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Our ref: 8353si

Site Investigation Report

for Land Adjacent to

Bealey Industrial Estate,

Radcliffe

For: Westchurch Homes Ltd
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Date of Report: 8 November 2024

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1.0 Introduction

This report is the findings of a site investigation on the ground conditions, contamination aspects and anticipated engineering/foundation requirements for a proposed residential development on land adjacent to Bealey Industrial Estate, Radcliffe. The site is proposed for development by Westchurch Homes Ltd, hereafter referred to as Westchurch Homes, comprising of a residential development of 84 No. residential dwellings, together with vehicular / pedestrian access, open space, landscaping, and other related infrastructure. The dwellings comprise traditional residential housing, comprising of a combination of detached, semi-detached, 3-4 block mews and 2 storey apartment buildings. The houses are assumed to be 2 storeys in height. The proposed development layout is shown on Westchurch Homes Proposed Site Layout, referenced SL01. An extract of the planning layout is overlain on Coopers Drawing No. 8353/RP, within Appendix 13. It is also assumed that all materials and workmanship will comply with the Building Regulations and the Premier Guarantee Technical Manual.

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The accuracy of map extracts cannot be guaranteed and it should be recognised that different conditions on /adjacent the site may have existed between and subsequent to the various map surveys. Historical map extracts are produced as an appendix Report by Groundsure under licence from Ordnance Survey. Coopers can reproduce and use these extracts in this report under their Ordnance Survey Licence No. AL100005579.

Where data supplied by others, including that from previous investigations, has been used it has been assumed that the information is correct. No responsibility can be accepted by Coopers for inaccuracies within the data supplied by others. We would advise that our client makes their own detailed enquiries to the Local Authorities to determine any additional planning constraints which may be applied to this site and which have not been identified within this report.

The results of the exploratory holes explorations are based upon the facts established from observations and field tests. It should be recognised that strata may vary considerably from point to point and the groundwater regime may be influenced by seasonal or other factors. While every attempt is made to assess the likelihood and extent of such variations, conditions may nevertheless exist which are undisclosed by this investigation.

This report has been prepared in accordance with the Building Regulations Part C (2004) and complies with the requirements associated with the planning guidance. This report should address the conditions placed within the planning conditions regarding the ground conditions and contamination. The scope of this report complies with the criteria for certification under the Initial Assessment including the Desk Study, the Walkover Survey, and the Basic Investigation (D4). This report constitutes a Phase I and II report in accordance with LCMR. The report is also prepared in accordance with BS10175: 2011+A2:2017, and complies with Phase 1 (Preliminary Investigation), and Phase 2 (Exploratory Investigation) investigation.

The further actions deemed necessary to be completed prior to development of the proposed site for residential development have been listed in Section 27 of this report. The full extent of further actions may not be limited to those issues stated and, during the course of the development, additional further actions may be required.

The report should be read in its entirety, including all associated drawings and appendices. Coopers cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context.

Arboricultural Survey and advice on arboricultural issues are considered to be outside the scope of this report except for their effect on the foundations to the proposed buildings. Where identification of any species is made, especially invasive plants such as Japanese Knotweed, Himalayan Balsam or Giant Hogweed, this should only be considered as a preliminary assessment and subject to confirmation by a professional Arboriculturist. Coopers take no responsibility for failing to identify, or the incorrect identification of, any tree or plant species on site.

This report is prepared and written in the context of the purposes stated above and should not be used in a different context. Furthermore, new information, improved practices and legislation may necessitate an alteration to this report in whole or in part after its submission. Therefore, with any change in circumstances or after the expiry of one year from the date of this Report, the report should be referred to Coopers for reappraisal.

2.0 Executive Summary

Grid Reference	SJ 797 081 (Refer to Drawing No. 8353/L1 in Appendix 13).
Approximate Area	4.79 Acres (1.94 Hectares)
Development Proposals (Section 3)	The site is proposed for development by Westchurch Homes, comprising of a residential development of 84 No. dwellings together with vehicular / pedestrian access, open space, landscaping and other related infrastructure. The dwellings comprise traditional housing of detached, semi-detached and 3-4 block mews residential houses assumed to be 2 storeys in height.
Site Investigation Data (Appendices 4 & 5)	Coopers undertook the following: • 9 No. mechanical excavated trial pits (referenced TP01 to TP09) up to 3.0m in depth. • 13 No. small diameter boreholes (referenced WS01 to WS09 and WS101 to WS103), drilled up to 5.45m in depth. Investigation limited to open areas of the site, outside of areas of services and dense vegetation.
Site Description (Sections 4 and 5)	The site consisted of rough open ground with dense vegetation and commercial units from Bealey Industrial Estate. Extensive areas of Japanese Knotweed and Himalayan Balsam have been noted. Locations of fly tipping identified, including suspected Asbestos Containing Materials (ACMs). The adjacent land consisted of open land to the north west, housing to the north east and south east, and Bealey Industrial Estate to the south west. A telecoms mast was present close to the site boundary.
Site History (Section 7)	The desk study data records the site to have consisted of agricultural land from 1850. From 1891 the north western parts of the site consisted of a reservoir and settling tanks to the adjacent Broad Dumers Paper Works, located to the south west of the site. A raised tramway was recorded within the site. In the 1980's the reservoir and settling tanks were infilled and the paper works occupied by the existing Bealey Industrial Estate. The land to the south of the site (beyond Dumers Lane) was the former Bealey's Bleach and Chemical Works, now occupied by housing. A diverted channel of water, named Bealey's Goit, ran from the River Irwell to the north west of the site and fed the onsite reservoir and channelled water to the former bleach & chemical works. An offshoot from Bealey's Goit is considered likely to be culverted in the southern part of the site.
Hazardous Installations and Development Constraints (Section 8)	Recorded hazardous installations are present within 500m of the site, including 1 No. existing Control of Major Accident Hazards (COMAH) site, located 150m to the west of the site at Eton Hill Industrial Estate. Numerous registers of hazardous and dangerous substances, pollution inventories and associated licenses are recorded on the industrial estates within the local area. It is advisable to hold consultation with the local authority regarding any specialist reports or information needed in relation to the proposed development.
Utility Locations (Section 8.0)	Live services are recorded within the site, including overhead and below ground electricity, 2 No. electrical substations, below ground telecoms cables connecting to the offsite telecoms mast, water, gas, culvert, and sewers. Service trace information has also identified unrecorded services.
Geology, Hydrology & Hydrogeology (Section 10)	**Drift** – Alluvium. **Bedrock** – Pennine Middle Coal Measures. Majority of the site is Peel Hall Rock Unit (Sandstone), and southern areas undifferentiated (mudstone/siltstone/sandstone). Bedrock based upon BGS boreholes is anticipated to be circa 20m. **Geological Faults** – 1 No. fault crossing the site north west/south east. **Groundwater** – Site not within a groundwater source protection zone. Drift and Bedrock recorded as Secondary A Aquifer. No active groundwater abstraction licenses recorded close to the site (closest recorded 1.7km). **Hydrology** – Closest watercourse is remaining section of Bealey's Goit, located to the north of the site. **Flood Risk** – Outside of recorded zones of flooding from rivers, seas or reservoirs. **Subsidence Hazards** – Environmental data reports references the site is generally designated as very low to negligible risks, with risk of compressible ground recorded as moderate due to the presence of alluvium. **Mineral Safeguarding** – The site is outside of any defined mineral safeguarding area. **Oil and Gas Production** – Negligible risk relating to future oil and gas generation beneath the site.
Environmental, Archaeological, Ecological and Conservation Issues (Section 11)	Consultation with Bury Council (Appendix 1) highlighted the that Bealey's Goit close to the site is defined as part of a Site of Biological Importance (SBI). Consultation advised with specialists in these fields and Local Authority regarding any limitations or requirements for additional surveys and assessments.
Coal Mining and Brine Extraction (Section 12)	**Brine Subsidence** – The site is not within a zone of potential impact from brine subsidence. **Coal Mining** – The site is within a Coal Authority reporting area but not within a defined as a high-risk development area. The assessment has identified the site to be outside of the defined areas of potential shallow coal mining. Coopers have completed a review and assessment based upon the desk study data, which defines the site as not requiring mine treatment works.

Ground Conditions (Section 15)	**Hardstanding and Remnant Substructures** – Surface tarmac and concrete hardstanding within industrial unit areas. Anticipated that remnant substructures to former buildings and reservoir will be present within the site, to be cleared prior to development. **Topsoil** – Encountered in open parts of the site, sandy/gravelly silt with inclusions of fragmented brick, concrete, glass, plastic and ash. **Madeground** – Generally shallow (<1.1m) to absent to the south of the former tramway, and relatively deeper to the north (up to 2.7m). Former reservoir is >4.45m deep and filled with materials including areas of visible fragmented ACMs (cement bound). **Natural Drift Strata** – alluvium highly varied, primarily soft/firm clay, very loose/loose sand, and loose to medium dense gravel. Localised areas of soft silt and peat identified. Deeper stiff glacial clay identified. **Bedrock** – Not encountered (anticipated to be circa 20m depth). **Groundwater** – frequent shallow perched groundwater. Commonly 2m to 3m depth, but variable and in placed <1m.
Radon (Section 13)	<1% of buildings above action threshold – No radon protection measures are required.
Landfill Sites & Ground Gases (Section 9 and 17)	**Landfills** - The former reservoir/settling tanks part of the site are recorded as a pre-licensed historical landfill. Bury Council record this was filled with inert and construction wastes in 1982 with further raising of levels with materials from former buildings completed in 1989. The types of wastes are not likely to be highly organic although pre-licensed inert landfills and construction wastes commonly include materials with the potential to degrade. Investigations have identified timber, fuel and ACMs within the reservoir infill. **Gas Monitoring** - Phased gas monitoring is ongoing. Current results indicate negligible hazardous ground gas and flow rates across the site, with slightly elevated methane associated with the former reservoir/landfill. **Mitigation Measures** - Subject to completion of the ground gas monitoring it is assumed that plots within the vicinity of the former reservoir/tanks and landfill would require Characteristic Situation 2 (CS2) mitigation measures. All other areas require no mitigation measures Construction details for gas mitigation measures have been provided in Appendix 13.
Contamination and Waste (Sections 16, 18 and 19)	**Conceptual Model** – Primary risks associated with madeground across the site, contaminants from former and current industry, including historical filled reservoir (landfill). Potential PCBs from electrical substations. Historical tramway with potential fuels/oils/creosote. **Contamination Testing** – Contaminants identified within shallow strata, including metals, PAH compounds, asbestos fibres and ACM debris. Former reservoir contains an area of petroleum range hydrocarbons and visible frequent fragments cement ACMs (verified by ACM testing). **Remediation –** Removal of TPH impacted soils from reservoir and picking of ACMs. Cover systems with gardens/landscaping. **Waste** – Cut and Fill proposals required. Any reuse of soils require Material Management Plans would be required with CL:AIRE registered DoW-CoP. **Soil Disposal** – Should soil disposal be required the majority of the soils would likely be designated as inert or non-hazardous waste. ACMs and any materials from reservoir likely to be hazardous waste. **Potable Water** – Potable water supply pipelines are expected to be standard Polyethylene pipes upon removal of TPH impacted soils from reservoir. **Further Works** – Further investigation and testing of soils from areas of current commercial use and electrical substations upon site clearance. Further water sampling during ongoing gas monitoring. Any reuse of soils to be subject to material management plan and CL:AIRE registration to comply with DoW-CoP.
Sub-Soil Classification (Section 20)	Concrete Classification (Based on BRE Special Digest 1 **All Strata - DS-1, AC-1/AC-1s, DC-1** Shrinkage Potential **Alluvial Clays** – High Shrinkage Potential
Trees (Section 21)	Trees present on and adjacent to the site with potential heave influence to foundation designs.
Ground Floor Slabs (Section 22)	Based upon the ground investigation the floor slab construction the following slab types are proposed: Precast suspended floor slabs (block and beam).
Anticipated Foundations (Section 23)	The majority of the shallow strata are unsuitable for conventional foundations. Subject to cut and fill proposals areas of loose to medium dense and medium dense gravels may allow local areas of conventional strip/trench fill foundations, although likely the majority of the foundations will be piled. Heave precautions required for pile designs within areas of trees and alluvial cohesive strata.
Dewatering and Trench Side Stability (Section 24 and 25)	Trench Stability – Short term trench stability is likely for shallow excavations. Where trenches are to being left open, deeper trenches, or persons to enter trenches these need to be fully supported or battered (where feasible to do so). Dewatering – Variable perched waters, commonly 2-3m although locally <1m. Dewatering likely to be required for deeper excavations Traditional soakaways – unsuitable due to variable drift strata, madeground and areas of shallow perched groundwater.

Road Sub-Grade (Section 26)	Following site clearance, vegetation removal and earthworks where regrading levels, the anticipated roads and car parking sub-grade materials are likely to comprise alluvial strata, madeground or engineered fills. Anticipated CBRs of <2% in majority of alluvial strata, CBR values of >5% anticipated in gravels (subject to proof rolling). Materials to be placed in road corridors will require placement and rolling to an engineering specification.
Further Actions (Section 27)	**Further action which Coopers consider will be required to progress the development status could include, but not necessarily be limited to: -** • Submit site investigation report for Local Authority approval. • Complete ground gas monitoring and further water sampling from monitoring wells and report on findings. • The final proposals for gas mitigation measures required will need to be specified and designs justified in accordance with BS8485. • Provide external works/levels to determine cut and fill proposals. • Remediation and enabling works strategy required. • Subject to proposed cutting and fill an earthworks strategy may be required. • Undertake additional investigation and testing of soils within the area of current commercial use, including electrical substations, concurrent with demolition. • Report on the findings of the investigation during the demolition to finalise remediation proposals for formal approval with the local authority. • Undertake predevelopment remediation works to include picking/removal of Asbestos Containing Materials from reservoir/landfill area and localised removal of petroleum hydrocarbon impacted soils. • Development Phase Remediation and Validation, to include cover systems in gardens and gas mitigation measures near to the former reservoir/landfills. • Produce Material Management Plan (MMP) for the reuse of soils on site. • Registration of intention for reuse of soils on site following CL:AIRE: DoW-CoP.

3.0 Proposed Development

(Refer to Appendix 13)

The site is proposed for development by Westchurch Homes, comprising of a residential development of 84 dwellings, together with vehicular / pedestrian access, open space, landscaping, and other related infrastructure. The dwellings comprise traditional residential housing, comprising of a combination of detached, semi-detached and 3-4 block mews and 2 storey apartment buildings. The houses are assumed to be 2 storeys in height. The proposed development layout is shown on Westchurch Homes Proposed Site Layout, referenced SL01. An extract of the planning layout is overlain on Coopers Drawing No. 8353/RP, within Appendix 13. It is also assumed that all materials and workmanship will comply with the Building Regulations and the Premier Guarantee Technical Manual.

4.0 Site Location

(Refer to Appendix 13)

The 4.79 acre (1.94 ha) site was located site is located approximately 1.58km to the north-east of Radcliffe Town Centre at National Grid Reference SJ 797 081. Access to the proposed site was located off Wild Street and the adjacent Bealey Industrial Estate located to the north west of Dumers Lane (A6053). The location of the site is shown on Drawing No. 8353/L1 in Appendix 13.

The surrounding area was residential housing to the north east, east, south east, and south, industrial units of Bealey Industrial Estate to the south west, west, and open land/trees to the north west (refer to Figure 1).

Figure 1 Annotated aerial photo recording approximate site boundary. Image date 21 April 2022, from Google Earth

5.0 Site Description

(Refer to the Site Plan in Appendix 13)

5.1 Site Walkover

Information obtained during the site walkover has been presented alongside data from the site investigation on the Site Plan, Drawing No. 8353/01 in Appendix 13.

The site was of an irregular shape generally wider in the north and narrowing towards the south. The northern and the central eastern parts of the site were a mixture of grassed areas and dense vegetation with self-seeded saplings and mature trees to parts (refer to Photographs 1 & 2).

Photograph 1: Showing the northern most point of the site, an opened grassed area with vegetation surrounding and the overhead power line that crosses the site

Photograph 2: Showing the central part of the site with a mixture of grassed areas with dense vegetation, mature trees and self-seeded saplings

Further assessment of the vegetation in these areas identified the presence of the invasive species, Himalayan Balsam (refer to Photograph 3) and Japanese Knotweed as both early growth and last year's dead vegetation (refer to Photograph 4). This became more prominent in the north western areas of the site.

Photograph 3: Showing the presence of Himalayan Balsam an invasive species in the north of the site, located adjacent to Japanese Knotweed

Photograph 4: Showing the visible signs of Japanese Knotweed as both early growth and last year's dead vegetation

A security fence dissected the central area of the site originating from the south eastern boundary before terminating at the western boundary. An embankment was present in the northern area of the site prompting a rise in topography towards the north west (refer to Photograph 5). Beyond the embankment a dilapidated steel framed structure and a large low level concrete structure were present (refer to Photograph 6), dense vegetation prevented further access towards the south and the possibility of uncovering any other features in this area.

Photograph 5: Showing the embankment in the central part of the site prompting a rise in the topography

Photograph 6: Showing the dilapidated steel framed structure and large low level concrete structure

There were significant signs of fly tipping across the eastern and central parts of the site with a variety of household waste including possible ACMs (refer to Photograph 7). A large shipping style container was also present in the central area of the site again containing household waste (refer to Photograph 8).

Photograph 7: Showing the presence of possible ACMs within the fly tipping present on site

Photograph 8: Showing large shipping container containing household waste in the central area of the site

The central and southern area of the site was part of Bealey Industrial Estate with storage compounds consisting of steel containers, storage for vehicles and a fireworks shop operating out of a unit in the central areas (refer to Photograph 9).

Moving towards the south, areas were occupied by parking for both coaches and cars. A hand car washing business was present along with a takeaway business again operating out of a small unit in the southern most part of the site (refer to Photograph 10).

Photograph 9: Showing the firework shop located in one of the units as part of Bealey Industrial Estate located in the central area of the site

Photograph 10: Showing the businesses at the southern most part of the site, a hand carwash and a takeaway

Beyond the north east and south east boundaries of the site was residential housing. Beyond the north western boundary was part of Bealey's Goit and an open grassed field. The southern western boundary consisted of industrial units that are part of Bealey Industrial Estate.

There are numerous underground services present on the site mainly in the north western, central and southern areas of the site. An overhead power line was present in the far north of the site, originating on site before passing through the north western boundary and continuing off site (refer to Photograph 1).

It was noted at the time of the site walkover that site investigation works in certain areas of the site would be restricted due to access from the dense vegetation, the embankment, the presence of Japanese knotweed and Himalayan Balsam, possible ACMs and areas of the site that are currently in use as part of Bealey Industrial Estate.

6.0 Previous Investigations and Scope of Works

6.1 Summary of Previous Investigations On/Close to Site:

Westchurch Homes stated no previous investigations for the ground had been supplied by the vendor. Consultations with Bury Council (Appendix 1) referenced a previous ground investigation had been supplied to the Council for the northern part of the site and the land to the north of the site, included in the following:

- Leyden Kirkby Associates (LKA) "Ground Investigation and Risk Assessment Report", referenced CL1192-02, Draft A, dated 30 November 2007.

The Council were able to supply a copy for review, but stated the information would be subject to copyright and hence have no reliance on the information provided, and the data has not been included within this report. The LKA report included inconsistencies, where the exploratory hole references differed between the plan, logs, and testing (site plan references the window samples as WS1-WS12, but the logs provided are WS101-WS112, the chemical test results reference samples WS102-WS108, then WS9-WS12).

The LKA report included a total of 5 No. exploratory holes close to the Westchurch Homes development area (hereafter referenced as "the site"). These identified reworked topsoil overlying madeground to depths of between 1.2m to 2.4m onto loose or medium dense sand and gravel onto deeper wet gravel and cobbles, with layers of very soft clay. The madeground deposits were primarily loose ash and clinker with inclusions of fragmented brick, coal and glass, with layers/areas of reworked clay with inclusions of gravel comprising ash, clinker and brick.

The LKA report included chemical testing of 6 No. recovered samples from areas close to the site, including 4 No. madeground and 2 No. samples of natural strata. The 2 No. natural samples were both referenced as from the same exploratory hole and depth, but identified different results, likely to be a referencing error. The samples within the site were scheduled for metals, PAH (16), phenols, pH, Loss on Ignition, 2:1 water soluble sulphate, asbestos, TPH-CWG and BTEX. Contaminants identified within the site are as follows:

- Arsenic (1 of 6 samples) at 40mg/kg.
- Lead (1 of 6 samples) at 480mg/kg.
- Zinc (1 of 6 samples) at 330mg/kg.
- Copper (1 of 6 samples) at 230mg/kg.
- Naphthalene (2 of 6 samples) at up to 9.4mg/kg.
- Benzo(a)anthracene (2 of 6 samples) at up to 8.7mg/kg.
- Benzo(b)fluoranthene (3 of 6 samples) at up to 11mg/kg.
- Benzo(a)pyrene (2 of 6 samples) at up to 13mg/kg.
- Dibenzo(a,h)anthracene (3 of 6 samples) at up to 1mg/kg.

6.2 Scope of Works:

The scope of works for investigations were outlined within emails and conversations between Westchurch Homes and Coopers, following initial review of background information on the context of the site. The works were to comprise a combined Phase I and II Site Investigation, with standard consultations and appraisals for proposed residential development.

Parts of the site was largely considered inaccessible for ground investigations due to either existing commercial use, fencing or vegetation. Westchurch Homes undertook works to clear the eastern part of the site for access by a small diameter drilling rig, although areas were still limited by topography, vegetation and suspected invasive plant species (Japanese Knotweed). The limitations on investigation are referenced on Coopers Drawing No. 8353/01 - Site Plan in Appendix 13 and areas permitted for investigation are highlighted green in Figure 2 (below).

