Haigh Huddleston & Associates
Civil & Structural Engineering Consultants
Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU
t 01924 464342 f 01924 450662 e trevor.haigh@haighhuddleston.co.uk

Phase 2
Geo-environmental Report

ON

PROPOSED DEVELOPMENT

AT

FORMER FIRE STATION, MANCHESTER ROAD, MARSDEN

FOR

SB HOMES LTD

APRIL 2019

E17/7092/R002

Prepared by

M.Huddleston MEng

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0.0 EXECUTIVE SUMMARY

SITE

The site is located at the former fire station, Manchester Road, Marsden. It is situated around Ordnance Survey grid reference 404939, 411461. A site location plan is included in Appendix A. The site is irregular in shape and divided into four separate areas by steel palisade fences and concrete post and chain link fences. The overall site area is approximately 0.30ha. The eastern half of the site is primarily overgrown hard standing with the single storey stone constructed fire station adjacent the northern boundary. In the north west corner is an area of overgrown gravels surrounded by a steel palisade fence. In the south west of the site is a wooded area with pedestrian access through the dividing fences. A gas governor is located here in an area of hardstanding that is separated from the remainder of the site by a concrete post and chain link fence. The eastern, southern and western boundaries are formed by a stone wall. The north western boundary with the property to the north west is formed in a mix of chain link fence, concrete panel fence and steel palisade fence.

The site slopes from east to west at an average grade of 1 in 53. A high point of approximately 188.500m AOD is located in the eastern corner of the site and a low point of approximately 186.86m towards the western corner.

HISTORY

The site was shown as farm fields until 1890, at which point the gas station and a gas holder were shown. The currently present fire station has been shown on site from 1930, along with a second gas holder.

GEOLOGY

There are no areas of artificial or superficial strata shown by groundsure to overly the site, however ground investigation works have proved made ground and fill to cover much of the site. The site is underlain by the Marsden Formation consisting of Mudstone and Siltstone.

MINING/QUARRYING

The Coal Authority Report is included in Appendix D and states that the property is not within a surface area that could be affected by past underground mining. The property is not in area where the Coal Authority has granted, or plans to grant, a licence to remove or otherwise work coal using underground methods.

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

HYDROLOGY

A culverted watercourse is recorded crossing the site from north west to south east. This connects two lengths of un-named tertiary river. Recent on-site investigations through dye-testing have proved that the culvert passes to the north of Manchester Road, over 40m north of the position indicated in the Groundsure report.

HYDROGEOLOGY

The bedrock underlying the site is classified as a Secondary (A) Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flows to rivers. These are generally aquifers formerly classified as minor aquifers.

Groundwater was encountered during the excavation of trial pits 1 and 2 in the western half of the site, as well as in all the window samples undertaken. Trapped groundwater was observed to be present within the original gasometer.

HAZARDOUS GAS

The property is in an area requiring basic radon protection measures. A maximum carbon dioxide concentration of 4.1% and no methane was recorded in an existing gas monitoring station. A maximum flow rate of 0.9 l/hr was detected in the monitoring stations. Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as Green, or CS1 by BS 8485:2105 Table 2 due to the low carbon dioxide and flow rate being recorded.

CONTAMINATION

Elevated levels of Arsenic and Lead were recorded in the made ground in TP01, and the ashy clay fill in TP05.

Two elevated levels of sulphate were recorded in the made ground of TP05, and WS03. This corresponds to a design sulphate class DS-5, ACEC class AC-4, when compared against the BRE Special Digest 1 “Concrete in aggressive ground”.

Elevated levels of sulphide were found in TP05, along with an extremely elevated level in WS03.

Three elevated levels of each of Benzo(a)pyrene, EPH (total) and PAH (total) were found in the made ground of TP02, TP06, and TP07.

Elevated pH was proved in the made ground of TP05, TP07, TP01 and WS03.

No asbestos fibres were detected in the samples taken from the site.

The natural ground found on site was found to be clear of contamination.

REMEDIATION	Contaminated made ground will be removed from the site, and a minimum 600mm thick capping layer implemented. Gas holders to be removed from site.
FOUNDATIONS	A combination of foundation types will be necessary for the proposed development. At present we would envisage the use of strip/trench fill and pile foundations will be necessary.

1.0 INTRODUCTION

1.1 As requested by SB Homes, this practice carried out ground and contamination investigation works to the proposed development at the former fire station, Manchester Road, Marsden

1.2 The purpose of the report was to:-

1.2.1 Identify the nature of the near surface strata, in order to enable recommendations to be made as to the most economic foundation solution for the proposed residential development.

1.2.2 To identify any areas of contaminated ground.

1.2.3 Determine if ground gas generation from the sites former use as a gas holder will adversely affect the site.

1.3 Soil sampling was undertaken via trial pits to determine the near surface strata. Distributed samples were taken for testing to ascertain the nature of the soils and fills present.

1.4 The conclusions and recommendations made in this report are limited to the findings of the preliminary Geotechnical Survey. The report is made on condition that Haigh Huddleston Associates will not in any circumstances be liable for loss, arising directly or indirectly from ground conditions encountered between trial pits and window samples, which have not been revealed by the investigation.

1.5 Any opinion given on the possible configuration of strata between trial pit and window samples locations and below maximum depth of the investigation is for guidance only. Any remarks on groundwater conditions made are based solely on observations made at the time of investigation. Kindly note that levels may differ from those reported due to seasonal variations or other influences.

1.6 Furthermore, there is the possibility that any trial pits or window samples undertaken as part of the investigatory works may be within the influence of existing or proposed foundations or excavations. Haigh Huddleston Associates cannot be held responsible for any failure of any excavations, foundations or structures within the influence of the trial pits or window samples.

2.0 THE SITE

2.1 The site is located at the former fire station, Manchester Road, Marsden. It is situated around Ordnance Survey grid reference 404939, 411461. A site location plan is included in Appendix A.

2.2 The site is irregular in shape and divided into four separate areas by steel palisade fences and concrete post and chain link fences. The overall site area is approximately 0.30ha.

2.3 The eastern half of the site is primarily overgrown hard standing with the single storey stone constructed fire station adjacent the northern boundary. There is vehicular access to this area from Manchester Road in the north eastern corner. In the north west corner is an area of overgrown gravels surrounded by a steel palisade fence. Vehicular access to this is from the property to the west. A land drain 225-450mm in diameter crosses the site from south east to north west, as well as a Yorkshire Water combined sewer 300mm in diameter.

2.4 In the south west of the site is a wooded area with pedestrian access through the dividing fences. A gas governor is located here in an area of hardstanding that is separated from the remainder of the site by a concrete post and chain link fence. An existing gas monitoring point was found on site, a short distance to the east of this gas governer.

2.5 The eastern, southern and western boundaries are formed by a stone wall. The north western boundary with the property to the north west is formed in a mix of chain link fence, concrete panel fence and steel palisade fence.

2.6 The site slopes from east to west at an average grade of 1 in 53. A high point of approximately 188.500m AOD is located in the eastern corner of the site and a low point of approximately 186.86m towards the western corner.

3.0 SITE HISTORY

A number of historical Ordnance Survey plans from 1854-2014 have been consulted. These are contained for reference within Appendix C to the rear of the report. Below is a brief description outlining the significant developments that may effect future construction of the site.

	Historical uses on site	Historical findings within 100m perimeter of the site	Historical findings further than 100m perimeter of the site
1854	i). The site is shown as open field. ii). Northern boundary formed by highway.	i). Iron Foundry 100m to south east. ii). Marsden centre 100m north.	i). Woollen mills 125m and 200m south west. ii). River heading south to north 175m to the west. iii). Ponds 150m south and 175m south west.
1890	i) Gas works shown in south west corner of site. ii) Two gas holders shown in east of site.	i). Foundry expanded to south.	i) Mills expanded to west and south west.
1904	i). The on-site features are similar to the previous sheet.	i). Cricket ground to the west.	i). Mills 150m to the north.
1930	i). Fire station shown adjacent northern boundary on site. ii). A third gas holder shown towards north of site and building shown along southern boundary. iii) Smallest gas holder in east of site no longer shown.	i). Foundry to south now labelled as mill buildings. ii). Cricket ground now a football ground.	i). No significant developments within 500m of the site.
1955-1956	i). The on-site features are similar to the previous sheet.	i). No significant developments within 100m of the site.	i) No significant developments within 500m of the site.
1980	i). Building on southern boundary reduced in size to occupy south eastern corner.	i) Works immediately north west of site.	i). No significant developments within 500m of the site.
2002	I). Only fire station shown on site now.	i). No significant developments within 100m of the site.	i) No significant developments within 500m of the site.
2010	i). The on-site features are similar to the previous sheet.	i). No significant developments within 100m of the site.	i) No significant developments within 500m of the site.
2014	i). The on-site features are similar to the previous sheet.	i). No significant developments within 100m of the site.	i) No significant developments within 500m of the site.

4.0 SITE GEOLOGY & MINING

4.1 The BGS Digital Geological Map of Great Britain at 1:10,000 scale has been consulted and we would report as follows:-

4.2 No artificial or superficial strata is shown overlying the site.

4.3 The site is underlain by the Marsden Formation consisting of Mudstone and Siltstone.

4.4 The nearest fault line is located 17m north of the site and heads from east to west.

4.5 A low risk of landslides is noted on site. Consideration should be given to stability if changes to drainage or excavations take place.

4.6 The Coal Authority Report is included in Appendix D and states that the property is not within a surface area that could be affected by past underground mining.

4.7 The property is not in area where the Coal Authority has granted, or plans to grant, a licence to remove or otherwise work coal using underground methods.

4.8 There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

4.9 There are no deep BGS boreholes recorded in the vicinity of the site.

5.0 ENVIRONMENTAL CONSIDERATIONS

5.1 Radon

The property is in a Radon Affected Area, as between 3 and 5% of properties are above the Action Level.

Basic Radon Protective Measures are necessary.

5.2 Landfill Sites

There are no recorded historical or current landfill sites located within 250m of the site.

5.3 Flood Risk

The westernmost corner of the site lies within both Zone 2 and Zone 3 EA defined flood zones.

A separate report has been undertaken by HHA to determine the flood risk to the proposed development.

5.4 Groundwater

The bedrock underlying the site is classified as a Secondary (A) Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flows to rivers. These are generally aquifers formerly classified as minor aquifers.

There are no recorded groundwater abstraction licences recorded within 250m of the site.

There are thirteen recorded surface water abstraction licenses recorded within 250m of the site. Two are located 118m north of the site, one is located 183m north east of the site and the remaining ten are located 237m south east of the site.

There are two recorded licensed discharge consents within 250m of the site. These are located 240m south west of the site and discharge to Wessenden Brook.

There are five recorded pollution incidents in controlled waters within 250m of the site. Four of these were Category (3) Minor incidents recorded 107m north west, 140m north west, 150m north and 186m north. A category 2 (Significant) Incident was recorded 125m north west of the site.

The site is not located in a Source Protection Zone.

A culverted watercourse is recorded crossing the site from north west to south east. This connects two lengths of un-named tertiary river. Recent on-site investigations through dye-testing have proved that the culvert passes to the north of Manchester Road, over 40m north of the position indicated in the Groundsure report.

6.0 PRELIMINARY CONCEPTUAL SITE MODEL

6.1 The initial stage in assessing the risks posed from contaminated land during the redevelopment of a site is to prepare a conceptual model. A generalised conceptual model can be developed highlighting the main pollutant linkages through a contaminant ► pathway ►receptor model for the construction of a residential development. In order to prepare the conceptual model for a particular site the following parameters need to be reviewed as discussed below.

6.2 Contamination of existing land can be caused by a number of factors, including:-

i) Possible historical/current industrial activities.
ii) Disposal of waste materials.
iii) Storage of materials.
iv) A number of natural processes can also lead to hazardous gases and elevated heavy metals.

6.3 Potential pathways can include ground and surface water, permeable strata, existing services providing a conduit and voided ground. Potential receptors can include human health, ecosystems, controlled waters and building structures. There are a number of ways that a receptor can be exposed to the contaminant these include, inhalation, direct contact, ingestion, dermal contact and uptake.

6.4 The site has been used as a gas holding site, as well as a fire station and yard, with a gas plant located in the southern area. There is therefore a risk of contamination from the following:

i. Use of the site as gas holding station from 1890 to 2000. (possible ground gas contamination).
ii. Leakage of EPHs from vehicles stored on site
iii. Demolition material from former buildings located on site.
iv. Possible infill material to any former cellars located on site.
v. Construction material to existing hardstanding areas.

Therefore the potential for some contamination to exist on site is considered to be moderate/high.

6.5 Considering the proposed residential end use of the site, there will be two possible human receptor groups exposed to the existing onsite contamination:-

a) Site operatives during development.

b) End users, future site users (the critical receptor is a 6 year old female).

6.6 Human receptors may be exposed to site contamination by a number of possible pathways. These pathways are summarised in Table 1 below.

Table 1- Potential Human Exposure Pathways

Human Exposure Pathway	Site Users	Construction Workers
Soil Ingestion	YES	YES
Consumption of Home Grown Vegetables	YES	NO
Dermal Contact	YES	YES
Dust Inhalation	YES	YES
Gases/Vapours	YES	NO

6.7 The construction workers will come into contact with any contaminated soil to a far greater extent than future residents. The exposure pathways are generally through dermal contact and indirect ingestion. However their exposure will be for a limited time and the provision and correct use of personnel protective equipment and adequate welfare facilities during construction should restrict their risks to acceptable levels.

6.8 The risk of pollution to controlled waters by existing contamination is considered low. There has been no recorded pollution incidents to the culverted watercourse crossing the site and it is shown to be underlain by mudstones and siltstones.

6.9 No specific areas of ecological importance have been identified in the initial desk top study. Therefore the site is considered to be in a low risk environmental setting.

6.10 It is proposed to construct residential properties on the site with private garden areas. The presence of elevated sulphates and hydrocarbons could affect the long term integrity of buried concrete structures, including foundations and drainage pipes. Plastic water supply pipes can also be damaged by the presence of hydrocarbon contamination. The site plans indicate that there will be limited garden areas on site, due to the proposed apartments as the majority of the site will be covered by impermeable areas such as car parking. This will reduce the potential for contaminants to reach site end users.

7.0 FIELDWORK

7.1 Trial pit and borehole investigations were undertaken on 10th July 2018 using a 360 tracked excavator with 600mm wide bucket. A total of seven trial pits and six window samples were undertaken on site. Three of the window sample points were fitted with gas monitoring stations for gas testing, along with one pre-existing station.

7.2 Materials encountered in the trial pits and window samples were examined and categorised. Trial pit and window sample logs are contained within Appendix B of the report.

7.3 The site investigation works were designed to achieve comprehensive site coverage within the proposed development area. In particular, trial pits/window samples were undertaken beneath the historical recorded locations of the former gasholders. The locations of the trial pits and window samples were restricted by the existing gas plant and former fire station, as well as a gas main and drainage pipes crossing the site.

7.4 Soil samples were removed from the natural and made ground deposits within the trial pits. The samples were removed by operatives wearing gloves and placed into airtight clean plastic containers and glass bottles for transportation to the laboratory.

7.5 A total of ten samples from the natural and made ground deposits were recovered from the trial holes and borehole for chemical analysis. The testing was carried out by a UKAS accredited laboratory to nationally or accredited in-house methods. The results of the contamination testing are contained within Appendix C of this report.

7.6 A suite of common potential contaminants consisting of heavy metals, phytotoxic metals, sulphates, sulphides and poly-aromatic hydrocarbons was analysed for, including a range of inorganic substances, asbestos and EPH. In addition to the standard analysis, due to the historical use of the site as a gas holding station, Cyanide, Vanadium, BTEX, 2-methylphenol and 2.4 Dimethylphenol were analysed.

7.7 All samples were stored in airtight containers within cool boxes at approximately 4°c until delivery to the laboratory within 48 hours.

8.0 RESULTS OF THE INVESTIGATION

8.1 GEOTECHNICAL INVESTIGATION

8.1.1 A copy of the trial hole and borehole logs providing a complete record of strata encountered beneath the proposed development is presented in Appendix B.

8.1.2 The fieldwork generally proved a surface layer of made ground and fill material, underlain by soft silty clays and sands, as well as occasional thin layers of peaty material, loose gravels and alluvial materials.

8.1.3 The fieldwork proved 0.4-3.0m of made ground at the surface of all trial pits consisting of Type 1 stone hardcore, gravels, clays, stones, soil, brick, silt and ash.

8.1.4 TP01 was excavated within the existing structure of the historic gasometer. The outer walls of the gasometer were formed by a stone construction approximately 0.6m thick. Within this former gasometer was very loosely consolidated fill material consisting of stone, bricks, and gravel, with some ashy material. Surface water has been retained within the structure, and was noted at a depth of 1.0m below the existing ground level. The base of the gasometer was unable to be proven due to the size and loosely consolidated nature of the fill material.

8.1.5 TP03 and TP04, both located just to the southwest of the existing former fire station building, and within the gasometer in the middle of the site, both proved made ground of type 1 stone hardcore, ending at depths of 1.4-1.7m below existing ground levels, where slabs/stone which could not be excavated were encountered. These are ascertained to be the base slabs to the gasometer.

8.1.6 The remaining four trial pits were located outside the gasometers. The made ground was generally underlain by grey silty clays. In TP02, adjacent to the gasometer in the south west of the site, beneath 2.0m made ground of re-engineered clay, there was soft grey silty clay with occasional rounded cobbles becoming more frequent with depth, from 2.0-3.5m. This was underlain by loose gravels and alluvial material to the base of the trial pit at 4.0m. In TP05, 1.7m of clayey fill was proved at the surface, underlain by a further 0.5m thick layer of clayey ashy fill with a strong odour of hydrocarbon. Below this was a 0.3m layer of dark brown peat with organic rotting

timber, followed by firm dark grey silty clay to the base of the trial pit at 2.8m. In TP06, a surface layer of made ground 0.7m thick consisting of stony gravel with clay, was underlain by soft brown clays with soft brown peaty pockets containing rotting timber/organic material, followed by soft/firm silty grey/blue clay to the base of the pit at 1.8m. TP07 proved a deep surface layer of made ground ash/scalpings with occasional brick and stone gravel, to a depth of 1.7m. This was underlain by soft/firm grey silty clay with pockets of brown fibrous peaty material, to the base of the pit at 2.7m.

8.1.7 The sides of all seven trial pits remained stable throughout investigation. It should be noted that the trial pits were only left open for a short duration of time.

8.1.8 WS02-WS06 generally proved 0.4-1.0m of fill consisting of gravels, sandstone and ash, underlain by grey brown clay, with refusal encountered at 3.0-3.9m below existing ground levels. In WS03-WS06, a 0.4-1.7m thick band of peat was encountered within this clay at depths of 1-2.7m BGL.

8.1.9 WS01 was undertaken within the footprint of a former gas holder and proved 0.4m of made ground consisting of soils and sandstone. This was underlain by fill material consisting of sandy gravel, brick and sandstone, to the base of the pit at 4.0m, at which point the hole collapsed.

8.1.10 Standard Penetration Test 'N' values taken at 1.0m depth increments within the window samples are summarised in Table 2 below:-

Table 2 Summary of SPT (N Values)

Depth (m)	1.00-1.45	2.0-2.45	3.0-3.45	4.0-4.45
WS01	SPTs not required			
WS02	5	27	REFUSAL	-
WS03	7	1	32	REFUSAL
WS04	4	3	11	REFUSAL
WS05	9	2	28	REFUSAL
WS06	14	1	24	REFUSAL

8.1.11 The SPT tests generally proved a combination of clays ranging from very soft to very stiff, and sands/gravels ranging from medium to very stiff, prior to refusal.

8.2 GROUNDWATER

8.2.1 Groundwater was encountered during the trial pit investigation in trial pits 1 and 2, at depths of 1.5m, and 2.4m respectively. This is believed to be water which has accumulated within the construction of the former gas holder. Water was encountered in all six window samples, at depths from 1.2-2.0m.

8.2.2 Water levels observed during gas testing ranged from 0.55mbgl, to 2.4mbgl. Based on the depths at which water was encountered, it is thought that water may be perched upon impermeable layers within the strata.

8.2.3 It should be recognised that ground water levels may vary throughout the year. During periods of heavy rainfall the groundwater levels may be substantially higher than the results revealed in this investigation.

8.3 GAS MONITORING

8.3.1 WS01, WS02 and WS04 were installed with gas standpipes and lockable covers. We were also able to undertake readings from an existing borehole on site, the location of which is indicated on the attached site investigation plan. Unfortunately we have no record of the construction, or previously recorded gas information from this station. Gas has been completed on site, and the wells have been monitored on six occasions.

8.3.2 A standard gas monitoring procedure has been followed in accordance with CIRIA guidance, including measurement of the following:-

i) Methane, Oxygen and Carbon Dioxide concentrations.
ii) Atmospheric Pressure.
iii) Gas Flow Rate.
iv) Standing Water Level

8.3.3 The results of the monitoring undertaken is summarised in Table 3 below.

Table 3 - Summary of Recorded Gas Levels.

Borehole No.	Date	Oxygen %	Carbon Dioxide %	Methane %	Flow Rate (l/hr)	Depth to Water (m)	Atmospheric Pressure (mb)
WS01	23.07.18	20.7	0.7	NR	ND	1.3	994
	11.09.18	21.1	ND	NR	ND	1.6	992
	01.10.18	21.3	ND	NR	ND	1.6	1003
	01.11.18	21.3	ND	NR	ND	1.6	983
	14.11.18	21.7	ND	NR	ND	1.7	991
	28.11.18	21.2	0.1	NR	ND	1.6	975
WS02	23.07.18	14.5	3.9	NR	ND	1.5	994
	11.09.18	17.1	3.7	NR	ND	1.6	992
	01.10.18	17.8	3.0	NR	0.1	2.4	1003
	01.11.18	19.3	2.3	NR	ND	1.45	983
	14.11.18	19.5	2.4	NR	ND	1.2	991
	28.11.18	19.8	1.4	NR	0.2	1.1	975
WS04	23.07.18	20.0	0.1	NR	ND	1.6	994
	11.09.18	20.4	0.3	NR	ND	0.55	992
	01.10.18	21.3	0.2	NR	-0.3	1	1003
	01.11.18	21.2	0.4	NR	-0.9	0.9	983
	14.11.18	21.8	0.1	NR	ND	0.8	991
	28.11.18	21.1	0.0	NR	0.1	0.7	975
Exs Station	23.07.18	-	-	-	-	-	-
	11.09.18	16.3	4.1	NR	ND	-	992
	01.10.18	17.7	4	NR	ND	-	1003
	01.11.18	18.1	3.6	NR	-0.1	-	983
	14.11.18	19.0	2.4	NR	0.1	-	991
	28.11.18	19.3	2.5	NR	1.1	-	975

8.3.4 A maximum carbon dioxide concentration of 4.1% and no methane was recorded in the existing monitoring station. A maximum flow rate of 1.1 l/hr was also recorded in the existing monitoring station.

8.3.5 Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as **Green,** or **CS1** by BS 8485:2105 Table 2 due to the low carbon dioxide and flow rate being recorded.

8.3.6 The existing gas monitoring proved similar results to the newly installed stations, however no reading could be taken for groundwater levels, as the existing gas tap was not able to be removed from it's standpipe.

9.0 CONTAMINATION

9.1 HUMAN HEALTH RISK ASSESSMENT

9.1.1 The appraisal of contaminated land within the UK is based on a risk assessment approach. The method involves the principle of defining a source ► pathway ►receptor, linkage to establish a human health risk. For any risk to exist to a potential receptor from an identified contaminant there must be an unbroken source ► pathway ►target relationship.

9.1.2 In the first instance site data for the contaminant levels are compared against guidance such as the CLEA values published by DEFRA. Should the site values exceed the guidance criteria, the contamination levels are recognised to have the potential to pose a risk to human health. Two scenarios are then available:-

a) To break or remove one of the source ► pathway ►receptor linkages, by specifying an appropriate level of remedial work. Examples of remedial action may include the removal of the contaminated material or alternatively specifying a sufficient capping layer.

b) The alternative approach is to provide a more detailed human health site specific risk assessment. This will involve examining factors such as soil properties, exposure assumptions, groundwater flows and contamination composition.

9.2 CONTAMINATION RESULTS

9.2.1 As stated above, in order to put the analytical results into context, the data has in the first instance been assessed in relation to several sets of guidelines: -

9.2.2 The analytical results have been assessed via an initial screening assessment with regard to the current Contaminated Land Exposure Assessment model (CLEA UK) for human health, which has been produced for the Environment Agency and the Department of Environment, Food and Rural Affairs (DEFRA). The CLEA model provides Soil Guideline Values (SGVs) for a limited range of contaminants only, and these are based on risk to human health. As such they do not take into account potential risks to other receptors eg groundwater and third party land.

9.2.3 It is proposed to redevelop the site for residential use. Soil results have therefore been assessed against the CLEA SGV's for Residential Properties with plant uptake, as these are considered to be the most suitable guidelines to protect the most critical targets from contaminants via all possible exposure routes.

9.2.4 Where no CLEA SGV has been published, Generic Assessment Criteria (GAC) based on guidelines from the Chartered Institute of Environmental Health (CIEH) and Land Quality Management Ltd (LQM) S4UL document residential land use with plant uptake has been used. Where there is no GAC, guidance limits have been adopted from sources referenced in the table below.

9.2.5 A new approach has now been adopted for the calculation of SGV based on an acceptably low level of risk. These Category 4 Screening Levels (C4SL) have been calculated for six substances to date by modifying the toxilogical/exposure parameters within CLEA. C4SLs have been used as tier 1 trigger levels within this assessment, superseding the previous CIEH and LQM SGVs.

9.2.6 Assessment of risk is considered as a tiered approach. Assessment based on non-intrusive means is considered Tier 1 assessment, comparison against SGVs and GACs is a Tier 2 assessment, and the generation of and comparison with Site Specific Assessment Criteria (SSAC) is a Tier 3 assessment and is conducted where deemed appropriate following the Tier 2 assessment.

9.2.7 The sulphate and acid concentrations have been compared against the BRE digest "Concrete in Aggressive Ground" parts 1-4. This will enable the concrete class to be specified in relation to possible contact with aggressive soils.

9.2.8 The results of the chemical analysis are presented on the laboratory analysis sheets with Appendix C. A summary of the significance of the results is presented in Table 4.

Table 4

Comparison of contaminant against accepted guidance values for residential use without plant uptake

CONTAMINANT	SGV MG/KG	CONCENTRATION IN ALL SOILS. MG/KG	No. OF SAMPLES EXCEEDING GUIDANCE VALUES	PERCENTAGE OF SAMPLES EXCEEDING GUIDELINE VALUE
Arsenic	40 (4)	2.9-49	1/10	10.0%
Cadmium	150 (4)	<0.1-0.8	0/10	
Chromium (Total)	130 (2)	9.0-39	0/10	
Lead	310 (4)	20-2600	1/10	10.0%
Mercury (Total)	1.2 (1)	<0.05-0.0.09	0/10	
Selenium	430 (1)	<0.5-1.0	0/10	
Copper	7100 (1)	8.7-130	0/10	
Vanadium	410 (1)	8.2-47	0/10	
Nickel	180 (1)	4.8-31	0/10	
Zinc	40000 (1)	14-620	0/10	
Cyanide, free	34	<0.1-2.1	0/10	
Sulphate	0.24 (3)	0.01-5.5	2/10	20.0%
Thiocyanate	50	<0.6-18	0/10	
Sulphide	250	<10-10000	3/10	30%
Naphthalene	2.3 (1)	<0.1-1.2	0/10	
Benzo(a)pyrene	5.3 (4)	<0.1-31	3/10	30%
Benzene	0.087 (1)	<0.01-0.06	0/10	
Ethylbenzene	47 (1)	<0.01	0/10	
Toulene	130 (1)	<0.01	0/10	
Xylene	56 (1)	<0.01	0/10	
PAH (Total)	40	<1.6-410	3/10	30%
EPH (Total)	250	<10-1500	3/10	30%
Phenols	750 (1)	<0.3-4.5	0/10	
2-Methylphenol	77	<0.1-0.2	0/10	
3&4-Methylphenol	77	<0.1-0.6	0/10	
2,4-Dimethylphenol	18	<0.1-0.1	0/10	
Asbestos	No fibres	No fibres	0/10	
pH	6-8	6.1-12.5	4/10	40.0%

(2) DEFRA CLR SGV's withdrawn used for initial comparison

(3) BS 8110 1985 Table 6.1

(4) Category 4 Screening Levels

9.2.9 Elevated levels of Arsenic (49mg/kg) and Lead (2600mg/kg) were recorded in the made ground at 1.50m in TP01, and the ashy clay fill at 1.80m in TP05.

9.2.10 Two elevated levels of sulphate (0.65mg/kg and 5.5mg/kg) were recorded in the made ground of TP05, and WS03, respectively. This corresponds to a design sulphate class DS-5, ACEC class AC-4, when compared against the BRE Special Digest 1 “Concrete in aggressive ground”.

9.2.11 Elevated levels of sulphide were found in TP05 at depths of 0.60m and 1.80m (260mg/kg and 1200mg/kg), along with an extremely elevated level in WS03 at 0.50m, of 10000mg/kg. These elevated readings coincided with the presence of a white residue in the samples of made ground submitted for chemical analysis.

9.2.12 Three elevated levels of each of Benzo(a)pyrene, EPH (total) and PAH (total) were found in the made ground of TP02 at 0.60m, TP06 at 0.50m, and TP07 at 0.40m.

9.2.13 Elevated pH was proved in the made ground of TP05 at 0.60m, TP07 at 0.40m, TP01 at 1.0m and WS03 at 0.50m.

9.2.14 Speciated analysis has been undertaken on the sample showing elevated levels of EPH (Total) and the results are shown in Table 5 below :-

Table 5

Comparison of recorded contaminant levels against speciated EPH LQM S4UL screening values for residential use with plant uptake.

Petroleum Hydrocarbons	**LQM S4UL Screening Values (mg/kg)**	**Recorded Concentrations**	**No. of samples exceeding Screening Values**
Aliphatics			
C5-C6	42	<0.01	0/3
C6-C8	100	<0.01-0.01	0/3
C8-C10	27	<0.01	0/3
C10-C12	130 (38)	<1.5	0/3
C12-C16	1100 (24)	<1.2	0/3
C16-C35	65000 (8.48)	<4.9	0/3

Aromatics			
C5-C7	70	<0.01-0.06	0/3
C7-C8	130	<0.01	0/3
C8-C10	34	<0.01	0/3
C10-C12	74	<0.9	0/3
C12-C16	140	<0.5	0/3
C16-C21	260	<0.6-15	0/3
C21-C35	1100	<1.4-22	0/3

9.2.15 The speciated analysis proves that the individual carbon bands are below their respective tier 1 trigger levels.

9.2.16 No asbestos fibres were detected in the samples taken from the site.

9.2.17 The natural ground found on site was found to be clear of contamination.

9.2.18 A sample of groundwater from TP01 was also tested for leachates, to ascertain if the contaminants were mobile and therefore likely to contaminate the underlain natural strata. Three of the chemicals tested for exhibited concentrations above the regulatory drinking water standards. These are however considered to be very conservative for groundwater contamination. These were dissolved Copper (5.2ug/l, against a standard of 3.0ug/l), Benzopyrene (2.6ug/l against a standard of 0.01ug/l) and PAH total (19ug/l, against a standard of 0.1ug/l).

9.3 QUALITATIVE RISK ASSESSMENT

9.3.1 The Qualitative Risk Assessment is based upon the previously discussed source ► pathway ►receptor principle. In relation to the proposed site these may be described as follows:-

9.3.2 **SOURCE**

i) Elevated levels of Benzo(a)pyrene, total EPH, and Total PAH

ii) Elevated levels of sulphate.

iii) Elevated levels arsenic and lead.

iv) Elevated levels of sulphide.

9.3.3 **PATHWAYS**

i) Ingestion of contamination material.

ii) Inhalation of contaminated particles.

iii) Dermal contact with the known contamination.

9.3.4 **RECEPTORS**

i) Residential site users.

ii) Construction and maintenance workers.

iii) Controlled waters

iv) The building structure.

9.3.5 Each of the receptors will now be appraised and attribute the likely risks involved.

i) Residential site users.

Based on the chemical results obtained, and the proposed land use of the site it is considered that there is currently a **Moderate** risk to end users from relatively shallow localised ground contamination on-site.

Three elevated levels of each of Benzo(a)pyrene, EPH (total) and PAH (total) were found in the made ground of TP02 at 0.60m, TP06 at 0.50m, and TP07 at 0.40m.

Two elevated levels of Sulphate (0.65 mg/kg and 5.5 mg/kg) were recorded in the made ground at 0.6m in TP02.

Elevated levels of sulphide were found in TP05 at depths of 0.60m and 1.80m (260mg/kg and 1200mg/kg), along with an extremely elevated level in WS03 at 0.50m, of 10000mg/kg, associated with a white residue in the collected sediment samples. This is primarily a risk of corroding steel reinforcement.

Elevated levels of Arsenic (49mg/kg) and Lead (2600mg/kg) were recorded in the made ground at 1.50m in TP01, and the ashy clay fill at 1.80m in TP05. These potentially could pose risks to the health of site users if they are not effectively mitigated.

Construction and Maintenance Workers.

It is considered that there is a **low** risk to construction and maintenance workers from the redevelopment of the site.

Construction workers should always wear PPE including overalls, boots and gloves when handling the contaminated materials onsite. In addition, eating, drinking and smoking should be restricted to designated areas where the above hygiene facilities are available.

ii) Controlled Waters

There are thirteen recorded surface water abstraction licenses recorded within 250m of the site. Two are located 118m north of the site, one is located 183m north east of the site and the remaining ten are located 237m south east of the site. A surface water feature crosses the site through a culvert.

Elevated PAH Total, Benzopyrene and copper results have been identified in the contamination testing of a sample of groundwater from TP01. A relatively impermeable clay strata has been found to underlie the site. No elevated contaminants have been identified within the natural sands or clay deposits underlying the site. This suggests that the contamination, has been contained by the clay deposits. Only limited perched ground water was encountered during the trial pit investigation. Due to the above, we would conclude that the risk to controlled waters of leaching contaminants from the site is **low**.

iii) Building Structures.

Two elevated levels of sulphate (0.65mg/kg and 5.5mg/kg) were recorded in the made ground of TP05, and WS03, respectively. This corresponds to a design sulphate class DS-5, ACEC class AC-4, when compared against the BRE Special Digest 1 “Concrete in aggressive ground”.

Service providers should be forwarded the final validated chemical levels in order for them to provide an accurate specification for the apparatus to be provided. New services should be surrounded and backfilled with clean material to afford some protection to the apparatus and allow any future maintenance work to be undertaken in clean material.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 GEOTECHNICAL ASSESSMENT

10.1.1 The fieldwork generally proved made ground overlying soft clay strata and alluvial material, to a depth of 4.0m. Made ground is not considered a suitable foundation material and therefore all loadings should be taken through to the natural underlying material of either firm clay or alluvial deposits, capable of providing suitable bearing.

10.1.2 A combination of foundation types will be necessary for the proposed development. At present we would envisage the use of strip/trench fill and pile foundations will be necessary.

10.1.3 The listed frontage of the former fire station building, which is to remain in place is indicated to adjoin a new two storey apartment block. The foundations for this area are likely to be lighter loaded and could be accommodated by a widened strip /trench fill foundation. It should be noted that underpinning may be required beneath the frontage of the former fire station, in order to deepen the existing foundation and tie in with the new building. This will need to be confirmed via further investigation.

10.1.4 We would suggest that the proposed apartments in the south of the site should be constructed on piled foundations with a reinforced concrete suspended ground beam, due to the depth of the underlying fill material, and the softness of the overlying clay deposits, as well as the additional loadings due to the three storey buildings.

10.1.5 Movement joints should be utilised at the junction of these different foundation types, due to the risk of differential settlement.

10.1.6 For initial design purposes we would envisage a safe bearing capacity 150kN/m^2 where foundations are extended onto the alluvial strata.

10.1.7 The following general comments relating to piling are provided for guidance, and further advice should be sought from a specialist-piling contractor.

10.1.8 Piled foundations should extend beneath the made ground and soft clay material, and be socketed into the underlying bedrock. It may be necessary to pre-drill the pile positions into the hard strata to ensure the loads are transferred to below the

unsuitable ground. The deepest areas of unsuitable ground found within the window samples was 3.9m, however the base of the on site gas holders has yet to be proved, therefore a preliminary estimate of 5-6m for the pile lengths should be allowed for using a minimum 1.0m socket into the natural strata.

10.1.9 The safe working load that may be supported on a pile is dependent on the pile diameter, its founding depth and the method of installation. As piles would be founded in bedrock, they will be essentially end bearing, although there may also be some shaft adhesion within the worked materials. It is essential that pile design allows for negative skin friction.

10.1.10 It is recommended however, that flexible service connections are used on this site, especially where they enter the buildings, in order to avoid any possible damage due to self-settlement of the weak strata once the site is developed.

10.1.11 On completion of the piling works, pile testing should be undertaken to confirm the adequacy and load carrying capacity of the installed piles.

10.1.12 Should any shallow obstructions occur, i.e. large boulders or existing foundations, they should either be grubbed-up, or alternatively replacement piles installed. The pile logs should be checked prior to the piling rig departing site, to ensure consistent pile lengths are installed throughout the site. At present we would propose that steel piles are utilised for the construction foundations.

10.1.13 The new houses can be built off ring beams designed to span the piles. In order to bond them to the piles, the tops of the piles must be tied to the reinforcement within the ground beams. This can be achieved by a variety of methods dependent upon the type of piles adopted.

10.1.14 For piled foundations, suspended floor slabs should be utilised. A pre-cast ‘Beam and Block’ concrete ground floor construction could be utilised, and suspended across the ring beams.

10.1.15 Two elevated levels of sulphate (0.65mg/kg and 5.5mg/kg) were recorded in the made ground of TP05, and WS03, respectively. This corresponds to a design sulphate class DS-5, ACEC class AC-4, when compared against the BRE Special Digest 1 “Concrete in aggressive ground”. Please note that if the existing fill material

is removed from site, and clean soils imported, along with the foundation constructed within the natural strata then a design sulphate class DS-1, ACEC class AC-1 can be adopted.

