



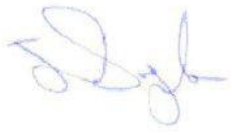
**GROUNDTECH**  
CONSULTING

**Job title:** New Office Block, Bury

**Report type:** Preliminary Risk Assessment

**Prepared for:** Kennedy Redford

**Date:** February 2022

| Document Control Form                   |                                                                                      |
|-----------------------------------------|--------------------------------------------------------------------------------------|
| PROJECT                                 | NEW OFFICE BLOCK, BURY                                                               |
| REPORT NAME                             | PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT                                            |
| REPORT REFERENCE                        | GRO-21438-3118                                                                       |
| STATUS                                  | FINAL                                                                                |
| ISSUE DATE                              | 07 FEBRUARY 2022                                                                     |
| REVISION                                | 1.1 17 DECEMBER 2025                                                                 |
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### Plans

| <i>Plan Reference</i> | <i>Revision</i> | <i>Title</i>                             |
|-----------------------|-----------------|------------------------------------------|
| GRO-21438-P01         | -               | Project Location Plan                    |
| GRO-21438-P02         | -               | Preliminary Development Constraints Plan |
| GRO-21438-P03         | -               | Illustrative Preliminary CSM             |

## 1.0 INTRODUCTION

### 1.1 Project Objectives

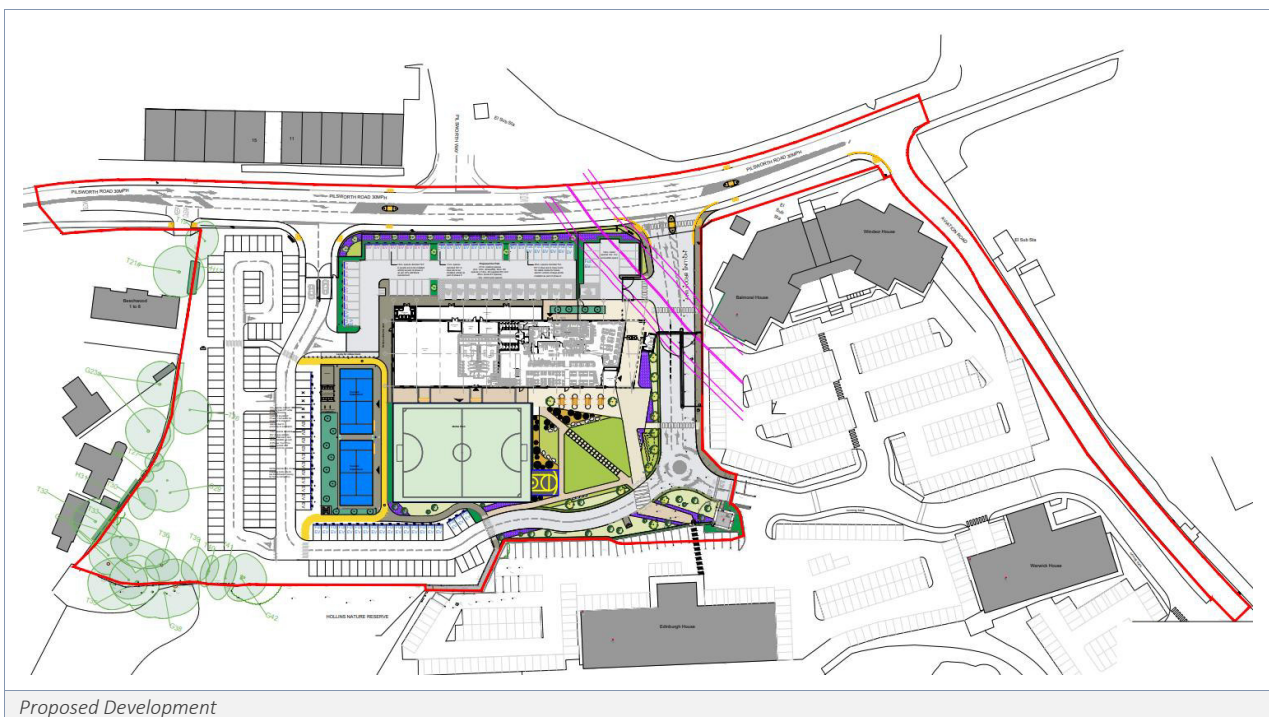
Groundtech Consulting Limited have been instructed by Kennedy Redford on behalf of their client JD Sports to undertake a Preliminary Risk Assessment for a site at Pilsworth Road in Bury.

The objectives of the Preliminary Risk Assessment were to establish the sites environmental and geotechnical background in order to generate a Conceptual Site Model to identify any potential constraints and linkages which may affect the redevelopment of the site.

The report has been undertaken to fulfil the requirements of a preliminary risk assessment in accordance with Land Contamination Risk Management (LCRM).

### 1.2 Proposed Development

The proposed development is commercial end use comprising a new office block with associated hardsurfaced car park and staff facilities including two covered paddle courts and a MUGA pitch.



### 1.3 Limitations

This Preliminary Risk Assessment is based on information obtained from a number of sources, and the information is assumed to be correct.

Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

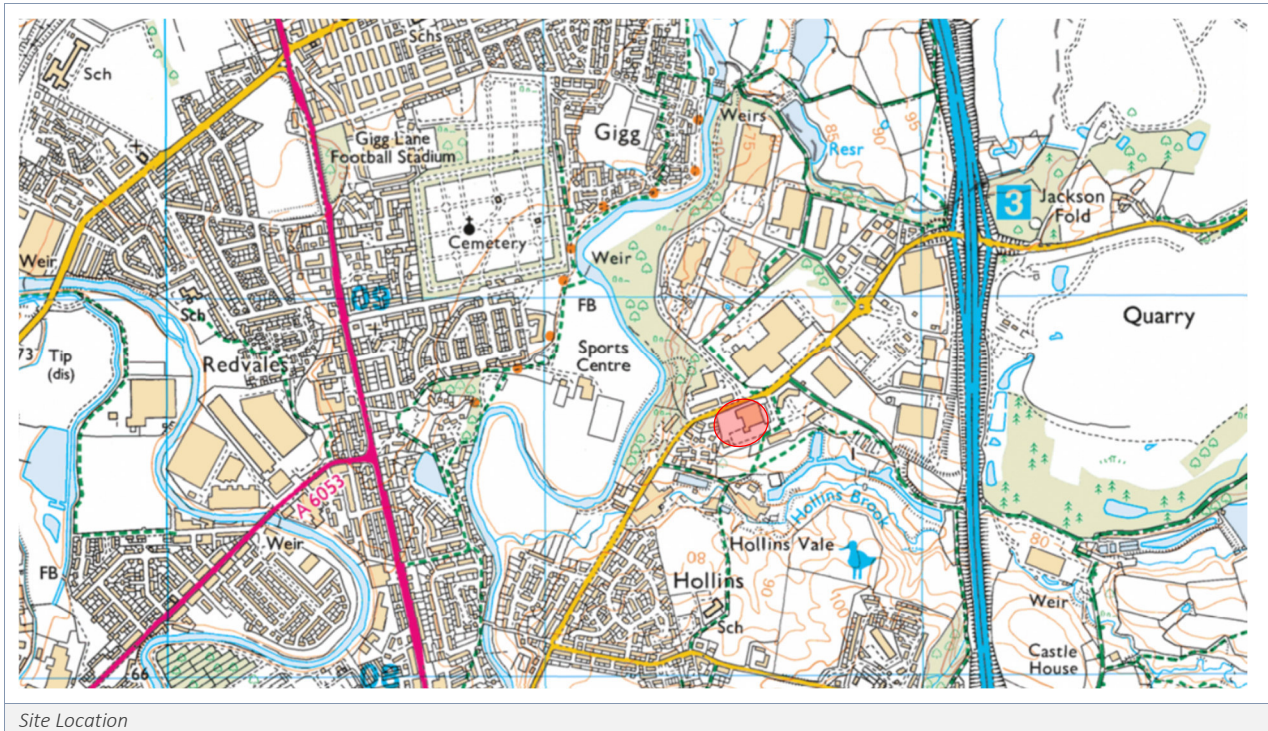


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## 2.0 SITE SETTING

### 2.1 Location

The site is located circa 2.4km south east of Bury Town Centre, as shown on the Project Location Plan GRO-21438-P01. The site is approximately centred on National Grid Reference 381527, 408662.



Access to the site is gained off Hollins Brook Way to the east.

### 2.2 Site Description

The site is relatively level across its footprint and roughly rectangular in shape, encompassing an area of approximately 1.5 Ha.

#### *Onsite Features*

The site was most recently occupied by a large warehouse unit which has recently been demolished. The footprint of the former building is surfaced with uneven ground with grass and some light vegetation. The remainder of the site is surfaced predominantly with concrete and is generally featureless.

A gas main crosses the north east corner of the site.

A vegetated strip is present along the site's northern boundary with some semi-mature and mature trees present.

#### *Site Boundaries and Surrounding Features*

The site boundaries are formed by metal fencing and trees are present close to the site's northern, eastern and southern boundaries.

The site is surrounded by the following features:



- *North – Pilsworth Road followed by light industrial/commercial units.*
- *East – Hollins Brook Way, commercial offices and an associated car park.*
- *South – Commercial office premises and Local Nature Reserve.*
- *West – Commercial buildings and residential housing estate.*

Site photographs are presented in *Appendix 2*, and any relevant features are recorded on the Preliminary Development Constraints Plan *GRO-21438-P02*.

### 3.0 ENVIRONMENTAL SETTING

#### 3.1 Site History

Available historical maps have been obtained, a list of dates and scale are listed in the table below:

| Scale           | Date                                                                             |
|-----------------|----------------------------------------------------------------------------------|
| 1:500           | 1891.                                                                            |
| 1:1,250         | 1956, 1957, 1970, 1981-85, 1988-92, 1991-95, 1992-95, 2003.                      |
| 1:2,500         | 1890, 1910, 1930, 1937, 1957, 1971, 1988.                                        |
| 1:10,000/10,560 | 1848-51, 1891, 1907-08, 1928-32, 1938, 1955, 1965, 1974, 1981, 2001, 2010, 2021. |