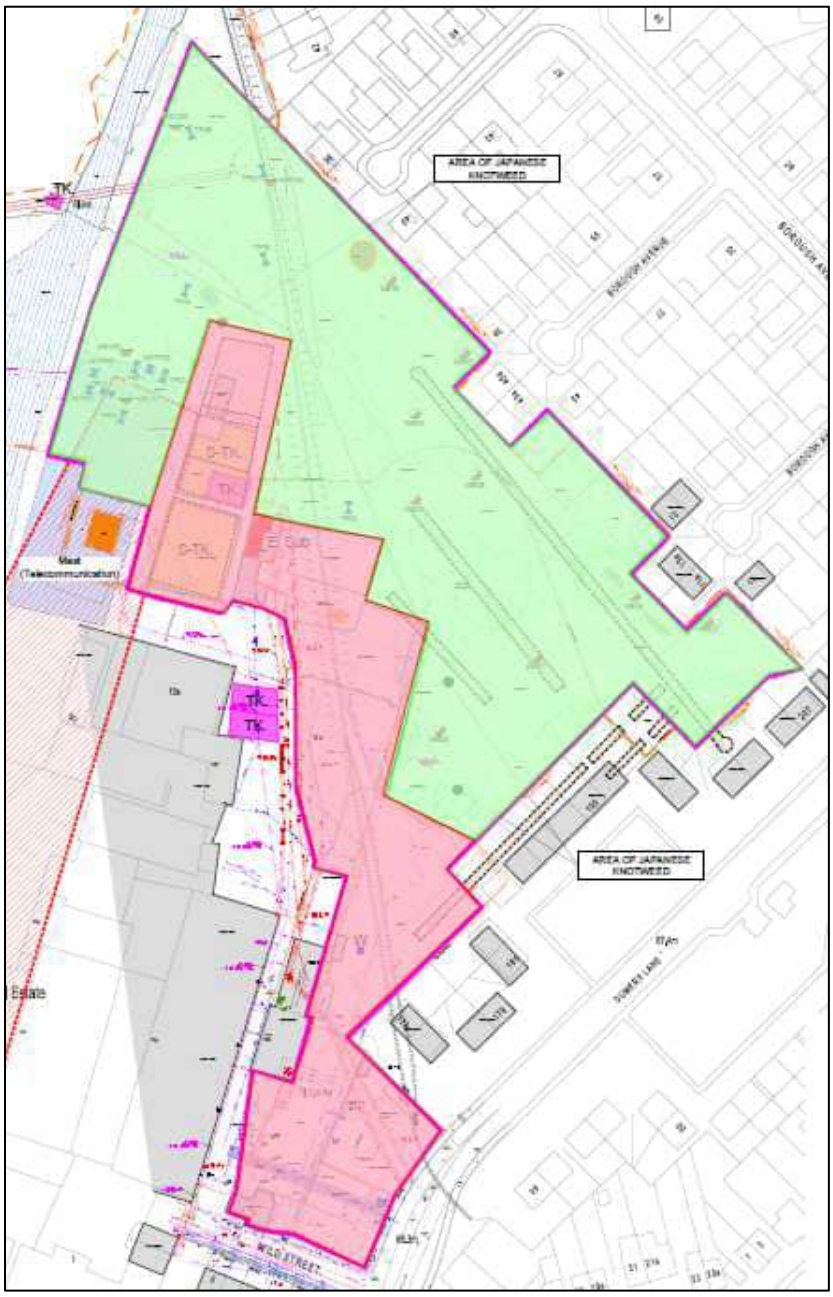


Figure 2: Annotated Extract of Coopers Site Plan, with shading of investigation areas, green shading defining area available for investigation, and pink defining inaccessible areas

7.0 Site History

(Refer to Appendices 1, 3, and 13)

7.1 Sources of Information

The following site history has been compiled from various sources, these include review of information supplied in house information, literature review and further consultations/reports.

A full copy of the historical Ordnance Survey (OS) maps generated by Groundsure are provided in Appendix 3 (note the maps include a wider site area to the north, proposed at the initial stages of site appraisal).

A summary of the historical use of the site and surrounding area was provided by Bury Council's Environmental Protection Officer within the environmental search request (Appendix 1), which included historical OS maps and historical aerial photography.

Historical aerial photography has been reviewed from those available to the public on the Historic England website, and other sources.

7.2 Early History

An artificial cut channel of water, referenced as Bealey's Goit passes adjacent to the site, which was referenced as constructed around 1760 to carry water from the River Irwell to Bealey's Bleachworks on Dumers Lane to the south of the site.

7.3 Ordnance Survey Maps

The site straddles the boundary of 4 No. different map sheets. These were not all updated at the same time and the map sheets provided include stitching of sheets from similar times.

1850/1851 (1:10,560): The first edition Ordnance Survey map recorded the site to have consisted of parts of 2 No. fields, separated by a field boundary, running approximately north/south. A reservoir for Bealey's Goit was situated beyond the north western site boundary with a secondary smaller channel from the reservoir passed through the southern part of the site feeding reservoirs for the referenced "Bleach Works" and "Vitriol Manufactory" to the south of the site.

Dumers Lane was recorded adjacent to the southern boundary. A cotton mill, referend as Eaton Hill was recorded approximately 125m to the west of the site, which included a reservoir and gasometer.

1891/1893 (1:500, 1:2,500 and 1:10,560): Reservoirs and filter beds were referenced in the north western part of the site, associated with the adjacent "Broad Dumers Works (Paper)" constructed to the south west of the site. A tramway was recorded crossing the site from north to south connecting to the referenced bleach and chemical works. A railway siding with adjacent well was recorded in the southern part of the site.

The higher resolution maps recorded terraced housing to the south and south east of the site off Dumers Lane. 2 No. gasometers were recorded for the referenced "Radcliffe Bleach & Chemical Works" works, the closest was approximately 25m to the south east of the site. A small chemical works was referenced approximately 80m to the east of the site. The gasometers to Eaton Hill Cotton Mill were not recorded.

1908/1910 (1:2,500 and 1:10,560): These Ordnance Survey maps recorded the tramway to be raised above the adjacent ground. Eaton Hill Mill was referenced as a dyeing mill.

1930/1932 (1:2,500 and 1:10,560): The 1932 maps no longer recorded the tramway and well within the site, and the smaller filter beds in the east were removed. A series of rectangular referenced tanks were located beyond to the western site boundary (adjacent). The gasometers and eastern half of the bleach/chemical works to the south of the site had been demolished and referenced as "Radcliffe Bleaching Works".

1937/1938 (1:2,500 and 1:10,560): No significant changes to the site. A residential housing estate was constructed to the immediate east of the site.

1955/1956 (1:1:250, 1:2,500 and 1:10,560): The maps record changes to the filter beds in the north west of the site, which were referenced as 2 No. settling tanks, smaller outbuilding, a tank and an electrical substation (refer to Figure 3). The former tramway through the site was recorded as a footpath.

The wider reservoir section of Bealey's Goit reservoir to the north west of the site was recorded as marsh. The demolished part of Radcliffe Bleach Works was identified as raised with spoil mounds.

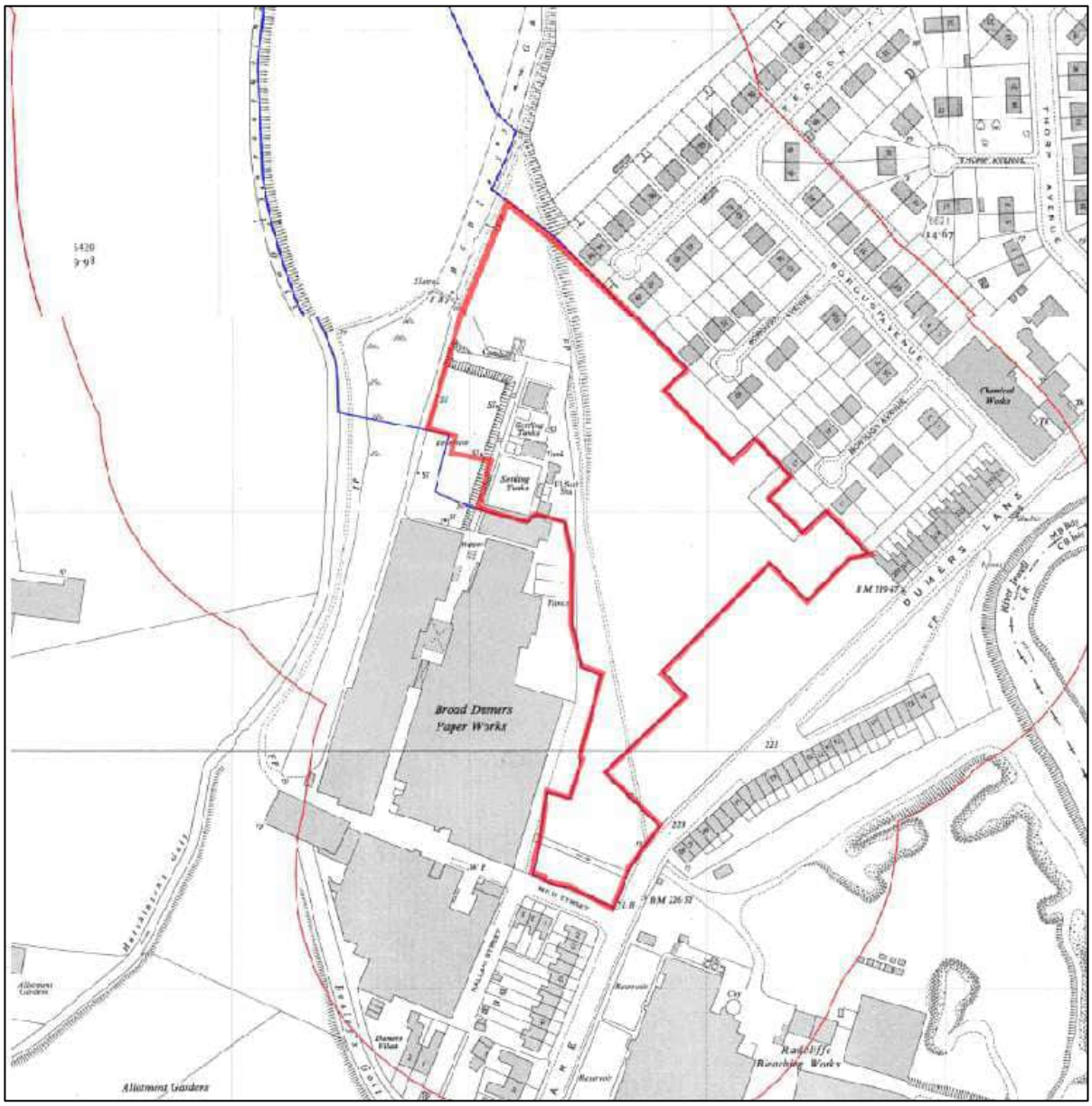


Figure 3: Extract of stitched versions of the 1955/1956 OS Map, 1:1,250 and 1:2,500 scale editions with approximate site boundary recorded in red

1965 (1:10,560): A referenced "Factory and Hostel" was established approximately 250m to the north east of the site

1975/1977/1980 (1,1250 & 1:10,000): The tank adjacent to the settling tanks in the west were removed and replaced with 3 No. cylindrical tanks. The smaller channel from Bealey's Goit/Reservoirs to the bleachworks within the southern part of the site was not recorded/culverted. A series of suspected garages to the adjacent housing estate were identified in the south eastern part of the site. A small unreferenced building was recorded in the southern part of the site.

New residential houses construction to the end of the cul-de-sac housing to the east and residential houses to the south of the site. A new residential housing estate was built to the north east of the site. The rectangular tanks to the west of the site boundary were replaced with 2 No. tanks within housing and a large tank (all cylindrical). The former small chemical works to 80m to the east of the site was demolished and replaced with housing. The spoil mounds on the demolished part of Radcliffe Bleach Works were not recorded. Additional works buildings were recorded approximately 50m to the west of the site.

1985/1986/1988 (1,1250 & 1:10,000): The reservoir and settling tanks were not recorded within the north western part of the site. The former Broad Dumers Paper Works to the south west of the site was recorded as Bealey Industrial Estate and a new electrical substation recorded adjacent to the southern part of the western site boundary. The bleach works to the south of the site was demolished and cleared. The Eaton Hill Dye Works, 125m to the west of the site, was recorded as an undefined works. The works buildings approximately 50m to the west of the site were referenced as part of an industrial estate off Eton Hill Road.

1992/1994/1995/2001: (1:1,250 & 1:10,000): The garages to the residential buildings in the south eastern part of the site were demolished and land cleared. The former bleach works to the south of the site was replaced with residential housing.

2003/2010: (1:1,250 & 1:10,000): No significant changes on the site. The wider section of Bealey's Goit/reservoir was infilled/not recorded, with the water course terminating adjacent to the site boundary (although potential culverted sections). Parts of the Bealey Industrial Estate to the south of the site was expanded with new outbuildings.

2024 (1:10,000): No significant changes to the site or surrounding area.

7.4 Historical Aerial Photographic Records

A review of available aerial photography for the site has been undertaken, with aerial photography supplied by Bury Council within their Environmental Search Request (Appendix 1), aerial photographic records held by Historic England and images from Google Earth.

Figure 4: Annotated aerial photograph of the site on 12 June 1948 with approximate site boundary (image from Historic England)

The first aerial photographs obtained for the site are from 1948 (Figure 4) with evidence of potential disturbed ground within open parts of the site. The subsequent images from 1979 and 1989 (supplied by Bury Council – Appendix 1) record the changes between the paper mill and the industrial estate, including infilling of sections of Bealey's Goit adjacent to the site and the reservoir/settling tanks within the site.

Images from the late 1990's onward record parts of the open land within the site divided by fencing, and establishment of small commercial buildings associated with the industrial units in the central and southern parts of the site. A telecoms mast was established adjacent to the site between 2003 and 2005. Areas of woodland and vegetation growth were recorded progressively and established by 2013. Aerial photography from 2017 records surface debris in open areas adjacent to some of the trading units and evidence of potential fly tipped wastes adjacent to fencing of residential properties adjoining the site. Fencing was erected extending a residential garden into the site was established between 31 January 2022 and 21 April 2022.

8.0 Hazardous Installations and Development Constraints

(Refer to Appendix 2 and Site Plan in Appendix 13).

8.1 **Findings**

The Groundsure Enviro+Geo Insight report (Appendix 2) includes details for the site and additional land to the north as part of the wider initial assessment area.

Dangerous/Hazardous Sites: The environmental data report details that within 500m of the site there are no recorded regulated explosive sites, radioactive substance authorisations or radioactive waste sites. There are registers of various other potential hazardous/dangerous sites within 500m of the site and consultation is advised with the local authority regarding any potential limitations to development associated with these processes. The registered sites within 500m of the site are:

- 2 No. recorded COMAH (Control of Major Accident Hazards)
- 2 No. hazardous substance storage/use.
- 4 No. List 1 Dangerous Substance Sites.
- 3 No. List 2 Dangerous Substance Sites.
- 2 No. Pollution Inventory Sites,
- 2 No. Pollution Inventory Waste Transfer Sites.
- 24 No. Part A(1) regulated industries for release of pollutants.
- 6 No. Part A(2) regulated industries for licensed pollutant release.

The closest COMAH site is approximately 150m to west of the site, located at Eton Hill Industrial Estate, relating to "Fragrance Oils International Ltd" defined as a COMAH Lower Tier Operator. The second COMAH site is recorded to be approximately 310m to the north east of the site, relating to a historical COMAH site by J and W Whewell Limited at Newbridge Chemical Works, also defined as COMAH Lower Tier Operator. Both of the COHAH sites are also designated as sites where Hazardous Substance Storage/Usage consent was granted under the Planning (Hazardous Substances) Regulations.

The List 1 Dangerous Substance sites relate to regulated discharge of dangerous materials. 3 No. of the sites are located 300-325m to the south of the site, relating to active and historical release of pentachlorophenol to the River Irwell from a sewage treatment works (1 No. active, 1 No. historic) and a dyeing and finishing company (active). The other recorded release is >500m to the north of the site (recorded in the report due to change in site boundary).

The List 2 Dangerous Substance sites relate to regulated discharges of dangerous materials. These are located circa 250m to the west, and 2 No. located circa 300m to the south east. The site 250m to the west is related to release of chromium and copper (no defined receiving water bodies) from Bep Surface Technologies, and the sites 300m to the south east are release of pentachlorophenol (archived - now redesignated as List 1) from Georgia Pacific BG Ltd (no defined receiving water bodies), and release of various hazardous substances from Bury Waste Water Treatment Works to the River Irwell.

The Pollution Inventory Sites are located 252m west and 443m south west of the site relating to metal works and surface treatment processes releasing various particulate matter, hazardous gases and metals to the air and waste water. The same sites are also recorded as Pollution Inventory waste transfer sites relating to recovery and disposal of wastes from the air and waste water.

The 24 No. recorded industries with records of installations regulated under Part A(1) of the Environmental Permitting Regulations for release of substances to the environment located >200m from the site. These relate to various chemical works, use of solvents and metal works. There are also 6 No. Part A(2) installations relating to licensed pollution release, of which 3 No. are within 200m of the site, relating to coating processes, bulk cement, and waste oil burning at sites on Bealey Industrial Estate, and Eton Hill Estate.

Pollution Incidents: 10 No. within 500m of the site, all of which are rated as minor. 2 No. of the pollution incidents are recorded on the site, in the areas of the existing premises, categorised as impacting the land with inert materials and wastes, described as "construction and demolition materials and wastes", both recorded on 1 July 2002.

Discharge Consents: There are 49 No. revoked discharge consents within 500m of the site. The majority of the discharge consents are revoked, with 5 No. active consents. The active consents all relate to water companies discharge of sewage to the River Irwell, the closest is located 53m south east of the site.

Current/Historical Land Uses: The Groundsure Report identifies that historical OS maps identify that within 500m of the site there are 311 No. historical industrial features, 257 No. historical tanks and 76 No. historical energy features, reflective of the industrial history of the sites (refer to Section 7 for details of the history of the site and the surrounding area).

There are 48 No. current recorded industrial land uses within 250m of the site, primarily related to local industrial/trading estates. Within the site there are defined tanks, pylons, masts and substations.

Conservation and Ecology Designations: The Groundsure Report details that within 2000m of the site the following environmental designations are present:

- 2 No. SSSI impact risk Zone, onsite and surround area, relating to rapid initial assessments of potential risks to a SSSI from developments associated with potential uses which could pose risks to the SSSI. The developments with potential risk are aviation sites, air pollution sites, and energy generation via combustion sites.
- 4 No. Natural England designated Local Nature Reserves, located 1532m east (Hollins Vale)) and 1703-1753m south west (3 No. sites all designated as Chapelfield).
- 6 No. designated area of greenbelt, located east/south of the site (56m+) and west/north west (300m+).

It is advisable to commission ecological surveys to determine any significant conservation and ecological limitations.

Invasive Weeds: Coopers site walkover identified widespread Japanese Knotweed on the site and local areas of Himalayan Balsam. It is understood that specialists are involved with identifying any invasive weeds and are ongoing with a program of treatment works.

Hazardous Building Materials: As detailed within Coopers' site description (Section 5), at the time of the walkover there were buildings within the site which are considered to potentially comprise of Asbestos Containing Materials (ACMs), and areas of suspected fly tipped ACMs were also observed.

Reviews of historical mapping records former buildings on the site which have been subject to historical demolition. These buildings may have contained hazardous materials, such as asbestos with the potential to be dispersed into the soils during historical demolition.

Live Utilities: Utilities plans have been provided indicating the presence of live services, the positions of which are overlain on Coopers Site Plan, Drawing No. 8353/01 in Appendix 13. Overhead 6kV and underground 11kV electricity and 2 No. electrical substations are identified on the site. An offsite telecommunications mast is present adjacent to the site, with the electricity and telecoms cables feeding the mast passing through the site. Water connections and a suspected culvert are identified in the southern part of the site. The developer has also provided copies of a utilities trace for the site.

8.2 **Conclusions**

Based on the findings of our review there are no significant hazardous installations or likely development limitations, although consultation is required with the local authority regarding potential impacts from the land designations in the region.

9.0 Landfill Sites and Infilled Ground

(Refer to Appendix 1 & 2)

9.1 **Findings**

According to the Groundsure Report (Appendix 2) and Bury Council (Appendix 1) the former reservoir/settling tanks within the site are designated as a historical landfill. The reservoir/tanks continue to the south of the site and are referenced by Bury Council as have been filled with inert and construction waste. The filling was pre-licensing but subject to planning permission which was granted in 1982. The area was further raised with materials from the levelled buildings.

The Council's report also references that local areas of filling within the influencing distance of the site may have been carried out for which no records are held.

Further discussions on risks posed from contaminated land and ground gas risks associated with the former landfill are provided within Section 17.

10.0 Geology, Hydrology & Hydrogeology

10.1 **General**

The following section is based upon desk study information only. For details of the findings of the ground investigation and ground conditions refer to Section 14. The following sources of information have been assessed:

- 1:10,560 scale British Geological Survey - Geological Map, Lancashire County Series, Sheet 87SE.
- 1:10,560 scale British Geological Survey - Geological Map, Lancashire County Series, Sheet 88SW.
- 1:10,560 scale British Geological Survey - Geological Map, Lancashire County Series, Sheet 95NE.
- 1:10,560 scale British Geological Survey - Geological Map, Lancashire County Series, Sheet 96NW.
- 1:50,000 scale online maps – British Geological Survey (BGS) website.
- Groundsure Report (Appendix 1).
- Coal Authority Consultants Coal Mining Report, referenced 51003405517001, dated 15 February 2024.

10.2 **Drift**

The geological maps record the site to contain alluvium drift strata which is recent (<11,800 years old).

10.3 Bedrock

Geological mapping records the north eastern half of the site to be underlain by Sandstone (Peel Hall Rock Unit) of the Pennine Middle Coal Measures, which is Carboniferous in age (315.2-318 Ma). The south western half of the site is underlain by undifferentiated Mudstone, Siltstone and sandstone of the Pennine Middle Coal Measures which are carboniferous in age (309.5-318Ma). No coal seams outcrop beneath the site.

The BGS boreholes approximately 300m to the south and south west, and 450m to the north west identify bedrock to be the region of 20m below ground level.

Figure 5: Extract of Groundsure 1:50,000 scale bedrock geology map

10.4 Geological Faults

An unnamed geological fault crosses the site in a north west/south east trend which downthrows to the south west.

10.5 Groundwater Vulnerability and Hydrogeology

The drift and bedrock geology is designated as a "Secondary A Aquifer", described as "*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.*"

The Groundsure Report (Appendix 1) references the site to lie outside of a groundwater source protection zone.

There are 5 No. historical potable water ground water abstractions recorded within 2000m of the site, relating to 2 No. sites, located 1700m south (Total Fitness Gym), and 1914m (Castlebrook Water Company), both of which are within separate fault blocks to the site. There are 2 No. active groundwater abstraction licenses and 15 No. historical ground water abstraction licenses within 2000m of the site. The active licenses relate to Bury Golf Club for irrigation, located 1169m to the south east of the site and Danish Crown UK Ltd (process water), located 1992m south east of the site, both within separate fault blocks. The historical licensed abstractions are located >1000m from the site, relating to a variety of uses including irrigation, pollution remediation, general cooling, process water, and expired versions of the active permits (all different fault blocks from the site).

10.6 Hydrology

The closest surface water receptor to the site is a section of Bealey's Goit which runs to the north of the site. The surface water is a historical cut to divert water from the River Irwell for use at a former bleach/dye works to the south of the site. The watercourse terminates close to the site, although sections are likely to be culverted within the site, based upon the historical maps, and current surface position in the region.

10.7 Flood Risk

The site is not located within 50m of any areas recorded to be at risk of potential flooding from rivers and seas, which is defined as less than a 1:1000 chance in any given year. There are no records of historical flood events, flood defences, or flood storage areas within 250m of the site.

Site specific assessments of flood risks are not part of the remit of this report and reference should be made to parties undertaking the site specific flood risk assessments for any specialist advice is recommended to assess flood risks, and drainage requirements relative to the development proposals, where required.