10.1.16 Wherever any foundations are located near existing or proposed new trees, their foundations must be sited below the root growth zone. Reference should be made to the NHBC standards Chapter 4.2 “Building Near Trees” which provides guidance on foundation criteria, depths and construction. All services should be similarly protected. Plasticity testing of the clays on site has shown them to be of medium volume change potential.

10.2 GAS MONITORING

10.2.1 As discussed previously, gas monitoring stations were installed in three of the window samples undertaken on site, and the pre-existing gas monitoring station was accessed.

10.2.2 The gas testing has proven a maximum carbon dioxide concentration of 4.1% and no methane in the existing monitoring station. A maximum flow rate of 0.9 l/hr was detected in the monitoring stations.

10.2.3 Basic Radon Protection measures are required for the site.

10.2.4 The proposed development consists of 2-4 storey residential housing and apartment buildings. Therefore the gas regime has been characterised in accordance with the traffic light methodology as outlined in *CIRIA Report C665*. Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as **Green,** or CS1 by BS 8485:2105 Table 2.
GSV = max carbon dioxide concentration x max flow rate 0.041 x 0.9 = 0.037 l/h

10.3 CONTAMINATION ASSESSMENT

10.3.1 Elevated levels of Benzo(a)pyrene and PAH total are noted in TP02 in the southwest of the site, as well as TP06 and TP07 in the northeast of the site, likely to be associated with locations where vehicles have previously been stored.

Elevated levels of Arsenic (49mg/kg) and Lead (2600mg/kg) were recorded in the made ground at 1.50m in TP01, and the ashy clay fill at 1.80m in TP05. These could potentially pose risks to the health of site users if they are not effectively mitigated.

10.3.2 Elevated levels of PAH Total, Benzopyrene and Copper were found in a water sample taken from TP01. It is considered unlikely that this will pose significant risk to groundwater due to the impermeable ground underlying the site, in particular the slabs thought to be present at the base of the gas holders, preventing leaching, as well as the location of the closest groundwater abstraction point being over 100m away from the site.

10.3.3 The most significant contamination is shown in the south eastern area of the site, where it is proposed to construct the largest block of flats (Building A). It is likely that the presence of contaminants will be mitigated in much of the site by the tarmacking of ground for roads and pavements, however it will be necessary to remediate the area, in order to prevent contamination reaching site users through any on site landscaping.

10.3.4 At present, we would recommend that made ground should be removed from any proposed soft landscaped areas on site, to accommodate a minimum 600mm capping layer. It is understood that the re-engineering of the ground in the south western part of the site will effectively remove any contaminated material. Any material excavated should be transferred to an appropriate storage facility.

10.3.5 In addition to the above it is worth noting that the finished floor level for the development is lower than the existing ground level. This will essentially necessitate the removal of an average 500mm depth of existing site level to accommodate. Therefore, an additional 600mm of the remaining material will need to be removed from site to accommodate the proposed 600mm clean capping. Since the majority of the contamination on site is within the made ground close to the surface, this will effectively remove the majority of the contamination.

10.3.6 Further contamination analysis will be necessary once the gas holders are removed from site. Samples should be taken from the base and perimeter of the excavations

10.3.7 A white residue, corresponding with extremely elevated levels of sulphide was encountered while undertaking TP05 and WS03. If any of this residue is encountered

during site works, it should be removed from site and transferred to an appropriate waste site, as per section 10.3.13 of this report. Furthermore, any ground encountered with an odour of hydrocarbons should be removed in the same manner.

10.3.8 No clean topsoil has been found on site. An amount of topsoil and subsoil sufficient to implement a minimum 600mm capping layer will therefore need to be imported to the site for use in landscaped areas.

10.3.9 Should any suspected areas of contamination be exposed during site construction, an engineer should be contacted to determine if additional chemical testing should be undertaken. The on-site staff should maintain a photographic record and dates of any exposed contaminated material.

10.3.10 All imported material should be tested for the range of contaminants listed previously in Table 4. Only material found to be below published trigger levels should be deemed uncontaminated and accepted for use on site.

10.3.11 If the imported material is from a Greenfield site, a minimum of 3 samples or 1 per 250m^3 of imported material should be taken for testing, whichever is greater. If it is from a brownfield site, a minimum of 6 samples, or 1 per 100m^3 of imported material should be taken for testing, whichever is greater. Material provided by a commercial supplier should be certified to the same level of testing, with the certificate less than two months old.

10.3.12 All imported certified material should be placed immediately. If this is not possible, or the material is not certified and sampling is to be carried out prior to being laid, it should be securely stored on site prior to use to prevent possible contamination from any materials on site.

10.3.13 If any areas of made ground are removed off site, they should be taken to a licensed waste site and full documentation should be obtained. Any material to be taken off-site should be suitably quarantined prior to removal to prevent cross contamination. Any relevant chemical test results should be given to the landfill operator, so that they can determine if this material is suitable to be disposed of in their licensed landfill.

11.0 SUGGESTED FURTHER WORK

11.1 Further ground investigations are necessary to ascertain how best to construct the foundations for the development, and to determine the most appropriate remediation method for the site. Trial pits will be required to determine the foundations of the existing fire station building.

11.2 The existing gas holders are to be removed from the site before construction is commenced. This should be carried out in the following steps:-

- Accumulated water removed from the base of the gas holders.
- Existing Gasholder construction excavated and materials stored for re-use or crushed. Including the more recent metal framed gasholder
- Inspection by Haigh Huddleston Associates, including contamination testing of material from the base, and perimeter of the excavation.
- Re-engineering of the remaining material.
- Inspection by Haigh Huddleston Associates.

11.3 Consideration should also be given to some further ground investigation of the eastern corner of the site, to ascertain the presence of the small gas holder shown on historical maps from before 1890 to 1930.

11.4 Validation of importation of clean topsoils and subsoils.

12.0 APPROVALS

12.1 Proposals for the remediation of contaminated land may require the approval of numerous bodies.

These include:

a) Kirklees Council Environmental Health Department as required by the building and planning regulations.

b) The NHBC or similar as they will provide the insurance costs to cover the property.

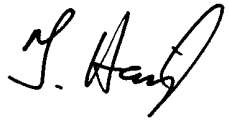
c) The Environment Agency if there are risks of contamination to ground or surface water systems. They will also require notification if material is removed from site and taken to an appropriate tip.

d) Relevant highways and drainage authorities and other service companies may also wish to know about the level of contaminants.

Prepared by

M. Huddleston. MEng

Checked by



T. Haigh. BSc.,C.Eng.M.I.C.E.

April 2019

APPENDIX A

SITE LOCATION PLAN

SITE INVESTIGATION PLAN

SITE CONCEPTUAL MODEL

Geo Insight

Address:	**MANCHESTER ROAD, SLAITHWAITE, HUDDERSFIELD, HD7 5JX**
Date:	**13 Nov 2017**
Reference:	**GS-4463511**
Client:	**Haigh Huddleston & Associates**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	404939,411461
Site Size:	0.30ha

0m	Scale 1:50	4m
0m	Scale 1:100	8m
0m	Scale 1:200	16m
0m	Scale 1:500	40m
0m	Scale 1:1250	100m

(When to scale of original plan bar = 8cm)

KEY

TRIAL PITS

BOREHOLES

AREAS INACCESSIBLE DURING SITE INVESTIGATION

Manchester Road

Former Fire Station

Emergency House

Gas Plant

Bus Shelter

1.3m high stone wall

2.4m high steel pallisade fence

1.6m high stone wall

High Pressure Gas Mains

Construction between 1906-1930

Construction before 1890

chain link fence

concrete panel fence

2.4m high concrete post and chain link fence

steel pallisade fence

Low stone wall

stone wall

max 2.0m highstone wall

225Ø

1.830

Watercourse / Land drain 450Ø

Historical Buildings

EXISTING MONITORING STATION

TP01 TP02 TP03 TP04 TP05 TP06 TP07

WS01 WS02 WS03 WS04 WS05

STN2 STN3 STN4 STN6 STN7

E 979.170 N 1971.470 El 187.270

E 1002.850 N 1986.630 El 187.400

E 1011.420 N 1959.940 El 188.140

E 945.450 N 1952.550 El 186.800

NOTE:
1. Tree locations indicative only.
2. Perimeter of site is banked up with earth so not a true reflection of ground levels.

Haigh Huddleston & Associates

Civil Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Rd, Dewsbury, WF12 7BU t 01924 464342 f 01924 450662

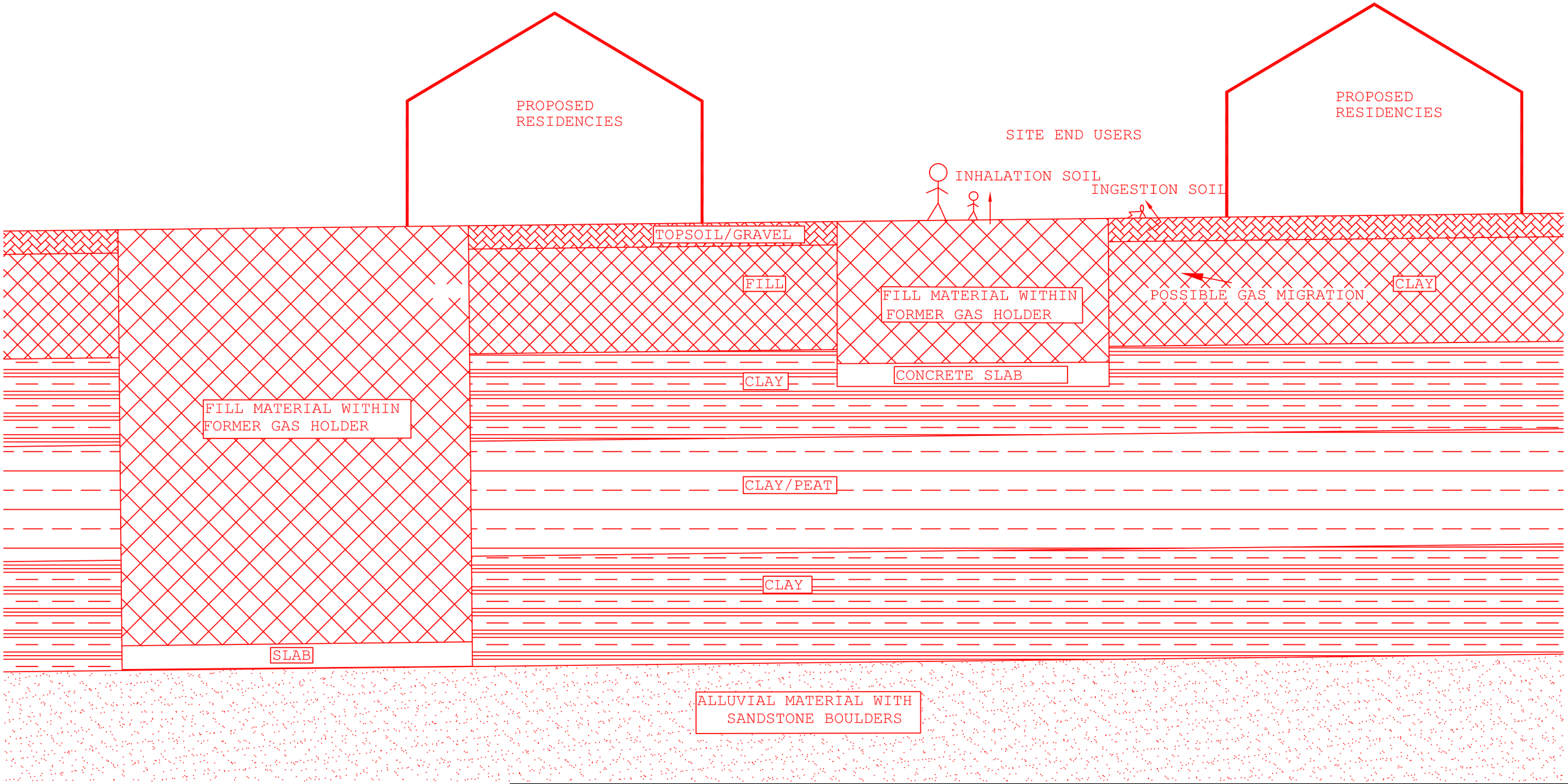
e trevor.haigh@haighhuddleston.co.uk

Client: SB HOMES

Project: FORMER FIRE STATION, MANCHESTER ROAD, MARSDEN

Detail: SITE INVESTIGATION WORKS PLAN

Dwn	Chkd	Date	Scale	Dwg No.
DP	MD	07.03.19	1/200@A2	E17/7092/200



Haigh Huddleston & Associates

Civil Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Rd, Dewsbury, WF12 7BU t 01924 464342 f 01924 450662

e trevor.haigh@haighhuddleston.co.uk

Client
SBHomes

Project
Former Fire Station, Marsden

Detail
Typical Site Conceptual Model

Scale	Dwn	Chkd	Date	Dwg No.
NTS	DP	MD	Apr '19	E17/7092/32

APPENDIX B

TRIAL PIT LOGS

WINDOW SAMPLE LOGS

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
Firth Building,
99-101, Leeds Road,
Dewsbury, WF12 7BU
t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 1 (Within gasometer)

Client :	**SB HOMES**	**Job No :**	**7092**
Site :	**FORMER MARSDEN FIRE STATION**	**Date :**	**JULY 2018**

0.0		
0.5		Made ground. Stones, soil, brick, silt with some ash. Sample taken at 0.5m.
1.0		
1.5		Sample taken at 1.5m. Groundwater.
2.0		
2.5		
3.0	**3.0**	
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	YES @ 1.5m
Sample taken	YES at 0.5 & 1.5m
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
Firth Building,
99-101, Leeds Road,
Dewsbury, WF12 7BU
t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 2 Outside Gasometer

Client :	**SB HOMES**	**Job No :**	**7092**
Site :	**FORMER MARSDEN FIRE STATION**	**Date :**	**JULY 2018**

0.0		
2.0	**2.0**	Made ground. Re-engineered clay with some stone and roots.
3.5	**3.5**	Soft light grey silty clay with occasional rounded cobbles becoming more frequent with depth. Small ingress of ground water at 2.4m.
4.0	**4.0**	Loose gravels and stone alluvial material.

REMARKS:

Ground water encountered during excavation	Small ingress of ground water at 2.4m.
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
Firth Building,
99-101, Leeds Road,
Dewsbury, WF12 7BU
t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 3 (within gasometer 2)

Client :	**SB HOMES**	**Job No :**	**7092**
Site :	**FORMER MARSDEN FIRE STATION**	**Date :**	**JULY 2018**

0.0		
0.5		Type 1 stone hardcore.
1.0		
1.5		
	1.7	Slabs stone/concrete unable to excavate.
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
Firth Building,
99-101, Leeds Road,
Dewsbury, WF12 7BU
t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 4 (within gasometer 2)

Client :	**SB HOMES**	**Job No :**	**7092**
Site :	**FORMER MARSDEN FIRE STATION**	**Date :**	**JULY 2018**

0.0		
		Type 1 stone hardcore.
0.5		
1.0		
	1.4	Stone/concrete flags unable to excavate.
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
Firth Building,
99-101, Leeds Road,
Dewsbury, WF12 7BU
t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 5 Outside gasometer 2

Client :	**SB HOMES**	**Job No :**	**7092**
Site :	**FORMER MARSDEN FIRE STATION**	**Date :**	**JULY 2018**

0.0		
0.5		Clayey fill with stones and gravels. Sample taken at 0.6m.
1.0		
1.5		
	1.7	
		Sample taken at 1.8m. Clayey ashy fill with strong odour of hydrocarbon.
2.0		
	2.2	
2.5	**2.5**	Dark brown peat with organic rotting timber.
	2.8	Firm dark grey silty clay.
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	YES at 0.6 and 1.8m.
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
Firth Building,
99-101, Leeds Road,
Dewsbury, WF12 7BU
t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 6

Client :	**SB HOMES**	**Job No :**	**7092**
Site :	**FORMER MARSDEN FIRE STATION**	**Date :**	**JULY 2018**

0.0		
0.5		Made ground. Stoney gravel with clay. Sample taken at 0.5m.
	0.7	
1.0	**1.0**	Soft brown clays with soft brown peaty pockets containing rotting timber/organic material.
1.5		Soft/firm silty grey/blue clay.
	1.8	
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	YES at 0.5m.
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
Firth Building,
99-101, Leeds Road,
Dewsbury, WF12 7BU
t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 7

Client :	**SB HOMES**	**Job No :**	**7092**
Site :	**FORMER MARSDEN FIRE STATION**	**Date :**	**JULY 2018**

0.0		
0.5		Made ground ash/scalpings with occasional brick and stone gravel.
1.0		
1.5		
	1.7	
2.0		Soft/firm grey silty clay with pockets of brown fibrous peaty material.
2.5		
	2.7	
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

PM Sampling

17132-06

Former Fire Station Marsden

Depth	SPT Results 75	75	PEN	75	75	75	75	PEN
WS/ 01	water @ 1.5m							
SPTs not required								
0-0.4m	made ground of soils and sandstone							
0.4-4m	sandy gravel brick sandstone fill							
	hole collapsed							
installed in JCB hole 1.0m plain, 2.0m slott no cover								

Depth	SPT Results 75	75	PEN	75	75	75	75	PEN
WS/ 02	water @ 1.5m							
1-1.45m	2	1		1	1	2	1	
2-2.45m	6	5		6	9	6	6	
3-3.45m	1	0		8	10	15	17	70mm
0-0.3m	sandy top soil							
0.3-0.7m	sand & gravel with sandstoe							
0.7-1.3m	dark brown caly/sandstone							
1.3-3.0m	black sandy gravel/sandstone							
2.5m install	0.5m plain	2.0m slotted		cover				

WS/ 03	water @ 2.0m							
1-1.45m	2	2		2	2	1	2	
2-2.45m	0	0		0	0	0	1	
3-3.45m	2	8		6	12	6	8	
4-4.45m	13	12	70mm	15	20	15		50mm
0-0.4m	sandy gravel							
0.4-1.0m	white chalk clay							
1-2.7m	clayish peat							
2.7-3.7m	grey clay							
3.7-4m	sandstone							

WS/ 04	water @ 1.2m							
1-1.45m	1	0		1	1	1	1	
2-2.45m	0	0		0	0	2	1	
3-3.45m	2	2		2	3	3	3	
4-4.45m	4	3		14	14	14	8	60mm
0-0.2m	soily gravel							
0.2-0.8m	ash & gravel fill							
0.8-1.0m	sandstone							
1-1.5m	brown clay							
1.5-1.9m	peat							
1.9-3.9m	greeny brown clay							
3.9-4m	sandstone							

WS/ 05	water @ 1.4m							
1-1.45m	2	1		2	2	2	3	
2-2.45m	0	0		1	0	1	0	
3-3.45m	5	7		6	7	9	6	
4-4.45m	14	11	50mm	20	22	8		30mm
0-0.3m	soily gravel							
0.3-1.0m	ash & sandstone							
1-1.4m	grey brown clay							
1.4-2.0m	peat							
2-3.8m	grey clay							
3.8-4m	sandstone							

WS/ 06	water @ 1.6m							
1-1.45m	2	3		4	4	3	3	
2-2.45m	0	1		0	0	0	1	
3-3.45m	6	6		6	5	6	7	
4-4.45m	15	10	30mm	31	19			10mm
0-0.3m	soily gravel							
0.3-0.9m	ash & sandstone							
0.9-1.5m	grey brown clay							
1.5-2.2m	peat							
2.2-3.9m	grey/brown clay							
3.9-4.0m	sandstone							

APPENDIX C

CHEMICAL ANALYSIS OF SAMPLES

GAS MONITORING RESULTS

Certificate of Analysis

Certificate Number 18-16690-1

01-Aug-18

Client Haigh Huddleston & Associates Ltd
Firth Buildings
99-101 Leeds Road
Dewsbury
WF12 7BU

Our Reference 18-16690-1

Client Reference 7092

Order No (not supplied)

Contract Title Fire Station, Marsden

Description 10 Soil samples, 1 Water sample.

Date Received 13-Jul-18

Date Started 13-Jul-18

Date Completed 01-Aug-18

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 18-16690, extra testing.**
Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

Sample ID	Depth	Lab No	Completed	Matrix Description
TP01	0.5	1365862	24/07/2018	Dark brown clayey, gravelly SAND including odd rootlets (Made ground - brick)
TP02	0.6	1365863	24/07/2018	Dark brown gravelly, very clayey SAND (Made ground - slag)
TP02	2	1365864	24/07/2018	Dark grey gravelly, sandy CLAY
TP03	1	1365865	24/07/2018	Brown clayey very gravelly SAND (Possible made ground - brick)
TP05	0.6	1365866	24/07/2018	Dark brown clayey, very gravelly SAND
TP05	1.8	1365867	24/07/2018	Dark brown slightly gravelly, sandy CLAY including some rootlets (Possible made ground - brick)
TP06	0.5	1365868	24/07/2018	Dark brown slightly gravelly, sandy CLAY including some rootlets
TP07	0.4	1365869	24/07/2018	Dark brown clayey, gravelly SAND including odd rootlets
WS03	0.5	1365870	24/07/2018	Cream sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP01	1	1365871	24/07/2018	Dark brown very clayey, very gravelly SAND (Made ground - brick)

Summary of Chemical Analysis
Soil Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

				Lab No	1365862	1365863	1365864	1365865	1365866	1365867
				Sample ID	TP01	TP02	TP02	TP03	TP05	TP05
				Depth	0.50	0.60	2.00	1.00	0.60	1.80
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	10/07/18	10/07/18	10/07/18	10/07/18	10/07/18	10/07/18
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	11	19	2.9	4.7	10	49
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.2	< 0.1	0.1	0.3	0.8
Chromium	DETSC 2301#	0.15	mg/kg	31	28	38	39	33	16
Copper	DETSC 2301#	0.2	mg/kg	37	30	28	21	48	46
Lead	DETSC 2301#	0.3	mg/kg	130	72	20	22	82	86
Mercury	DETSC 2325#	0.05	mg/kg	0.06	< 0.05	< 0.05	< 0.05	0.07	< 0.05
Nickel	DETSC 2301#	1	mg/kg	30	31	30	28	28	15
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	0.7	1.0
Vanadium	DETSC 2301#	0.8	mg/kg	30	27	34	19	25	32
Zinc	DETSC 2301#	1	mg/kg	110	100	93	48	82	55
Inorganics										
pH	DETSC 2008#			8.0	6.8	6.1	8.0	8.4	6.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	1.2	2.9	2.7	0.6	3.1	34
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	0.3	0.2	< 0.1	0.2	0.4
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	< 0.6	0.6	< 0.6	< 0.6	18
Sulphide	DETSC 2024*	10	mg/kg	20	35	20	< 10	260	1200
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.04	0.03	0.03	0.01	0.19	0.65
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		< 0.01				
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		0.01				
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01				
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		< 1.5				
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		< 1.2				
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		< 1.5				
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		< 3.4				
Aliphatic C5-C35	DETSC 3072*	10	mg/kg		< 10				
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		0.06				
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		< 0.01				
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01				
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		< 0.9				
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		< 0.5				
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		15				
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		22				
Aromatic C5-C35	DETSC 3072*	10	mg/kg		37				
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg		37				
EPH (C10-C40)	DETSC 3311#	10	mg/kg	160	1500	< 10	39	170	160
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	0.06	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

				Lab No	1365862	1365863	1365864	1365865	1365866	1365867
				Sample ID	TP01	TP02	TP02	TP03	TP05	TP05
				Depth	0.50	0.60	2.00	1.00	0.60	1.80
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	10/07/18	10/07/18	10/07/18	10/07/18	10/07/18	10/07/18
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	0.2	1.2	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.2	0.6	< 0.1	< 0.1	0.3	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.1	9.0	< 0.1	< 0.1	< 0.1	0.3
Fluorene	DETSC 3301	0.1	mg/kg	0.1	7.5	< 0.1	< 0.1	0.3	0.3
Phenanthrene	DETSC 3301	0.1	mg/kg	2.0	71	< 0.1	< 0.1	1.9	1.6
Anthracene	DETSC 3301	0.1	mg/kg	0.9	16	< 0.1	< 0.1	0.9	0.4
Fluoranthene	DETSC 3301	0.1	mg/kg	5.1	71	< 0.1	0.5	6.7	2.3
Pyrene	DETSC 3301	0.1	mg/kg	5.0	63	< 0.1	0.5	6.4	4.5
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	2.7	28	< 0.1	0.3	3.1	1.1
Chrysene	DETSC 3301	0.1	mg/kg	2.8	30	< 0.1	0.4	3.5	0.8
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	2.5	24	< 0.1	0.4	2.9	0.8
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	1.6	14	< 0.1	0.2	1.6	0.5
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	3.5	31	< 0.1	0.4	3.8	1.3
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	2.2	23	< 0.1	0.4	2.6	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.4	3.6	< 0.1	< 0.1	0.5	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	2.0	23	< 0.1	0.3	2.2	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	32	410	< 1.6	3.5	37	14
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	4.5
SVOCs										
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	0.6	< 0.1	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	0.6	< 0.1	< 0.1	0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	0.2	1.8	< 0.1	< 0.1	0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

			Lab No	1365862	1365863	1365864	1365865	1365866	1365867
			Sample ID	TP01	TP02	TP02	TP03	TP05	TP05
			Depth	0.50	0.60	2.00	1.00	0.60	1.80
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	10/07/18	10/07/18	10/07/18	10/07/18	10/07/18	10/07/18
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Dibenzofuran	DETSC 3433	0.1	mg/kg	0.1	14	< 0.1	0.1	0.2	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	11	< 0.1	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	0.2	16	< 0.1	0.2	0.3	0.2

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

			Lab No	1365868	1365869	1365870	1365871
			Sample ID	TP06	TP07	WS03	TP01
			Depth	0.50	0.40	0.50	1.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	10/07/18	10/07/18	10/07/18	10/07/18
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	5.3	12	4.9	17
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.4	< 0.1	0.8
Chromium	DETSC 2301#	0.15	mg/kg	16	34	9.0	34
Copper	DETSC 2301#	0.2	mg/kg	21	130	8.7	52
Lead	DETSC 2301#	0.3	mg/kg	30	46	11	2600
Mercury	DETSC 2325#	0.05	mg/kg	0.09	0.06	< 0.05	0.09
Nickel	DETSC 2301#	1	mg/kg	9.7	21	4.8	24
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.7	< 0.5	0.6
Vanadium	DETSC 2301#	0.8	mg/kg	14	47	8.2	39
Zinc	DETSC 2301#	1	mg/kg	56	64	14	620
Inorganics							
pH	DETSC 2008#			7.3	10.2	12.5	8.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.9	2.8	23	3.4
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.3	0.4	2.1	0.4
Thiocyanate	DETSC 2130#	0.6	mg/kg	5.1	1.2	3.8	< 0.6
Sulphide	DETSC 2024*	10	mg/kg	71	180	10000	78
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.11	0.17	5.5	0.20
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5		
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2		
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5		
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4		
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10		
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9		
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5		
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	15		
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	14		
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	28		
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	28		
EPH (C10-C40)	DETSC 3311#	10	mg/kg	1200	570	35	20
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

			Lab No	1365868	1365869	1365870	1365871
			Sample ID	TP06	TP07	WS03	TP01
			Depth	0.50	0.40	0.50	1.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	10/07/18	10/07/18	10/07/18	10/07/18
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	0.3	0.8	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.1	0.7	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	3.0	1.4	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	4.3	2.5	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	53	13	0.2	0.2
Anthracene	DETSC 3301	0.1	mg/kg	8.9	4.4	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	52	19	1.0	0.4
Pyrene	DETSC 3301	0.1	mg/kg	45	17	1.0	0.6
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	20	7.6	0.8	0.2
Chrysene	DETSC 3301	0.1	mg/kg	22	8.6	0.7	0.3
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	18	7.0	0.9	0.2
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	9.9	3.9	0.5	0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	22	9.1	1.2	0.4
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	16	6.1	0.9	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	2.4	1.2	0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	13	5.0	0.8	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	290	110	8.1	2.5
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4	< 0.3	< 0.3	< 0.3
SVOCs							
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	0.5	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	0.9	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

			Lab No	1365868	1365869	1365870	1365871
			Sample ID	TP06	TP07	WS03	TP01
			Depth	0.50	0.40	0.50	1.00
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	10/07/18	10/07/18	10/07/18	10/07/18
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	2.4	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	4.0	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

			Lab No	1365872
			Sample ID	TP01
			Depth	
			Other ID	
			Sample Type	WATER
			Sampling Date	10/07/18
			Sampling Time	n/s
Test	**Method**	**LOD**	**Units**	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	3.7
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.04
Chromium, Dissolved	DETSC 2306	0.25	ug/l	1.2
Copper, Dissolved	DETSC 2306	0.4	ug/l	5.2
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.44
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.02
Nickel, Dissolved	DETSC 2306	0.5	ug/l	16
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	11
Inorganics				
pH	DETSC 2008			7.5
Thiocyanate	DETSC 2130	40	ug/l	< 40
Sulphate as SO4	DETSC 2055	0.1	mg/l	12
Sulphide	DETSC 2208	0.01	mg/l	0.02
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	0.31
Acenaphthylene	DETSC 3304	0.01	ug/l	0.04
Acenaphthene	DETSC 3304	0.01	ug/l	0.08
Fluorene	DETSC 3304	0.01	ug/l	0.09
Phenanthrene	DETSC 3304	0.01	ug/l	0.58
Anthracene	DETSC 3304	0.01	ug/l	0.21
Fluoranthene	DETSC 3304	0.01	ug/l	1.6
Pyrene	DETSC 3304	0.01	ug/l	1.2
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	0.92
Chrysene	DETSC 3304	0.01	ug/l	2.0
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	3.1
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	1.3
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	2.6
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	2.3
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	0.52
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	2.4
PAH Total	DETSC 3304	0.04	ug/l	19
Phenols				
Phenol	DETSC 3451*	0.5	ug/l	< 0.50

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 18-16690-1
Client Ref 7092
Contract Title Fire Station, Marsden

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1365862	TP01 0.50	SOIL	NAD	none	Rebecca Burgess
1365863	TP02 0.60	SOIL	NAD	none	Rebecca Burgess
1365864	TP02 2.00	SOIL	NAD	none	Rebecca Burgess
1365865	TP03 1.00	SOIL	NAD	none	Rebecca Burgess
1365866	TP05 0.60	SOIL	NAD	none	Rebecca Burgess
1365867	TP05 1.80	SOIL	NAD	none	Rebecca Burgess
1365868	TP06 0.50	SOIL	NAD	none	Rebecca Burgess
1365869	TP07 0.40	SOIL	NAD	none	Rebecca Burgess
1365870	WS03 0.50	SOIL	NAD	none	Rebecca Burgess
1365871	TP01 1.00	SOIL	NAD	none	Rebecca Burgess

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 18-16690-1
Client Ref 7092
Contract Fire Station, Marsden

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1365862	TP01 0.50 SOIL	10/07/18	GJ 250ml, PT 1L		
1365863	TP02 0.60 SOIL	10/07/18	GJ 250ml, PT 1L		
1365864	TP02 2.00 SOIL	10/07/18	GJ 250ml, PT 1L		
1365865	TP03 1.00 SOIL	10/07/18	GJ 250ml, PT 1L		
1365866	TP05 0.60 SOIL	10/07/18	GJ 250ml, PT 1L		
1365867	TP05 1.80 SOIL	10/07/18	GJ 250ml, PT 1L		
1365868	TP06 0.50 SOIL	10/07/18	GJ 250ml, PT 1L		
1365869	TP07 0.40 SOIL	10/07/18	GJ 250ml, PT 1L		
1365870	WS03 0.50 SOIL	10/07/18	GJ 250ml, PT 1L		
1365871	TP01 1.00 SOIL	10/07/18	GJ 250ml, PT 1L		
1365872	TP01 WATER	10/07/18	GJ 250ml x2	pH/Cond/TDS (2 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Haigh Huddleston & Associates
Civil & Structural Engineering Consultants
Firth Buildings, 99 -101 Leeds Road, Dewsbury, WF12 7BU
t 01924 464342 f 01924 450662 e trevor.haigh@haighhuddleston.co.uk

SITE:	Former Fire Station, Huddersfield Rd, Marsden
CLIENT:	SB Homes
JOB NO:	7092
SHEET NO:	1

GAS MONITORING RESULTS

	GAS CONCENTRATIONS								FLOW DATA				Qhg per borehole		WELL AND WATER DATA			A Pressure (mB)	Comments
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Oxygen (%v/v)		Flow rate (l/hr)		Differential borehole Pressure (Pa	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Response Zone		
	Peak	Steady	Peak	Steady	Peak	Steady	Min	Steady	Peak	Steady									
Ambient Air	ND	ND	ND	ND	ND	ND	21.2	21.2	NR	NR			-	-				994	Date: 23.07.18 Time: 11.00am
WS01	ND	ND	ND	ND	0.7	0.6	20.7	20.7	ND	ND			NR	0.0007	1.30	2.75		994	Ground dry, warm, sunny
WS02	ND	ND	ND	ND	3.9	3.9	14.5	14.5	ND	ND			NR	0.0039	1.50	2.15		994	
WS04	ND	ND	ND	ND	0.1	0.1	20.0	20.0	ND	ND			NR	0.0001	1.60	2.70		994	**Existing Station Repaired**
Exs Station													0	0					
Ambient Air	ND	ND	ND	ND	ND	ND	21.3	21.3	NR	NR			NR	NR					Date: 11.09.18 Time: 1.00pm
WS01	ND	ND	ND	ND	ND	ND	21.1	21.1	ND	ND			NR	NR	1.60	2.75		992	Ground wet, cold, cloudy, windy
WS02	ND	ND	ND	ND	3.7	3.7	17.1	17.1	ND	ND			NR	0.0037	1.60	2.15		992	
WS04	ND	ND	ND	ND	0.3	0.3	20.4	20.4	ND	ND			NR	0.0003	0.55	2.70		992	
Exs Station	ND	ND	ND	ND	4.1	4.1	16.3	16.3	ND	ND			NR	0.0041	-	-		992	
Ambient Air	ND	ND	ND	ND	ND	ND	21.3	21.3	NR	NR			NR	NR					Date: 01.10.18 Time: 12.00pm
WS01	ND	ND	ND	ND	ND	ND	21.3	21.3	ND	ND			NR	NR	1.60	2.75		1003	Ground dry, cold, cloudy
WS02	ND	ND	ND	ND	3.0	3.0	17.8	17.8	0.1	0.1			NR	0.003	2.40	2.15		1003	
WS04	ND	ND	ND	ND	0.2	0.2	21.3	21.3	-0.3	-0.3			NR	0.0006	1.00	2.70		1003	
Exs Station	ND	ND	ND	ND	4.0	4.0	17.7	17.7	ND	ND			NR	0.004	-	-		1003	Falling AP
Ambient Air	ND	ND	ND	ND	ND	ND	21.4	21.4	NR	NR			NR	NR					Date: 01.11.18 Time: 2.00pm
WS01	ND	ND	ND	ND	ND	ND	21.3	21.3	ND	ND			NR	NR	1.60	2.75		983	Ground wet, cold, sunny
WS02	ND	ND	ND	ND	2.3	2.3	19.3	19.3	ND	ND			NR	0.0023	1.45	2.15		983	
WS04	ND	ND	ND	ND	0.4	0.3	21.2	21.2	-0.9	-0.9			NR	0.0036	0.90	2.70		983	
Exs Station	ND	ND	ND	ND	3.6	3.5	18.1	18.1	-0.1	-0.1			NR	0.0036	-	-		983	
Ambient Air	ND	ND	ND	ND	ND	ND	21.3	21.3	NR	NR			NR	NR					Date: 14.11.18 Time:10.00am
WS01	ND	ND	ND	ND	ND	ND	21.7	21.8	ND	ND			NR	NR	1.70	2.75		991	Ground damp, cold, Cloudy
WS02	ND	ND	ND	ND	2.4	2.4	19.5	19.5	ND	ND			NR	0.0024	1.20	2.15		991	
WS04	ND	ND	ND	ND	0.1	0.0	21.8	21.8	ND	ND			NR	0.0001	0.80	2.70		991	
Exs Station	ND	ND	ND	ND	2.4	2.4	19.0	19.1	0.1	0.1			NR	0.0024	-	-		991	

ND - Not detected

NR - Not recorded

NB: where no flow (ND) recorded Qhg values are calculated using equipment limit of detection (0.1 l/hr). Where negative flows recorded, these are converted to positive values for calculation of Qhg.

Ambient air check: CH_4 [ ] CO_2 [ ] O_2 [ ]

Haigh Huddleston & Associates
Civil & Structural Engineering Consultants
Firth Buildings, 99 -101 Leeds Road, Dewsbury, WF12 7BU
t 01924 464342 f 01924 450662 e trevor.haigh@haighhuddleston.co.uk

SITE:	Former Fire Station, Huddersfield Rd, Marsden
CLIENT:	SB Homes
JOB NO:	7092
SHEET NO:	2

GAS MONITORING RESULTS

	GAS CONCENTRATIONS								FLOW DATA				Qhg per borehole		WELL AND WATER DATA				Comments
Monitoring Point	Methane (%v/v		%LEL		Carbon dioxide (%v/v)		Oxygen (%v/v)		Flow rate (l/hr		Differential borehole Pressure (Pa	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Response Zone	A Pressure (mB)	
	Peak	Steady	Peak	Steady	Peak	Steady	Min	Steady	Peak	Steady									
Ambient Air	ND	ND	ND	ND	ND	ND	21.3	21.3	NR	NR			NR	NR				975	Date: 28.11.18 Time: 11.00am
WS01	ND	ND	ND	ND	0.1	0.1	21.2	21.5	0	0			NR	0	1.6	2.75		975	Ground Wet, cold, cloudy
WS02	ND	ND	ND	ND	1.4	1.4	19.8	19.8	0.2	0.1			NR	0.0028	1.1	2.15		975	
WS04	ND	ND	ND	ND	0	0	21.1	21.1	0.1	0			NR	0	0.7	2.7		975	
Exs Station	ND	ND	ND	ND	2.5	2.3	19.3	19.4	1.1	0.1			NR	0.0275	-			975	**Falling AP**
Ambient Air																			
WS01																			
WS02																			
WS04																			
Exs Station																			
Ambient Air																			
WS01																			
WS02																			
WS04																			
Exs Station																			
Ambient Air																			
WS01																			
WS02																			
WS04																			
Exs Station																			
Ambient Air																			
WS01																			
WS02																			
WS04																			
Exs Station																			

NR - Not recorded

NB: where no flow (ND) recorded Qhg values are calculated using equipment limit of detection (0.1 l/hr). Where negative flows recorded, these are converted to positive values for calculation of Qhg.