The plans were examined and potential issues have been identified and summarised in the table below:

| Date    | Site                                                                                                                    | Surrounding Area                                                                                                                                                                                                                                                                                                                                        |
|---------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1848-51 | <i>Formed by fields and undeveloped apart from one footpath running roughly north to south in the east of the site.</i> | <i>The surroundings mostly comprise undeveloped fields. Hollins Vale village is adjacent to the west and south. Hollins Brook c.100m south running approximately east to west.<br/><b>Hollins Vale Print Works</b> c.100m south.<br/><b>Hollins Vale Bleach Works</b> c.200m southwest.<br/>Six reservoirs are between c.80m and 150m to the south.</i> |
| 1890    | <i>No change.</i>                                                                                                       | <i>Reservoir c.90m east.<br/>Hollins Vale Print Works now <b>Bleach Works</b>.</i>                                                                                                                                                                                                                                                                      |
| 1910    | <i>No change.</i>                                                                                                       | <i><b>Tanks</b> between c.80m and 200m south.<br/><b>Settling tanks</b> c.200m south.<br/>Numerous <b>chimneys</b> present associated with Bleach Works to the south.</i>                                                                                                                                                                               |
| 1930    | <i>No change.</i>                                                                                                       | <i><b>Dye Works</b> replaces one of Bleach Works buildings c.110m south.<br/><b>Settling tanks</b> c.150m south west.</i>                                                                                                                                                                                                                               |
| 1956    | <i>No change.</i>                                                                                                       | <i><b>Electricity substation</b> c.110m south west.<br/><b>Tank</b> c.120m south west.<br/><b>Hollins Vale Works (Glue and Gelatine)</b> replaces Bleach Works c.100m south.<br/><b>Hollins Vale Works (Perfume)</b> replaces Dye Works c.110m south.<br/><b>Pumphouse</b> c.110m south.</i>                                                            |
| 1970    | <i>No change.</i>                                                                                                       | <i><b>Depot</b> c.120m northeast.</i>                                                                                                                                                                                                                                                                                                                   |
| 1971    | <i>No change.</i>                                                                                                       | <i><b>Works (Foam Rubber)</b> c.220m south east.<br/><b>Unidentified Works</b> c.70m north.<br/><b>Settling tanks</b> c.200m east.<br/>Two ponds c.90m south.</i>                                                                                                                                                                                       |
| 1981    | <i>No change.</i>                                                                                                       | <i><b>Works</b> in place of old Depot.</i>                                                                                                                                                                                                                                                                                                              |
| 1981-85 | <i>No change.</i>                                                                                                       | <i>Construction of <b>Industrial units</b> adjacent to the site along Pilsworth Road c.15m north.<br/><b>Electricity substation</b> c.150m west.</i>                                                                                                                                                                                                    |

|         |                                                                 |                                                                                                                                                                                                         |
|---------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1988-92 | <b>Warehouse</b> constructed on site in its most recent format. | <b>Electricity substation</b> c.40m north and c.150m west.                                                                                                                                              |
| 1991-95 | No change.                                                      | Residential development constructed adjacent to the site due west.                                                                                                                                      |
| 2001    | Small building erected in the southwest corner of the site.     | No change.                                                                                                                                                                                              |
| 2003    | No change.                                                      | Commercial office block constructed adjacent to the site east.<br>Several of the smaller reservoirs to south no longer present, probably <b>infilled</b> .<br><b>Electricity substation</b> c.40m east. |
| 2021    | No significant changes.                                         | Viridor Pilsworth South <b>Landfill</b> c.600m east.                                                                                                                                                    |

The historical plans are presented in *Appendix 3*.

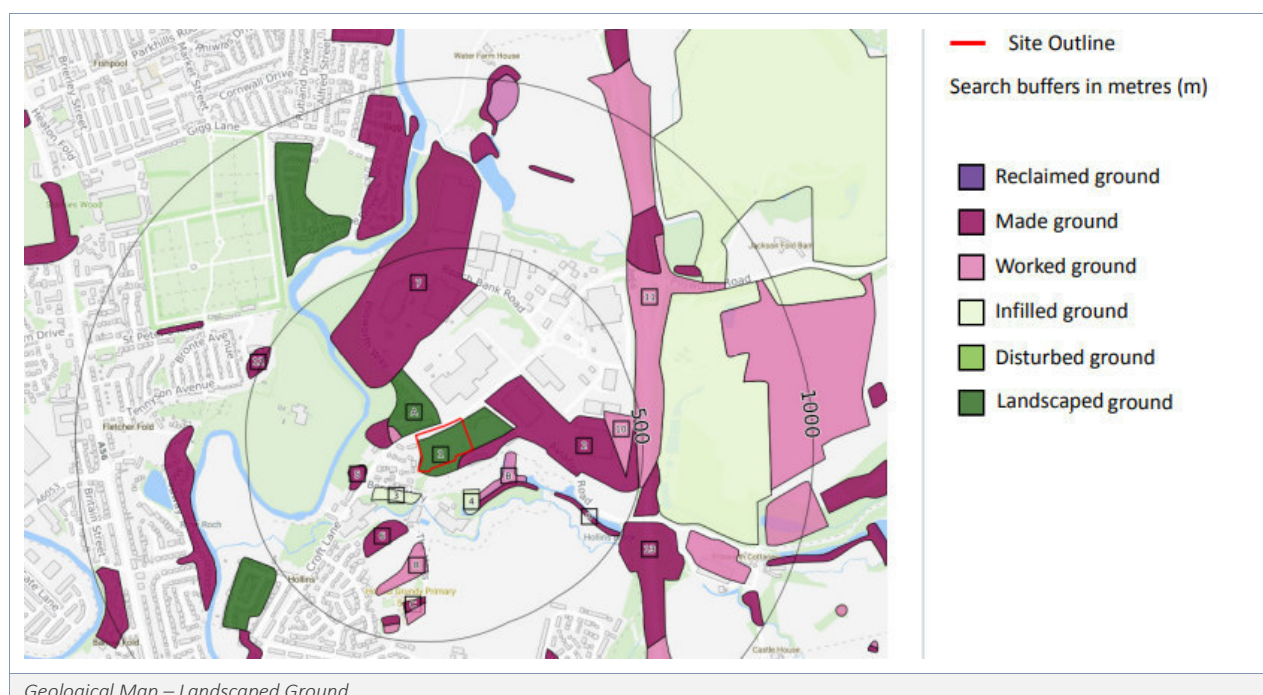
## 3.2 Geology

The following British Geological Survey (BGS) records and other available information were inspected to accurately determine the geology underlying the site:

- 1:50,000 Scale Geological Sheet 85, Manchester – Solid and Drift Edition.
- Memoir.
- BGS Records.

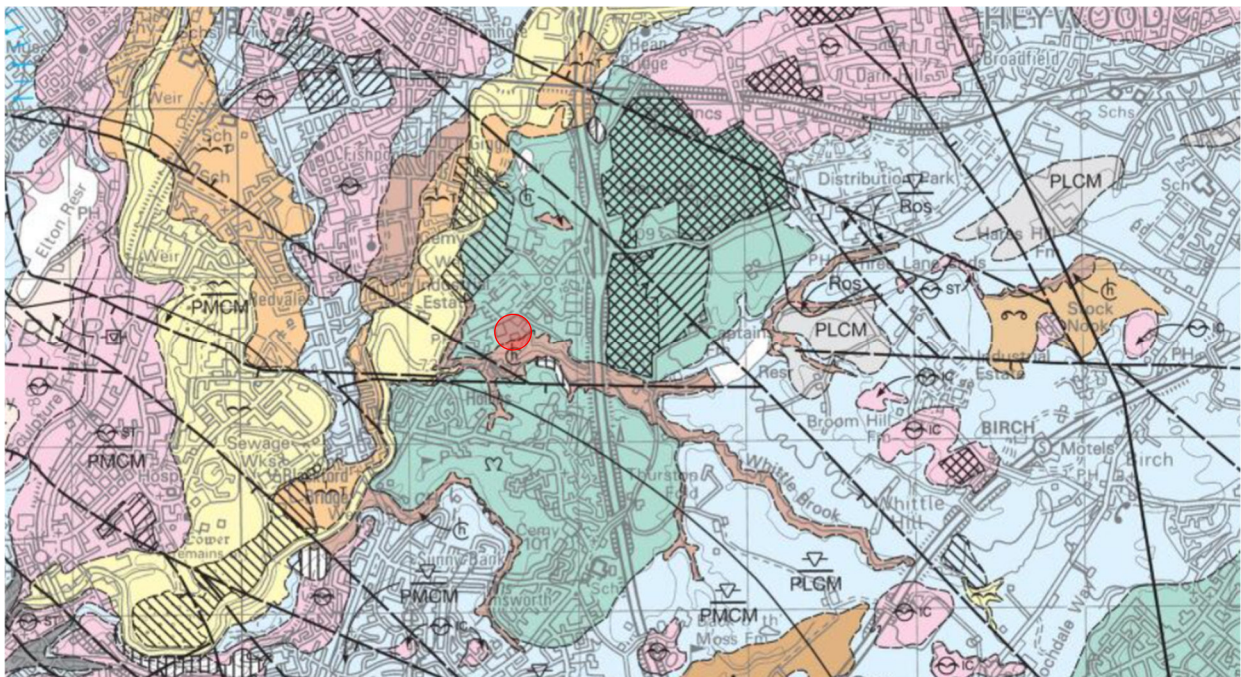
### Made Ground

Made Ground is not indicated to underlie the site from the BGS 1:50,000 geological maps. However, landscaped ground is indicated below almost the entire site in the Groundsure report. Furthermore, Made Ground is anticipated due to the site's development with a commercial warehouse unit which has recently been demolished.



### Superficial Deposits

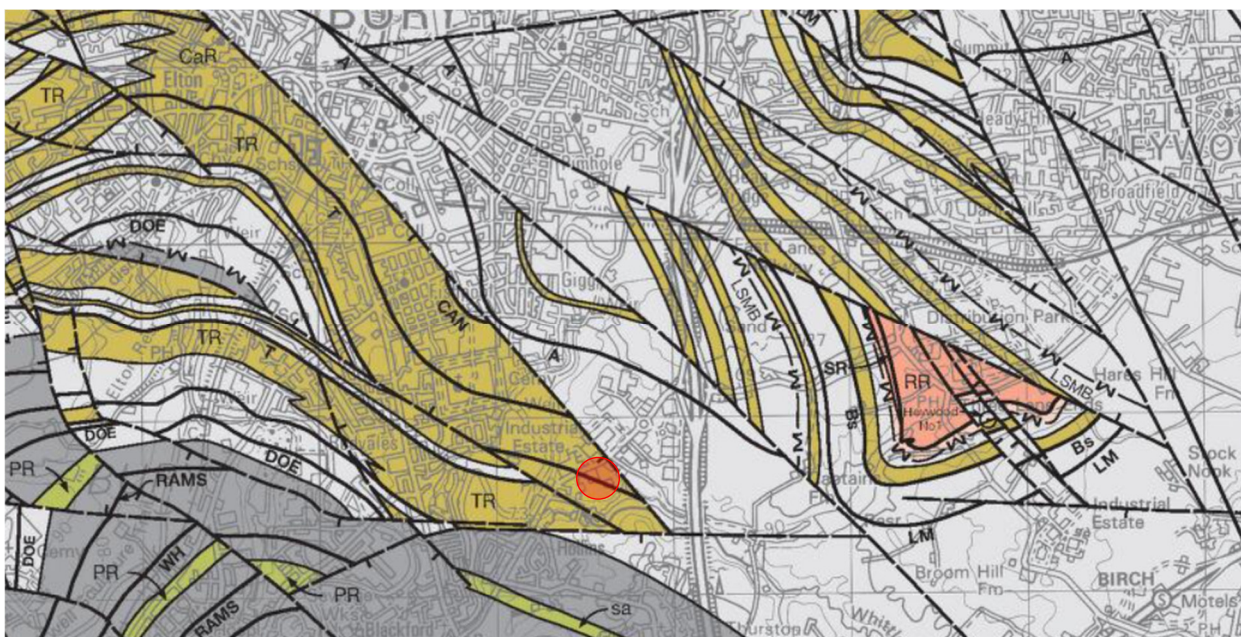
The site is indicated to be underlain by Hummocky (moundy) Glacial Deposits which characteristically comprises clay, sand and gravel.