10.8 Mineral Safeguarding

Summary
Where mineral resources are present the mineral planning authority may designate areas as Mineral Safeguarding Areas (MSA) and Mineral Consultation Areas (MCA). These are aimed to safeguard areas from unnecessary sterilization by non-mineral development, and consultation with the local authority is advised to confirm if they have any local mineral safeguarding concerns regarding the site.

Bury Council have defined MSAs under the Greater Manchester Joint Minerals Plan, which are recorded on the Bury Council's Policy Map on their website. The map records no defined MSAs within on close to the site.

10.9 Oil and Gas Production

The UK government has placed a moratorium on unconventional extraction of onshore natural gas via hydraulic fracturing (or fracking) of shales (primarily Bowland Shale Formation – within Carboniferous bedrock). As with most parts of north west England and north Wales the geological conditions exist which are locally favourable for small scale onshore gas production via fracking. Subject to political and socio-economic considerations there is potential that the fracking of shale gases may occur locally in the future, which would be subject to regulatory and planning obligations.

The BGS Mineral resources map for Greater Manchester outlines the region has perceived poor hydrocarbon prospectivity for conventional oil and gas production with historical exploration within the carboniferous strata within minor hydrocarbon shows identified. The map outlines the potential for future coal bed methane (CBM) extraction within the region is primarily associated with abandoned coal mines in the western areas of Greater Manchester.

The potential for future oil and gas production impacting the site is therefore considered as negligible.

10.10 Subsidence Hazards

The Groundsure Report notes that the site is designated as low, very low risk, or negligible risk from collapsible ground, ground dissolution, landslides, shrinking and swelling clays, and running sands. The site is defined as at moderate risk of compressible ground, related to the presence of alluvium. The report references that "*Compressibility and uneven settlement hazards are probably present. Land use should consider specifically the compressibility and variability of the site.*"

The subsidence risk outlined in the Groundsure Report relates to natural ground and does not account for the site specific ground conditions established through ground investigations, outlined within this report.

11.0 Environmental, Archaeological, Ecological and Conservation Issues

(Refer to Appendix 1 and 2)

11.1 General

The determination of important archaeological, ecological or conservation constraints would require assessments by suitably qualified persons and are considered beyond the scope for appraisal within this report.

The Bury Council's Environmental Search Report highlights that the section of Bealey's Goit close to the site boundary is defined as part of a defined "*Site of Biological Importance*" (SBI) referenced as "*Swan Lodge*". 49 No. SBIs have been defined within the Bury region, which are referenced as subject to surveys by Greater Manchester Ecology Unit.

Further information of the ecological or conservation considerations for development on the site would be detailed within reports from the ecological consultants.

11.2 Conclusions

Based on the findings of our desk study, we do not anticipate that the site is likely to be significantly affected by environmental, archaeological, ecological, or conservation issues. It is advisable to contact the Local Authority Planning Department regarding any limitations or restrictions associated with the proposed development and any further requirements for surveys/reports by specialists in these fields.

12.0 Mining and Brine Extraction

(Refer to Appendix 1 to 5 and 13)

12.1 Brine Subsidence

The Groundsure Report (Appendix 2) defines the site as being outside of a zone of historical brine abstraction, with no soluble rocks identified. The site is therefore not at risk of brine subsidence.

12.2 Coal Mining – Summary

The site is outside of a Development High Risk Area, therefore does not require a Coal Mining Risk Assessment (CMRA) to be submitted to the Local Planning Authority for the proposed development. Desk study information supplied demonstrated the presence of recorded mine workings at depths of 195m to 368m beneath the site. The Coal Authority Consultants Coal Mining Report (Appendix 4) relates to an original wider site area, which contained the subcrop of 2 No. coal seams. The seams and projected shallow mining influence related to these seams are now outside of the site. Due to the proximity of seams and a geological fault crossing the site a Coal Mining Risk Assessment has been provided below.

12.3 Coal Mining - Consultation Areas and Risk Designation

According to the Groundsure Report (Appendix 2) the site is within a coal mining area, where coal mining reports would be required. The gov.uk website by The Coal Authority, titled "*Planning Applications and Coal Mining Risk Assessment*", updated 17 September 2024, provides advice on the requirements for planning applications within areas of defined coalfields. The guide details the areas underlain by a coalfield are split into "*Development Low Risk Areas*" and "*Development High Risk Areas*".

The Coal Authority define a Development Low Risk Area is *"where past coal mining activity has taken place at sufficient depth that it is likely to pose a low risk to new development"* and a Development High Risk Areas is "*where recorded coal mining risks are present at the surface or shallow depth and are likely to affect new development*".

Development High Risk Areas are defined within parts of the coalfield where the following items are recorded:

- Mine entries;
- Shallow coal workings (recorded and probable);
- Workable coal seam outcrops;
- Mine gas sites and areas;
- Recorded coal mining related hazards;
- Geological features (including fissures and break lines);
- Former surface mining sites.

Where sites are within a defined Development High Risk Area, most planning applications require submission of Coal Mining Risk Assessments (CMRA) to the Local Planning Authority (LPA), where The Coal Authority will be a Statutory Consultee to the LPA.

The Coal Authority Consultants Coal Mining Report (Appendix 4). The report referenced the presence of the outcrop of coal seams within the original search area including the White seam and RAMS seam. The seams are separated by a geological fault which downthrows to the south west. The revised site boundary now identifies the seams to outcrop approximately 100m north (White seam) and 80m to the west (Rams seam). The seams dip to the south and south east with defined zones of probable shallow coal mining not impacting the site. The outcrop locations have been correlated with 1:10,560 scale BGS maps (site spans 4 No. map editions), with annotations recording the revised site boundary and seams in relation to Coal Authority and BGS maps provided in Figure 6 (below).

Figure 6: Annotated extract of The Coal Authority map with overlays of BGS 1:10,560 scale maps, referenced coal seams an names, and revised site boundary (pink)

12.4 Coal Mining Risk Assessment – Contents.

The Coal Authority define the information which should be provided within the CMRA, including, comprising the following:

- **Introduction:** Site location, plan and description of the site. Description of the proposed development, including development layout plans, where possible.
- **Sources of Information**: Referenced information to include (but not limited to) up to date The Coal Authority Consultants Coal Mining Report, site history based upon historical mapping, previous desk studies on or near the site, results of previous investigations on or near to the site.
- **Identification and Assessment of Site Specific Coal Mining Risks:** Referencing the types of risks identified, the interaction of the risks, along with the geological and hydrogeological factors influencing the risks. The identification and assessments are referenced as often a purely desk based study, but based upon documented evidence particular aspects can require intrusive site investigations (e.g. locating mine shafts). Where the assessments identify coal mining features exist there are requirements for more detailed discussion and assessment of the risks to the application site and proposed development.

- **Mitigation Strategy Proposals:** Where the assessments have identified coal mining risks to the proposed development the assessments are required to define the measures required to mitigate the risks. This can include items for adapting the development layout to avoid the risks and/or treatment works proposed to ensure the stability/safety associated with the mining features.
- **Conclusions:** The CMRA is to include a summary of the coal mining legacy risks, requirements for further investigations (if needed), and any measures recommended for treatment/mitigation to ensure the safety and stability of the proposed development in relation to the coal mining risks.

12.5 Coal Mining Risk Assessment – Introduction

A detailed description of the site location, site description and proposed development are provided within Sections 3 to 5 of this report, with drawings contained within Appendix 13 showing location, features and proposed development layout.

In summary: The site consists of open/vegetated ground and commercial units of an industrial estate in Radcliffe. The site is proposed for residential development of 84 No. traditional houses.

12.6 Coal Mining Risk Assessment – Sources of Information.

Coopers have undertaken a detailed review of the available relevant desk study information in relation to the coal mining legacy risks to the site. The following sources of information have been referenced within the mining assessment:

- British Geological Survey (BGS) - 1:10,560 scale Geological Map, Lancashire County Series, Sheet 87SE, 88SW, 95NE and 96NW (site spans the corners of 4 No. maps).
- British Geological Survey - 1:50,000 scale online maps –website.
- British Geological Survey – Borehole Records (online).
- Groundsure Report (Appendix 2).
- The Coal Authority – Consultants Coal Mining Report, reference 51003405517001, dated 15 February 2024 (Appendix 4).
- The Coal Authority - Website.

12.7 Coal Mining Risk Assessment – Identification and Assessment of Site Specific Coal Mining Risks:

General
As outlined previously the types of coal mining risks are grouped by The Coal Authority as follows:

- Mine entries;
- Shallow coal workings (recorded and probable);
- Workable coal seam outcrops;
- Mine gas sites and areas;
- Recorded coal mining related hazards;
- Geological features (including fissures and break lines);
- Former surface mining sites.

Mine Entries:
None on or close to the site.

Shallow Coal Workings (recorded and probable) and Workable Coal Seam Outcrops – Desk Study Data:

The Coal Authority Consultants Mining Report references the outcrop of White and Rams seams beneath the original site area with reference to probable shallow mine workings. The seams are recorded on the 1:10,560 scale BGS County Series maps. The Coal Authority website defines the extent of the probable shallow workings to terminate within the fault block to the west of the site adjacent to the western corner of the site, and close to the northern corner of the site.

The plans therefore identify the site as unaffected by recorded and probable mine workings or coal outcrops.

Mine Gas Sites/Areas:
Areas of open workings can pose a high risk of mine gas release which can have a risk to life, particularly where gases enter confined spaces such as buildings or trenches. The primary risks from mine gases are posed where accumulated in open workings which then migrate where displaced (commonly through either mine treatment or flooding after abandonment). Pathways for mine gas migration can be complex, migrating through mine entries, faults/fractures in the bedrock or by pathways created by development (e.g. vibro stone columns).

The Coal Authority report identified the shallowest recorded workings beneath the site was at a depth of 195m, and the last working of coal beneath the site was 1894. Given the depth and age of workings these are considered to be flooded and therefore would not contain a reservoir of gas for migration to the surface.

The Coal Authority report references there are no mine gas sites within 500m of the site.

The site is therefore considered to be unaffected by mine gas sites/areas.

Further discussions on the risks posed by hazardous ground gases are detailed in Section 17.

Recorded Coal Mining Hazards:
There are no referenced further coal mining hazards based upon the recorded information from the coal authority, desk study and ground investigations.

Geological Features (fissures and break lines):
Fault reactivations and fissures are documented within CIRIA C758 as a potential hazard associated with historical mining. Prediction of fault reactivations and fissures is difficult and it should not be presumed that faults within areas of mining will reactivate and that past reactivation does not mean ground movements will continue indefinitely. Fault zones and types require consideration in the context of the type and age of the mining as part of an initial appraisal. The mechanisms of fault reactivation have been referenced in detailed papers by Donnelly, L. (2006) outlining the mechanisms and identified locations specific to defined coal fields.

Fault reactivations are referenced to occur concurrently with mining subsidence, with influence of water regress postulated as a potential trigger mechanism. The number of occurrences of fault reactivations have decreased from the middle of the 1990's and no new claims or incidents were reported from April 2012 to the end of 2017. CIRIA C758 references that no confirmed observations of continuing or renewed reactivation of faults more than 10 to 15 years after completion of mining has occurred.

As discussed in Section 10.4, there are 2 No. geological faults crossing the site. The Coal Authority Mining Report references that no coal mining subsidence claims have been received within 50m of the site, indicative that fault reactivations have not occurred (as these would result in damage over an area). Given the mining ceased over 130 years ago the likely for fault reactivation is considered negligible.

Former surface mining sites (sometimes using historic opencast extraction methods):
The Coal Authority Consultants Report and associated plan (Appendix 4) details no opencast mining areas are recorded within 500m of the site. The site is therefore considered unaffected.

12.7 Non-Coal Mining

The Groundsure Report details the site is outside of a defined non-coal mining extraction area, therefore considered to not be influenced by non-coal mining.

12.8 Summary of Proposed Mining Treatment Works

No proposed mine treatment works are required.

13.0 Radon

(Refer to Appendix 1)

Radon is a naturally occurring radioactive gas with no visual or olfactory detection potential. Radon has no significant acute risk, however at higher concentrations the lifetime lung cancer risk is significantly increased. It is estimated that the annual number of lung cancer deaths in the UK as a result of high radon exposure from the ground is 1,100 persons per annum (*UK Health Security Agency website*).

In general the presence of other forms of gases supersede those of radon precaution measures from a design perspective, although this is subject to much current debate (particularly on the mitigation from acute risks at low mortality rates against chronic risks of much higher numbers of fatalities). Further discussions on hazardous ground gases are detailed in Section 17.

The Groundsure Report (Appendix 1) designates the site as within an area where less than 1% of properties are above the radon action level (revised site boundary). It should be noted that the BGS and UK Health Protection Agency updated the UK dataset for radon designations on 1 December 2022 and the report postdates this revision.

This is designated as a level where no radon protection measures are required for new buildings. As detailed in BR211 (2023), assessments and testing for radon ingress is only possible after occupation, therefore it is not possible to undertake on site monitoring of radon prior to construction.

14.0 Ground Investigation

(Refer to Appendices 5, 6 and 13).

14.1 Methodology

The ground investigation by Coopers was designed to disclose the typical ground conditions across the site and target potential abnormal ground conditions. The investigation works were phased due to limited accessibility to parts of the site due to existing site use, dense vegetation and invasive plant species.

There were limitations to the investigation areas and methods, associated with the existing site use, live services, and vegetation cover. The accessible parts of the site are defined on Coopers Drawing No. 8353/01 – Site Plan in Appendix 01.

Coopers undertook the following:

- 9 No. trial pits (referenced TP01 to TP09) up to 3m in depth.
- 13 No. small diameter boreholes (referenced WS01 to WS09 and WS101 to WS104), drilled up to 5.45m in depth.

The locations of the exploratory holes were positioned by laser measurements relative to topographic surveyed features. All exploratory hole positions are shown on Coopers Drawing No. 8353/01 in Appendix 13, with copies of exploratory hole logs contained in Appendix 5 and 6.

14.2 In-situ Testing

In situ testing including SPTs within the small diameter boreholes at 1m intervals and hand shear vanes within cohesive strata within trial pits and boreholes. These works provided specific geotechnical information for use in the foundation appraisal, contained in Section 20 and 23.

14.3 Monitoring Wells

Monitoring wells were installed within the small diameter boreholes to determine if hazardous ground gas was present and allow potential for further monitoring of shallow groundwaters. Details of the monitoring wells are provided on the boreholes logs and discussed in Section 17.7.

14.4 Sampling Strategy

Coopers' investigation and sampling looked to address the key aspects for the proposed site development with consideration of the previous uses of the site. This included coverage and targeting to identify typical ground conditions and potential variations with likely abnormal conditions. Coopers Drawing No. 8353/01 in Appendix 13 includes an overlay of the historical features, in conjunction with the exploratory holes by Coopers.

Types of laboratory suites by Coopers were scheduled for chemical testing based upon the likely types of contaminants in accordance with series of BS ISO 18400 (2018) "*Soil Quality – Sampling*" and visual/olfactory observations during the exploratory holes. The suites of testing by Coopers were reflective of the conceptual model and ground condition. The initial conceptual model and basis of the sampling strategy are discussed in further detail in Section 16 of this report.

Chemical and Geotechnical laboratory testing was commissioned by Coopers for testing by Derwentside Environmental Testing Services (DETS), and Murray Rix to define the typical properties of the strata.

Copies of the chemical test results are provided in Appendix 8 and the geotechnical testing in Appendix 9.

15.0 Ground Conditions Encountered

(Refer to Appendices 4, 5 and 13)

15.1 General

The investigation by Coopers was a targeted-adaptive approach, where positions were situated to target former features identified from the desk study information and where ground conditions varied selecting positions to allow delineation. Assumptions on average thickness of strata based upon exploratory hole numbers is therefore going to introduce a statistical bias due to the targeted investigation strategy.

15.2 Hardstanding, Foundations and Services

Surface tarmac and concrete hardstanding was identified within the industrial units in the southern parts of the site (refer to site description in Section 5). The investigations within the areas of the former reservoir and settling tanks in the north identified deep madeground and likely that remnant substructures are in situ (unable to bottom out).

15.3 Topsoil/Madeground (similar to topsoil)

All of Coopers exploratory holes identified topsoil or reworked topsoil to depths of between 0.3m to 0.6m. The topsoil was typically sandy to gravelly silt, with variable inclusions identified including fragmented brick, concrete, glass, plastic, and ash.

15.4 Madeground

Coopers identified madeground within 2 No. boreholes (WS03 and WS06) in the area outside of the former reservoirs/tanks to depths of 1.0m to 1.1m, consisting of reworked sands and clays with inclusions of fragmented brick, ash and clinker.

The madeground to the north of the former tramway was more variable, in places up to 2.7m (TP04 and TP06). The madeground within the reservoir was >4.45m (WS101) in depth. Some of the trial pits within the area of the reservoir were unable to be advance due to the presence of suspected asbestos containing materials (cement asbestos) within the soils (TP01). The general madeground was noted for inclusions of fragmented brick, concrete, plastic, ash and clinker.

The LKA investigation to the northern of the site identified the presence of deeper madeground within all their exploratory holes, recorded to depths of between 1.2m to 2.4m, consisting of reworked sands and clays with inclusions of fragmented brick, coal, glass, ash and clinker. The local authority references that the former reservoirs and settling tank within the site areas are designated as a landfill have been filled with construction and inert waste and buildings levelled to raise the levels. The filling was given planning permission in 1982 and the raising of levels in 1989. The depth of infill is unknown but could be in excess of 5m in depth.

Photographs 11 and 12: Showing nature of general madeground within trial pit TP02 (left) and the infill reservoir TP09 (right)

15.5 Natural Drift Strata

The geological maps define the presence of alluvium (sand, silt and clay), consisting of post glacial deposits, formed from detrital material deposits from watercourses (including floodplains). The Coopers boreholes identified the alluvium to comprise of layers of gravel, sand, silt, clay and peat. The sands were commonly loose in the upper strata, becoming medium dense or dense at depths, with localised areas of very loose sand. The upper clays varied between soft and firm, with deeper firm or stiff glacial clays identified in several locations.

The LKA investigation in the northern part of the site identified similar combinations of soft clay, loose and medium dense sand, sand & gravel, and gravel & cobbles, continuing to depths of at least 5m.

15.6 Bedrock

Bedrock was not encountered on site to depths of 5.45m. The BGS boreholes approximately 300m to the south and south west, and 450m to the north west identify bedrock to be the region of 20m below ground level.

15.7 Groundwater

Water entries were identified within the majority of the small diameter boreholes, and one of the trial pits, at depths of 0.6m to 3.0m. Perched groundwater was identified within 3 No. of the 9 No. monitoring wells at depths between 0.67m to 2.39m.

The ground investigation identified the majority of the trial pits to have groundwater as absent, with seepages or land drains identified within 5 No. of the 28 No. trial pits. The exploratory holes referenced iron staining on much of the recovered shallow strata, representing the pyritic nature of the rock types.

Discussions regarding potential contaminants related to controlled waters are contained within Section 16.

15.8 Further Investigation

As detailed previously, investigation areas were limited by the existing use, live services and areas of vegetation. Upon vacant possession of the site further investigation works will be required concurrent with the demolition. Areas of deeper madeground within the former reservoirs will require bottoming out, which are likely to require cable percussive boreholes.

16.0 Contamination Assessments

(Refer to Appendices 1-3, 5, 6, 7, 8, 10, 11, and 13)

16.1 General

Coopers were commissioned to undertake an intrusive investigation with assessment of potential contamination. The investigation was designed to target the potential sources of contaminants and delineate, where possible, the extent. No investigations were permitted in the southern part of the site due to current commercial use.

The site is proposed for development by Westchurch Homes, comprising of a residential development of 84 No. residential properties, consisting of a combination of detached, semi-detached and 3 to 4 block mews houses, with associated gardens, parking, roads and public open space. An extract of the planning layout which is overlain on Coopers Drawing No. 8353/RP, within Appendix 13. It is also assumed that all materials and workmanship will comply with the Building Regulations and the Premier Guarantee guidance.

This is an appraisal of the issues identified to date regarding contamination with respect to future residents occupying the site, contractors working on site, the surrounding residents/ workers/members of the public and the surrounding environment.

Details regarding the legislation which sets the framework for contaminated land assessment have been included within Appendix 10.

16.2 Summary of Initial Conceptual Site Model – Sources/Exposure Pathways/Receptors.

The initial conceptual model has been provided based upon the current use of the site, disclosed during the site walkover (refer to Section 5) and former use of the site and surrounding land, based upon desk study data (refer to Section 7). Subsequent sections in this report discuss the discussions include the revised conceptual site model based upon exploratory holes and chemical testing.

The historical OS maps (Appendix 3) and Local Authority Consultation (Appendix 1) demonstrate the site to have been utilised as open land, filter beds, and reservoirs from the former Dumers Paper Works (subsequently Broad Dumers Paper Works). A tramway connecting to Radcliffe Bleach and Chemical Works, electricity substations, and Bealeys Goit (part infilled). The historical maps/Local Authority response record surrounding area to include Eaton Hill Cotton Mill (later a dye works, then dye and finishing), a gasometer, Dumers Paper Works, Radcliffe Bleach and Chemical Works (later bleaching works), a chemical works, engineering works, infilled reservoirs, areas of waste disposal activity and a sewage works (refer to Figure 7, below and Figure 4 in Section 7.4).

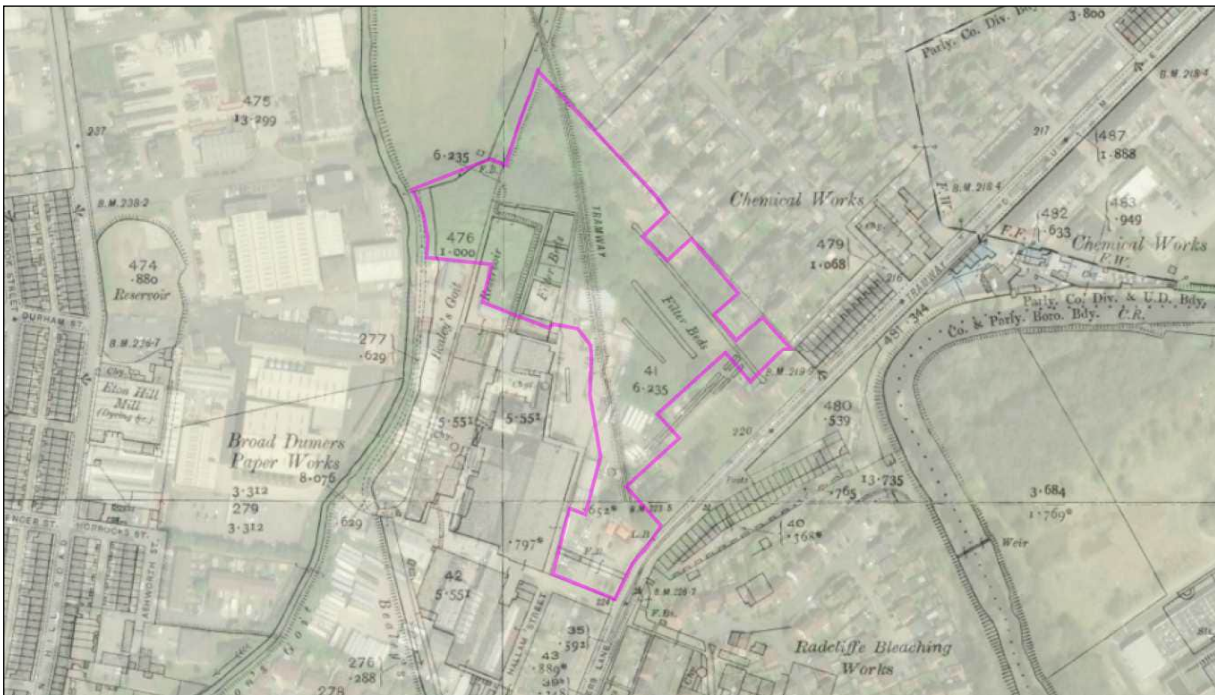


Figure 7: Overlay of historical Ordnance Survey map with current aerial photography and approximate site boundary

The specific potential sources of contaminants are defined in the following sections, based upon industry profiles, ground investigation and historical data.