Ambient air check: CH_4 [ ] CO_2 [ ] O_2 [ ]

APPENDIX D

COAL AUTHORITY REPORT

GEOLOGICAL REPORT

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report

FORMER FIRE STATION
HUDDERSFIELD
WEST YORKSHIRE

Date of enquiry:	13 November 2017
Date enquiry received:	13 November 2017
Issue date:	13 November 2017
Our reference:	51001688243001
Your reference:	SB HOMES 7092

CON29M Non-Residential Mining Report

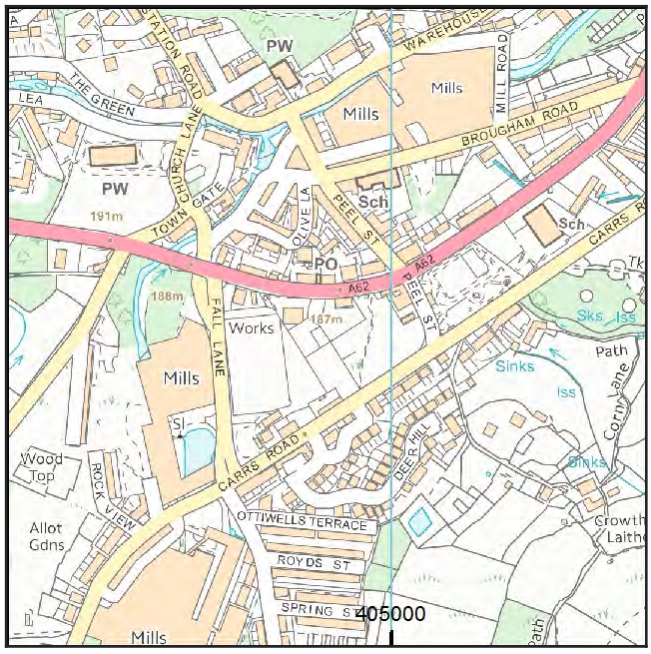
This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

HAIGH HUDDLESTON & ASSOCIATES

Enquiry address

FORMER FIRE STATION, HUDDERSFIELD, WEST YORKSHIRE



Approximate position of property

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

/company/the-coal-authority
/thecoalauthority
/coalauthority

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	No
2	Present underground coal mining	No
3	Future underground coal mining	No
4	Mine entries	No
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is not within a surface area that could be affected by past underground mining.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4. Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

5. Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6. Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7. Present opencast coal mining
The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8. Future opencast coal mining
There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9. Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31st October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10. Mine gas
The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining
The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support
The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

13. Working facilities order
The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

15. Information from the Cheshire Brine Subsidence Compensation Board
The property lies outside the Cheshire Brine Compensation District.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

Disclaimer

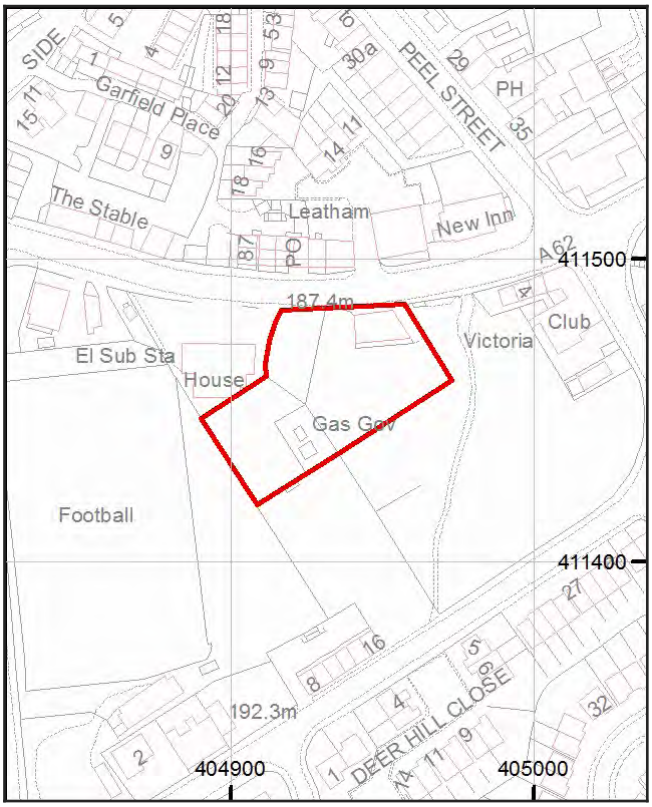
Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



Map data

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

/company/the-coal-authority
/thecoalauthority
/coalauthority

Groundsure
LOCATION INTELLIGENCE

Haigh Huddleston & Associates

99-101, LEEDS ROAD,
DEWSBURY, WF12 7BU

Groundsure Reference:	GS-4463511
Your Reference:	SB_HOMES_7092
Report Date	13 Nov 2017
Report Delivery Method:	Email - pdf

Geo Insight

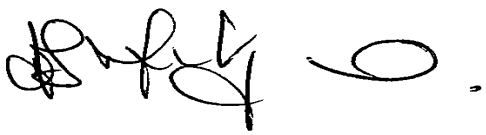
Address: MANCHESTER ROAD, SLAITHWAITE, HUDDERSFIELD, HD7 5JX

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 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**MANCHESTER ROAD, SLAITHWAITE, HUDDERSFIELD, HD7 5JX**
Date:	**13 Nov 2017**
Reference:	**GS-4463511**
Client:	**Haigh Huddleston & Associates**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	404939,411461
Site Size:	0.30ha

Groundsure
LOCATION INTELLIGENCE

Contents Page

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?*	No
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	Yes
1.3 Bedrock, Solid Geology and linear features	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 linear features 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?*	No
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	No
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	Yes
	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 linear features	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 linear features within 500m of the study site boundary?	Yes

Section 3: Radon

3. Radon	3.1Is 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 3 and 5% of properties are above the Action Level.
	3.2Radon Protection	Basic 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	0	0	9	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	0	1	8

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	1	0	2	0
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

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

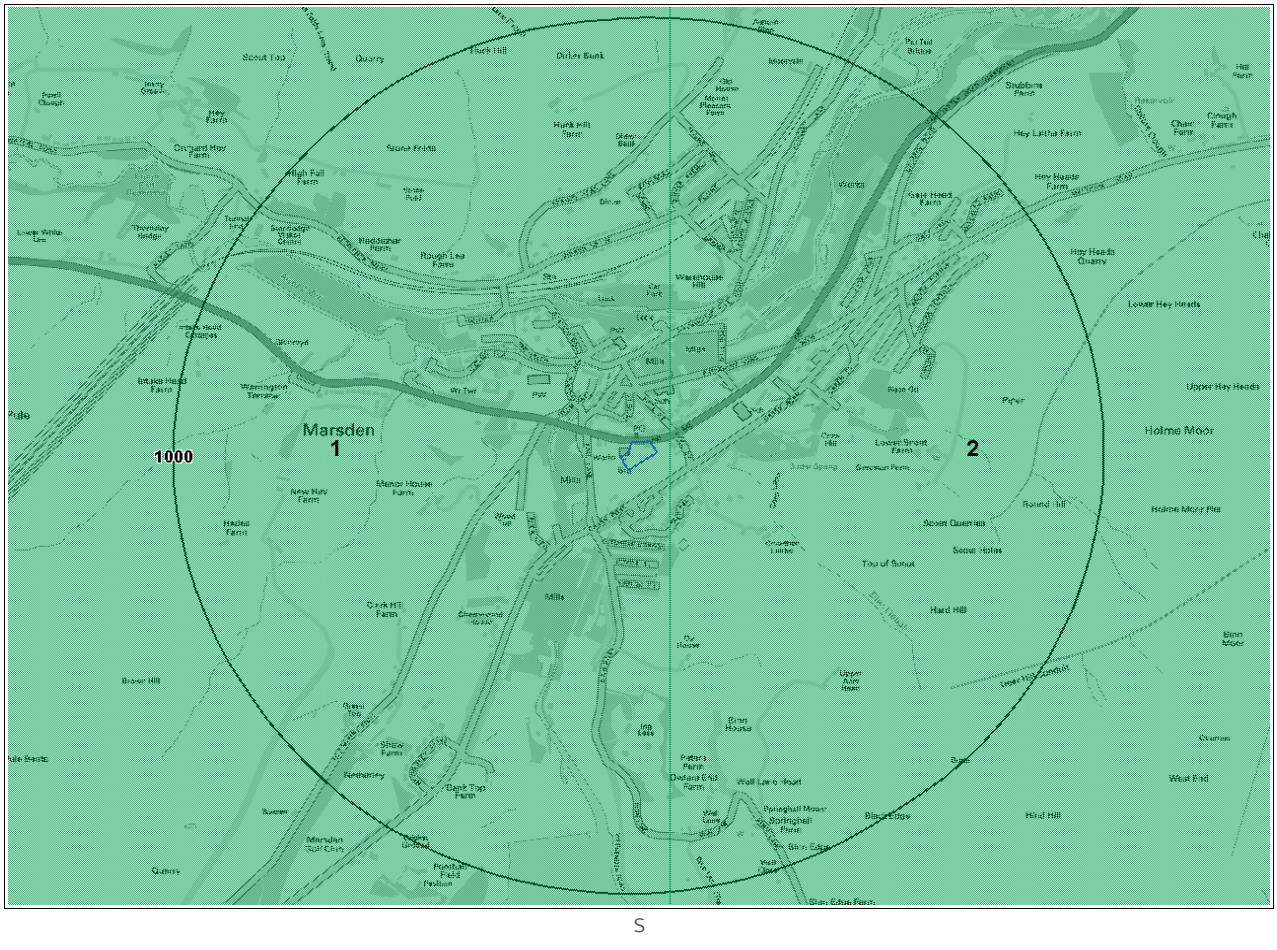
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Moderate
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Negligible
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Negligible

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	0	1

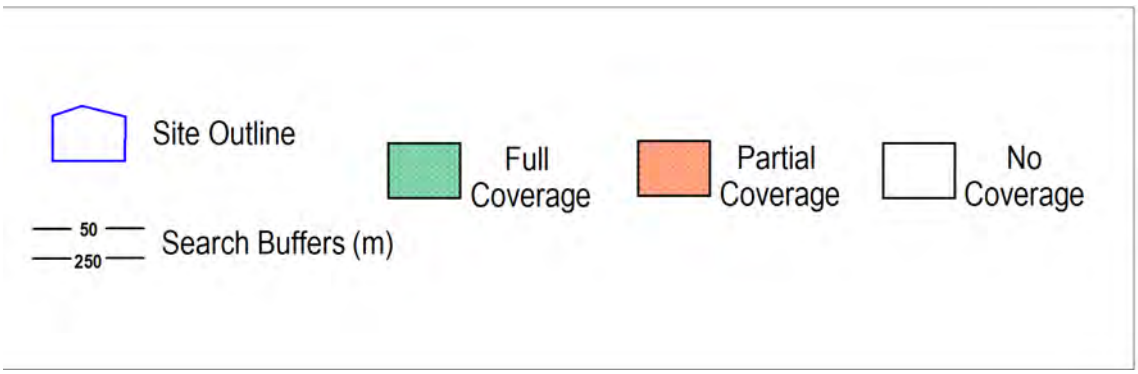
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	1	8	0

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	1	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	0	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend



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	Some deposits are mapped
2	27.0	Some deposits are mapped	Full	Full	Some deposits are mapped
N3	1419.0	Some deposits are mapped	Full	Full	Some deposits are mapped
N4	1422.0	Some deposits are mapped	Full	Full	Some deposits are mapped

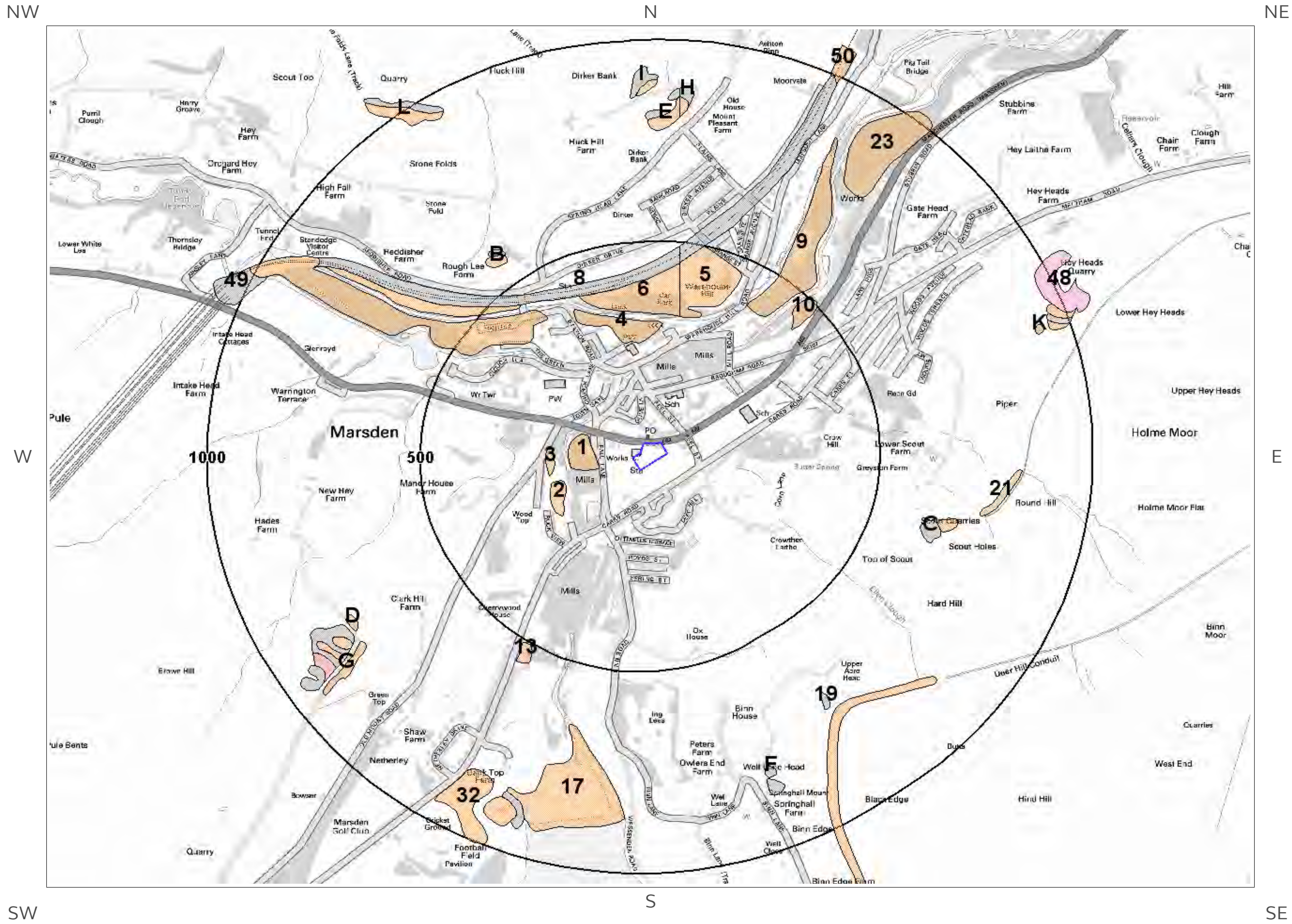
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not 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

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? Yes

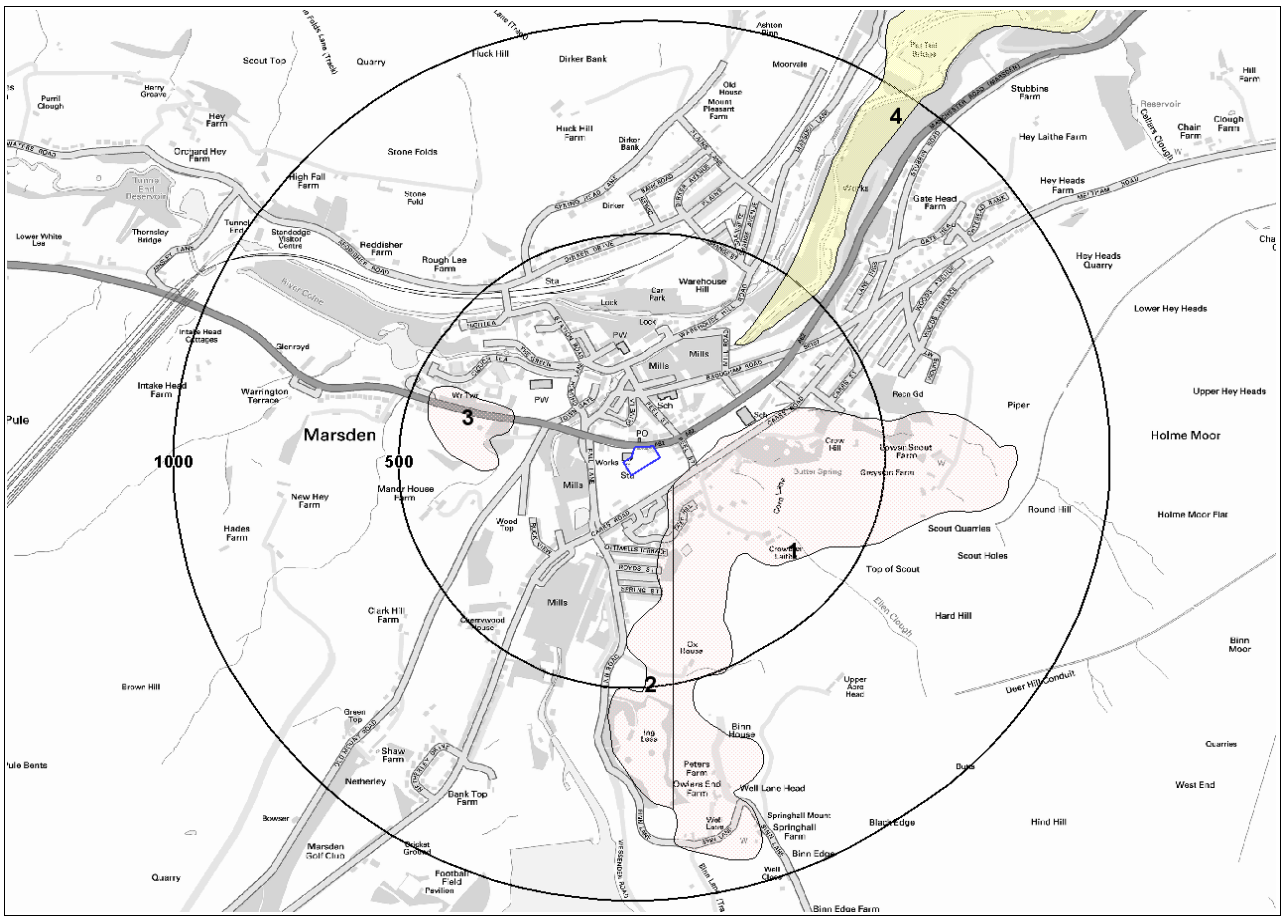
ID	Distance	Direction	LEX Code	Description	Rock Description
1	82.0	W	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	170.0	W	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	183.0	W	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
4	252.0	N	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
5	317.0	N	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
6	317.0	N	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
7A	369.0	NW	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
8	389.0	N	WGR-VOID	Worked Ground (Undivided)	Void
9	391.0	NE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
10	418.0	NE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
11A	448.0	NW	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
12	449.0	N	WGR-VOID	Worked Ground (Undivided)	Void

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

NW N NE

W E

SW S SE



Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

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
4	302.0	NE	ALV-CZ	Alluvium - Silty Clay	Clay, Silty

1.2.2 Landslip

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

Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	63.0	SE	SLIP-UKNOWN	Landslide Deposits	Unknown/unclassified Entry
2	69.0	SE	SLIP-UKNOWN	Landslide Deposits	Unknown/unclassified Entry
3	261.0	W	SLIP-UKNOWN	Landslide Deposits	Unknown/unclassified Entry

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

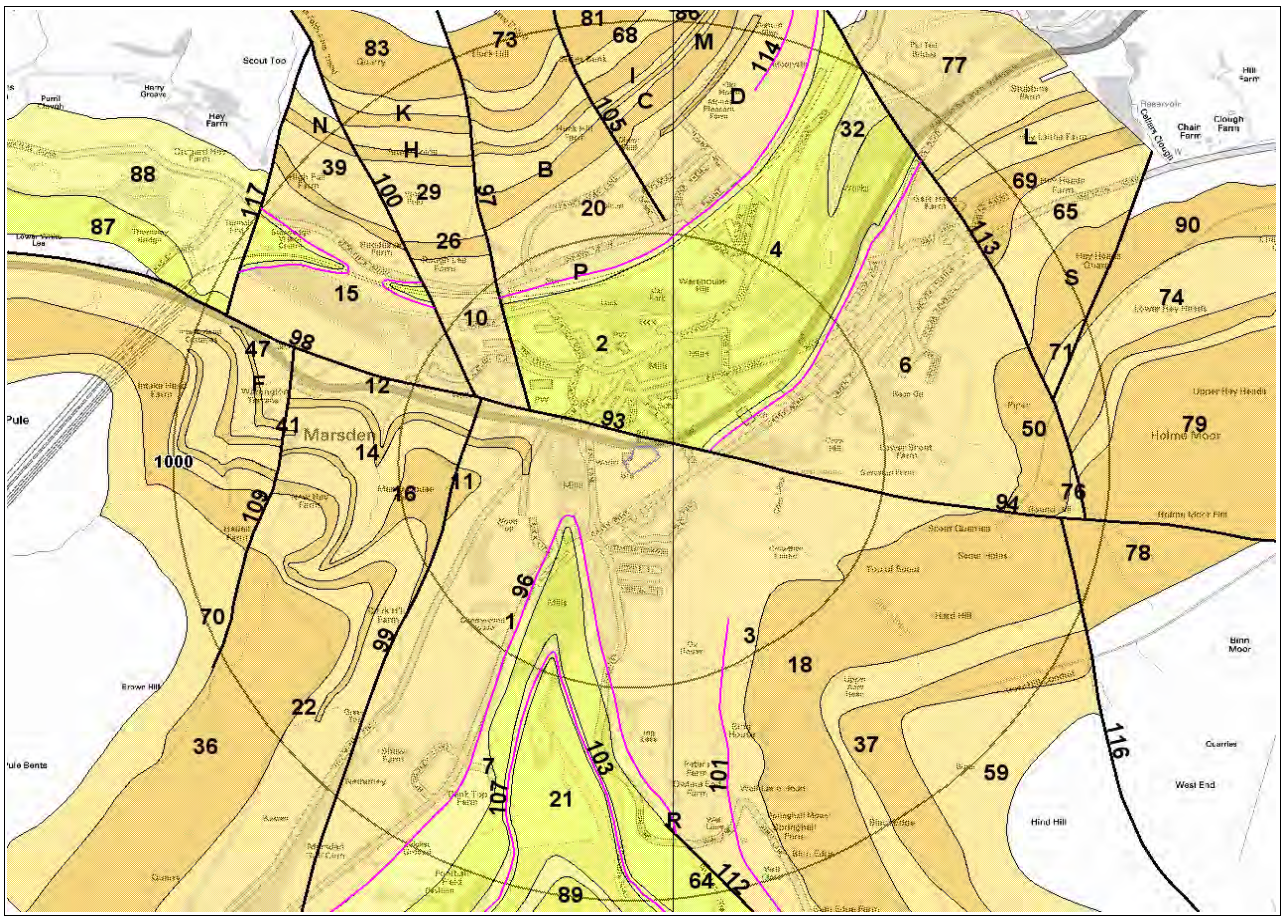
This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and linear features map (1:10,000 scale)

NW N NE

W E

SW S SE



Bedrock and linear features Legend

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and linear features

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	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
2	17.0	N	UK-SDST	Upper Kinderscout Grit - Sandstone	Kinderscoutian Sub-age
3	27.0	E	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
4	40.0	NE	UK-SDST	Upper Kinderscout Grit - Sandstone	Kinderscoutian Sub-age
5O	90.0	E	HEBD-MDSI	Hebden Formation - Mudstone And Siltstone	Kinderscoutian Sub-age
6	109.0	E	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
7	163.0	SW	HEBD-MDSI	Hebden Formation - Mudstone And Siltstone	Kinderscoutian Sub-age
8	185.0	SW	UK-SDST	Upper Kinderscout Grit - Sandstone	Kinderscoutian Sub-age
9	205.0	W	RDG-SDST	Readycon Dean Flags - Sandstone	Marsdenian Sub-age
10	240.0	NW	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
11	320.0	W	EC-SDST	East Carlton Grit - Sandstone	Marsdenian Sub-age
12	345.0	W	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
13	346.0	W	RDG-SDST	Readycon Dean Flags - Sandstone	Marsdenian Sub-age
14	349.0	W	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
15	363.0	NW	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
16	366.0	W	EC-SDST	East Carlton Grit - Sandstone	Marsdenian Sub-age
17P	395.0	N	HEBD-MDSI	Hebden Formation - Mudstone And Siltstone	Kinderscoutian Sub-age
18	399.0	SE	MGG-SDST	Midgley Grit - Sandstone	Marsdenian Sub-age
19	410.0	SW	HEBD-MDSI	Hebden Formation - Mudstone And Siltstone	Kinderscoutian Sub-age
20	421.0	N	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
21	463.0	S	LK-SDST	Lower Kinderscout Grit - Sandstone	Kinderscoutian Sub-age
22	465.0	W	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age
23Q	478.0	N	HEBD-MDSI	Hebden Formation - Mudstone And Siltstone	Kinderscoutian Sub-age
24D	494.0	N	MARSD-MDSI	Marsden Formation - Mudstone And Siltstone	Marsdenian Sub-age

1.3.2 Linear features

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

ID	Distance (m)	Direction	Category Description	Feature Description
93	17.0	N	FAULT	Normal fault, inferred; crossmarks on downthrow side
94	40.0	NE	FAULT	Normal fault, inferred; crossmarks on downthrow side
95O	109.0	E	FOSSIL_HORIZON	Fossil horizon, marine band ()
96	163.0	SW	FOSSIL_HORIZON	Fossil horizon, marine band ()
97	240.0	NW	FAULT	Normal fault, inferred; crossmarks on downthrow side
98	240.0	NW	FAULT	Normal fault, inferred; crossmarks on downthrow side
99	345.0	W	FAULT	Normal fault, inferred; crossmarks on downthrow side
100	363.0	NW	FAULT	Normal fault, inferred; crossmarks on downthrow side
101	402.0	SE	FOSSIL_HORIZON	Fossil horizon, marine band ()
102P	421.0	N	FOSSIL_HORIZON	Fossil horizon, marine band ()
103	451.0	S	FOSSIL_HORIZON	Fossil horizon, lingula band ()
104Q	494.0	N	FOSSIL_HORIZON	Fossil horizon, marine band ()

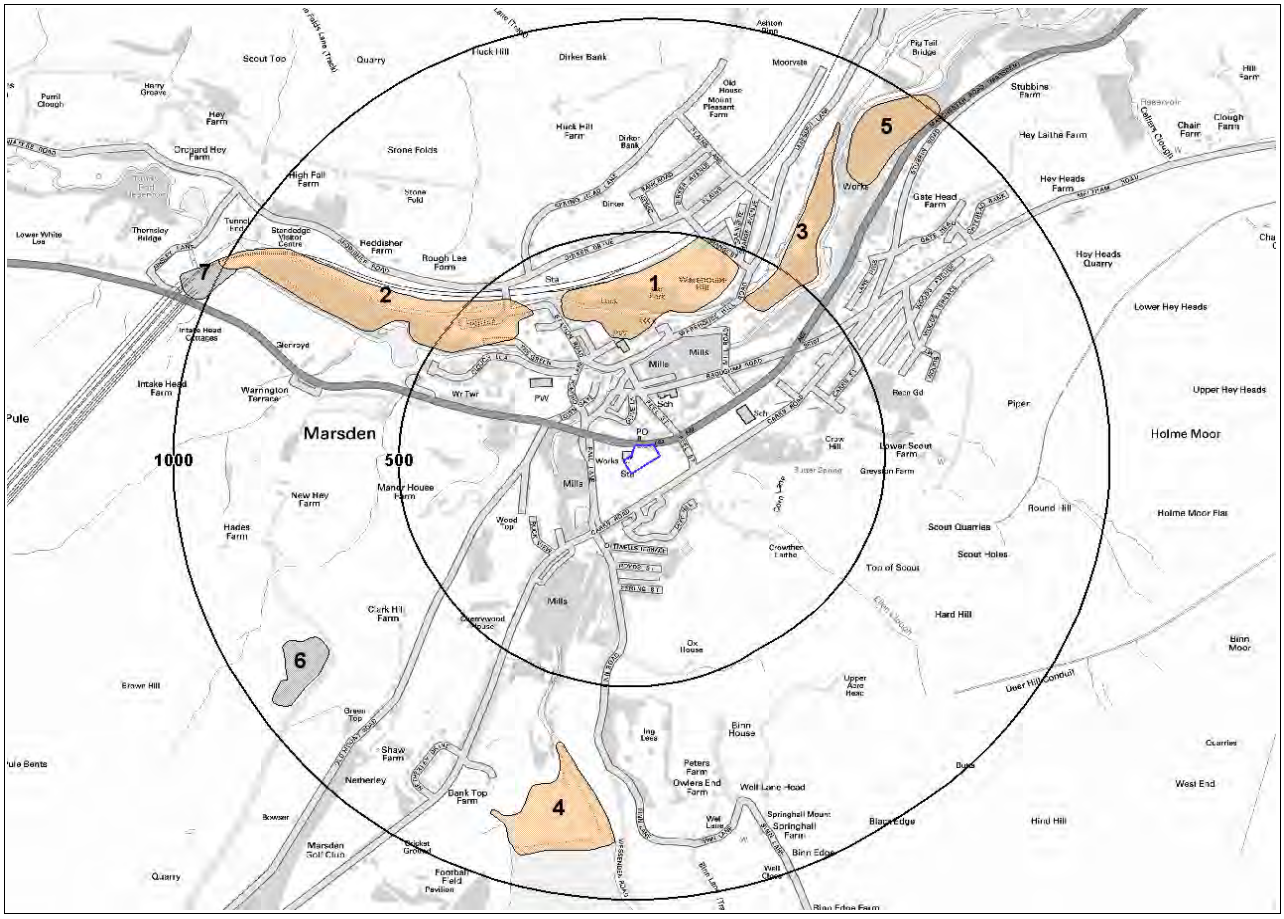
The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

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

NW N NE



W E

SW S SE

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

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: 086

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	251.0	N	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	369.0	NW	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	391.0	NE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

2.1.2 Permeability of Artificial Ground

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

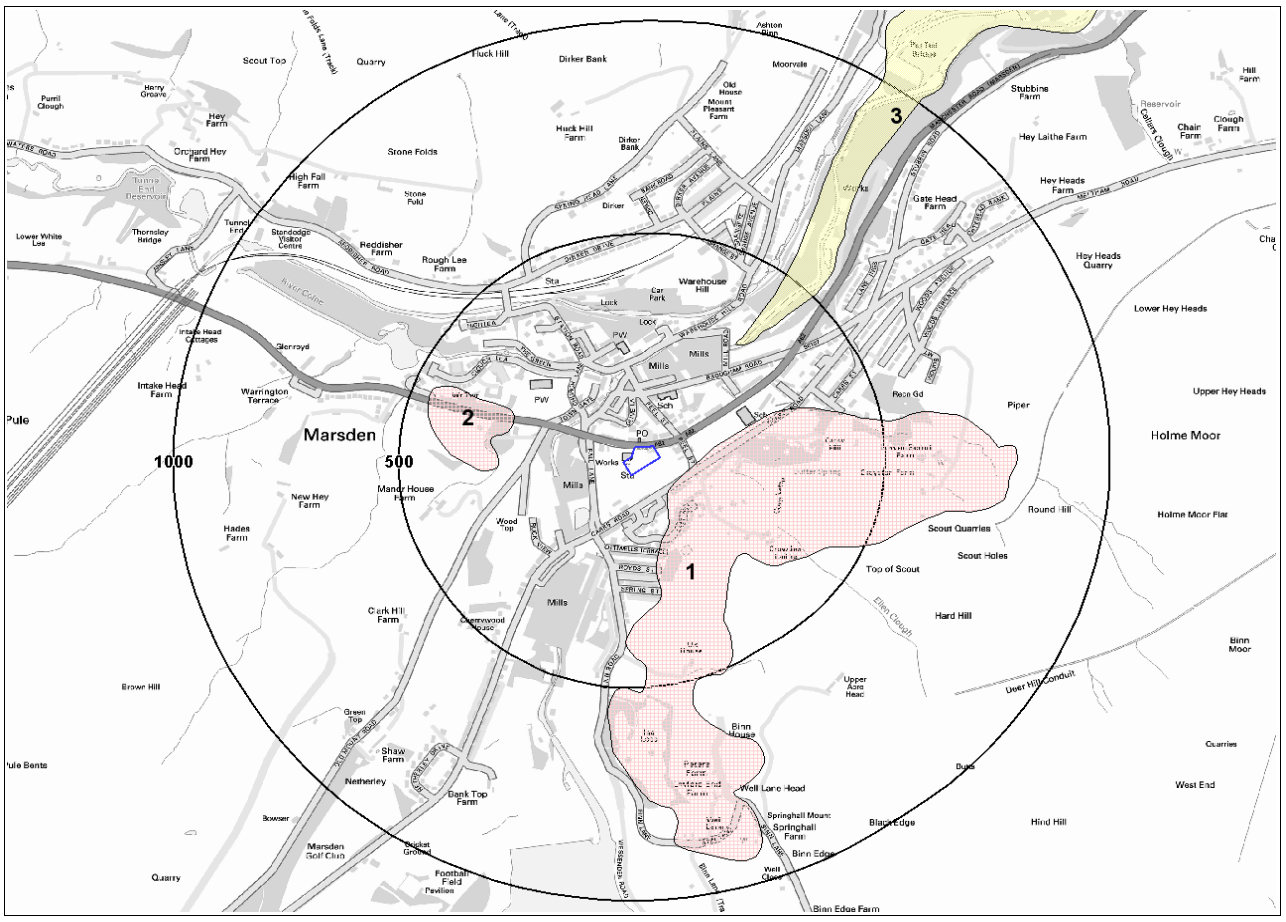
Database searched and no data found.

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

NW N NE

W E

SW S SE



Site Outline

500
1000
Search Buffers (m)

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
3	302.0	NE	ALV-XCZSV	ALLUVIUM	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? No

Database searched and no data found.

2.2.3 Landslip

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	63.0	SE	SLIP-UKNOWN	LANDSLIDE DEPOSITS	UNKNOWN/UNCLASSIFIED ENTRY
2	261.0	W	SLIP-UKNOWN	LANDSLIDE DEPOSITS	UNKNOWN/UNCLASSIFIED ENTRY

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.

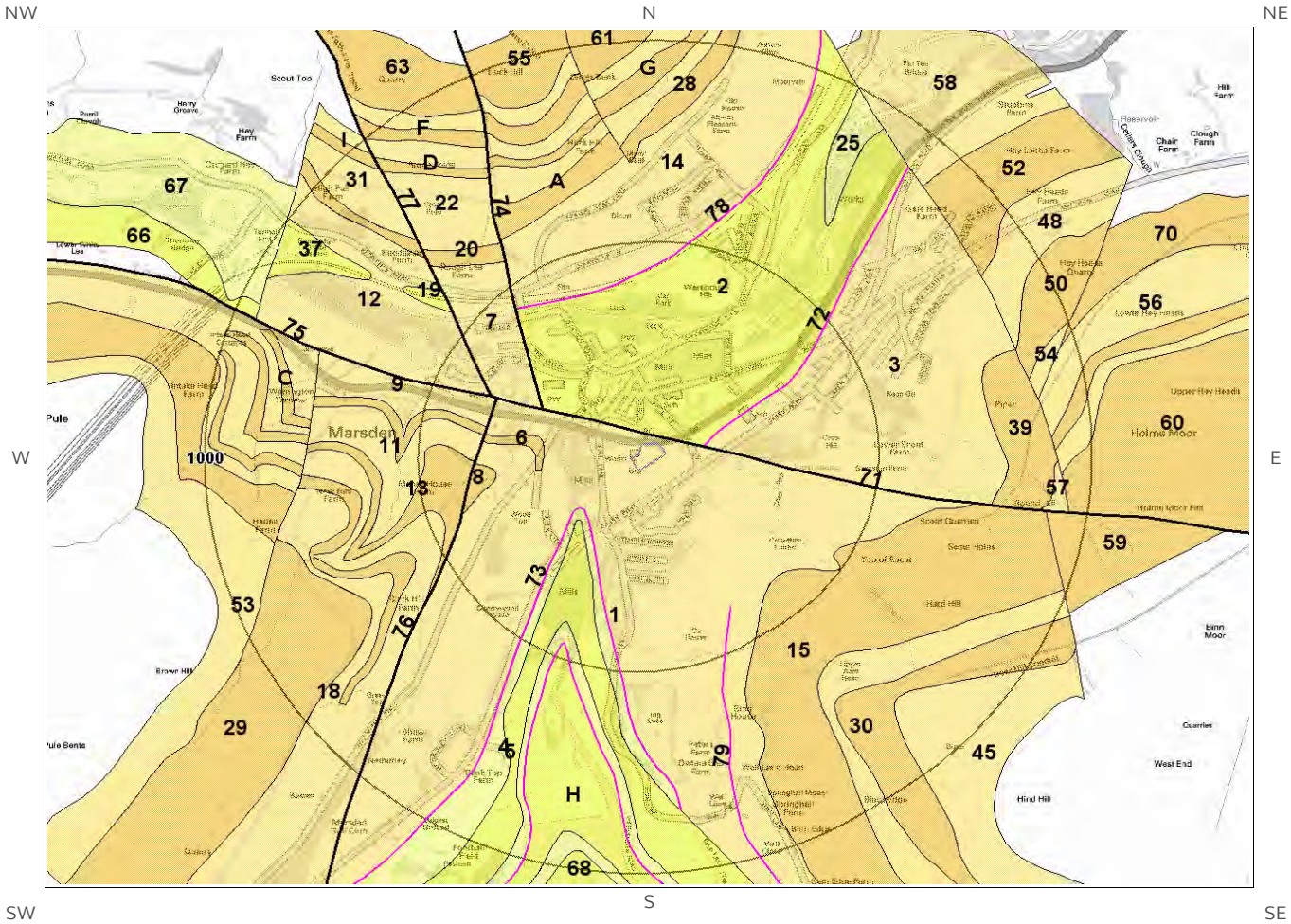
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

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 linear features map (1:50,000 scale)



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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 086

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	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
2	17.0	N	UK-SDST	UPPER KINDERSCOUT GRIT - SANDSTONE	NAMURIAN
3	90.0	E	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
4	162.0	SW	HEBD-MDSI	HEBDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
5	185.0	SW	UK-SDST	UPPER KINDERSCOUT GRIT - SANDSTONE	NAMURIAN
6	205.0	W	RDG-SDST	READYCON DEAN FLAGS - SANDSTONE	NAMURIAN
7	240.0	NW	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
8	320.0	W	EC-SDST	EAST CARLTON GRIT - SANDSTONE	NAMURIAN
9	345.0	W	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
10	346.0	W	RDG-SDST	READYCON DEAN FLAGS - SANDSTONE	NAMURIAN
11	349.0	W	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
12	363.0	NW	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
13	366.0	W	EC-SDST	EAST CARLTON GRIT - SANDSTONE	NAMURIAN
14	395.0	N	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
15	399.0	SE	MGG-SDST	MIDGLEY GRIT - SANDSTONE	NAMURIAN
16J	410.0	SW	HEBD-MDSI	HEBDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN
17H	464.0	S	LK-SDST	LOWER KINDERSCOUT GRIT - SANDSTONE	NAMURIAN
18	466.0	W	MARSD-MDSI	MARSDEN FORMATION - MUDSTONE AND SILTSTONE	NAMURIAN

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	Fracture	Low	Low

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
17.0	N	Fracture	High	Moderate
27.0	E	Fracture	Low	Low
40.0	NE	Fracture	High	Moderate

2.3.3 Linear features

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

ID	Distance	Direction	Category Description	Feature Description
71	17.0	N	FAULT	Fault, inferred
72	90.0	E	FOSSIL_HORIZON	Marine band
73	162.0	SW	FOSSIL_HORIZON	Marine band
74	240.0	NW	FAULT	Fault, inferred
75	240.0	NW	FAULT	Fault, inferred
76	345.0	W	FAULT	Fault, inferred
77	363.0	NW	FAULT	Fault, inferred
78	395.0	N	FOSSIL_HORIZON	Marine band
79	402.0	SE	FOSSIL_HORIZON	Marine band
80J	464.0	S	FOSSIL_HORIZON	Lingula band

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 3 and 5% 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? Basic radon protective measures are necessary.