Geological Map – Superficial Deposits

### Solid Geology

The Trencherbone Rock underlies the site which comprises sandstone. The memoir indicates this unit to be grey brown, fine grained, cross bedded with ironstone concretions and numerous mudstone interbeds.



Geological Map – Solid Geology

A coal seam is shown to subcrop on site striking north west to south east. The seam is dipping to the south west, an angle of 15° is indicated in the general surrounding area. The seam subcropping below the site is not labelled on the BGS geological maps.

The next underlying seam is referenced the Trencherbone (Oldham Great) Coal which also dips south west and subcrops to the north east of the site. However, this seam is predominantly cut out by the fault to the north of the site and is not anticipated to be beneath the site based on its most northerly subcrop.

The next seam to subcrop north east of the Trencherbone Coal is the Cannel Coal seam which is also cut out by the fault to the north of the site.

The site is on the downthrown side of the faults to the north east and south and has therefore moved down relative to the surrounding areas. The Trencherbone Coal and Trencherbone Rock Sandstone sequence is repeated south west of the site on the upthrown side of the fault. This repetition of stratigraphic sequence has been caused by a relative uplift of the sequence to the south west of the site and subsequent erosion of uplifted material leading to a repetition of the stratigraphic sequence.

The unnamed coal seam subcropping at the site is likely to be the Blenfire Coal which is shown to be the next seam in the stratigraphic sequence overlying the Trencherbone Rock and Trencherbone Coal. Alternatively, due to heavy folding in the area the unnamed seam may be a repetition of the Trencherbone Coal seam caused by Isoclinal folding of the entire sequence followed by a sequence of later faulting which has distorted the earlier folds.

A standalone Coal Mining Risk Assessment (*GRO-21438-3119*) has been carried out by Groundtech Consulting which provides more details and should be read in conjunction with this report.

#### *Geological Faults*

Faults are present circa 130m north east and circa 150m south of the site trending approximately north west to south east. The site is shown to be on the downthrown side of both faults. The surrounding area is heavily faulted.

#### *BGS Records*

The nearest BGS boreholes record is located approximately 15m south of the site and the following sequence was recorded:

- *Topsoil – 0.4m bgl*
- *Loose to medium dense yellow brown clayey Sand – 1.8m bgl*
- *Firm grey brown silty sandy Clay with some laminations and silt bands – 5.3m bgl*
- *Medium dense brown fine and medium Sand – 5.5m bgl*
- *Firm/stiff dark brown silty sandy Clay with fine and medium subrounded gravel – 9.0m bgl.*

A further BGS borehole record is located circa 80m east of the site and the following sequence was recorded:

- *Backfill – 2.0m bgl*
- *Sand and Gravel – 33.0m bgl*
- *Marl – 34.0m bgl*
- *Sandstone/Marl – 42.0m bgl*
- *Sandstone – 76.0m bgl*
- *Sandstone/Marl – 80.0m bgl*

- Marl with Sandstone bands – 89.0m bgl

Other BGS borehole records in the area to the west of the site do not record any bedrock being encountered up to a depth of 13.0m bgl.

The BGS records are presented in *Appendix 6*.

### 3.3 Hydrogeology

The superficial Glacial deposits in this area are classified by the Environment Agency 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 flow to rivers.

The bedrock is also classified as a Secondary A Aquifer with low vulnerability.

The soils beneath the site are classified as having a high a high leaching potential. These are soils which have little ability to attenuate diffuse source pollutants and therefore have the potential to allow pollutants to move rapidly.

The site is not indicated to lie within a Source Protection Zone.

There are twenty-five records of groundwater abstractions within 2000m of the site, only five of which are active. The nearest active abstraction licence is located 764m east of the site and relates to dewatering at Pilsworth Landfill.

There are no active potable water abstraction licenses within 2000m of the site. A historical potable abstraction was recorded 78m east of the site relating to a borehole utilised for drinking, cooking, sanitary and washing.

Chemical data for the groundwater body onsite has indicated a chemical rating of 'Poor' was recorded in 2019.

### 3.4 Hydrology

The nearest named watercourse is Hollins Brook located 91m south of the site.

Environment Agency information indicates that the site is outside a flood risk zone and is not at risk of flooding. The Risk of flooding from rivers and the sea (RoFRaS) is low.

There are thirteen surface water abstractions recorded within 2000m of the site, the nearest of which is a historical one located 955m east of the site, relating to general cooling. The nearest active surface water abstraction is located 1866m west of the site and relates to hydroelectric power generation at the River Irwell.

There are two recorded discharges to controlled waters within 500m of the site, the nearest of which is located 174m to the south and relates to discharge of final treated effluent to the Hollins Brook.

Chemical data obtained 94m south of the site from the Whittle Brook indicates a chemical rating of 'Fail' was recorded in 2019.

### 3.5 Environmental Consultations

A request has been submitted to the Contaminated Land Officer at Bury Council for information pertaining to the site. This information is currently outstanding and will be forwarded upon receipt.

An environmental consultation has been conducted through Groundsure, which accesses British Geological Survey and Environment Agency databases. The complete Groundsure Report can be found in *Appendix 4* and a summary of the more relevant points is presented in the table below.

| Record                              | <250m | 250 – 500m | Description                                                                                                                                                                                                                                                                                                      |
|-------------------------------------|-------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Authorised Processes</i>         | 19    | 5          | <i>Nearest is 45m west at Viridor Waste Management Ltd relating to waste landfilling and pollutant release to public sewer.<br/>Permit in place for unloading of petrol into storage 397m north east at Asda Pilsworth.</i>                                                                                      |
| <i>Pollution Incidents</i>          | 4     | 11         | <i>Nearest is onsite relating to atmospheric pollutants and effects as a result of landfill odour in July 2003. This had a minor impact on air and no impact on water and land.</i>                                                                                                                              |
| <i>Landfill and Waste Treatment</i> | 3     | 11         | <i>Historic landfill located 156m north west relating to inert waste belonging to Park Pt Landfill Ltd.<br/>Pilsworth inert landfill located 396m north west which is a licenced waste site receiving biodegradable wastes.<br/>Viridor Waste Management Ltd located 45m west relating to waste landfilling.</i> |
| <i>Discharge Consents</i>           | 5     | 0          | <i>Nearest is 174m south relating to sewage from Hollins Vale Works.</i>                                                                                                                                                                                                                                         |
| <i>Petrol Filling Stations</i>      | 0     | 1          | <i>Located 405m north east.</i>                                                                                                                                                                                                                                                                                  |
| <i>Current Industrial Uses</i>      | 36    | 0          | <i>The nearest is onsite relating to hire services belonging to Sunbelt Rentals Ltd.<br/>Colours, Chemicals and Water Softeners and Supplies 25m north.<br/>Industrial Repairs and Servicing 26m north.</i>                                                                                                      |

### 3.6 Radon

Map 17 'Lancashire, south Cumbria and western North Yorkshire' from BRE 211 and HPA were examined which defines areas which require radon protective measures. The probability is less than 1% and Bury is not an area requiring radon precautions in foundations in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings' 2015 Edition.

The radon data in the Groundsure report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland, the Groundsure report confirms the classification of less than 1% on the radon maps. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supersede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square.

### 3.7 Coal Authority Consultation

The site lies in an area where the Law Society and Coal Authority recommends a mining consultation is undertaken due to past or current mining possible affecting the site. A standalone Coal Mining Risk Assessment has been undertaken by Groundtech Consulting, referenced *GRO-21438-3119* which should be read in conjunction with this report.

A consultation was carried out with the Coal Authority, which is presented in *Appendix 5*, the main findings are outlined below.

#### *Past Mining*

The site is not within a surface area that could be affected by any past recorded underground coal mining.

#### *Present Mining*

The site is not within the zone of influence of any present underground coal workings.

#### *Future Mining*

The property is not in an area where the Coal Authority are determining whether to grant a licence to remove coal by underground workings.

The property is not in an area likely to be affected at the surface by any planned underground workings.

Reserves of coal exist in the local area that may be worked in the future.

No notice of the risk of land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

#### *Mine Entries*

There are no records of any mine entries on or within 20m of site boundary.

#### *Coal Mining Geology*

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

#### *Opencast Coal Mining*

The property is not in an area affected by past or present coal mining extracted by opencast methods. The property is also not in an area affected by a proposed opencast coal mine.

#### *Subsidence*

The Coal Authority has not received a damage notice or claim for the subject property or within 50m since 31 October 1994.

#### *Mine Gas*

There is no record of mine gas emission requiring action by the Coal Authority within the boundary of the property.

#### *Withdrawal of Support*

The property is not in an area which notice of entitlement to withdraw support has been published.

### ***Coal Authority Interactive Map***

The Coal Authority Interactive Map has been consulted to obtain any further information with regard to historic coal mining at the site. The information is summarised in the following section:

#### ***Development High Risk Area***

The southern half of the site, to the south of the coal seam bisecting the site is indicated to be within the Development High Risk Area.

#### ***Past Shallow Coal Mine Workings***

None indicated.

#### ***Probable Unrecorded Shallow Workings***

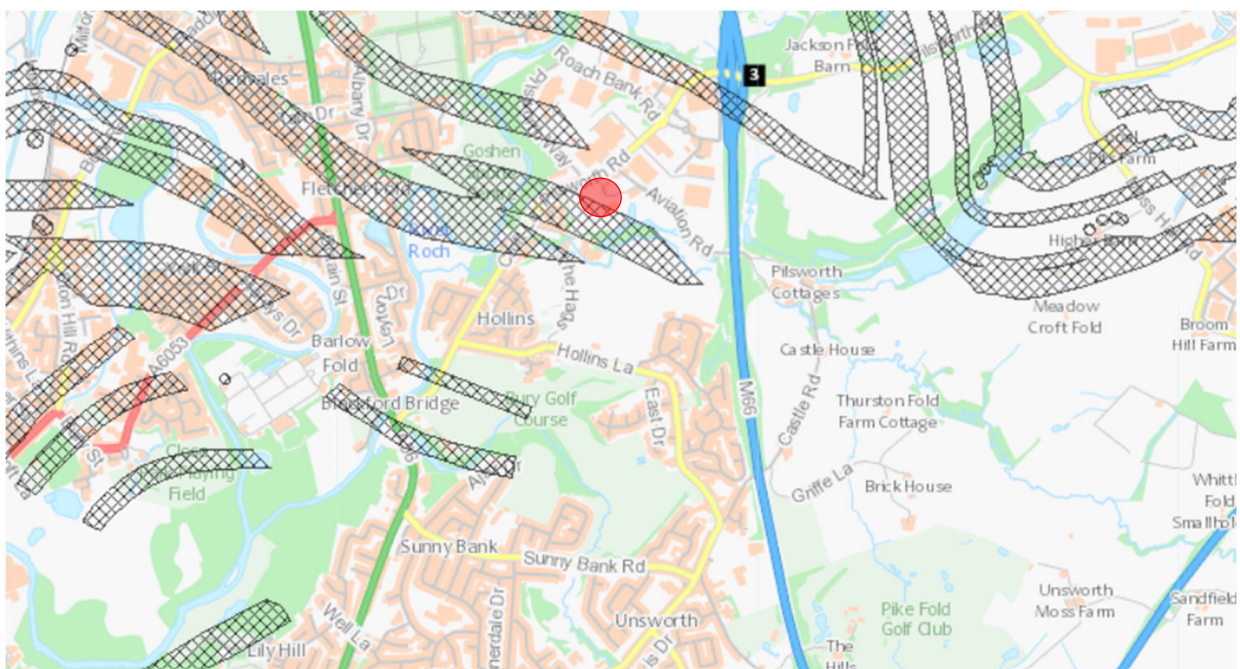
Probable unrecorded shallow coal mine workings are indicated in the south of the site in the area indicated to be within the Development High Risk Area.