Potential Source of Contaminants –

Paper Manufacturing Works.

The site was within the grounds of the former "Broad Dumers Works (Paper)", which was established between the Ordnance Survey map editions of 1850 and 1890. Trade Directories of 1888 recorded the site to have been operated by John Wild and Sons. The site consisted of open grounds, reservoirs, electrical substation, filter beds and settling tanks for the works. A section of Bealey's Goit is recorded within the site, consisting of a cut to channel water from the River Irwell to the Bealey's Vitriol Works (latterly named Radcliffe Bleach and Chemical Works) located to the south of the site. The paper works was last referenced on Ordnance Survey maps of 1977, and by 1985 as Bealey Industrial Estate.

The former Department of Environment - Industry Profile "Pulp and Paper Manufacturing Works" records the main groups of contaminants as follows:

- Metals and Metallic Compounds
- Inorganic compounds
- Acids and Alkalis
- Solvents
- Other Organic Compounds
- Oils
- Asbestos
- Polychlorinated Biphenyls (PCBs)

These forms of contaminants would tend to be primarily associated with point locations within the works buildings, although waste materials from the processes could have been placed locally within the grounds.

Landfill – Infilled Reservoirs and Settling Tanks

The Bury Council "*Environmental Search Report*" (Appendix 1) references the former reservoirs and settling tanks to the paper mill are recorded as a historical landfill site. The landfill was a pre-licensed site, owned by Wimpy Waste Management and latterly Beazer. Planning permission for the landfill was granted in 1982 for the filling with inert and construction waste, followed by permission in 1989 to raise levels using materials from levelled buildings.

The Council's report also references that local areas of filling within the influencing distance of the site may have been carried out for which no records are held.

The landfill of inert and construction wastes in 1982 and levelling of buildings used to raise levels in 1989 are considered as highly likely to have included asbestos containing materials. Asbestos was commonly used within a large variety of materials in buildings in the UK in the 20th century. Of the numerous types of asbestos three principal types were used commercially within the UK. The three types were chrysotile, amosite, and crocidolite, commonly called white, brown and blue asbestos respectively (although material or fibre colour does not consistently correlate with type and therefore not advocated as a term of use). Informal and formal prohibition on certain types of asbestos was applied from 1969, and crocidolite and amosite were rarely used after 1980 and banned by 1986. The sale and use of chrysotile was formally prohibited in 1999.

The landfill of inert and construction wastes in 1982 may have included importation of soils or materials from other sites, which may not be identified as inert by current standards, and typically considered only to be of low leaching potential.

Electrical Substation - PCBs.

The site contained an electrical substation, recorded on historical Ordnance Survey maps as established between 1937 and 1956. Electrical substations are commonly associated with the historical use of Polychlorinated Biphenyls (PCBs). PCBs were used between the 1950s and the late 1970s as a dielectric fluid in most capacitors (used to stabilise fluctuations in electrical current, mainly on industrial sites) and <1% of transformers (used to change voltage of power supply). PCBs are a restricted substance which is prohibited for manufacture in the UK, first controlled under the 1986 Control of Pollution Regulations (*Department of Environment Industry Profile – Engineering Works: Electrical and Electronic Equipment, Manufacturing Works*).

PCBs provide a risk to human health and ecosystems, which are recorded to cause chloracne (skin condition) in humans and found in animals to reduce the autoimmune system, damage liver, effect reproduction and cause cancers, amongst other health effects (*HSE website*). PCBs are stable and highly persistent once released into the environment, characterised by their very low mobility, as highly viscous fluids or solids. PCBs bioaccumulate within a food chain and considered a high risk to fresh water ecosystems, although low risk to groundwater (*Department of Environment Industry Profile – Engineering Works: Electrical and Electronic Equipment, Manufacturing Works*).

Given the age of the substation this would be considered to have potentially contained PCBs with potential for release to the subsurface during maintenance or through leaks. PCBs in these areas would be very local to the source with investigation required beneath the structures following decommissioning to confirm the potential presence. It should be noted that these areas must be tested by laboratory analysis as PCBs commonly have no olfactory indication, and only observed as an oily liquid at high concentrations.

Raised Tramway Track and Ballast – Oils/Lubricants/Timber Treatment

The historical maps record a former tramway track running through the site to the Radcliffe Bleach and Chemical Works to the south of Dumers Lane. The track was established by 1891 and removed between 1910 and 1922. Concentrations of fuel and lubricating oils and preservative products for the sleepers, such as creosote, maybe present along the railway lines running across the site. Therefore, hydrocarbons and PAHs may be present in elevated concentrations along these routes.

General Madeground – Metals and PAH Compounds

The Bury Council "*Environmental Search Report*" (Appendix 1) references an investigation to the immediate north of the site by a third party where madeground deposits of 1-2m in depth were identified including ash and clinker inclusions. These forms of deposits are derived from partial combustion of low grade coal and fusing to walls of boiler systems within furnaces. The type of contaminants are commonly associated with elevated concentrations of metals and PAH compounds, which are relatively stable and bound to the soil (due to the method of formation from combustion). Elevated concentrations of these compounds are relatively common which can provide risks to human health from chronic exposure. Other forms of contaminants may also exist within the madeground, subject to their provenance.

Potential Source of Contaminants – Petroleum Range Hydrocarbons/Volatile Contaminants
The open parts of the site have been located adjacent to the former paper mill, works and industrial estate where storage of disposal of waste fuels, oils and lubricants may have occurred. The historical OS maps reference 3 No. circular tanks adjacent to settling tanks in 1975, which were removed between 1982 and 1990. The nature and types of products stored in the tanks are unknown, however are more likely to have been holding tanks for waters, given the reference to an adjacent sluice to a settling tank, lack of clear access road/path for filling and location in the context of the works.

The presence of fuels, oils and lubricants will commonly be identified by clear visual and olfactory signs of contaminants, these however can be more difficult to detect where older spillages/release occurs where the products are diluted and the more volatile fractions degrade/volatilise. Confirmation testing of soils are required to identify the presence of potential contaminants.

Once released into the soils these contaminants will be mobile and follow complex pathways with groundwater movements. These contaminants will commonly pose risks to human health from multiple exposure pathways, including inhalation of vapours/dusts, dermal contact with impacted soils and secondary ingestion (via hand to mouth or vegetable growth). The high mobility of these contaminants can pose risks to controlled waters where pathways exist to reach aquifers or perched groundwater/water courses.

Potential Source of Contaminants – Asbestos Fibres or Asbestos Containing Materials (ACMs).
The recorded landfill part of the site (discussed previously) is considered to have a high risk of asbestos containing materials used within the landfill operations. The other madeground deposits on the site may include asbestos fibres or materials if generated with inclusions from former buildings.

The original buildings were built prior to common use of asbestos, however expansions, renovations and changes are considered highly likely and may have used a variety of types and forms of ACMs. Corrugated sheeting on industrial units was particularly common, along with pipe lagging and Asbestos Insulating Boards (AIB). On some sites surplus materials during renovation works were buried in open ground to avoid additional disposal costs. Burial pits are very unlikely to found during investigation works however would be located during development phase works where specialist removal and disposal under consultation with qualified asbestos consultants is advised.

Coopers site walkover has identified suspected fly tipped ACM materials at surface. If these materials are disturbed or degrade then asbestos fibres can be released into the soils.

Pathways of Mobile Contaminants.
The preferential pathway for most mobile contaminants will be via madeground or utilities trenches, due to the less consolidated nature of the material, combined with typical larger variations of gravel/cobble inclusions. These can result in complex migration pathways and local attenuation around built structures (e.g. chambers, foundations, etc). Where contaminants enter natural strata the migration will commonly be dictated the particle size of the strata types and following the trends of the shallow groundwater. Cohesive materials will commonly limit migration pathways and result in perching of shallow groundwater, whilst granular strata will commonly allow migration. Any contaminants in bedrock will commonly migrate along fractures and fissures within the shallow rock, which are dictated by weathering condition more so than strata type.

The historical maps identified a former well in the southern part of the site, and former path of culverted section of Bealey's Goit. These provide preferential pathways for migration of contaminants and direct pathways to impact controlled water receptors.

The desk study information supported the likely presence of madeground overlying alluvium. Deeper glacial clays were likely with bedrock in the region of 20m below ground level.

Receptors – Human Health.
The primary human receptors are assumed to be the future residents with exposure to contaminants within gardens or properties through inhalation (vapours or dusts), dermal (soil contact), or ingestion (via hand to mouth or particles adhered to vegetable growth). Other common human health receptors can be contractors on site, adjacent residents, utilities company workers and landscape gardeners. Whilst it is difficult to account for non-conventional uses of the site the likely exposure of these key receptors is considered in the context of the contamination findings in subsequent sections.

Receptors – Controlled Waters.
Discussions on the geological, hydrological and hydrogeological context of the site are provided in Section 10 of this report.

The hydrogeological conditions are considered of relatively low sensitivity, situated outside of a groundwater source protection, with Secondary A Aquifer designation of the drift and bedrock.

A historical groundwater well was recorded on Ordnance Survey maps in the southern part of the site, and a suspected culverted section of a connection to Bealey's Goit crosses the site in the southern area.

The primary controlled water receptors are considered likely to be the surface waters associated Bealey's Goit close to the site, with the deeper bedrock aquifer protected by deeper glacial clays (underlying the alluvium). Where mobile contaminants are present these could pose a risk to these receptors, where further assessments would be required.

The sensitive change of use to residential land use will often result in remediation criteria for protection of human health to criteria that are less than for the protection of controlled waters, but can depend on the properties and risks of the specific compounds, depths/extent and migration pathways.

16.3 Investigation Strategy and Sampling Protocols

The ground investigation was designed to get a general coverage across the site and target specific areas to address local variations. The targets for the investigation are listed in Table 1 below, however limitations due to existing use, services will necessitate further investigation following site clearance and disconnection/diversion of services.

Table 1: List of targets for ground investigation due to contamination risk, likely risks and accessibility

Target for Investigation	Reason	Accessible for investigation
Former Reservoir	Filled Ground (recorded landfill)	Yes
Settling Tanks	Filled Ground (recorded landfill)	Yes
Thin Filter Beds	Filled Ground	Yes
Former Tramway	Oils/lubricants/timber treatment	Yes
Electrical Substations	PCB potential	No (live)
Existing Works/Units	Variable Fuels/Oils/Solvents	No (in use)
Historical Well	Pathway for migration of contaminants	No (services)

The area of the existing trading units in the southern part of the site was not permitted for investigation whilst in active use. Upon vacant possession of the site further investigation works are required to determine the nature of the strata within these areas and the potential presence of contamination.

Other limitations to the investigation were associated with live services, live electrical substations. dense vegetation and invasive weed species. Whilst the overall coverage achieved within these areas are reasonable it would be prudent to undertake additional investigation in these areas upon clearance and disconnection of services.

The investigation included a combination of mechanical excavated trial pits (revealing a wider area of the shallow ground conditions, aiding assessment of lateral extent of shallow features), and small diameter boreholes (allowing monitoring wells and in situ testing to infer soil strengths). The following total number of exploratory holes were undertaken by Coopers:

- 9 No. trial pits (referenced TP01 to TP09) up to 3.0m in depth.
- 13 No. small diameter boreholes (referenced WS01 to WS09 and WS101 to WS104), drilled up to 5.45m in depth.

Based upon the initial conceptual model and findings from the exploratory holes, Coopers scheduled samples for chemical testing by DETS. The samples schedule for testing included a range of reworked and natural topsoil, madeground and natural strata. The testing included suites of analysis including Coopers standard metal suite, PAH-16, TPH analysis (speciated carbon banded aliphatic/aromatic ranges), VOC suite, SVOC suite, PCB suite, asbestos fibres, pH, sulphate, TOC, and bulk asbestos identification (suspected ACM). Further analysis of leachate testing and asbestos quantification has also been undertaken where high concentrations of contaminants were present and asbestos identified (respectively).

- 25 No. soil samples for standard inorganics, PAH-16, pH, TOC, and sulphates.
- 23 No. soil samples for asbestos identification.
- 9 No. soil samples for TPH (CWG suite with aliphatic and aromatic banding by carbon range).
- 6 No. soil samples for VOC and SVOC suites.
- 3 No. soil samples for PCB (WHO 12).
- 1 No. cement sheet fragment for bulk asbestos identification.
- 6 No. samples for additional leachate testing of metals/PAH-16.
- 4 No. samples for asbestos quantification.

All samples were taken on the day in appropriate containers for laboratory testing and stored within cool boxes, for return to refrigerators for cold storage prior to issue to the laboratory to ensure samples were appropriate for the forms of chemical testing and not listed as deviating by the laboratory.

16.4 Contamination Results – Initial Assessment Against Screening Values

The laboratory testing was scheduled in batches for accredited analysis by DETS. The results of the testing are provided within the following laboratory certificates, contained in Appendix 8:

- DETS Test Report No. 24-06432, dated 11 April 2024.
- DETS Test Report No. 24-07560, dated 17 April 2024.
- DETS Test Report No. 24-20913, dated 8 October 2024.
- DETS Test Report No. 24-21167, dated 14 October 2024.
- DETS Test Report No. 24-22203, dated 22 October 2024.
- DETS Test Report No. 24-22201, dated 22 October 2024.

Soil samples were reviewed against available generic Tier 1 screening values for residential gardens with plant uptake, contained in Appendix 10, with associated explanation sheets. The results of which are discussed in subsequent sections.

Inorganic and PAH compounds

Elevated concentrations of metals and PAH compounds above the Tier 1 thresholds for residential gardens, summarised in Table 2 (below)

Table 2: Summary of elevated metal and PAH contaminants within soil samples

Determinant	Concentration in mg/kg (above Tier 1)	Tier 1 Threshold in mg/kg	Elevated samples
Arsenic	49-150	37	8 of 25 No.
Beryllium	2.8	1.7	2 of 25 No.
Copper	200-440	100-200 (*)	3 of 25 No.
Lead	210-300	200	7 of 25 No.
Nickel	80	60-110	1 of 25 No.
Zinc	310	200-300 (*)	1 of 25 No.
Benzo(a)pyrene	3.1-3.2	2.2	2 of 25 No.
Dibenzo(a.h)anthracene	0.44	0.24	1 of 25 No.

Notes to Table 2:
** - Phytotoxic threshold for gardens where thresholds vary by pH*

Topsoil, madeground and shallow alluvium clay were identified to contain elevated concentrations of metals across the site. The natural granular strata and peat did not contain any elevated concentrations. The elevated PAH compounds were specific to the area of the infilled reservoirs. Further discussions and assessments of these forms of contaminants are provided in Section 16.5.

Asbestos Containing Soils

4 No. soil samples were identified to contain amosite and chrysotile asbestos, reported to consist of fibre bundles (TP02 at 0.7m, TP03 at 0.2m and TP09 at 1.0m) and microscopic cement debris (WS102 at 0.7m). 1 No. bulk cement fragment observed during excavation of trial pit TP01 within the former reservoir, this was tested and confirmed to contain chrysotile. Fragments of these materials were locally abundant, and the trial pit terminated at shallow depth due to risks resulting from disturbance of ACMs. The samples with asbestos fibres were quantified as containing between 0.002% to 0.004% of asbestos. The sample with microscopic cement debris was measured to be 0.0309g, with asbestos and constituted 0.035% of the soil sample.

Petroleum Range Hydrocarbons

1 No. sample from the infilled reservoir was identified to contain elevated concentrations of mid and high carbon range aromatic petroleum range hydrocarbons. The sample consisted of deeper madeground within the infilled reservoir. The madeground had no identified visual/olfactory indication of petroleum range hydrocarbons and sample consisted of gravel with various demolition derived materials including brick. The infilled reservoir was previous identified to contain tarmac.

Table 3: Summary of elevated TPH contaminants within soil samples

TPH Ranges	Concentration in mg/kg (above Tier 1)	Tier 1 Threshold in mg/Kg
Aromatic >C12-C16	498	140
Aromatic >C16-C21	1760	250
Aromatic >C21-C35	1362	890

VOCs and SVOCs

The testing for VOC suites have identified no concentrations above the limits of detection, VOCs identified concentrations of PAH compounds, with other forms below limits of detection.

PCB Suites

The testing identified no detectable PCB concentrations, although further testing would be required beneath the electrical substations following decommissioning.

Leachate Testing and Results

Coopers commissioned additional testing for selected samples with higher concentrations of metal and PAH compounds of the following samples:

- TP02 (0.7m) - lead
- TP04 (0.1m) - arsenic and lead
- TP05 (0.4m) – arsenic, copper and lead
- WS02 (0.3-0.8m) – arsenic
- WS03 (0.6m) - arsenic and copper.
- WS04 (0.2m) – arsenic
- WS06 (0.3-0.6m) – lead
- WS06 (0.8m) – arsenic and cyanide
- WS09 (0.2m) - zinc
- WS101 (0.4m) - arsenic and lead
- WS101 (3-4m) - PAH-16
- WS102 (0.7m) - copper, lead and PAH-16

The leachate results identified the following results:

- Arsenic <0.16-7.1 µg/l
- Copper 1.5-2.8 µg/l
- Cyanide <40 µg/l
- Lead 0.22-3.4 µg/l
- Zinc 12 µg/l
- Benzo(a)pyrene 0.05-0.25 µg/l

The concentrations of metal and PAH compounds were typical of general madeground where these forms of contaminants are considered as characterised as low mobility. The metal concentrations were below Groundwater Thresholds (maximum values), but in the ranges where risks could be posed to inland surface waters. The PAH concentrations were above groundwater and freshwater thresholds, due to the very low thresholds.

Coopers are scheduled to undertake additional water sampling during the current phase of ground gas monitoring to further identify the presence of potential contaminants impacting groundwater.

16.5 Contamination Assessment and Recommended Remedial Actions.

Metal/PAH Contaminants

As detailed previously, the elevated concentrations of metal/inorganic contaminants were present within many of the samples of topsoil and madeground on the site, and local PAH compounds within the former reservoirs. These forms of contaminants are characterised to be of low mobility, under typical conditions these forms of contaminants are largely bound to the soils, with negligible risks posed from vapour inhalation.

The primary exposure risk for future residents is from direct exposure to the soils within the proposed residential gardens, where ingestion (hand to mouth), inhalation (dusts), vegetable uptake can pose a more significant risk to human health. These forms of contaminants are relatively common in reworked soils and considered typically suitable to mitigate exposure risks through provision of an inert cover system within the proposed garden growing mediums.

It should be noted that additional testing and assessments may determine individual determinands as suitable to remain (e.g. lead bioaccessibility), the materials also contain other forms of contaminants and are largely unacceptable to remain in gardens to the texture of the materials present.

The PAH concentrations were local to the former reservoir. The highest samples were also identified to have higher carbon range aromatic TPHs. An analysis of the potential source for the PAH contaminants was undertaken via a forensic method

Polycyclic Aromatic Hydrocarbons (PAH) are a family of hundreds of congeners with a chemical structure of two or more fused aromatic rings. They tend to form complex mixtures rather than simple compounds and occur naturally in crude oil, coal and peat. Processed petroleum products, partial combustion of carbon based fuels, and processed coal derivatives (include creosotes and tarmac) are common sources for higher concentrations of PAH compounds. The United States Environmental Protection Agency (USEPA) published a list of 16 No. priority PAH pollutants, commonly termed USEPA-16. These compounds vary by classification of carcinogenicity and genotoxicity based upon studies. Exposure pathways for soils in residential settings vary by compound, with primary contribution to exposure being either ingestion of soil and indoor dusts, or consumption of homegrown produce and attached soil, and lower contribution from dermal and inhalation of dusts/vapours (indoor and external).

Coopers have completed a source signature double ratio plot to identify the potential source of the PAH compounds within the former reservoir. The print sheet and explanation sheet are contained in Appendix 10 and annotated extract contained within Figure 8 (below). The results show the PAH compounds are within the petroleum range class, inferred to be characteristic of used engine oils. A larger population size would be require to better characterise the provenance, however the presence of TPH concentrations within the soils and nature of the materials (inert landfill wastes and demolition derived materials could include materials with fuels.

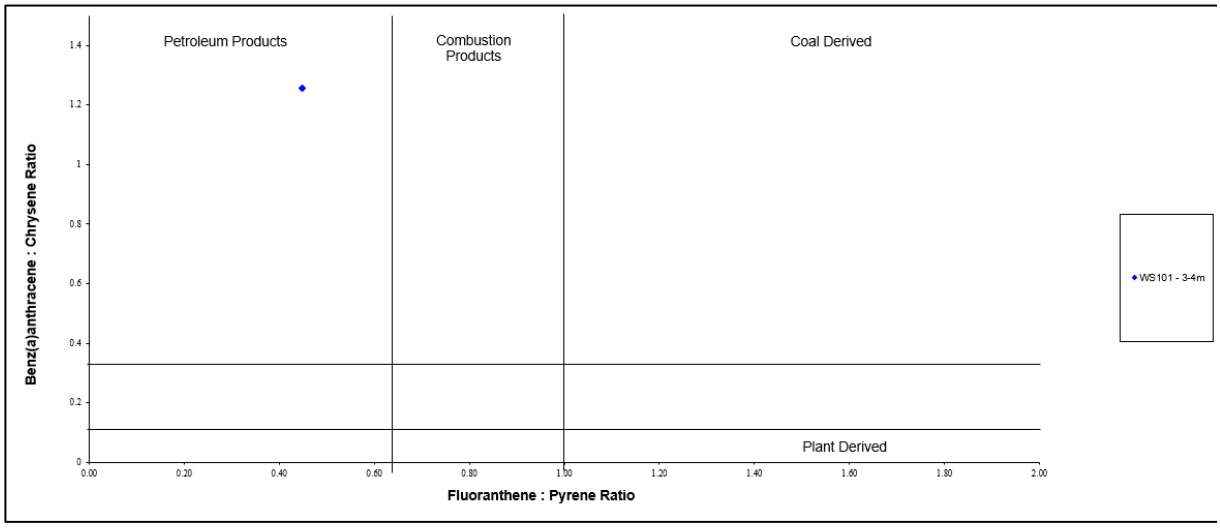


Figure 8: Extract of Source Signation Double Ratio Plot of PAH profile

Further discussions on fuels and volatile contaminants are provided below.