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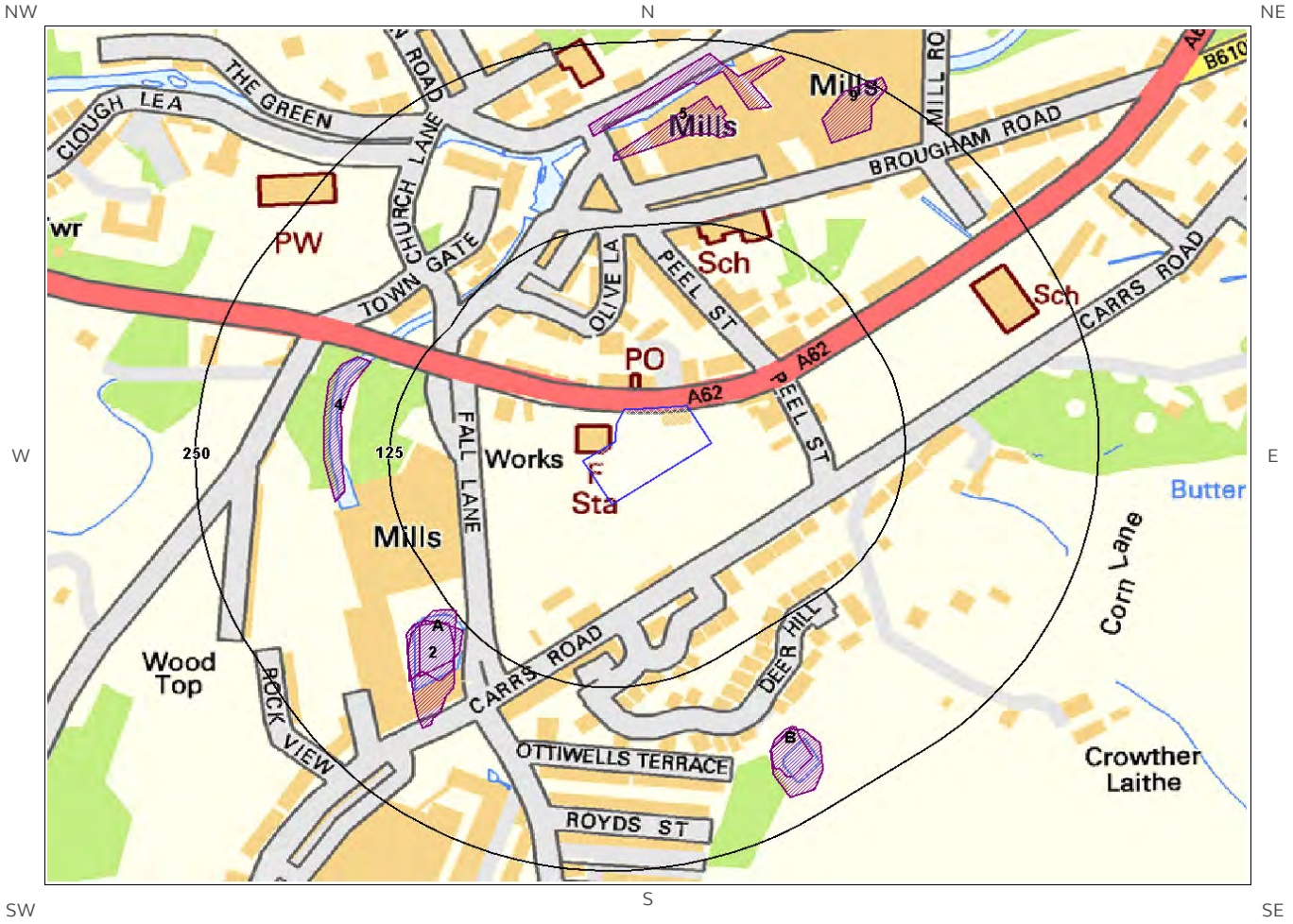
4 Ground Workings map



Ground Workings Legend

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

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
1A	124.0	SW	404796 411323	Pond	1980
2	129.0	SW	404795 411302	Water Body	1890
3A	133.0	SW	404792 411318	Pond	1930
4	153.0	NW	404728 411470	Pond	1930
5	170.0	N	404948 411674	Pond	1890
6	187.0	N	404937 411698	Pond	1930
7B	190.0	SE	405025 411250	Reservoir	1951
8B	191.0	SE	405028 411242	Reservoir	1930
9	202.0	NE	405065 411687	Pond	1890

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

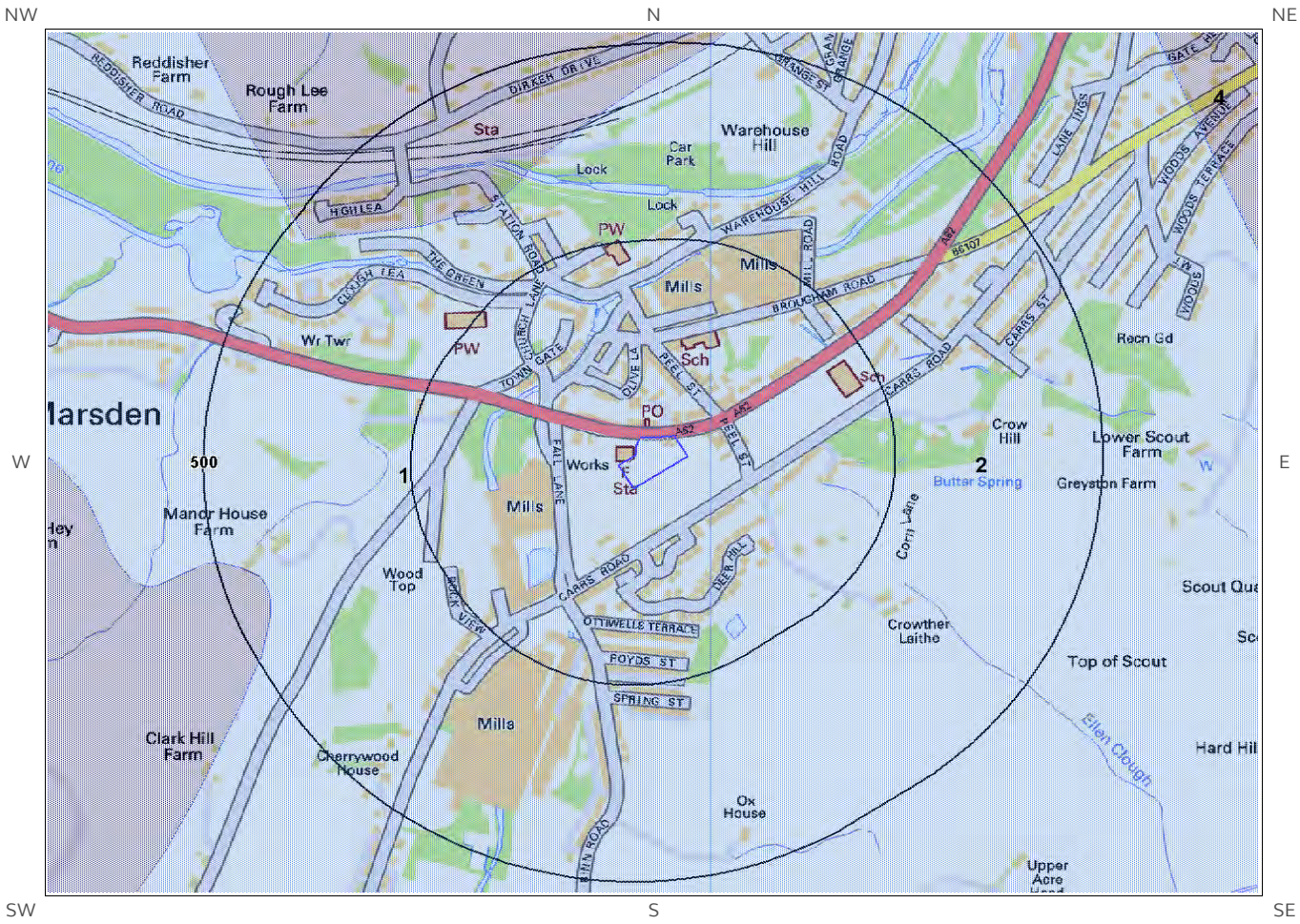
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

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
Not shown	465.0	SE	405328 411159	Sandstone	Pasture Wood	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	653.0	E	405595 411260	Sandstone	Scout	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	757.0	SW	404233 411072	Sandstone	Netherley	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	810.0	SE	405220 410671	Sandstone	Well Lane Head	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	815.0	N	404953 412300	Sandstone	Dirker Bank	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	854.0	SW	404175 410980	Sandstone	Netherley	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	881.0	N	405017 412364	Sandstone	Dirker Bank	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	922.0	N	404912 412406	Sandstone	Dirker Bank	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	962.0	NW	404417 412305	Sandstone	Stone Folds	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

Site Outline

250
500
Search Buffers (m)

Historical Mining

Non-Coal Mining Cavities

Natural Cavities

Non-Coal Mining

Highly likely

Likely

Unlikely

Highly unlikely

Rare

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	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
2	27.0	E	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
3	349.0	NW	Not available	Vein Mineral	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	499.0	N	Not available	Vein Mineral	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

5.5 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? No

Database searched and no data found.

5.7 Brine Extraction

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.

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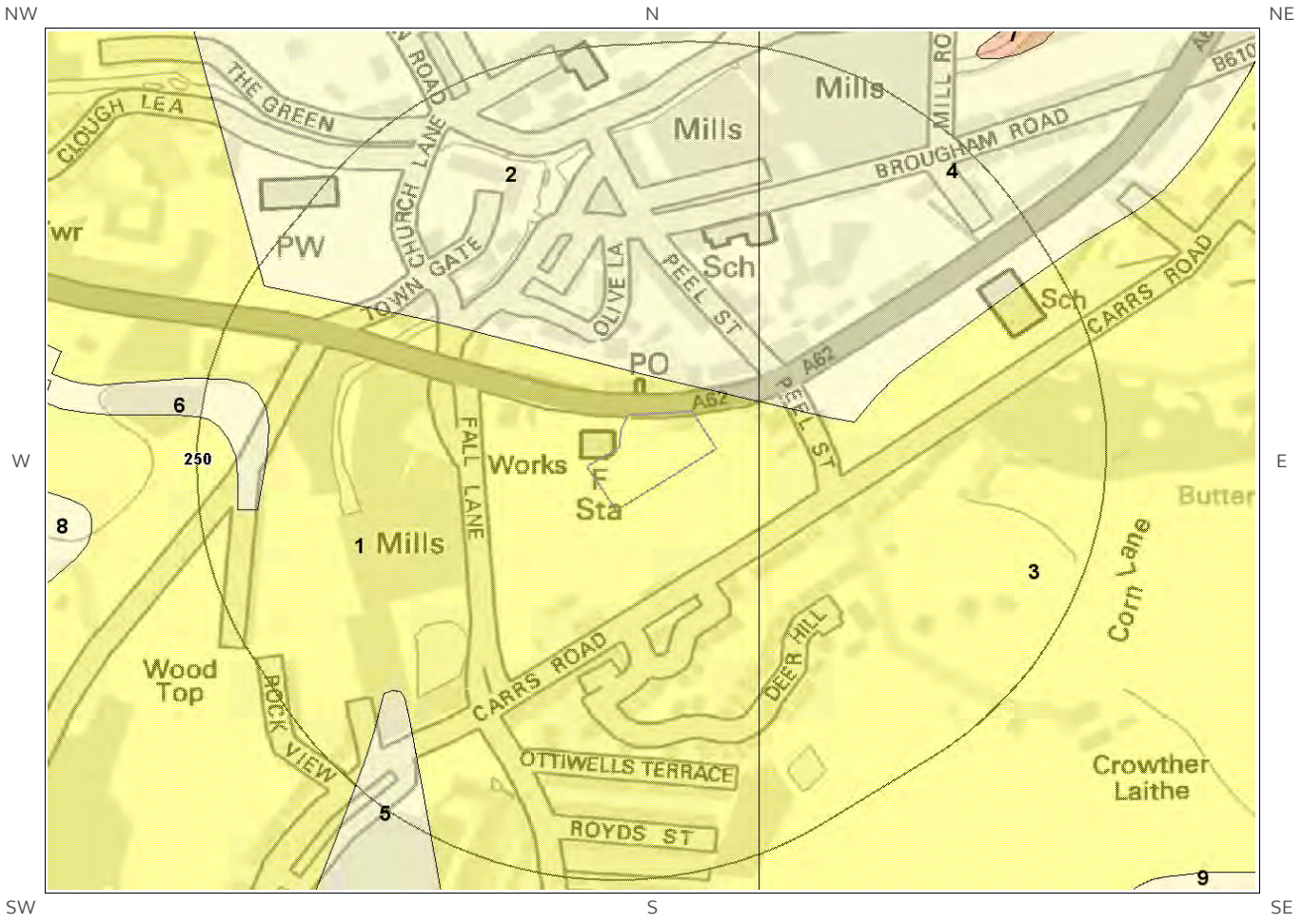
6 Natural Ground Subsidence

6.1 Shrink-Swell Clay map



Shrink Swell Clay Legend

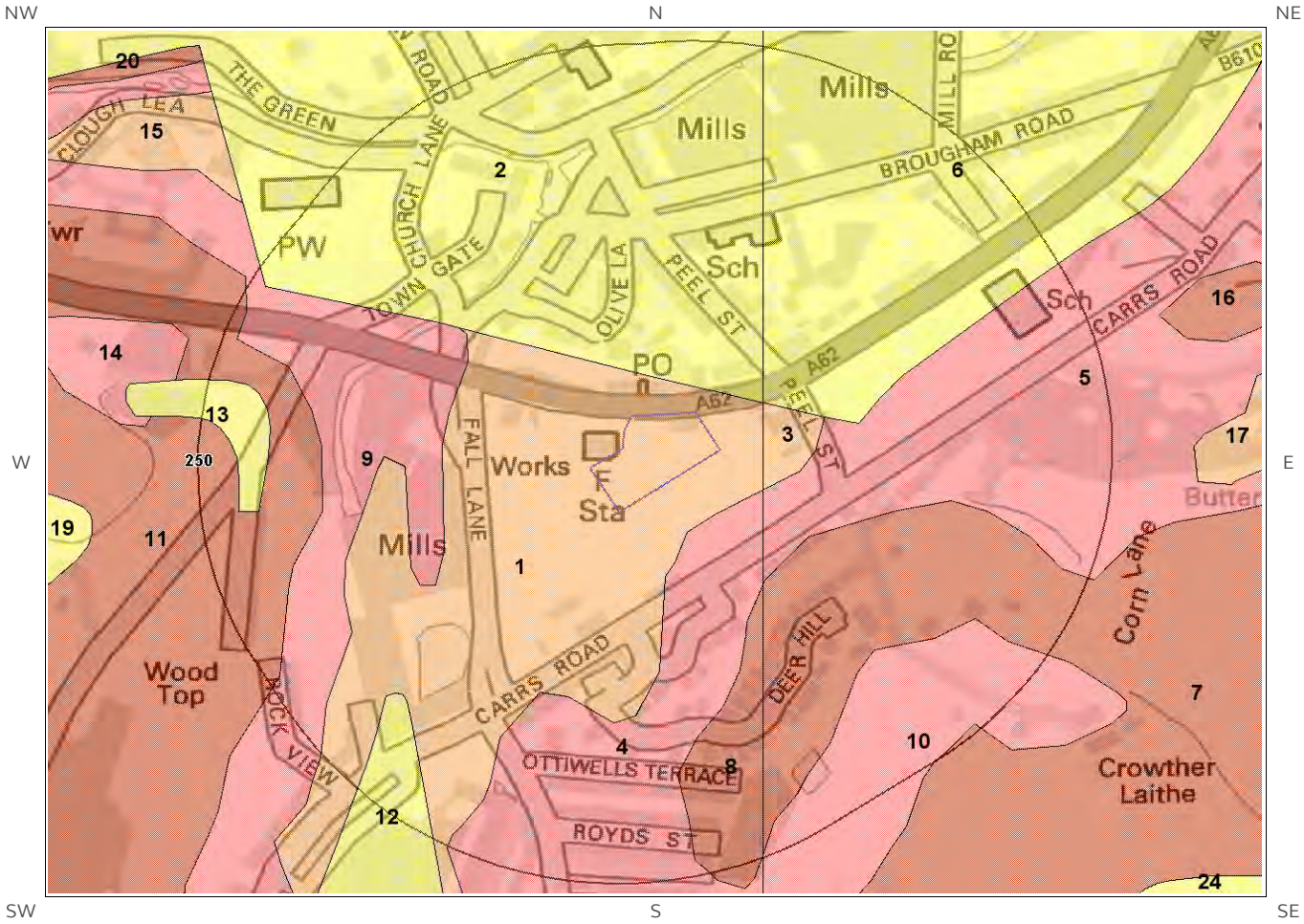
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.2 Landslides map



Landslides Legend

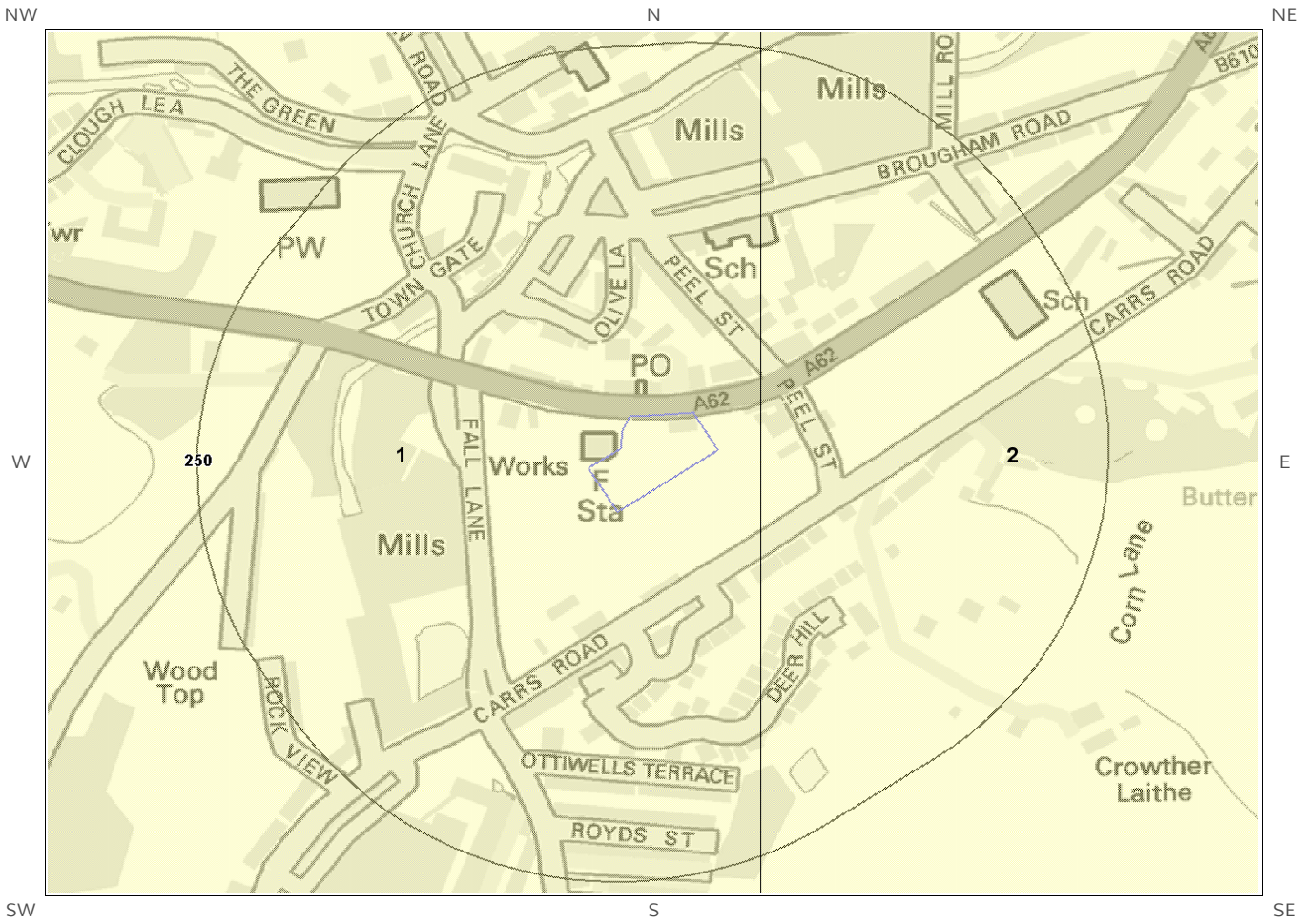
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.3 Ground Dissolution of Soluble Rocks map



Ground Dissolution Soluble Rocks Legend

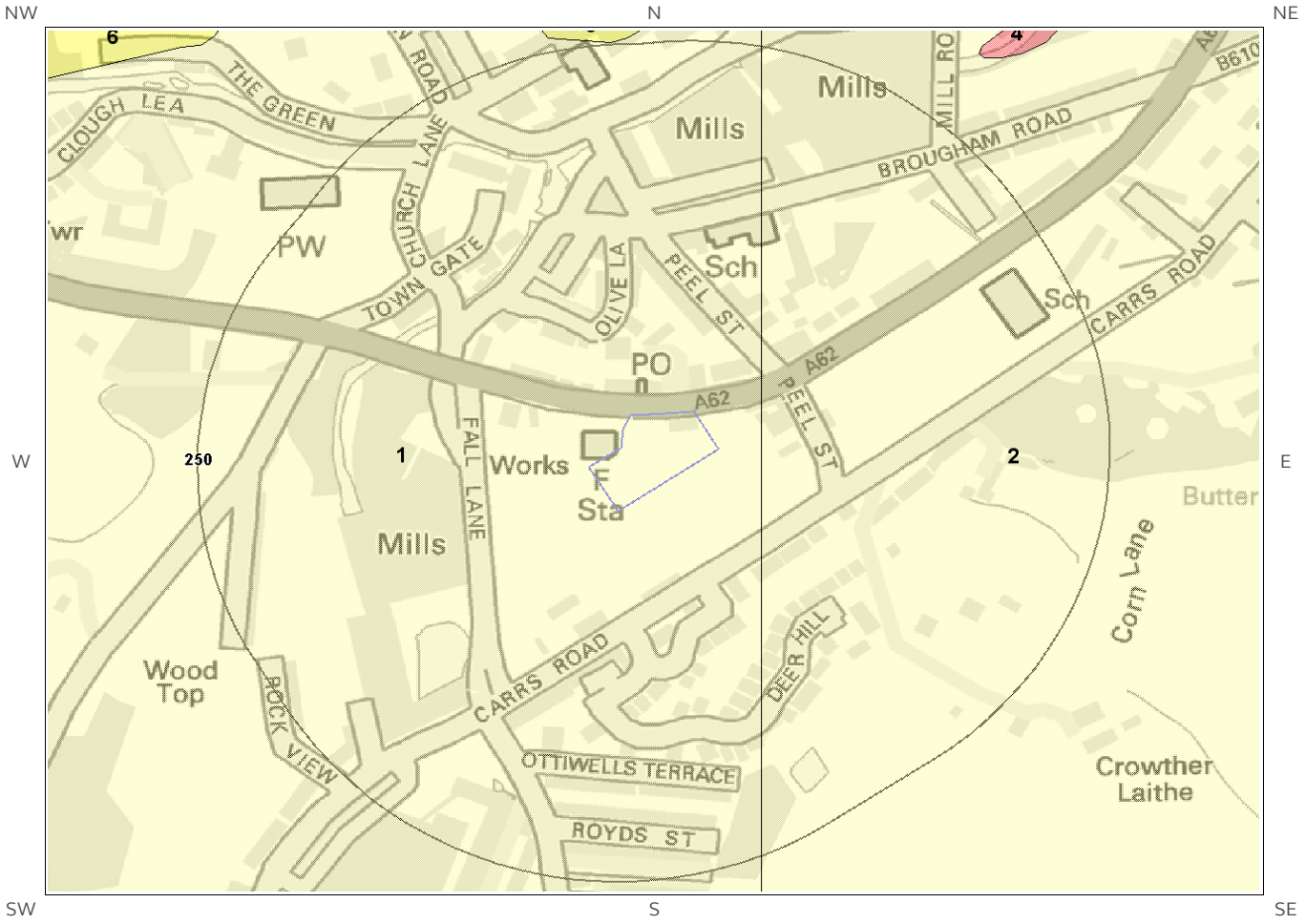
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.4 Compressible Deposits map



Compressible Deposits Legend

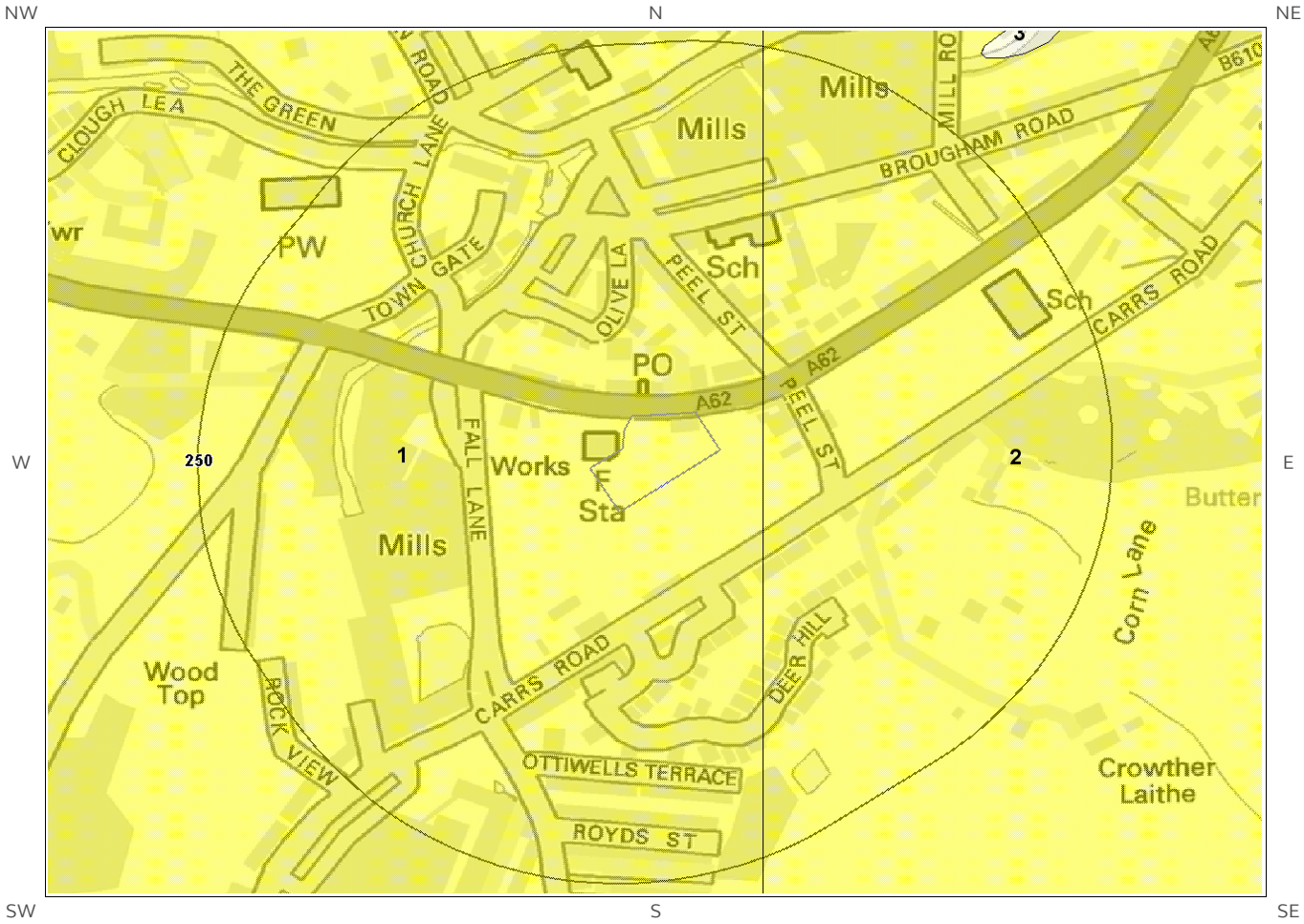
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.5 Collapsible Deposits map



Collapsible Deposits Legend

Site Outline

125
250
Search Buffers (m)

No Data / Null

Negligible

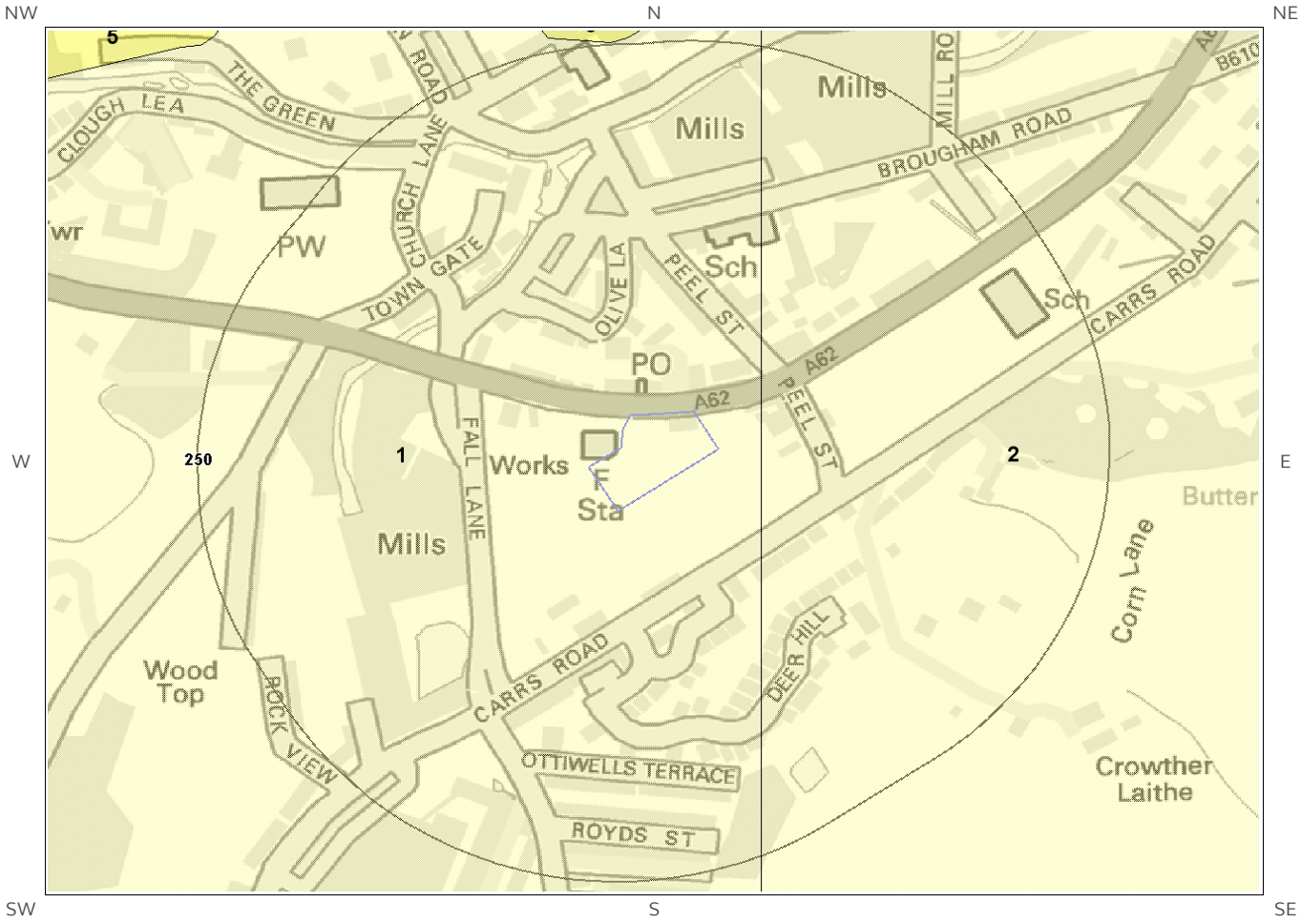
Very Low

Low

Moderate

High

6.6 Running Sand map



Running Sand Legend

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	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.
2	17.0	N	Negligible	Ground conditions predominantly non-plastic. 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 likely due to potential problems with shrink-swell clays.
3	27.0	E	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.
4	40.0	NE	Negligible	Ground conditions predominantly non-plastic. 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 likely due to potential problems with shrink-swell clays.

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

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	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
2	17.0	N	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.
3	27.0	E	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
4	34.0	SE	Moderate	Significant potential for slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not undercut or place large amounts of material on slopes without technical advice. For new build - consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property - probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.
5	38.0	SE	Moderate	Significant potential for slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not undercut or place large amounts of material on slopes without technical advice. For new build - consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property - probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.
6	40.0	NE	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.

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.
2	27.0	E	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	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.
2	27.0	E	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:

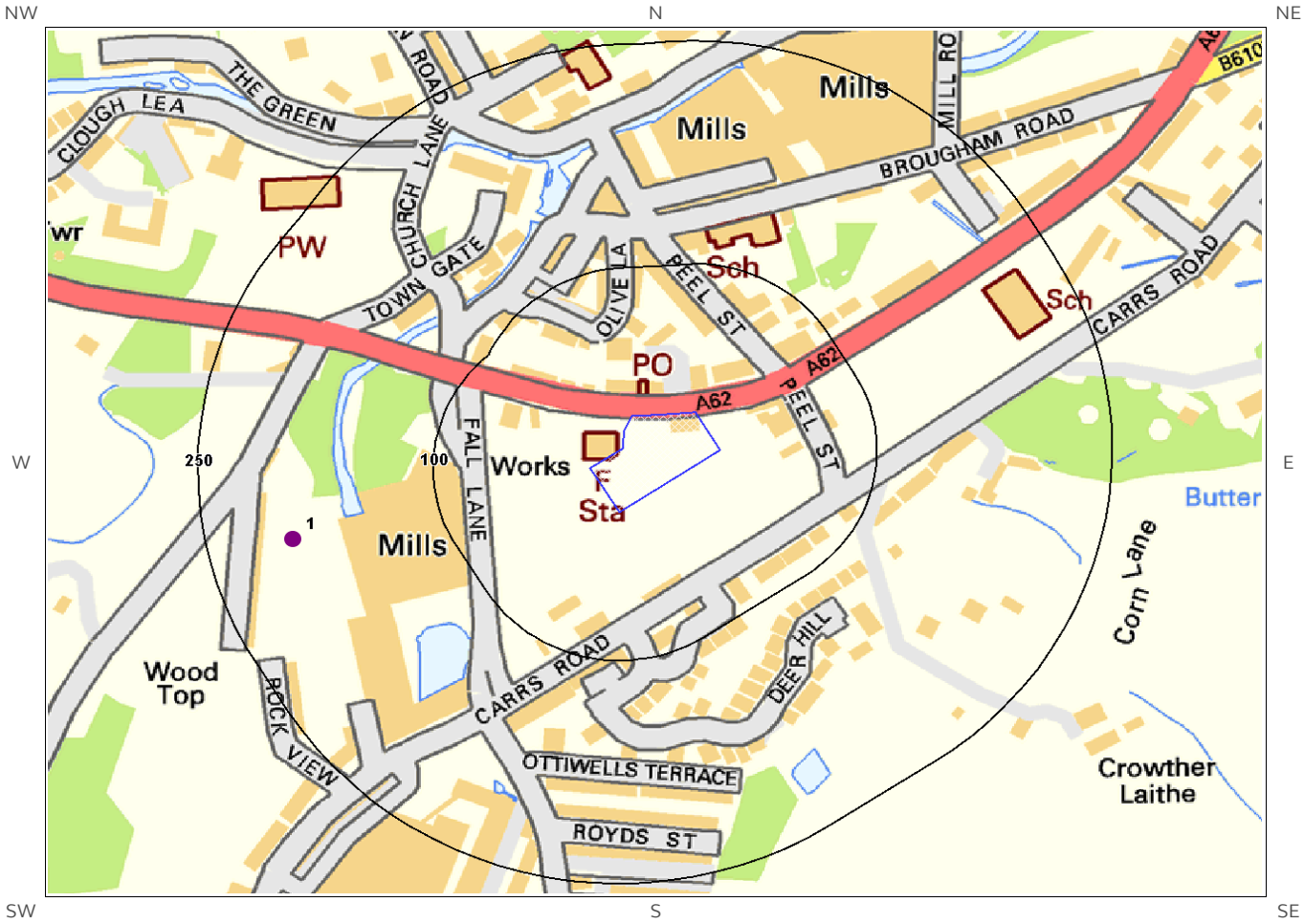
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	27.0	E	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.