#### ***Mine Entries***

There are no recorded coal mine entries on, or within 1km of the site.

#### ***Outcrop/Subcrop***

A coal seam subcrop is indicated running across the site trending north west to south east.



Coal Authority Interactive Map - Development High Risk Areas

## 4.0 CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

### 4.1 Introduction

The potential level of risk posed by contaminants in soil and/or groundwater will be influenced by the type and concentration of the contamination at source, the likelihood of exposure occurring, the potential pollution linkages and the likely chronic or acute effects on the receptors.

A contaminant is defined as a substance that has the potential to cause harm, a risk is considered to exist if such a substance is present at sufficient concentrations to cause harm and if a pathway is present a receptor could be exposed to the contaminant.

Section 4.0 compiles the information from the previous sections to assemble a Conceptual Site Model to inform the risk assessment process. The potential sources identified on the site and off the site that are within influencing distance are assessed to determine if pollution linkages exist and an unacceptable risk is posed to human health and controlled waters. The assessment has been carried out on a qualitative basis and aims to produce a complete and comprehensive Preliminary Conceptual Site Model, the potential pollution linkages are displayed on *GRO-21438-P03 - Illustrative Preliminary CSM*.

Three potential types of impacts exist for a site and all three need to be considered in the qualitative preliminary risk assessment:

- *Impacts from sources on the subject site.*
- *Impacts to the surrounding area from the subject site.*
- *Impacts to the subject site from the surrounding area.*

### 4.2 Potential Contamination Sources

#### *Onsite Sources and Associated Contaminants*

From the information obtained during the PRA, a number of potential sources of contamination have been identified which may affect the redevelopment of the site for commercial end use.

Made Ground is likely to underlie the site, the majority of which is indicated as landscaped ground. Furthermore, the commercial unit on site has recently been demolished and therefore Made Ground soils will be present. Made Ground may be a source of a range of contaminants including heavy metals, PAHs, asbestos and hydrocarbons.

A warehouse building was constructed on the site in the 1980s which was most recently occupied by a plant hire company and the surrounding hard surfaced yards were utilised for storing plant and machinery. Associated contaminants could include fuels and oils associated with refuelling of plant. Further contaminants could include solvents and automotive fluids associated with plant maintenance.

Prior uses of the warehouse building are not known. However, a range of contaminants associated with light industrial use may include asbestos, metals, PAHs and hydrocarbons.

#### *Offsite Sources and Associated Contaminants*

Several offsite sources of contamination have been identified which may affect redevelopment for commercial end use, these are listed below:

- *Bleach Works c.200m south west and 100m south.*

- Hollins Vale Print Works c.100m south.
- Chimneys associated with works to south.
- Tanks c.80m - 200m south and c.120m south west.
- Settling Tanks c.200m south, c.150m south west and c.200m east.
- Dye Works c.110m south.
- Electricity substation c.110m south west and c.150m west, c.40m east and north.
- Hollins Vale Works (Glue and Gelatine) c.100m south.
- Hollins Vale Works (Perfume) c.110m south.
- Pumphouse c.110m south.
- Depot c.110m north east, later replaced by unidentified works
- Works (Foam rubber) c.220m south east.
- Unidentified Works c.70m north.
- Industrial units c.15m north.
- Six reservoirs between c.80m and c.150m south and c.90m east.
- Two ponds c.90m south.
- Landfill sites 156m north west, 396m north west and 45m west.
- Colours, Chemicals and Water Softeners and Supplies 25m north.
- Industrial Repairs and Servicing 26m north.

The DoE industry profiles have been consulted and the following contaminants of concern have been identified as outlined in the table below:

| Industry Profile                       |           | Associated Contaminants of Concern                                 | Required Testing                         |
|----------------------------------------|-----------|--------------------------------------------------------------------|------------------------------------------|
| Depot                                  |           | Fuel derived hydrocarbons                                          | TPH CWG.                                 |
| Chemical<br>(Rubber processing)        | Works     | Vulcanising agents, pigments, solvents, acids, metals.             | Metals, speciated PAHs                   |
| Chemical<br>(Cosmetics and toiletries) | Works and | Solvents, metallic compounds, inorganic and organic compounds.     | Metals, speciated PAHs, SVOCs and VOCs   |
| Textile and manufacturing              | Dye       | Metals, solvents, inorganic compounds, dyes, detergents, pigments. | Metals, Speciated PAHs, VOCs, SVOCs.     |
| Animal and Waste Products              | Animal    | Acids, ammonia, pathogens, solvents, detergents.                   | Metals, Speciated PAHs, VOCs, pathogens. |

Contaminants associated with Hollins Vale Print Works may include metals, solvents, dyes and pigments.

Chimneys were present in the vicinity of the numerous works to the south of the site and associated contamination may include metals, ash, slag and PAHs.

The electricity substations identified may be a source of PCBs dependant on their age as these were widely used as cooling agents in transformers prior to being banned.

Industrial repairs and servicing are recorded as a recent site use 26m north which may be a source of fuels, oils, metals and solvents.

Numerous tanks were present associated with the works in the vicinity of the site. These could be a source of a range of contaminants dependent upon what they were used to store which may have included fuels, oils or other chemicals.

Settling tanks may be a source of sludge which has potential to generate ground gases including methane and carbon dioxide.

Further potential sources of ground gas may include the landfill sites located north west and west of the site. Numerous ponds and reservoirs were present to the south and east of the site, some of which appear to have been infilled and could therefore be a source of ground gases dependent upon the nature of any backfilled material.

#### 4.3 Pollution Linkages

The definition of a pollution linkage is a medium which allows a contaminant to impact a receptor. Potential pollution linkages have been recognised for the commercial development from the identified contamination sources that exist.

At this stage, the potential contaminants identified above are considered to pose an unacceptable risk to human health and controlled waters through the following pollution linkages:

- *Direct soil and dust ingestion.*
- *Dermal contact with soil both indoors and outdoors.*
- *Indoor air inhalation from soil and vapour.*
- *Outdoor inhalation of soil and vapour.*
- *Migration and accumulation of ground gas into internal spaces.*
- *Impaction of groundwater from soil contamination (diffuse and point).*
- *Impaction of groundwater from groundwater plume.*
- *Migration of soil and groundwater contamination impacting surface waters.*

#### 4.4 Receptors

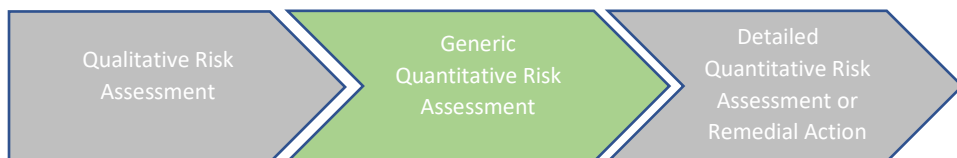
Receptors generally fall into the categories of human health or controlled waters within the river basin system. The recognized receptors are listed below:

- *Site end users.*
- *Underlying Secondary A Aquifer.*
- *Hollins Brook located 91m south.*
- *Clean potable water supply pipe.*

#### 4.5 Preliminary Conceptual Site Model (CSM)

The factual information obtained from the searches and summarised in Section 2.0 and 3.0 has been used to compile a Preliminary CSM. Using Source-Pathway-Receptor assessment criteria that is applicable in the UK, a risk assessment has been completed to determine if a plausible pollution linkage exists between the identified contaminants and receptors. The risk classification has been estimated in accordance with the CIRIA C552 assessment criteria outlined in *Appendix 7*.

## Human Health Pollution Linkage Assessment



- The table below represents the second stage in the land quality risk assessment process - **the Generic Quantitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

| Conceptual Site Model |                    |                                                          |                                  |                          | Generic Quantitative Risk Assessment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|--------------------|----------------------------------------------------------|----------------------------------|--------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PL                    | Potential Source   | Pollution Linkage                                        | Likelihood                       | Consequence/<br>Severity | Risk Rating                          | Rationale and Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| PL1                   | Contaminated Soils | Ingestion of soil and dust.<br>Dermal contact with soil. | Unlikely to<br>Low<br>likelihood | Medium                   | Moderate to Low                      | <p><i>Pollution Linkage 1 refers to proposed site users coming into contact with contaminated soils on the site.</i></p> <p><i>Made Ground is likely to be present beneath the site due to the demolition of the previous commercial unit on site. Heavy metals, PAHs and asbestos may be present in the Made Ground soils. The warehouse onsite was previously occupied by a plant hire company and external areas were utilised to store plant and machinery. Leaks and spillages of fuels/oils may have occurred associated with refuelling of plant. However, hardsurfacing across external areas will have prevented the downward migration of any associated contaminants into underlying soils.</i></p> <p><i>All contaminative sources identified to the south are not likely to have impacted the site due to being down gradient from the site including the bleach works, print works, tanks, glue and gelatine works, perfume works, foam rubber works and dye works.</i></p> <p><i>Depending on the age of the electricity substations, the nearest of which is located c.40m north of the site, PCBs may have been used as a cooling agent within the</i></p> |