The proposals for protection of human health for metal and PAH compounds will be for inclusion of an inert cover system within gardens to break the exposure pathway for residents. The proposed cover system depths and verification are included in Section 18.

Petroleum Range Hydrocarbons and Volatile Contaminants

No detected VOCs or non-PAH SVOCs were identified within the ground investigation.

Elevated petroleum range hydrocarbons were present within a deeper sample from the former reservoir, identified within the mid to high carbon aromatic ranges, potentially related to oil. The sample had no identified visual/olfactory indication of fuels. As the madeground within the infilled reservoir was unable to be bottomed out further fuels may be present and following site clearance localised removal of hotspot contamination is recommended with associated validation.

The fuels provide potential risks to controlled waters and human health. As such further water sampling is scheduled to be undertaken.

The occupied commercial premises will require further investigation following vacant procession to identify the potential presence of petroleum range hydrocarbons and volatile contaminants.

Asbestos Containing Soils – Assessment Method

The previous sections provide details as to the presence of Asbestos Containing Soils (ACSs) in the form of free fibres within the madeground and topsoil, and cement asbestos fragments within the infilled reservoir.

As referenced above there are requirements for placement of inert cover systems for Inorganic/PAH Compounds contaminants, however ACSs can pose risks to construction workers and adjacent members through inhalation pathways which differ significantly. The approaches to assessment of asbestos containing soils are detailed in the following guidance:

- CIRIA C733, 2014, "*Asbestos in Soils and Madeground*".
- CL:AIRE, 2016. "*Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance.*"
- CIRIA C765, 2017, "*Asbestos in Soil and Made Ground Good Practice Guide.*"

There are no acceptable generic thresholds for Asbestos Containing Soils (ACSs) by designated end use. CIRIA C733 advocates a staged approach with initial qualitative assessment (below), and where higher risks are identified then further detailed quantitative assessments and exposure assessments should be complete. It should be noted there is no generic threshold for determining relative lower or higher risks, although risk assessment tools have been released by CL:AIRE to aid assessments. The approach of several companies to infer laboratory detection limit or withdrawn ICRCL threshold as an applicable threshold for risk is not appropriate, as detailed within CIRIA C733 "*the value of 0.001 per cent mentioned in ICRCL should not be used in this capacity.*" This is further detailed that "*It is not a level below which ICRCL considered that risks are acceptable or below which potential civil liberties could be assumed to be negligible. So, it is not an appropriate generic assessment criterion for ACSs*."

In addition to the normal contaminated land legislation the following regulations and acts apply to asbestos exposure:

- Control of Asbestos Regulations, 2012.
- Health and Safety at Work Act, 1974.
- Construction (Design and Management) Regulations, 2015.
- Management of Health and Safety at Work Regulations, 1999.

Asbestos Containing Soils – Initial Qualitative Assessment Approach

Exposure Risks

The primary asbestos risk to human health is through the inhalation of respirable fibres, where they can provide non-malignant pleural disease, asbestosis, lung cancer, and mesothelioma. CIRIA C733 details that environmental exposure (non-work related) to asbestos is not considered a concern for non-malignant pleural disease and asbestosis, with asbestos related lung cancer and mesothelioma the primary human health risks. The HSE have stated that occupational exposure to asbestos is "*the single greatest cause of work-related deaths in UK*" with an estimated circa 4000 deaths annually in the UK alone (CIRIA C733).

Initial Asbestos Analysis and Supplemental Investigation Method

To undertake a robust qualitative assessment of the risks a method of qualitative assessment has been assessed by SOBRA within the publication "*Summer Workshop Report – Asbestos in Soils*" (2015). The approach is based upon assessments of the nature of the asbestos, the soil characteristics, quality of the data and the receptor types during each activity where asbestos containing soils are liable to be disturbed. The approach assessed by SOBRA has been included into assessment tools by CL:AIRE/JIWG and a summary of the SOBRA approach is provided in Table 4 (below), followed by appraisal of each criteria.

Table 4 - Qualitative Assessments Criteria Based Upon SOBRA Guidance

Assessment Criteria		Explanation
Asbestos Nature	Asbestos type	whether chrysotile, amosite, crocidolite or a mixture of fibre types
	Asbestos composition	whether bonded, unbonded, and whether in a poor or good condition
	Asbestos quantity	percentage asbestos content in the soil
	ACM matrix	the ACM matrix degradation rate – i.e. the potential release rate of asbestos fibres from the matrix
	Respirable fibres	the respirable fibre index – a measure of the proportion of respirable fibres in the ACM, as opposed the total fibre count
Soil Characteristics	Soil type	sand, loam, silt, clay and aggregates
	Moisture content	-
	Depth to ACS	-
	Ground cover and propensity for surface wind erosion	-
	Heterogeneity of ground conditions	spatial scale of variation
Data	Data Quality	assessment of the ground investigation to characterise the asbestos in soils (see below)
Receptor	Age group	-
	Exposure frequency	-
	Exposure duration	-
	Activity level	associated with physical intensity of soil disturbance activity and propensity for dust generation

Asbestos Nature:

- Fibre bundles of chrysotile and amosite (0.002-0.004%) in 3 of 23 samples.
- Microscopic cement debris was measures (0.035% of the soil sample) in 1 of 23 samples.
- Cement Asbestos Fragments (15% chrysotile) observed in reservoir.
- The potential fibre release to the air from small amounts of fibre bundles would be relatively low.
- The potential for degradation and release of large volumes of asbestos fibres from material with frequent cement sheeting is high if this material is heavily worked.

Soil Characteristics:

- The ACS was a madeground with little limitations on atmospheric release provided by granular nature of the constituents of the host material.
- The silt/clay content of the soils hold a greater proportion of moisture and therefore relatively less liable to release fibres than granular soils. CIRIA C733 details the relative proportion of asbestos release from cohesive strata to sand strata is 40%. Given the soil type a high release rate is anticipated.

Data Quality:

- A relatively large sample population has been subject to testing by laboratories for the size of the site, with the data supporting the results of previous investigations.
- The asbestos debris/fibres are infrequent such that it is not easy to distinguish areas without high density sampling, which will commonly identify sporadic presence (not forming hotspot/plumes like fuel spillages).
- The fragmented ACMs were visibly identified within the area of the reservoir infill.
- It should be made clear that with any investigation there is a potential for undisclosed contaminants to be found. With ACMs the common risk is the deliberate burial in discrete locations. These are difficult to disclose during the investigations and during any soil disturbance contractors would be required to identify any potential suspected ACMs and appoint qualified/licensed persons to confirm the materials and provide/agree the information for safe removal.
- It should be noted that evidence of previous fly-tipping and potential for asbestos containing materials at surface, with risk that debris and fibres will be local to the area of storage. Advice on the safe removal of ACMs requires advice from specialist asbestos consultants.

Receptor:

- The receptor sensitivity varies by work activity and stage. The primary phase of soil disturbance would be during the excavation works to regrade site levels and construction of roads/sewers. The receptors most exposed to soil dusts would be the contractors, due to proximity, who are less sensitive receptors, due to age.
- The site is located in close to offsite residential housing. Adjacent residents would be considered less likely to be impacted (due to proximity to the work areas) but more sensitive to exposure (due to age, with infants and children potentially playing in the gardens subject to occupation at the time of construction).
- The future residents are the most sensitive receptor if asbestos containing soils were present within the growing medium of gardens/landscaping, due to the potential for repeat and long-term exposure. It is generally accepted that no acceptable amounts of asbestos within residential gardens/POS are acceptable under planning regimes for new developments. As outlined previously the madeground deposits also contain other forms of contaminants such that an inert cover system is proposed (remediation detailed in Section 18).

The above qualitative assessment shows the risks posed by asbestos would be unacceptable for long term exposure within a soil in a residential open space area and proposed gardens, which also contains other forms of contaminants. The proposals are for inclusion of an inert cover system within the proposed gardens/landscaping to break the exposure pathway between the most sensitive receptors and the contaminants.

During excavation works within the former reservoir an asbestos consultant/contractor should be in attendance to hand pick any ACM fragments. Whilst this will not remove all asbestos, the higher risk of significant fibre release would be mitigated by ACM removal. During these works mitigation measures to control dusts and air monitoring will be required. Further details for asbestos mitigation works will be provided within a proposed remediation and enabling works strategy.

Further details of the remediation are provided in Section 18.

The print sheets for the JIWG decision support tools released by CL:AIRE have been provided in Appendix 10, confirming the remediation works would be classified as being an activity where Control of Asbestos Regulations (CAR) apply to workers, and the remediation works would be sufficient to be determined as negligible risk upon completion. A summary of the receptor ranking tool results are provided in Table 5 and 6, below. It should be noted that the sheets work on the basis of the ACMs being within a soil, and do not apply to ACMs outside of a soil where much more significant risks are present and must be strictly managed from CAR under guidance from an asbestos consultant.

Table 5: Summary of CL:AIRE Decision Support Tools for Qualitative Assessment of Receptor Risks – ACM Materials in Reservoir

Future Residents – Post Remediation (cover system)		Future Residents – No Remediation with soils remaining in POS	
Source Hazard	Medium	Source Hazard	Very Low
Emission-Exposure	Low	Emission-Exposure	Medium
Receptor	High	Receptor	High
Pathway	Negligible	Pathway	Medium
Overall Risk	Negligible	Overall Risk	Medium
Adjacent Residents (During Soil Excavation/Movement)		Contractors (During Soil Excavation/Movement)	
Source Hazard	Very Low	Source Hazard	Very Low
Emission-Exposure	Medium	Emission-Exposure	Medium
Receptor	High	Receptor	Medium
Pathway	Medium	Pathway	High
Overall Risk	Medium	Overall Risk	Medium

Table 6: Summary of CL:AIRE Decision Support Tools for Qualitative Assessment of Receptor Risks – Free Fibres/Debris in madeground/soil

Future Residents – Post Remediation (cover system)		Future Residents – No Remediation with soils remaining in POS	
Source Hazard	Medium	Source Hazard	Medium
Emission-Exposure	Low	Emission-Exposure	Medium
Receptor	High	Receptor	High
Pathway	Negligible	Pathway	Medium
Overall Risk	Negligible	Overall Risk	Medium
Adjacent Residents (Madeground During Soil Excavation/Movement)		Contractors (Madeground During Soil Excavation/Movement)	
Source Hazard	Medium	Source Hazard	Medium
Emission-Exposure	Medium	Emission-Exposure	Medium
Receptor	High	Receptor	Medium
Pathway	Medium	Pathway	High
Overall Risk	Medium	Overall Risk	High

Controlled Waters Assessment

As detailed previously the primary surface water receptor is considered to be surface waters due to the proximity of Bealeys Goit water channel close to the site. The leachate analysis of soils indicates the metal and PAH contaminants are typically of low leachate potential, but above EQS thresholds for surface waters. Elevated petroleum range hydrocarbons were also present within the former reservoir which are characterised as being of higher mobility and the potential to be mobilised by construction activities.

Additional water sampling is scheduled during the period of ground gas monitoring to assess the potential for the petroleum range hydrocarbons to be impacting perched groundwater, and the metals are not impacting on surface waters.

16.6 Further Works

The following further works are recommended to satisfy the risks associated with contaminants identified within the site:

- Submit site investigation report for local authority approval.
- Water sampling during ground gas monitoring to establish the risks to controlled waters from the reservoir infill.
- Remediation and Enabling Works Strategy.
- Undertake additional investigation and testing of soils within the southern part of the site in the area of existing commercial units and electrical substations during demolition phase works.
- Removal of identifiable ACM fragments within reservoir infill prior to construction.
- Validation of hotspot removal (petroleum range hydrocarbons) during demolition and site clearance.
- Registration of intention for reuse of soils on site following CL:AIRE: DoW-CoP.
- Validation of cover systems within proposed residential gardens.

17.0 Initial Ground Gas Assessment

Refer to Appendices 1 to 7, and 13.

17.1 General

All information and advice regarding requirements for gas precaution measures are considered to be provisional until approval from statutory bodies has been granted.

The approaches to ground gas investigations and assessments of risks are detailed within the following British Standards:

- BS 8485:2015+A1:2019 '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.*'
- BS 8576:2013 '*Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs).*'

The British Standards references numerous specific papers regarding ground gas research. Papers referenced in this report include publications released after the latest updates to the British Standard. Of particular relevance to this site are the following publications, discussed and referenced in subsequent sections, some of which were released between commencing investigation and report production:

- BRE BR211 (2023) "*Radon – Guidance on Protective Measures for New Buildings (including supplementary advice for extensions, conversions and refurbishment projects)*."
- CIRIA C735 (2014) "*Good Practice on the Testing and Verification of Protection Systems for Buildings Against Ground Gases*."
- Lucas, S., and Wilson, S. (2020) "*Corrosion and Puncture Resistance of Aluminium Foil Gas Membranes beneath Concrete Slabs*" in Geosynthetics International, Vol. 27-4.

Coopers have appraised the potential risk of ground gases to provide an initial conceptual model in terms of source-pathway-receptor, following current standards and guidance. Based upon this conceptual model it was determined that ground gas monitoring was required.

The investigation has been phased as areas of the site became accessible. Gas monitoring on the first phase of the investigation has been completed and further monitoring is ongoing for the second phase of investigation.

The subsequent sections include assessments of the information based upon the monitoring to date, for appraisal only and should be finalised following completion of the proposed monitoring.

17.2 Initial/Preliminary Conceptual Model

General: - In accordance with BS8485, Clause 4, "*To complete an assessment of the risks posed by the presence of permanent and other ground gases, the potential sources of gas in and around a site should be identified; guidance on the collection of the relevant information is provided in BS 8576*."

In accordance with BS8576, Clause 6, the development of a preliminary conceptual site model is the first stage in determining the requirements for a program for gas monitoring. The initial stage of which is identification of "*Potential sources of hazardous gases based on a review of the current and previous uses of the site and neighbouring land, and the underlying natural and man-made geology and hydrogeology*;"

The following sections include a more detailed discussion of the risks posed by known and common sources of hazardous ground gases, the pathways for gas mitigation and the potential impact to the receptors. To aid classification of the risk of different sources of hazardous ground gas a decision matrix has been provided in BS8576, Clause 8.7, Figure 7, which classifies the generation potential of sources of hazardous ground gas from very low to very high.

The initial conceptual model has defined the site as a potential to be up to a high risk due to the presence of a historical pre-1990's landfill within the site. If the landfill was entirely inert the designation is very low risk, although lack of regulation in the past would commonly include materials such as timber or other waste types which would raise the risk classification.

Common Hazardous Ground Gas Source Identification - Landfills (on site): - A detailed review of multiple sources of information has been undertaken to assess the potential for landfill gases to impact the proposed development. The reviews have included the findings of a Groundsure Report (Appendix 2) and Bury Council "*Environmental Search Report*" (Appendix 1).

The Bury Council "*Environmental Search Report*" (Appendix 1) references the former reservoirs and settling tanks to the paper mill are recorded as a historical landfill site. The landfill was a pre-licensed site, owned by Wimpy Waste Management and latterly Beazer. Planning permission for the landfill was granted in 1982 for the filling with inert and construction waste, followed by permission in 1989 to raise levels using materials from levelled buildings.

The Council's report also references that local areas of filling within the influencing distance of the site may have been carried out for which no records are held.

The gas generation potential of landfills is defined by the types of waste and the age since deposition. The primary gases associated with historical landfills are methane and carbon dioxide from the bacterial decay of organic constituents (other secondary gases and vapours also associated). The decay begins shortly after deposition and can take many years to stabilise. During the active phase of decay high concentrations and flow rates would be characteristic, whilst older landfills will commonly display high concentrations from gases held within pore spaces, but at low flow rates due to the reduction in ongoing decay. BS8576 designates landfill risks by type and age as detailed in Table 7 (the standards are >10 years ago, the boundaries may be considered to need revising):

Table 7: Landfill Risk Designation by Type from BS8576

Landfill Type/Age	Risk Designation	Comments
Municipal landfill sites	Very High Risk	
Landfill 1990's onwards	Very High Risk	
Landfill mid 1960's to 1990	High Risk	
Landfill 1945 to 1965	Moderate Risk	This could also be "low" or, if disturbed, "high".
Inert landfill sites	Very Low Risk	Lack of regulation in the past means that most sites are never entirely inert – they can include timber, plasterboard and even domestic refuse and consequently care is needed when assessing such sites. They might require a higher risk classification

The landfill of inert and construction wastes in 1982 and levelling of buildings used to raise levels are likely to be primarily materials with little organic content, such as brick and concrete, although timber and other wastes may be present. The very low risk designation for inert landfills is therefore considered to not apply, and a more realistic low to moderate risk designation would be assigned. Should significant organic materials be identified, such as industrial wastes from the former industry then risk designation would be further raised to high risk.

Common Hazardous Ground Gas Source Identification - Underground Coal Mine Workings and Mine Shafts (on / off site): As detailed within Section 12, the site is situated within a Coal Authority coal mine reporting area but designated as outside of a high-risk development area. This risk designation is applied where no shallow mine workings, mine entries or other significant mining related hazard exists.

Coal is commonly associated with trapped hazardous gases within pore spaces, primarily comprising of methane and carbon dioxide, although other gases including carbon monoxide can be present. Numerous historical coal mining disasters are attributed to the release of mine gas. Following abandonment of former coal mines these gases can migrate towards the surface where they can pose a significant risk to human health, including loss of life from asphyxiation and explosion.

CL:AIRE have released guidance "*Good Practice in the Risk Assessment for Coal Mine Gas Emissions*", 2021. The procedures follow the same initial approach outlined in BS8485 of formation of an initial conceptual site model through desk study data, determining source-pathway-receptor relationship and investigations to monitor gases based upon the model. The main variations are that the interpretation and designation of gas risks requires specific classification based upon the nature of the mine workings, and that adoption of gas screening values within BS8485 may not be appropriate, particularly where pathways of gas migration bypass the shallow soils, such as mine shafts, faults or future development pathways. The initial appraisal coal mine gas risk classification within CL:AIRE (2021) are summarised in Table 8.

Table 8: Summary of Risk Designations of Coal Mine Gas Emissions based upon CL:AIRE Guidance (2021)

Risk Designation	Criteria	Requirements
No Risk	• Outside of Coal Authority Coal Mining Reporting Area.	• No mitigation measures required for coal mine gases.
Negligible Risk	• Mine Entries >50m from site boundary. • Workings >150m depth. • No faults or other potential pathways connecting surface to deeper unflooded mine workings • Outside area of past or probably shallow workings on Coal Authority viewer.	• Findings of assessment to be provided in report. • No mitigation measures required for coal mine gases.
Low Risk	• Workings 30-150m but permanently flooded or covered by 10m+ of low permeability (<$1x10^{-6}$ m/s hydraulic conductivity) superficial deposits. • Mine Entries >50m from site boundary	• Findings of assessment to be provided in report. • No mitigation measures required for coal mine gases. • Review of assessment once development designs are finalised.
Moderate Risk	• None of the high risk criteria below.	• Detailed mine gas risk assessment required. • Findings of assessment to be provided within a report. • Assessment of mitigation measures based upon risk-based design. • Review of assessment once development designs are finalised.
High Risk	• Mine Entries on site or within 20m of site boundary. • Workings below site at <30m depth and unflooded or variable water levels. • Faults of other pathways connecting surface to deeper unflooded workings. • Within area of past or probable shallow workings on Coal Authority viewer.	• Assess if mine gas risks can be mitigated, if not there will be requirements to change the development proposals. • Detailed mine gas risk assessment required. • Findings of assessment to be provided within a report. • Assessment of mitigation measures based upon risk-based design. • Review of assessment once development designs are finalised.

The site is underlain by deep workings at depths of circa 195m to 368m last worked in 1894. The seams at this depth would have flooded and designated as a negligible risk on this basis. Based upon the CL:AIRE approach the designation is defined as a negligible risk where no mitigation measures are required.

Former Ponds and Natural Organic Rich Material (on/off site): - As detailed in Section 7, the historical OS maps record no historical ponds on or close to the site. Drift strata includes alluvium where deposits of natural organic materials such as silt and peat can be present.

Natural organic strata is commonly associated with elevated concentrations of gases trapped within the pore spaces of the soil, but at low flow rates as a result of the older natural deposits where degradable plant matter has largely decayed leaving little ongoing degradation. These can pose risks where groundwater fluctuates resulting in displacement of hazardous ground gas, but generally classified as a very low risk source.

Deep Madeground (on site): - Potential for reworked ground on land adjacent to the paper mill, with mill chase adjacent to the site. Historical maps do not record any ground disturbance and land remaining largely the same since late 1800's. Madeground gas risk would depend on the type of materials and age of deposition.

Radon (on site): - As detailed in Section 13 – Radon, the site lies within an area where radon protection measures are not required for new buildings.

Petroleum Hydrocarbons/Volatile Substance Vapours (on site): - The contamination section (Section 16) details there are no significant sources of petroleum range hydrocarbons or other volatile organic substances, therefore not considered as unaffected.

17.3 **Potential Pathways**

The primary pathway for migration of hazardous ground gases commonly follow pathways created by the built environment, such as foundations, pipelines and trenches associated with services. These pathways are often difficult to assess by monitoring and require consideration of the potential increased risk where pathways will be created by the development. Madeground deposits will commonly have high gas transmissivity due to the common gravel to cobble sized inclusions and poor consolidation from works were placed in an uncontrolled manner. The natural shallow drift strata are alluvium, which are commonly silts, clays and fine sands with potential for limited migration of gases. The deeper glacial clays would be limiting to gas migration due to the fine cohesive soils.

Once gases generated have reached the surface they will dissipate rapidly through atmospheric diffusion unless confined by buildings, as summarised in Figure 9 (below), or low points such as trenches. Hazardous gases beneath buildings can migrate through cracks or spaces in the floor slab and collect within the buildings. Any work in a confined space (including trenches) must assess the potential for hazardous gases to be present and health and safety provisions should be applied in accordance with HSE guidance.