6.6 Running Sands

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	27.0	E	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.

7 Borehole Records map



Borehole Records Legend

Site Outline

Borehole Locations

125
250
Search Buffers (m)

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: 1

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	196.0	W	404700 411400	SE01SW4	10.0	OLD MOUNT RD MARSDEN 1

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/36971

8 Estimated Background Soil Chemistry

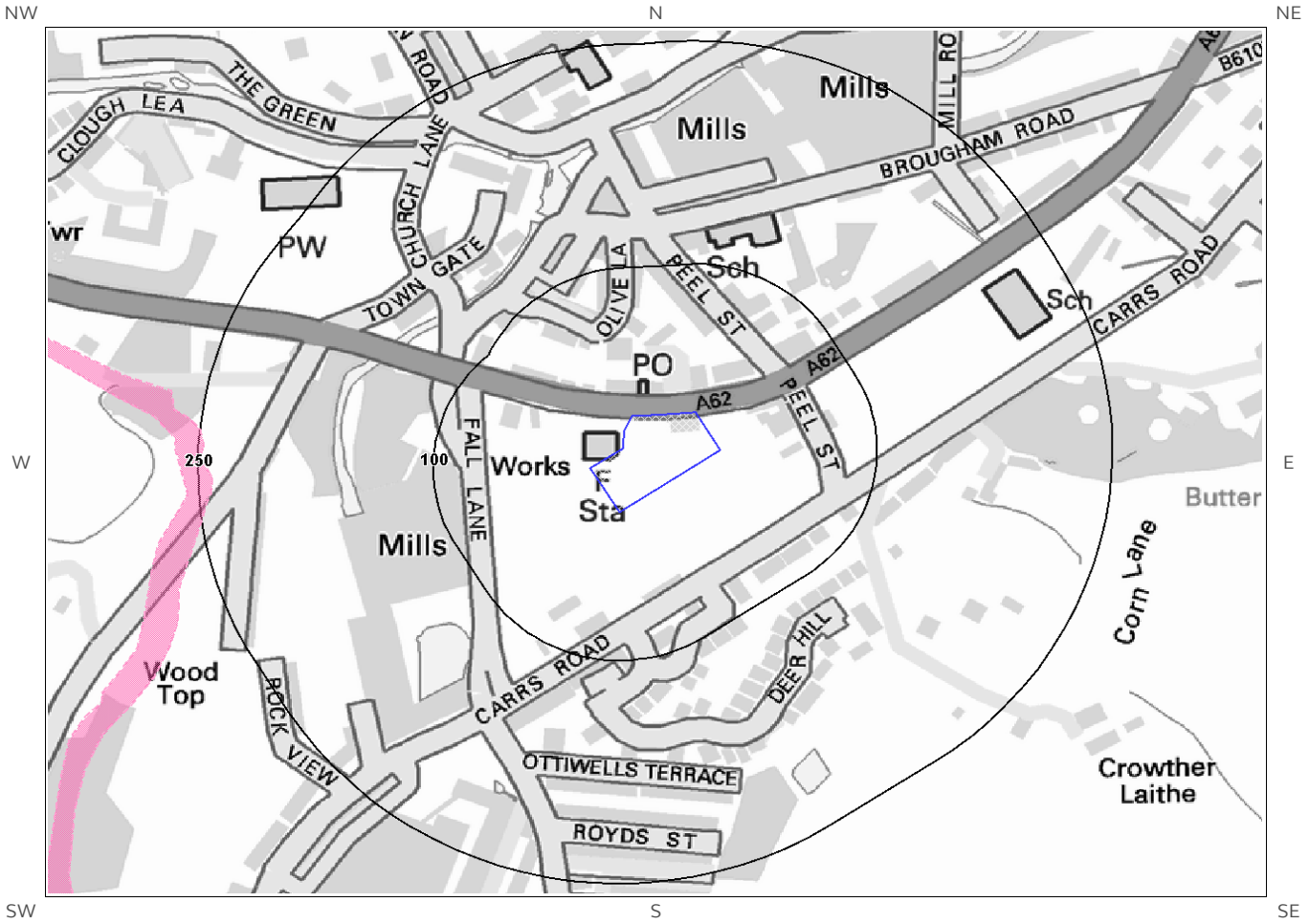
Records of background estimated soil chemistry within 250m of the study site boundary: 9

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	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
15.0	N	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
27.0	E	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
27.0	E	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
44.0	NE	Sediment	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
44.0	NE	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
47.0	SE	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
50.0	SE	Sediment	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
50.0	SE	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

- Site Outline
- Search Buffers (m) — 250 — 500
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

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? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1	241	W	404592 411298	Railway Sidings	1904

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?	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.

9.5 Railway Projects

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.

Contact Details

Groundsure Helpline

Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

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

Johnson Poole & Bloomer Limited

Harris and Pearson Building, Brettel Lane
Brierley Hill, West Midlands
DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS

Tel: 08456 050505
Website: http://www.ordnancesurvey.co.uk/

Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**

Peter Brett Associates
Caversham Bridge House
Waterman Place
Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016/

APPENDIX E

GROUNDSURE REPORT

HISTORICAL MAPS

Haigh Huddleston & Associates

99-101, LEEDS ROAD,
DEWSBURY, WF12 7BU

Groundsure Reference:	GS-4463510
Your Reference:	SB_HOMES_7092
Report Date	13 Nov 2017
Report Delivery Method:	Email - pdf

Enviro Insight

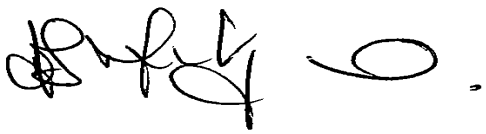
Address: MANCHESTER ROAD, SLAITHWAITE, HUDDERSFIELD, HD7 5JX

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 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**MANCHESTER ROAD, SLAITHWAITE, HUDDERSFIELD, HD7 5JX**
Date:	**13 Nov 2017**
Reference:	**GS-4463510**
Client:	**Haigh Huddleston & Associates**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	404939,411461
Site Size:	0.30ha

Report Reference: GS-4463510
Client Reference: SB_HOMES_7092

Contents Page

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	15	0	24	58
1.2 Additional Information – Historical Tank Database	6	0	2	14
1.3 Additional Information – Historical Energy Features Database	6	3	8	4
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	1	0	0	2
1.6 Potentially Infilled Land	0	0	9	20

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	1
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	1	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	1
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	0	2	1
2.1.9 Records of Water Industry Referrals	0	0	0	1
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	6	5
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	1	2	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	1	2	1
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	1	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	1	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	2	6	2

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	2	3	9	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
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?	None
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	1	12
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	13	9	11	14
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	2	1
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)	1	0	0	1	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	Yes	No	Yes	No
6.10 Detailed River Network entries within 500m of the site	1	0	18	22	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment 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?	Medium
7.4 Are there any Flood Defences within 250m of the study site?	No
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 below Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low

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	4	20
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	2	3
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	2	3
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	5
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	1	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	0	0
8.11 Records of National Parks	0	0	0	0	1	1
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	0
8.14 Records of Green Belt land	0	0	1	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Very Low
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Very Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Moderate
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?	Negligible
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Negligible
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 3 and 5% 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?	Basic 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.

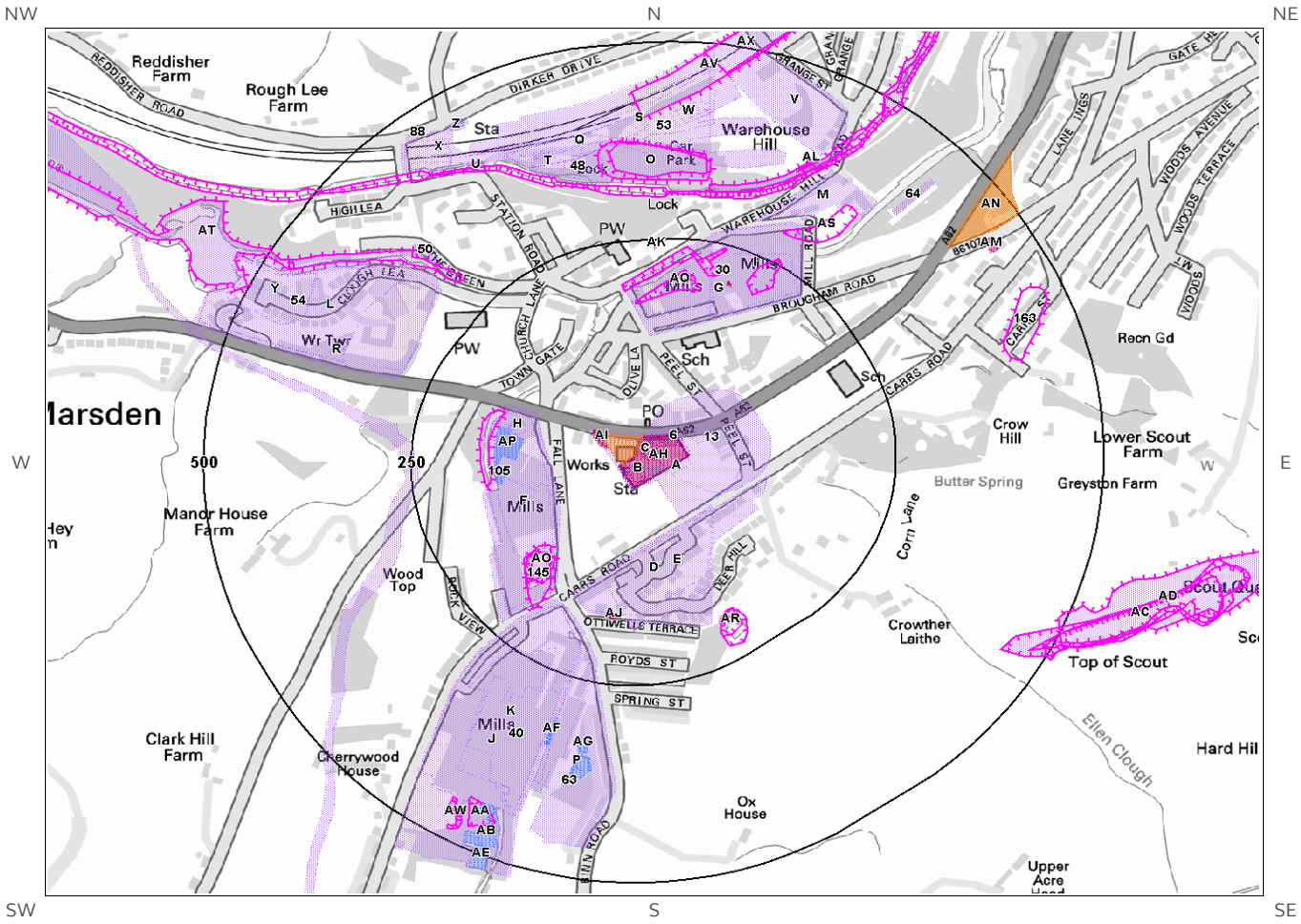
Note: Maps

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



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

Industrial Land Use

Potentially Infilled Land

Site Outline

Search Buffers (m)
250
500

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

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: 97

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Gas Works	1890
2A	0	On Site	Gas Works	1904
3A	0	On Site	Gas Works	1930
4AH	0	On Site	Unspecified Works	1980
5B	0	On Site	Unspecified Tank	1955
6	0	On Site	Fire Station	1980
7B	0	On Site	Gasometers	1890
8B	0	On Site	Gasometers	1904
9C	0	On Site	Unspecified Commercial/Industrial	1955
10C	0	On Site	Gasometer	1930
11C	0	On Site	Unspecified Tank	1980
12C	0	On Site	Unspecified Tank	1955
13	0	On Site	Smithy	1890
14B	0	On Site	Gasometer	1930
15B	0	On Site	Unspecified Tank	1980
16D	67	SE	Unspecified Mill	1955
17D	70	SE	Unspecified Mills	1980
18E	73	SE	Unspecified Foundry	1930
19E	73	SE	Unspecified Foundry	1890
20E	73	SE	Unspecified Foundry	1904
21F	80	W	Unspecified Mills	1980
22F	81	W	Unspecified Mills	1955
23F	87	W	Unspecified Mills	1930
24F	89	SW	Unspecified Mills	1904
25F	89	SW	Unspecified Mills	1890
26H	122	W	Unspecified Tanks	1930
27G	128	N	Unspecified Mills	1890
28G	128	N	Unspecified Mills	1904
29H	130	W	Unspecified Tanks	1955
30	149	N	Unspecified Mills	1930
31AQ	156	N	Unspecified Mills	1980
32I	157	N	Unspecified Mills	1955
33I	157	N	Unspecified Mills	1978

34J	169	SW	Unspecified Mills	1955
35J	169	SW	Unspecified Mills	1980
36K	174	SW	Unspecified Mills	1930
37P	197	S	Unspecified Commercial/Industrial	1955
38K	223	SW	Unspecified Mills	1904
39	241	W	Railway Sidings	1904
40	275	S	Unspecified Mill	1890
41L	285	NW	Unspecified Mills	1955
42L	286	NW	Unspecified Mills	1930
43M	287	N	Unspecified Mills	1904
44M	287	N	Unspecified Mills	1890
45AT	295	NW	Mill Pond	1955
46N	311	N	Disused Canal	1978
47N	311	N	Disused Canal	1955
48	322	N	Railway Carriage and Iron Works	1890
49O	325	N	Unspecified Heap	1980
50	329	NW	Unspecified Mill	1980
51O	329	N	Unspecified Heap	1955
52P	339	S	Unspecified Tank	1955
53	347	N	Railway Sidings	1930
54	350	NW	Unspecified Mills	1980
55T	351	N	Railway Buildings	1930
56S	360	N	Railway Sidings	1955
57R	362	NW	Unspecified Tank	1930
58Q	362	N	Railway Sidings	1904
59Q	362	N	Railway Sidings	1890
60R	363	NW	Unspecified Tank	1955
61S	365	N	Railway Sidings	1980
62T	374	N	Railway Building	1980
63	377	S	Unspecified Tank	1930
64	385	NE	Unspecified Tanks	1955
65U	387	NW	Railway Building	1890
66U	389	NW	Railway Building	1930
67U	389	NW	Railway Building	1904
68S	391	N	Railway Buildings	1890
69S	391	N	Railway Buildings	1904
70W	393	N	Goods Shed	1930
71V	396	NE	Smithy	1904
72V	396	NE	Smithy	1890
73X	396	NW	Railway Station	1955
74W	400	N	Railway Building	1955
75AV	405	N	Cuttings	1904
76X	408	NW	Railway Station	1904
77X	408	NW	Railway Station	1930

78X	410	NW	Railway Station	1890
79Y	424	NW	Unspecified Mills	1890
80Y	427	NW	Unspecified Mills	1904
81X	435	NW	Railway Station	1980
82AA	437	SW	Unspecified Heap	1955
83Z	447	NW	Railway Station	1904
84AW	448	SW	Unspecified Ground Workings	1955
85AC	449	SE	Unspecified Quarries	1930
86Z	450	NW	Railway Station	1930
87AA	454	S	Unspecified Tanks	1930
88	463	NW	Railway Building	1930
89AB	464	S	Unspecified Tanks	1955
90AX	465	N	Cuttings	1930
91AB	471	S	Unspecified Tanks	1930
92AC	478	SE	Unspecified Quarries	1955
93AE	483	S	Unspecified Tanks	1955
94AD	491	SE	Unspecified Quarry	1890
95AD	491	SE	Unspecified Quarry	1904
96AE	491	S	Unspecified Tanks	1930
97AC	493	SE	Unspecified Disused Quarries	1978

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: 22

ID	Distance (m)	Direction	Use	Date
98C	0	On Site	Gasholder Station	1994
99C	0	On Site	Gasholder Station	1967
100C	0	On Site	Gasholder	1967
101B	0	On Site	Gasholder	1967
102C	0	On Site	Gasholder	1988
103C	0	On Site	Gasholder Station	1988
104AP	120	W	Tanks	1967
105	135	W	Tanks	1967
106AF	308	S	Tanks	1994
107AF	309	S	Tanks	1967
108AF	310	S	Tanks	1988
109AG	321	S	Unspecified Tank	1994
110AG	321	S	Unspecified Tank	1967

111AG	321	S	Unspecified Tank	1988
112P	344	S	Unspecified Tank	1994
113P	344	S	Unspecified Tank	1967
114P	345	S	Unspecified Tank	1988
115AA	437	SW	Tanks	1967
116AA	437	SW	Tanks	1988
117AA	437	SW	Tanks	1994
118AB	451	S	Tanks	1966
119AE	487	S	Tanks	1966

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: 21

ID	Distance (m)	Direction	Use	Date
120B	0	On Site	Gasholder	1967
121AH	0	On Site	Gasholder Station	1988
122AH	0	On Site	Gasholder Station	1967
123AH	0	On Site	Gasholder Station	1994
124AH	0	On Site	Gasholder	1988
125AH	0	On Site	Gasholder	1967
126AI	26	NW	Electricity Substation	1967
127AI	27	NW	Electricity Substation	1988
128AI	27	NW	Electricity Substation	1994
129AJ	162	S	Electricity Substation	1967
130AJ	163	S	Electricity Substation	1988
131AJ	164	S	Electricity Substation	1994
132G	200	N	Electricity Substation	1995
133G	201	N	Electricity Substation	1967
134AK	239	N	Electricity Substation	1988
135AK	240	N	Electricity Substation	1967
136AK	242	N	Electricity Substation	1994
137AL	379	NE	Electricity Substation	1967
138AL	388	NE	Electricity Substation	1995
139AM	446	NE	Electricity Substation	1995
140AM	448	NE	Electricity Substation	1967

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: 3

ID	Distance (m)	Direction	Use	Date
141AI	0	On Site	Garage	1967
142AN	404	NE	Garage	1967
143AN	466	NE	Garage	1995

1.6 Potentially Infilled Land

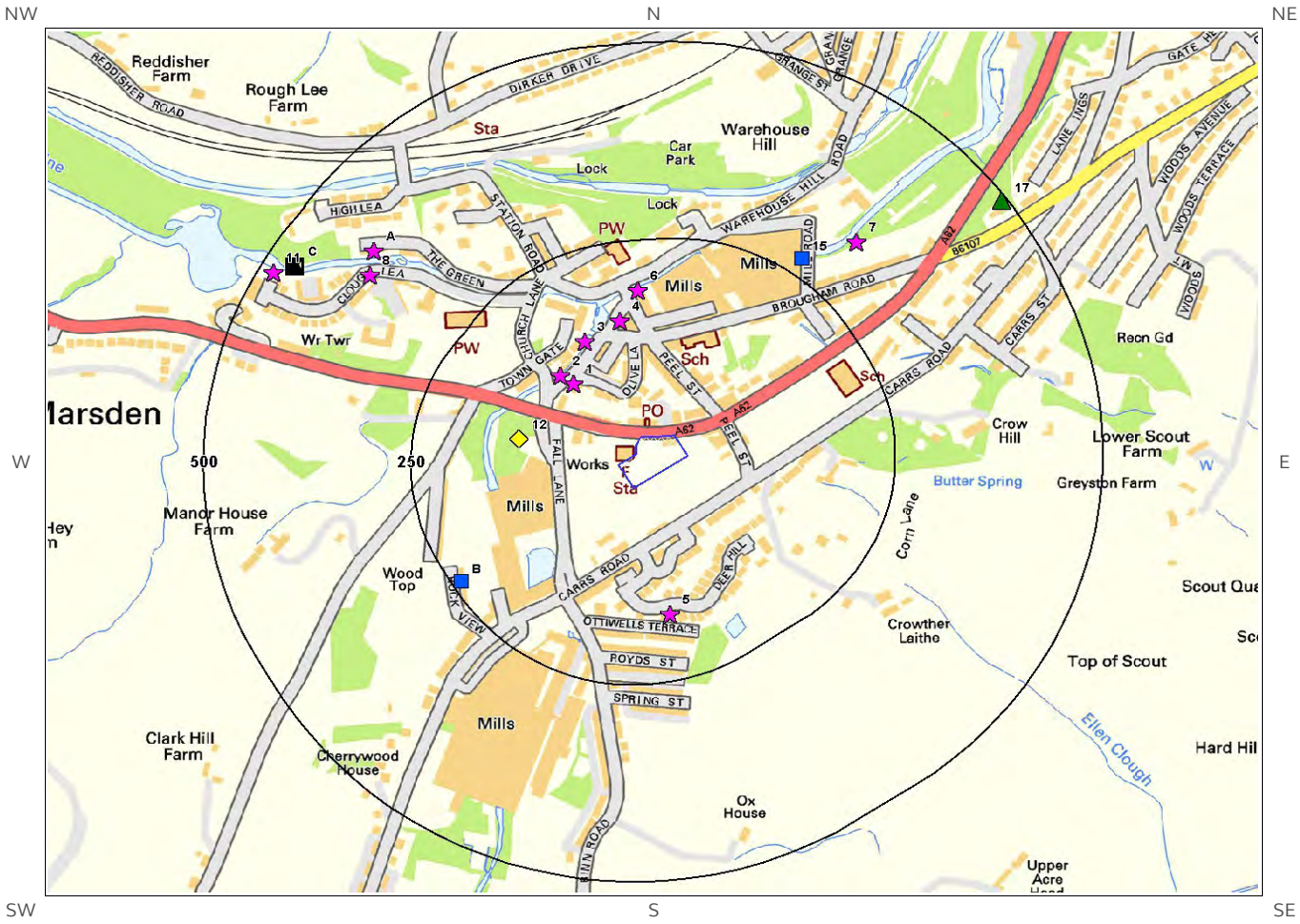
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 29

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

ID	Distance(m)	Direction	Use	Date
144AO	124	SW	Pond	1980
145	129	SW	Water Body	1890
146AO	133	SW	Pond	1930
147AP	153	NW	Pond	1930
148AQ	170	N	Pond	1890
149	187	N	Pond	1930
150AR	190	SE	Reservoir	1955
151AR	191	SE	Reservoir	1930
152I	202	NE	Pond	1890
153AS	288	NE	Pond	1890
154AS	288	NE	Pond	1904
155AT	295	NW	Mill Pond	1955
156AU	303	N	Canal	1890
157AU	303	N	Canal	1930
158AU	303	N	Canal	1904
159N	311	N	Disused Canal	1955
160N	311	N	Disused Canal	1978
161O	325	N	Unspecified Heap	1980
162O	329	N	Unspecified Heap	1955
163	405	E	Pond	1890

164AV	405	N	Cuttings	1904
165AW	437	SW	Unspecified Heap	1955
166AA	448	SW	Unspecified Ground Workings	1955
167AC	449	SE	Unspecified Quarries	1930
168AX	465	N	Cuttings	1930
169AC	478	SE	Unspecified Quarries	1955
170AD	491	SE	Unspecified Quarry	1890
171AD	491	SE	Unspecified Quarry	1904
172AC	493	SE	Unspecified Disused Quarries	1978

2. Environmental Permits, Incidents and Registers Map



- Site Outline
- Search Buffers (m) — 250 — 500
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- 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:

1

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

ID	Distance (m)	Direction	NGR	Details	
19C	464	NW	404500 411700	Operator: J Bailly Ancion Ltd (dissolved) Address: Clough Lee Mills, Marsden, Huddersfield, West Yorkshire, HD7 6DL Process: Coating Processes And Printing	Permit Number: AU7826 Original Permit Number: IPCAPP Date Approved: 29-8-1996 Effective Date: 1-9-1996 Status: Revoked

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:

1

The following List 2 Dangerous Substance Inventory Site records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
12	124	W	404770 411480	Name: John Crowther & Sons, Marsden, Huddersfield Status: Not Active Receiving Water: Unknown	Authorised Substances: Cyfluthrin

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

1

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	
17	493	NE	405351 411782	Address: Burnlee Garage, Meltham Road, Marsden, Huddersfield, HD7 6JW Process: Waste Oil Burner <0.4MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

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:

3

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

ID	Distance (m)	Direction	NGR	Details	
13B	240	SW	404700 411300	Address: J E CROWTHER LTD, BANK BOTTOM MILLS, MARSDEN, HUDDERSFIELD, HD7 6HR Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: WRA7012 Permit Version: 1	Receiving Water: WESSENDEN BROOK Status: NEW CONSENT, BY APPLICATION (WRA 91, SECTION 88) Issue date: 04/01/1994 Effective Date: 04-Jan-1994 Revocation Date: 18/11/1996

ID	Distance (m)	Direction	NGR	Details	
14B	240	SW	404700 411300	Address: J E CROWTHER LTD, BANK BOTTOM MILLS, MARSDEN, HUDDERSFIELD, HD7 6HR Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: WRA7012 Permit Version: 2	Receiving Water: WESSENDEN BROOK Status: NEW CONSENT, BY APPLICATION (WRA 91, SECTION 88) Issue date: 19/11/1996 Effective Date: 19-Nov-1996 Revocation Date: -
15	272	NE	405110 411710	Address: BROUGHAM ROAD CSO, OFF BROUGHAM ROAD (R/O NO.44), MARSDEN, HUDDERSFIELD, WEST YORKSHIRE Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: WRA9254 Permit Version: 1	Receiving Water: RIVER COLNE Status: SURRENDERED UNDER EPR 2010 Issue date: 04/09/2007 Effective Date: 04-Sep-2007 Revocation Date: 27/03/2012

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

1

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

ID	Distance (m)	Direction	Address	Permission reference	Local Authority	First Date Received	Last Date Received	Status
20C	464	NW	J BAILLY ANCION LTD (DISSOLVED), CLOUGH LEE MILLS, MARSDEN, HUDDERSFIELD, WEST YORKSHIRE, HD7 6DL	AH2494	WAKEFIELD CITY COUNCIL	01-Jun-2001	01-Jul-2017	DEAD (APPLICATION)

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

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

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:

11

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

ID	Distance (m)	Direction	NGR	Details	
1	107	NW	404834 411551	Incident Date: 17-Dec-2002 Incident Identification: 126457 Pollutant: Inert Materials and Wastes Pollutant Description: Soils and Clay	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
2	125	NW	404819 411561	Incident Date: 19-Apr-2004 Incident Identification: 230629 Pollutant: Inert Materials and Wastes Pollutant Description: Soils and Clay	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
3	140	NW	404848 411605	Incident Date: 12-Jun-2002 Incident Identification: 84535 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
4	150	N	404890 411631	Incident Date: 12-Jun-2002 Incident Identification: 84538 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
5	166	S	404951 411258	Incident Date: 30-Jul-2003 Incident Identification: 177768 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
6	186	N	404912 411669	Incident Date: 04-Nov-2002 Incident Identification: 118700 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
7	329	NE	405175 411731	Incident Date: 23-Feb-2003 Incident Identification: 138699 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
8	385	NW	404590 411689	Incident Date: 30-Jan-2002 Incident Identification: 55347 Pollutant: Oils and Fuel Pollutant Description: Gas and Fuel Oils	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
9A	400	NW	404594 411719	Incident Date: 25-Feb-2003 Incident Identification: 139241 Pollutant: Specific Waste Materials Pollutant Description: Other Specific Waste Material	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
10A	400	NW	404594 411719	Incident Date: 25-Feb-2003 Incident Identification: 139241 Pollutant: Specific Waste Materials Pollutant Description: Other Specific Waste Material	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
11	483	NW	404473 411692	Incident Date: 28-Oct-2002 Incident Identification: 117073 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

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

0

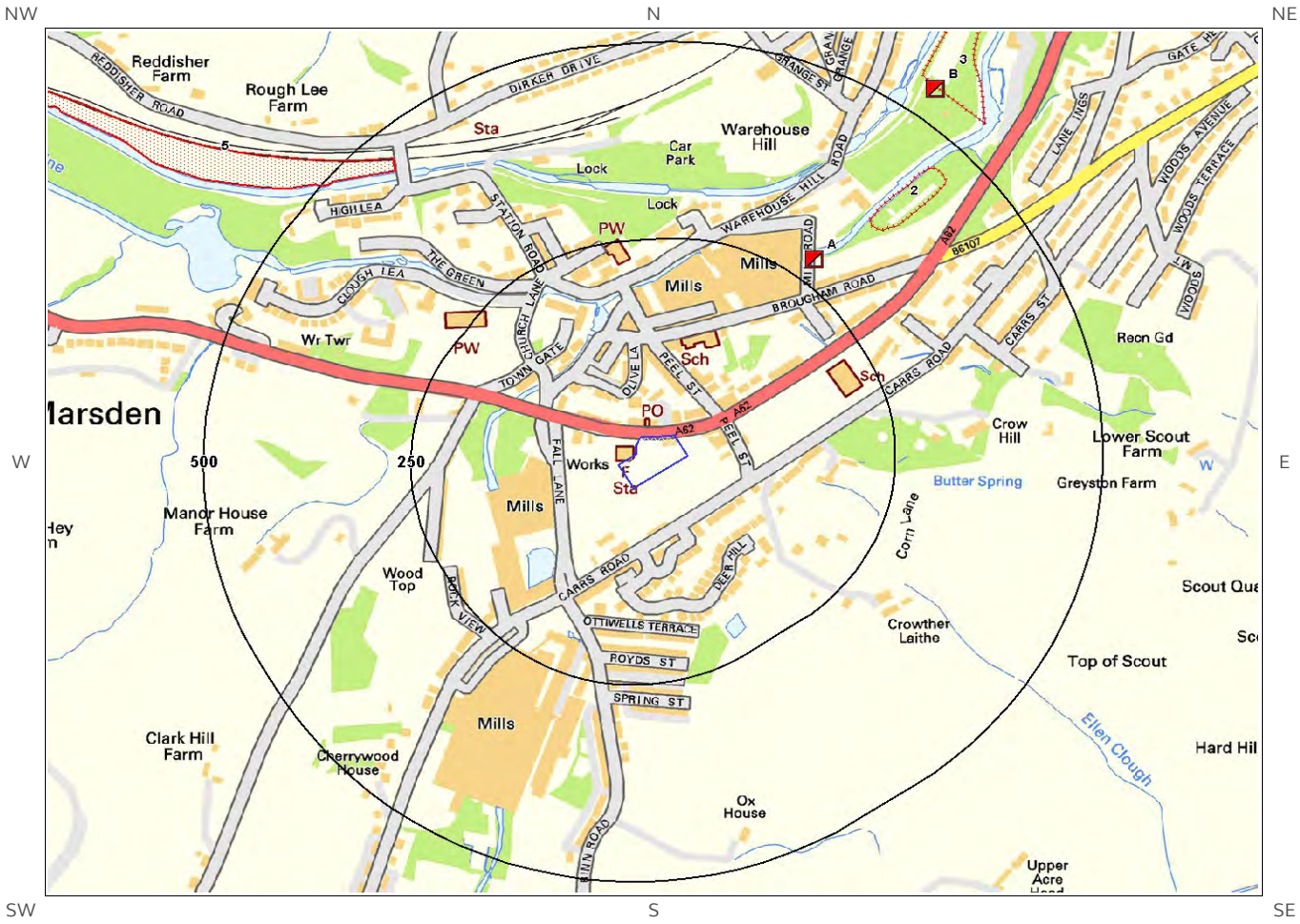
Database searched and no data found.

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



Site Outline

250 / 500 Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

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:

3

The following Environment Agency/Natural Resources Wales landfill records are represented as polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
2	357	NE	405125 411709	Address: Bank Bottom Mills, Marsden, Huddersfield, West Yorkshire, HD7 6HR Landfill Reference: 60998.0 Environmental Permitting Regulations (Waste) Reference: JEC003 Landfill Type: A05: Landfill taking Non-Biodegradeable Wastes	Operator: J E Crowther (Holdings) Plc Status: Issued IPPC Reference: EPR Reference:
3	543	NE	405271 411926	Address: Land/premises At, Off Marsden Lane, Smithy Holme Bridge, Marsden, West Yorkshire, HD1 2TG Landfill Reference: 60997.0 Environmental Permitting Regulations (Waste) Reference: KIR002 Landfill Type: A04: Household, Commercial & Industrial Waste Landfill	Operator: Kirklees Council Status: Issued IPPC Reference: EPR Reference:
Not shown	847	SW	404485 410659	Address: Mount Road, Marsden, West Yorkshire Landfill Reference: 60991.0 Environmental Permitting Regulations (Waste) Reference: JEC002 Landfill Type: A04: Household, Commercial & Industrial Waste Landfill	Operator: John Edward Crowther Limited Status: Closure IPPC Reference: EPR Reference:

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

4

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	
5	449	NW	404300 411800	Site Address: Tunnel End, Off High Lea, Marsden Waste Licence: - Site Reference: - Waste Type: Inert, Industrial, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	720	NE	405400 412200	Site Address: Wood Bottom, Manchester Road, Marsden, West Yorkshire Waste Licence: Yes Site Reference: 4700/WY033 Waste Type: Industrial, Commercial, Household, Special Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 14-Oct-1977 Licence Surrendered: Licence Holder Address: - Operator: Colne Valley Urban District Council Licence Holder: - First Recorded: - Last Recorded: 28-Oct-1979
Not shown	961	E	405900 411800	Site Address: Hey Heads Quarry, Meltham Road, Marsden Waste Licence: - Site Reference: - Waste Type: Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1040	NE	405719 412427	Site Address: Cellars Clough Mills, Manchester Road, Huddersfield, Marsden, West Yorkshire Waste Licence: Yes Site Reference: - Waste Type: Industrial, Commercial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 05-Aug-1985 Licence Surrendered: Licence Holder Address: Manchester Road, Huddersfield, Marsden, West Yorkshire Operator: Mr K S Cooper Licence Holder: Mr K S Cooper First Recorded: - Last Recorded: -

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

1

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	979	NE	405500.0 412300.0	Address: Wood Bottom, Manchester Rd, Marsden BGS Number: 1981.0	Risk: No risk to aquifer Waste Type: N/A

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

1

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

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
Not shown	854	NE	405477 412240	Refuse Tip	1967 mapping	Polygon

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:

10

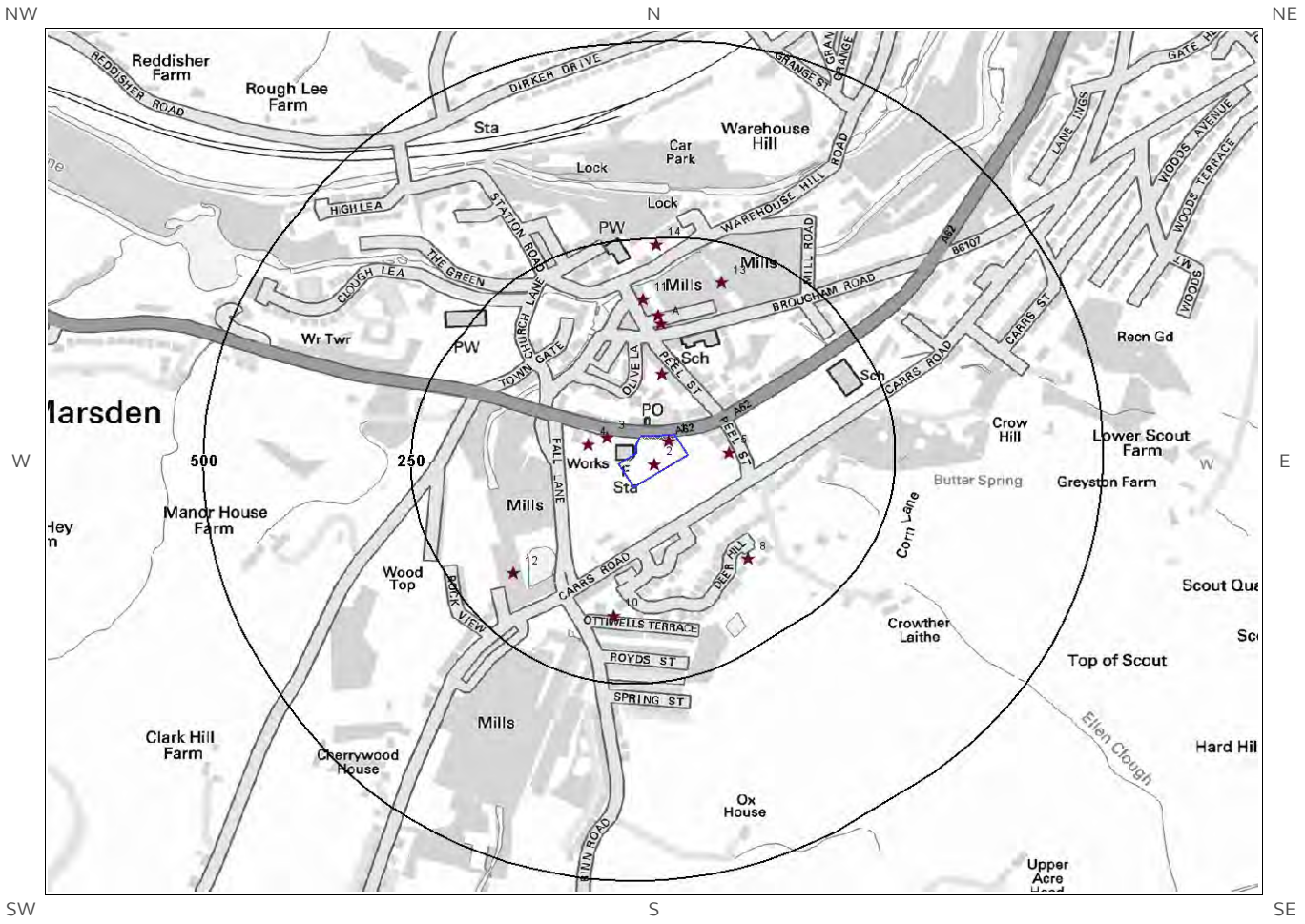
The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
9A	280	NE	405125 411709	Site Address: Bank Bottom Mills, Marsden, Huddersfield, West Yorkshire, HD7 6HR Type: Landfill taking Non-Biodegradeable Wastes Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: JEC003 EPR reference: EA/EPR/XP3095ZP/A001 Operator: J E Crowther (Holdings) Plc Waste Management licence No: 60998 Annual Tonnage: 4000.0	Issue Date: 21/01/1985 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Wood Bottom Correspondence Address: -
10A	280	NE	405125 411709	Site Address: Wood Bottom, Marsden, Huddersfield, West Yorkshire, HD7 6HR Type: Landfill taking Non-Biodegradeable Wastes Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: JEC003 EPR reference: - Operator: J E Crowther (Holdings) Plc Waste Management licence No: 60998 Annual Tonnage: 0.0	Issue Date: 21/01/1985 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Wood Bottom Correspondence Address: Bank Bottom Mills, Marsden, Huddersfield, West Yorkshire, HD7 6HR

