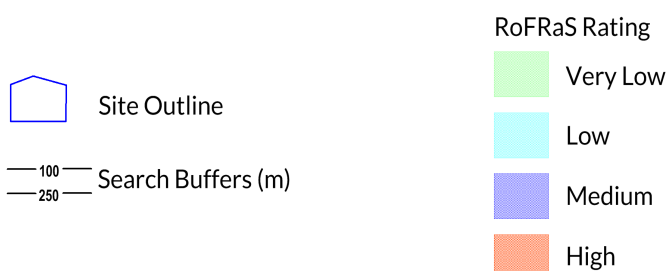
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7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? Yes

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	0	On Site	17-Aug-2017	Zone 2 - (Fluvial /Tidal Models)
2J	166	S	17-Aug-2017	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? Yes

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	0	On Site	22-Aug-2017	Zone 3 - (Fluvial Models)
2J	20	SE	22-Aug-2017	Zone 3 - (Fluvial Models)
	201	S	22-Aug-2017	Zone 3 - (Fluvial Models)
	220	S	22-Aug-2017	Zone 3 - (Fluvial Models)
	220	S	22-Aug-2017	Zone 3 - (Fluvial Models)
	222	S	22-Aug-2017	Zone 3 - (Fluvial Models)
	222	S	22-Aug-2017	Zone 3 - (Fluvial Models)
	224	S	22-Aug-2017	Zone 3 - (Fluvial Models)
	225	S	22-Aug-2017	Zone 3 - (Fluvial Models)
	225	S	22-Aug-2017	Zone 3 - (Fluvial Models)

226	S	22-Aug-2017	Zone 3 - (Fluvial Models)
226	S	22-Aug-2017	Zone 3 - (Fluvial Models)
227	S	22-Aug-2017	Zone 3 - (Fluvial Models)
229	S	22-Aug-2017	Zone 3 - (Fluvial Models)
234	S	22-Aug-2017	Zone 3 - (Fluvial Models)
243	S	22-Aug-2017	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite?

High

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a High (1 in 30 or greater) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRaS flood Risk
1	0.0	On Site	Low
2	0.0	On Site	Low
3	0.0	On Site	Low
4A	0.0	On Site	Low
5	0.0	On Site	High
6	0.0	On Site	Low
7	0.0	On Site	Low
8	0.0	On Site	Low
9	0.0	On Site	Low
10	0.0	On Site	Medium
11	0.0	On Site	Medium
12	0.0	On Site	Medium
13	0.0	On Site	Medium
14	0.0	On Site	Medium
15	4.0	SE	Low
16A	4.0	SE	Low
17	4.0	E	Low
18	5.0	E	Medium
19	7.0	SE	Low
20	7.0	SE	Medium
21	8.0	E	Low

22C	11.0	SE	Low
23B	14.0	SE	Low
24B	14.0	SE	Low
25B	16.0	SE	Low
26C	17.0	SE	Low
27B	17.0	S	Low
28D	17.0	SE	Low
29	18.0	E	Medium
30	18.0	NE	Medium
31	19.0	SE	Medium
32	20.0	N	Medium
33D	22.0	S	Low
34E	23.0	NE	High
35E	24.0	NE	High
36	27.0	NE	High
37	28.0	E	Low
38	28.0	E	Medium
39F	28.0	S	Low
40	33.0	E	High
41	35.0	E	Low
42F	36.0	S	Low
43	38.0	S	Medium
44	38.0	E	Low
45F	42.0	S	Low
46G	50.0	SE	Low

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site?

Yes

The following flood defence records are represented as lines on the Flood Map:

ID	Distance (m)	Direction	Update
192	3	E	14-Aug-2017
193	85	NE	14-Aug-2017
194	87	SE	14-Aug-2017
195	90	NE	14-Aug-2017
196	98	NE	14-Aug-2017
197	99	SE	14-Aug-2017
198	101	NE	14-Aug-2017
199	117	E	14-Aug-2017
200	120	NE	14-Aug-2017
201	129	S	14-Aug-2017
202	136	S	14-Aug-2017
203	138	SE	14-Aug-2017

ID	Distance (m)	Direction	Update
204	160	SE	14-Aug-2017
205	227	S	14-Aug-2017

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface
Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

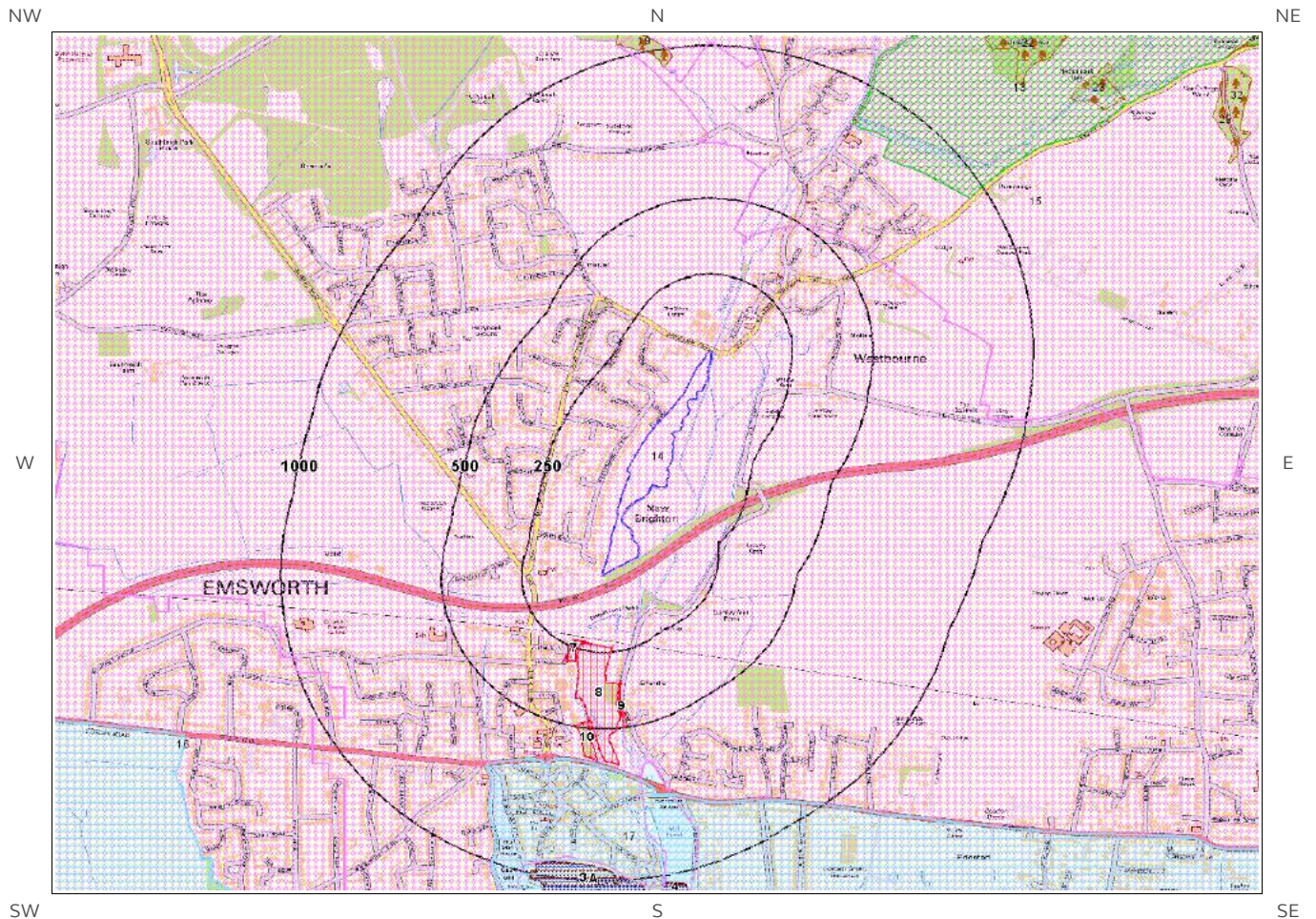
7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? Moderate

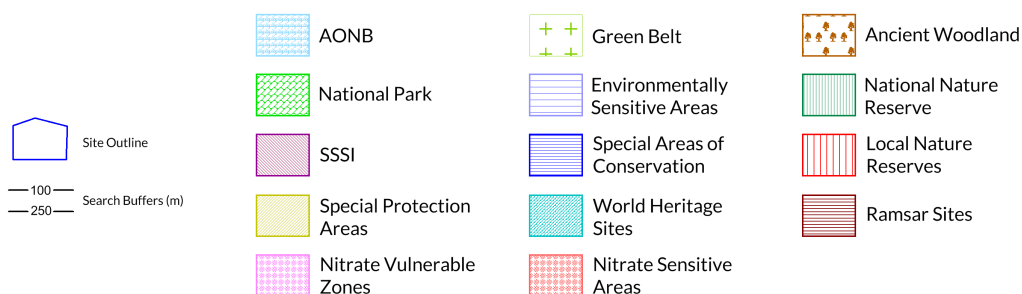
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?

Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

3

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
3	947	S	Chichester Harbour	Natural England
4	1020	S	Chichester Harbour	Natural England
Not shown	1388	S	Chichester Harbour	Natural England

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

1

The following Special Area of Conservation (SAC) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SAC Name	Data Source
1	947	S	Solent Maritime	Natural England

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

1

The following Special Protection Area (SPA) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SPA Name	Data Source
2A	947	S	Chichester and Langstone Harbours	Natural England

8.5 Records of Ramsar sites within 2000m of the study site:

1

The following Ramsar records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ramsar Site Name	Ramsar Site Status	Data Source
6A	947	S	Chichester and Langstone Harbours	Listed	Natural England

8.6 Records of Ancient Woodland within 2000m of the study site:

17

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
19	942	N	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1102	N	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1245	N	UNKNOWN	Ancient Replanted Woodland
22	1296	NE	UNKNOWN	Ancient and Semi-Natural Woodland
23	1392	NE	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1537	NE	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1597	N	UNKNOWN	Ancient Replanted Woodland
Not shown	1615	N	UNKNOWN	Ancient Replanted Woodland
Not shown	1666	NE	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1694	N	UNKNOWN	Ancient and Semi-Natural Woodland
29	1723	E	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1747	NW	UNKNOWN	Ancient Replanted Woodland
Not shown	1752	N	UNKNOWN	Ancient and Semi-Natural Woodland
32	1776	E	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1785	NW	UNKNOWN	Ancient Replanted Woodland
34	1879	NE	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1944	NW	UNKNOWN	Ancient Replanted Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

6

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
7	222	S	Brook Meadow (Emsworth)	Natural England
8	225	S	Brook Meadow (Emsworth)	Natural England
9	346	S	Brook Meadow (Emsworth)	Natural England
10	479	S	Brook Meadow (Emsworth)	Natural England
Not shown	1453	S	Eames Farm	Natural England
Not shown	1668	S	Eames Farm	Natural England

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

1

The following Environmentally Sensitive Area records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	ESA Name	Data Source
Not shown	1772	NE	South Downs	Natural England

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

1

The following Area of Outstanding Natural Beauty (AONB) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	AONB/NSA Name	Data Source
17	609	S	Chichester Harbour	Natural England

8.11 Records of National Parks (NP) within 2000m of the study site:

1

The following National Park records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NP Name	Data Source
13	829	NE	South Downs	Natural England

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

3

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
14	0	On Site	Existing	DEFRA
15	368	N	Existing	DEFRA
16	881	SW	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a **Groundsure Geo Insight**, available from our [website](#). The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site?

Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site?

Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slight possibility for collapsible deposit problems after major changes in loading or groundwater conditions. Normal maintenance to avoid large amounts of water entering the ground through pipe leakage or soak-aways should reduce the likelihood of problems due to collapsible deposits. For new build, assess the possibility of collapsible (loessic) deposits in ground investigation. For existing property, no significant increase in insurance risk from collapsible deposits is likely.

9.1.6 Running Sand

What is the maximum Running Sand* hazard rating identified on the study site?

Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.

Is the property in an area where Radon Protection are required for new properties or extensions to existing

ones as described in publication BR211 by the Building Research Establishment?

No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Chalk	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered

Past underground mine workings are unlikely. The rock types present in these areas are such that mineral veins may be present on which it is possible that mining has been undertaken and/or it is possible that small scale underground extraction of other materials may have occurred. All such occurrences are likely to be of localised extent and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No

Guidance: No Guidance Required.

Contact Details

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general@wdeconsulting.co.uk



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**British
Geological Survey**

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**The Coal
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Web: <http://www.havant.gov.uk/>

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WDE Consulting Ltd

62a, WESTERN ROAD,
TRING, HP23 4BB

Report Reference: WDE-4345132

Your Reference: 17-515

Report Date 13 Oct 2017

Report Delivery Email - pdf
Method:

Geo Insight

Address: WESTWOOD CLOSE, EMSWORTH, PO10 7QL

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on (T) 08444 159 000 quoting the above report reference number.

Yours faithfully,

WDE Consulting

Enc.
Groundsure Geo Insight

Address: WESTWOOD CLOSE, EMSWORTH, PO10 7QL

Date: 13 Oct 2017

Reference: WDE-4345132

Client: WDE Consulting Ltd



Aerial Photograph Capture date: 20-Aug-2013
Grid Reference: 475256,106859
Site Size: 4.93ha

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale

1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	Yes
	1.2.2 Are there any records of landslide within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of faults within 500m of the study site boundary at 1:10,000 scale?	Yes

Section 2: Geology 1:50,000 Scale

2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslide within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults

2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.

2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?

Yes

2.3.3 Are there any records of faults within 500m of the study site boundary?

Yes

Section 3: Radon

3. Radon

3.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

3.2 Radon Protection

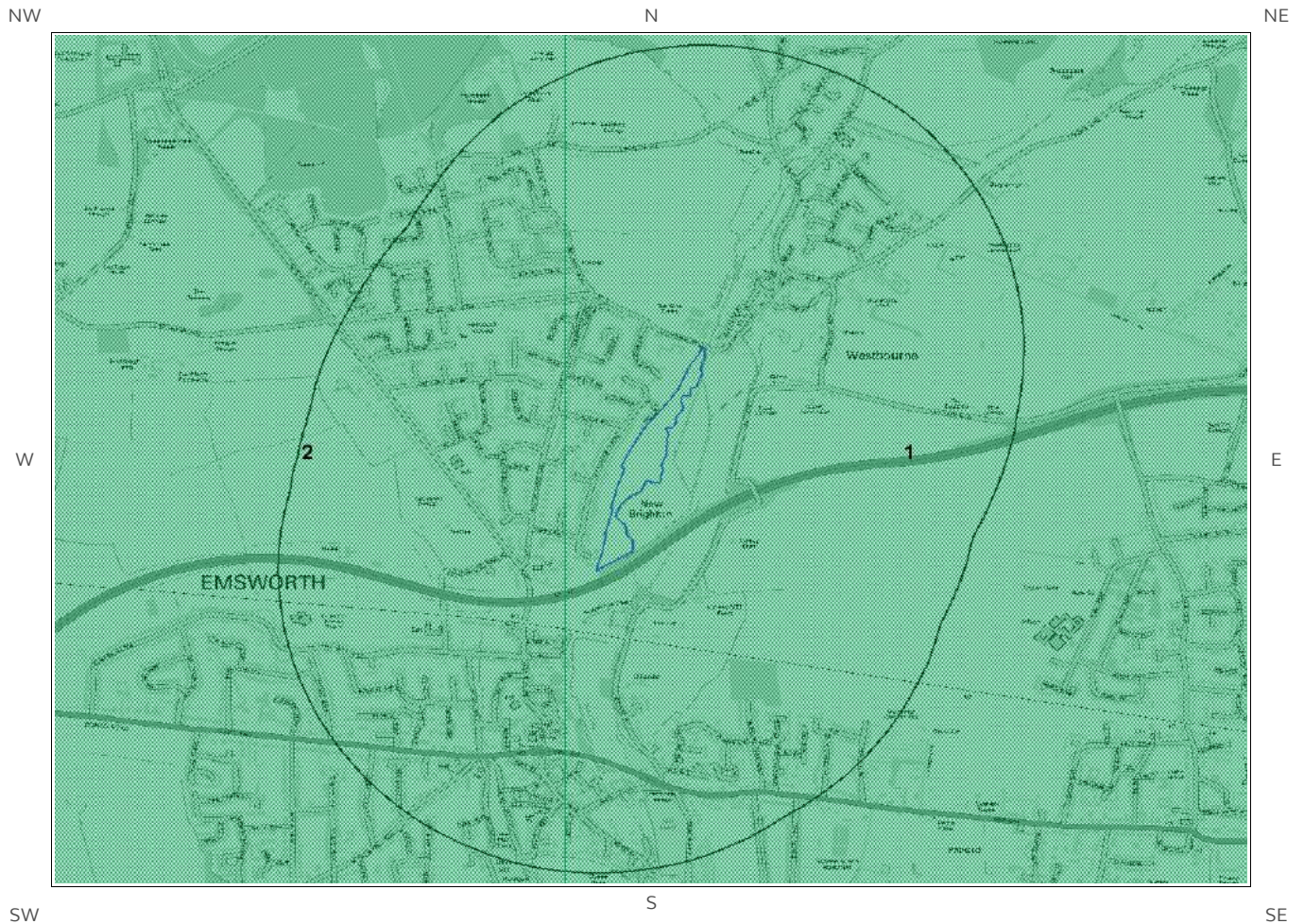
No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	1	0	22	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	1	1	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	1	0	1	3	1
5.5 Non-Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	1	3

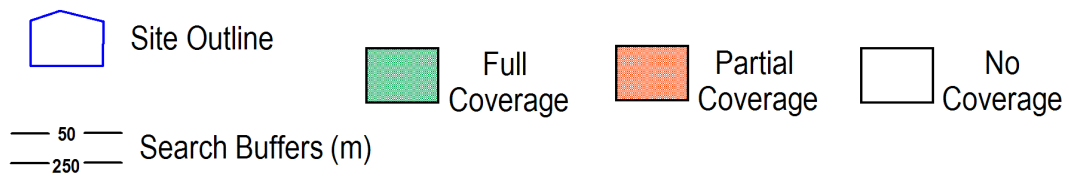
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Low				
6.2 Landslides	Very Low				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	Moderate				
6.5 Collapsible Deposits	Low				
6.5 Running Sand	Low				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	3	4	32		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	5	3	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched	
9.3 Historical Railways	0	0	0	Not Searched	
9.4 Active Railways	0	0	22	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	101.0	Some deposits are mapped	Full	Full	No coverage
N3	1487.0	Some deposits are mapped	Full	Full	No coverage
N4	1491.0	Some deposits are mapped	Full	Full	No coverage

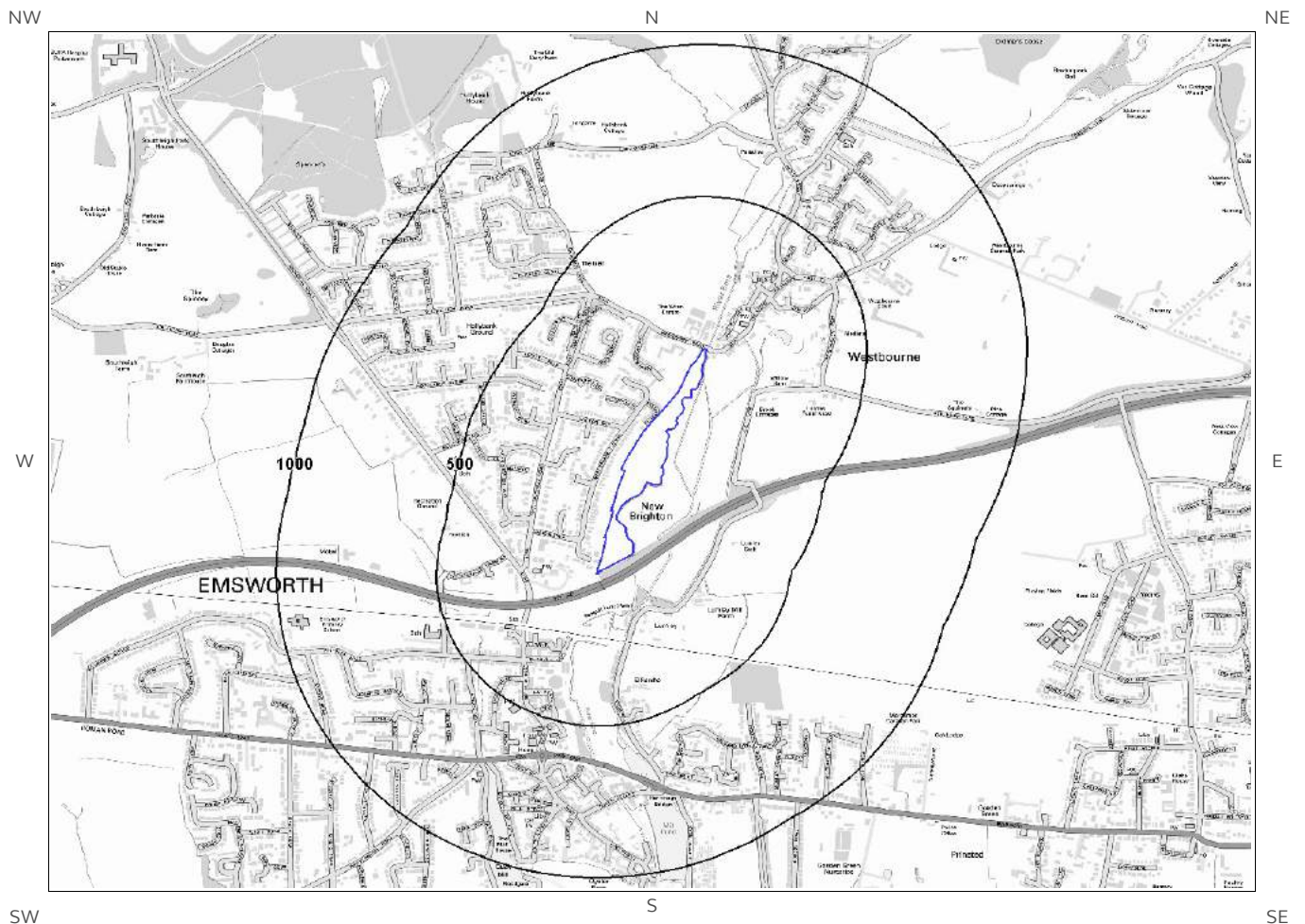
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

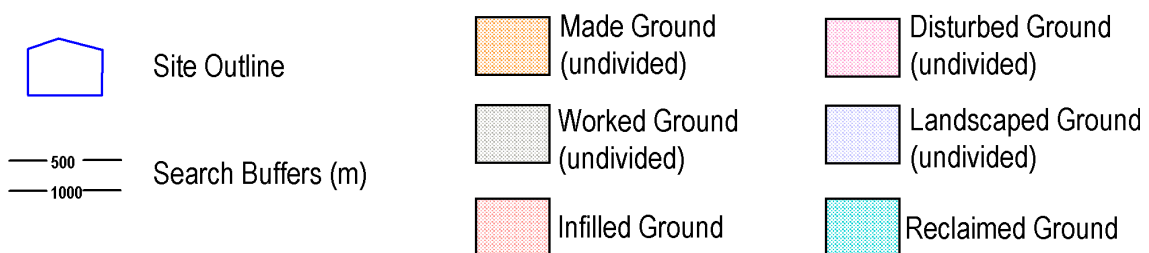
1 Geology (1:10,000 scale).

1.1 Artificial Ground Map (1:10,000 scale)



Artificial Ground Legend

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1. Geology 1:10,000 scale

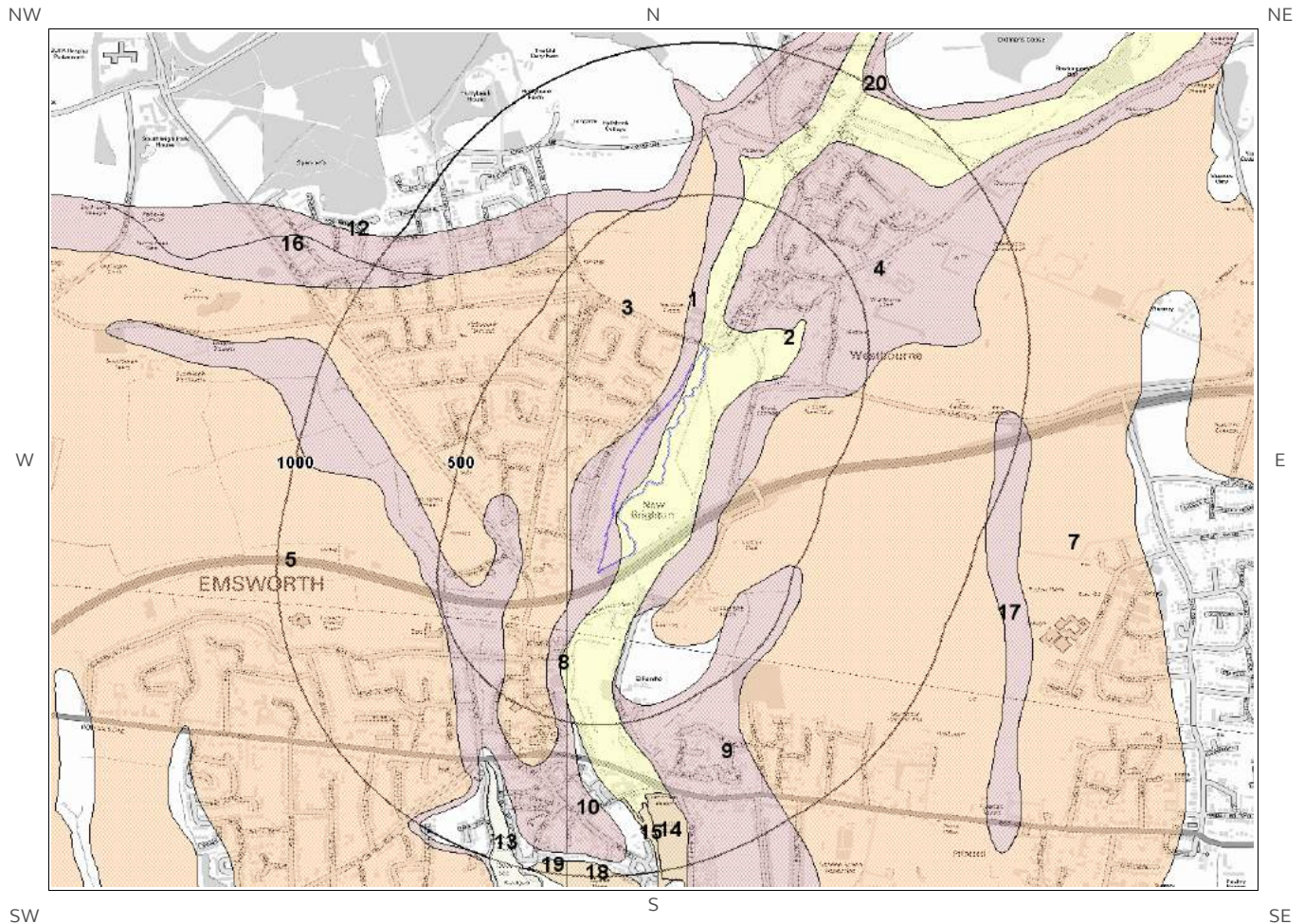
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

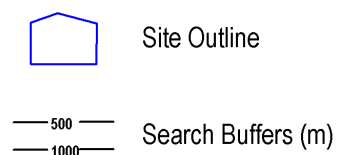
Database searched and no data found.