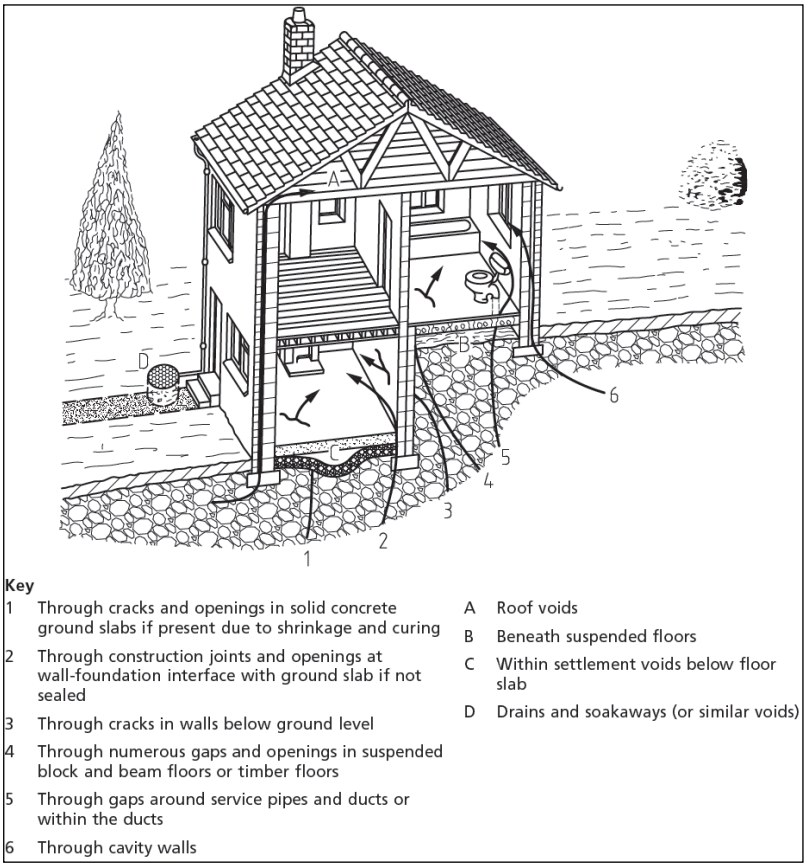


Figure 9: Potential pathways for hazardous ground gas to ingress into residential buildings (from BS8485)

17.4 Receptors

***Future Occupants**:* The primary receptors are anticipated to be the future occupants of the residential houses via the build up and ingress of potential hazardous gases/vapours through the ground floor slabs of the properties. These are considered highly sensitive receptors for the purposes of the conceptual model.

***Adjacent residents**:* These can be exposed to hazardous gas if sources of gas are generated on site and migrate beyond the site boundary or preferential pathways exist for the horizontal migration of gases beyond the site boundary.

Construction/Maintenance Workers: Other receptors include construction workers, primarily through work within trenches or excavations where preferential pathways for the migration and collection of gases could occur. HSE guidance on safe work in confined space details potential dangers from gases within trenches, assessments required and precautions to take prior to entering a confined space. The appointment of a supervisor to ensure the necessary procedures and precautions are in place where construction workers intend to enter a confined space is advisable in accordance with HSE guidance.

17.5 Conceptual Model Summary

The conceptual model has demonstrated that the main potential gas risks are associated with the former landfill operations associated with filling of reservoirs and raising of levels with inert and construction wastes, in addition to materials derived from historical demolition. The risk designation of the type of landfill is considered to be low to moderate, subject to the types of waste present. Other potential sources (deep madeground, alluvium, and coal workings) are designated as low risk, very low risk or negligible risk.

A summary of the ground gas risks is provided in Table 9 below with extract of conceptual model in Figure 10.

Table 9: Summary of Initial Conceptual Model Associated with Hazardous Ground Gases

Sources	Gas	Receptor	Pathway	Risk
Landfills (off site)	Methane, carbon dioxide, & carbon monoxide (other trace gases)	Future occupants, construction/ maintenance workers/off site residents	Gas present at shallow depths with preferential pathways following built structures of granular strata.	Landfill was inert and construction waste relating to infilled reservoirs in 1980's. Raising of levels with materials from the former buildings in late 1980's. Pre-licensed landfill may have other types of waste and potential presence of degradable organic materials. Age and nature of the wastes would be defined as **low to moderate risk**.
Coal Mining – Underground Workings (on/offsite)	Methane, carbon dioxide, & carbon monoxide.	Future occupants, construction/ maintenance workers/off site residents	Negligible pathways to surface from deep workings.	Deep workings, last mining in late 1800's. Mine workings at depth would be flooded **– Negligible risk.**
Former Ponds and Natural Organic Strata (on/offsite)	Methane & carbon dioxide	Future occupants, construction/ maintenance workers/off site residents	Gas present at shallow depths with preferential pathways following built structures of granular strata.	No former ponds. Alluvium may contain peat pockets or peat or organic silt. Materials would not be actively generating gas, with residual gas trapped on pore space of soils. Unless groundwater fluctuations the potential risks for significant gas is designated as a **very low risk**.
Deep Madeground (on site)	Primary risks from Methane & carbon dioxide	Future occupants, construction/ maintenance workers/off site residents	Gas present at shallow depths with preferential pathways following built structures of granular strata.	Excludes madeground from landfill and raising of levels from former buildings over the landfill (detailed in landfill section). Initial conceptual model defines potential for madeground associated with open land adjacent to the former paper mill. No significant ground workings recorded on historical maps. Intrusive investigation will identify the depth of madeground and the nature of the materials – **Low Risk**.
Radon (on site)	Radon	Future Residents	Exposure to radon gases migrating into buildings through floor slab construction.	The site is within an area where **No Radon Protection Measures** are required.
Petroleum Hydrocarbons/ VOCs (on site)	Hydrocarbon vapours	Future occupants	Primarily vertical pathway of hazardous vapours which can migrate into buildings and enclosed spaces	The primary risk is chronic exposure. These source of the vapours can pose risks to controlled waters and human health from other exposure pathways where removal is proposed. No VOCs identified. **Site Unaffected following remediation.**

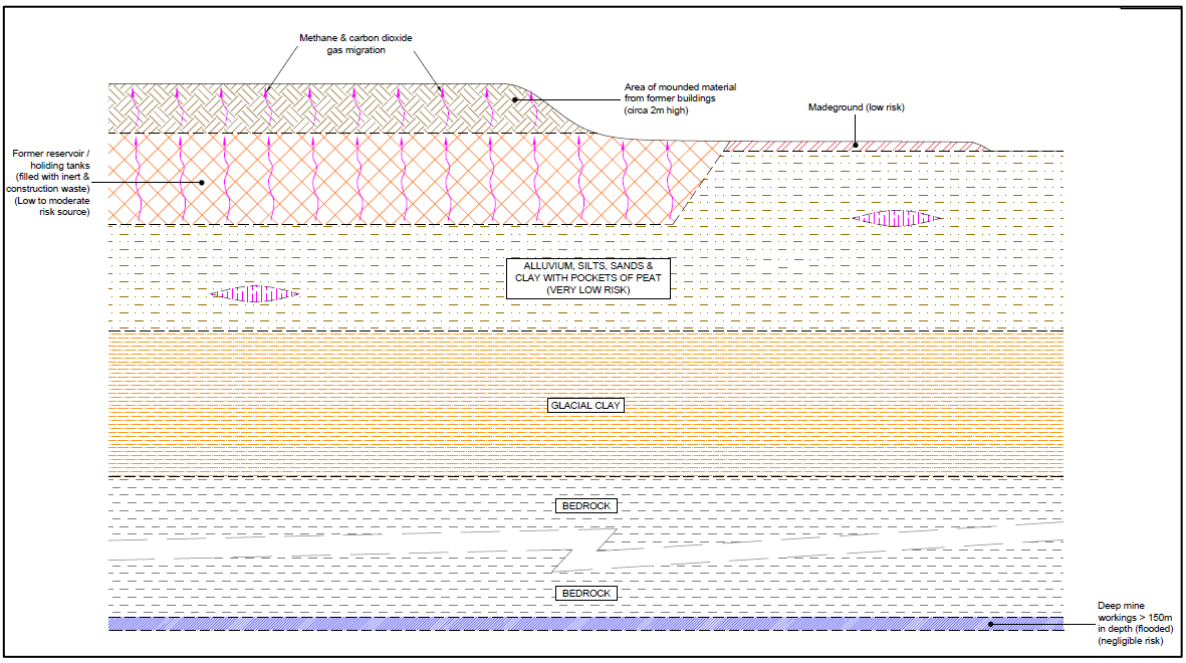


Figure 10: Extract of Coopers Ground Gas Conceptual Model

17.6 Profile of Potential Hazardous Ground Gases

The primary potential hazardous ground gases with the potential to be generated from the defined sources from the landfill waste, including methane, carbon dioxide and carbon monoxide. The properties, pathways and hazards posed by these gases differ, with summary profile of the gases of concern contained in Tables 10 to 12 below.

Table 10: Profile of Methane as Significant Hazardous Ground Gas from BS8576

Methane - CH_4
Methane is a colourless, odourless, flammable gas. Methane is explosive at concentrations of between about 5% and 15% v/v (volume fraction) in air. Below 5% v/v (the lower explosive limit – LEL) there is insufficient methane to support combustion and above 15% v/v (the upper explosive limit – UEL) there is insufficient oxygen to support combustion. The flammability range of methane varies depending on the concentrations of other gases present. For example: • where carbon dioxide concentrations are >25% v/v, methane is non-flammable; and • if the oxygen concentration is reduced, the limits of flammability are reduced (e.g. at 13.45% v/v oxygen, the LEL and UEL are altered to 6.5% v/v and 7% v/v respectively, whilst at 13.25% oxygen, the mixture is incapable of propagating flame (see [14]). Methane is a low toxicity gas but can result in asphyxiation due to its ability to displace air and hence oxygen. Oxygen starvation occurs at 33% v/v methane, whilst at 75% v/v methane, death results after 10 minutes. Methane is less dense than air.

Table 11: Profile of Carbon Dioxide as Significant Hazardous Ground Gas from BS8576

Carbon Dioxide - CO_2
Carbon dioxide (CO_2) is a colourless, odourless gas. It is both highly toxic and an asphyxiant and can cause adverse health effects in concentrations greater than 0.5% v/v. It is denser than air. • 3% v/v carbon dioxide can result in headaches and shortness of breath, with increasing severity up to 5% v/v or 6% v/v; • 6% to 10-11% v/v causes visual distortion, headaches, increased heart rates, dizziness, mental depression, tremors and rapid loss of consciousness (less than 15 minutes) possibly resulting in death; • >22% v/v is likely to result in death. The Health and Safety Executive has published the following limiting concentrations for work-related exposure: • Long-term exposure limit (LTEL – 8 hour period): 0.5% v/v; and • Short-term exposure limit (STEL – 15 minute period): 1.5% v/v. An additional hazard arises if air containing more than 0.5% carbon dioxide provides the combustion air to a central heating boiler or similar apparatus (e.g. it is drawn in from the sub-floor void). In these circumstances, there is a danger that carbon monoxide could be formed.

Table 12: Profile of Carbon Monoxide as Significant Hazardous Ground Gas from BS8576

Carbon Monoxide - CO
Carbon monoxide (CO) is a colourless, odourless gas. It is highly toxic, flammable an explosive at higher concentrations. Primary risks are as an asphyxiant and can cause adverse health effects at low concentrations. It is denser than air. The effects of exposure to different concentrations of carbon monoxide are: • 35ppm – 6 to 8 hours exposure, headaches and dizziness • 100ppm – 2 to 3 hours exposure, slight headache, • 200ppm – 2 to 3 hours exposure, slight headache, loss of judgement. • 400ppm – 1 to 2 hours frontal headache. • 800ppm – 45 minutes exposure, dizziness, nausea and convulsions. Insensible within 2 hours. • 1600ppm – 20 minutes exposure, headache, tachycardia, dizziness, and nausea. Death in <2 hours. • 3200ppm – 5 to 10 minutes exposure, headache, dizziness, nausea. Death in <30 minutes. • 6400ppm – 1 to 2 minutes exposure, headache & dizziness. Convulsions, respiratory arrest, and death in <20 minutes. • 12800ppm – 2 to 3 breaths, loss of consciousness. Death in <3 minutes. The Health and Safety Executive has published the following limiting concentrations for work-related exposure: • Long-term exposure limit (LTEL – 8 hour period): 30ppm; and • Short-term exposure limit (STEL – 15 minute period): 200ppm

17.7 Investigation Strategy, Monitoring Wells and Response Zones

BS8576 (2013) defines that investigation and mitigation is not required where there is no credible source. Very low potential sources may be viable to discount if no credible pathway exists. Where low to high ground gas risks exist then an investigation and monitoring strategy is required.

BS8576 (2013), Chapter 8.4 advocates that the monitoring should commonly be targeted to identify the risks in relation to the source-pathway-receptor model. This targeted method supersedes the approach of CIRIA C665 (2007) which made recommendations for prescriptive spacing of monitoring wells based upon source classification and receptor sensitivity. BS8576 (2013), Chapter 8.4, provides examples of sites where non-targeted methods would be appropriate, as below:

i) Permanent and consistent on site gas source;
ii) VOCs in wide and undefined extent;
iii) Where the conceptual model is unable to suitably define the gas targets, such that a phased monitoring approach would be appropriate.

Coopers appraisal of the gas risk defined that a targeted approach was required to target the areas of the landfill and areas of deeper madeground. Monitoring wells in other areas of the site were required to identify if horizontal gas migration from the landfill is present and identify if significant gas concentrations are present of the other defined sources (deep madeground and alluvium).

The investigation was phased with initial areas available for investigation limited to the eastern parts of the site, with further access made to allow investigation of the north western areas of the site, including the former reservoir. Monitoring wells were installed in all of Coopers' small diameter boreholes (excluding WS102 which terminated on an obstruction during hand dug service inspection pit). The locations of the boreholes are provided on Coopers Drawing No. 8353/01 in Appendix 13, with annotated extract in Figure 11.

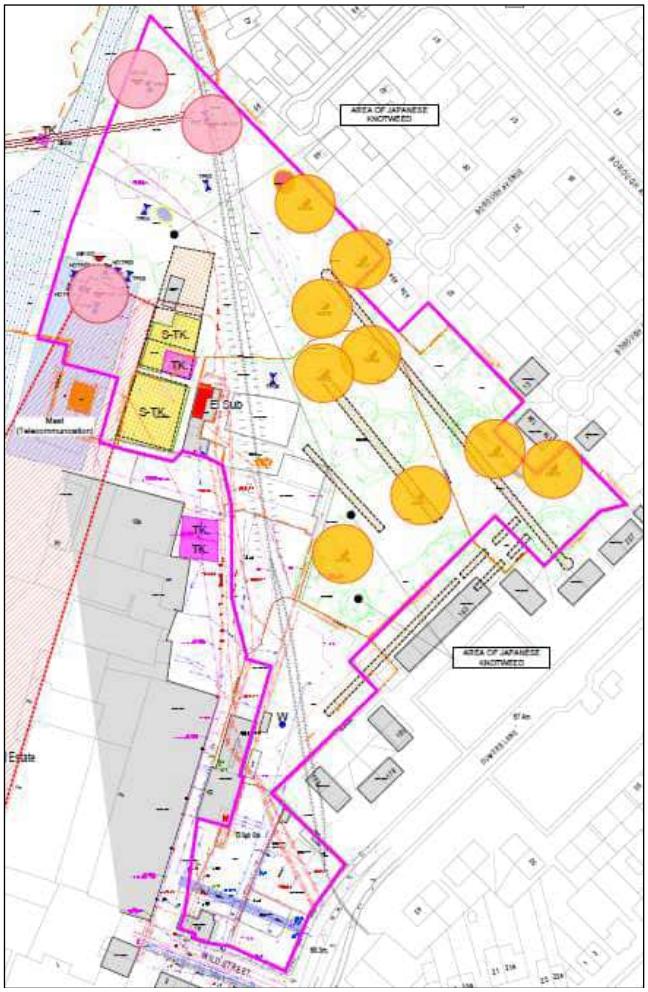


Figure 11: Showing gas monitoring positions in relation to varying sources. The orange circles represent the initial phase of investigation and the red circles are the secondary phase

Details of the monitoring wells and response zones are provided in the borehole logs, contained in Appendix 6 and summarised in Table 13 within Section 17.8. The gas monitoring wells constructed on behalf of Coopers consisted of 50mm HDPE pipe with slotted sections, geosoc surround to prevent silting up and inert gravel surround. Bentonite seals were constructed above the response zone to limit atmospheric gas ingress. A dual valve system with down feed was constructed to homogenise stratified gases, compliant with BS8576 (2013), was included, as shown in Figure 12, with flush stopcock cover.

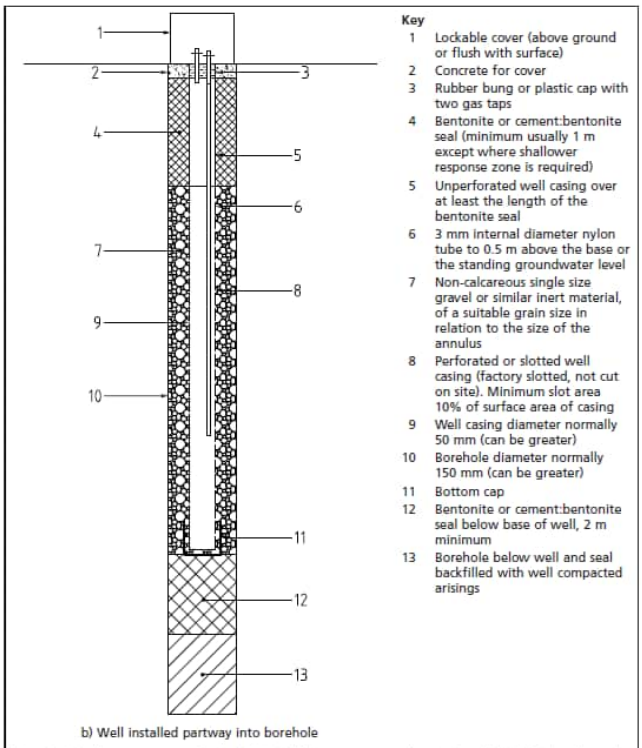


Figure 12: Extract of borehole monitoring well installation as recommended by BS8576

17.8 Ground Gas Monitoring

As detailed in BS8485(2015)+A1:2019 the gas monitoring procedures are to follow BS8576 (2013). This removes prescribed monitoring periods and frequencies with the onus transferred to the consultants to justify that their monitoring data is sufficient to characterise the site. Specific guidance on the requirements for gas monitoring duration is detailed within BS8576, Clause 8.6, in which the consultants should assess and appraise the risks based upon the levels of protection, as follows "*Gas monitoring does not necessarily need to be carried out under worst case conditions. It does not necessarily need to be at low or falling atmospheric pressure, but rather should be continued until it is unlikely that additional data will change the interpretation of the data, the outcome of the risk assessment, and the proposed remedial actions. This requires continued assessment of data as the monitoring progresses. One of the main considerations is to assess whether gas flow rates or concentrations could possibly increase and thereby affect the risk assessment and hence the choice of protective measures.*"

The approach to determining the sufficiency of the data is provided within BS8576, Annex F: Assessment of Whether Sufficient Gas Monitoring Data Have Been Collected. Table F.1 to F.3 within the BS8576 provide a decision matrix to appraise the sufficiency of the gas data.

For the purposes of practicality it is common practice to undertake an initial predefined set of monitoring visits to establish the ranges and variations that occur under different conditions and times. The monitoring proposed is to include 6 No. visits over a period of just under 3 months, which would be commonly considered appropriate for initial appraisal purposes. At the time of this report production a total of 2 No. visits have been completed with findings considered as interim, subject to completion of the monitoring. The monitoring is to include a range of atmospheric pressure and weather conditions, typically valid to allow an appraisal of variations occurring as a result of changes in conditions.

Coopers monitoring was undertaken with GA5000 gas analyser, manufacturer by QED (formerly Geotechnical Instruments). The initial phase of monitoring was undertaken within a 24-month manufacturer calibration, with certificate provided in Appendix 7. The secondary phase occurred after the manufacturer closed their UK and European operations, with equipment calibration and certification being undertaken in the USA. The return time for the instrument calibration has been advised to be 2 months. Coopers have ordered a second GA5000 to allow calibration to be staggered, and in the interim are undertaking Gresham Tube samples for laboratory testing to confirm the results of the instrument (which is out of calibration). Laboratory certification for the Gresham Tube testing is contained in Appendix 7.

The monitoring procedures by Coopers include an initial flow reading recorded at 10 second intervals over a period of 1 minute (to allow rates to stabilise), followed by continuous monitoring of gas concentrations at 15 second intervals over a period of at least 5 minutes, as recommended within BS8576. Following completion of the monitoring the bung is removed, water levels measured, followed by replacement of the bung and closing of valves. Gresham tube sampling immediately follows the gas monitoring stage.

The summary of peak and steady concentrations, flow rates and any relevant notes relating to the monitoring are contained on a summary table in Appendix 7. The range of results identified to date are summarised in Table 13 below.

Table 13: – Summary of Ground Gas Monitoring

Borehole	Target Strata/Source	Response Zone (m bgl)	Pressure Range (mbar) (*1)	Peak Carbon Dioxide (% by Vol.)	Peak Methane (% by Vol.)	Min. Oxygen (% by Vol.)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Water Level (m bgl)	Steady Flow (l/h)
Initial Phase (April to June 2024)										
WS01	Pathways/Control – Sand	0.5-1.6	991-1020	2.6-6.1	0.0-0.1	14.6-18.1	0	0-2	Dry	0.1-0.3
WS02	Pathways/Control – Clay and Sand	1.0-3.0	992-1020	2.1-3.8	0.0-0.1	17.2.-19.5	0	1-2	2.02-2.39	0.0-0.4
WS03	Shallow Madeground	0.5-1.0	991-1020	1.4-2.9	0.0-0.1	17.8-20.5	0-1	1-2	Dry	0.2-0.3
WS04	Pathways/Control – Gravel	1.0-2.0	992-1020	0.1-3.0	0.0-0.1	19.2-21.4	0	1-2	Dry	0.0-0.4
WS05	Pathways/Control – Sand/Gravel	0.5-1.5	992-1020	2.2-4.2	0.0-0.1	15.3-18.8	0-1	1-2	Dry	0.0-0.3
WS06	Shallow Madeground	0.5-1.1	991-1019	0.3-8.3	0.0-0.2	10.7-21.5	0-1	1-3	0.67-0.99	0.0-2.1
WS07	Shallow Madeground – Clay	1.0-3.0	992-1020	2.8-4.8	0.0-0.1	15.9-18.7	0-1	1-2	1.21-1.59	0.0-0.3
WS08	Pathways/Control – Gravel	1.0-1.8	991-1020	3.0-4.6	0.0-0.1	15.5-18.1	0-1	1-2	Dry	0.0-0.4
WS09	Pathways/Control – Sand/Gravel	1.0-2.45	990-1019	2.9-5.3	0.0-0.1	15.7-17.3	0	0-2	Dry	0.0-0.3
Secondary Phase (October 2024 onwards)										
WS101	Landfill – Former Reservoir	1.0-3.5	985	4.9	1.4	0.9	0	4	3.2	0.1
WS103	Deep Madeground	1.0-2.5	986	1.7	0.1	19.1	0	3	Dry	0.3
WS104	Madeground	1.0-1.5	986	1.4	0.1	19.5	0	2	Dry	0.2

17.9 Ground Gas Assessment

As outlined previously, a secondary phase of investigation has been completed which includes ongoing monitoring of hazardous ground gas. Assessments of the gas risk have been undertaken based upon initial monitoring results only, and will need to be revised upon completion of the monitoring.