ID	Distance (m)	Direction	NGR	Details	
11B	541	NE	405271 411926	Site Address: Land/premises At, Off Marsden Lane, Smithy Holme Bridge, Marsden, West Yorkshire, HD1 2TG Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: KIR002 EPR reference: EA/EPR/XP3395ZX/A001 Operator: Kirklees Council Waste Management licence No: 60997 Annual Tonnage: 5000.0	Issue Date: 05/07/1984 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Marsden Dredsing Disposal Site Correspondence Address: -
12B	541	NE	405271 411926	Site Address: Off Marsden Lane, Smithy Holme Bridge, Marsden, West Yorkshire, HD1 2TG Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: KIR002 EPR reference: - Operator: Kirklees Metropolitan Council Waste Management licence No: 60997 Annual Tonnage: 5000.0	Issue Date: 05/07/1984 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Marsden Dredsing Disposal Site Correspondence Address: South Pennine Ring, Middle Warehouse, Castle Quay, Manchester, M15 4NJ
13B	541	NE	405271 411926	Site Address: Off Marsden Lane, Next To Smithy Holme Bird, Marsden, HD1 2TG Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: KIR002 EPR reference: - Operator: Kirklees Metropolitan Borough Council Waste Management licence No: 60997 Annual Tonnage: 0.0	Issue Date: 05/07/1984 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Canal Dredgings Site Correspondence Address: Planning Services, Civic Centre, Huddersfield, HD1 2TG
14B	541	NE	405271 411926	Site Address: Off Marsden Lane, Smithy Holme Bridge, Marsden, West Yorkshire, HD1 2TG Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: KIR002 EPR reference: - Operator: British Waterways-yorkshire Business Waste Management licence No: 60997 Annual Tonnage: 0.0	Issue Date: 05/07/1984 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Marsden Dredsing Disposal Site Correspondence Address: South Pennine Ring, Middle Warehouse, Castle Quay, Manchester, M15 4NJ
Not shown	870	SW	404485 410659	Site Address: Mount Road, Marsden, West Yorkshire Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: JEC002 EPR reference: EA/EPR/UP3495ZU/V004 Operator: John Edward Crowther Limited Waste Management licence No: 60991 Annual Tonnage: 0.0	Issue Date: 28/02/1978 Effective Date: - Modified: 12/02/2015 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure Site Name: Mount Road Landfill Site Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	870	SW	404485 410659	Site Address: Bank Bottom Mills, Marsden, Huddersfield, West Yorkshire, HD7 6HR Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: JEC002 EPR reference: EA/EPR/UP3495ZU/A001 Operator: J E Crowther Limited Waste Management licence No: 60991 Annual Tonnage: 8000.0	Issue Date: 28/02/1978 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Mount Road Correspondence Address: -
Not shown	1211	NE	405719 412427	Site Address: Cellars Clough Mills, Manchester Road, Marsden, Huddersfield, West Yorkshire, HD7 6NA Type: Household, Commercial & Industrial Waste Landfill Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MRK001 EPR reference: - Operator: Mr K S Cooper Waste Management licence No: 61000 Annual Tonnage: 0.0	Issue Date: 05/08/1985 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Cellars Clough Mills Correspondence Address: Cellars Clough Mills, Manchester Road, Marsden, Huddersfield, West Yorkshire, HD7 6NA
Not shown	1211	NE	405719 412427	Site Address: Cellars Clough Mills, Manchester Road, Marsden, Huddersfield, West Yorkshire, HD7 6NA Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MRK001 EPR reference: EA/EPR/XP3595ZH/A001 Operator: Mr K S Cooper Waste Management licence No: 61000 Annual Tonnage: 4000.0	Issue Date: 05/08/1985 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Revoked Site Name: Cellars Clough Mills Correspondence Address: -

4. Current Land Use Map



Site Outline

Search Buffers (m)

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 14

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	0	On Site	Gas Holder Station	404950 411478	HD7	Gas Features	Infrastructure and Facilities
2	0	On Site	Gas Holder Station	404933 411448	HD7	Gas Features	Infrastructure and Facilities
3	37	NW	Electricity Sub Station	404875 411482	HD7	Electrical Features	Infrastructure and Facilities
4	45	NW	Works	404853 411473	HD7	Unspecified Works Or Factories	Industrial Features
5	50	E	Telephone Exchange	405023 411463	HD7	Telecommunications Features	Infrastructure and Facilities
6	78	N	Huddersfield Stoves Ltd	404941 411562	30a, Peel Street, Marsden, Huddersfield, HD7 6BW	Cookers and Stoves - Non Electrical	Consumer Products
7A	142	N	Mumbles Magazine	404940 411626	2, Derby Terrace, Huddersfield, HD7 6BW	Published Goods	Industrial Products
8	150	SE	Jackson Electrical Contracting	405045 411328	55, Deer Hill Drive, Marsden, Huddersfield, HD7 6LF	Electrical and Electronic Engineers	Engineering Services
9A	153	N	E C C Electronic Engineering	404937 411637	19, Peel Street, Marsden, Huddersfield, HD7 6BW	Electrical and Electronic Engineers	Engineering Services
10	165	S	Electricity Sub Station	404883 411256	HD7	Electrical Features	Infrastructure and Facilities
11	174	N	Fishcake Publications	404919 411657	7a, Peel Street, Marsden, Huddersfield, HD7 6BR	Published Goods	Industrial Products
12	182	SW	Heyfield Engineering Ltd	404762 411310	Unit 6 Mount Road Industrial Units, Mount Road, Marsden, Huddersfield, HD7 6NU	Industrial Engineers	Engineering Services
13	202	N	Electricity Sub Station	405013 411679	HD7	Electrical Features	Infrastructure and Facilities
14	243	N	Electricity Sub Station	404935 411727	HD7	Electrical Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 0

Database searched and no data found.

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.

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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

Database searched and no data found.

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

5.3 Bedrock and Solid Geology

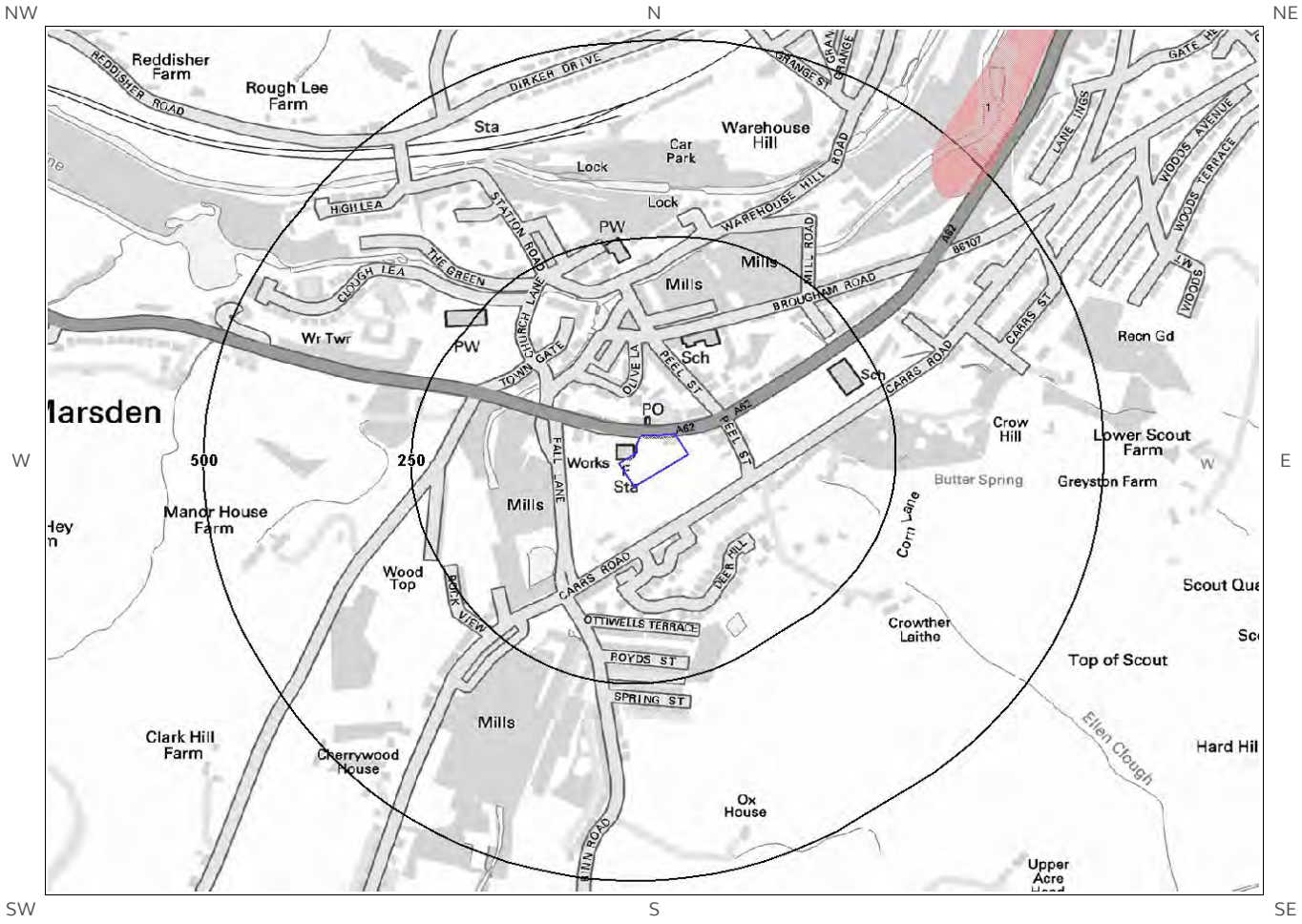
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
MARSD-MDSI	MARSDEN FORMATION	MUDSTONE AND SILTSTONE
UK-SDST	UPPER KINDERSCOUT GRIT	SANDSTONE

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

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



Site Outline

250 — 500 — Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

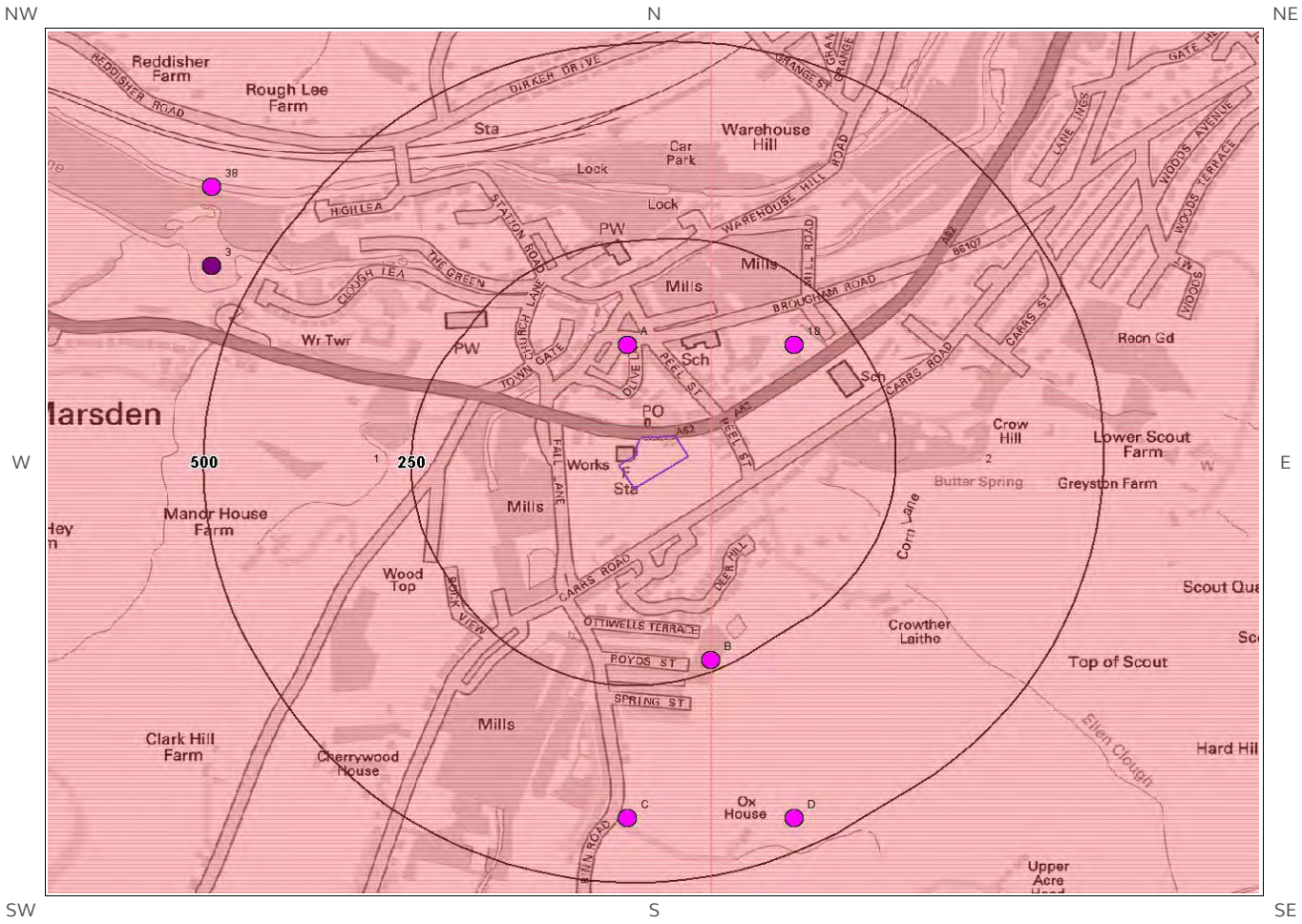
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licenses



Site Outline

250 — 500 — Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

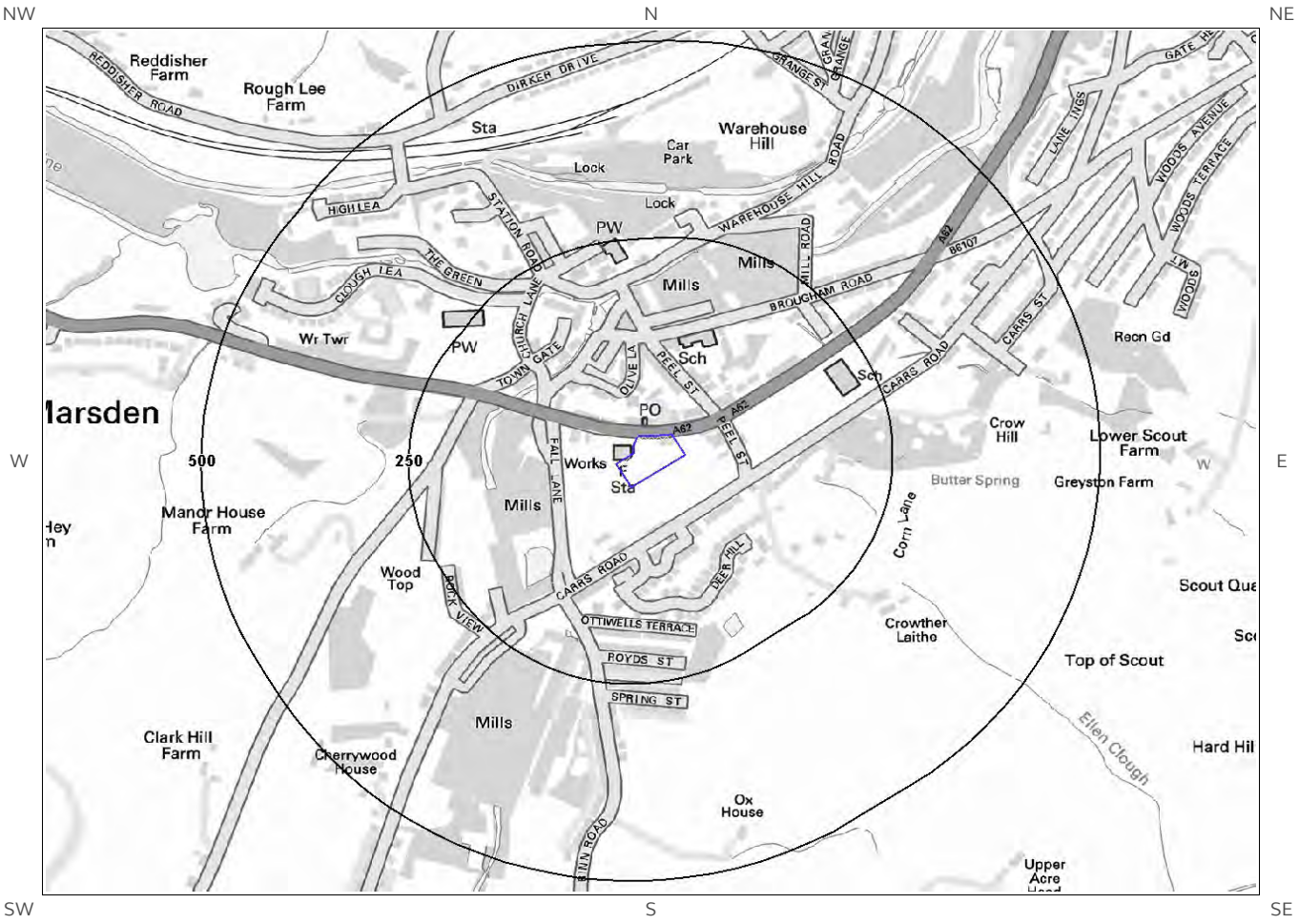
Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

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



Site Outline

250
500
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

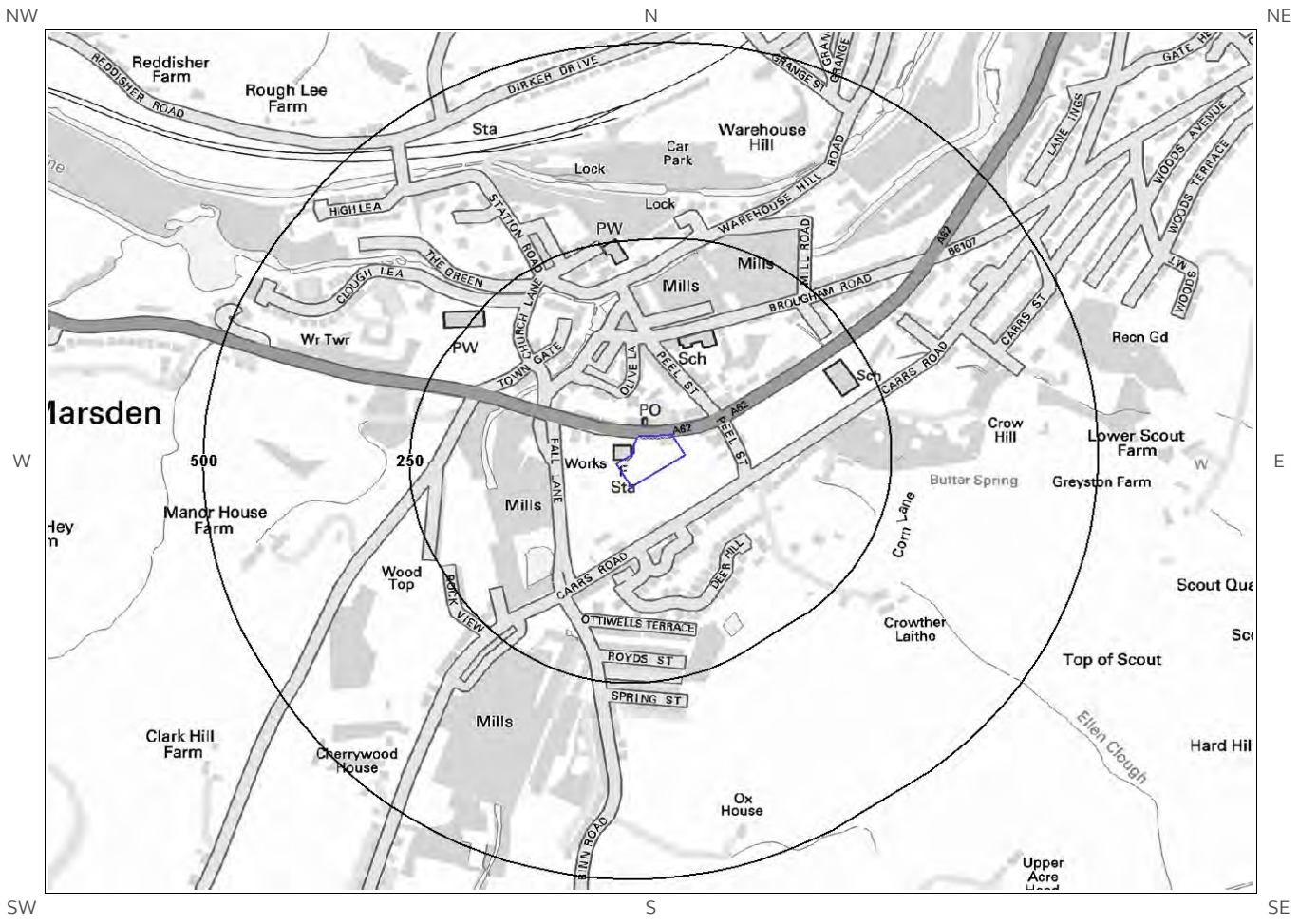
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

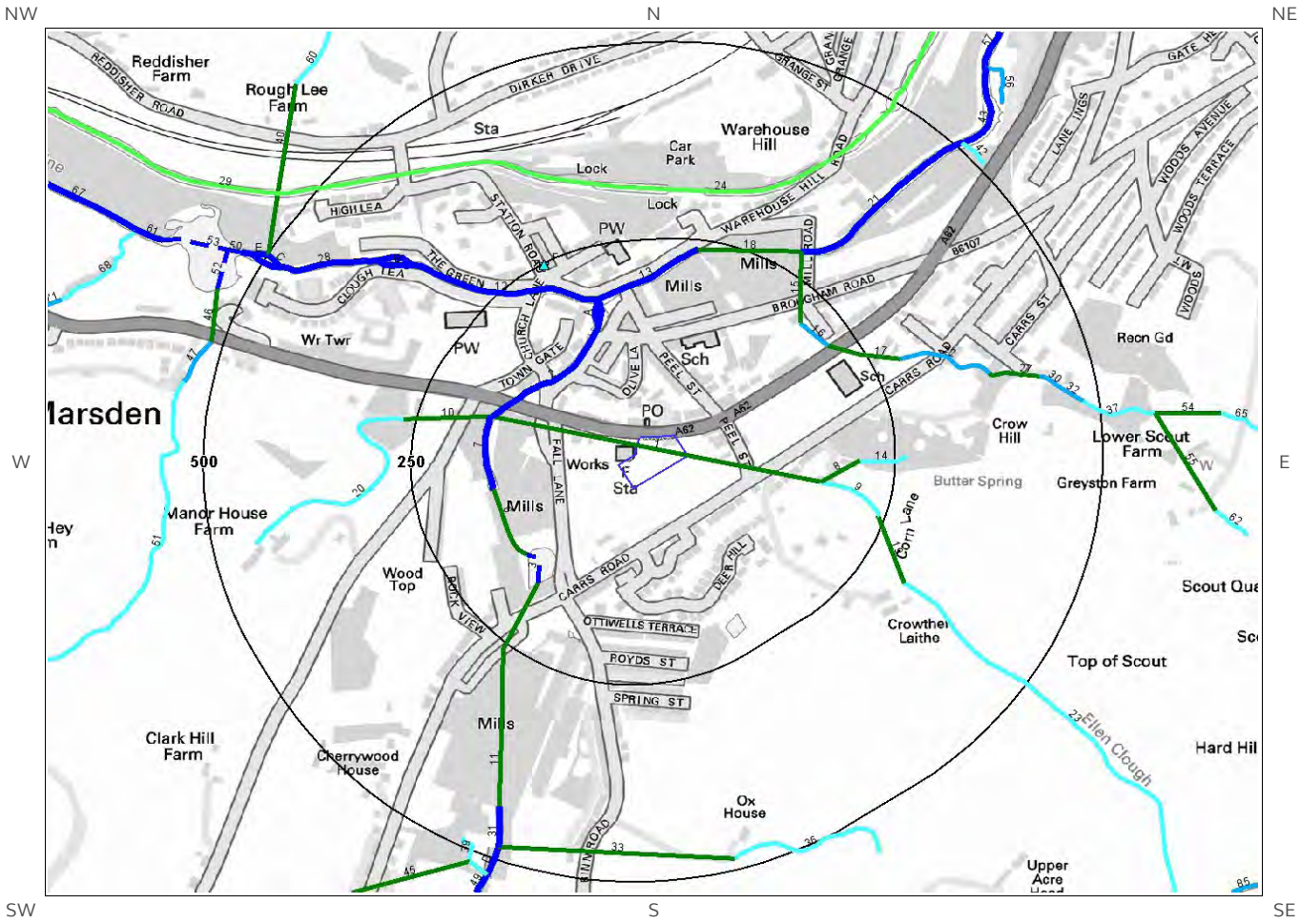
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Site Outline

Potable Water Abstraction Licence

250 — 500 — Search Buffers (m)

6e. Hydrology – Detailed River Network and River Quality



Site Outline

250 Search Buffers (m)
500

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

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	441	NE	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

6.2 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
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	27	E	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	
3	551	NW	404400 411700	Status: Historical Licence No: 2/27/11/054 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Groundwaters Point: Spring Data Type: Point Name: S B HOMES LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 68902 Original Start Date: 20/1/1966 Expiry Date: - Issue No: 101 Version Start Date: 7/5/1999 Version End Date:
Not shown	1118	SW	404350 410450	Status: Historical Licence No: 2/27/11/180 Details: Spray Irrigation - Direct Direct Source: Groundwaters Point: Borehole Data Type: Point Name: MARSDEN GOLF CLUB	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 6764 Original Start Date: 11/10/1996 Expiry Date: 30/11/2006 Issue No: 100 Version Start Date: 11/10/1996 Version End Date:
Not shown	1118	SW	404350 410450	Status: Historical Licence No: 2/27/11/180 Details: Spray Irrigation - Direct Direct Source: Groundwaters Point: Borehole - Millstone Grit - Marsden Data Type: Point Name: MARSDEN GOLF CLUB	Annual Volume (m^3): 5600 Max Daily Volume (m^3): 50 Original Application No: 6764 Original Start Date: 11/10/1996 Expiry Date: 30/11/2006 Issue No: 100 Version Start Date: 11/10/1996 Version End Date:
Not shown	1118	SW	404350 410450	Status: Historical Licence No: 2/27/11/192 Details: Spray Irrigation - Direct Direct Source: Groundwaters Point: Borehole - Millstone Grit - Marsden Data Type: Point Name: MARSDEN GOLF CLUB	Annual Volume (m^3): 2500 Max Daily Volume (m^3): 50 Original Application No: 8252 Original Start Date: 1/4/2007 Expiry Date: 31/3/2015 Issue No: 1 Version Start Date: 1/4/2008 Version End Date:
Not shown	1121	SW	404280 410490	Status: Active Licence No: 2/27/11/192/R01 Details: General Washing/Process Washing Direct Source: Groundwaters Point: Borehole - Millstone Grit - Marsden Data Type: Point Name: Boustead	Annual Volume (m^3): 2500 Max Daily Volume (m^3): 50 Original Application No: NPS/WR/017244 Original Start Date: 1/4/2015 Expiry Date: 31/3/2027 Issue No: 1 Version Start Date: 1/4/2015 Version End Date:
Not shown	1121	SW	404280 410490	Status: Active Licence No: 2/27/11/192/R01 Details: Spray Irrigation - Direct Direct Source: Groundwaters Point: Borehole - Millstone Grit - Marsden Data Type: Point Name: Boustead	Annual Volume (m^3): 2500 Max Daily Volume (m^3): 50 Original Application No: NPS/WR/017244 Original Start Date: 1/4/2015 Expiry Date: 31/3/2027 Issue No: 1 Version Start Date: 1/4/2015 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1815	N	405000 413300	Status: Historical Licence No: 2/27/11/092 Details: General Farming & Domestic Direct Source: Groundwaters Point: Spring - Slaithwaite Hall Data Type: Point Name: THE DARTMOUTH YORKSHIRE ESTATE	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 0043005 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	1815	N	405000 413300	Status: Historical Licence No: 2/27/11/092 Details: General Farming & Domestic Direct Source: Groundwaters Point: Slaithwaite Hall Data Type: Point Name: THE DARTMOUTH YORKSHIRE ESTATE	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 43005 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	1815	N	405000 413300	Status: Active Licence No: 2/27/11/092 Details: General Farming & Domestic Direct Source: Groundwaters Point: Spring - Slaithwaite Hall Data Type: Point Name: THE DARTMOUTH YORKSHIRE ESTATE	Annual Volume (m^3): 15597 Max Daily Volume (m^3): 42.73 Original Application No: 430(5) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2008 Version End Date:
Not shown	1977	E	406900 411900	Status: Historical Licence No: 2/27/11/099 Details: General Farming & Domestic Direct Source: Groundwaters Point: Spring-os Field 1816 Data Type: Point Name: THE DARTMOUTH YORKSHIRE ESTATE	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 0043012 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	1977	E	406900 411900	Status: Historical Licence No: 2/27/11/099 Details: General Farming & Domestic Direct Source: Groundwaters Point: Spring-os Field 1816 Data Type: Point Name: THE DARTMOUTH YORKSHIRE ESTATE	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 0043012 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	1977	E	406900 411900	Status: Historical Licence No: 2/27/11/099 Details: General Farming & Domestic Direct Source: Groundwaters Point: Spring Data Type: Point Name: THE DARTMOUTH YORKSHIRE ESTATE	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 43012 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	1977	E	406900 411900	Status: Active Licence No: 2/27/11/099 Details: General Farming & Domestic Direct Source: Groundwaters Point: Spring - Os Field 1816 Data Type: Point Name: THE DARTMOUTH YORKSHIRE ESTATE	Annual Volume (m^3): 7467 Max Daily Volume (m^3): 20.45 Original Application No: 430(12) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2008 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	
16A	118	N	404900 411600	Status: Historical Licence No: 2/27/11/101 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Wessenden Brook Data Type: Point Name: COLNE VALLEY SPINNING CO LTD	Annual Volume (m^3): 129688 Max Daily Volume (m^3): 545.52 Application No: 1623 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 25/6/1980 Version End Date:
17A	118	N	404900 411600	Status: Active Licence No: 2/27/11/101 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Wessenden Brook - Marsden Data Type: Point Name: COLNE VALLEY SPINNING CO LTD	Annual Volume (m^3): 129688 Max Daily Volume (m^3): 545.52 Application No: 1623 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 25/6/1980 Version End Date:
18	183	NE	405100 411600	Status: Active Licence No: 2/27/11/101 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: River Colne Data Type: Point Name: COLNE VALLEY SPINNING CO LTD	Annual Volume (m^3): 129688 Max Daily Volume (m^3): 545.52 Application No: 1623 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 25/6/1980 Version End Date:
19B	237	SE	405000 411200	Status: Historical Licence No: 2/27/11/102 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Surface Water Point: Tributary Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
20B	237	SE	405000 411200	Status: Historical Licence No: 2/27/11/102 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Point: Tributary Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
21B	237	SE	405000 411200	Status: Active Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Tributary - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
22B	237	SE	405000 411200	Status: Historical Licence No: 2/27/11/102 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Point: Unnamed Tributary - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 01624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
23B	237	SE	405000 411200	Status: Active Licence No: 2/27/11/102 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Surface Water Point: Tributary - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
24B	237	SE	405000 411200	Status: Historical Licence No: 2/27/11/102 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Point: Tributary Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
25B	237	SE	405000 411200	Status: Historical Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Unnamed Tributary - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
26B	237	SE	405000 411200	Status: Historical Licence No: 2/27/11/102 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Surface Water Point: Unnamed Tributary - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
27B	237	SE	405000 411200	Status: Historical Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Unnamed Tributary - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
28B	237	SE	405000 411200	Status: Active Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Tributary - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
29C	419	S	404900 411000	Status: Historical Licence No: 2/27/11/101 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Scout Stream Data Type: Point Name: COLNE VALLEY SPINNING CO LTD	Annual Volume (m^3): 129688 Max Daily Volume (m^3): 545.52 Application No: 1623 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 25/6/1980 Version End Date:
30C	419	S	404900 411000	Status: Active Licence No: 2/27/11/101 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Scout Stream - Marsden Data Type: Point Name: COLNE VALLEY SPINNING CO LTD	Annual Volume (m^3): 129688 Max Daily Volume (m^3): 545.52 Application No: 1623 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 25/6/1980 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
31D	460	SE	405100 411000	Status: Active Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Binn Stream - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
32D	460	SE	405100 411000	Status: Active Licence No: 2/27/11/102 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Surface Water Point: Binn Stream - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
33D	460	SE	405100 411000	Status: Historical Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Binn Stream Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
34D	460	SE	405100 411000	Status: Active Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Binn Stream - Marsden Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
35D	460	SE	405100 411000	Status: Historical Licence No: 2/27/11/102 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Point: Binn Stream Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 01624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
36D	460	SE	405100 411000	Status: Historical Licence No: 2/27/11/102 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Surface Water Point: Binn Stream Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
37D	460	SE	405100 411000	Status: Historical Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Binn Stream Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
38	603	NW	404400 411800	Status: Active Licence No: 2/27/11/053 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: River Colne Data Type: Point Name: S B HOMES LTD	Annual Volume (m^3): 145470 Max Daily Volume (m^3): 636 Application No: 689(1) Original Start Date: 20/1/1966 Expiry Date: - Issue No: 102 Version Start Date: 3/4/2002 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	653	S	404700 410800	Status: Historical Licence No: 2/27/11/102 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Point: Wessenden Brook Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 01624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	653	S	404700 410800	Status: Active Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Wessenden Brook Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	653	S	404700 410800	Status: Active Licence No: 2/27/11/102 Details: General Cooling (Existing Licences Only) (Low Loss) Direct Source: Surface Water Point: Wessenden Brook Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	653	S	404700 410800	Status: Active Licence No: 2/27/11/102 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Wessenden Brook Data Type: Point Name: J E CROWTHER LTD	Annual Volume (m^3): 1652505.58 Max Daily Volume (m^3): 6787.32 Application No: 1624 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 28/4/1966 Version End Date:
Not shown	826	S	404800 410600	Status: Active Licence No: 2/27/11/065 Details: Potable Water Supply - Direct Direct Source: Surface Water Point: Butterley Reservoir Data Type: Point Name: YORKSHIRE WATER SERVICES LTD	Annual Volume (m^3): 12410000 Max Daily Volume (m^3): 12410000 Application No: NPS/WR/012982 Original Start Date: 27/1/1966 Expiry Date: - Issue No: 101 Version Start Date: 7/3/2013 Version End Date:
Not shown	826	S	404800 410600	Status: Historical Licence No: 2/27/11/065 Details: Potable Water Supply - Direct Direct Source: Surface Water Point: Spring - Butterley Reservoir Data Type: Point Name: YORKSHIRE WATER SERVICES LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 0224601 & 0224602 Original Start Date: 27/1/1966 Expiry Date: - Issue No: 100 Version Start Date: 19/12/1980 Version End Date:
Not shown	906	NE	405410 412270	Status: Active Licence No: 2/27/11/108 Details: Lake & Pond Throughflow Direct Source: Surface Water Point: River Colne-marsden Data Type: Point Name: Cellars Clough Properties Ltd	Annual Volume (m^3): 4091481 Max Daily Volume (m^3): 23939.7 Application No: NPS/WR/018590 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 104 Version Start Date: 4/3/2015 Version End Date:
Not shown	927	NE	405400 412300	Status: Historical Licence No: 2/27/11/108 Details: Lake & Pond Throughflow Direct Source: Surface Water Point: River Colne Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 00218 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 101 Version Start Date: 18/5/2002 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	927	NE	405400 412300	Status: Historical Licence No: 2/27/11/108 Details: Milling & Water power other than electricity generation Direct Source: Surface Water Point: River Colne Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 218 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 29/5/1990 Version End Date:
Not shown	927	NE	405400 412300	Status: Historical Licence No: 2/27/11/108 Details: Lake & Pond Throughflow Direct Source: Surface Water Point: River Colne Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 218 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 101 Version Start Date: 18/5/2002 Version End Date:
Not shown	1293	NW	402800 411000	Status: Active Licence No: 2/27/11/064 Details: Potable Water Supply - Direct Direct Source: Surface Water Point: Scammonden Intakes And Catchwater In Colne S/c Data Type: Line Name: YORKSHIRE WATER SERVICES LTD	Annual Volume (m^3): 5840000 Max Daily Volume (m^3): 5840000 Application No: NPS/WR/012983 Original Start Date: 27/1/1966 Expiry Date: - Issue No: 101 Version Start Date: 7/3/2013 Version End Date:
Not shown	1304	NE	405800 412480	Status: Active Licence No: 2/27/11/108 Details: Lake & Pond Throughflow Direct Source: Surface Water Point: Park Gate Clough-marsden Data Type: Point Name: Cellars Clough Properties Ltd	Annual Volume (m^3): 4091481 Max Daily Volume (m^3): 23939.7 Application No: NPS/WR/018590 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 104 Version Start Date: 4/3/2015 Version End Date:
Not shown	1304	NE	405800 412480	Status: Historical Licence No: 2/27/11/109 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Park Gate Clough-marsden Data Type: Point Name: SMITH DEVELOPMENTS LTD	Annual Volume (m^3): 18184 Max Daily Volume (m^3): 72.7 Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 101 Version Start Date: 1/10/2004 Version End Date:
Not shown	1304	NE	405800 412480	Status: Historical Licence No: 2/27/11/109 Details: Boiler Feed Direct Source: Surface Water Point: Park Gate Clough-marsden Data Type: Point Name: SMITH DEVELOPMENTS LTD	Annual Volume (m^3): 18184 Max Daily Volume (m^3): 72.7 Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 101 Version Start Date: 1/10/2004 Version End Date:
Not shown	1319	NE	405800 412500	Status: Historical Licence No: 2/27/11/109 Details: Boiler Feed Direct Source: Surface Water Point: Park Gate Clough Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 0021802 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 29/5/1990 Version End Date:
Not shown	1319	NE	405800 412500	Status: Historical Licence No: 2/27/11/109 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Point: Park Gate Clough Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 29/5/1990 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1319	NE	405800 412500	Status: Historical Licence No: 2/27/11/109 Details: Boiler Feed Direct Source: Surface Water Point: Park Gate Clough Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 29/5/1990 Version End Date:
Not shown	1324	NE	406000 412300	Status: Historical Licence No: 2/27/11/109 Details: Boiler Feed Direct Source: Surface Water Point: Cellars Clough Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 29/5/1990 Version End Date:
Not shown	1324	NE	406000 412300	Status: Historical Licence No: 2/27/11/109 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Point: Cellars Clough Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 29/5/1990 Version End Date:
Not shown	1324	NE	406000 412300	Status: Historical Licence No: 2/27/11/109 Details: Boiler Feed Direct Source: Surface Water Point: Cellars Clough Data Type: Point Name: COOPER	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 0021802 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 29/5/1990 Version End Date:
Not shown	1341	NE	406030 412290	Status: Active Licence No: 2/27/11/108 Details: Lake & Pond Throughflow Direct Source: Surface Water Point: Cellars Clough-marsden Data Type: Point Name: Cellars Clough Properties Ltd	Annual Volume (m^3): 4091481 Max Daily Volume (m^3): 23939.7 Application No: NPS/WR/018590 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 104 Version Start Date: 4/3/2015 Version End Date:
Not shown	1341	NE	406030 412290	Status: Historical Licence No: 2/27/11/109 Details: Boiler Feed Direct Source: Surface Water Point: Cellars Clough-marsden Data Type: Point Name: SMITH DEVELOPMENTS LTD	Annual Volume (m^3): 18184 Max Daily Volume (m^3): 72.7 Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 101 Version Start Date: 1/10/2004 Version End Date:
Not shown	1341	NE	406030 412290	Status: Historical Licence No: 2/27/11/109 Details: General Use Relating To Secondary Category (Medium Loss) Direct Source: Surface Water Point: Cellars Clough-marsden Data Type: Point Name: SMITH DEVELOPMENTS LTD	Annual Volume (m^3): 18184 Max Daily Volume (m^3): 72.7 Application No: 218(2) Original Start Date: 28/4/1966 Expiry Date: - Issue No: 101 Version Start Date: 1/10/2004 Version End Date:
Not shown	1597	NE	406100 412600	Status: Historical Licence No: 2/27/11/110 Details: Milling & Water Power Other Than Electricity Generation Direct Source: Surface Water Point: River Colne Data Type: Point Name: LILA HURST LTD	Annual Volume (m^3): 110013 Max Daily Volume (m^3): 287.76 Application No: 219 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 4/9/1987 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	826	S	404800 410600	Status: Active Licence No: 2/27/11/065 Details: Potable Water Supply - Direct Direct Source: Surface Water Point: Butterley Reservoir Data Type: Point Name: YORKSHIRE WATER SERVICES LTD	Annual Volume (m^3): 12410000 Max Daily Volume (m^3): 12410000 Original Application No: NPS/WR/012982 Original Start Date: 27/1/1966 Expiry Date: - Issue No: 101 Version Start Date: Version End Date:
Not shown	826	S	404800 410600	Status: Historical Licence No: 2/27/11/065 Details: Potable Water Supply - Direct Direct Source: Surface Water Point: Spring - Butterley Reservoir Data Type: Point Name: YORKSHIRE WATER SERVICES LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 0224601 & 0224602 Original Start Date: 27/1/1966 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1293	NW	402800 411000	Status: Active Licence No: 2/27/11/064 Details: Potable Water Supply - Direct Direct Source: Surface Water Point: Scammonden Intakes And Catchwater In Colne S/c Data Type: Line Name: YORKSHIRE WATER SERVICES LTD	Annual Volume (m^3): 5840000 Max Daily Volume (m^3): 5840000 Original Application No: NPS/WR/012983 Original Start Date: 27/1/1966 Expiry Date: - Issue No: 101 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	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.
410	SE	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.