1.2 Superficial Deposits and Landslips Map (1:10,000 scale)



Artificial Ground Legend

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1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	HEAD-XVSZC	Head - Gravel, Sand, Silt And Clay	Gravel, Sand, Silt And Clay
2	0.0	On Site	ALV-XCZSV	Alluvium - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel
3	32.0	NW	RTDU-XSZC	River Terrace Deposits (undifferentiated) - Sand, Silt And Clay	Sand, Silt And Clay
4	94.0	NE	HEAD-XVSZC	Head - Gravel, Sand, Silt And Clay	Gravel, Sand, Silt And Clay
5	101.0	W	RTDU-XSZC	River Terrace Deposits (undifferentiated) - Sand, Silt And Clay	Sand, Silt And Clay
6	158.0	SW	HEAD-XCZSV	Head - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel
7	187.0	SE	RTDU-XSZC	River Terrace Deposits (undifferentiated) - Sand, Silt And Clay	Sand, Silt And Clay
8	267.0	S	ALV-XCZSV	Alluvium - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel
9	348.0	SE	HEAD-XVSZC	Head - Gravel, Sand, Silt And Clay	Gravel, Sand, Silt And Clay
10	413.0	S	HEAD-XVSZC	Head - Gravel, Sand, Silt And Clay	Gravel, Sand, Silt And Clay
11	475.0	N	HEAD-XCZSV	Head - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

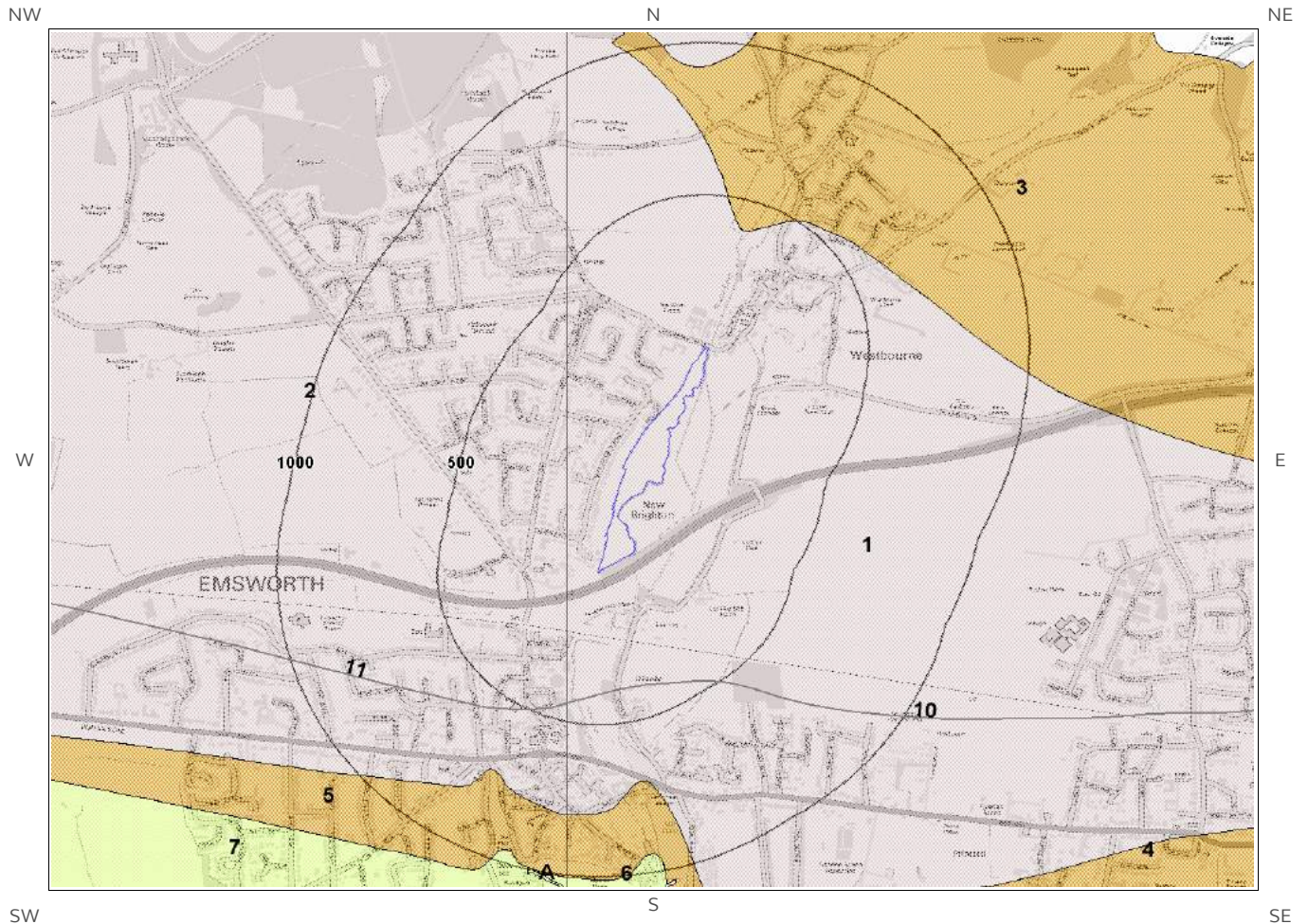
No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and Faults Map (1:10,000 scale)

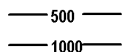


Bedrock and Faults Legend

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Site Outline



Search Buffers (m)

1.3 Bedrock and Faults

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	LC-CLSISA	London Clay Formation - Clay, Silt And Sand	Eocene Epoch
2	101.0	W	LC-CLSISA	London Clay Formation - Clay, Silt And Sand	Eocene Epoch
3	400.0	N	LMBE-CLAY	Lambeth Group - Clay	Paleocene Epoch

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? Yes

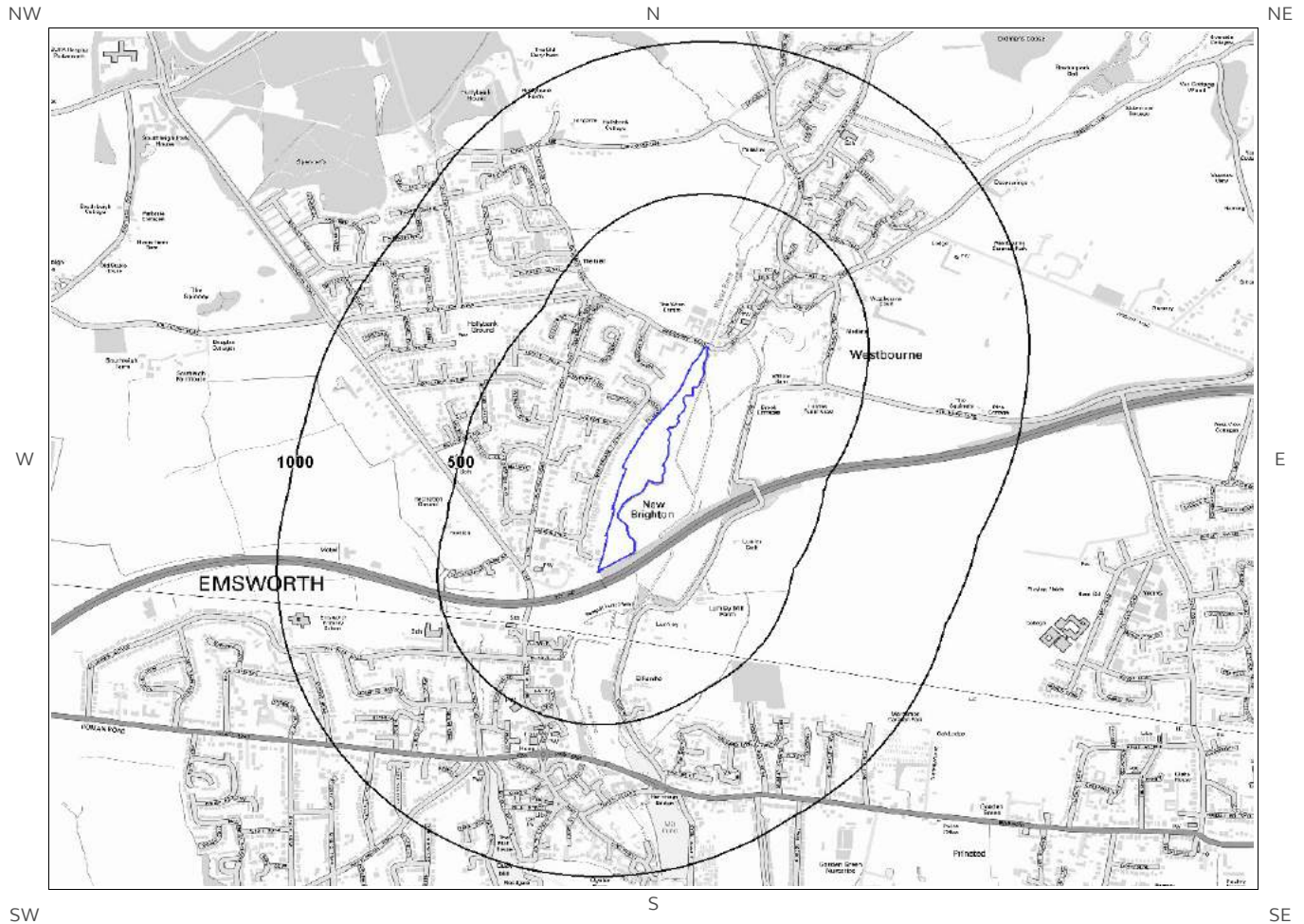
ID	Distance (m)	Direction	Category Description	Feature Description
10	388.0	S	FOLD_AXIS	Axial plane trace of major syncline
11	443.0	S	FOLD_AXIS	Axial plane trace of major syncline

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

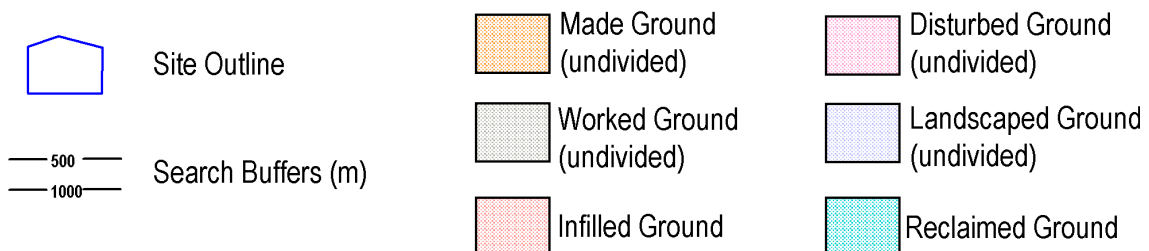
2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

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2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 316

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? No

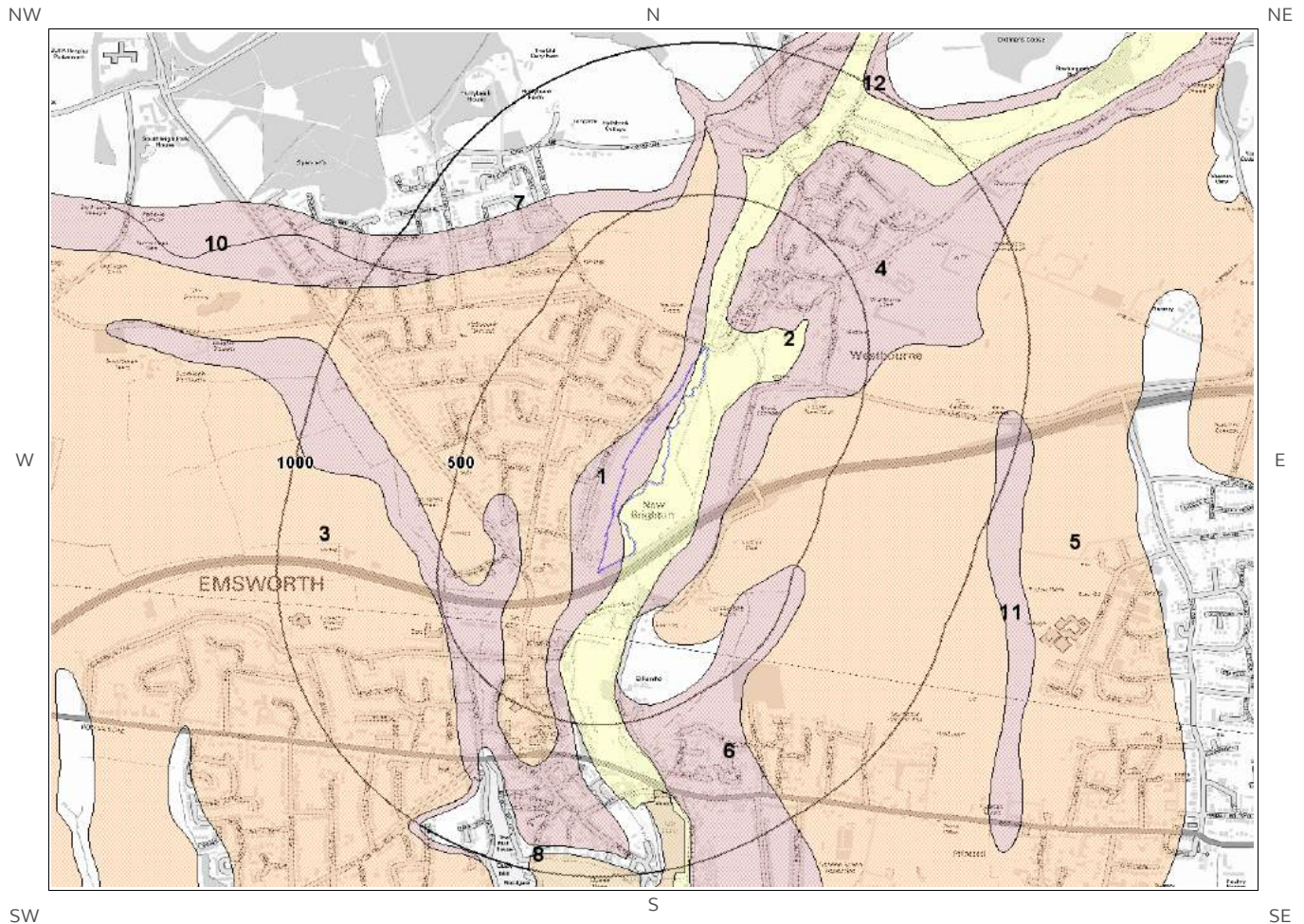
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

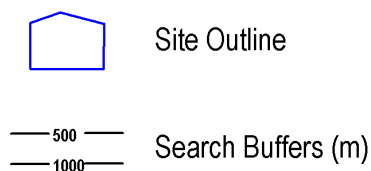
Database searched and no data found.

2.2 Superficial Deposits and Landslips Map (1:50,000 scale)



Ground Workings Legend

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2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	HEAD-XCV	HEAD	CLAY AND GRAVEL
2	0.0	On Site	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
3	28.0	NW	RTDU-XSZC	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	SAND, SILT AND CLAY
4	100.0	NE	HEAD-XCV	HEAD	CLAY AND GRAVEL
5	193.0	SE	RTDU-XSZC	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	SAND, SILT AND CLAY
6	344.0	S	HEAD-XCV	HEAD	CLAY AND GRAVEL
7	474.0	N	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	High	Very Low
0.0	On Site	Mixed	High	Low
28.0	NW	Intergranular	High	Low

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

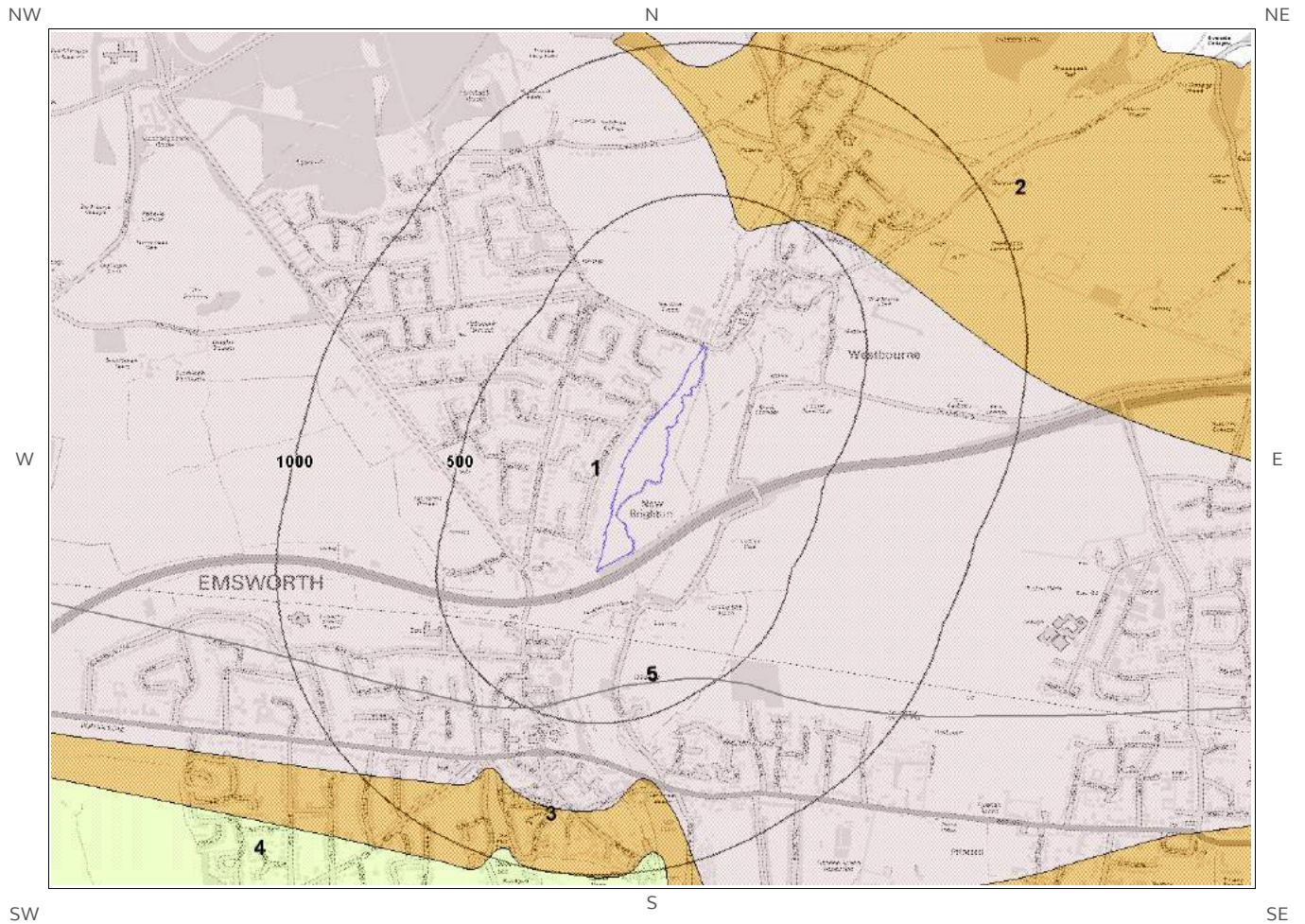
2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary?

No

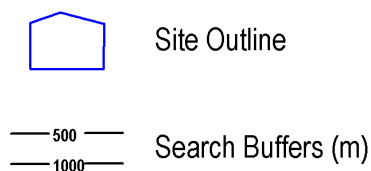
Database searched and no data found.

2.3 Bedrock and Faults Map (1:50,000 scale)



Ground Workings Legend

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2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 316

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	LC-XCZS	LONDON CLAY FORMATION - CLAY, SILT AND SAND	YPRESIAN
2	404.0	N	LMBE-XCZS	LAMBETH GROUP - CLAY, SILT AND SAND	THANETIAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Moderate	Very Low

2.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? Yes

ID	Distance	Direction	Category Description	Feature Description
5	386.0	S	FOLD_AXIS	Axial plane trace of major syncline

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

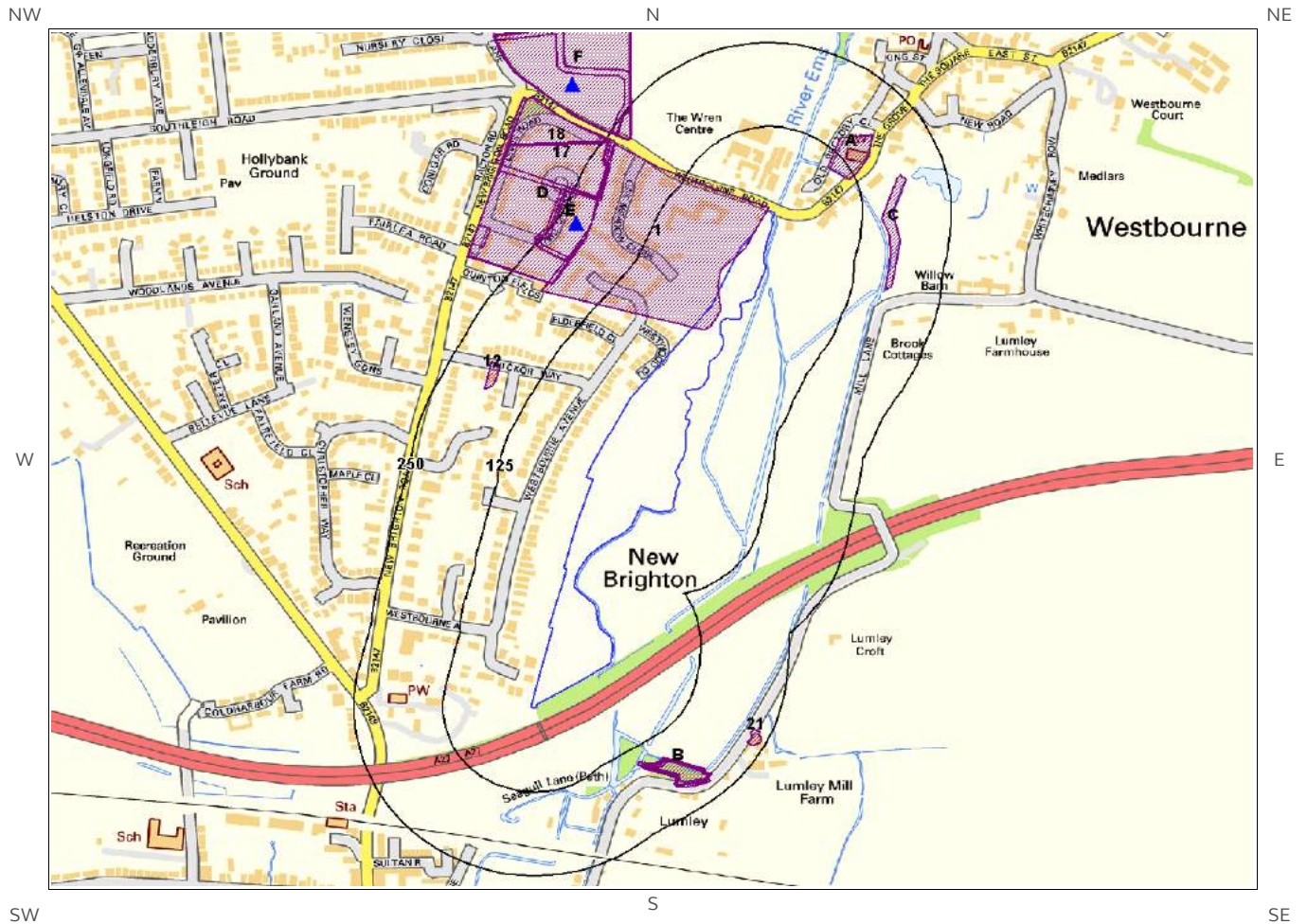
3.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

3.2 Radon Protection

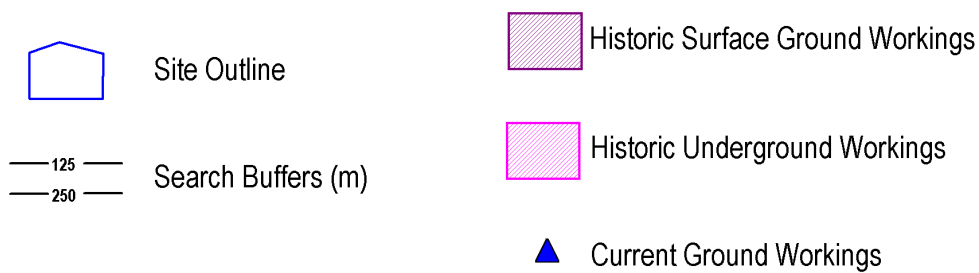
Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings Map



Ground Workings Legend

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4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1	0.0	On Site	475276 107191	Brick Field	1895
2A	102.0	NE	475551 107309	Grave Yard	1877
3A	102.0	NE	475551 107309	Grave Yard	1877
4B	145.0	SE	475302 106410	Pond	1932
5B	150.0	SE	475308 106393	Mill Pond	1896
6C	152.0	E	475612 107197	Pond	1973
7C	152.0	E	475612 107197	Pond	1990
8B	152.0	SE	475304 106391	Pond	1907
9B	152.0	SE	475305 106392	Mill Pond	1914
10B	153.0	SE	475306 106389	Pond	1877
11B	153.0	SE	475306 106389	Pond	1877
12	178.0	NW	475046 106984	Unspecified Pit	1914
13D	193.0	NW	475111 107226	Brick Works	1914
14D	195.0	NW	475111 107260	Brick Works	1907
15E	197.0	NW	475152 107208	Unspecified Heap	1914
16E	198.0	NW	475130 107207	Unspecified Ground Workings	1907
17	209.0	NW	475134 107287	Brick Field	1896
18	216.0	NW	475135 107325	Brick Field	1895
19F	220.0	NW	475145 107425	Brick Works	1910
20F	221.0	NW	475145 107425	Brick Works	1907
21	224.0	SE	475416 106444	Pond	1942

ID	Distance (m)	Direction	NGR	Use	Date
22F	240.0	NW	475145 107423	Unspecified Pit	1910
23F	242.0	NW	475237 107424	Unspecified Ground Workings	1907

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

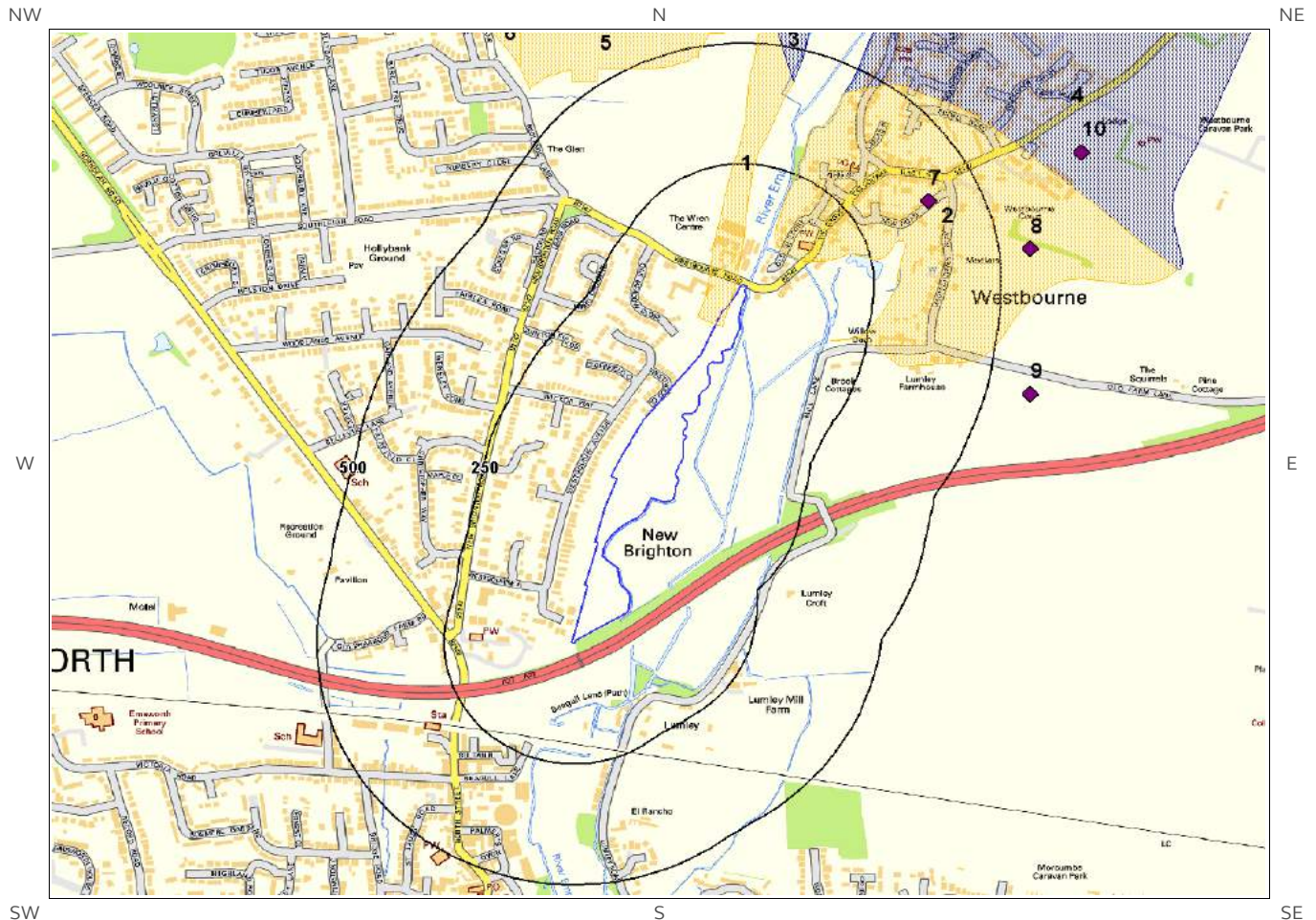
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
24E	226.0	NW	475163 107210	Clay & Shale	New Brighton Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
25F	334.0	NW	475158 107417	Clay & Shale	Westbourne Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Chalk	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
2	100.0	NE	Not available	Chalk	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
3	432.0	N	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
4	444.0	NE	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
5	474.0	N	Not available	Chalk	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered
6	625.0	NW	Not available	Chalk	Small scale underground mining may have occurred; mine adits, shafts and tunnels may be present. Potential for localised difficult ground conditions are at a level where they should be considered

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? Yes

The following Natural Cavities information provided by Peter Brett Associates:

ID	Distance (m)	Direction	NGR	Superficial Deposits	Bedrock Deposits	Cavity Type and Number
7	396.0	NE	475800 107400	Head Gravels	Chalk Group, Lambeth Group	Swallow Hole x 3
8	561.0	E	476000 107300	Head Gravels	Chalk Group, Lambeth Group	Swallow Hole x 1
9	586.0	E	476000 107000	Head Gravels	Chalk Group, Lambeth Group	Swallow Hole x 1
10	711.0	NE	476100 107500	Head	Chalk Group, Lambeth Group, London Clay Formation	Swallow Hole x 1

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

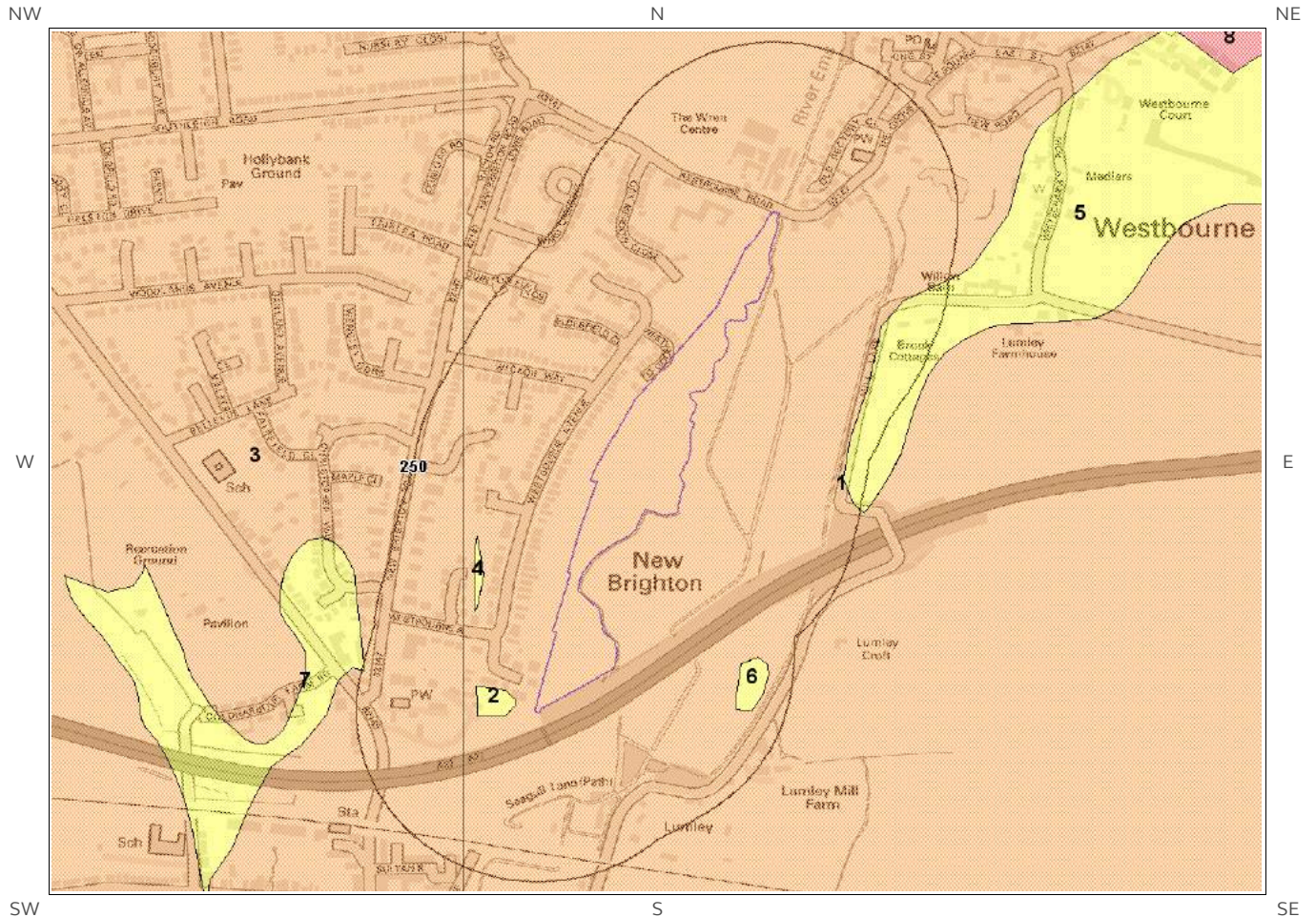
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map