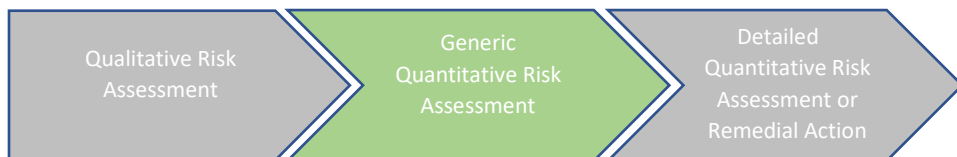
| Conceptual Site Model |                  |                   |            |                          | Generic Quantitative Risk Assessment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|------------------|-------------------|------------|--------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PL                    | Potential Source | Pollution Linkage | Likelihood | Consequence/<br>Severity | Risk Rating                          | Rationale and Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                       |                  |                   |            |                          |                                      | <p>transformers, however due to the relative immobility of PCBs and the small volume used they are unlikely to have impacted the site.</p> <p>The depot previously located c.110m north east of the site is potentially a source of fuel derived hydrocarbons and oils. However, gross mobile contamination impacting the site is not anticipated.</p> <p>Unspecified works were present c.15m north of the site and c.70m north of the site and commercial/ light industrial buildings remain at these locations today. The use of these buildings historically is not known, and a range of associated contaminants could have been present although external hardsurfaced areas will have prevented downward migration of CoC.</p> <p>TXL Products are located 25m north of the site and are recorded as Colours, Chemicals and Water Softeners and Supplies. However, no manufacturing is undertaken here, and the premises are utilised for retail of janitorial products and no associated contamination is anticipated.</p> <p>Direct Hydraulics are recorded 26m north of the site, listed as industrial repairs and servicing which may be a source of fuels, oils, metals and solvents. The premises are relatively small and located in a hardsurfaced yard within a unit with concrete floor slabs and therefore impaction of underlying soils and migration of contaminants off site is not likely.</p> |

| Conceptual Site Model |                    |                       |            |                          | Generic Quantitative Risk Assessment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------|--------------------|-----------------------|------------|--------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PL                    | Potential Source   | Pollution Linkage     | Likelihood | Consequence/<br>Severity | Risk Rating                          | Rationale and Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                       |                    |                       |            |                          |                                      | <p>All of the remaining potential sources of contamination are all at distances where they are unlikely to have any notable impact to the subject site due the migration distances involved and the heavy industrial surrounding land uses.</p> <p>The proposed development is for a new commercial office block with two five a-side football pitches, car park and areas of soft landscaping.</p> <p>In conclusion, Made Ground is likely to be present beneath the majority of the site and is potentially contaminated with a suite of determinands associated with the demolition of the former commercial building and previous uses of the site. Areas of soft landscaping will form part of the proposed development and a pollution linkage is currently considered to exist.</p>                                      |
| PL2                   | Contaminated Soils | Inhalation of vapour. | Unlikely   | Medium to Severe         | Low                                  | <p>This pollution linkage refers to volatile vapours migrating into confined spaces within the proposed development. Hydrocarbon contamination associated with fuel leaks/spillages from the former plant hire yard may be present. However, gross mobile hydrocarbon contamination is not anticipated, and hardstanding will have largely prevented downward migration of any contaminants. Furthermore, in these instances the majority of volatiles will have likely dispersed into the atmosphere prior to hydrocarbons migrating into the underlying soils.</p> <p>Tanks identified in the surrounding area historically were all located down gradient of the site along with the majority of the contaminative sources in the area which will have prevented migration of mobile contaminants onto the subject site.</p> |

| Conceptual Site Model |                    |                                                              |                |                          | Generic Quantitative Risk Assessment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|--------------------|--------------------------------------------------------------|----------------|--------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PL                    | Potential Source   | Pollution Linkage                                            | Likelihood     | Consequence/<br>Severity | Risk Rating                          | Rationale and Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| PL3                   | Contaminated Soils | Inhalation of soil dust by adjacent site users.              | Unlikely       | Medium                   | Low                                  | <i>Pollution Linkage 3 relates to contamination on the subject site affecting adjacent site users. Significant mobile contamination is not anticipated to be present beneath the site therefore no pollution linkage is considered to exist.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| PL4                   | Contaminated Soils | Attacking potable water supply pipe.                         | Low likelihood | Medium                   | Moderate to Low                      | <i>Pollution Linkage 4 refers to the possible contaminants permeating potable water pipes and consumption by the future site end users of the tainted water supply. Made Ground is likely to be present below the site and may be present at installation depth. Hydrocarbon contamination of shallow Made Ground soils is a possibility due to the former use of the site as a plant hire depot/yard.</i><br><br><i>Potable water supply pipes will be included as part of the development and a pollution linkage is currently considered to exist and a local water company risk assessment is required prior to construction to advise on the level of protection required for the potable water supply.</i> |
| PL5                   | Ground Gas         | Migration and accumulation of ground gas in internal spaces. | Likely         | Medium to Severe         | Moderate to High                     | <i>Made Ground is likely present beneath much of the site due to the demolition of the former commercial building and the presence of hardstanding across the majority of the site. Deep made ground may be present with the potential to generate ground gases.</i><br><br><i>Landfill sites have been identified 156m north west, 396m north west and 45m west of the site. The nearest of which is being monitored for emissions of methane, carbon dioxide and carbon monoxide and may be a significant source of ground gases.</i>                                                                                                                                                                          |

| Conceptual Site Model |                  |                   |            |                          | Generic Quantitative Risk Assessment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|------------------|-------------------|------------|--------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PL                    | Potential Source | Pollution Linkage | Likelihood | Consequence/<br>Severity | Risk Rating                          | Rationale and Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                       |                  |                   |            |                          |                                      | <p>Various small ponds and reservoirs of various sizes were present south of the site associated with the former bleach works. Some of these have been infilled historically and dependent upon the nature of any backfilled material may be a source of ground gases.</p> <p>Settling tanks have been identified c.200m south, c.150m south west and c.200m east of the site which may be a source of sludge which has the potential to generate ground gases.</p> <p>The site is underlain by superficial Glacial deposits and nearby borehole records indicate the presence of granular natural soils which will provide a feasible pathway for gas migration to the site.</p> <p>Due to the considerable sources of ground gas in the vicinity of the site, an intrusive investigation including the installation and monitoring of ground gas wells will be required.</p> <p>The site is not within an area requiring radon precautions within foundations.</p> |

## Controlled Waters Pollution Linkage Assessment



- The table below represents the second stage in the land quality risk assessment process – **Generic Quantitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

| Conceptual Site Model |                    |                                                                                                                                      |            |          | Generic Quantitative Risk Assessment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------|----------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PL                    | Potential source   | Pollution linkage                                                                                                                    | Likelihood | Severity | Level of risk                        | Rationale                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| PL6                   | Contaminated Soils | <p>Impaction of groundwater from soil contamination (diffuse and point).</p> <p>Impaction of groundwater from groundwater plume.</p> | Unlikely   | Medium   | Low                                  | <p>Made Ground is likely to be present beneath the majority of the site due to its historical development and may potentially be contaminated with a suite of Contaminants of Concern. The former plant hire depot and associated yard may have been a source of hydrocarbons associated with refuelling of plant and oil/fuel leaks. However, hardstanding across the site will have prevented downward migration and leaching of contaminants and gross mobile contamination is unlikely to be present.</p> <p>Geological maps and BGS records indicate that the site is underlain by Hummocky Glacial deposits comprising clay, sand and gravel which is classified as a Secondary A Aquifer. The bedrock underlying the site is the Trencherbone Rock which comprises Sandstone and is also classified as a Secondary A Aquifer.</p> <p>The site is not within 500m of a SPZ and is not considered a sensitive resource, the nearest active groundwater abstraction is 764m east of the site which is sufficient to allow considerable attenuation. No potable groundwater abstractions are present within 2000m of the site. A chemical rating of 'Poor' has been determined for the groundwater body below the site.</p> |

| Conceptual Site Model |                    |                                                                           |            |          | Generic Quantitative Risk Assessment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|--------------------|---------------------------------------------------------------------------|------------|----------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PL                    | Potential source   | Pollution linkage                                                         | Likelihood | Severity | Level of risk                        | Rationale                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                       |                    |                                                                           |            |          |                                      | Furthermore, the proposed development will be predominantly covered with hardsurfacing and a new drainage system installed. This will considerably reduce infiltration and leaching of potential contaminants, therefore no pollution linkage is considered to exist.                                                                                                                                                                                                                                                                                                                            |
| PL7                   | Contaminated Soils | Migration of soil and groundwater contamination impacting surface waters. | Unlikely   | Medium   | Low                                  | <p>Pollution Linkage 7 refers to the impact of Hollins Brook 91m south of the site from contaminated soils and groundwater.</p> <p>No significant sources of mobile contamination have been identified on site and numerous sources of mobile contamination have been identified by the desk-based consultations in the surrounding area which are potentially more impactful than the subject site. Furthermore, chemical data taken from 94m south of the site has recorded a chemical rating of 'Fail' indicating that surface waters have been impacted by previous industrial activity.</p> |

## 5.0 GROUND ENGINEERING RECOMENDATIONS AND POTENTIAL LIMITATIONS

### 5.1 Preliminary Foundation Assessment

Foundations for the proposed three-storey office block development will be dictated by the proposed loadings and ground conditions encountered. Nearby boreholes have indicated the presence of both natural firm Clay and natural granular soils to depths of up to 33.0m bgl.

The design of the superstructure elements has not yet been fully developed, but it is envisaged that a framed structure of beams and columns supporting upper floors and roof will be appropriate. It is anticipated that column loads for the development will be in the order 500 to 2000 kN (SLS). Based on the anticipated column loads it is likely that piled foundations will be required for the proposed commercial development, and this will be confirmed by the findings of the Ground Investigation.

The site is within the Coal Mining reporting area and the Coal Mining Risk Assessment has determined that further investigation is required. If coal mine workings are present beneath the site, then a programme of drilling and grouting may be required where a sufficient depth of rock cover is not present overlying any worked coal seams.

Semi-mature and mature trees are present along the site's northern, western and southern boundaries and cohesive Glacial deposits may be present. Foundations will need to be designed in accordance with appropriate guidance when building near trees.

The above preliminary foundation recommendations have been formed from desk-based information and should be confirmed by a Ground Investigation in accordance with current guidance.

### 5.2 Additional Limitations

The presence of underground coal mine workings may be a limitation of the site as discussed above and intrusive drilling works are required to quantify the risk.

The use of SuDS drainage may be feasible if natural granular deposits underly the site and should be confirmed by in-situ testing in accordance with BRE365.

## 6.0 CONCLUSIONS AND GROUND INVESTIGATION SCOPE RATIONALE

### 6.1 Land Quality

The site remained undeveloped and formed by fields until the 1980s when a warehouse was constructed on the site which has been the only development on site until it was recently demolished.

The risk to Human Health from contaminated soils is currently considered to be *Moderate to Low* based on the possibility of contaminated Made Ground being present associated with the demolition of the former warehouse and the former use as a plant hire depot/yard.

No significant sources of volatile contamination have been identified and the risk from vapours is considered *Low*.

Potential sources of ground gas including landfill sites, infilled ponds and reservoirs and settling tanks have been identified in the vicinity of the site. These sources are currently considered to pose a *Moderate to High* risk to site end users.

The site is not in an area affected by Radon.

The risk to groundwater is considered *Low* as no significant mobile contamination is anticipated and hardstanding across the site will have reduced downward migration from previous uses of the site into the underlying soils.

The risk to surface waters is also considered to be *Low*. Furthermore, the groundwater and surface water in the area is recorded as having poor quality from a chemical perspective.

### 6.2 Ground Engineering

Ground conditions are anticipated to comprise Made Ground over natural Glacial Deposits comprising clay, sand or gravel. Based on the anticipated column loads it is likely that piled foundations will be required for the proposed commercial development, and this will be confirmed by the findings of the Ground Investigation.

Underground coal mine workings may be present beneath the site and a programme of drilling and grouting may be required if sufficient rock cover is not present.

The use of SuDS drainage may be suitable if natural granular deposits are present beneath the site.