The monitoring in June 2024 was outside of the landfill areas, within accessible parts of the site. The monitoring wells were primarily in natural strata or shallow madeground to assess the migration pathways in the shallow soils. The supplemental investigation targeted the former landfill associated with the reservoir, and areas of deeper madeground.

The initial phase of investigation identified typically low concentrations or negligible flow rates of hazardous ground gas. Sporadic slightly elevated concentrations of carbon dioxide were identified (marginally above 5%, all below 10%). The first monitoring visit from the supplemental investigation has identified the presence of detectable concentrations of methane of 1.4% from the former reservoir/landfill. The negligible flow rates are likely to be indicative that the gases are not actively generated which is supported by the presence of a shallow perched water table which limits gas flow rates. Waste materials below perched waters can result in saturated methane within the local groundwater which reduces the potential risks posed to building ingress (as the borehole causes the methane to come out of solution by reduced pressure), unless the waters are displaced into an enclosed area (where the potential risk becomes very high). Further testing and assessments are required during the monitoring period to identify the concentrations of hazardous ground gas and the potential provenance (via water sampling and isotope analysis).

The below sections include a basic assessment of the typical ground gas with analysis of concentrations of hazardous ground gases combined with ground gas flow rates to generate a Gas Screening Value (GSV) as outlined in BS8485 for appraisal only, followed by a discussion and assessment. The GSV is calculated for methane and carbon dioxide following the below equation:

$$GSV = \frac{concentration\ (by\ vol.)}{100} \times flowrate\ (l/hr)$$

The site specific GSVs for methane and carbon dioxide are used to correlate gas risks based upon thresholds outlined within BS8485, summarised in Table 14. The standards reference that the GSV should be used as an aid to the ground gas risk assessment, and not replacing it. The decisions of requirements for mitigation requires determination by appropriately experienced persons with justification.

Table 14: Thresholds for Gas Screening Values (GSV) in accordance with BS8485:2015+A1:2019

BS8485:2015+A1:2019		
Classification	GSV (methane and carbon dioxide)	Limitations for Consideration
CS1	<0.07	<1% CH4, <5% CO2
CS2	<0.70	<70 L/hr
CS3	<3.5	-
CS4	<15	-
CS5	<70	-
CS6	>70	-

No GSVs are provided for other hazardous gases being monitored, such as carbon monoxide or hydrogen sulphide. As detailed within BS8576 the only existing thresholds available to assess these for occupational exposure limits (OEL). For carbon monoxide the short term OEL_{ST} is 200ppm and the long term OEL_{LT} is 30ppm. For hydrogen sulphide the OEL_{ST} is 10ppm and OEL_{LT} is 5ppm. It should be noted that the OEL_{LT} is based upon 8 hour exposure limit converted to an annual mean and the OEL_{ST} is based upon 15 minute exposures converted to an annual mean. The OEL's may therefore be inappropriate for residential end use. For carbon monoxide it may be suitable to assume the European Standard EN50291 (supersedes BS7860) for domestic carbon monoxide detectors in residential properties lower alarm limit of 30ppm is appropriate and is in correlation with the OEL_{LT}. It may be considered that where hydrogen sulphide is present in any consistent notable presence it could pose a risk to residential human health and will require assessment.

The current gas regime for each borehole is defined in Table 15 below. The screening values and peak concentrations are defined as Characteristic Situation 1 (CS1). The worst case conditions across the site would be designated as CS1, although as outlined previously the monitoring wells are targeted to determine gases in relation to the sources therefore application of results on site basis would typically be overly cautious.

Table 15 – Summary of GSV's for Each Borehole

Borehole Reference	Characteristic Carbon Dioxide (%)	Characteristic Methane (%)	Characteristic Flow Rate (l/hr)	GSV Carbon Dioxide	GSV Methane	BS8475 CS Class
Initial Phase (April to June 2024)						
WS01	6.1	0.1	0.3	0.0183	0.0003	CS1
WS02	3.8	0.1	0.4	0.0152	0.0004	CS1
WS03	2.9	0.1	0.3	0.0078	0.0003	CS1
WS04	3.0	0.1	0.4	0.0120	0.0004	CS1
WS05	4.2	0.1	0.3	0.0126	0.0003	CS1
WS06	8.3	0.2	2.1	0.1743	0.0042	CS2
WS07	4.8	0.1	0.3	0.0144	0.0003	CS1
WS08	4.6	0.1	0.4	0.0184	0.0004	CS1
WS09	5.3	0.1	0.3	0.0159	0.0003	CS1
Secondary Phase (October 2024 onwards)						
WS101	4.9	1.4	0.1	0.0049	0.0014	CS1
WS102	1.7	0.1	0.3	0.0051	0.0003	CS1
WS103	1.4	0.1	0.2	0.0042	0.0002	CS1

Notes to Table 15:

- *Where applicable zero values have been changed to instrument LOD as GSVs include multiplication of values.*
- *Characteristic carbon dioxide and methane and flow rates are typically the maximum values during the monitoring, although consideration of steady state can be justified if monitoring data and assessment justify these are representative.*

The monitoring identified a spike in flow rates within borehole WS06 of 2.1 l/hr on 1 No. monitoring visit. The monitoring well was installed in natural strata, with no significant methane or carbon dioxide concentrations identified during that monitoring visit. During this visit the groundwater was close to the top of the response zone, which can result in anomalous flow rates due to a pressure differential within the well headworks. The other monitoring visits all identified negligible flow rates.

Sporadic spikes in carbon dioxide above 5% were identified in boreholes WS01, WS06 and WS09. WS01 and WS09 were control positions with response zones in natural strata, which WS06 contained shallow madeground with high perched groundwater (as described above). BS8485 provides clarification that peak concentrations are not thresholds for ground gas assessment, and that consideration of the peak values may result in changes to the ground gas designations, where supported by the conceptual site model. These monitoring wells were not within any defined likely source and considered to represent the variations that occur on sites.

Methane above 1% was identified within the landfill where the same approach to consider the gas results in the context of the conceptual site model applies. The landfill was defined as a potential significant risk and should the methane be identified as a trend with the ongoing monitoring be then it is likely that mitigation measures are required.

For initial appraisal purposes, subject to completion of the additional ground gas monitoring it is assumed that the plots within the areas of the former landfill/reservoirs will require CS2 gas mitigation measures. Based upon the current development layout the plots proposed for mitigation are Plots 61 to 83, as recorded on the enclosed remediation plan.

Outline proposals for gas mitigation measures are included below, assumed to be the worst-case design criteria, this should be confirmed within a design report and verification plan prior to development.

17.10 Characteristic Situation 2 Mitigation Designs

Coopers typical gas mitigation detail is contained in Appendix 13, referenced 8353/LRH/CS2/PC/PE/G-01.

In accordance with BS8485:2015+A1:2019, the design of gas mitigation measures is recommended to achieve points defined by the type of building and the type of gas regime. Private residential houses are classified as "Type A" buildings, as follows:

Type A building*: private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.*

Under the BS8485 points system, for Type A buildings, a design score of 3.5 points is required for a CS2 regime, as per Section 7.1, Table 4, within the standards. The points achieved are via the following approach:

- Structural Barrier (Floor Slab Construction).
- Gas Resistant Membrane.
- Ventilation Measures.

The design and detailing of gas protection measures requires more than just adding up points in the BS8485 screening system and providing standard details for membrane installations. The process should be systematic and commence with a general description of the gas protection system necessary to mitigate all of the potentially significant risks. The design of the gas protection system should include consideration of the protection inherently provided by the building construction and any conflict between the building design and gas protection measures. BS8485 advises that the gas protection design should be summarised in a design report and site specific design drawings should be provided. The report should: identify the key assumptions made in the design, justify the points assigned (if using the points system), justify the choice of products including gas membrane specification (not just gas transmission rate), provide ventilation calculations (site specific calculations to demonstrate performance), and include any other specific requirements."

The BS8485 points system is being used within the design system, and each aspect of the mitigation design is considered in the following sections by proposed floor slab construction, based upon semi-stiff raft foundations with integral floor slabs.

Precast Floors – Design Justification

1) Structural Barrier.

BS8485:2015+A1:2019, Annex A provides informative commentary on floor slab construction in relation to gas ingress and risk values.

The developer is proposing the construction of a precast suspended floor slab (block and beam) with a non-structural, reinforced concrete screed finish. Precast suspended floor slabs provide significantly less resistance to gas ingress compared with cast in situ reinforced concrete floors slabs and rafts due to the gaps at the boundary between individual components allowing gas ingress. The reinforced concrete screed will offer some effectiveness to limit gas ingress, however this is relatively thin (subject to design circa 75mm), non-structural where micro crack widths will allow more gas ingress in comparison to other floor slabs. BS8485 defines the overall very high risk for gas ingress to the proposed buildings through these types of floor slab construction.

Given the design system for the proposed floor slabs the structural barrier is determined as being insufficient to contribute towards the allocated points for gas mitigation.

2) Gas Resistant Membranes.

The developer's preferences for construction of the gas membrane is to locate this above the insulation, below the concrete screed, with membrane to step over internal/party walls and the external wall as a horizontal transition.

BS8485:2015+A1:2019, Annex A provides informative commentary on the choice and selection of gas resistant membranes on a site specific basis, including the properties of the materials, the reliance on the membrane within the design system, the robustness of the materials to survive construction, the installation methods and the requirements for verification.

Given the gas risk from slightly elevated gas concentrations without elevated flow rates, and the primary protection offered by the passive ventilation system, Coopers propose to utilise a minimum 2000 gauge virgin polymer LDPE membrane for gas mitigation. This membrane does not include an aluminium foil layer and therefore is not at risk of contact corrosion.

The gas membrane is not the primary form of protection within the designs (which is the subfloor ventilation layer, discussed below), however should the ventilation layer become blocked in the future, the floor slab offers little resistance to gas ingress and the membrane would need to be sufficient to mitigate gas ingress to the enclosed spaces of the building.

To achieve the requirements for designation of 2 points within BS8485 independent verification is required in accordance with CIRIA C735. A verification plan and method statement is to be provided upon completion of ground gas monitoring.

3) Ventilation Design.

BS8485:2015+A1:2019, Annex B provides informative commentary on performance of different forms of subfloor ventilation, largely based upon the research by Department of the Environment, Transport and the Regions (DETR) Partners in Technology (PiT) (1997) *"Passive Venting of Soil Gases Beneath Buildings Research Report – Volume 1, Guide for Design*" and "*Volume 2, Computational Fluid Dynamics Modelling: Example Output*". Models were based upon limited parameters for small (5m by 5m) and large buildings (30m width) with recommendations for designs based upon the results.

The Coopers referenced typical gas mitigation construction detail includes a minimum 150mm subfloor void, with side ventilation including standard cranked venting/air bricks at 2m centres, and internal walls containing connecting pipe work of 75mm at 1m centres.

Coopers Designs include:

- 150mm sub floor void (min.).
- Cranked external venting to air bricks at 2m spacing on at least 3 sides (frontages commonly not possible where level access is required).
- Internal wall venting pipes of 75mm diameter at 1m spacing.

Venting Performance:

- Periscopic ventilation = 6600mm^2 (typical ventilation per periscopic vent, subject to product types).
- Internal cross ventilation connection = 4417.86mm^2 (75mm diameter pipe, area is πr^2).

17.11 Conclusions

The revised conceptual model, based upon the ongoing monitoring, has indicated that there are slightly elevated concentrations of hazardous ground gas associated with the former reservoir which is recorded as a historical landfill containing inert and construction wastes. These gases are migrating in the shallow soils in the areas close to the source. Gas mitigation measures should be considered to the equivalent of Characteristic Situation 2.

Typical construction details for gas mitigation measures within the floor slab construction are included in Appendix 13.

18.0 Remediation and Validation

18.1 Remediation Proposals

The remediation and validation proposals within this document are provisional proposals to be supplemented by a remediation and enabling works strategy.

During the site clearance and demolition of existing buildings further investigation works will be required within areas previously inaccessible. The results of this phase of investigation and any changes to the remediation proposals will require prior approval from the Local Authority.

The contamination assessments have identified the topsoil and madeground to contain contaminants including metals, PAH compounds and asbestos fibres/debris. The designated historical landfill area of the former reservoir contains fragmented cement asbestos and an area of petroleum hydrocarbon impacted soils.

Predevelopment works are required to remove localised petroleum hydrocarbon impacted soils from the former reservoir and hand picking to remove ACMs.

Development phase remediation is required to include an inert cover system within proposed residential gardens.

Any reuse of the excavated soils would be subject to testing to confirm they are suitable for the intended use.

18.2 Ground Gas Mitigation Measures

As detailed within Section 17, ground gas monitoring is ongoing. The hazardous ground gases identified are likely to be associated with the former reservoir/historical landfill, which pose a high risk in areas where buildings are proposed to be constructed. There are insufficient natural barriers to stop gas migration and a precautionary Characteristic Situation 2 gas mitigation design is required.

Upon completion of the gas monitoring and design report a validation plan is required to ensure the designs are sufficient to mitigate the risks of hazardous ground gas and that the construction of the mitigation measures are appropriate.

Refer to Section 17 for detailed explanation of the design system for gas mitigation.

Refer to Section 18.7 for details of verification of gas mitigation measures.

18.3 Waste Exemptions/Requirements

Should reuse of soils be proposed the earthworks process will include consideration of the excavated materials to be designated as a waste process, where registrations are recommended to follow the CL:AIRE Definition of Waste – Code of Practice (DoW-CoP) to ensure the soils are not designated as illegally deposited waste.

Where following the DoW-CoP the developer should establish a Material Management Plan (MMP) showing the location of the materials to be stockpiled and progressive use. The proposals should be agreed between the developer and their contractor. An independent suitably Qualified Person (QP) should review the information provided and complete the declarations for registration under the CL:AIRE system.

The QP will require regulatory approval of the proposals, including consultation with the Local Authority and Environment Agency, prior to registering the declaration, which must be in place prior to the intended placement of the soils.

This process and designations of the soils are discussed in further detail in Section 19 of this report.

18.4 Validation of ACM Removal

During excavation of the reservoir the visible ACMs will require hand picking to mitigate the risk of these further fragmenting and exposing construction personnel to higher concentrations of asbestos fibres. The hand picking will need to be undertaken under the supervision of an asbestos consultant with materials segregated in specialist sealed skips of bags for removal from site. The asbestos consultant will direct measures to mitigate dusts during these works (such as damping down soils) and monitor for airborne fibres in locations around the excavation and soil movements.

The works will not remove all asbestos from the soils, as fibres and microscopic debris will not be viable for removal. The removal of the ACMs will however facilitate the safe future construction without further risk of significant deterioration of ACMs.

A verification report will need to be provided by the asbestos consultants confirming the safe removal, air monitoring results and disposal of the ACMs.

18.5 Protection of Residents within Gardens

The contaminants identified within the site has been shown to be a risk to future residents through exposure within the proposed growing medium of gardens. The depths of garden activities and use of the garden area has to be reasonable. It is not feasible to carry out risk assessments regarding extreme land use; therefore, it has been assumed that the majority of domestic gardening occurs within the upper 0.6m of soil. The predominant depth of regular excavation will be up to 0.2m due to the planting of annual and biannual bedding plants with shallow weeding. It is anticipated that the deeper planting will be associated with the planting of deep potted shrubs, and is generally restricted to few occasions over several years.

It is anticipated that the majority of the gardens will comprise lawn and ornamental bedding. Residents may utilise their rear garden as allotments and grow vegetables. It is anticipated that the deepest cropping vegetable will be the potato and generally crops to depths of up to 0.5m (it should be noted that potatoes are generally over dug where by during the growth of the crop soil is piled onto the plant). It is therefore considered that the initial 0.6m depth of garden will be the threshold zone for risk to the resident for non-mobile contaminants. This assessment concurs with the findings of BRE Report 465, Cover Systems for Land Regeneration. It is highly unlikely that the resident will excavate to depths in excess of 0.6m. If this does occur, it will be on the basis of once or possibly twice a year for a very small period of time.

It is highly unlikely that the residents will be planting vegetables for consumption within the front gardens of the houses, and the development layout shows the frontages are primarily parking bays and borders. It should be noted that it is unlikely that clauses will be present within the deeds to restrict this practice; however, we have to assume reasonable practices within these areas of the site. It is traditional to plant lawn and bedding plants, or pave the entire area of the front garden depending upon the resident's proficiency regarding gardening. It is generally assumed that the aesthetic value of having a vegetable patch in the front garden is significantly low, and produce may be lost by theft from passers-by. The potential for human health risk regarding the consumption of vegetables grown in these areas is hence negligible and should not be considered. The assume typical planting within the plot frontages are therefore designated as 0.45m.

The transporting of soils into the property also poses a risk to the residents. The soils caked on shoes and adhered to clothing due to contact with soils will dry, desiccate and form dust in the houses.

Any excavations associated with the constructing of extensions to the property should only be completed after consulting the Planning Department of Bury Council.

Children may come into contact with soils during unsupervised playtime through direct ingestion and during supervised playtime through inadvertent consumption of soils from toys, which have come into contact with soils. When very young children excavate in soils, it is anticipated the maximum depth will be in the order of 0.2m to 0.3m. It is anticipated that parents will not leave young children unsupervised in garden areas for any significant period of time.

Based upon the conceptual model the proposed reasonable use of the garden growing medium is restricted to 0.6m, and frontages as 0.45m, with consideration of contaminants within this zone requiring remedial actions, discussed in the following sections.

18.6 Cover Systems in Gardens (Development Phase)

To protect the future residents from exposure to contaminants the madeground can be excavated from the 0.6m growing medium in rear gardens and 0.45m in frontages for replacement with inert subsoil and topsoil. Subject to the proposals for cutting and filling as part of regrading site levels the madeground depth within parts of the site the natural strata may be less than 0.6m deep, where the inert cover would in places remove the entirety of the madeground. Where the madeground is removed prior to the 0.6m inert cover depth the proposed gardens would be as demonstrated in Figure 13. Where madeground is still present at the base of the 0.6m cover layer a high tensile strength geotextile will be placed at the base to prevent inadvertent exposure to the underlying contaminants or cross-mixing. The cover system for the proposed gardens would be as demonstrated in Figure 14.

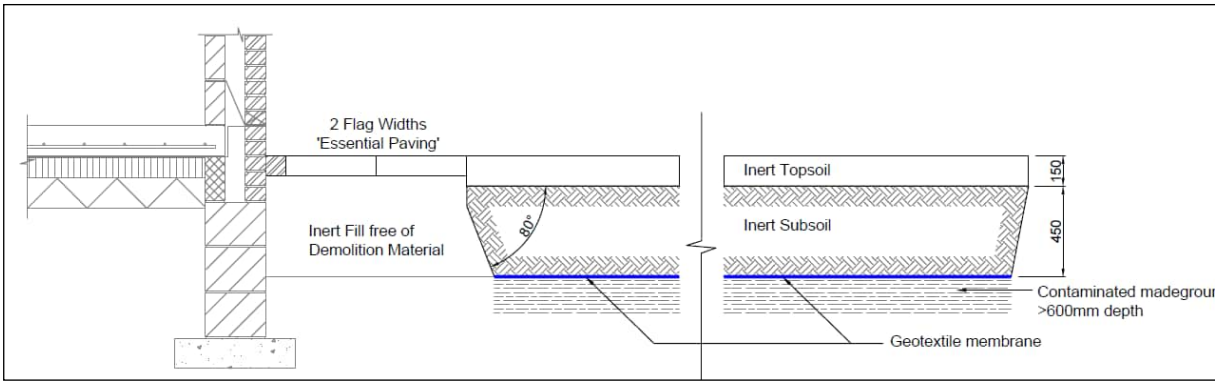


Figure 13: Inert Cover within Proposed Gardens where Contaminants are >600mm in Depth

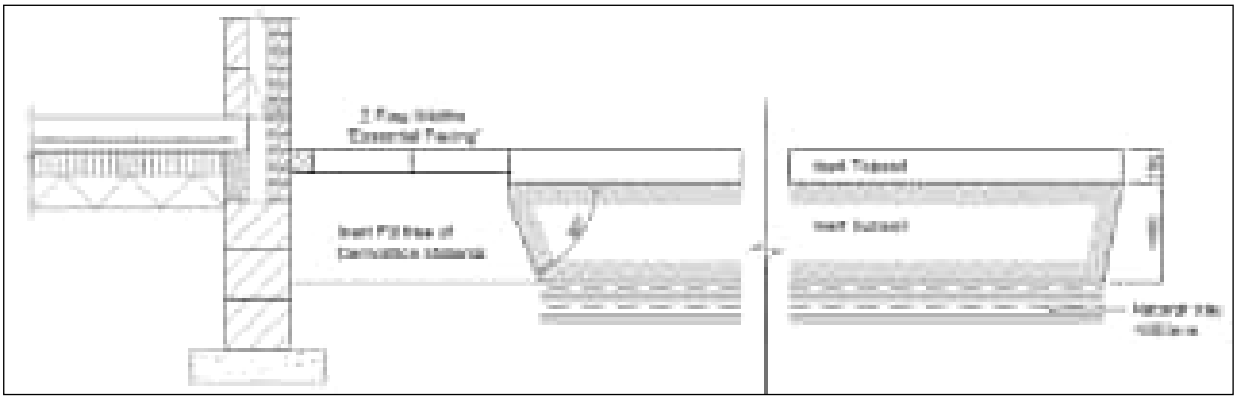


Figure 14: Inert Cover within Proposed Gardens where Contaminants are <600mm in Depth

It is likely that the inert subsoil and topsoil to be placed within the gardens will be inert natural soils imported to site. Verification testing of any soils intended for gardens are required to be considered appropriate to ensure it has not been cross-mixed during generation. Further discussions of soil testing are provided in Section 18.7.

Following placement of the inert subsoil and topsoil the depth of the inert cover will be confirmed via excavation of validation holes, to the full cover depth or natural strata. The validation holes should prove the presence of the geotextile or natural strata at the base of the validation holes. The validation strategy for verification of inert cover systems within gardens is provided in Section 18.8.

18.7 Soil Testing.

The subsoils and topsoil intended for reuse within the proposed gardens should be stockpiled for testing prior to placement. It is anticipated that the majority or all of the soils for placement within the gardens will be inert natural strata and topsoil from the site. The soils testing during the site investigation and conceptual model indicate no significant risk of contaminants within these strata, unless accidentally cross-mixed during placement.

Should imported soils be required for use within the proposed gardens these will require testing prior to use, with suites and quotas subject to provenance. The source of any imported soils and indicative testing should be provided to Coopers in advance, to determine if appropriate for delivery to site for testing.

Once soils are delivered to site or generated from site and stockpiled the materials should be segregated by source and end use for testing by Coopers. Typical sample frequencies are provided within Table 16 (below), although for large volumes of materials a reduced frequency may be appropriate, subject to local authority approval.