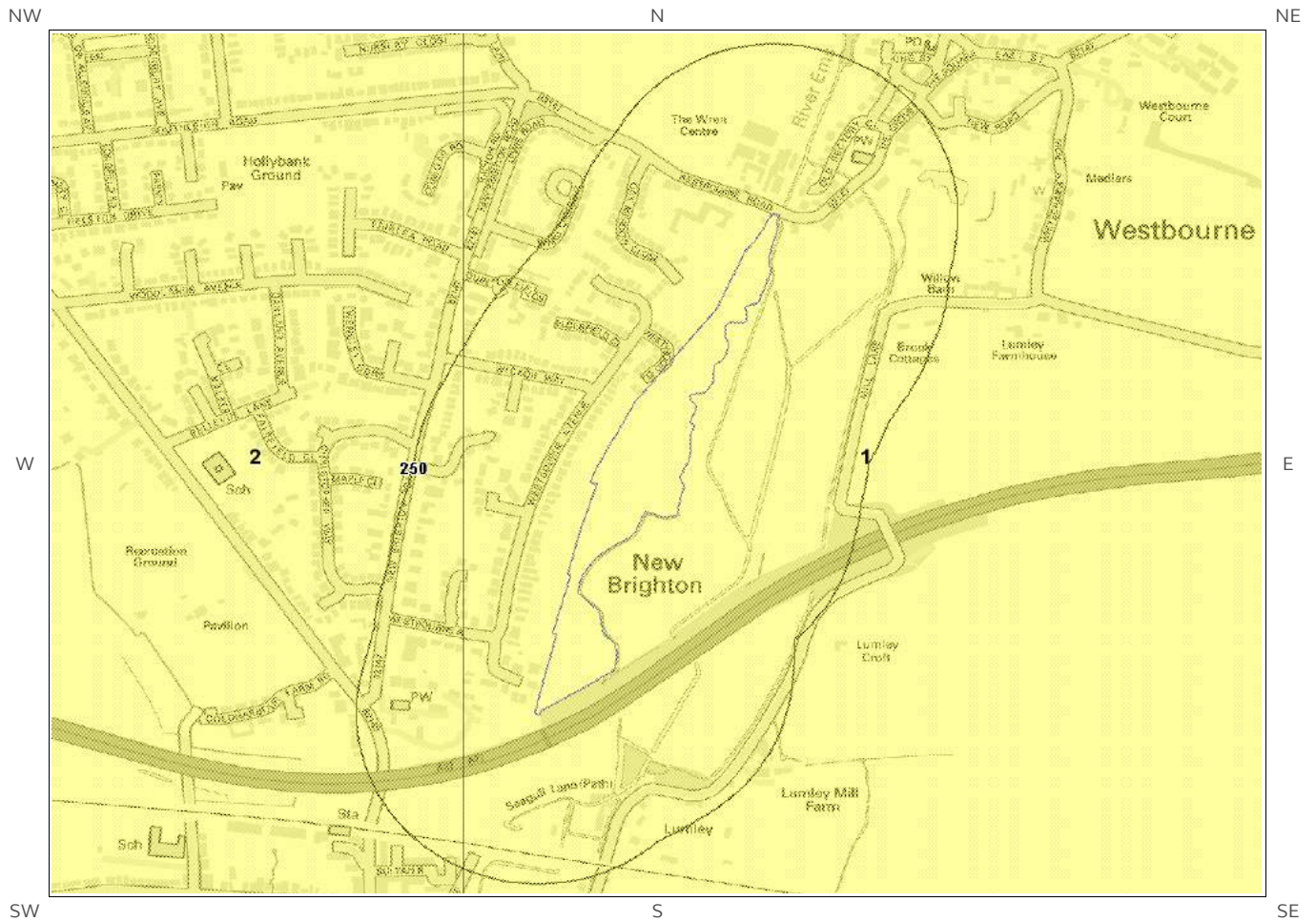


Shrink Swell Clay Legend

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6.2 Landslides Map

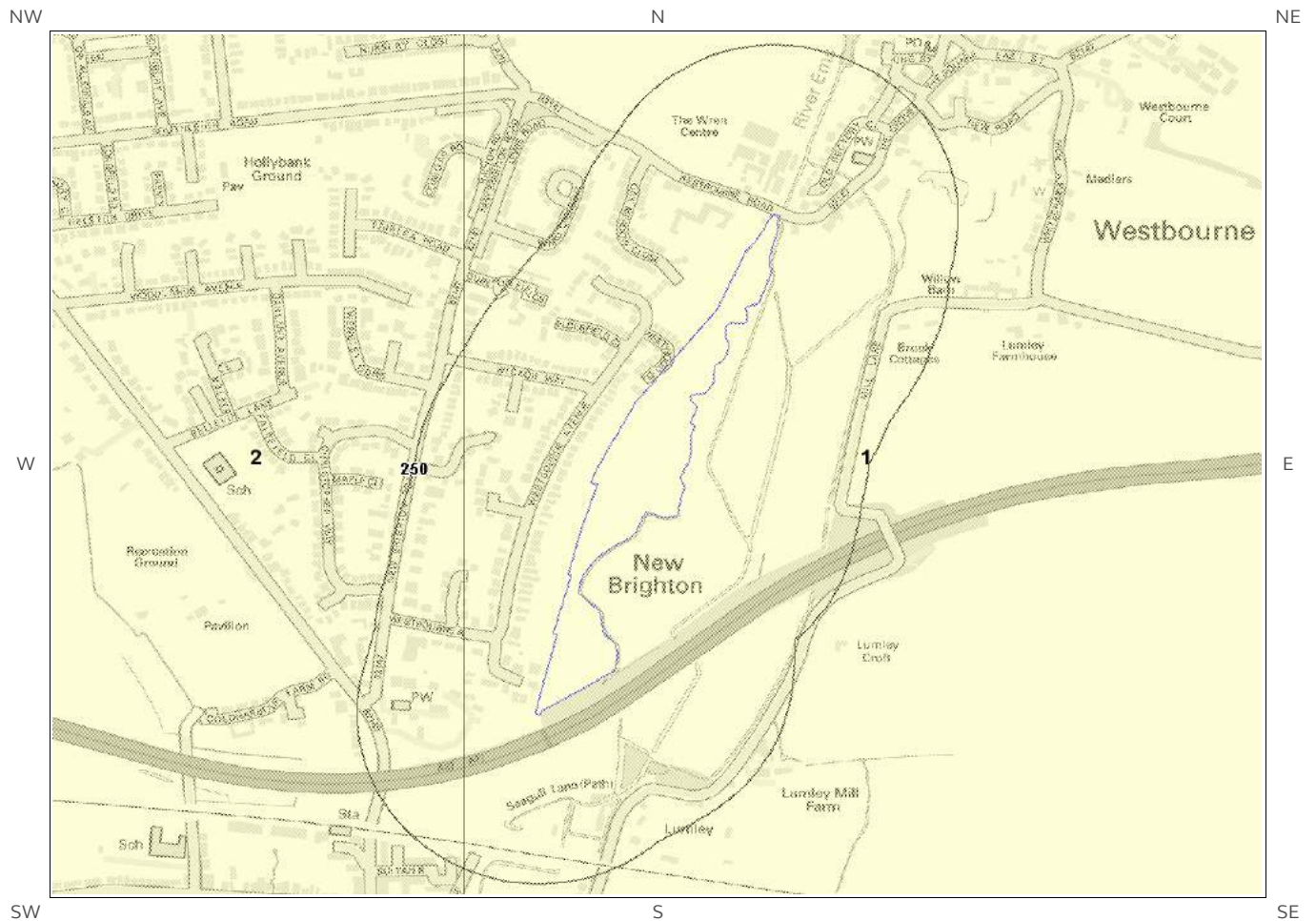


Landslides Legend

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6.3 Ground Dissolution of Soluble Rocks Map



**Ground Dissolution
Soluble Rocks Legend**

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The map shows the New Brighton area, with the River Embankment running vertically through the center. The area is divided into five numbered regions (1-5) and includes labels for 'New Brighton', 'Westbourne', 'River Embankment', and various landmarks like 'The Wharf Centre' and 'Lumley Mill Farm'. The map also shows the River Embankment and surrounding streets, including 'The Wharf Centre', 'Lumley Mill Farm', and 'Westbourne'. The map is divided into five numbered regions (1-5) and includes labels for 'New Brighton', 'Westbourne', 'River Embankment', and various landmarks like 'The Wharf Centre' and 'Lumley Mill Farm'.

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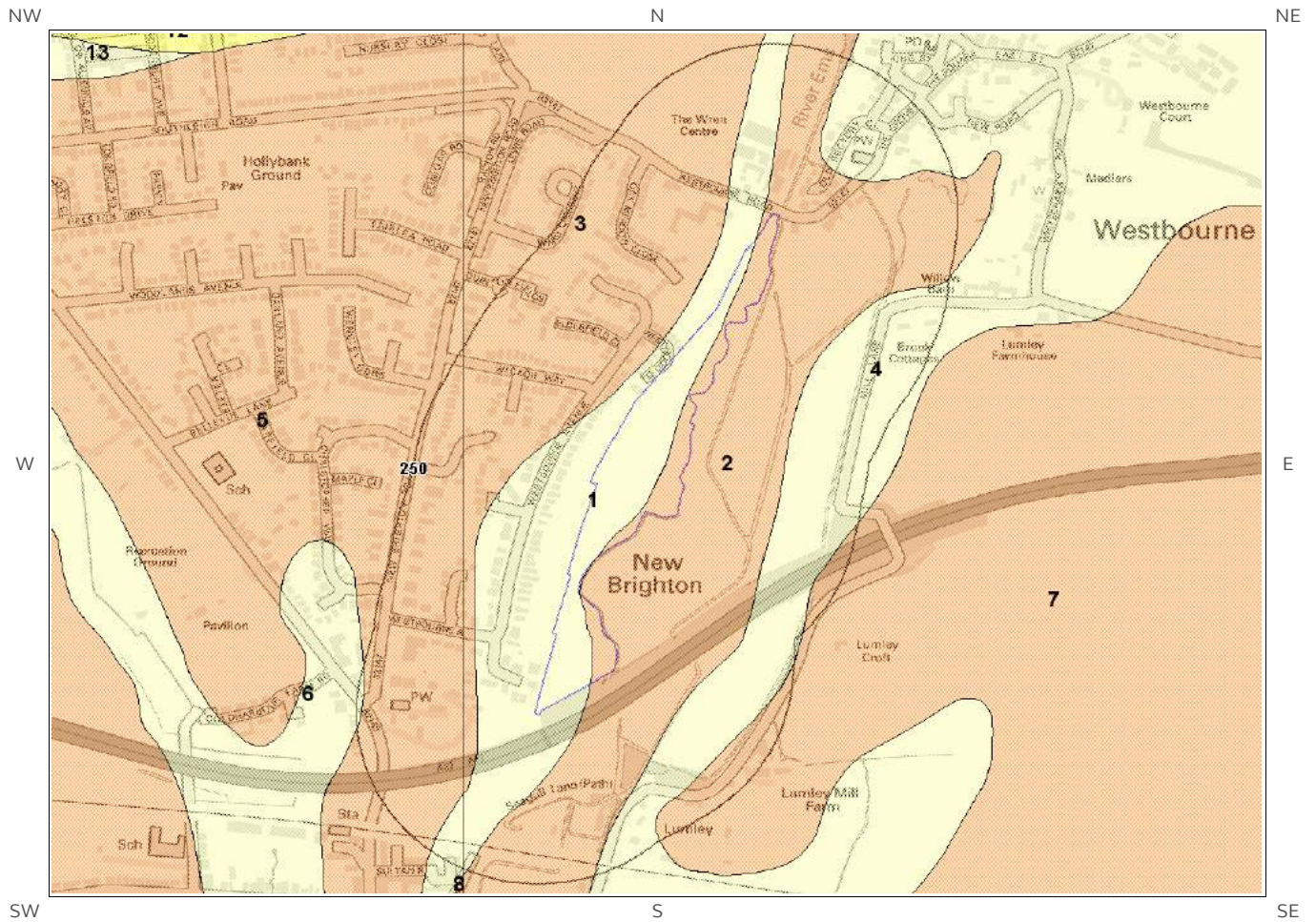


[illegible]

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6.6 Running Sand Map



Running Sand Legend

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6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site* boundary? Moderate

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.
2	29.0	W	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

* This includes an automatically generated 50m buffer zone around the site

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.
2	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

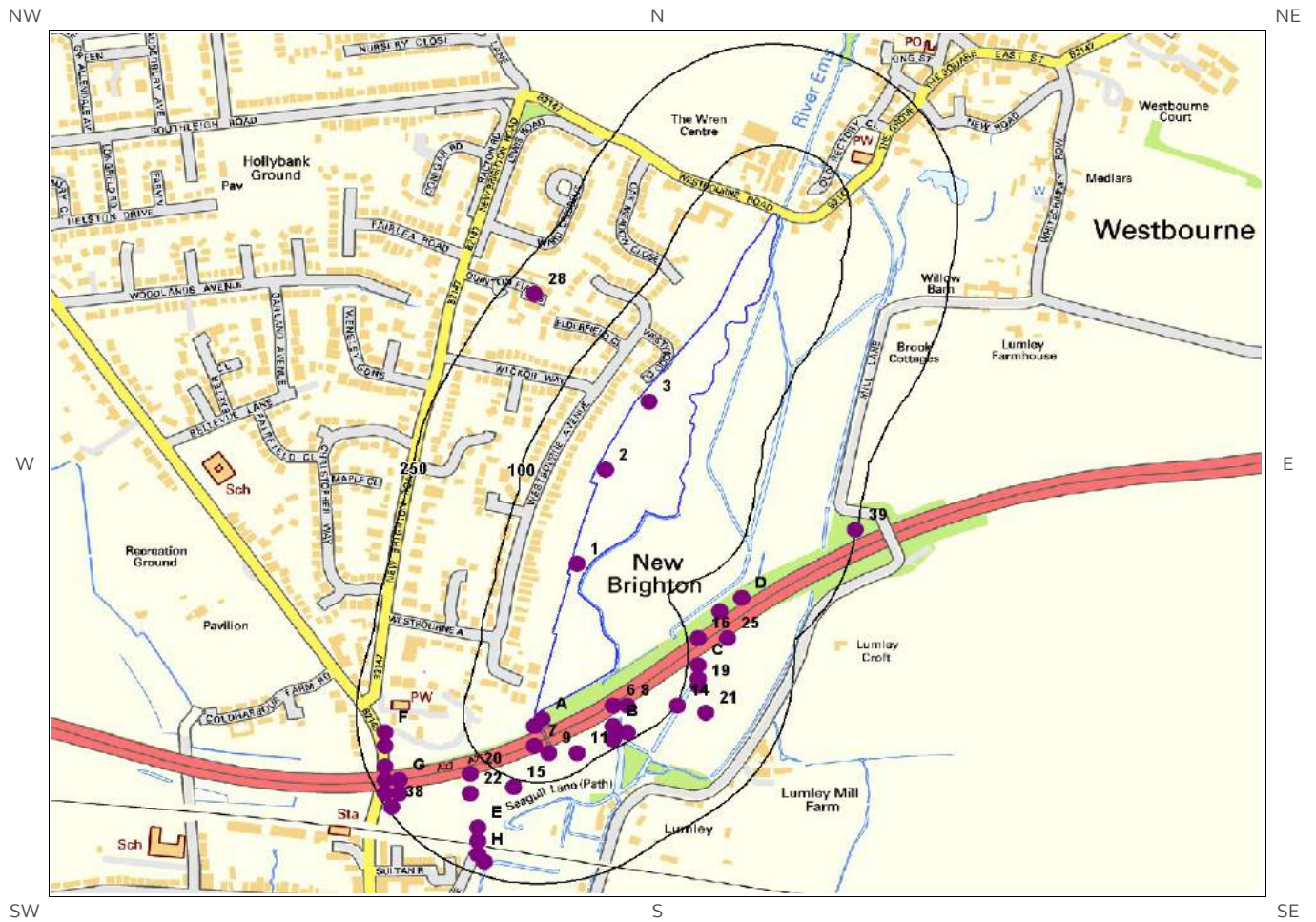
The following Collapsible Rocks information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
3	28.0	NW	Low	Slight possibility for collapsible deposit problems after major changes in loading or groundwater conditions. Normal maintenance to avoid large amounts of water entering the ground through pipe leakage or soak-aways should reduce the likelihood of problems due to collapsible deposits. For new build, assess the possibility of collapsible (loessic) deposits in ground investigation. For existing property, no significant increase in insurance risk from collapsible deposits is likely.

The following Running Sands information provided by the British Geological Survey:

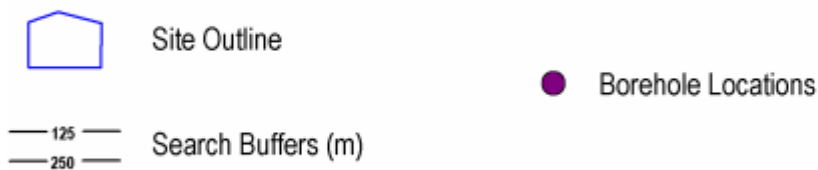
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
3	28.0	NW	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.

7 Borehole Records Map



Borehole Records Legend

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7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary:

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ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	0.0	On Site	475160 106710	SU70NE103	5.0	EMSWORTH RELIEF SEWER BH16
2	0.0	On Site	475200 106850	SU70NE104	5.0	EMSWORTH RELIEF SEWER BH17
3	0.0	On Site	475260 106950	SU70NE105	5.0	EMSWORTH RELIEF SEWER BH18
4A	8.0	S	475110 106480	SU70NE102	5.0	EMSWORTH RELIEF SEWER BH15
5A	18.0	S	475100 106470	SU70NE155	4.0	A27 HAVANT - CHICHESTER 612
6	44.0	SE	475210 106500	SU70NE10	10.0	A27 HAVANT TO CHICHESTER BH45
7	48.0	S	475100 106440	SU70NE7	5.0	A27 HAVANT TO CHICHESTER BH42
8	55.0	SE	475230 106500	SU70NE11	20.0	A27 HAVANT TO CHICHESTER BH46
9	59.0	S	475120 106430	SU70NE152	10.0	A27 HAVANT - CHICHESTER 601
10B	70.0	SE	475210 106470	SU70NE58	2.0	A27 HAVANT TO CHICHESTER TP 209
11	78.0	SE	475160 106430	SU70NE9	5.0	A27 HAVANT TO CHICHESTER BH44
12B	88.0	SE	475210 106450	SU70NE12	20.0	A27 HAVANT TO CHICHESTER BH47
13B	89.0	SE	475230 106460	SU70NE13	10.0	A27 HAVANT TO CHICHESTER BH48
14	103.0	SE	475300 106500	SU70NE14	10.0	A27 HAVANT TO CHICHESTER BH49
15	113.0	S	475070 106380	SU70NE8	25.0	A27 HAVANT TO CHICHESTER BH43
16	116.0	E	475330 106600	SU70NE60	2.0	A27 HAVANT TO CHICHESTER TP 211
17C	116.0	E	475330 106560	SU70NE15	10.0	A27 HAVANT TO CHICHESTER BH50
18C	119.0	E	475330 106540	SU70NE16	20.0	A27 HAVANT TO CHICHESTER BH51
19	121.0	E	475330 106530	SU70NE17	10.0	A27 HAVANT TO CHICHESTER BH52
20	127.0	SW	475010 106400	SU70NE5	5.1	A27 HAVANT TO CHICHESTER BH40
21	143.0	SE	475340 106490	SU70NE59	2.0	A27 HAVANT TO CHICHESTER TP 210
22	150.0	SW	475010 106370	SU70NE6	5.0	A27 HAVANT TO CHICHESTER BH41

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
23D	154.0	SE	475390 106660	SU70NE170	2.0	A27 HAVANT - CHICHESTER TP T308
24D	155.0	E	475360 106640	SU70NE169	2.5	A27 HAVANT - CHICHESTER TP T307
25	155.0	E	475370 106600	SU70NE18	5.0	A27 HAVANT TO CHICHESTER BH53
26E	187.0	SW	475020 106320	SU70NE101	6.0	EMSWORTH RELIEF SEWER BH14
27E	206.0	SW	475020 106300	SU70NE156	5.0	A27 HAVANT - CHICHESTER TP404
28	211.0	NW	475100 107110	SU70NE69	78.63	THE LAUNDRY 316/57 EMSWORTH
29F	213.0	W	474890 106460	SU70NW195	6.0	EMSWORTH RELIEF SEWER BH22
30G	215.0	SW	474910 106390	SU70NW40	30.0	A27 HAVANT TO CHICHESTER BH37
31F	216.0	W	474890 106440	SU70NW42	6.0	A27 HAVANT TO CHICHESTER BH39
32H	224.0	S	475020 106280	SU70NE157	6.0	A27 HAVANT - CHICHESTER TP405
33G	225.0	SW	474910 106370	SU70NW49	5.3	TRIAL PIT 208
34G	225.0	W	474890 106410	SU70NW302	20.0	A27 HAVANT - CHICHESTER B301
35H	230.0	S	475030 106270	SU70NE100	6.0	EMSWORTH RELIEF SEWER BH13
36G	233.0	SW	474890 106390	SU70NW37	20.0	A27 HAVANT TO CHICHESTER BH34
37G	242.0	SW	474890 106370	SU70NW38	35.0	A27 HAVANT TO CHICHESTER BH35
38	244.0	SW	474900 106350	SU70NW41	30.0	A27 HAVANT TO CHICHESTER BH38
39	248.0	E	475550 106760	SU70NE62	2.0	A27 HAVANT TO CHICHESTER TP 213

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/425338
#2: scans.bgs.ac.uk/sobi_scans/boreholes/425339
#3: scans.bgs.ac.uk/sobi_scans/boreholes/425340
#4A: scans.bgs.ac.uk/sobi_scans/boreholes/425337
#5A: scans.bgs.ac.uk/sobi_scans/boreholes/15624033
#6: scans.bgs.ac.uk/sobi_scans/boreholes/425245
#7: scans.bgs.ac.uk/sobi_scans/boreholes/425242
#8: scans.bgs.ac.uk/sobi_scans/boreholes/425246
#9: scans.bgs.ac.uk/sobi_scans/boreholes/15624026
#10B: scans.bgs.ac.uk/sobi_scans/boreholes/425293
#11: scans.bgs.ac.uk/sobi_scans/boreholes/425244
#12B: scans.bgs.ac.uk/sobi_scans/boreholes/425247
#13B: scans.bgs.ac.uk/sobi_scans/boreholes/425248
#14: scans.bgs.ac.uk/sobi_scans/boreholes/425249
#15: scans.bgs.ac.uk/sobi_scans/boreholes/425243
#16: scans.bgs.ac.uk/sobi_scans/boreholes/425295
#17C: scans.bgs.ac.uk/sobi_scans/boreholes/425250
#18C: scans.bgs.ac.uk/sobi_scans/boreholes/425251
#19: scans.bgs.ac.uk/sobi_scans/boreholes/425252
#20: scans.bgs.ac.uk/sobi_scans/boreholes/425240
#21: scans.bgs.ac.uk/sobi_scans/boreholes/425294
#22: scans.bgs.ac.uk/sobi_scans/boreholes/425241
#23D: scans.bgs.ac.uk/sobi_scans/boreholes/15624377
#24D: scans.bgs.ac.uk/sobi_scans/boreholes/15624374
#25: scans.bgs.ac.uk/sobi_scans/boreholes/425253
#26E: scans.bgs.ac.uk/sobi_scans/boreholes/425336
#27E: scans.bgs.ac.uk/sobi_scans/boreholes/15624034
#28: scans.bgs.ac.uk/sobi_scans/boreholes/425304
#29F: scans.bgs.ac.uk/sobi_scans/boreholes/425577
#30G: scans.bgs.ac.uk/sobi_scans/boreholes/425422
#31F: scans.bgs.ac.uk/sobi_scans/boreholes/425424
#32H: scans.bgs.ac.uk/sobi_scans/boreholes/15624040
#33G: scans.bgs.ac.uk/sobi_scans/boreholes/425431
#34G: scans.bgs.ac.uk/sobi_scans/boreholes/15624347
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#37G: scans.bgs.ac.uk/sobi_scans/boreholes/425420
#38: scans.bgs.ac.uk/sobi_scans/boreholes/425423
#39: scans.bgs.ac.uk/sobi_scans/boreholes/425297

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary:

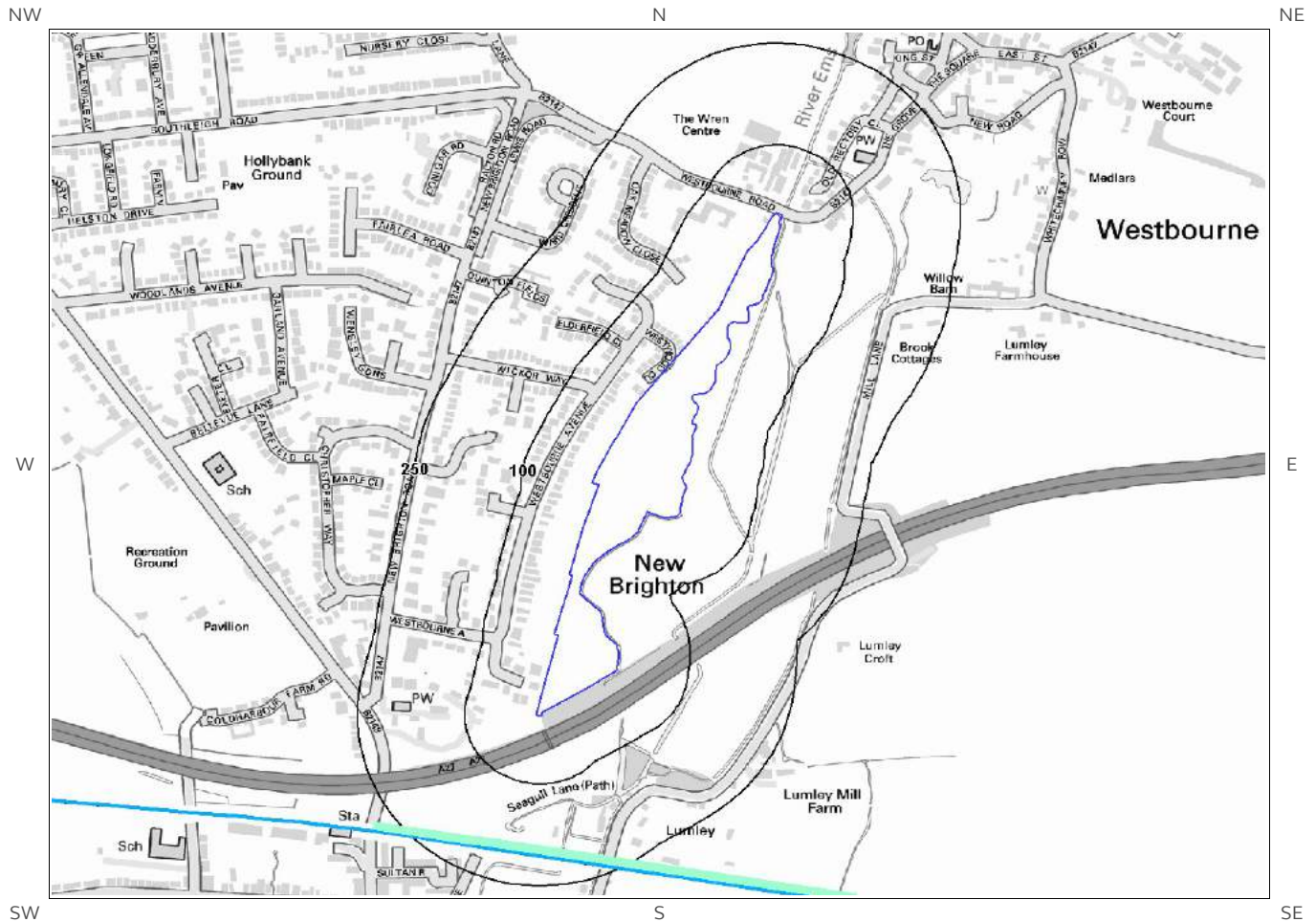
8

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
25.0	SE	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
28.0	NW	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
29.0	NW	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

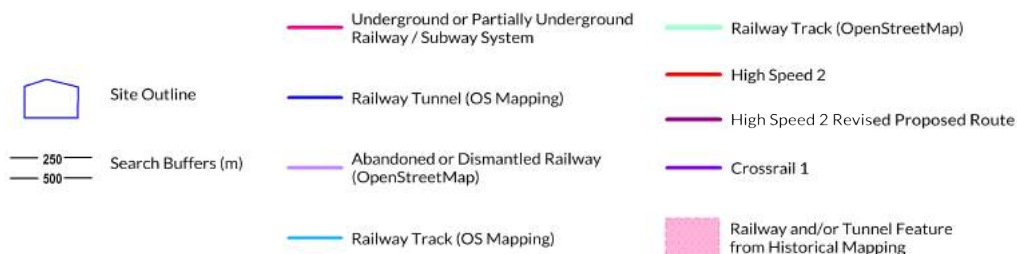
*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels Map



Railways and Tunnels Legend

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9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Name	Type
193	S	West Coastway Line	Rail
193	S	West Coastway Line	Rail
197	S	West Coastway Line	Rail
197	S	West Coastway Line	Rail
198	S	West Coastway Line	Rail
198	S	West Coastway Line	Rail
202	SW	West Coastway Line	Rail
202	SW	West Coastway Line	Rail
203	S	West Coastway Line	Rail
203	S	Not given	Multi Track
203	S	Not given	Multi Track
203	S	West Coastway Line	Rail
206	SW	West Coastway Line	Rail
206	SW	West Coastway Line	Rail
228	SE	West Coastway Line	Rail
228	SE	West Coastway Line	Rail
231	S	West Coastway Line	Rail
231	S	West Coastway Line	Rail
232	SE	West Coastway Line	Rail
232	SE	West Coastway Line	Rail
234	SE	West Coastway Line	Rail
234	SE	West Coastway Line	Rail