### 6.3 Recommended Ground Investigation Scope of Investigation

Based on the information in this report we consider a main investigation is required in accordance with BS 10175:2017 and BS 22475. The following scope of works is recommended based on the Preliminary CSM compiled, additional works may be required as the result of planning conditions for the proposed development:



| Method of Investigation                                                 | G / E      |
|-------------------------------------------------------------------------|------------|
| <i>4 No. cable percussive boreholes with rotary open hole follow on</i> | <i>G/E</i> |
| <i>Trial pitting to depths between 3m and 4m</i>                        | <i>G/E</i> |
| <i>Soil percolation testing</i>                                         | <i>G</i>   |
| <i>Shallow gas monitoring installations</i>                             | <i>E</i>   |
| <i>Chemical testing comprising Metals, PAHs, TPH CWG and asbestos.</i>  | <i>E</i>   |
| <i>Geotechnical testing</i>                                             | <i>G</i>   |
| <i>Monitoring</i>                                                       | <i>E</i>   |

**Note**      **Environmental (E) / Geotechnical (G)**

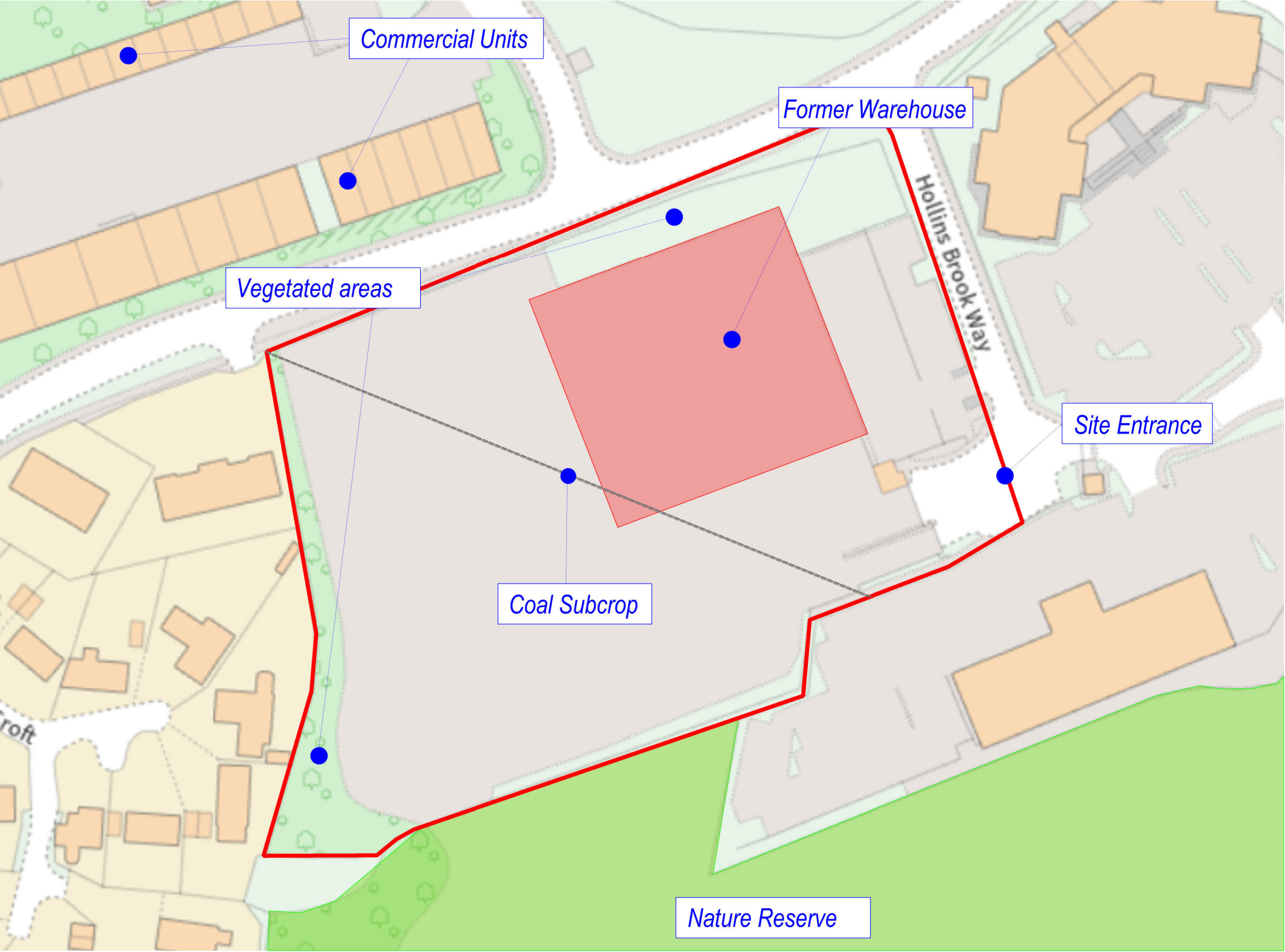


## APPENDIX 1 - Plans



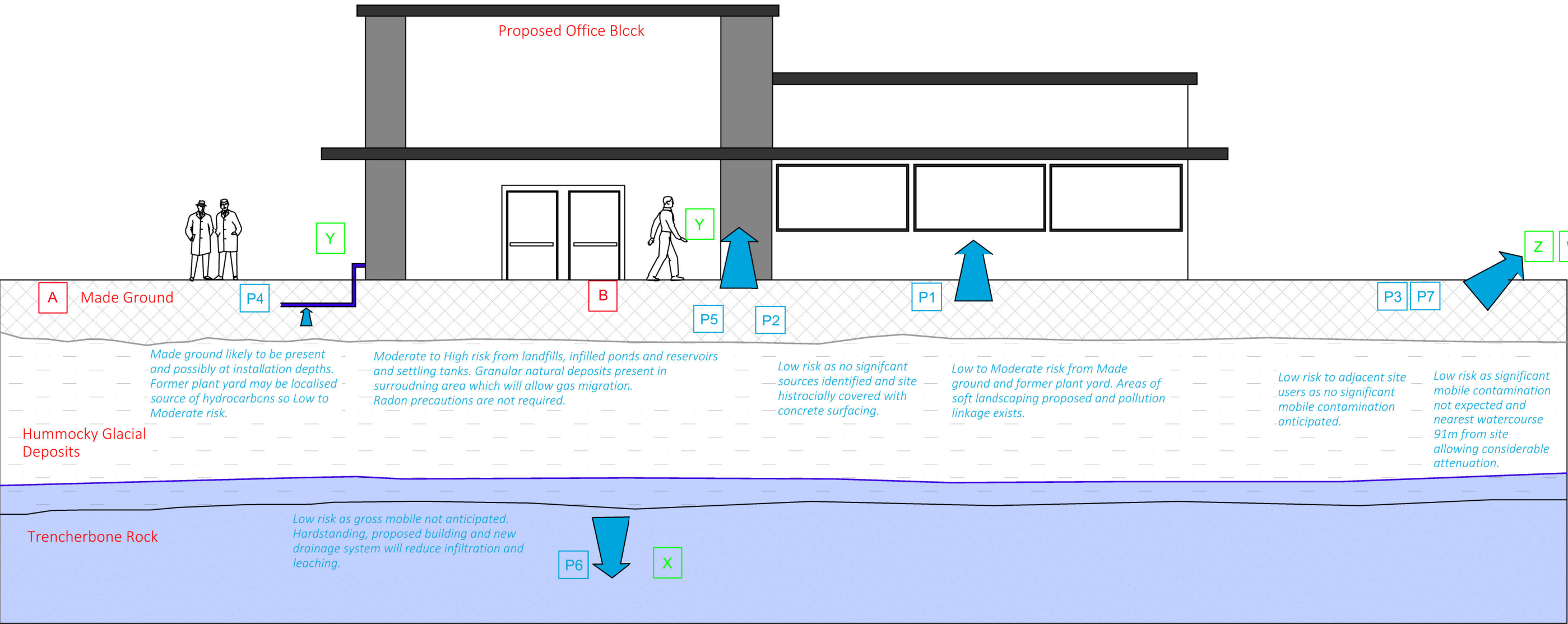
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| <div>GROUNDTECH</div> <div>CONSULTING</div> <div></div> | <div>CLIENT</div> <div>JD SPORTS</div>                     | <div>DATE</div> <div>JANUARY 2022</div>         |      |         |      | <div>Status</div> <div>Preliminary</div> <div>Draft</div> <div>Issued</div> <div>For Comment</div> <div>Approved</div> | <div>Notes</div> <div> - Site Location</div> |
|                                                         | <div>PROJECT TITLE</div> <div>NEW OFFICE BLOCK, BURY</div> | <div>SCALE</div> <div>NTS</div>                 |      |         |      |                                                                                                                        |                                              |
|                                                         | <div>PLAN TITLE</div> <div>PROJECT LOCATION PLAN</div>     | <div>PLAN NUMBER</div> <div>GRO-21438-P01</div> |      |         |      |                                                                                                                        |                                              |
|                                                         |                                                            |                                                 | Rev. | Details | Date |                                                                                                                        |                                              |
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|                                                         | JD SPORTS                                | JANUARY 2022  |  |  | Preliminary |             |       |
|                                                         | PROJECT TITLE                            | SCALE         |  |  | Draft       |             |       |
|                                                         | NEW OFFICE BLOCK, BURY                   | NTS           |  |  | Issued      | <div></div> |       |
|                                                         | PLAN TITLE                               | PLAN NUMBER   |  |  | For Comment |             |       |
|                                                         | PRELIMINARY DEVELOPMENT CONSTRAINTS PLAN | GRO-21438-P02 |  |  | Approved    |             |       |
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| SOURCES                                                           | POLLUTION LINKAGES                                                                                                                                                                                                                                                                                                                                                                                              | RECEPTORS                                                                                                                              |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <p>A. Contaminated soils / Made ground.</p> <p>B. Ground gas.</p> | <p>P1. Ingestion of soil and dust.</p> <p>P2. Inhalation of vapour.</p> <p>P3. Inhalation of soil dust by adjacent site users.</p> <p>P4. Attacking of potable water supply pipe.</p> <p>P5. Migration and accumulation of ground gas in internal places.</p> <p>P6. Impaction of groundwater from soil contamination.</p> <p>P7. Migration of soil and groundwater contamination impacting surface waters.</p> | <p>W. Hollins Brook</p> <p>X. Groundwater within the Secondary A Aquifer.</p> <p>Y. Site end users.</p> <p>Z. Adjacent site users.</p> |



|                                                          |                              |               |      |         |      |             |       |
|----------------------------------------------------------|------------------------------|---------------|------|---------|------|-------------|-------|
| <div>GROUNDTECH</div> <div>CONSULTING</div> <div>G</div> | CLIENT                       | DATE          |      |         |      | Status      | Notes |
|                                                          | JD SPORTS                    | JANUARY 2022  |      |         |      | Preliminary |       |
|                                                          | PROJECT TITLE                | SCALE         |      |         |      | Draft       |       |
|                                                          | NEW OFFICE BLOCK, BURY       | NTS           |      |         |      | Issued      |       |
|                                                          | PLAN TITLE                   | PLAN NUMBER   |      |         |      | For Comment |       |
|                                                          | PRELIMINARY ILLUSTRATIVE CSM | GRO-21438-P03 | Rev. | Details | Date | Approved    |       |





## APPENDIX 2 - Site Photographs



*Photograph 1 – General site photo looking North West.*



*Photograph 2 – Site photo showcasing the position of the old A-Plant Unit facing west.*



*Photograph 3 – Photo of the site entrance.*



*Photograph 4 – General site photo looking generally east.*



Photograph 5 – General site photo looking north.



Photograph 6 – General site photo of access gate.