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:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

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

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
102F	246	NW	404800 411700	River Name: Colne Reach: Haigh Reservoir Embawessenden Brook End/Start of Stretch: End of Stretch NGR	B	B	B	B	B
103F	246	NW	404800 411700	River Name: Wessenden Brook Reach: Butterley Reservoir River Colne End/Start of Stretch: End of Stretch NGR	D	C	C	C	C
Not shown	925	S	404800 410500	River Name: Wessenden Brook Reach: Butterley Reservoir River Colne End/Start of Stretch: Start of Stretch NGR	D	C	C	C	C

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). 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):

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
105F	246	NW	404800 411700	River Name: River Colne Reach: Wessenden Brook Lingards Woods End/Start of Stretch: Start of Stretch NGR	A	A	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	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
2	121	NW	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
3	147	SW	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Lake/Reservoir Main River Status: Currently Undefined
4A	152	N	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
5A	152	N	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
6	153	W	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
7	153	W	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
8	164	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
9	164	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
10	165	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
11	167	SW	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
12	182	N	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
13	182	N	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
14	207	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
15	208	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
16	208	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
17	217	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
18	238	N	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
19	242	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
20	266	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
21	280	NE	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
22	284	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
23	307	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
24	312	N	River Name: Huddersfield Narrow Canal Welsh River Name: - Alternative Name: -	River Type: Canal Main River Status: Currently Undefined
25B	352	NW	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
26B	352	NW	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
27	379	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
28	388	NW	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
29	422	NW	River Name: Huddersfield Narrow Canal Welsh River Name: - Alternative Name: -	River Type: Canal Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
30	435	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
31	436	S	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
32	451	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
33	464	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
34C	478	NW	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
35C	478	NW	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
36	478	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
37	481	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
38D	485	S	River Name: Wessenden Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
39	489	SW	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
40	499	NW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
41E	499	NW	River Name: River Colne Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined

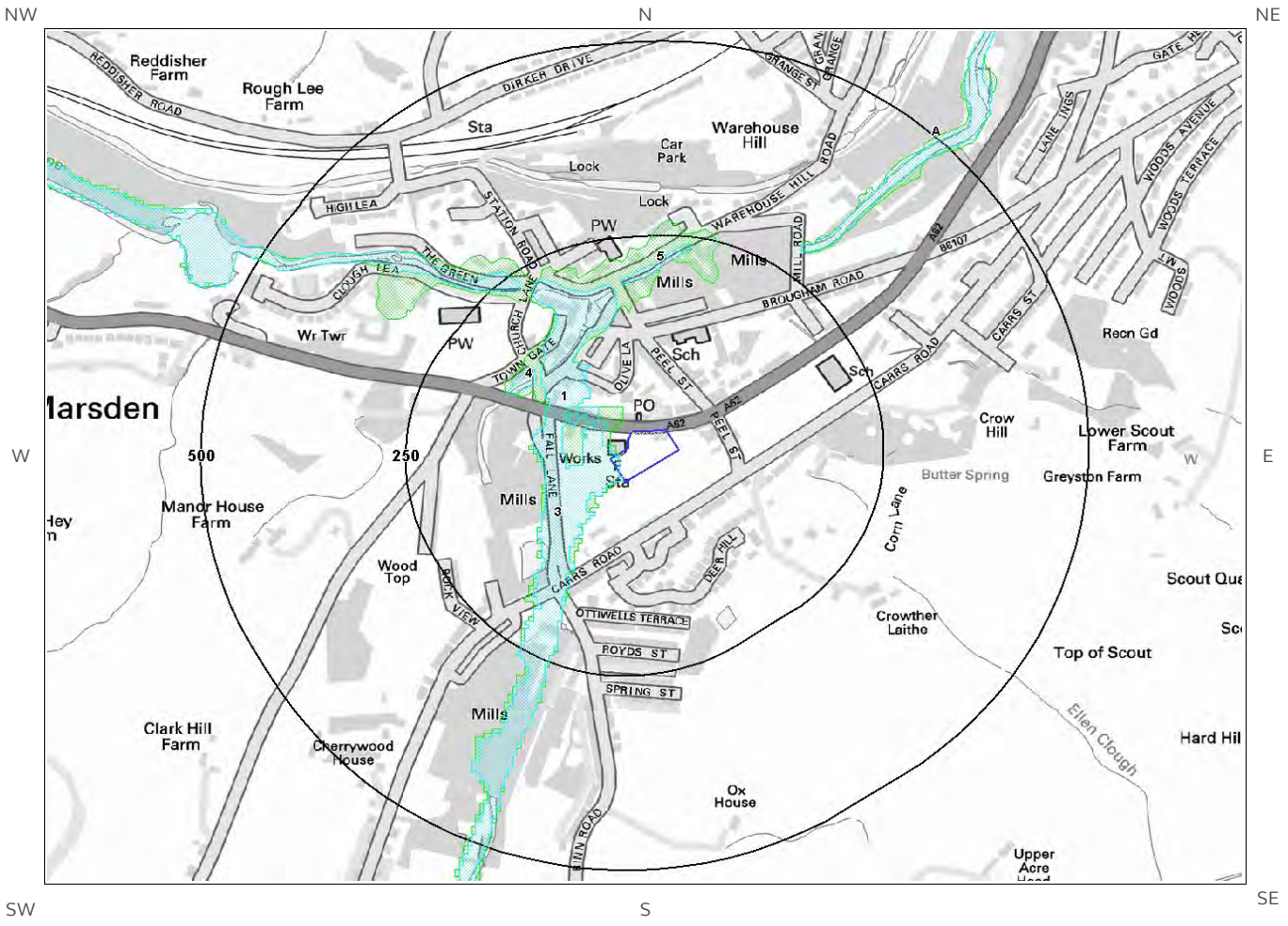
6.11 Surface Water Features

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
119	NW
127	SW
134	NW
148	W
164	E
190	N
229	NW

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



Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

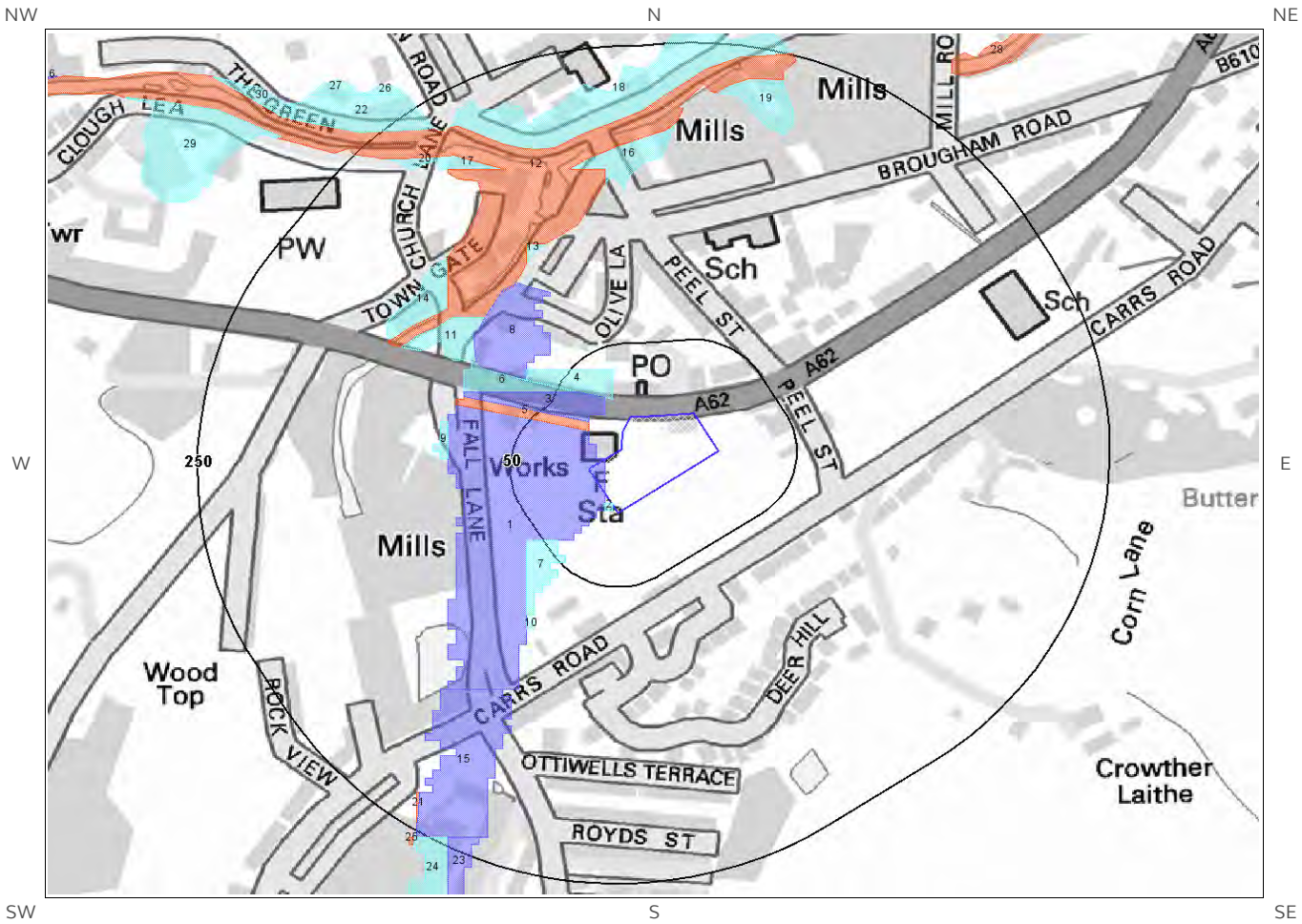
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



Site Outline

100 / 250 Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

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)

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)
	133	NW	22-Aug-2017	Zone 3 - (Fluvial Models)
	190	N	22-Aug-2017	Zone 3 - (Fluvial Models)
	229	NW	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? Medium

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 Medium (greater than 1 in 100 but less than 1 in 30) 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	Medium
2	0.0	On Site	Low
3	16.0	NW	Medium
4	17.0	NW	Low
5	22.0	W	High
6	37.0	NW	Low
7	42.0	SW	Low

7.4 Flood Defences

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

Database searched and no data found.

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? Clearwater 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 below Surface

Where potential for groundwater flooding of property situated below ground level is indicated, this means that given the geological conditions there may be a groundwater flooding hazard to basements and other below surface infrastructure. Unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area you need take no further action in relation to groundwater flooding hazard. If there are records of previous incidences of groundwater flooding, then is recommended that other information e.g. rainfall history, property type, and land drainage information in addition to previous records of flooding be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

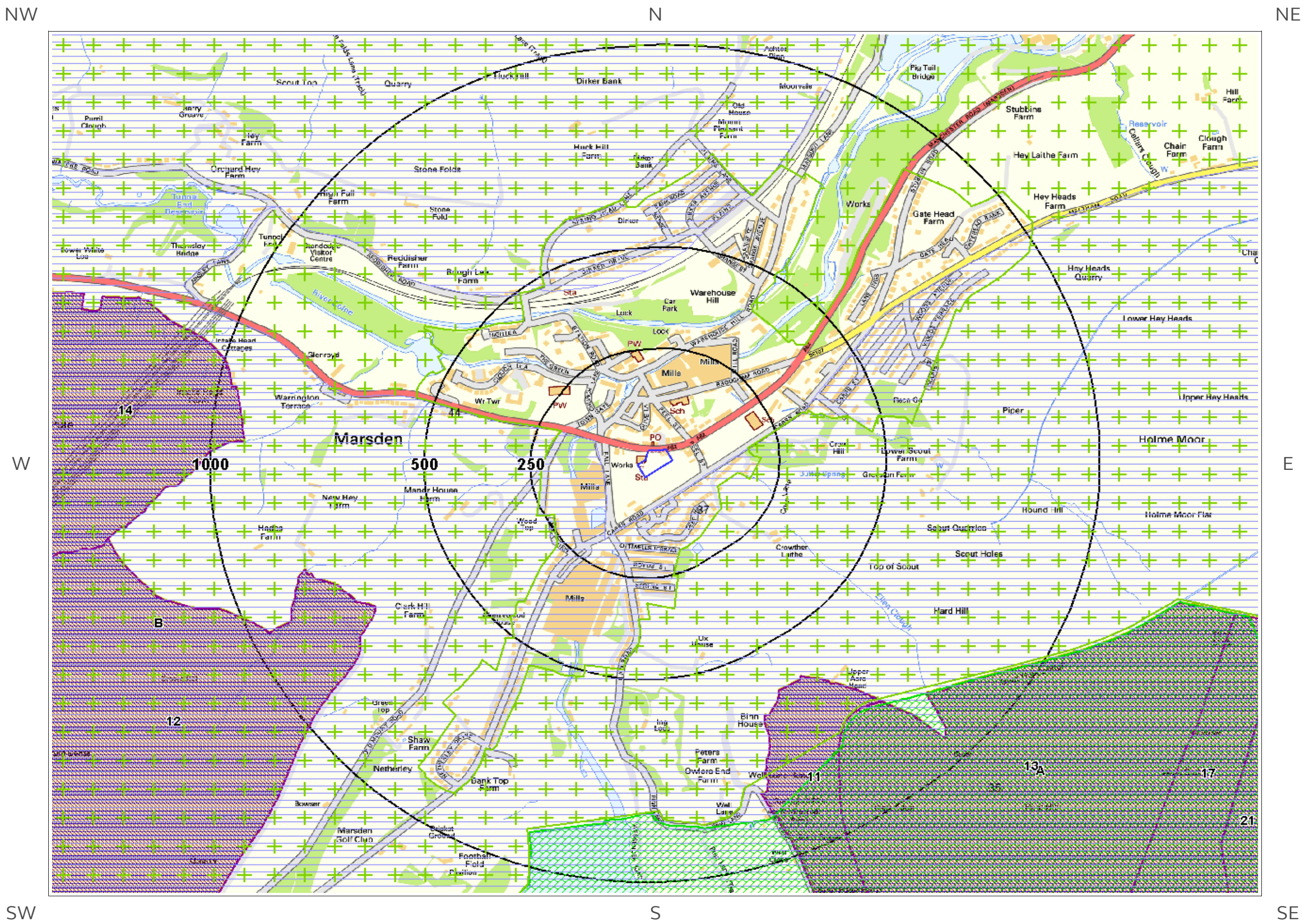
7.8 Groundwater Flooding Confidence Areas

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

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



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:

24

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
11	610	SE	Dark Peak	Natural England
12	705	SW	South Pennine Moors	Natural England
13	753	SE	Dark Peak	Natural England
14	921	W	South Pennine Moors	Natural England
Not shown	1110	S	Dark Peak	Natural England
Not shown	1219	N	South Pennine Moors	Natural England
17	1369	E	Dark Peak	Natural England
Not shown	1419	S	Dark Peak	Natural England
Not shown	1443	SW	Dark Peak	Natural England
Not shown	1458	SW	Dark Peak	Natural England
21	1498	E	Dark Peak	Natural England
Not shown	1540	SW	Dark Peak	Natural England
Not shown	1574	SE	Dark Peak	Natural England
Not shown	1600	SW	Dark Peak	Natural England
Not shown	1621	SE	Dark Peak	Natural England
Not shown	1698	NW	South Pennine Moors	Natural England
Not shown	1758	SE	Dark Peak	Natural England
Not shown	1792	N	South Pennine Moors	Natural England
Not shown	1806	SW	Dark Peak	Natural England

ID	Distance (m)	Direction	SSSI Name	Data Source
Not shown	1827	W	South Pennine Moors	Natural England
Not shown	1858	W	South Pennine Moors	Natural England
Not shown	1899	S	Dark Peak	Natural England
Not shown	1964	SW	Dark Peak	Natural England
Not shown	1994	SE	Dark Peak	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:

5

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
1A	610	SE	South Pennine Moors	Natural England
2B	705	SW	South Pennine Moors	Natural England
Not shown	1110	S	South Pennine Moors	Natural England
Not shown	1219	N	South Pennine Moors	Natural England
Not shown	1419	S	South Pennine Moors	Natural England

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

5

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
6A	609	SE	Peak District Moors (South Pennine Moors Phase 1)	Natural England
7B	704	SW	South Pennine Moors Phase 2	Natural England

ID	Distance (m)	Direction	SPA Name	Data Source
Not shown	1108	S	Peak District Moors (South Pennine Moors Phase 1)	Natural England
Not shown	1221	N	South Pennine Moors Phase 2	Natural England
Not shown	1419	S	Peak District Moors (South Pennine Moors Phase 1)	Natural England

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

0

Database searched and no data found.

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

5

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
Not shown	1222	S	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1288	S	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1662	SE	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1662	S	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1745	S	UNKNOWN	Ancient and Semi-Natural Woodland

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

0

Database searched and no data found.

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:

2

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
37	73	SE	North Peak	Natural England
Not shown	1419	S	North Peak	Natural England

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

0

Database searched and no data found.

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

2

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
35	762	SE	Peak District	Natural England
Not shown	1419	S	Peak District	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:

0

Database searched and no data found.

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

1

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
44	123	SE	Liverpool, Manchester and West Yorks Greenbelt	Kirklees District (B)

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? Very Low

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

Hazard
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.

9.1.2 Landslides

What is the maximum Landslide* 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 slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not undercut or place large amounts of material on slopes without technical advice. For new build consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.

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? Negligible

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

Hazard
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.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* 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
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.

9.1.6 Running Sand

What is the maximum Running Sand** 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
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.

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 3 and 5% of properties are above the Action Level.

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

9.2.2 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? Basic 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	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
27.0	E	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

Past underground mine workings may occur. The rock types present in these areas are such that small mineral veins may be present on which it is possible that small scale mining has been undertaken and/or it is possible that limited underground extraction of other materials may have occurred. All such occurrences are likely to be of minor 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

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency
National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506
Web: **www.environment-agency.gov.uk**
Email: enquiries@environment-agency.gov.uk

Public Health England
Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: Kirklees Council
Phone: 01484 221 000
Web: http://www.kirklees.gov.uk/
Address: Civic Centre 3, Market Street, Huddersfield, HD1 1WG

Gemapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444

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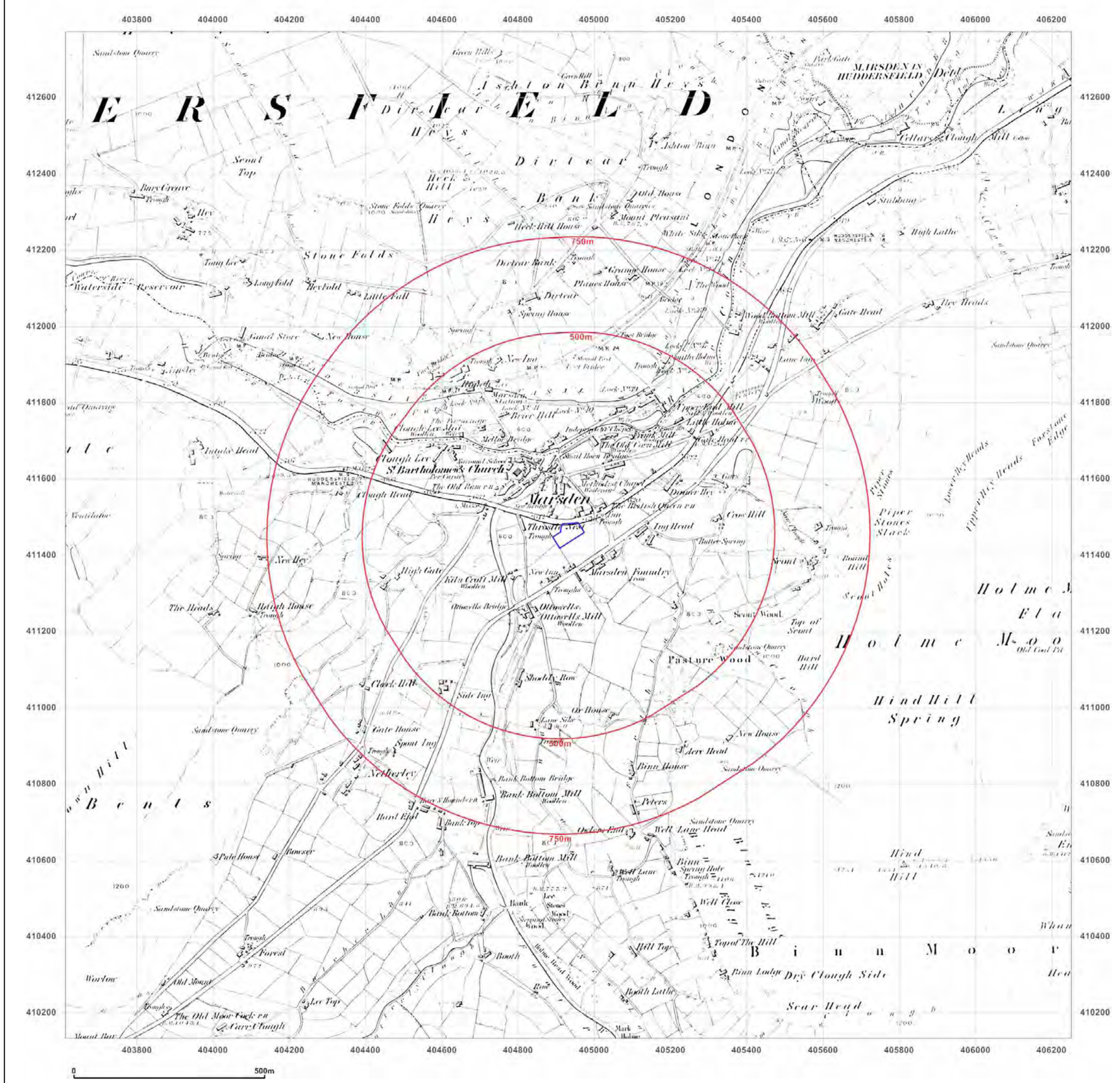

Site Details:

MANCHESTER ROAD,
SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

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Report Ref:	GS-4463512
Grid Ref:	404931, 411452

Map Name:	County Series
Map date:	**1854**
Scale:	1:10,560
Printed at:	1:10,560

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Surveyed 1850
Revised N/A
Edition 1854
Copyright N/A
Levelled 1853

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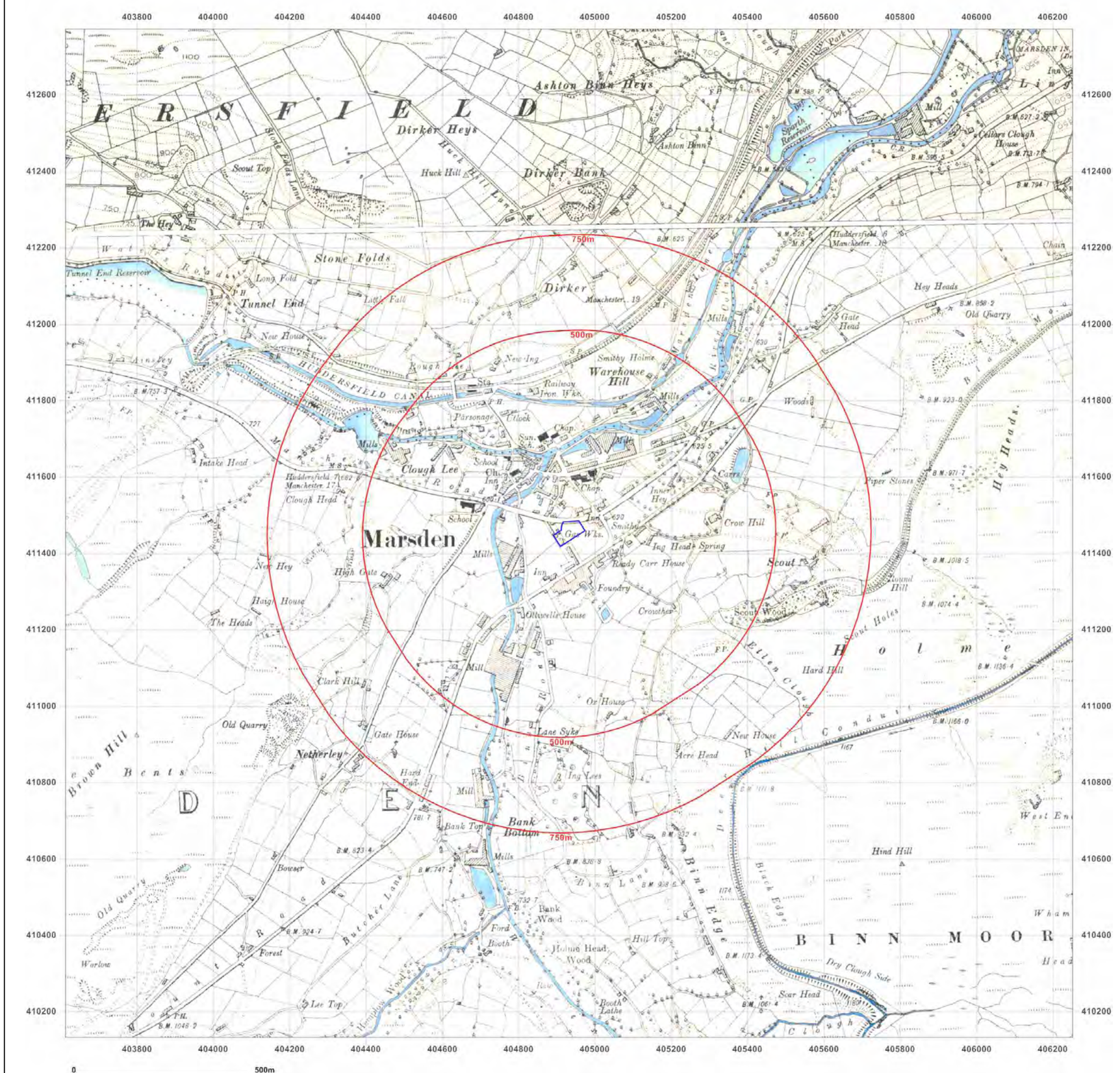

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Site Details:

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Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: County Series

Map date: **1890**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1890
Revised 1890
Edition N/A
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Revised 1890
Edition N/A
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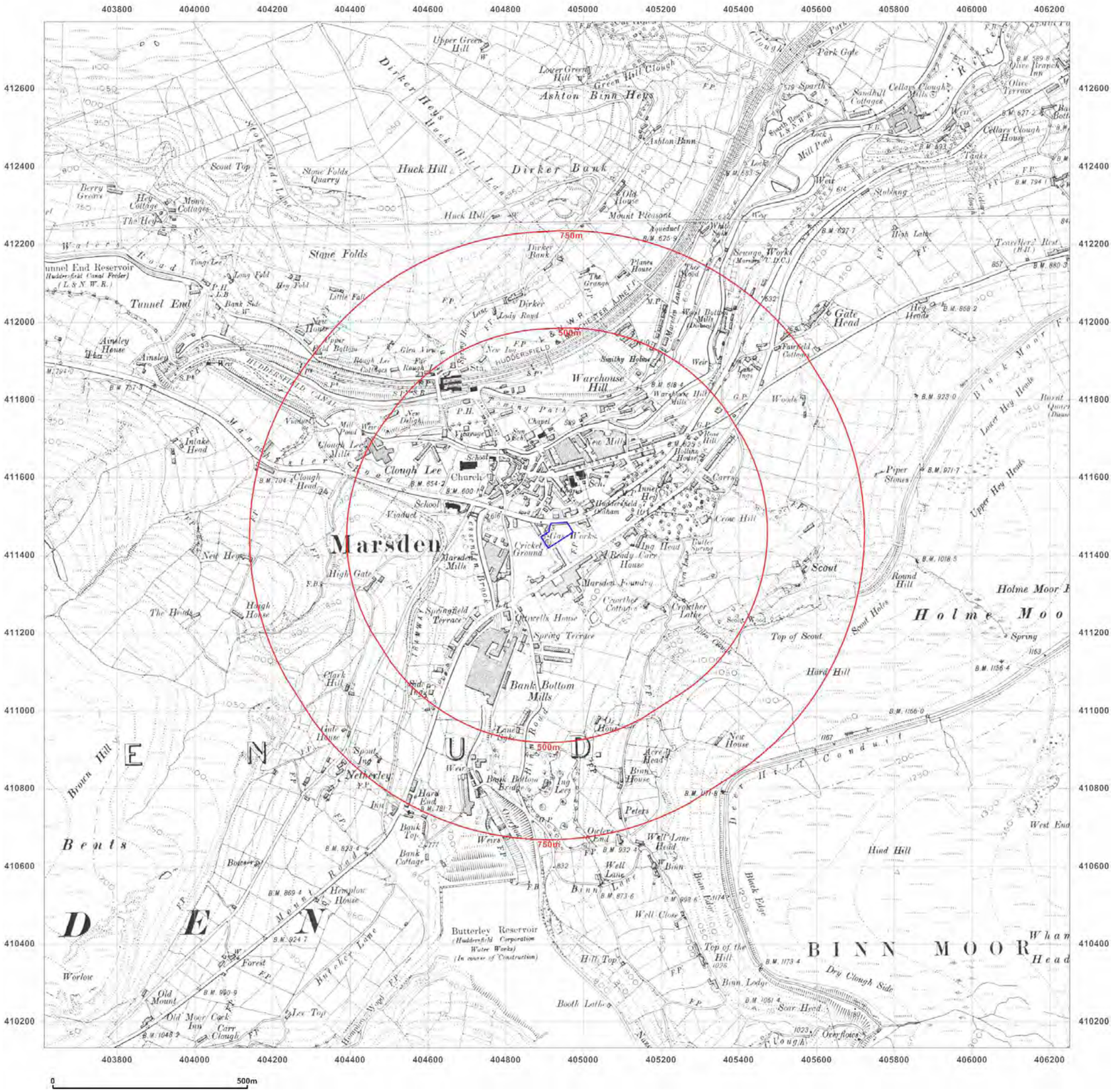

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Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: County Series

Map date: **1904**

Scale: 1:10,560

Printed at: 1:10,560

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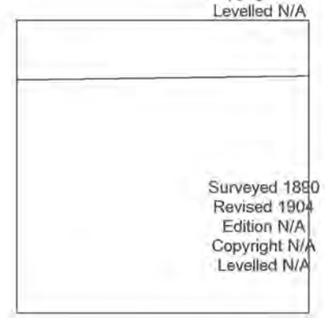
Surveyed 1890
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1890
Revised 1904
Edition N/A
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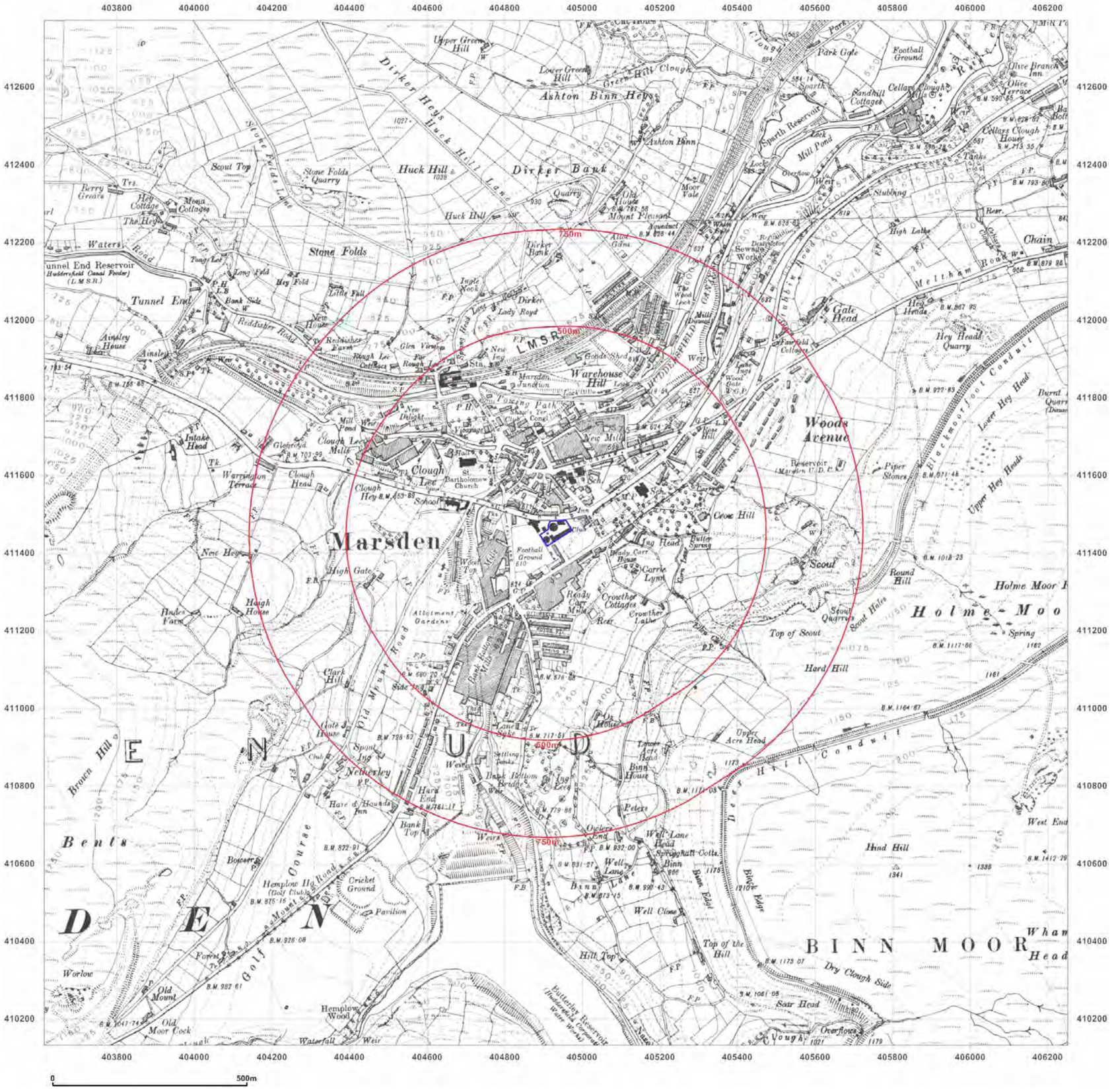