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

*Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a **Groundsure HS2 and Crossrail 1 Report**.*

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

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LE12 6HX



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Mansfield
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DX 716176 Mansfield 5
www.coal.gov.uk



The Coal
Authority

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
<https://www.gov.uk/government/organisations/public-health-england>
Email: enquiries@phe.gov.uk
Main switchboard: 020 7654 8000



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Johnson Poole & Bloomer Limited

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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: County Series

Map date: 1866

Scale: 1:10,560

Printed at: 1:10,560



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Edition N/A
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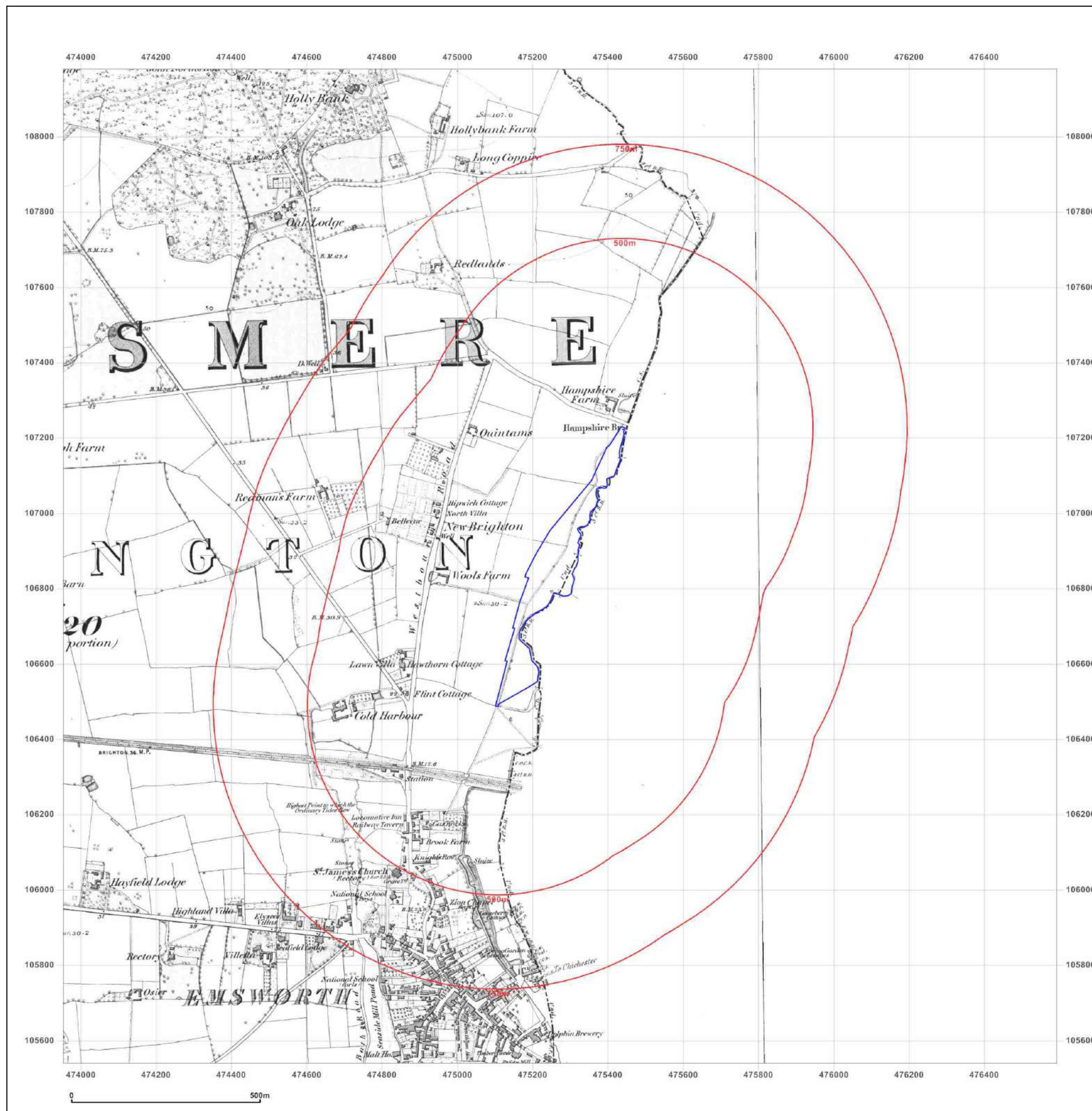


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Client Ref: 17-515
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Grid Ref: 475272, 106859

Map Name: County Series

Map date: 1875-1877

Scale: 1:10,560

Printed at: 1:10,560



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Surveyed 1877
Revised 1877
Edition N/A
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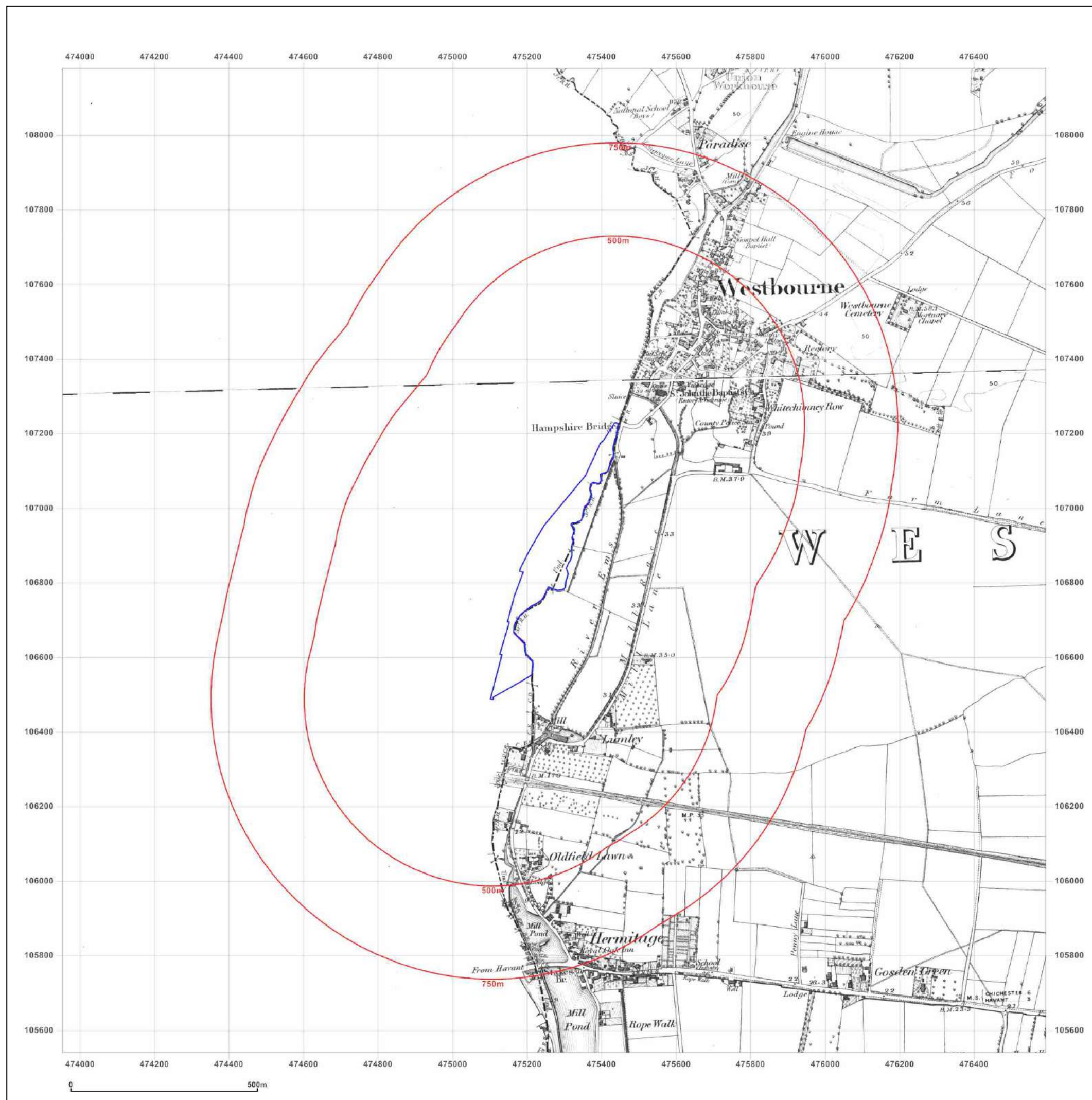


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: County Series

Map date: 1895-1896

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
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Edition N/A
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Surveyed 1875
Revised 1896
Edition N/A
Copyright N/A
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Surveyed 1873
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

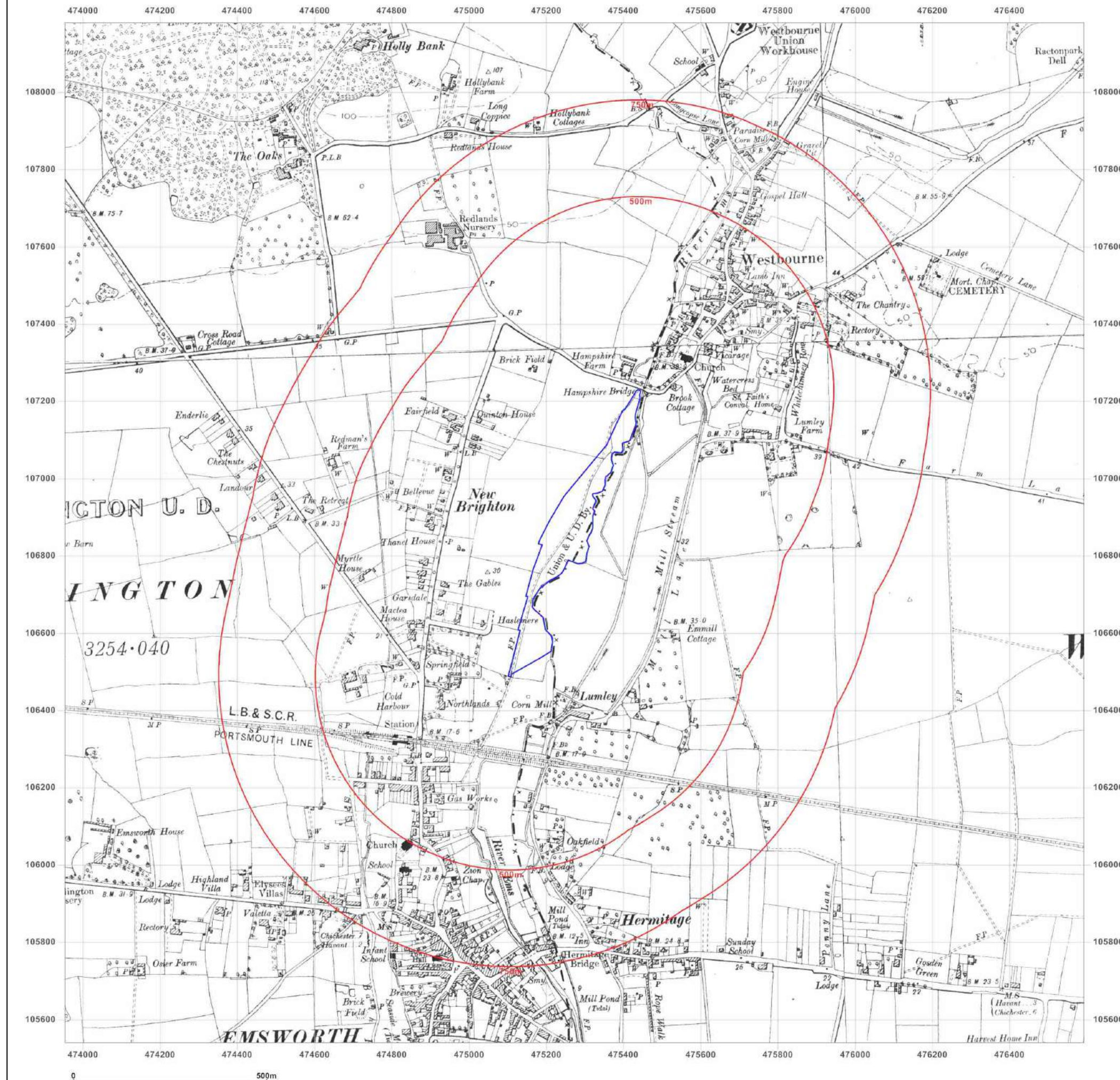


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: County Series

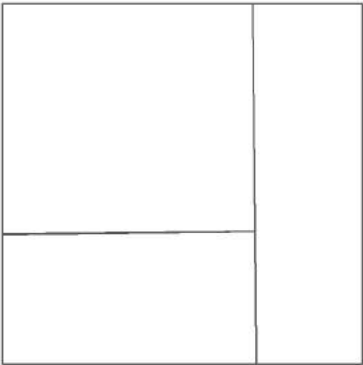
Map date: 1896-1898

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
Revised 1895
Edition 1898
Copyright N/A
Levelled N/A



Surveyed 1866
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

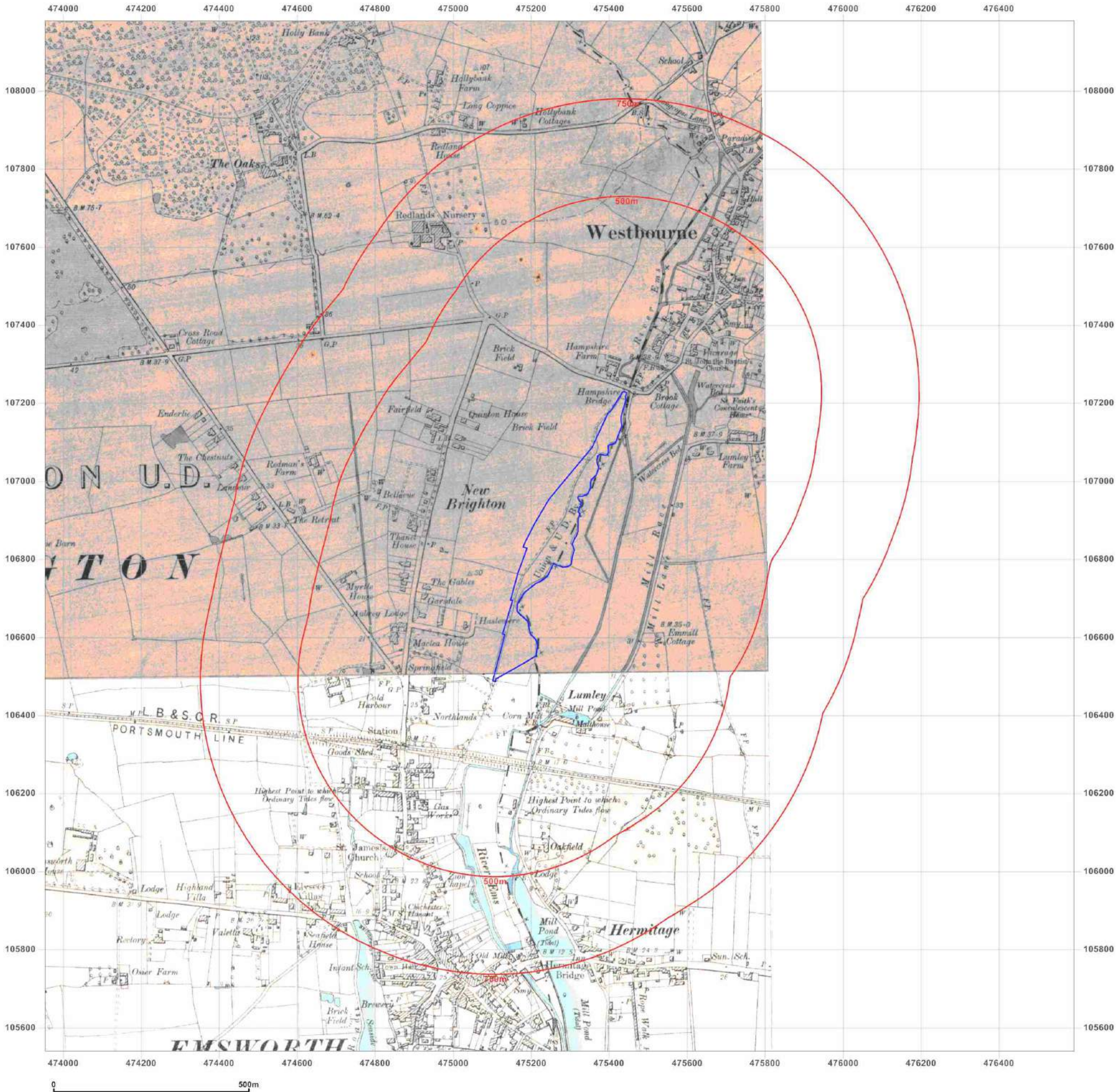


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: County Series

Map date: 1907

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1865
Revised 1907
Edition N/A
Copyright N/A
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Surveyed 1865
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A

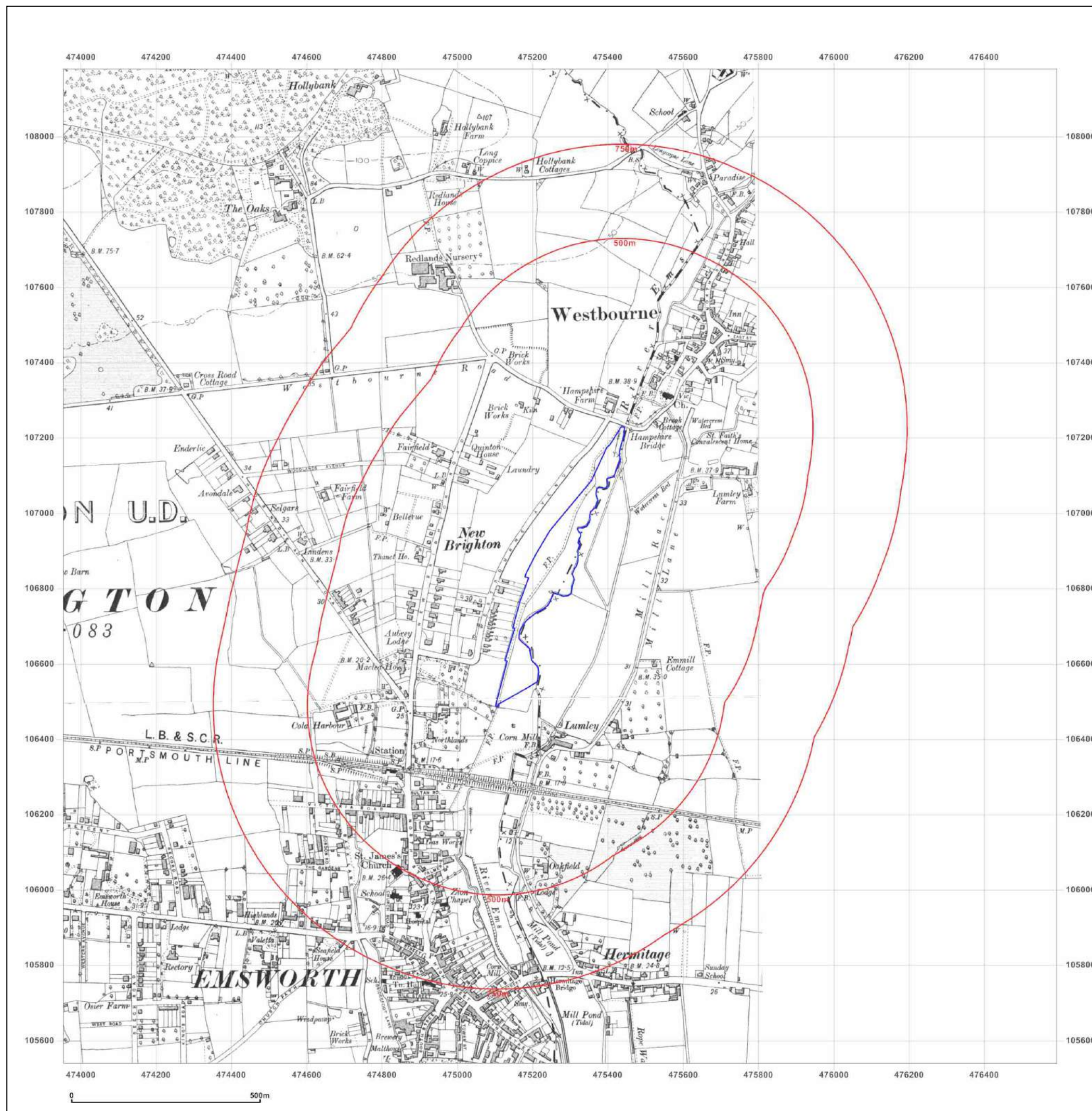


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: County Series

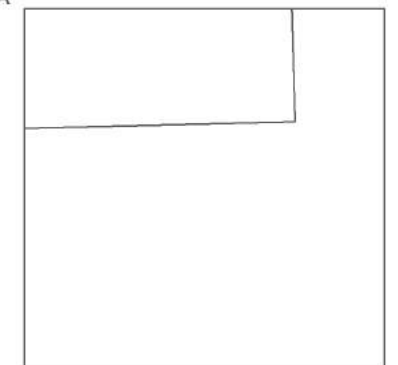
Map date: 1910

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
Revised 1910
Edition N/A
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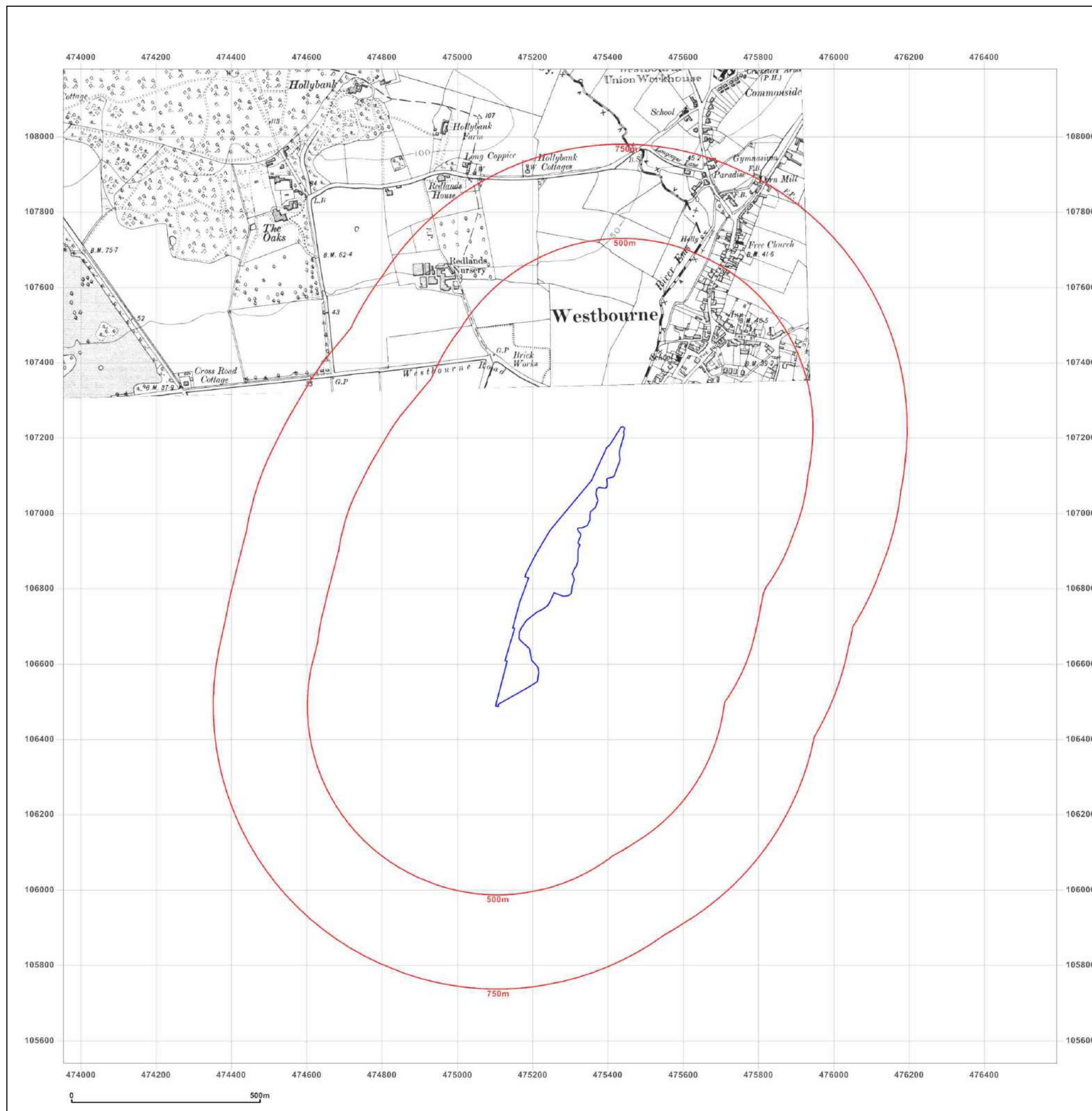


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Map Name: County Series

Map date: 1910-1914

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
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Revised 1914
Edition N/A
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Revised 1914
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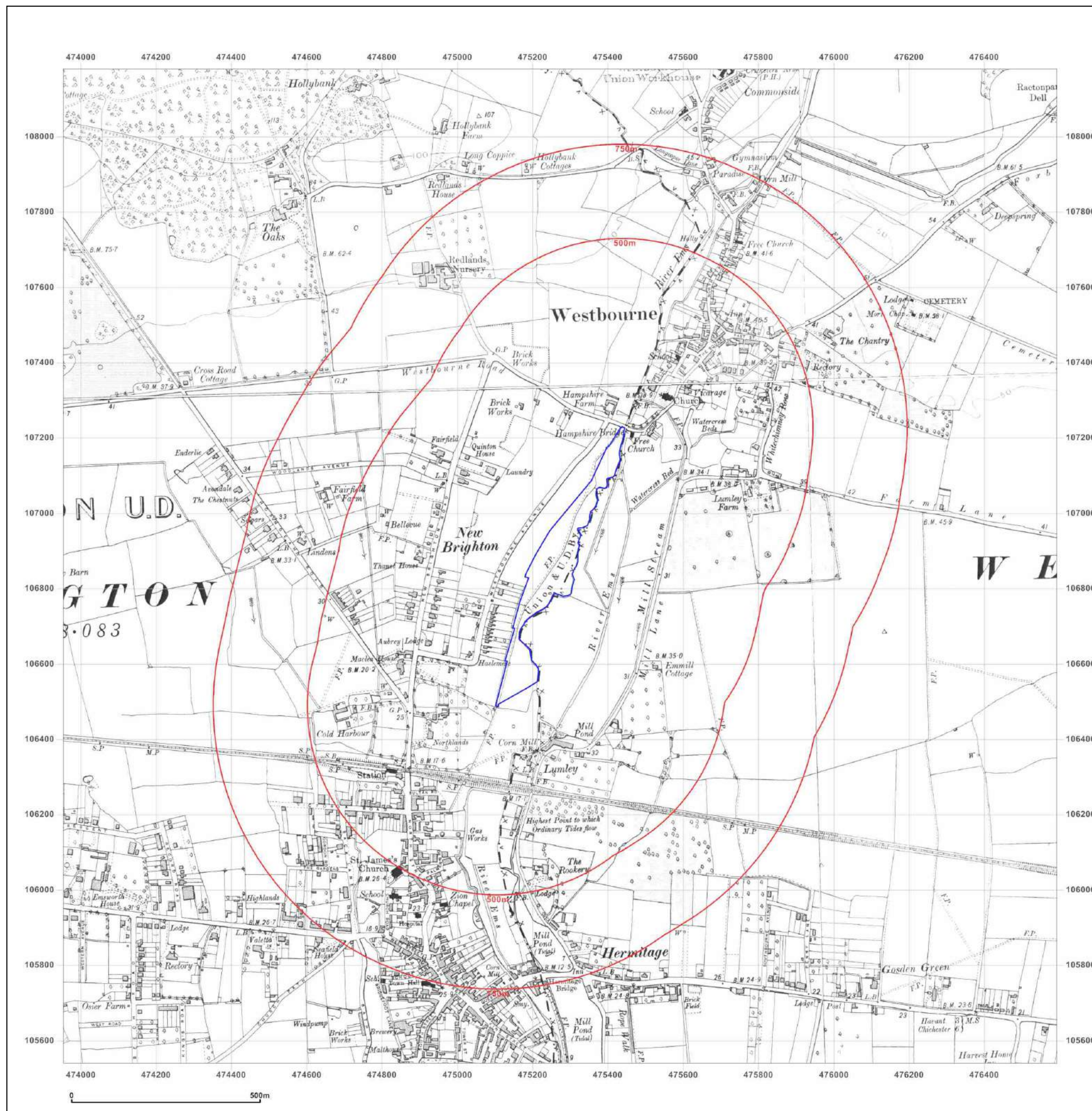


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: County Series

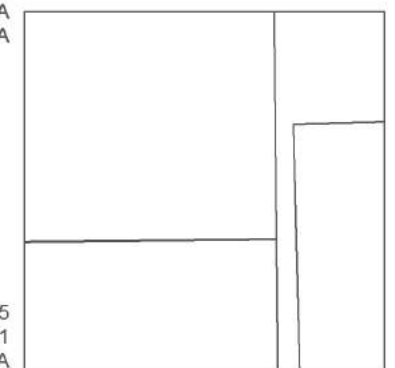
Map date: 1931-1932

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1865
Revised 1931
Edition N/A
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Surveyed 1865
Revised 1931
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1873
Revised 1932
Edition N/A
Copyright N/A
Levelled N/A