## APPENDIX 3 - Historical Plans

# County Series 1:10,560 scale

## VEGETATION



Fir Wood



Deciduous Wood



Mixed Wood



Brushwood



Orchard



Reeds



Rough Pasture



Furze



Marsh



Osiers

## ROADS



Railway over Road



Road over Railway



Road over River or Canal



Level Crossing



Railway over River



Road over Stream



Road over Stream



Sunken Road



Raised Road

## RAILWAYS



Double Lines of Railway



Single Lines of Railway and Tramway

## GENERAL FEATURES



Gravel Pit



Sand Pit



Quarry



Shingle



Other Pits



Antiquities, Site of



Arrow, showing direction of flow of water



Trigonometrical Station

## BOUNDARIES



County Boundary



Parish Boundary



Contours



Parliamentary Division Boundary



Union Boundary



Rural District Boundary

# National Grid 1:10,000 scale

## HEIGHTS (METRES)

Values are given in metres above mean sea level at Newlyn.

Surface heights determined by ground survey 163m  
air survey 162m

Bench marks and their values are shown on large scale maps, and bench mark lists containing fuller and possibly later levelling information are obtainable from the Director General, Ordnance Survey.

Contours are at 5 metres vertical interval.

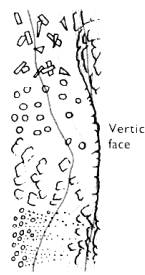
## ROCK FEATURES

Loose rock

Boulders

Outcrop

Scree



## CONVERSION SCALE

Metres - Feet

2000 Metres 6500 Feet

6000

5000

1500

4000

## ABBREVIATIONS

BP,BS Boundary Post or Stone  
Ch Church  
CH Club House  
F Sta Fire Station  
FB Foot Bridge  
Fn Fountain  
GP Guide Post  
MP,MS Mile Post or Stone  
P Pole or Post  
Pol Sta Police Station

PO Post Office  
PC Public Convenience  
PH Public House  
S Stone  
Spr Spring  
TCB Telephone Call Box  
TCP Telephone Call Post  
TH Town Hall  
W Well  
Y Youth hostel

## ROADS

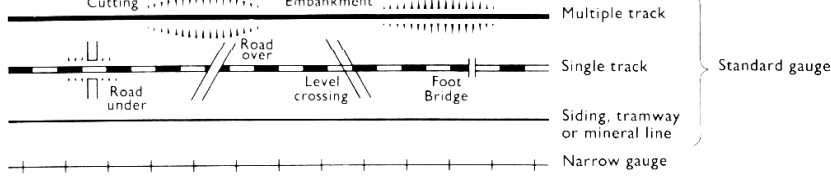
Road

Track

Where unfenced shown by pecked lines.

Path

## RAILWAYS



## GENERAL FEATURES

Antiquity, (site of)

Boulders

Building

Pylon

Pole

Glasshouse

Triangulation station

Lake, loch or pond

Sloping masonry

= Chalk pit, clay pit or quarry

= Gravel pit

= Sand pit

Refuse or slag heap

Direction of flow of water

Shingle

Sand

## VEGETATION

Bracken, rough grassland

Scrub

Heath

Marsh

Saltings

Reeds

Coppice

Orchard

Coniferous trees

Non-coniferous trees

In some areas bracken ( ) and rough grassland ( ) are shown separately.



GroundSure

# Historical Map Pack Legend

# County Series & National Grid 1:10,560 scale

Information present on these legends is sourced from the same Ordnance Survey mapping as the maps used in this product.

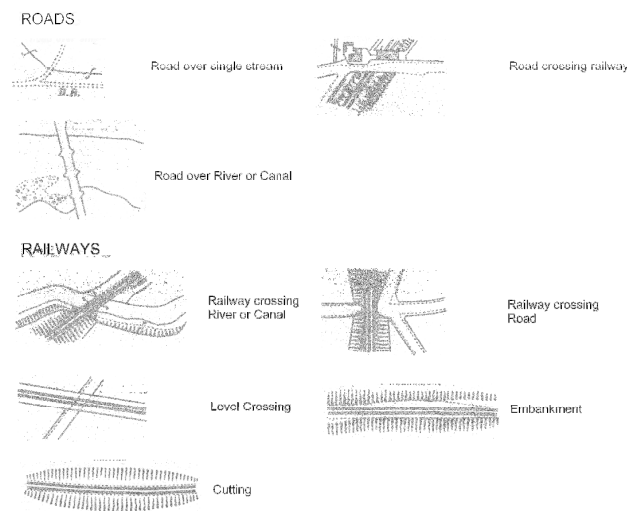
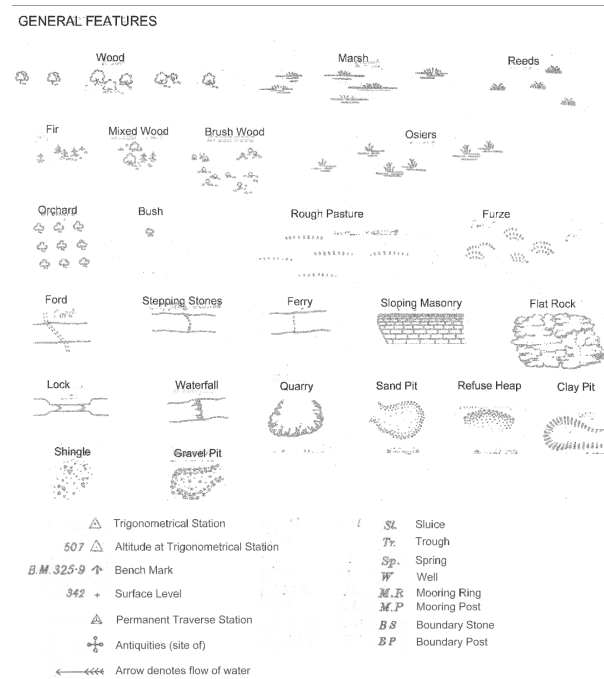
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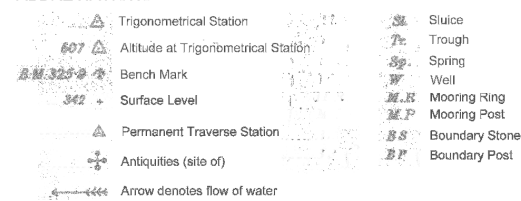
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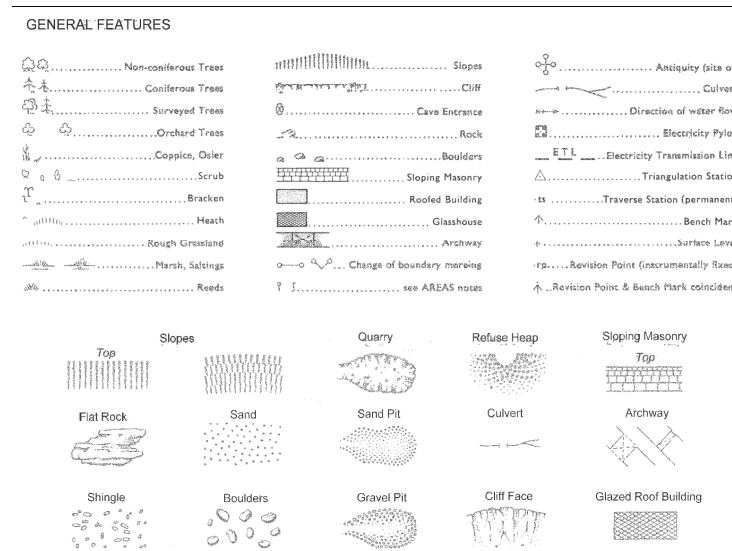
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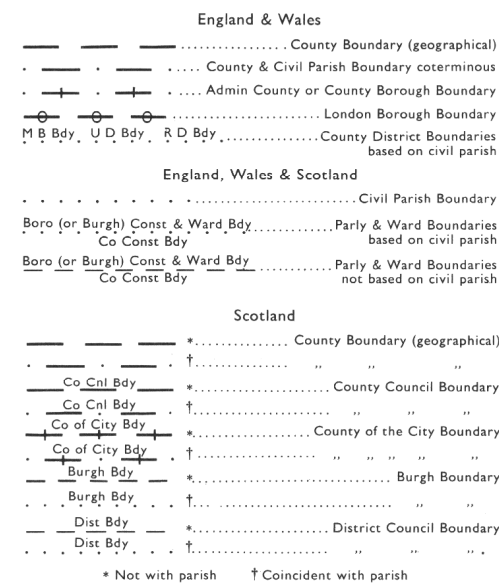
### ABBREVIATIONS



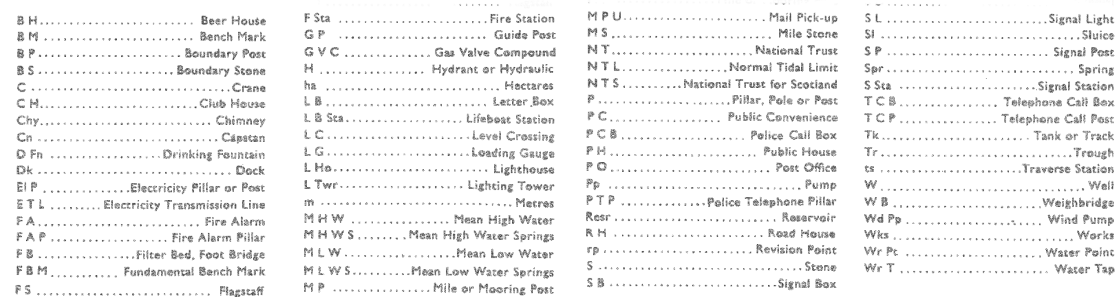
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### BOUNDARIES



### ABBREVIATIONS



## Historical Map Pack Legend

### County Series

### 1:1,250 scale

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### County Series & National Grid