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Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1849
Revised 1930
Edition N/A
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Surveyed 1850
Revised 1930
Edition N/A
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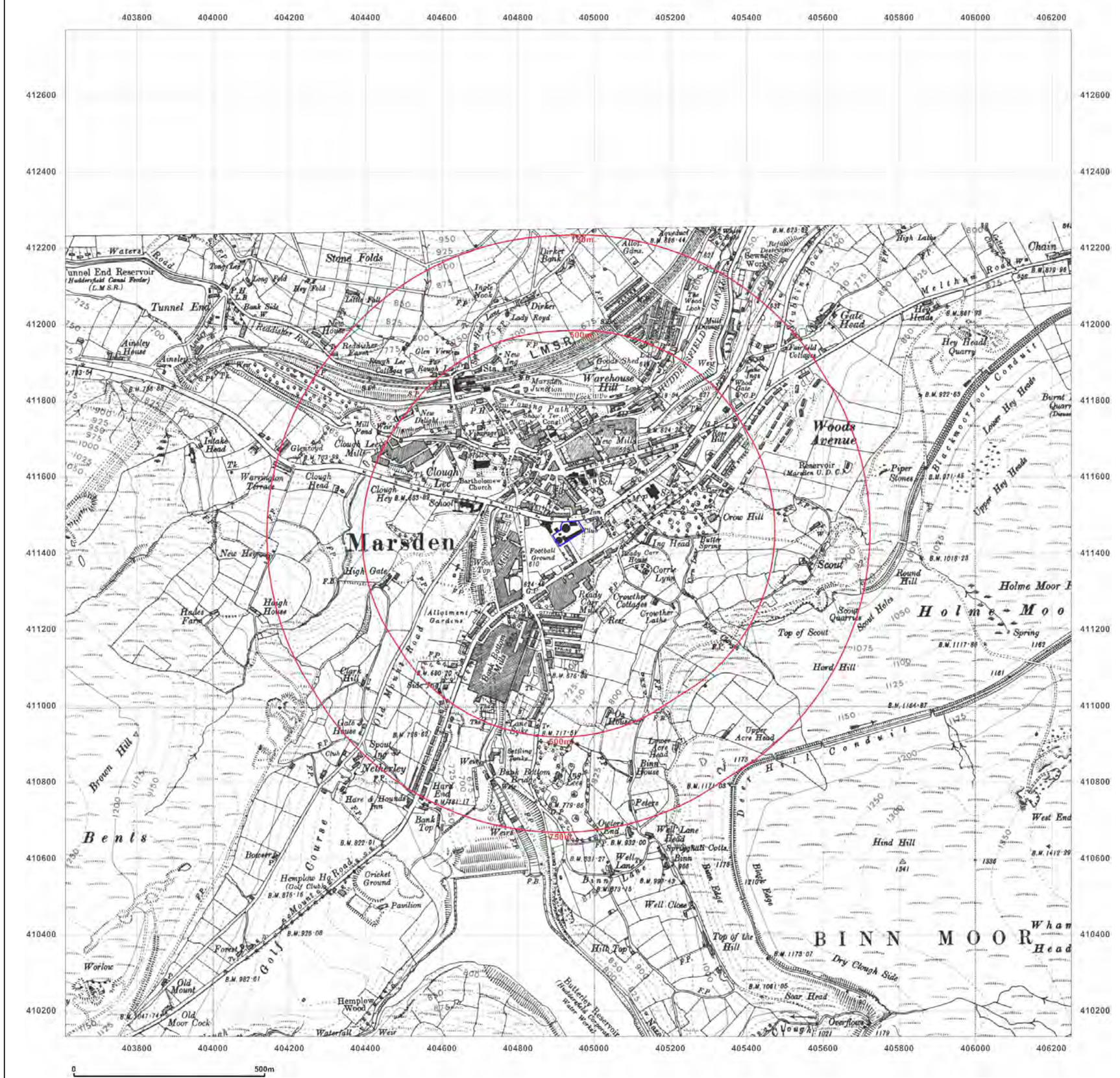

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Client Ref:	SB_HOMES_7092
Report Ref:	GS-4463512
Grid Ref:	404931, 411452

Map Name:	County Series
Map date:	**1930**
Scale:	1:10,560
Printed at:	1:10,560

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Revised 1930
Edition N/A
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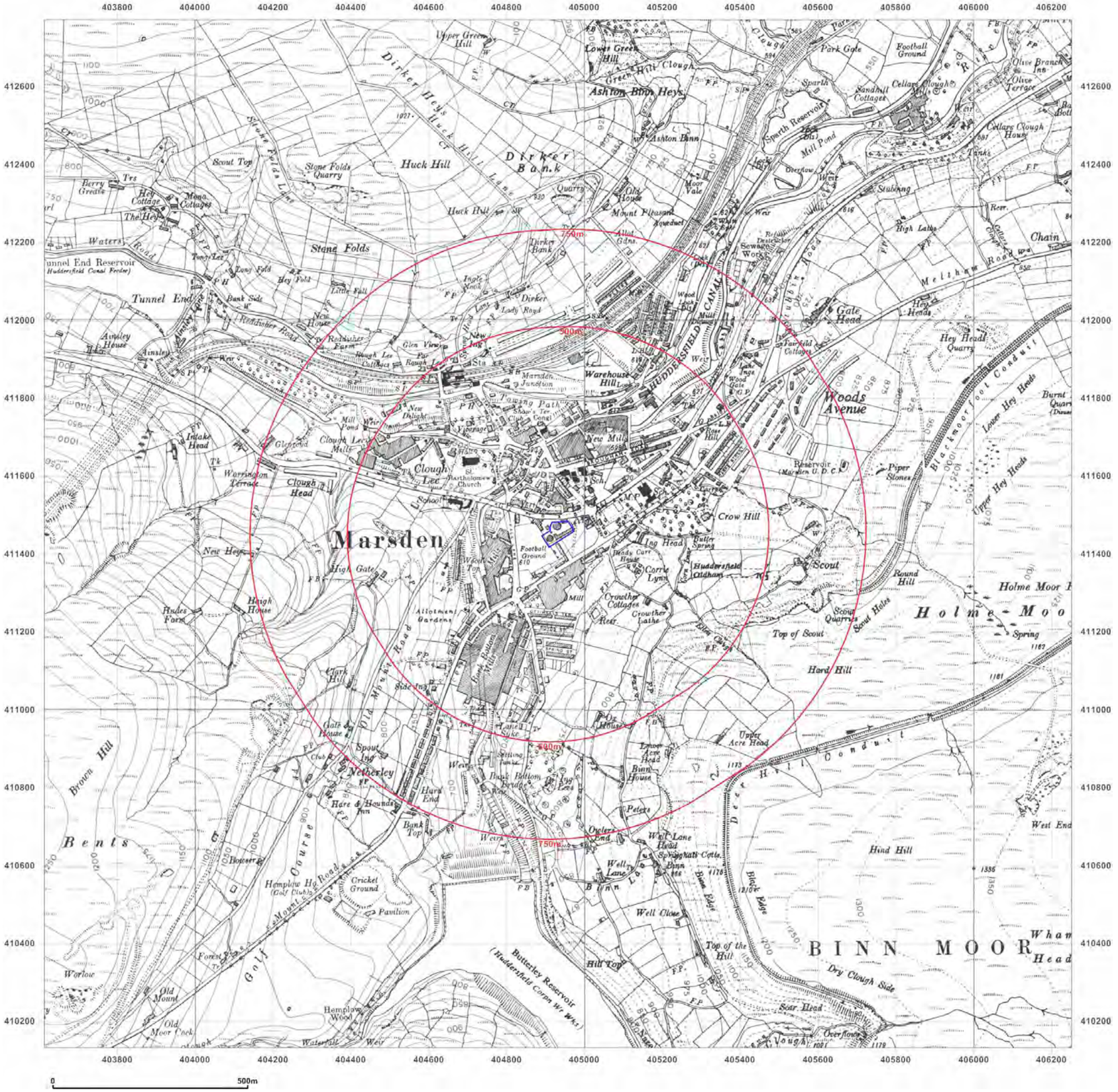

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Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: Provisional

Map date: **1955**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed N/A
Revised 1955
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Copyright N/A
Levelled N/A

Surveyed N/A
Revised 1955
Edition N/A
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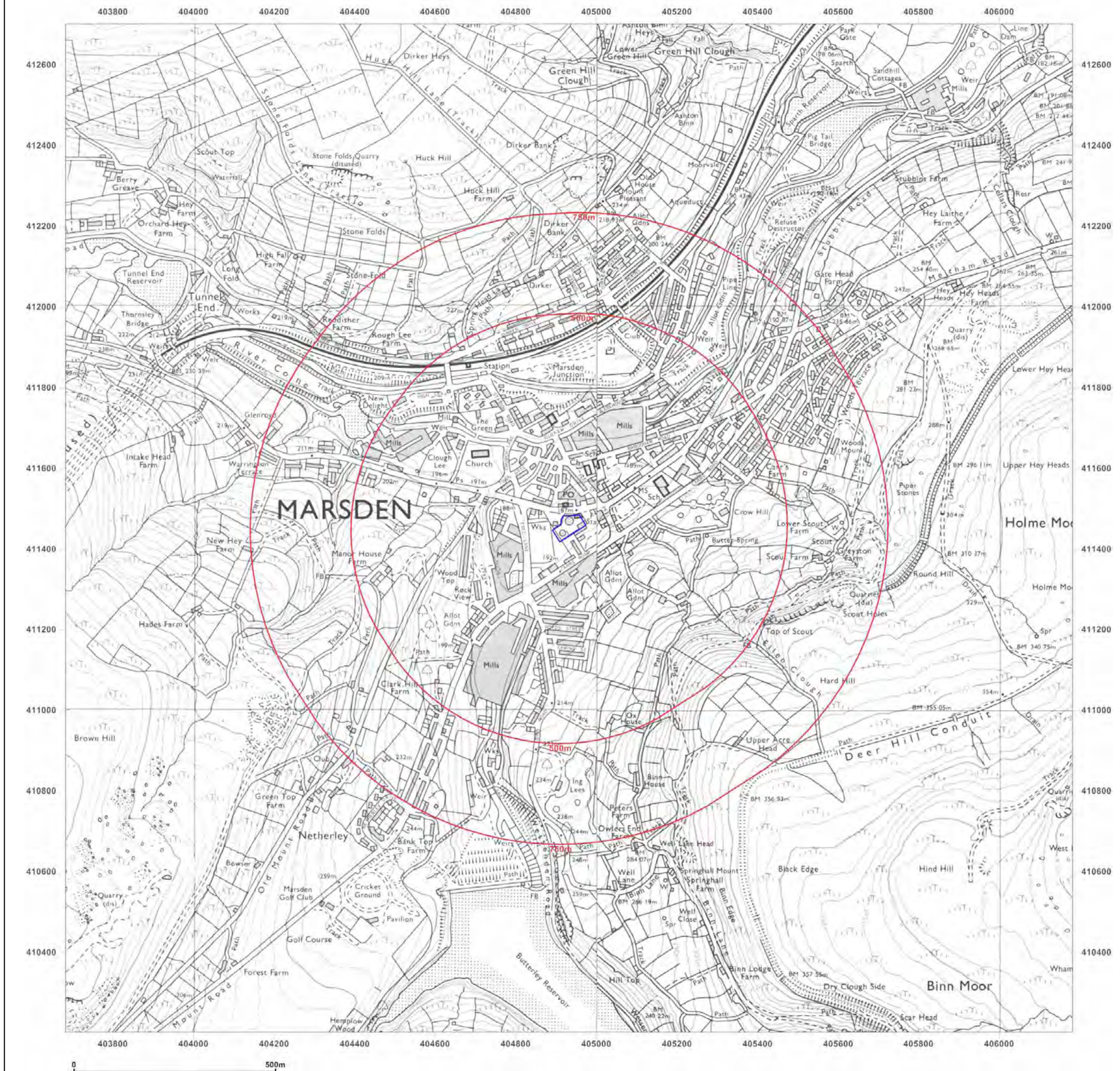

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Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name:	National Grid
Map date:	**1978-1980**
Scale:	1:10,000
Printed at:	1:10,000

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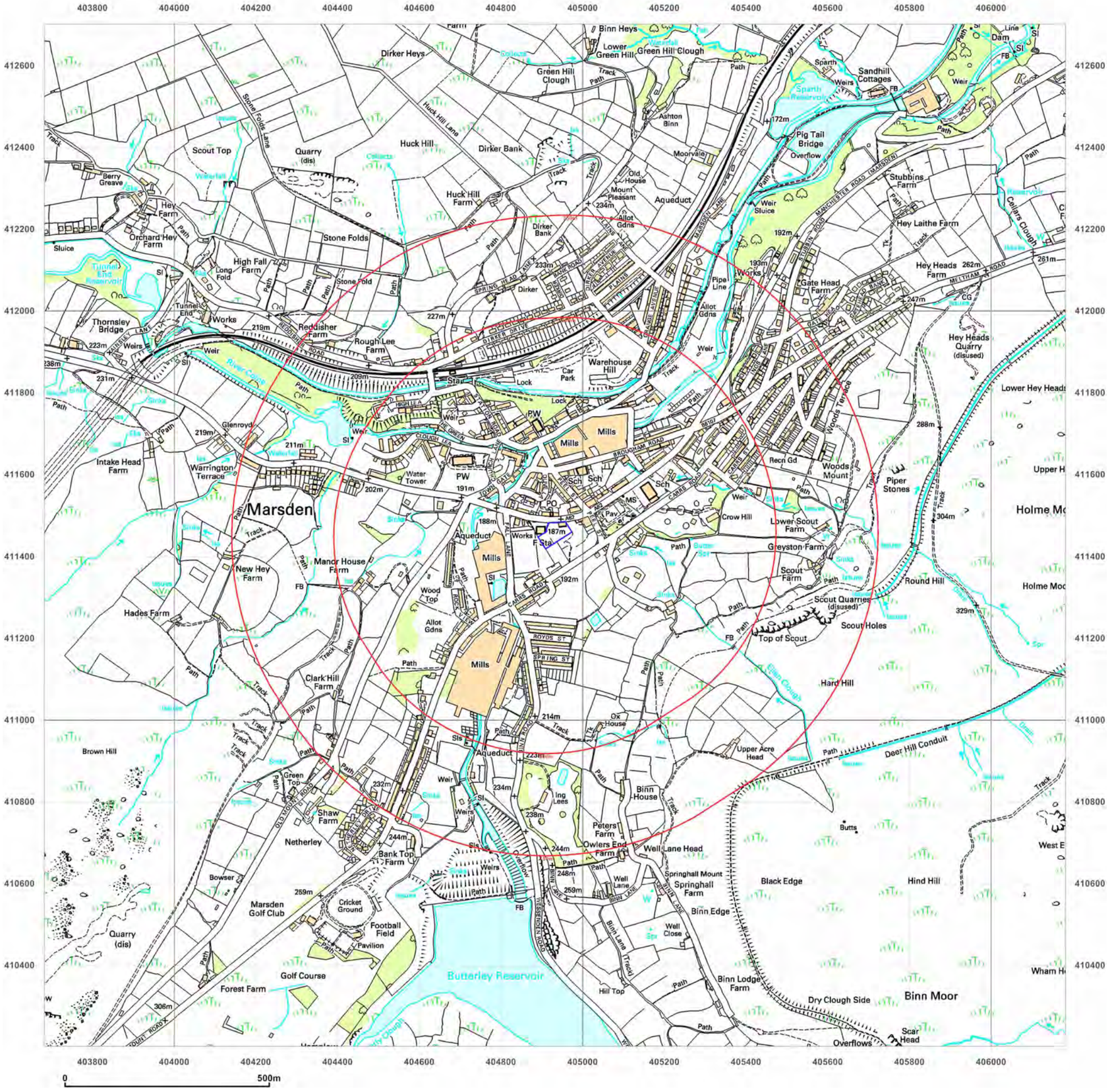

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Client Ref:	SB_HOMES_7092
Report Ref:	GS-4463512
Grid Ref:	404931, 411452

Map Name:	1:10,000 Raster
Map date:	**2002**
Scale:	1:10,000
Printed at:	1:10,000

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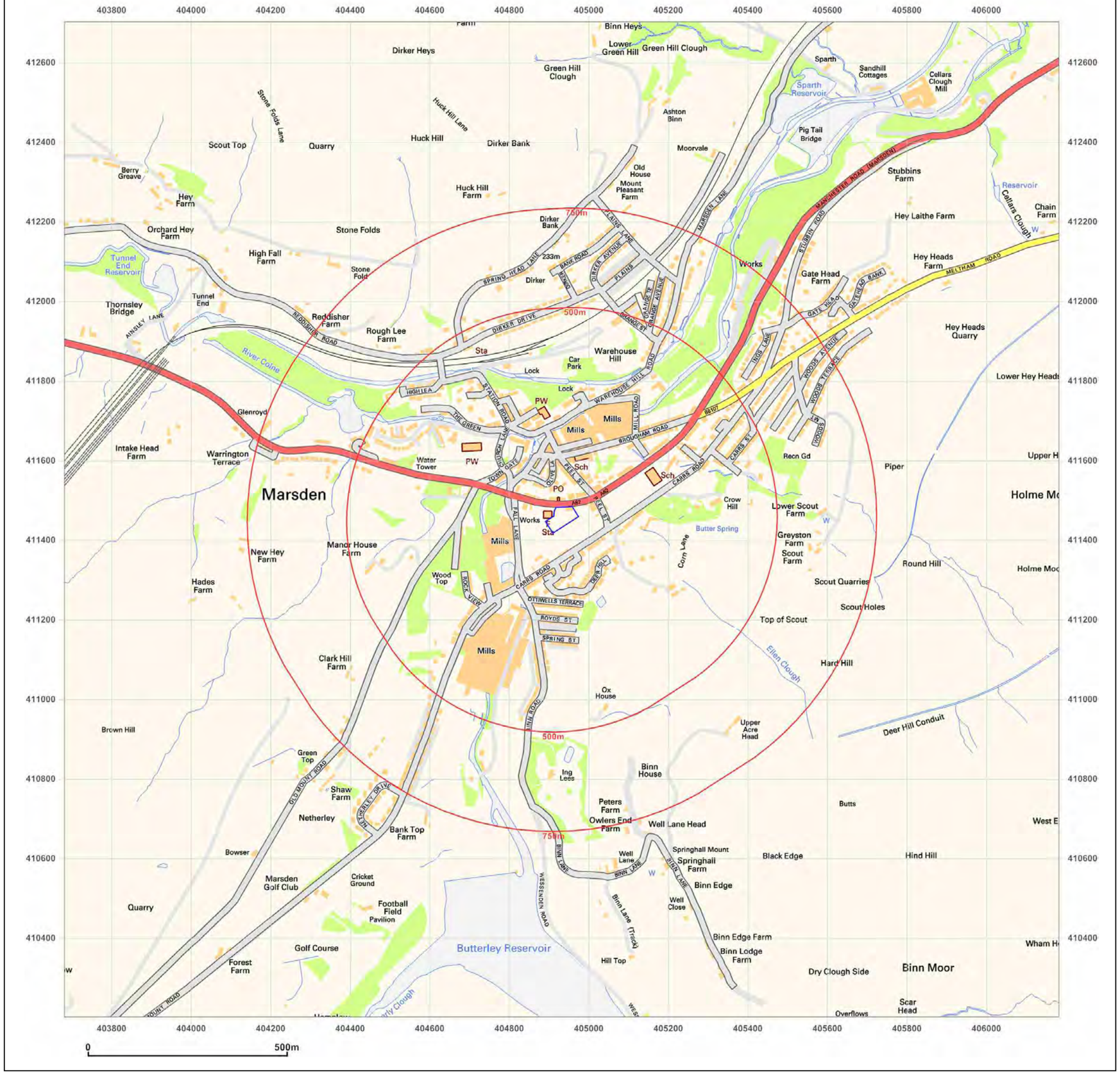

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Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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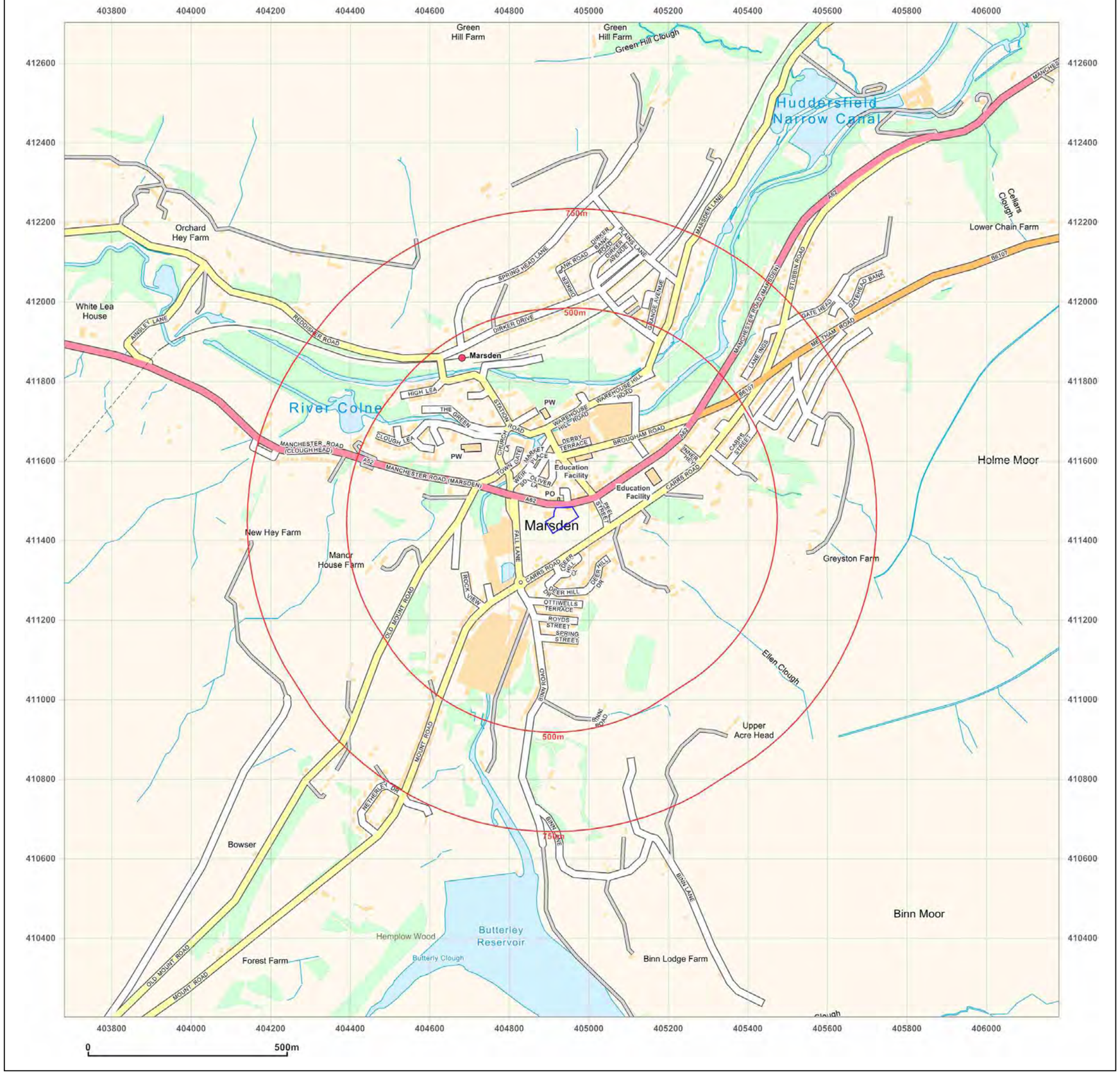

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Site Details:

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HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

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Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: County Series

Map date: **1892**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
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HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: County Series

Map date: **1906**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1906
Revised 1906
Edition N/A
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Production date: 13 November 2017

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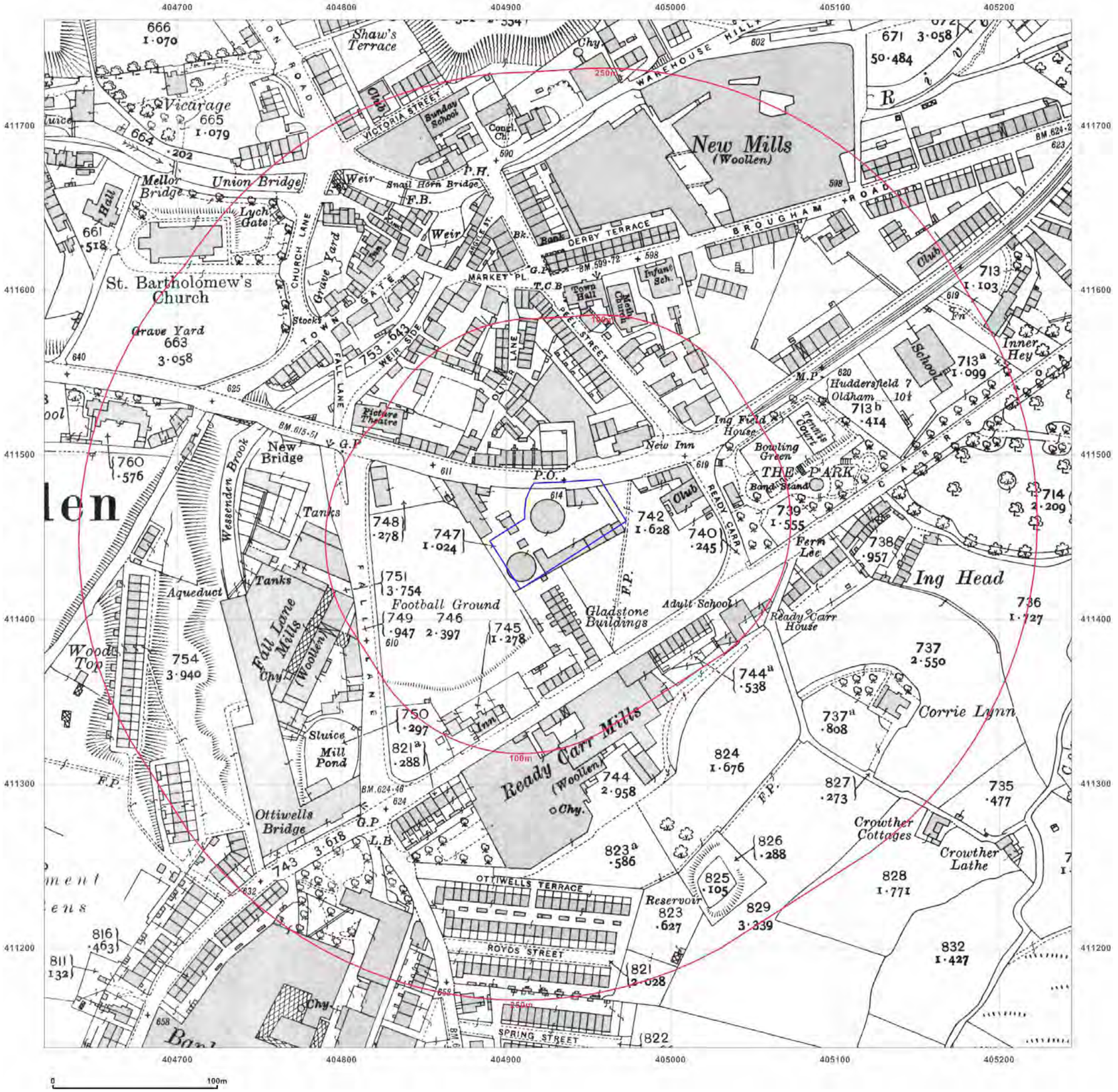

Groundsure INSIGHTS

Site Details:

MANCHESTER ROAD,
SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: County Series

Map date: **1932**

Scale: 1:2,500

Printed at: 1:2,500

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

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Production date: 13 November 2017

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Site Details:

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SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **1967**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1967
Revised 1967
Edition N/A
Copyright 1968
Levelled 1966

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Production date: 13 November 2017

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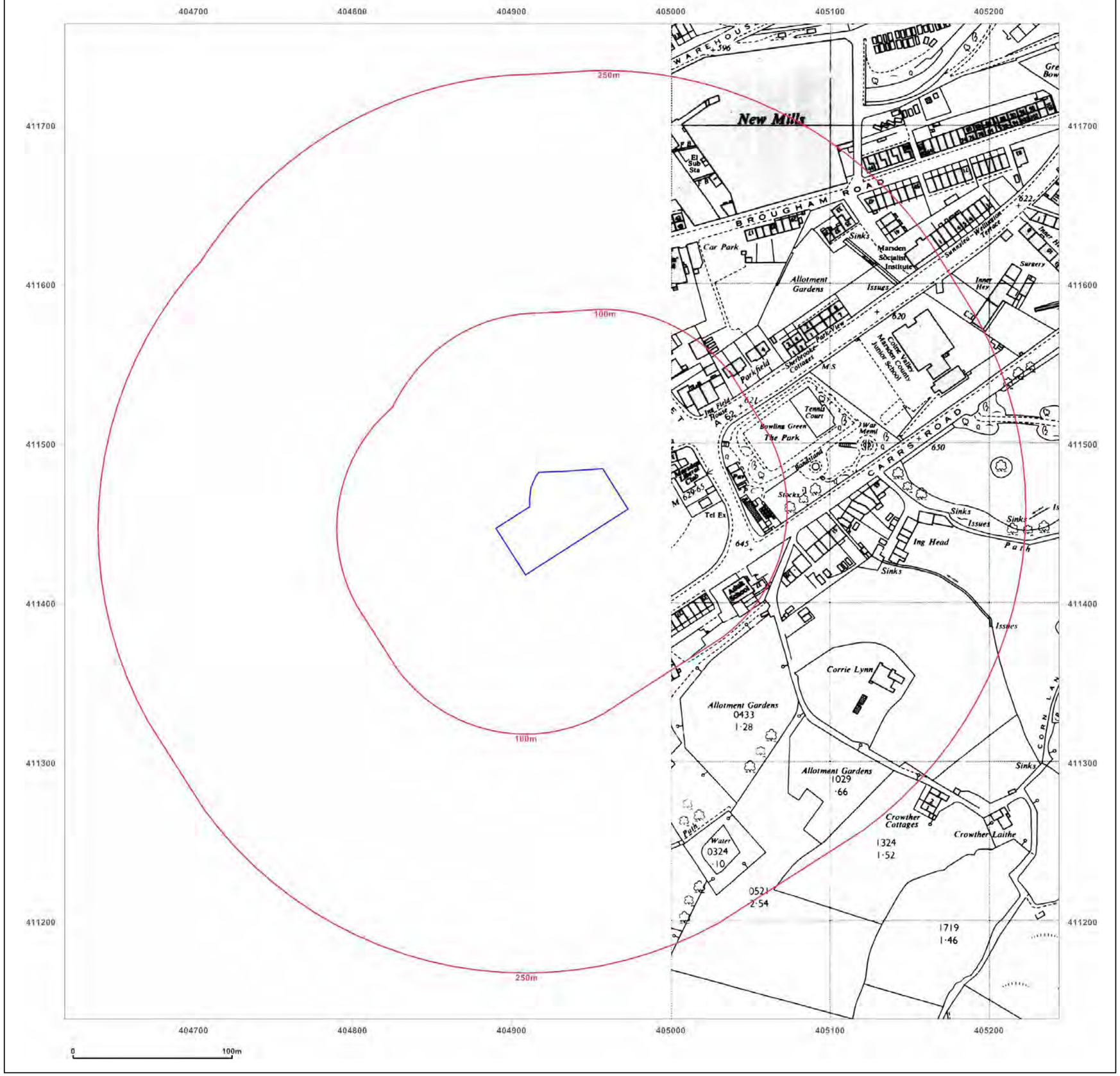

Groundsure INSIGHTS

Site Details:

MANCHESTER ROAD,
SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **1968**

Scale: 1:2,500

Printed at: 1:2,500

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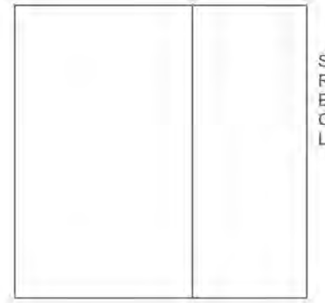

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Groundsure INSIGHTS

Site Details:

MANCHESTER ROAD,
SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **1988-1993**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1966	Surveyed N/A
Revised 1988	Revised N/A
Edition N/A	Edition N/A
Copyright 1988	Copyright 1993
Levelled 1966	Levelled N/A

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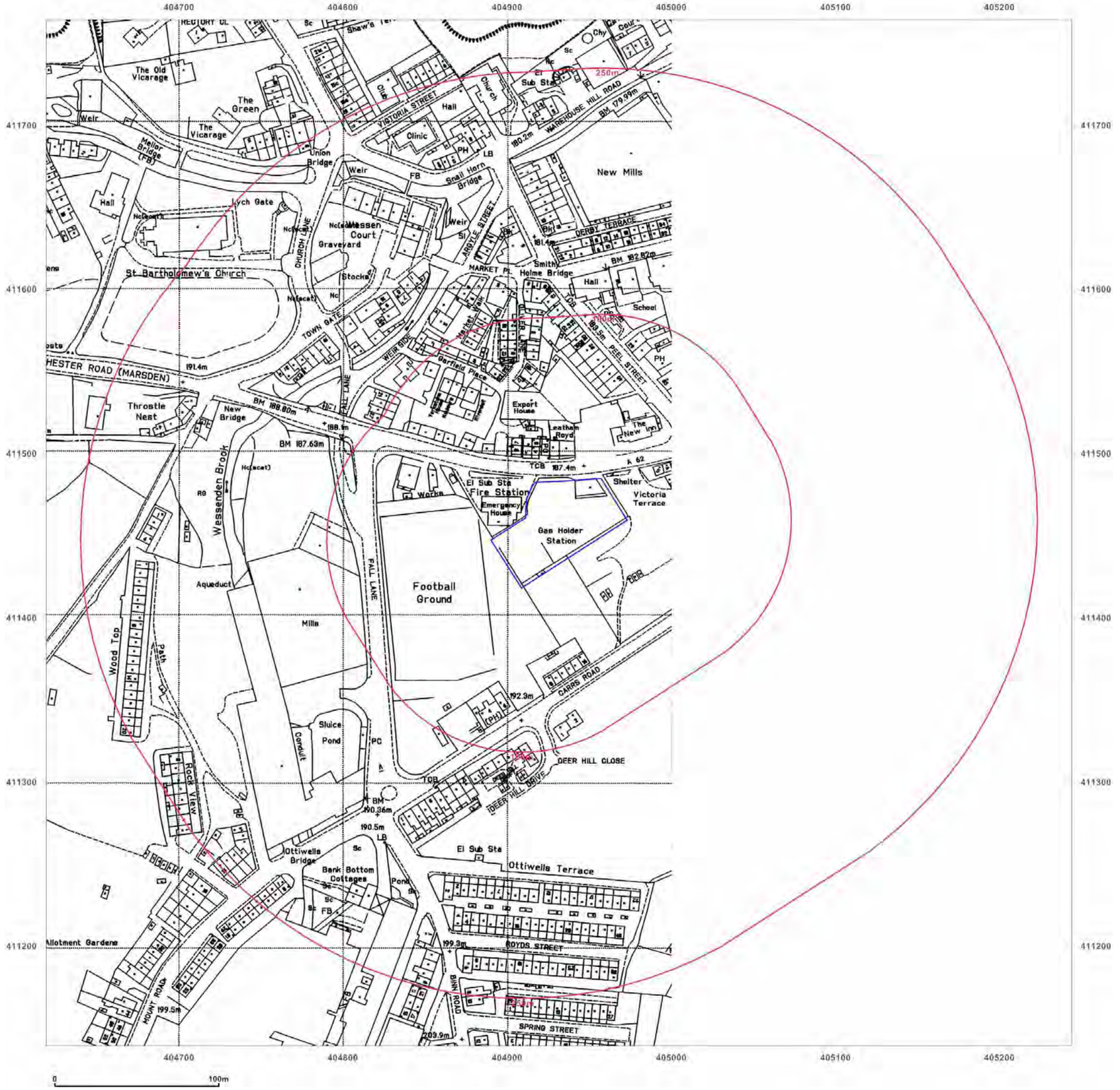

Groundsure INSIGHTS

Site Details:

MANCHESTER ROAD,
SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **1994**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1994
Revised 1994
Edition N/A
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Groundsure INSIGHTS

Site Details:

MANCHESTER ROAD,
SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **1993-1995**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A	Surveyed 1995
Revised N/A	Revised N/A
Edition N/A	Edition N/A
Copyright 1993	Copyright 1995
Levelled N/A	Levelled N/A

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Production date: 13 November 2017

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Groundsure INSIGHTS

Site Details:

MANCHESTER ROAD,
SLAITHWAITE,
HUDDERSFIELD, HD7 5JX

Client Ref: SB_HOMES_7092
Report Ref: GS-4463512
Grid Ref: 404931, 411452

Map Name: National Grid

Map date: **1994-1995**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1994
Revised N/A
Edition N/A
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Levelled N/A

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

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