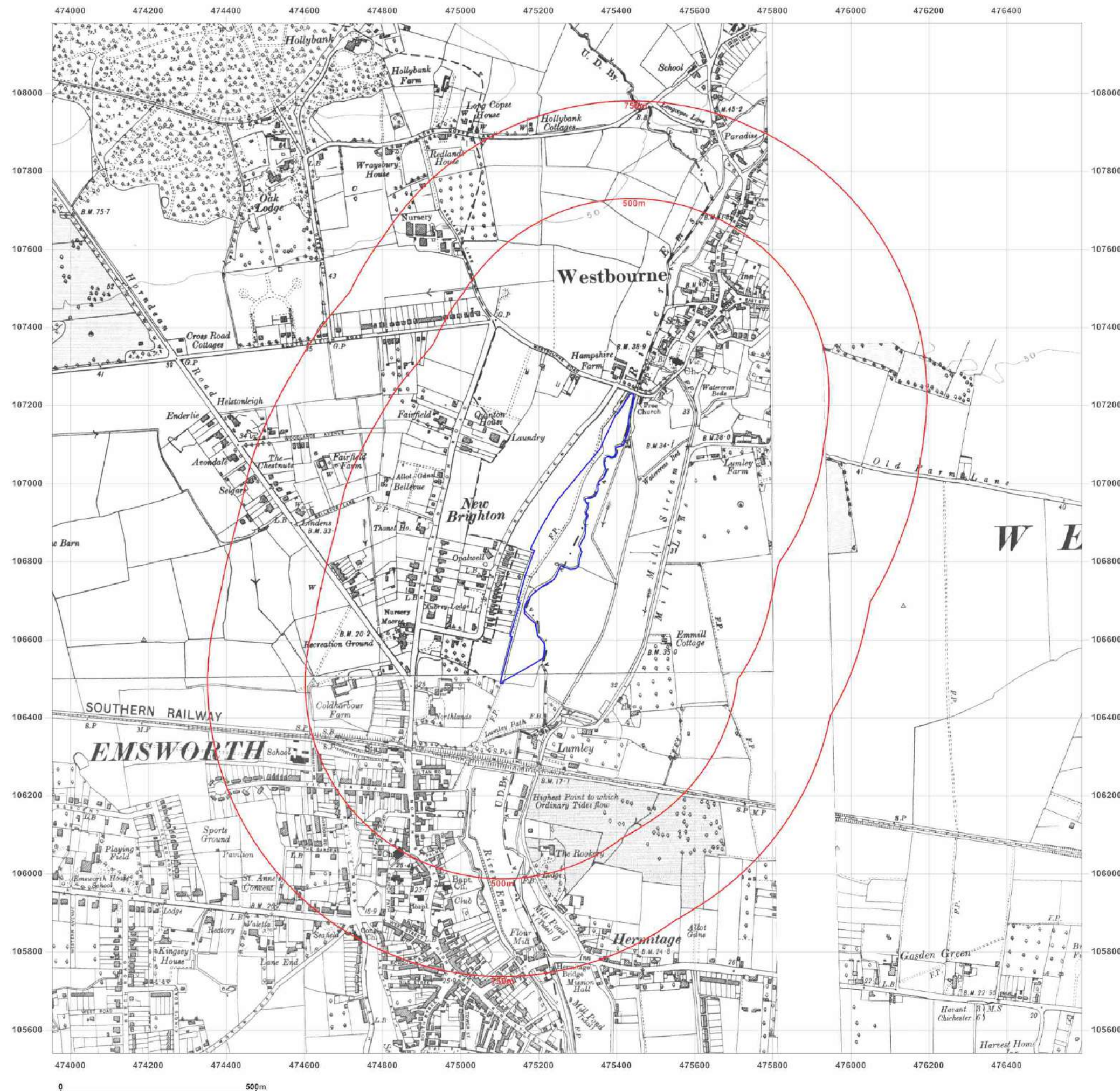


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: County Series

Map date: 1938-1942

Scale: 1:10,560

Printed at: 1:10,560



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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: Provisional

Map date: 1962-1963

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
Revised 1957
Edition N/A
Copyright 1963
Levelled N/A

Surveyed N/A
Revised 1961
Edition N/A
Copyright 1962
Levelled N/A

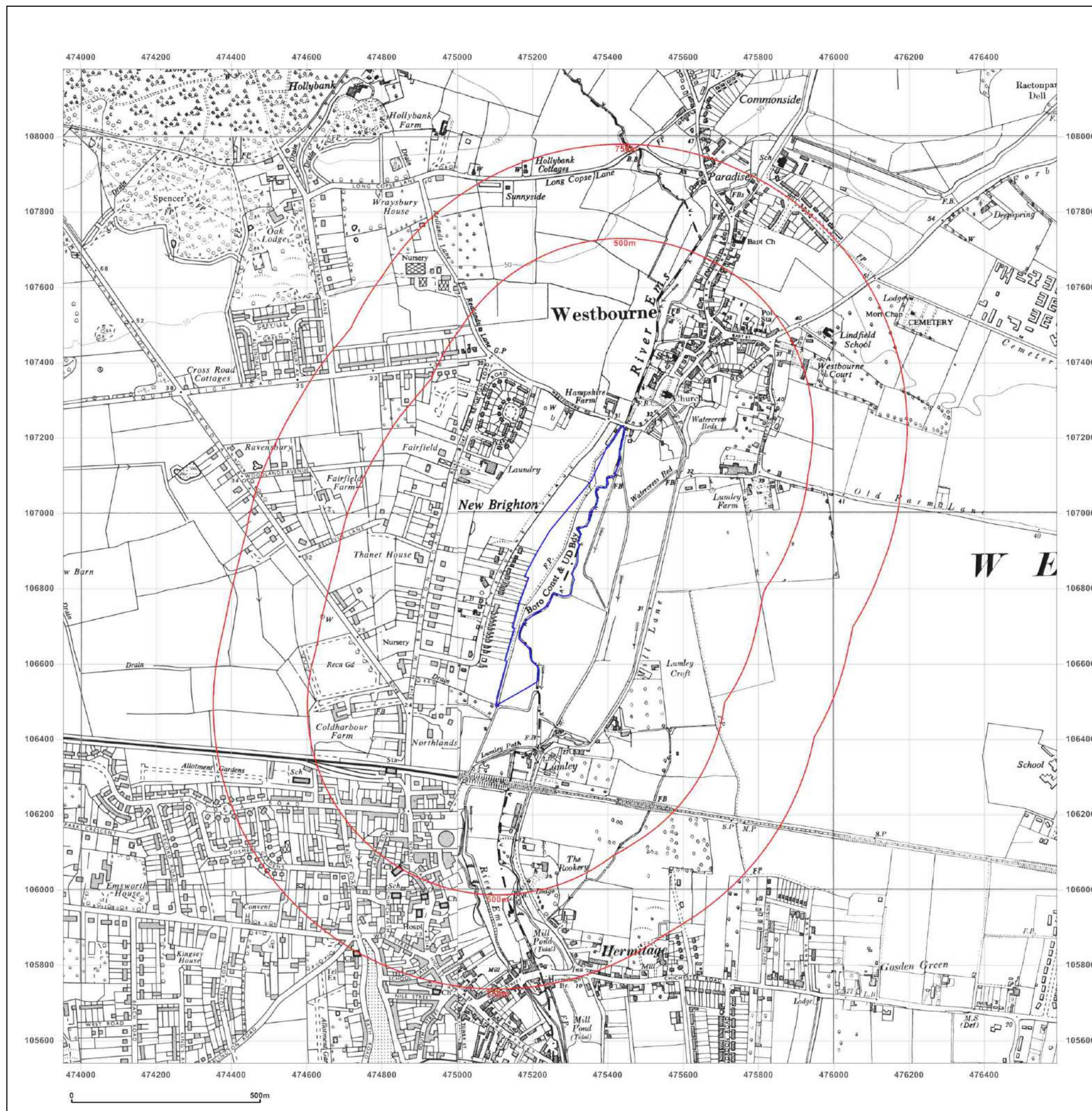


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: Provisional

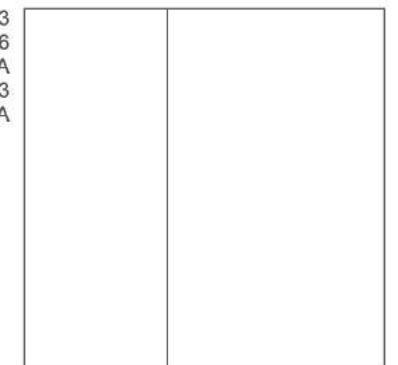
Map date: 1966

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
Revised 1966
Edition N/A
Copyright 1963
Levelled N/A

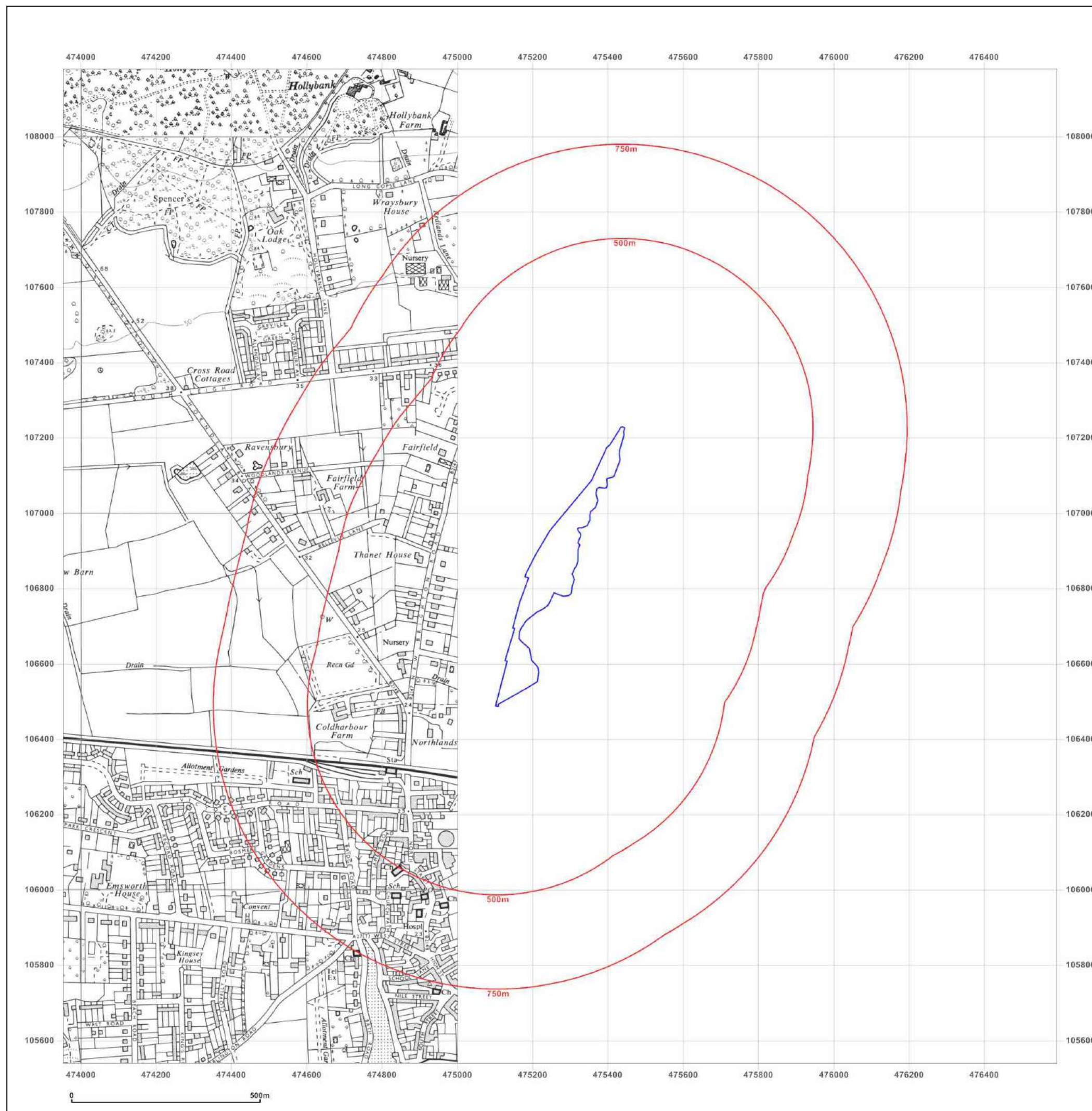


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: National Grid

Map date: 1973-1975

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1973
Revised 1975
Edition N/A
Copyright 1975
Levelled 1962

Surveyed 1969
Revised 1973
Edition N/A
Copyright 1973
Levelled N/A

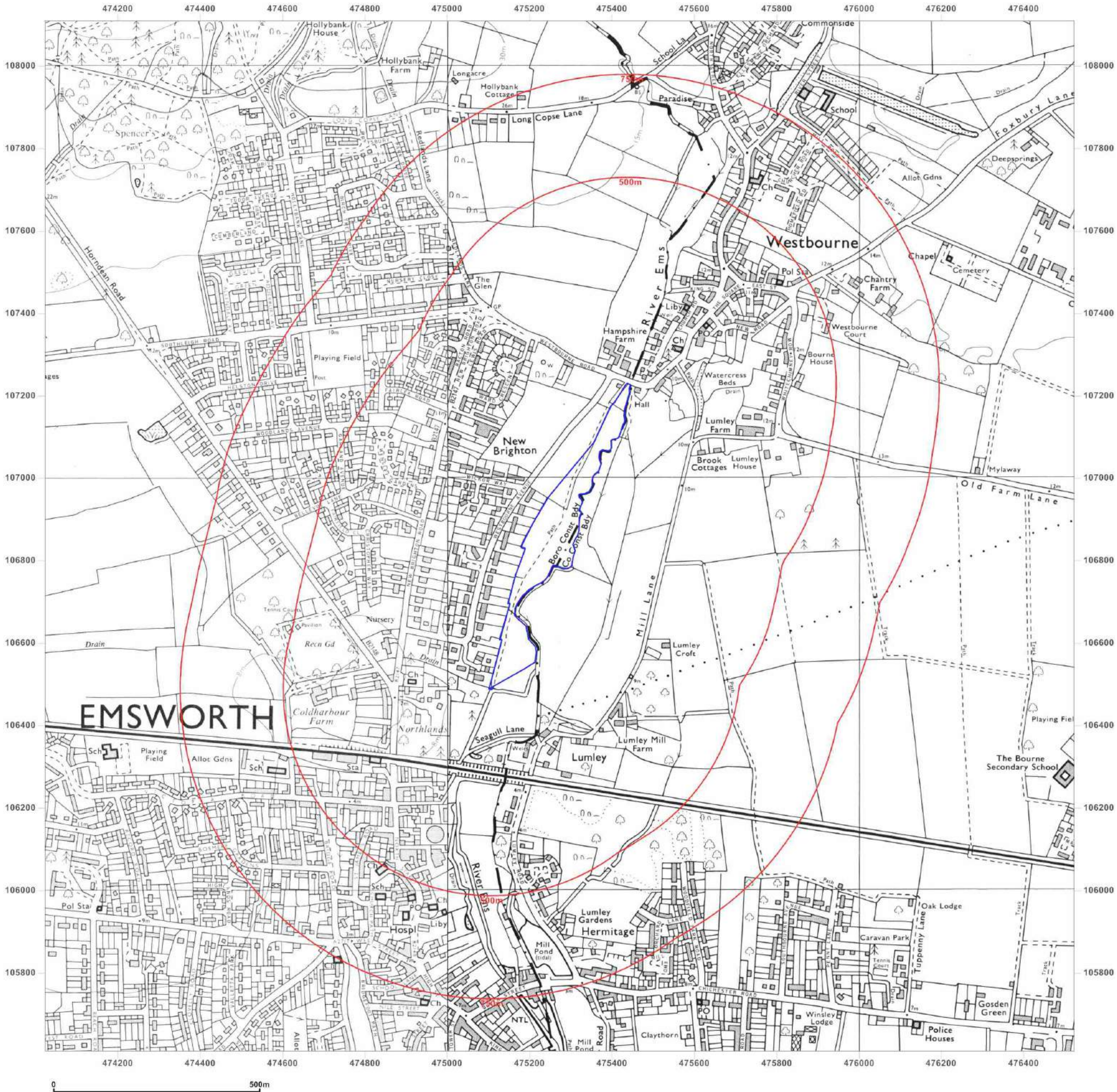


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: National Grid

Map date: 1990-1991

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1989
Revised 1991
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1969
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

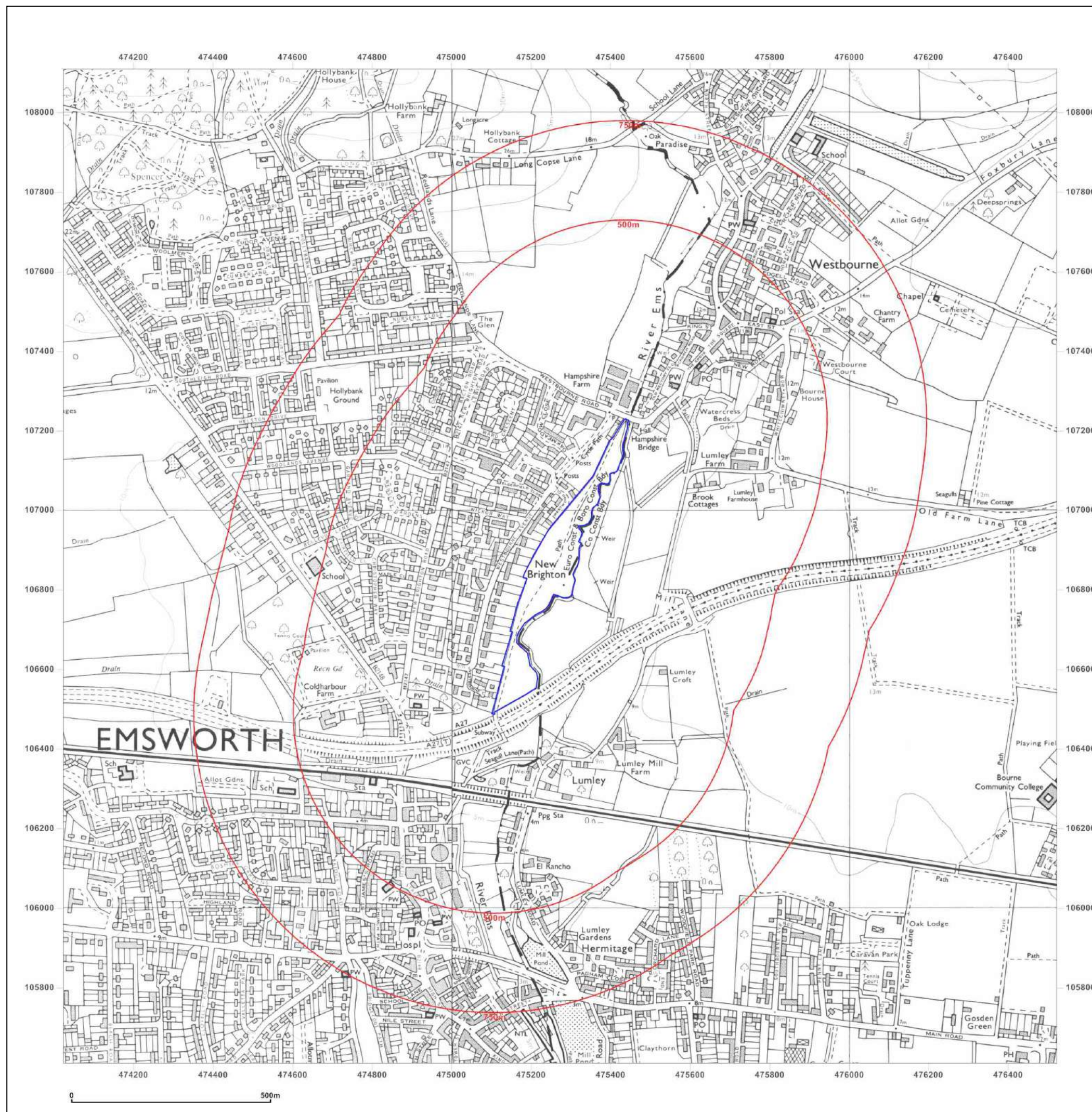


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: 1:10,000 Raster

Map date: 2002

Scale: 1:10,000

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2002



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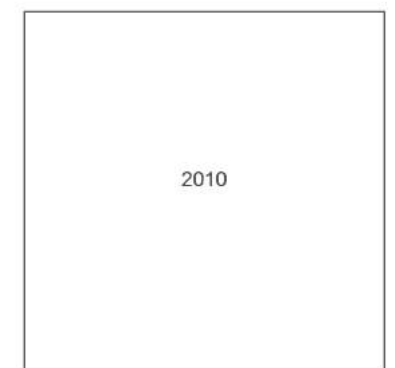
Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000

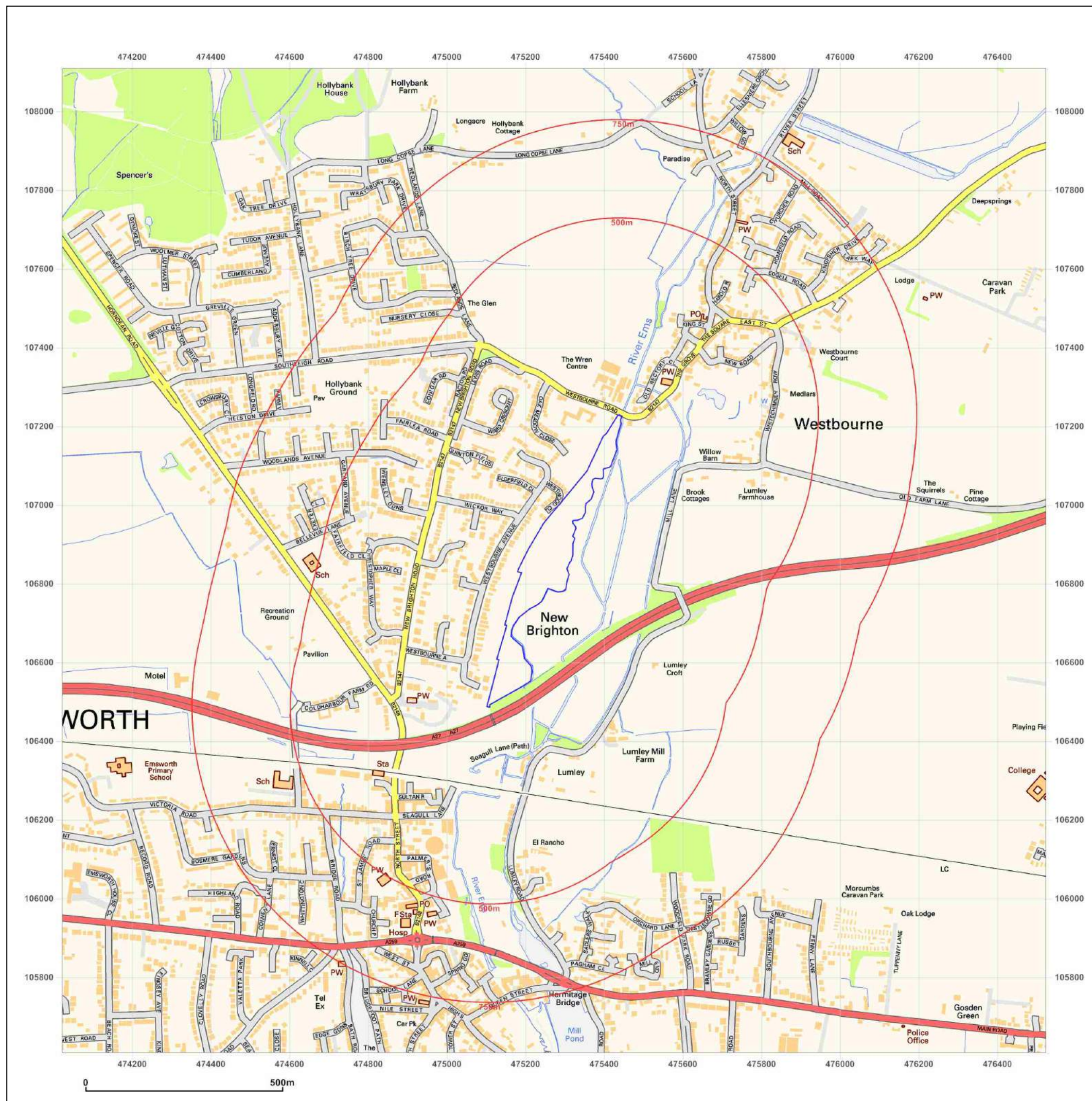


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Client Ref: 17-515
Report Ref: WDE-4345133
Grid Ref: 475272, 106859

Map Name: National Grid

Map date: 2014

Scale: 1:10,000

Printed at: 1:10,000



2014

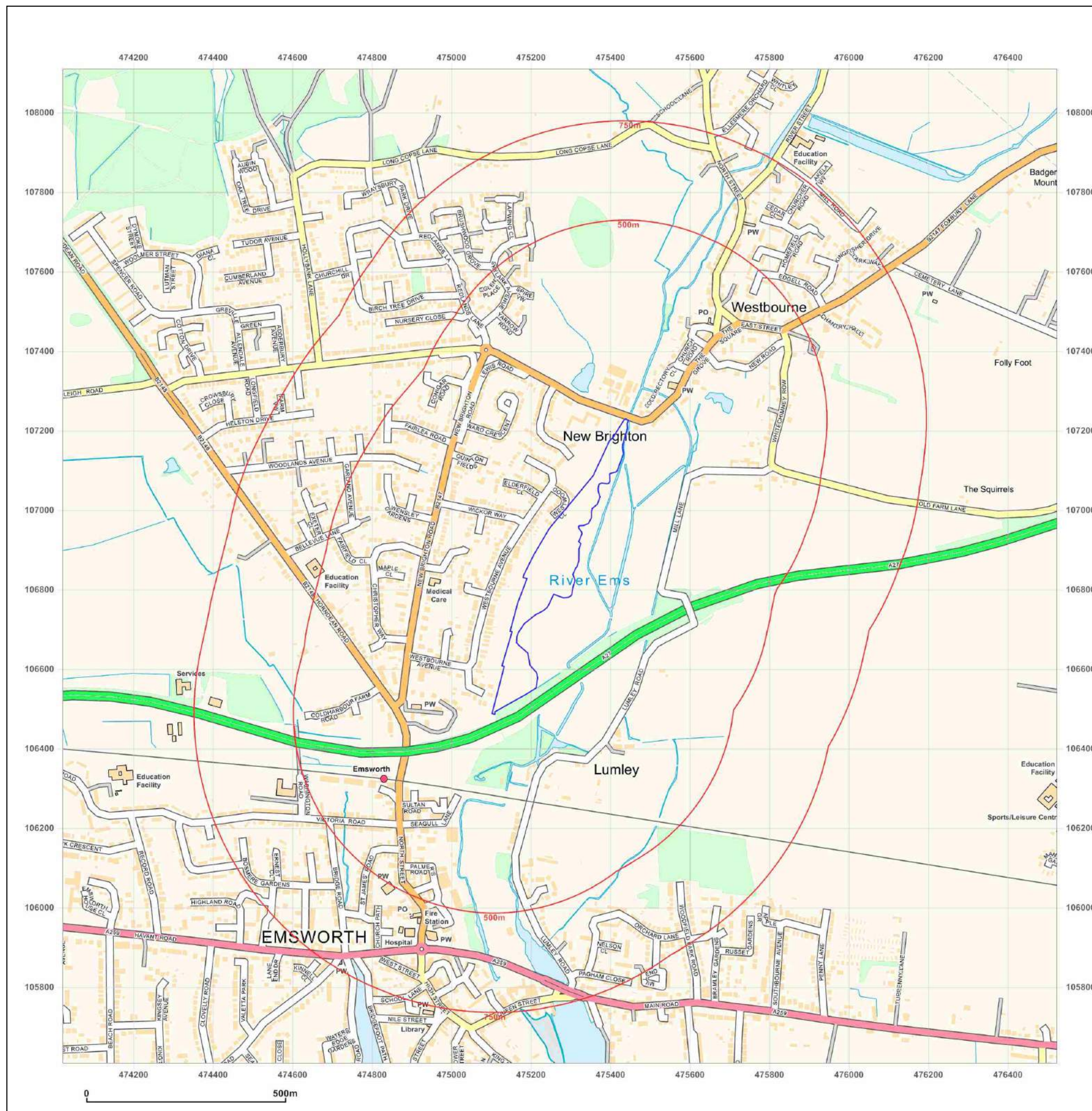


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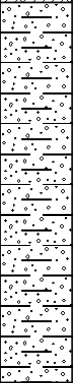
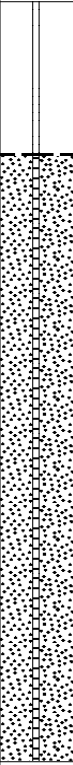


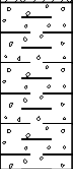
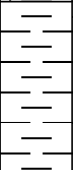
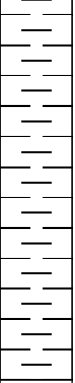
APPENDIX D

Borehole Logs

Trial Pit Logs

Dynamic Probe Logs

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Westwood Close, Emsworth		Number BH1	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Hampshire Homes		Job Number 20768	
		Location		Dates 24/10/2017		Engineer JWF		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	J1		0.0ppm		(0.30) 0.30	TOPSOIL: Dark brown sandy clay. Soft to very stiff brown very gravelly, slightly sandy CLAY. Gravels are fine to coarse subangular flints.	 		
1.00 1.00	J2 C1		1.0ppm		(2.50)	Water strike(1) at 1.46m.			
			0.0ppm		2.80	Stiff grey CLAY			
3.90 4.00	B1 C2		0.0ppm		(2.20)				
			0.0ppm		5.00	Complete at 5.00m			
Remarks							Scale (approx) 1:50	Logged By JWF	Figure No. 20768.BH1

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Westwood Close, Emsworth		Number BH2	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Hampshire Homes		Job Number 20768	
		Location		Dates 24/10/2017		Engineer JWF		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	J1		0.0ppm		(0.30) 0.30	TOPSOIL: Dark brown sandy clay.			
1.00	C1				(1.10)	Soft to very stiff brown very gravelly CLAY. Gravels are fine to coarse subangular flints.			
2.00	J2		0.0ppm		1.40	Stiff brown grey mottled CLAY.			
3.00	C2		0.0ppm		(3.60)	... Becoming grey with depth.			
			0.0ppm		5.00	Complete at 5.00m			
Remarks No groundwater encountered.							Scale (approx) 1:50	Logged By JWF	Figure No. 20768.BH2

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Westwood Close, Emsworth		Number BH3	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Hampshire Homes		Job Number 20768	
		Location		Dates 24/10/2017		Engineer JWF		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	J1		0.0ppm		(0.30) 0.30	TOPSOIL: Dark brown sandy clay.			
0.80	J2					Soft to very stiff brown very gravelly, sandy CLAY. Gravels are fine to coarse subangular flints.			
			0.0ppm		(1.30)				
					1.60	Stiff brownish grey CLAY.			
2.00	C1		0.0ppm			... Becoming grey with depth.			
									