### 1:2,500 scale

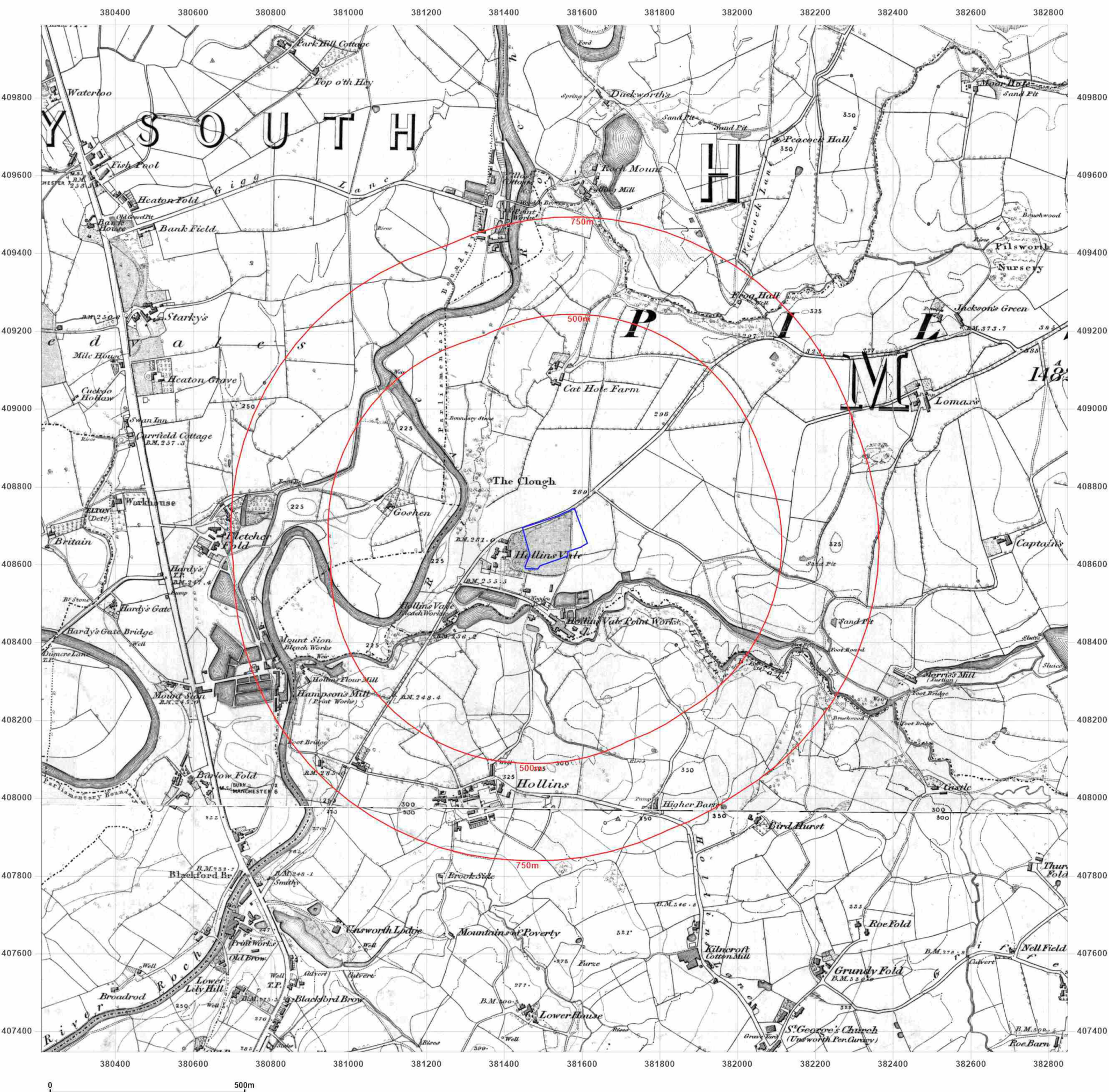
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Bury, Plisworth Road, Bury, BL9  
8RD

Client Ref: EMS\_745837\_970188  
Report Ref: EMS-745837\_970188  
Grid Ref: 381529, 408666

Map Name: County Series

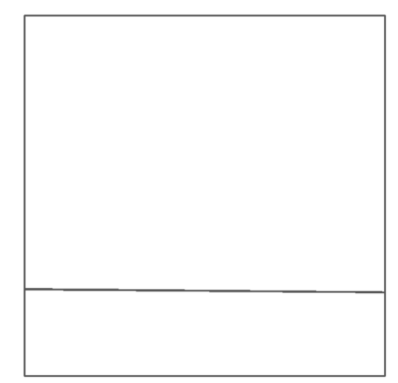
Map date: 1848-1851

Scale: 1:10,560

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**Report Ref:** EMS-745837\_970188  
**Grid Ref:** 381529, 408666

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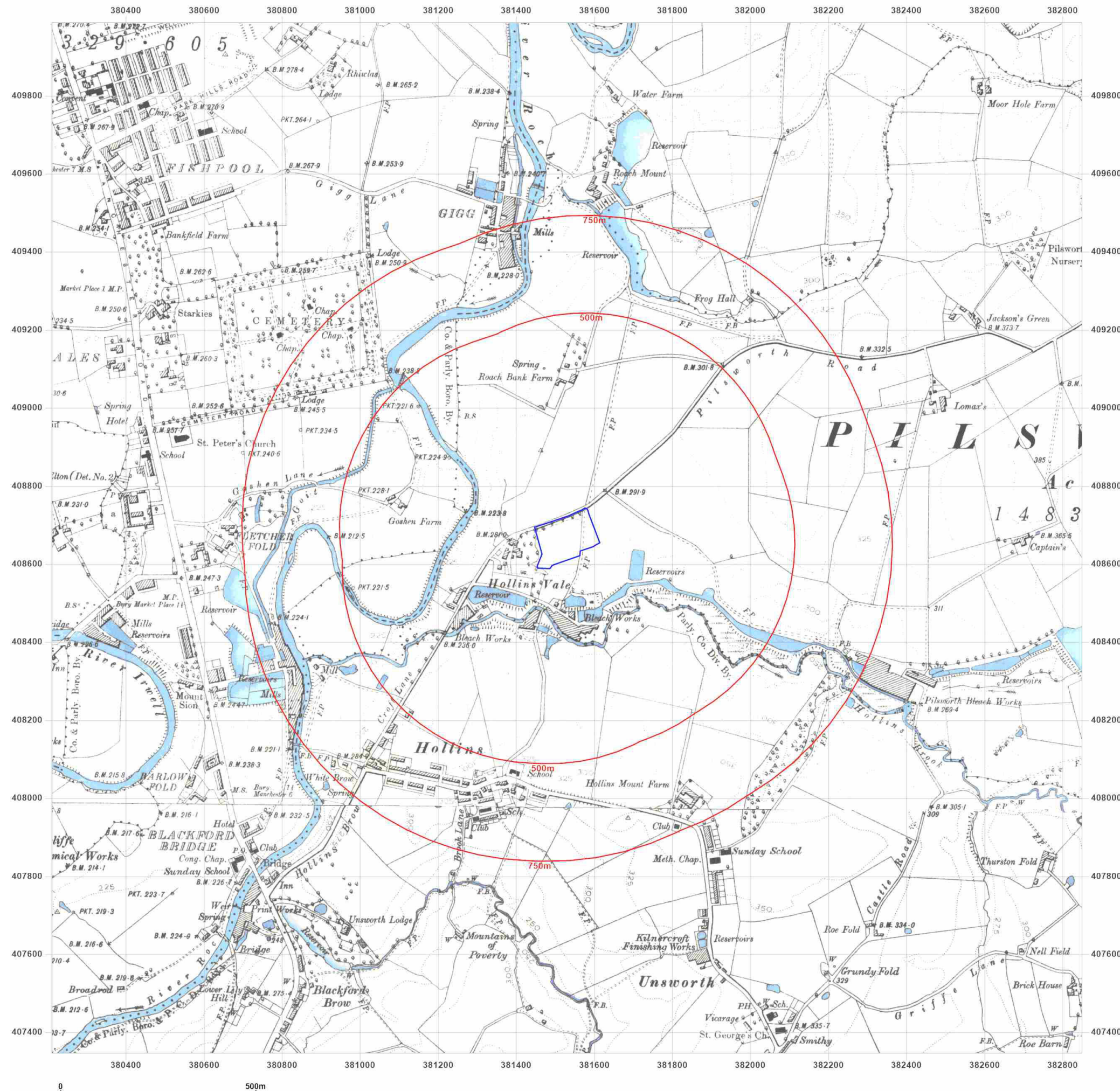


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**Report Ref:** EMS-745837\_970188  
**Grid Ref:** 381529, 408666

**Map Name:** County Series

**Map date:** 1907-1908

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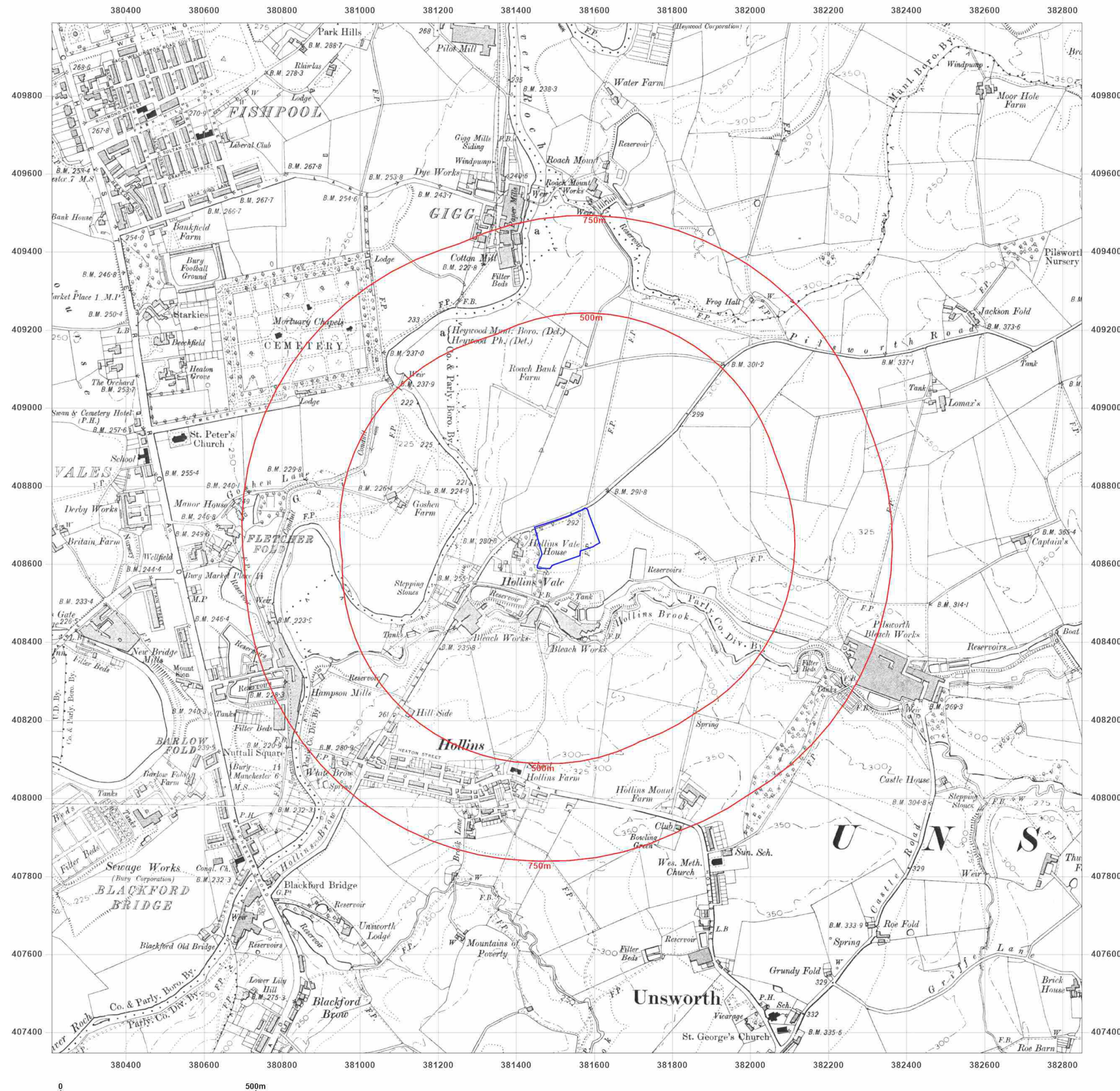


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**Grid Ref:** 381529, 408666

**Map Name:** County Series

**Map date:** 1928-1932

**Scale:** 1:10,560

**Printed at:** 1:10,560



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