			0.0ppm						
									
									
			0.0ppm		(3.40)				
									
4.00	C2		0.0ppm						
									
			0.0ppm		5.00	Complete at 5.00m			
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
Remarks No groundwater encountered.							Scale (approx)	Logged By	
							1:50	JWF	
							Figure No. 20768.BH3		

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Westwood Close, Emsworth		Number BH4	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Hampshire Homes		Job Number 20768	
		Location		Dates 24/10/2017		Engineer JWF		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
1.00	J1		0.0ppm		(0.50)	TOPSOIL: Dark brown sandy clay.			
1.20	C1		0.0ppm		0.50	Soft to very stiff brown very gravelly sandy CLAY. Gravels are fine to coarse subangular			
			Water strike(1) at 1.20m.		(1.30)				
			0.0ppm		1.80	Stiff grey CLAY			
			0.0ppm						
			0.0ppm						
			0.0ppm		(3.20)				
3.80	B1		0.0ppm						
			0.0ppm						
			0.0ppm						
4.50	C2		0.0ppm		5.00	Complete at 5.00m			
Remarks							Scale (approx) 1:50	Logged By JWF	
							Figure No. 20768.BH4		

Excavation Method

Trial Pit

Dimensions

Ground Level (mOD)

Client

Hampshire Homes

Job
Number
20768

Location

Dates

25/10/2017

Engineer

JWF

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						TOPSOIL: Dark brown sandy clay.		
					(0.30) 0.30	Soft brown very gravelly CLAY. Gravels are fine to coarse subangular flints.		
					(0.70)			
					1.00 (0.50)	Stiff orange brown and grey CLAY		
					1.50	Complete at 1.50m		

Plan

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Remarks

No groundwater encountered.

Scale (approx)

1:50

Logged By

JWF

Figure No.

20768.TP1

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Westwood Close, Emsworth		Trial Pit Number TP2	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Hampshire Homes		Job Number 20768	
		Location		Dates 25/10/2017		Engineer JWF		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
					(0.30) 0.30 (0.60) 0.90 (0.50) 1.40	TOPSOIL: Dark brown sandy clay.			
					Soft brown very gravelly CLAY. Gravels are fine to coarse subangular flints.				
					Stiff brown CLAY				
					Complete at 1.40m				
Plan 						Remarks No groundwater encountered.			

Excavation Method		Dimensions		Ground Level (mOD)		Client		Job Number	
Trial Pit						Hampshire Homes		20768	
		Location		Dates		Engineer		Sheet	
				25/10/2017		JWF		1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
						TOPSOIL: Brown sandy clay.			
						Soft brown gravelly CLAY. Gravels are fine to coarse subangular flints.			
						Complete at 1.60m			
Plan					Remarks				
					No groundwater encountered.				
					Scale (approx)		Logged By		Figure No.
					1:50		JWF		20768.TP3

Excavation Method		Dimensions		Ground Level (mOD)		Client		Job Number		
Trial Pit						Hampshire Homes		20768		
		Location		Dates 25/10/2017		Engineer JWF		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
			Water strike(1) at 1.40m.		(0.30) 0.30	TOPSOIL: Dark brown sandy clay.				
					(1.10)	Medium dense brown clayey fine to coarse subangular GRAVEL with occasional cobbles.				
					1.40	Complete at 1.40m				
Plan					Remarks					
.	.	.	.	.	.	.	.	Field interpretation of granular materials.		
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					Scale (approx)		Logged By		Figure No.	
					1:50		JWF		20768.TP4	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Hampshire Homes	Job Number 20768
	Location	Dates 24/10/2017	Engineer JWF	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
0.00-0.10	1			0.00	
0.10-0.20	1				
0.20-0.30	1				
0.30-0.40	2				
0.40-0.50	3				
0.50-0.60	1			0.50	
0.60-0.70	1				
0.70-0.80	1				
0.80-0.90	1				
0.90-1.00	1				
1.00-1.10	3			1.00	
1.10-1.20	5				
1.20-1.30	6				
1.30-1.40	8				
1.40-1.50	8				
1.50-1.60	8			1.50	
1.60-1.70	9				
1.70-1.80	8				
1.80-1.90	8				
1.90-2.00	5				
2.00-2.10	1			2.00	
2.10-2.20	1				
2.20-2.30	1				
2.30-2.40	1				
2.40-2.50	1				
2.50-2.60	1			2.50	
2.60-2.70	1				
2.70-2.80	1				
2.80-2.90	2				
2.90-3.00	1				
3.00-3.10	1			3.00	
3.10-3.20	2				
3.20-3.30	2				
3.30-3.40	2				
3.40-3.50	2				
3.50-3.60	2			3.50	
3.60-3.70	2				
3.70-3.80	2				
3.80-3.90	2				
3.90-4.00	3				
4.00-4.10	2			4.00	
4.10-4.20	3				
4.20-4.30	2				
4.30-4.40	3				
4.40-4.50	3				
4.50-4.60	3			4.50	
4.60-4.70	3				
4.70-4.80	3				
4.80-4.90	3				
4.90-5.00	2			5.00	

Remarks

Scale (approx)	Logged By
1:25	JWF
Figure No.	
20768.DP1	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Hampshire Homes	Job Number 20768
	Location	Dates 24/10/2017	Engineer JWF	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
0.00-0.10	1			0.00	
0.10-0.20	1				
0.20-0.30	1				
0.30-0.40	1				
0.40-0.50	1			0.50	
0.50-0.60	6				
0.60-0.70	7				
0.70-0.80	7				
0.80-0.90	5				
0.90-1.00	5			1.00	
1.00-1.10	7				
1.10-1.20	6				
1.20-1.30	3				
1.30-1.40	1				
1.40-1.50	1			1.50	
1.50-1.60	1				
1.60-1.70	2				
1.70-1.80	2				
1.80-1.90	2				
1.90-2.00	2			2.00	
2.00-2.10	1				
2.10-2.20	1				
2.20-2.30	2				
2.30-2.40	2				
2.40-2.50	2			2.50	
2.50-2.60	2				
2.60-2.70	2				
2.70-2.80	2				
2.80-2.90	2				
2.90-3.00	2			3.00	
3.00-3.10	1				
3.10-3.20	2				
3.20-3.30	2				
3.30-3.40	2				
3.40-3.50	2			3.50	
3.50-3.60	2				
3.60-3.70	2				
3.70-3.80	2				
3.80-3.90	2				
3.90-4.00	2			4.00	
4.00-4.10	3				
4.10-4.20	2				
4.20-4.30	2				
4.30-4.40	3				
4.40-4.50	3			4.50	
4.50-4.60	3				
4.60-4.70	3				
4.70-4.80	3				
4.80-4.90	3				
4.90-5.00	3			5.00	

Remarks

**Scale
(approx)** 1:25
**Logged
By** JWF
Figure No. 20768.DP2

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Hampshire Homes	Job Number 20768
	Location	Dates 24/10/2017	Engineer JWF	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
0.00-0.10	1			0.00	
0.10-0.20	1				
0.20-0.30	1				
0.30-0.40	1				
0.40-0.50	1			0.50	
0.50-0.60	1				
0.60-0.70	1				
0.70-0.80	1				
0.80-0.90	1				
0.90-1.00	3			1.00	
1.00-1.10	6				
1.10-1.20	9				
1.20-1.30	12				
1.30-1.40	10				
1.40-1.50	9			1.50	
1.50-1.60	8				
1.60-1.70	5				
1.70-1.80	2				
1.80-1.90	2				
1.90-2.00	1			2.00	
2.00-2.10	1				
2.10-2.20	2				
2.20-2.30	2				
2.30-2.40	2				
2.40-2.50	1			2.50	
2.50-2.60	2				
2.60-2.70	2				
2.70-2.80	2				
2.80-2.90	3				
2.90-3.00	3			3.00	
3.00-3.10	3				
3.10-3.20	3				
3.20-3.30	4				
3.30-3.40	4				
3.40-3.50	3			3.50	
3.50-3.60	3				
3.60-3.70	3				
3.70-3.80	3				
3.80-3.90	4				
3.90-4.00	4			4.00	
4.00-4.10	3				
4.10-4.20	3				
4.20-4.30	3				
4.30-4.40	3				
4.40-4.50	3			4.50	
4.50-4.60	3				
4.60-4.70	2				
4.70-4.80	3				
4.80-4.90	3				
4.90-5.00	3			5.00	

Remarks

Scale (approx)	Logged By
1:25	JWF
Figure No.	
20768.DP3	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Hampshire Homes	Job Number 20768
	Location	Dates 24/10/2017	Engineer JWF	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
0.00-0.10	1			0.00	0 2 4 6 8 10 12 14 16 18 20
0.10-0.20	1				
0.20-0.30	1				
0.30-0.40	1				
0.40-0.50	1			0.50	
0.50-0.60	3				
0.60-0.70	5				
0.70-0.80	5				
0.80-0.90	5				
0.90-1.00	6			1.00	
1.00-1.10	9				
1.10-1.20	11				
1.20-1.30	9				
1.30-1.40	7				
1.40-1.50	3			1.50	
1.50-1.60	7				
1.60-1.70	6				
1.70-1.80	3				
1.80-1.90	2				
1.90-2.00	2			2.00	
2.00-2.10	1				
2.10-2.20	2				
2.20-2.30	2				
2.30-2.40	2				
2.40-2.50	2			2.50	
2.50-2.60	2				
2.60-2.70	2				
2.70-2.80	2				
2.80-2.90	2				
2.90-3.00	2			3.00	
3.00-3.10	2				
3.10-3.20	1				
3.20-3.30	2				
3.30-3.40	1				
3.40-3.50	2			3.50	
3.50-3.60	2				
3.60-3.70	2				
3.70-3.80	2				
3.80-3.90	2				
3.90-4.00	2			4.00	
4.00-4.10	2				
4.10-4.20	2				
4.20-4.30	2				
4.30-4.40	2				
4.40-4.50	2			4.50	
4.50-4.60	3				
4.60-4.70	2				
4.70-4.80	3				
4.80-4.90	3				
4.90-5.00	3			5.00	

Remarks

Scale
(approx) 1:25

**Logged
By**
JWF

Figure No.
20768.DP4

APPENDIX E

Ground Gas Sheets

Permeability Sheets

					Gas Monitoring			
Site Westwood Close, Emsworth Client Hampshire Homes					Job Number 20768			
					Sheet Number 1			
Date 25 th October 2017 Air Temperature °C °C Barometric Pressure 1021 mB 1021 mB Visit No								
Borehole No	BH1				BH2			
Condition of Standpipe	Good- Large Gas feed pipe				Good- Large Gas feed pipe			
Time	0 mins	5 mins	10 mins	15 mins	0 mins	5 mins	10 mins	15 mins
Combustible gas (CH4) % LEL	001	001	001	n/a	0	0	0	n/a
Combustible gas (CH4) % vol	00.1	00.1	00.1	n/a	0	0	0	n/a
Combustible Gas (CH4) Peak	00.1	00.1	00.1	n/a	0	0	0.1	n/a
Carbon Dioxide % vol	2.6	2.6	1.5	n/a	1.2	2.1	2.4	n/a
Oxygen % vol	17.7	17.4	19.0	n/a	19.4	17.5	17.1	n/a
Flow Rate (max) l/hr	-0			n/a	-0			n/a
Relative Downhole Pressure (mb)	+8.35			n/a	+2.2			n/a
Downhole Temperature (°C)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CO (ppm)	0000	0005	0002	n/a	0005	0008	0003	n/a
H2S (ppm)	0000	0000	0000	n/a	0000	0000	0000	n/a
Remarks								

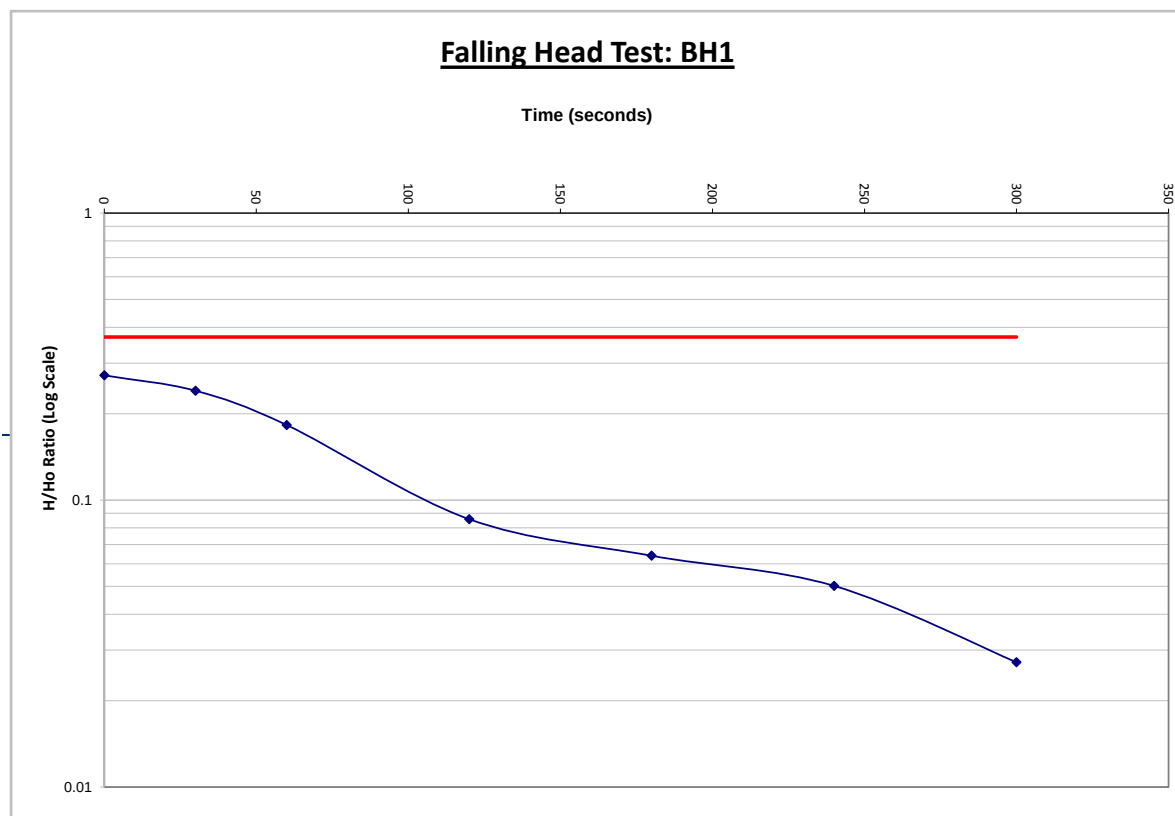
Date of Test	25/10/2017
Completed by	JWF
Site Name	WESTWOOD CLOSE, EMSWORTH
BH Location	BH1

Depth to Water-M (TOC)	4.08
Diameter of well (m)	0.05

		Units
Area (A)	0.00616225	m ²
F	0.1375	
Head (H°)	4.08	m
Time (T)	300	sec
Permeability K	0.000149388	m/sec

Time (Secs)	DTW	H	H/Ho Ratio
0	2.970	1.11000	0.272058824
30	3.099	0.98100	0.240441176
60	3.335	0.74500	0.182598039
120	3.730	0.35000	0.085784314
180	3.819	0.26100	0.063970588
240	3.875	0.20500	0.050245098
300	3.969	0.11100	0.027205882

Comments:
>10 ³



[illegible]

The graph displays the depth of a point (TP1) over time. The y-axis represents depth in meters below ground level, ranging from 0.000 to -1.600. The x-axis represents time in seconds, ranging from 0 to 15000. A blue line with diamond markers shows the depth profile, which starts at approximately -0.450 m at 0 seconds and gradually decreases to about -0.550 m at 15000 seconds. Two horizontal red lines are drawn at depths of -0.750 m (labeled V_{75}) and -1.350 m (labeled V_{25}).

Time (seconds)	Depth (m) below ground level
0	-0.450
1000	-0.460
2000	-0.460
3000	-0.460
4000	-0.460
5000	-0.470
6000	-0.470
7000	-0.480
8000	-0.490
9000	-0.500
10000	-0.510
11000	-0.520
12000	-0.530
13000	-0.540
14000	-0.550
15000	-0.550

Test concluded at 4 hours due to poor drainage. Failed to drain 25% of water added.

 $< 10^{-6}$

[illegible]

TP2

Time (seconds)

Depth (m) below ground level

V_{75}

V_{25}

Time (seconds)	Depth (m) below ground level
0	-0.38
1000	-0.41
1500	-0.53
2500	-0.58
3500	-0.64
4500	-0.65
6000	-0.65
8000	-0.65
10000	-0.65
12000	-0.65
14000	-0.65
15000	-0.65

Test concluded at 4 hours due to poor drainage. Failed to drain 75% of water added.

8.69E-06

[illegible]

TP3

Time (seconds)

Depth (m) below ground level

V_{75}

V_{25}

Time (seconds)	Depth (m) below ground level
0	-0.35
1000	-0.42
2000	-0.50
3000	-0.55
4000	-0.72
5000	-0.85
6000	-0.88
7000	-0.88
8000	-0.88
9000	-0.92
10000	-0.95
11000	-0.96
12000	-0.96
13000	-0.96
14000	-0.96
15000	-0.96

Test concluded at 4 hours due to poor drainage. Failed to drain 75% of water added.

9.64E-06

[illegible]

TP4

The graph displays the depth of a point over time. The x-axis represents time in seconds, ranging from 0 to 5000. The y-axis represents depth in meters below the ground level, ranging from 0.00 to -1.60. A blue line with diamond markers shows the depth increasing over time. Two horizontal red lines are drawn at -0.60m and -1.20m.

Time (seconds)	Depth (m) below ground level
0	-0.30
100	-0.35
200	-0.40
300	-0.40
400	-0.40
500	-0.45
750	-0.53
1000	-0.68
1500	-0.75
2000	-1.00
3000	-1.13
3500	-1.40

Vp	Amount of Water Lost	DTW bgl
75%	0.9	-0.593
25%	0.3	-1.193

4.29E-05

[illegible]

TP4 Fill 2

The graph displays the depth of TP4 Fill 2 over time. The x-axis represents Time in seconds, ranging from 0 to 6000. The y-axis represents Depth in meters below ground level, ranging from 0.00 to -1.60. A blue line with diamond markers shows the depth increasing over time. Two horizontal red lines are drawn at -0.50m and -1.10m.

Time (seconds)	Depth (m) below ground level
0	-0.20
100	-0.22
200	-0.25
300	-0.28
400	-0.30
500	-0.32
600	-0.35
700	-0.38
800	-0.42
900	-0.45
1000	-0.48
1500	-0.55
2000	-0.65
2500	-0.75
3000	-1.05
5500	-1.35

Vp	Amount of Water Lost	DTW bgl
75%	0.9	-0.5
25%	0.3	-1.1

4.37E-05

APPENDIX F

Laboratory Test Results

Waste Checker Sheet

**Jacob Fenton**

WDE Consulting Ltd
62a Western Road
Tring
Hertfordshire
HP23 4BB

t: 01442 825570
f: 01442 891410
e: general@wdeconsulting.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 17-65527

Project / Site name:	Westwood Close, Emsworth	Samples received on:	27/10/2017
Your job number:	20768	Samples instructed on:	27/10/2017
Your order number:	17-535	Analysis completed by:	07/11/2017
Report Issue Number:	1	Report issued on:	07/11/2017
Samples Analysed:	4 soil samples - 2 water samples		

Signed: _____

Vineetha Meethale Vettil
Senior Account Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.



Analytical Report Number: 17-65527

Project / Site name: Westwood Close, Emsworth

Your Order No: 17-535

Lab Sample Number				845618	845619	845620	845621	
Sample Reference				BH1.2	BH2.3	BH3.1	BH4.1	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				1.20	2.00	0.20	1.00	
Date Sampled				24/10/2017	24/10/2017	24/10/2017	24/10/2017	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	10	19	16	11	
Total mass of sample received	kg	0.001	NONE	0.40	0.38	0.42	0.38	

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	
------------------	------	-----	-----------	--------------	--------------	--------------	--------------	--

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.7	7.6	7.2	6.9	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Total Sulphate as SO ₄	mg/kg	50	MCERTS	370	250	490	280	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.014	0.068	0.014	0.031	
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.4	0.4	1.6	0.5	

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
----------------------------	-------	---	--------	-------	-------	-------	-------	--

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Fluoranthene	mg/kg	0.05	MCERTS	0.36	< 0.05	< 0.05	< 0.05	
Pyrene	mg/kg	0.05	MCERTS	0.32	< 0.05	< 0.05	< 0.05	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.21	< 0.05	< 0.05	< 0.05	
Chrysene	mg/kg	0.05	MCERTS	0.19	< 0.05	< 0.05	< 0.05	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.26	< 0.05	< 0.05	< 0.05	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.16	< 0.05	< 0.05	< 0.05	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.23	< 0.05	< 0.05	< 0.05	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1.73	< 0.80	< 0.80	< 0.80	
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.7	12	5.0	5.9	
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.9	1.3	0.7	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	< 0.2	0.3	< 0.2	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	35	27	36	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	24	17	14	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	16	27	16	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	34	16	22	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	71	63	73	

Analytical Report Number: 17-65527

Project / Site name: Westwood Close, Emsworth

Your Order No: 17-535

Lab Sample Number	845618	845619	845620	845621	
Sample Reference	BH1.2	BH2.3	BH3.1	BH4.1	
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)	1.20	2.00	0.20	1.00	
Date Sampled	24/10/2017	24/10/2017	24/10/2017	24/10/2017	
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	



Analytical Report Number: 17-65527

Project / Site name: Westwood Close, Emsworth

Your Order No: 17-535

Lab Sample Number				845624	845625			
Sample Reference				BH1	BH4			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				25/10/2017	25/10/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	7.2	7.2			
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Sulphate as SO ₄	µg/l	45	ISO 17025	40500	220000			
Sulphide	µg/l	5	NONE	< 5.0	< 5.0			
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.29	2.44			

Total Phenols

Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10			
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.16	NONE	< 0.16	< 0.16			
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.37	0.29			
Boron (dissolved)	µg/l	10	ISO 17025	74	91			
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03	< 0.02			
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Copper (dissolved)	µg/l	0.5	ISO 17025	0.6	0.6			
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2			
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05			
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.0	2.8			
Selenium (dissolved)	µg/l	0.6	ISO 17025	0.7	1.9			
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.8	0.6			



Analytical Report Number: 17-65527

Project / Site name: Westwood Close, Emsworth

Your Order No: 17-535

Lab Sample Number				845624	845625			
Sample Reference				BH1	BH4			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				25/10/2017	25/10/2017			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	130	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	130	< 10			
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 17-65527

Project / Site name: Westwood Close, Emsworth

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
845618	BH1.2	None Supplied	1.20	Brown clay with gravel.
845619	BH2.3	None Supplied	2.00	Brown clay.
845620	BH3.1	None Supplied	0.20	Brown clay and loam with gravel and vegetation.
845621	BH4.1	None Supplied	1.00	Brown clay with gravel and vegetation.

Analytical Report Number : 17-65527

Project / Site name: Westwood Close, Emsworth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L0102B-PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 17-65527

Project / Site name: Westwood Close, Emsworth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding.	L076-PL	W	MCERTS
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



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Analytical Report Number : 17-65706

Project / Site name:	Westwood Close, Emsworth	Samples received on:	27/10/2017
Your job number:	20768	Samples instructed on:	27/10/2017
Your order number:	17-535	Analysis completed by:	10/11/2017
Report Issue Number:	1	Report issued on:	10/11/2017
Samples Analysed:	2 WAC 10:1 Samples		

Signed: _____

Vineetha Meethale Vettil
Senior Account Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Waste Acceptance Criteria Analytical Results							
Report No:	17-65706						
					Client: WDEVN		
Location	Westwood Close, Emsworth						
Lab Reference (Sample Number)	846480 / 846481				Landfill Waste Acceptance Criteria		
Sampling Date	24/10/2017				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH1.1						
Depth (m)	0.20						
Solid Waste Analysis							
TOC (%)**	1.0				3%	5%	6%
Loss on Ignition (%) **	2.8				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.9				100	--	--
pH (units)**	6.5				--	>6	--
Acid Neutralisation Capacity (mol / kg)	-2.3				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:01	Limit values for compliance leaching test		
	(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0012			< 0.0110	0.5	2	25
Barium *	0.0072			0.0437	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0019			0.012	0.5	10	70
Copper *	0.011			0.065	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	< 0.0004			< 0.0040	0.5	10	30
Nickel *	0.0022			0.014	0.4	10	40
Lead *	0.0012			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0045			0.028	4	50	200
Chloride *	1.3			7.7	800	4000	25000
Fluoride	0.55			3.3	10	150	500
Sulphate *	3.6			22	1000	20000	50000
TDS	13			80	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	5.67			34.5	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.2						
Dry Matter (%)	87						
Moisture (%)	13						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.							
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation				** = UKAS accredited (liquid eluate analysis only)			
				** = MCFRTS accredited			

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results							
Report No:	17-65706						
					Client: WDENV		
Location	Westwood Close, Emsworth						
Lab Reference (Sample Number)	846482 / 846483				Landfill Waste Acceptance Criteria		
Sampling Date	24/10/2017				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH3.2						
Depth (m)	0.80						
Solid Waste Analysis							
TOC (%)**	0.7				3%	5%	6%
Loss on Ignition (%) **	2.4				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.9				100	--	--
pH (units)**	6.8				--	>6	--
Acid Neutralisation Capacity (mol / kg)	-1.1				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:01	Limit values for compliance leaching test		
	(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.0011			< 0.0110	0.5	2	25
Barium *	0.0114			0.0657	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0041			0.023	0.5	10	70
Copper *	0.0079			0.045	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	< 0.0004			< 0.0040	0.5	10	30
Nickel *	0.0027			0.016	0.4	10	40
Lead *	0.0030			0.018	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0069			0.040	4	50	200
Chloride *	1.2			6.8	800	4000	25000
Fluoride	0.32			1.8	10	150	500
Sulphate *	3.5			20	1000	20000	50000
TDS	15			84	4000	60000	100000
Phenol Index (Monhydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	5.62			32.4	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.3						
Dry Matter (%)	90						
Moisture (%)	10						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.							
				*= UKAS accredited (liquid eluate analysis only)			
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation							
** = MCERTS accredited							

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



Analytical Report Number : 17-65706

Project / Site name: Westwood Close, Emsworth

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
846480	BH1.1	None Supplied	0.20	Brown clay and sand with vegetation.
846482	BH3.2	None Supplied	0.80	Brown clay and gravel with vegetation.

Analytical Report Number : 17-65706

Project / Site name: Westwood Close, Emsworth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance"	L046-UK	W	NONE
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS



Analytical Report Number : 17-65706

Project / Site name: Westwood Close, Emsworth

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48, 65, 68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Naphthalene				0.000005					0.000005					0.000005	0.000005
Acenaphthylene	0.000005			0.000005											
Acenaphthene	0.000005														
Fluorene															
Phenanthrene	0.000005			0.000005					0.000005						
Anthracene	0.000005													0.000005	0.000005
Fluoranthene	0.000036			0.000036					0.000036						
Pyrene	0.000032			0.000032											
Benzo(a)anthracene															
Chrysene				0.000019			0.000019						0.000019		
Benzo(b)fluoranthene							0.000026							0.000026	0.000026
Benzo(k)fluoranthene				0.000016			0.000016								
Benzo(a)pyrene							0.000023				0.000023		0.000023	0.000023	0.000023
Indeno(1,2,3-cd)pyrene															
Dibenz(a,h)anthracene							0.000005							0.000005	0.000005
Benzo(ghi)perylene														0.000005	0.000005
Arsenic			0.0012		0.0012									0.0012	0.0012
Boron	0.00013			0.00013											
Cadmium	0.00003	0.00003	0.00003		0.00003	0.00003	0.00003								
Chromium										0.0035			0.0035		
Copper				0.0024										0.0024	0.0024
Lead				0.0027						0.0027		0.0027		0.0027	0.0027
Mercury		0.00003				0.00003					0.0027	0.0027		0.00003	0.00003
Nickel							0.0034	0.0034	0.0034						
Selenium			0.0001		0.0001										0.0001
Zinc	0.0073			0.0073											
Benzene	0.0001		0.0001	0.0001			0.0001								
Toluene				0.0001								0.0001			
Ethylbenzene				0.0001	0.0001							0.0001			
p & m-xylene	0.0001			0.0001											
o-xylene	0.0001			0.0001											
MTBE (Methyl Tertiary Butyl Ether)	0.0001														
PRO C6-C10				0.0000006			0.0000006							0.0000006	0.0000006
DRO C10-C25				0.0042					0.0042					0.0042	0.0042
Total (or greatest)	0.0079	0.00006	0.0014	0.0173	0.0014	0.00006	0.0034	0.0034	0.0042	0.0035	0.0027	0.0027	0.0035	0.0106	0.0107
Threshold (%)	20.0	0.1	3	25.0	3.0	0.1	0.1	0.1	1.0	1.0	0.5	5.0	0.1	25.00	25.00
Exceeded? (y/n)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48, 65, 68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Benzo(a)pyrene							0.000023						0.000023		
BaP Concentration in TPH							4.6E-10						4.6E-10		
BaP Exceeded (y/n)							N						N		
TPH (EC5 - EC35)				0.002			0.002				0.002		0.002	0.002	0.002
Threshold (%)				25.0			0.1				5.0		0.1	2.50	2.50
Hazardous Properties				N			N				N		N	N	N

APPENDIX G

Geotechnical Laboratory Results

SPT Variation Graphs

CBR Variation Graphs



TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

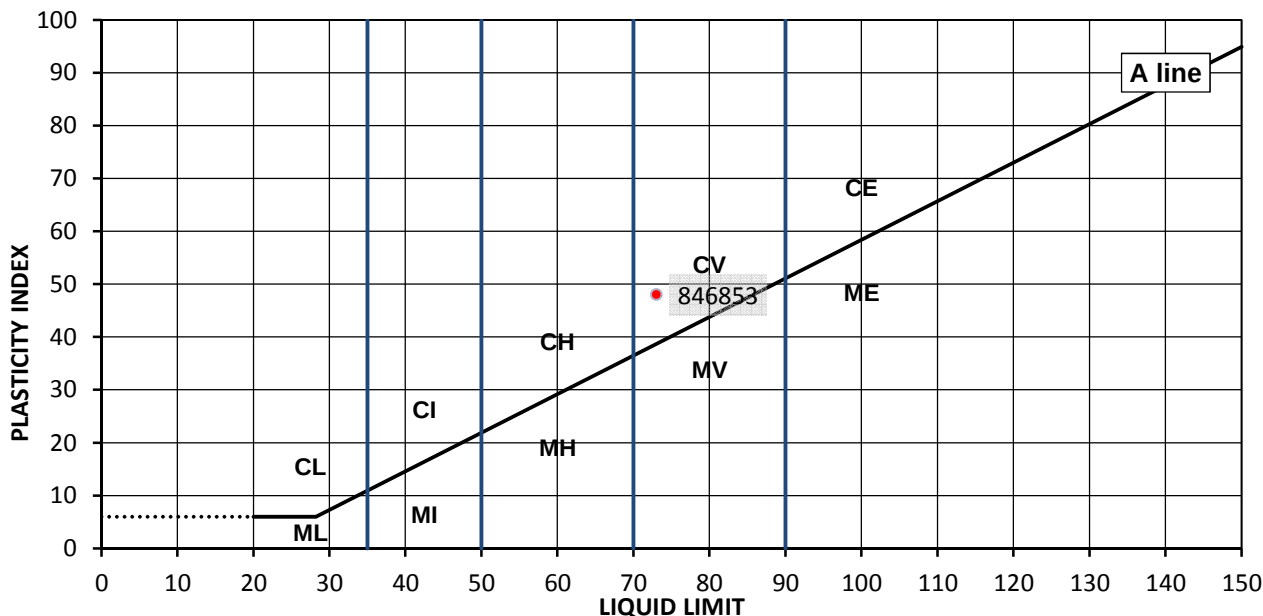
TEST RESULTS

Laboratory Reference: 846853
Sample Reference: Not Given

Description: Dark brown CLAY
Location: BH1.4
Sample Preparation: Tested in natural condition

Sample Type: B
Depth Top [m]: 4.00
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	73	25	48	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C Clay	L Low	below 35
M Silt	I Medium	35 to 50
	H High	50 to 70
	V Very high	70 to 90
	E Extremely high	exceeding 90
Organic	O append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section
Date Reported: 14/11/2017

Signed:

Mark Beastall
Geotechnical Commercial
Manager

for and on behalf of i2 Analytical Ltd

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The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."



TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

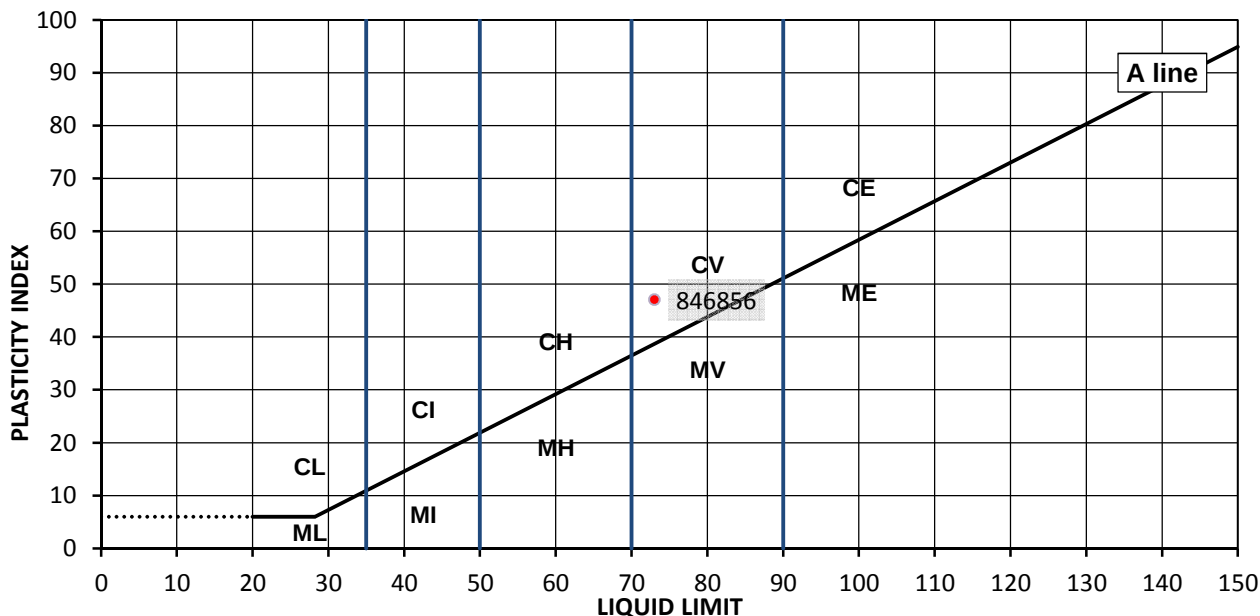
TEST RESULTS

Laboratory Reference: 846856
Sample Reference: Not Given

Description: Dark brown CLAY
Location: BH2.4
Sample Preparation: Tested in natural condition

Sample Type: C
Depth Top [m]: 3.00
Depth Base [m]: 4.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	73	26	47	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C Clay	L Low	below 35
M Silt	I Medium	35 to 50
	H High	50 to 70
	V Very high	70 to 90
	E Extremely high	exceeding 90
Organic	O append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section
Date Reported: 14/11/2017

Piotrowski

Signed:

Mark Beastall
Geotechnical Commercial
Manager

M. Beastall

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 846857
Sample Reference: Not Given

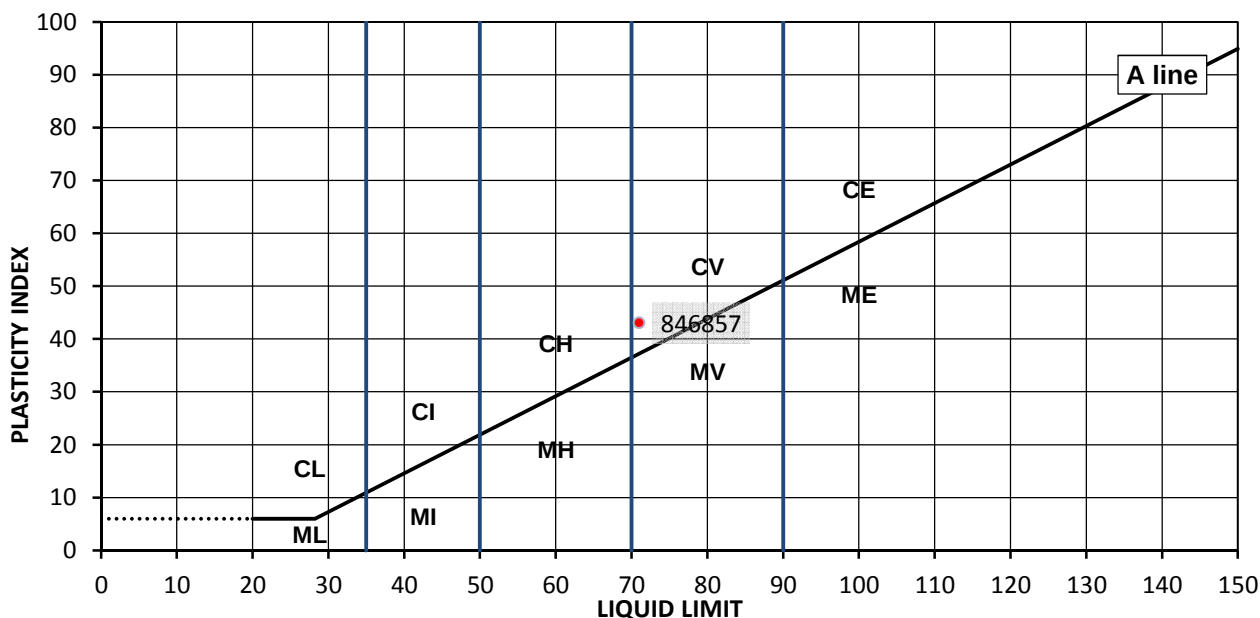
Description: Yellowish brown CLAY

Location: BH3.3

Sample Preparation: Tested in natural condition

Sample Type: C
Depth Top [m]: 2.00
Depth Base [m]: 3.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
30	71	28	43	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
Organic	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section

Date Reported: 14/11/2017

Signed:

Mark Beastall
Geotechnical Commercial
Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	Density		M/C	Atterberg				PD
		Reference	Top depth [m]	Base depth [m]	Type		bulk	dry		% Passing 425um	LL	PL	PI	
							Mg/m3	Mg/m3		%	%	%	%	%
846853	BH1.4	Not Given	4.00	Not Given	B	Dark brown CLAY			26	100	73	25	48	
846856	BH2.4	Not Given	3.00	4.00	C	Dark brown CLAY			27	100	73	26	47	
846857	BH3.3	Not Given	2.00	3.00	C	Yellowish brown CLAY			30	100	71	28	43	

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 14/11/2017

Signed:

Mark Beastall
Geotechnical Commercial Manager

for and on behalf of i2 Analytical Ltd

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*



4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

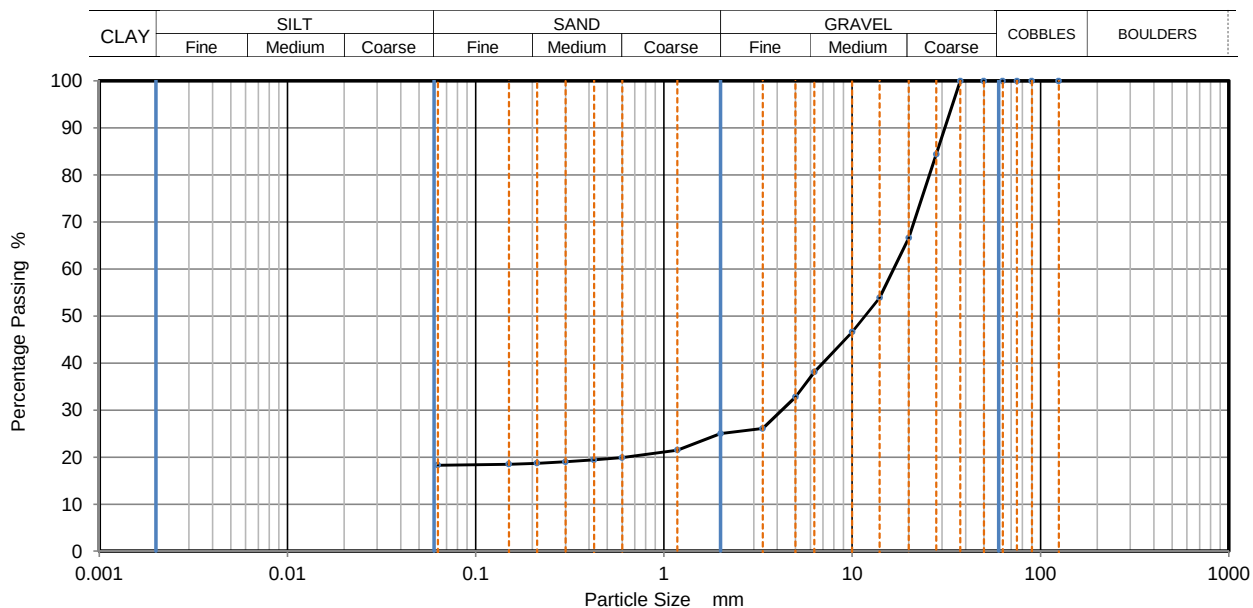
Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 846852
Sample description: Dark brown clayey GRAVEL
Location: BH1.3
Supplier: Not Given

Sample Reference: Not Given
Sample Type: C
Depth Top [m]: 1.20
Depth Base [m]: 2.00



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	84		
20	67		
14	54		
10	47		
6.3	38		
5	33		
3.35	26		
2	25		
1.18	22		
0.6	20		
0.425	19		
0.3	19		
0.212	19		
0.15	19		
0.063	18		

Dry Mass of sample [g]: 2167

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	75.00
Sand	6.80
Fines <0.063mm	18.30

Grading Analysis	
D100	mm 37.5
D60	mm 16.6
D30	mm 4.23
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Mark Beastall
Geotechnical Commercial
Manager

Date Reported: 14/11/2017

for and on behalf of i2 Analytical Ltd

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

TEST CERTIFICATE

Determination of California Bearing Ratio

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

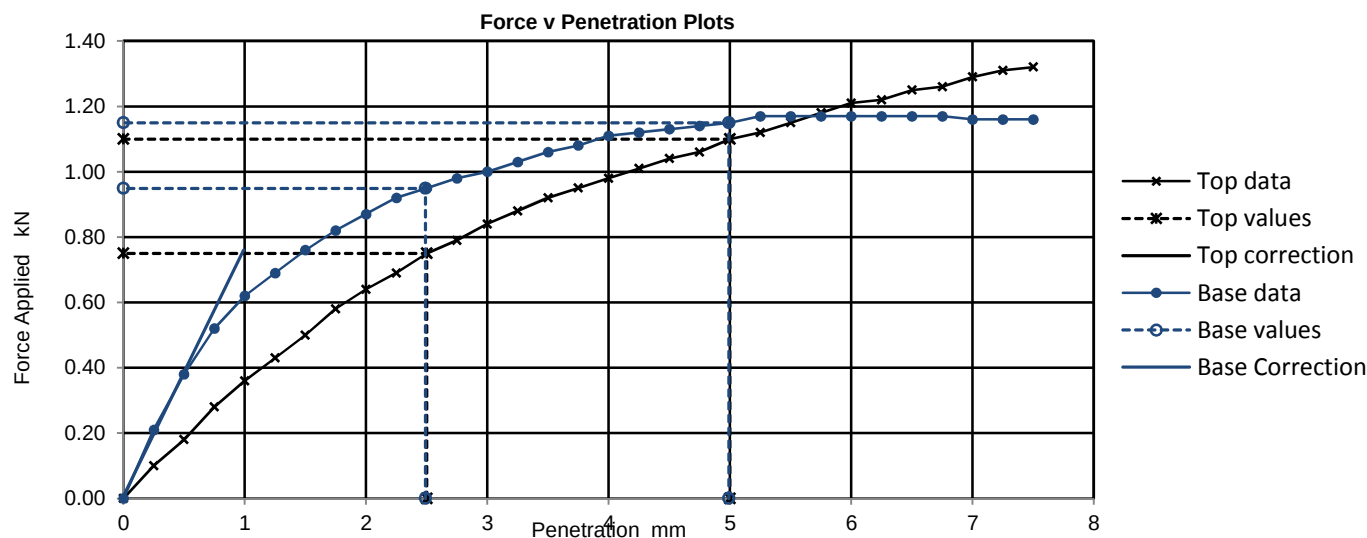
Test Results:

Laboratory Reference: 846855
Hole No.: BH2.2
Sample Reference: Not Given

Depth Top [m]: 1.00
Depth Base [m]: 2.00
Sample Type: C

Specimen Preparation:

Condition	Remoulded			Soaking details		Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days	
				Time to surface		days	
Sample Description:	Brown gravelly CLAY			Amount of swell recorded		mm	
Material retained on 20mm sieve removed			9	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density		1.99	Mg/m3	Surcharge applied		8 kg
	Dry density		1.61	Mg/m3			4.9 kPa
	Moisture content		24	%			



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	5.7	5.5	5.7	
Yes	7.2	5.7	7.2	

Moisture Content %
23
24

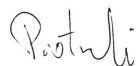
Remarks:

Test/ Specimen specific remarks:

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section



Mark Beastall
Geotechnical
Commercial Manager



Date Reported: 14/11/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

Test Result

Laboratory Reference: 846854
Hole No.: BH1.5
Sample Reference: Not Given
Sample Description: Brown CLAY

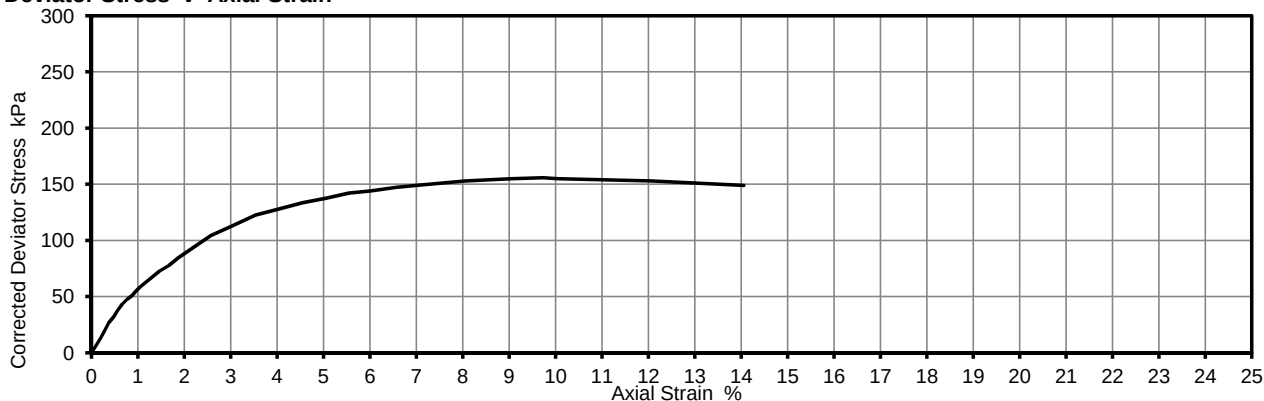
Test Number	1
Length	99.34 mm
Diameter	50.70 mm
Bulk Density	1.97 Mg/m ³
Moisture Content	28 %
Dry Density	1.54 Mg/m ³

Rate of Strain
Cell Pressure
Axial Strain at failure
Deviator Stress, $(\sigma_1 - \sigma_3)_f$
Undrained Shear Strength, c_u
Mode of Failure

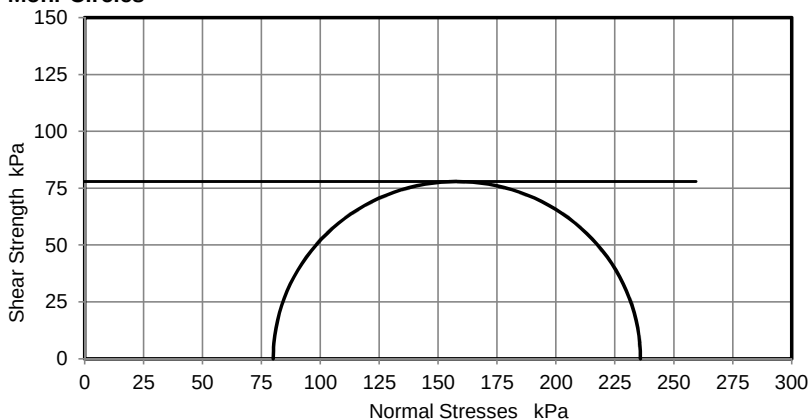
Depth Top [m]: 4.00
Depth Base [m]: 5.00
Sample Type: C

2.00	%/min
80	kPa
9.7	%
156	kPa
78	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Brittle	

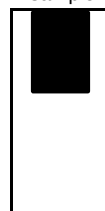
Deviator Stress v Axial Strain



Mohr Circles



Position
within
sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 14/11/2017

Signed:

Mark Beastall
Geotechnical
Commercial Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

Test Result

Laboratory Reference: 846858
Hole No.: BH3.4
Sample Reference: Not Given
Sample Description: Dark grey CLAY

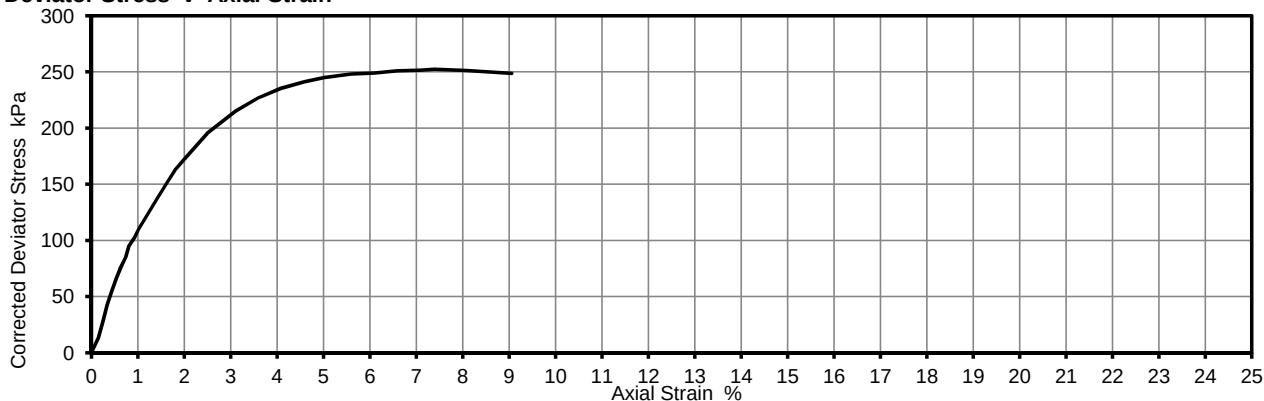
Test Number	1
Length	97.59 mm
Diameter	51.67 mm
Bulk Density	1.89 Mg/m3
Moisture Content	23 %
Dry Density	1.53 Mg/m3

Rate of Strain
Cell Pressure
Axial Strain at failure
Deviator Stress, $(\sigma_1 - \sigma_3)_f$
Undrained Shear Strength, c_u
Mode of Failure

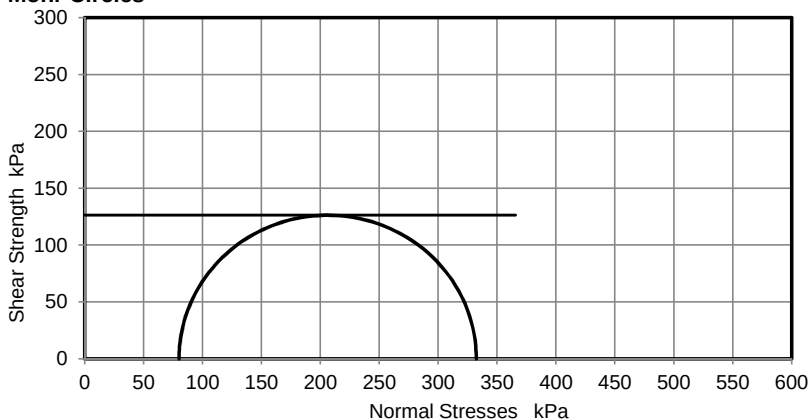
Depth Top [m]: 4.00
Depth Base [m]: 5.00
Sample Type: C

2.00	%/min
80	kPa
7.4	%
252	kPa
126	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Brittle	

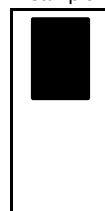
Deviator Stress v Axial Strain



Mohr Circles



Position
within
sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 14/11/2017

Signed:

Mark Beastall
Geotechnical
Commercial Manager

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: WDE Consulting Ltd
Client Address: 62a Western Road
Tring
Hertfordshire
HP23 4BB
Contact: Jacob Fenton
Site Name: Westwood Close, Elmsworth
Site Address: Not Given

Client Reference: 20768
Job Number: 17-65770
Date Sampled: 24/10/2017
Date Received: 27/10/2017
Date Tested: 10/11/2017
Sampled By: Not Given

Test Result

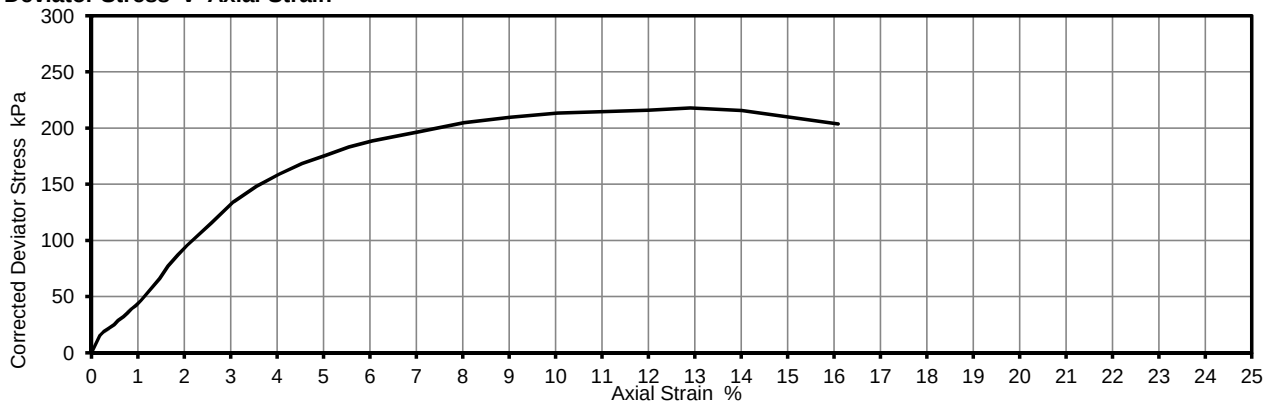
Laboratory Reference: 846859
Hole No.: BH4.2
Sample Reference: Not Given
Sample Description: Brown slightly gravelly CLAY

Depth Top [m]: 1.20
Depth Base [m]: 2.00
Sample Type: C

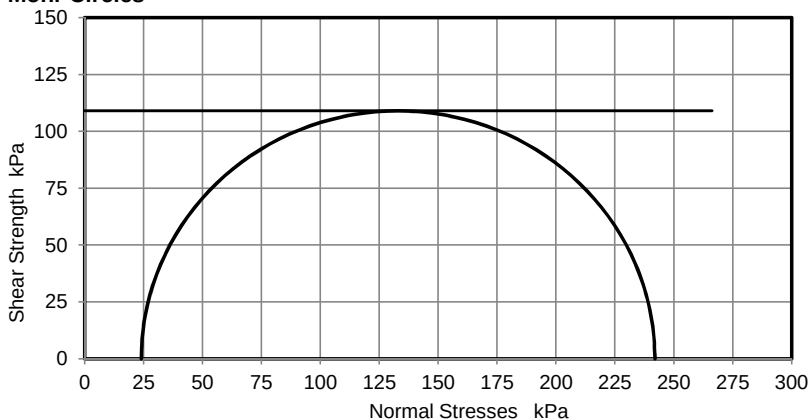
Test Number	1
Length	94.70 mm
Diameter	50.90 mm
Bulk Density	1.97 Mg/m ³
Moisture Content	22 %
Dry Density	1.61 Mg/m ³

Rate of Strain	2.00 %/min
Cell Pressure	24 kPa
Axial Strain at failure	12.9 %
Deviator Stress, $(\sigma_1 - \sigma_3)_f$	218 kPa
Undrained Shear Strength, c_u	109 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Brittle

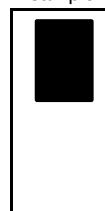
Deviator Stress v Axial Strain



Mohr Circles



Position
within
sample



Notes:

Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 14/11/2017

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Geotechnical
Commercial Manager

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Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP1

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

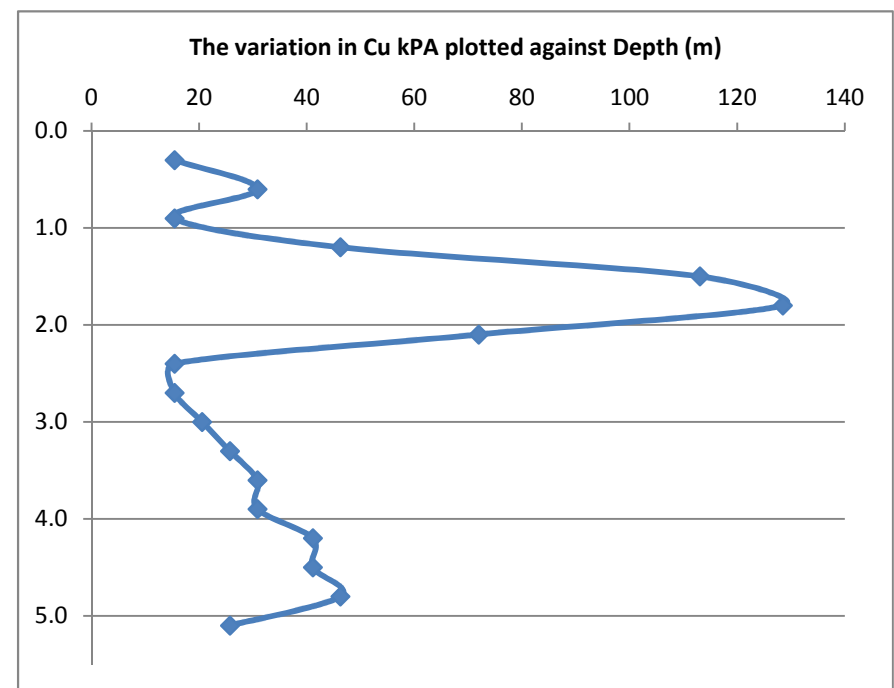
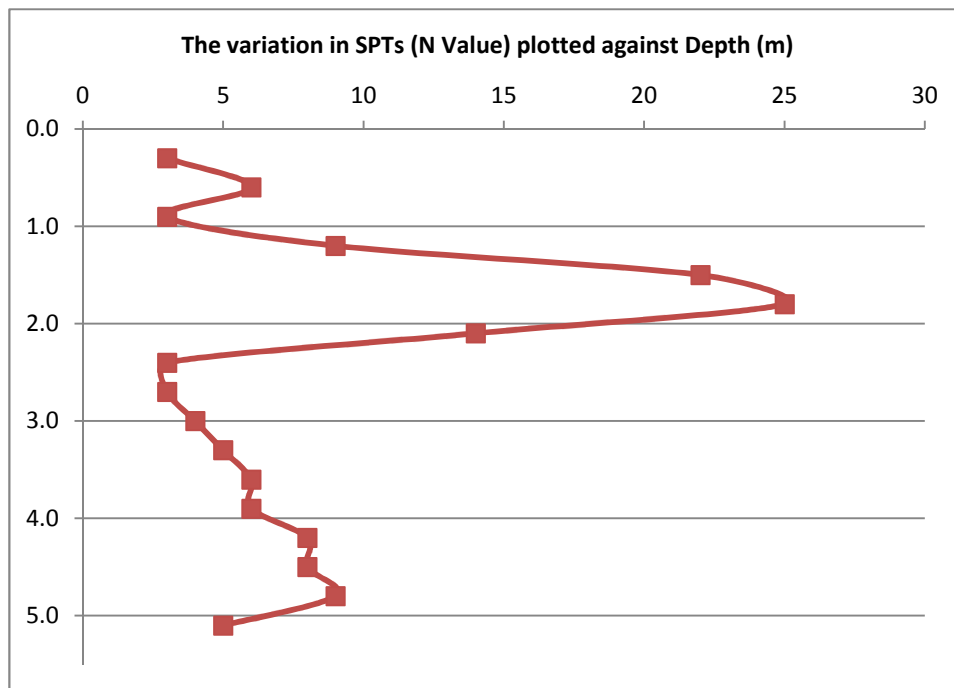
Correlation factor	5.14
--------------------	------

Depth (m)	SPT N Value	Cu kPa	Q alt kPa
0.3	3	15.4	21.3
0.6	6	30.8	46.0
0.9	3	15.4	21.3
1.2	9	46.3	70.2
1.5	22	113.1	170.4
1.8	25	128.5	192.4
2.1	14	72.0	109.7
2.4	3	15.4	21.3
2.7	3	15.4	21.3
3.0	4	20.6	29.5
3.3	5	25.7	37.8
3.6	6	30.8	46.0
3.9	6	30.8	46.0
4.2	8	41.1	62.2
4.5	8	41.1	62.2
4.8	9	46.3	70.2
5.1	5	25.7	37.8

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP1

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor	5.14
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Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP2

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

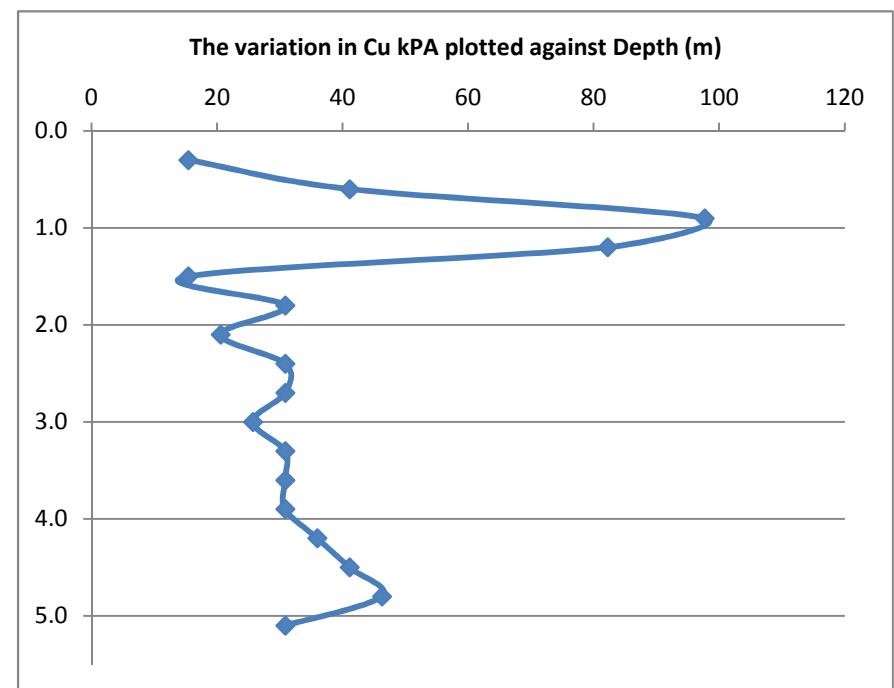
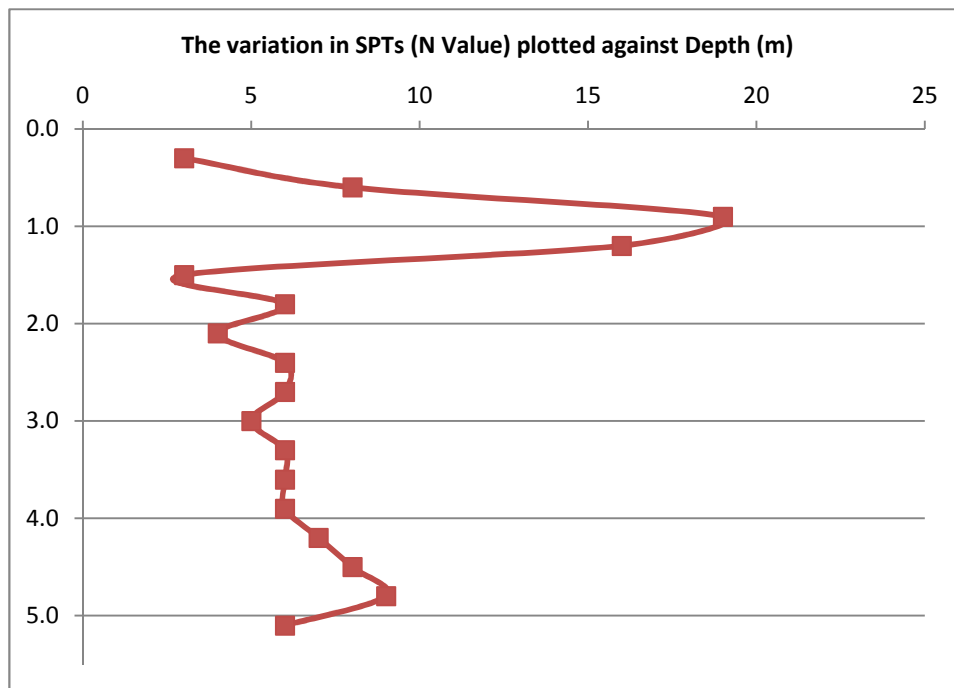
Correlation factor	5.14
--------------------	------

Depth (m)	SPT N Value	Cu kPa	Q alt kPa
0.3	3	15.4	21.3
0.6	8	41.1	62.2
0.9	19	97.7	148.0
1.2	16	82.2	125.2
1.5	3	15.4	21.3
1.8	6	30.8	46.0
2.1	4	20.6	29.5
2.4	6	30.8	46.0
2.7	6	30.8	46.0
3.0	5	25.7	37.8
3.3	6	30.8	46.0
3.6	6	30.8	46.0
3.9	6	30.8	46.0
4.2	7	36.0	54.1
4.5	8	41.1	62.2
4.8	9	46.3	70.2
5.1	6	30.8	46.0

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP2

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor	5.14
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Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP3

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

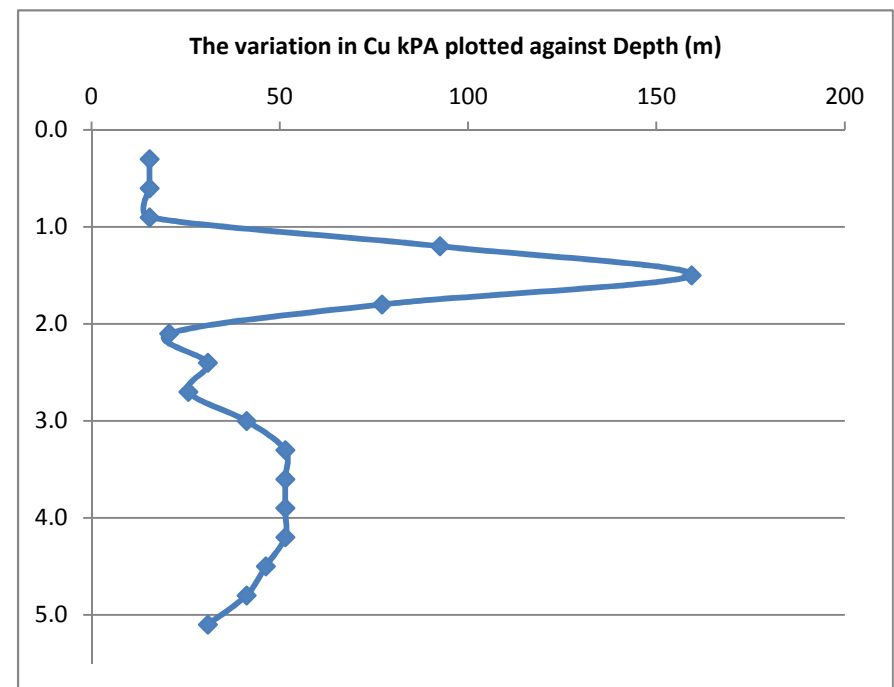
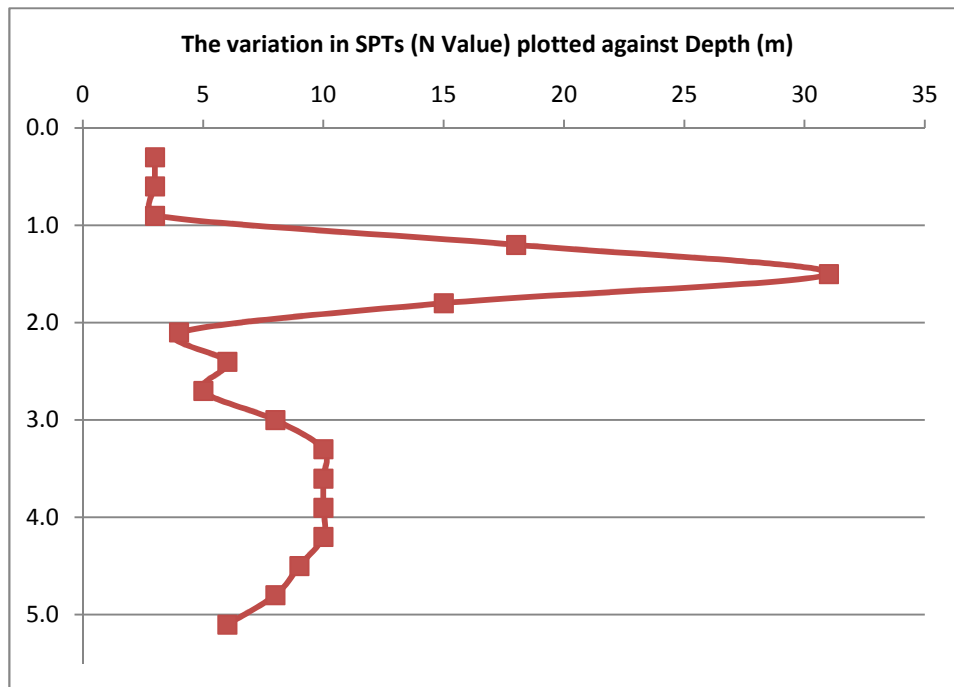
Correlation factor	5.14
--------------------	------

Depth (m)	SPT N Value	Cu kPa	Q alt kPa
0.3	3	15.4	21.3
0.6	3	15.4	21.3
0.9	3	15.4	21.3
1.2	18	92.5	140.4
1.5	31	159.3	235.0
1.8	15	77.1	117.5
2.1	4	20.6	29.5
2.4	6	30.8	46.0
2.7	5	25.7	37.8
3.0	8	41.1	62.2
3.3	10	51.4	78.2
3.6	10	51.4	78.2
3.9	10	51.4	78.2
4.2	10	51.4	78.2
4.5	9	46.3	70.2
4.8	8	41.1	62.2
5.1	6	30.8	46.0

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP3

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor	5.14
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Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP4

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

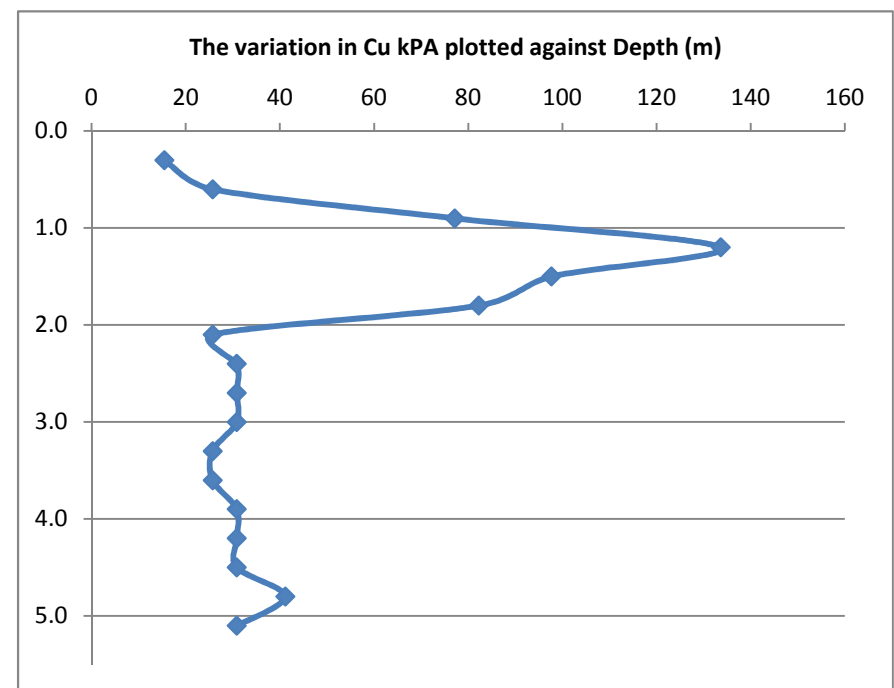
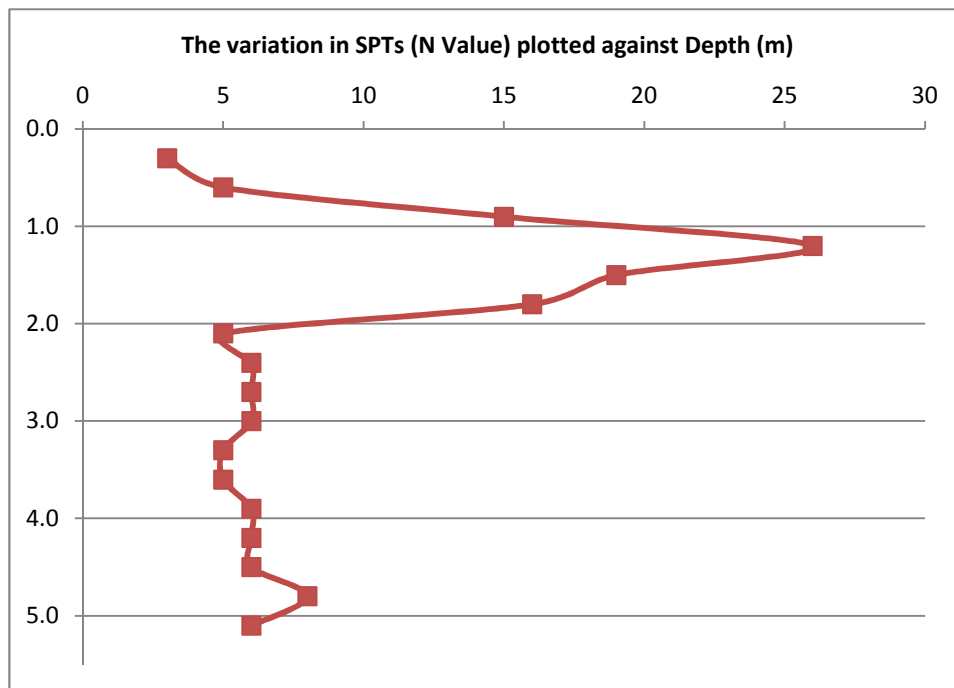
Correlation factor	5.14
--------------------	------

Depth (m)	SPT N Value	Cu kPa	Q alt kPa
0.3	3	15.4	21.3
0.6	5	25.7	37.8
0.9	15	77.1	117.5
1.2	26	133.6	199.6
1.5	19	97.7	148.0
1.8	16	82.2	125.2
2.1	5	25.7	37.8
2.4	6	30.8	46.0
2.7	6	30.8	46.0
3.0	6	30.8	46.0
3.3	5	25.7	37.8
3.6	5	25.7	37.8
3.9	6	30.8	46.0
4.2	6	30.8	46.0
4.5	6	30.8	46.0
4.8	8	41.1	62.2
5.1	6	30.8	46.0

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP4

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor	5.14
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Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP1

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	1.21
0.2	1.21
0.3	1.21
0.4	2.92
0.5	4.89
0.6	1.21
0.7	1.21
0.8	1.21
0.9	1.21
1	1.21
1.1	4.89
1.2	9.37
1.3	11.82
1.4	17.05
1.5	17.05
1.6	17.05
1.7	19.80

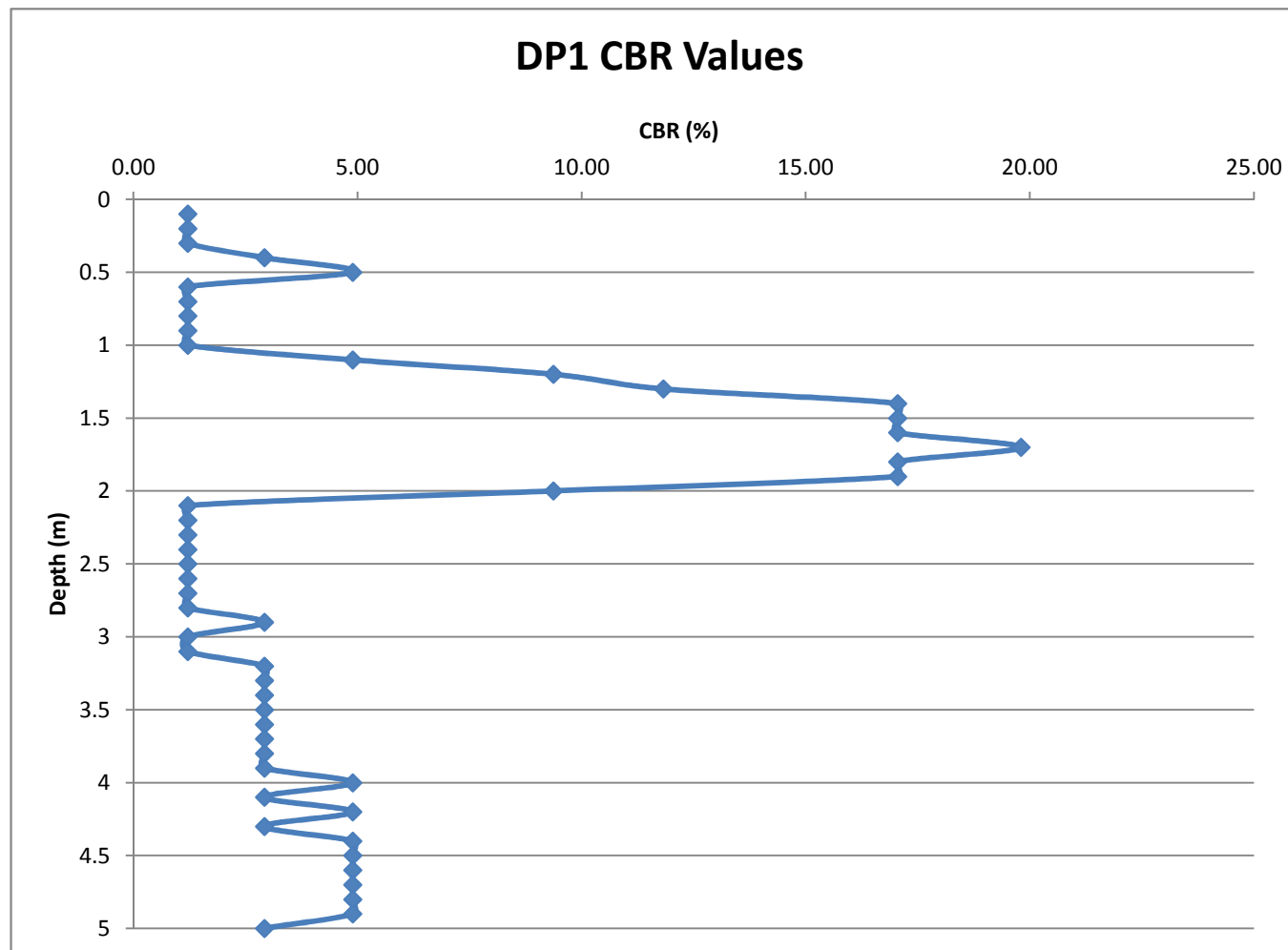
Depth (m)	CBR (%)
1.8	17.05
1.9	17.05
2	9.37
2.1	1.21
2.2	1.21
2.3	1.21
2.4	1.21
2.5	1.21
2.6	1.21
2.7	1.21
2.8	1.21
2.9	2.92
3	1.21
3.1	1.21
3.2	2.92
3.3	2.92
3.4	2.92

Depth (m)	CBR (%)
3.5	2.92
3.6	2.92
3.7	2.92
3.8	2.92
3.9	2.92
4	4.89
4.1	2.92
4.2	4.89
4.3	2.92
4.4	4.89
4.5	4.89
4.6	4.89
4.7	4.89
4.8	4.89
4.9	4.89
5	2.92

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP1

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion Calculation $\log CBR = 2.628 - 1.273 \log(DCP)$



Graph of CBR Values (%)

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP2

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	1.21
0.2	1.21
0.3	1.21
0.4	1.21
0.5	1.21
0.6	11.82
0.7	14.38
0.8	14.38
0.9	9.37
1	14.38
1.1	11.82
1.2	4.89
1.3	1.21
1.4	1.21
1.5	1.21
1.6	2.92
1.7	2.92

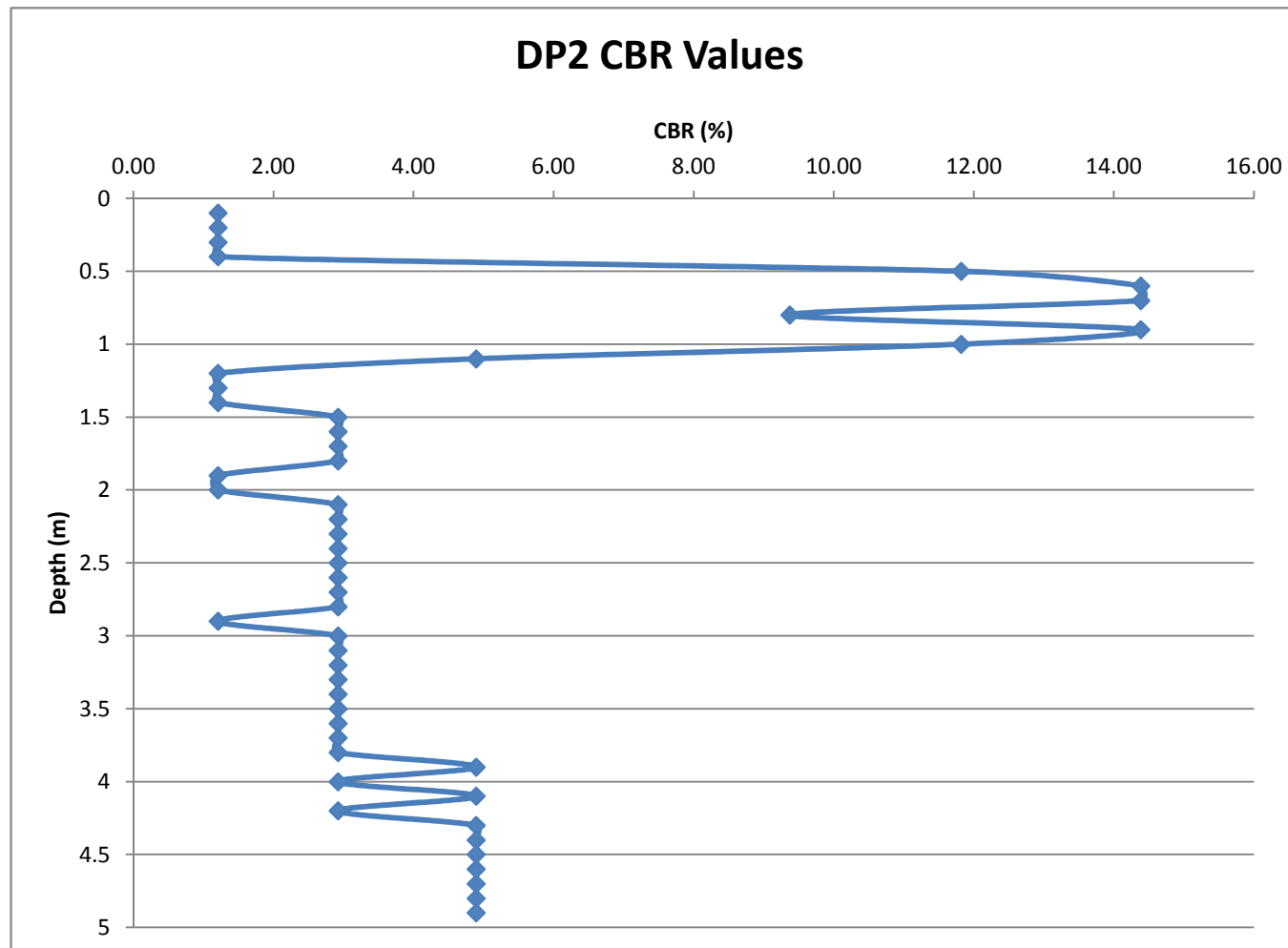
Depth (m)	CBR (%)
1.8	2.92
1.9	2.92
2	1.21
2.1	1.21
2.2	2.92
2.3	2.92
2.4	2.92
2.5	2.92
2.6	2.92
2.7	2.92
2.8	2.92
2.9	2.92
3	1.21
3.1	2.92
3.2	2.92
3.3	2.92
3.4	2.92

Depth (m)	CBR (%)
3.5	2.92
3.6	2.92
3.7	2.92
3.8	2.92
3.9	2.92
4	4.89
4.1	2.92
4.2	4.89
4.3	2.92
4.4	4.89
4.5	4.89
4.6	4.89
4.7	4.89
4.8	4.89
4.9	4.89
5	4.89

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP2

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion Calculation $\log CBR = 2.628 - 1.273 \log(DCP)$



Graph of CBR Values (%)

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP3

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log \text{CBR} = 2.628 - 1.273 \log(\text{DCP})$

Depth (m)	CBR (%)
0.1	1.21
0.2	1.21
0.3	1.21
0.4	1.21
0.5	1.21
0.6	1.21
0.7	1.21
0.8	1.21
0.9	1.21
1	4.89
1.1	11.82
1.2	19.80
1.3	28.56
1.4	22.65
1.5	19.80
1.6	17.05
1.7	9.37

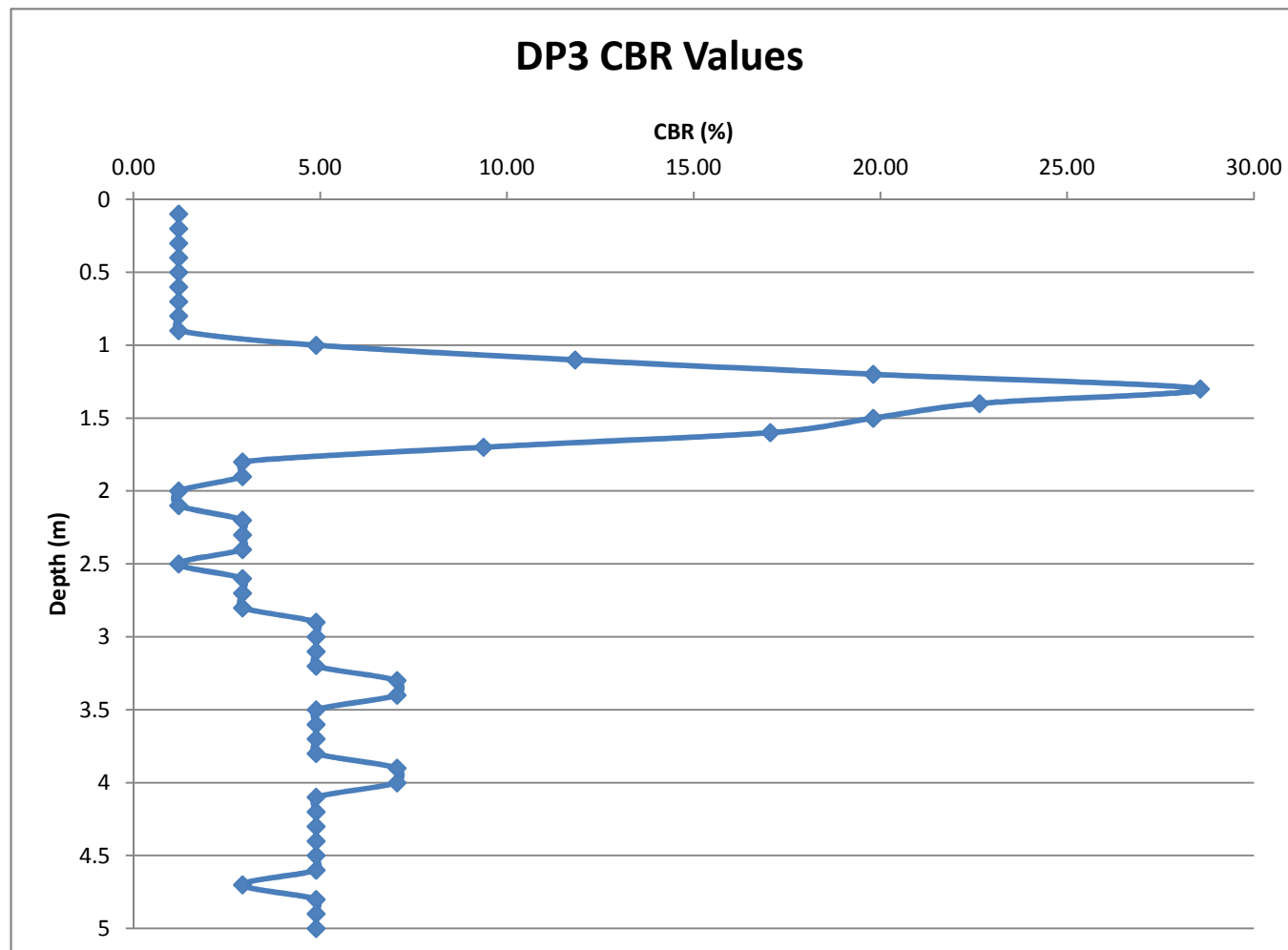
Depth (m)	CBR (%)
1.8	2.92
1.9	2.92
2	1.21
2.1	1.21
2.2	2.92
2.3	2.92
2.4	2.92
2.5	1.21
2.6	2.92
2.7	2.92
2.8	2.92
2.9	4.89
3	4.89
3.1	4.89
3.2	4.89
3.3	7.05
3.4	7.05

Depth (m)	CBR (%)
3.5	4.89
3.6	4.89
3.7	4.89
3.8	4.89
3.9	7.05
4	7.05
4.1	4.89
4.2	4.89
4.3	4.89
4.4	4.89
4.5	4.89
4.6	4.89
4.7	2.92
4.8	4.89
4.9	4.89
5	4.89

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP3

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion Calculation $\log CBR = 2.628 - 1.273 \log(DCP)$



Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP4

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	1.21
0.2	1.21
0.3	1.21
0.4	1.21
0.5	1.21
0.6	4.89
0.7	9.37
0.8	9.37
0.9	9.37
1	11.82
1.1	19.80
1.2	25.57
1.3	19.80
1.4	14.38
1.5	4.89
1.6	14.38
1.7	11.82

Depth (m)	CBR (%)
1.8	4.89
1.9	2.92
2	2.92
2.1	1.21
2.2	2.92
2.3	2.92
2.4	2.92
2.5	2.92
2.6	2.92
2.7	2.92
2.8	2.92
2.9	2.92
3	2.92
3.1	2.92
3.2	1.21
3.3	2.92
3.4	1.21

Depth (m)	CBR (%)
3.5	2.92
3.6	2.92
3.7	2.92
3.8	2.92
3.9	2.92
4	2.92
4.1	2.92
4.2	2.92
4.3	2.92
4.4	2.92
4.5	2.92
4.6	4.89
4.7	2.92
4.8	4.89
4.9	4.89
5	4.89

Date of Test	24/10/2017
Completed by	JWF
Site Name	Westwood Close, Emsworth
Hole number	DP4

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion Calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