Table 16: Sample testing quota and suites by source for reuse in garden growing medium

Strata Type	Origin	Sample quote	Testing Suite
Virgin Quarried Material	Quarry certified	1-2 samples per source	Standard Metals
Imported Subsoil	Unverified/Recycled	1:50m^3 (min. 6 samples)	Standard Metals, PAH-16, TPH-CWG, pH, TOC, and asbestos (other analysis may be required if unverified or specific risks, e.g. PCB, VOC, SVOC suites)
	Greenfield	1:100m^3 (min. 3 samples)	Standard Metals, PAH-16, pH, TOC, and asbestos
Imported Topsoil	Unverified/Recycled	1:50m^3 (min. 6 samples)	Standard Metals, PAH-16, TPH-CWG, pH, TOC, and asbestos (other analysis may be required if unverified or specific risks, e.g. PCB, VOC, SVOC suites)
	Greenfield	1:100m^3 (min. 3 samples)	Standard Metals, PAH-16, pH, TOC, and asbestos
Imported Crushed Brick/Concrete	N/A	1:500m^3 (min. 3 samples)	Asbestos identification
Site Won Subsoil (not envisaged, subject to cut and fill proposals)	Site	1:500m^3 (min 3 samples)	Standard Metals, PAH-16, pH, TOC, and asbestos

18.8 Garden Validation

The remediation for the removal/capping of the madeground from the proposed gardens and landscaping in all parts of the site will be subject to validation. Where the individual gardens are proposed for placement of an inert cover/removal of contaminated soil to natural, the inert cover depth and geotextile/natural strata at the base should be verified via validation holes. The validation of the placement of inert cover growing mediums will consist of:

- Upon completion of the gardens to finished level, Coopers are to attend site to excavate validation holes to prove cover thickness of the growing medium. This will be undertaken on a spacing of 1 hole per 3 No. front borders/gardens and 1 hole per 3 No. rear gardens.
- The validation holes must not be pre-dug and be in locations of Coopers choosing. Placement of pipes and removal to validate depths are not considered as independent validation.
- Photographic evidence to demonstrate the location of the validation hole, the nature of the inert material and the depth of cover (refer to Photographs 13 to 16).
- Upon completion of the validation Coopers will produce a validation certificate to include all chemical testing, photographic records and verification documents required for statutory approvals.
- Upon completion of the development a validation completion report will be produced confirming the remediation requirements have been achieved including testing of all soils (reused or imported).

Photographs 13 and 14: Examples of validation photographs demonstrating validation hole location and soils forming inert cover

Photographs 15 and 16: Examples of validation photographs demonstrating inert cover depth and geotextile

18.9 Validation of Gas Mitigation Measures (Development Phase)

The approaches to verification of gas mitigation measures are detailed within CIRIA C735, introducing the holistic approach accounting for 4 key criteria, detailed in Table 17.

Table 17 – Risk Based Approach to determine gas inspection program

Consideration	Assessment Criteria
Gas Regime	Risk based upon Characteristic Situation and levels of protection
Complexity of Designs	Based upon number of penetrations, building shape, steps in slab levels, etc.
Number of Plots/Buildings	The number of plots; where greater numbers are considered a high risk of variation and build duration.
Installation workforce	NVQ Level 2 qualification or general ground works contractor.

The gas regime is relatively low risk, defined as Characteristic Situation 2, at low concentrations and flow rates, relating to areas of the former landfill (historical reservoirs/tanks). The gas designs have the primary form of protection achieved through passive venting with relatively lower reliance on the gas membrane through the design. The floor slab however is not offering any significant protection against gas ingress.

The buildings are standard construction without complex designs, with no stepped levels, basements, or other complex construction means current envisaged.

The initial proposals for plots requiring mitigation measures are provided on Coopers Drawing No. 8353/RP in Appendix 13. With 23 No. plots (6 No. buildings) proposed for installation of protection measures there is unlikely to be significant potential for variations in frequencies of verification. Coopers do not advocate or support frequency inspections due to common problems with defects being revealed on contractor's photographs and potential for significant problems for the developer where retrospective mitigation or verification becomes very costly.

The installation workforce is likely to be general contractors without specialist NVQ 2 training. From Coopers' experience the standard of installation among general contractors is more varied with potential for the work to be completed by inexperienced personnel where common defects would be likely.

The verification is proposed to include independent inspection of each gas membrane and mechanical stress point testing of seams by pick testing. These works should be completed by competent persons in the inspection of membranes. There are various schemes launched where to demonstrate competence, such as NVQ4, CL:AIRE qualification, or British Verification Council (BVC Full Membership). Should companies undertaking inspection not be able to demonstrate suitable competence then further integrity testing of joints (air lancing) is recommended.

A summary of the verification regime is provided in Table 18.

Table 18 – Gas Verification Requirements by Construction Method

Construction Method (Note *1)	Independent Inspection (Note *2)	Stress Point Testing (Note *2)	Integrity Testing (Note *2)
Block and beam floor slab, proprietary gas membrane with very good passive venting.	All plots to be inspected	All joints/seams	None

Notes to Table 18:
**1 – Changes to any proposed slab type, construction personnel and achievement of NVQ level 2 training must be reported to consultants for reassessment of the gas regime and inspection strategy.*
**2 – Inspectors of gas membranes installation to demonstrate competence/training in verification of gas membranes, for example NVQ4, BVC membership, otherwise integrity testing is proposed to further support the verification. The method of testing would be subject to the methods of jointing and installation, which should be agreed with the local authority.*

The aspects to be verified are listed in Table 19 below, with example photographs 17 to 28 showing example photographs.

Table 19: Gas Mitigation Measures Inspection Criteria

Inspection Criteria	Detailed Inspection Notes
1. Product Verification	*Confirmation that suitable products have been installed to consist of photographs of product types (manufacturer/name), labels on packaging and delivery tickets. Gas Membrane **AND** tapes*
2. General Condition	*The membrane is to be inspected to ensure there are no tears, punctures or rips. Take photographs of full plot status for each plot being inspected.*
3. Membrane Subgrade	*Commonly either insulation or sand blinding, check no gravel or other items with the potential to puncture when weight is applied.*
4. Jointing/Welds	*Checking the overlaps between membranes are correctly sealed, with correct tapes with sufficient overlaps or a good quality heat sealed weld if this method being utilised. Take photographs of at least one jointing section per plot being inspected to show sufficient overlap and use of tapes.*
5. Creases/folds	*Care must be taken to ensure that creases & folds within the membrane do not span over the jointing sections (bridging) as this provides an unacceptable gas pathway.*
6. Service Entry Points	*Verification of the presence of preformed tophats sealed to the pipe and membrane. If service entries are constructed using detailing strip or equivalent product then ensure adequate seal is achieved. Ensure installation is carried out in accordance with manufacturers guidance. Take photographs of all tophat installations.*
7. Corner Sections	*Not cut and folded where punctures are present but concealed with tapes. Either formed with Detailing Strip or preformed corner units.*
8. Reinforcement Spacers	*Use of metal spacers/ties with potential to puncture the membrane would only be permitted with protection board.*
9. Membrane Dirt/Debris	*Whilst we appreciate the membranes are constructed on a real-world construction site, the membrane must be free of debris such as stones or mortar that would be liable to damage the membrane when weight is applied through subsequent construction. Whilst mud is inevitable on the membrane it must be kept to a minimal level to allow the membrane to be inspected and defects disclosed. If the membrane is not visible due to the amount of mud then it will be failed and need to be cleaned for reinspection.*
10. Puncture Repairs	*Punctures are relatively common and occasional damage with proper repair is not considered to be indicative of defective workmanship. All punctures require a patch that spans the damaged section by at least 150mm on each side.*
11. Party Walls	*The use of temporary blockwork for shuttering commonly involves placing the gas membrane above the blocks for the initial concrete pour. When this is removed we advocate placing the membrane back to run flat through the party wall to allow this to be sealed and inspected on the subsequent plot. Alternative approaches are available but the membrane must not be cut and patched after the second plot is cast (due to additional damage, difficult repairs, and lack of inspection at this stage). Also if robust details adopted the membrane will need to drop through the cavity.*
12. Door Thresholds	*Care is required in relation to gas membrane positions through the wall cavity to the external wall around the door thresholds, closing the cavity, and protection beneath any sills. The use of preformed cloaking units and/or detailing strip protection would be recommended.*
13. Wall Cavity Inspection	*Confirming that proprietary gas membrane or gas DPC spans the external walls. Check for rips across cavity. Check for jointing detail of gas resistant DPC or membrane across cavity to main membrane. Take photographs for all plots inspected.*
14. Internal Garage	*One of the most common problems/defects in construction occur for internal garages where the membrane positions need to account for variations in proposed slab level. If internal garage then **phone office** during the visit to confirm the following items:*
a) Sloping Floor	*Check if the developer has sloping garages, if so these are critical to membrane positioning and requires particular attention to membrane positions.*
b) Internal Walls	*If sloping floor then check the membrane transitions at a low level through the internal wall to the plot to ensure it will not be exposed above the frontage of the sloping garage.*
c) External Walls	*If sloping floor then check the membrane steps up within the external wall cavity of the internal garage to ensure it is not exposed above the fall of the garage.*
d) Pillars	*Check the pillar/garage entrance section for the use of detailed strip to ensure not exposed around the entrance and closure of the cavity – refer to construction guide for details.*

Table 19 continued on following page

Table 19: Gas Mitigation Measures Inspection Criteria…Continued

15. Stepped Slab		*Check sufficient overlap of gas membrane to span the step between plots. Particular attention to be paid to the formation of corners to the external walls in line with Plot specific construction detail.*
a)	**Wall Ties**	*Check sealing of wall ties as per plot specific construction detail at approximately 0.9m centres. Take photographs of all wall ties and distances between each ensure detail strip secured to tie – refer to detail.*
16. Timber Frames – 1st Stage Inspection		*High risk, common problems/defects in construction in relation to fixings to masonary through membrane and sealing around external vents. Multiple positions failures can occur. Verify membrane routing and ensure a detailed inspection of every periscopic vent is undertaken.*
a)	**Periscopic Vents**	*Ensure they are formed and sealed with Detailing Strip.*
17. Timber Frames – 2nd Stage Inspection		*Checking the joiners' fixings between the soleplate and the gas membrane ensuring the fixing aligns with the position of the double-sided butyl tape to ensure an adequate seal is formed protecting against a gas pathway.*
a)	**Soleplate fixings**	*Check every fixing usually spaced at 0.60m centres across the soleplate both around the perimeter and internal party walls. Fixing and double-sided butyl tape must align with one another.*
18. External Wall Venting		*Check positioning of vents are on 3 sides of dwelling at approximately 2m centres. Take photographs of vents on external walls for each plot. (May be possible to photograph other plots on site which are at stage of installing vents. Will be useful for these plots later on).*
19. Subfloor Venting Type Checked		*If stone venting then check the stone is single sized, 20-40mm. May need to do this on adjacent plots, stockpile or ask for delivery tickets. Some designs need drains laid in the stone so check the construction details, if dims given then measure with tape and photograph*
20. Subfloor Venting Thickness		*The venting medium (void/stone) is of a designated thickness as shown on the gas design details. Photograph thickness of adjacent plots showing how large the void dimension will be with a staff. If not visible on adjacent plots request this item be provided for future inspection.*
21. Internal/Partition Wall Venting		*Check the spacing and dimensions of any interconnecting pipes between the subfloor venting medium. This can vary by size of building and design approaches so be careful to check against the gas details*

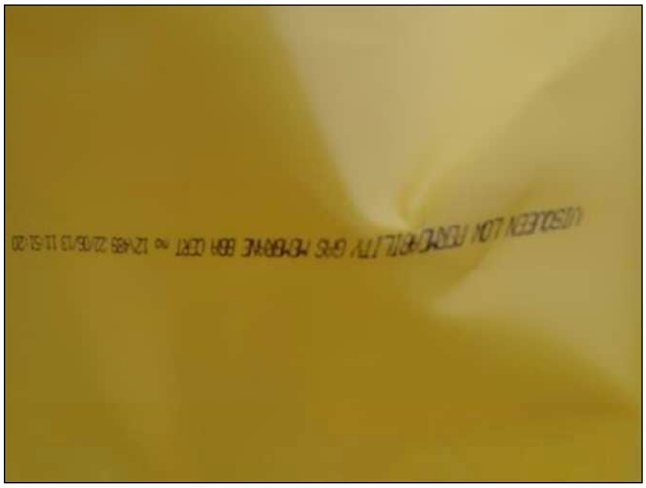
Photographs 17 and 18: Confirm presence of internal venting pipes, diameter and spacing. The typical spacing is 1 No. 75mm diameter pipe every 1m. This can change depending upon the pipe diameter, and the presence of spaces below the blocks and between the beams (dependant upon site specific construction variations) or changes by . This may not be able to be directly observed on each plot, depending upon the site specific design of gas protection measures. If not recorded then observation of other plots under construction, or requesting photographs to be taken by construction management can be deemed appropriate depending upon confidence in the construction as site progresses

Photographs 19 and 20: Verify presence of cranked vents along the external walls and sufficient spacing. Areas of access points to internal garages or external adjoining garages may not be possible to have cranked venting and alternative construction options should be discussed where necessary. Plots with stone venting to include photographs demonstrating the cranked vents are aligned with the stone

Photograph 21: Check general condition of membrane for punctures/tears etc – take panoramic photograph showing general condition

Photographs 22 and 23: Check >150mm overlaps of membranes and proprietary tapes placed and sealed with photographs taken

Photographs 24 and 25: Check tophat is sealed to membrane and pipework with tapes, and Jubilee clip



Photographs 26 and 27: If new delivery of product types is present and copies of supply tickets are not available then inspect product labels to confirm manufacturers and product types

Photograph 28: If no product labels are present then inspect stores for product types

18.10 Conclusions

Further works are required prior to finalising remediation and validation proposals. Ongoing gas monitoring is to be completed and additional investigation works are required concurrent with the demolition and site clearance.

Remediation proposals are currently consisting of localised removal of ACM fragments from the former reservoir, TPH impacts soils within the reservoir, and cover systems for all proposed gardens. It is assumed that gas mitigation measures will be required for plots in the area of the former reservoir.

19.0 Management of Materials and Waste

19.1 Management of Materials

Where materials are excavated for construction purposes, if possible, these should be retained on site, where considered suitable for use, to ensure sustainability of the development. Where suitable materials are excess to requirement, it is recommended that they are transferred for reuse rather than sent to landfill. The developer may complete the works under the CL:AIRE Development Industry Code of Practice for the Definition of Waste, Version 2 (or superseding versions if relevant).

Should madeground soils require reuse or additional soils need to be imported from another development to raise site levels, depending on the volume, a U1 exemption or a Materials Management Plan (MMP) may be required in accordance with DoW-CoP. An MMP must be reviewed by an independent Qualified Person (QP) for subsequent registration with CL:AIRE.

The intended use of soils excavated from the site would be detailed within the MMP for implementation within the construction phase. The MMP would require the identification and classification of materials intended for reuse or disposal off-site (including classification as inert, non-hazardous, stable non-reactive hazardous, or hazardous waste) and volume targets for disposal of each type.

Each soil type which is intended for removal will be classified with one of the following EC waste designation codes, as detailed within Environment Agency "*Technical Guidance WM3 - Hazardous Waste*". Generally, the soils would be classified as:

- **17 05 04 soil and stones other than mentioned in 17 05 03 – not containing dangerous substances**.

Based upon the chemical analysis of the samples taken to date:

- **Madeground strata** would likely be **Non hazardous waste,** following testing for Waste Acceptance Criteria (WAC) if intended for landfill.

- **Reservoir Infill** (assumed to contain ACMs and elevated TPH concentrations) would likely be **Hazardous waste**, following testing for Waste Acceptance Criteria (WAC) if intended for landfill.

- **Natural Strata** would likely be **Non hazardous waste, potentially inert** following testing for Waste Acceptance Criteria (WAC) if intended for landfill.

It is recommended that the chemical analysis results obtained to date plus WAC analysis are provided to a waste disposal site for confirmation of the disposal route, to enable the detailed assessment and full characterisation of the waste.

Within the DoWCoP, there are two paths which may guide the documentation required for the form of soil management systems. The initial path expects a Remediation Strategy to be produced for the site (assuming it to be potentially contaminated) to determine which strata or areas of the site are considered to be contaminated with regard to the proposed land use (Route A). The second path expects a Design Statement to be utilised for those sites where there is no contamination per se (Route B). Based on the characteristics identified at this site, a Remediation Strategy would be applicable.

Direct transfer of naturally occurring soils may be undertaken, however a robust assessment of the materials has to be undertaken to confirm this material is suitable for use and uncontaminated. It should be noted that the degree of threshold for contamination will be judged on the receiving sites requirements (based on the proposed end use).

The Code of Practice requires 4 No. factors to be addressed within the MMP:

(1) Protection of human health and protection of the environment;
(2) Suitability of use, without further treatment;
(3) Certainty of use; and
(4) Quantity of material.

With regard to Box A within the Code of Practice (c.3.7, p.13), the material types encountered have been classified to determine the 'Categorisation of materials within the ground'. Areas and volumes of strata noted below, will require assessment by a qualified quantity surveyor. These volumes would not represent the volumes of soils likely to be excavated through any part of the construction phase of the site redevelopment, rather the anticipated total volume of that stratum.

Table 20 - Categorisation of Materials within the Ground in Accordance with CL:AIRE Code of Practice

(1)	Material that is capable of being used in another place on the same site without treatment*;
(2)	Material that is capable of being used in another place on the same site following ex-situ treatment on site*;
(3)	Material that is capable of being used in another development site without treatment (Direct Transfer);
(4)	Material that is capable of being used in another development site following ex-situ treatment on another site e.g. Hub site*;
(5)	Material that is not capable of being used on the site or elsewhere and requires recovery or disposal off site as waste; or
(6)	Material that will be surplus to requirements and requires recovery or disposal off site as waste.
*	Having regard to the conceptual model (receptors and pathways) and appropriate risk assessment of the location where materials are to be used. We do not consider damping down to be treatment.

Reworked Topsoil – (1) or (6)

Reworked topsoil within the site contain contaminants (metals, PAH compounds and low level asbestos) which are not suitable for use in residential gardens or landscaping on residential sites. The topsoil cannot be reused in areas of significant earthworks, or where geotechnical sensitive (such as plots/roads) due to the high organic content and potential settlement where subject to loading. Based upon the current development layout there are no significant open space areas where these could be reused for upfilling and therefore likely that these soils will require removal from the site.

General Madeground (excluding reservoir infill) – (1) (3) and (6).

The general madeground contains contaminants (metals, PAH compounds and low level asbestos) which are unsuitable for residential garden growing mediums, but can reused on the site in selected areas, subject to suitable compaction for the intended end use. Surplus soils to be removed from site may be accepted for use on other sites of low sensitivity (e.g. bulk filling) or alternatively be removed to landfill for disposal.

Natural Strata (excluding silt/peat) – (1), (3) and (6).

Natural strata would be suitable for reuse in gardens and public open space as a growing medium, and where geotechnically suitable for use beneath buildings, roads, or as up fill (subject to suitable compaction for the designated end use). These materials if proven geotechnically and chemically suitable for use on other sites may be transferred under an MMP for the receiving site.

Silt/Peat (1) and (6)

Localised organic strata within the alluvium may be feasible to reuse within the topsoil in the gardens and public open space. Consultation would be needed with the groundworks contractor as to the viability. Alternatively, this would require disposal to a permitted waste management facility.

19.2 Cut and fill operations

Earthworks will be subject to review upon receipt of external works. It is likely that temporary cutting and filling will be required in areas of the site. Should significant upfill be proposed (generally assumed as >1m) then an earthworks specification and testing is recommended to ensure settlement is not significant.

Materials intended for reuse or importation and use within the earthworks will need to be classified in accordance with Series 600 and placed in layers with a vibratory roller (layer thickness and passes subject to material classification and roller specification). Where cohesive materials are intended for placement, we would advocate these are placed shortly after excavation or placed during summer months (as suitable compaction requires soils to not exceed their optimum moisture content).

19.3 Risks to Groundworks Contractors

We do not anticipate that groundworks contractors will be detrimentally affected by the materials present on site assuming basic site hygiene is followed comprising; wearing gloves, overalls, steel toe capped boots and hard hat on site, and basic welfare facilities are present within the site.

The basis of the assessment is that ACMs within the soils are removed prior to construction phase works. Should ACMs be identified within soils at any stage the works should safely stop and asbestos consultants contacted to arrange a site visit to determine safe methods of removal and any licensing or notifications required to the HSE to comply with CAR.

20.0 Sub Soil Classification

(Refer to Appendices 5, 6, 8, 9 and 13)

20.1 **General**

Samples of the soils from the exploratory holes by Coopers were submitted to DETS (Appendix 8) and Murray Rix (Appendix 9).

In situ testing of soil strengths were also undertaken on the site during the ground investigation.

20.2 **Results of In Situ Testing**

In situ SPT testing was undertaken within small diameter boreholes, consisting of SPT N values at 1m intervals. Shear strengths of the clays were tested from recovered samples utilising a hand shear vane, although these identified spurious results due to the samples breaking up during testing , resulting in lower values. Both forms of testing can be affected by the material properties/conditions, for example shear vanes will commonly produce false shears in gravelly clays and SPT N values influenced by water ingress. The logs reference certain areas where testing was considered likely to be spurious due to material properties.

Table 21 below details the in situ testing relevant to assessments of the construction requirements for this site. Further testing or assessments may be required for foundation design or earthworks purposes.

Table 21: - Summary of In Situ Testing

Strata Type	Shear Vanes Readings (kPa)	SPT (N Value) (*2)
Soft Clay	20*-30*	0-2
Firm Clay	38*-40*	2-27
Stiff Clay	42*-78*	27-40
Sand	-	0->50
Gravel	-	6->50

The exploratory holes identified the general trend of increased strength with depth (refer to Figures 15 and 16). The SPT N values were typically lower in the shallow soft/firm clays and sands and higher within stiff clay and gravel.

Madeground	Gravel	Soft/Firm Clay	Water Strike
Silt	Sand & Gravel	Stiff Clay	
Peat	Sand	Borehole Terminated	

Depth below ground level (m)	Exploratory Hole References												
	WS01	WS02	WS03	WS04	WS05	WS06	WS07	WS08	WS09	WS101	WS102	WS103	WS104
0.0													
0.1													
0.2													
0.3													
0.4													
0.5													
0.6													
0.7													
0.8													
0.9													
1.0	5	6	25	13	10	0	2	26	6	27		2	13
1.1													
1.2													
1.3													
1.4													
1.5													
1.6													
1.7													
1.8													
1.9													
2.0	14	12	22	15	49	34	10	37	6	6		0	5
2.1													
2.2													
2.3													
2.4													
2.5													
2.6													
2.7													
2.8													
2.9													
3.0	0	11	11	27		32	19	14	9	29		2	15
3.1													
3.2													
3.3													
3.4													
3.5													
3.6													
3.7													
3.8													
3.9													
4.0	12	17	40	13		48	50		6	4		27	50
4.1													
4.2													
4.3													
4.4													
4.5													
4.6													
4.7													
4.8													
4.9													
5.0	21	27		27									
5.1													
5.2													
5.3													
5.4													

Figure 15: Summary of SPT N values by strata type and depth

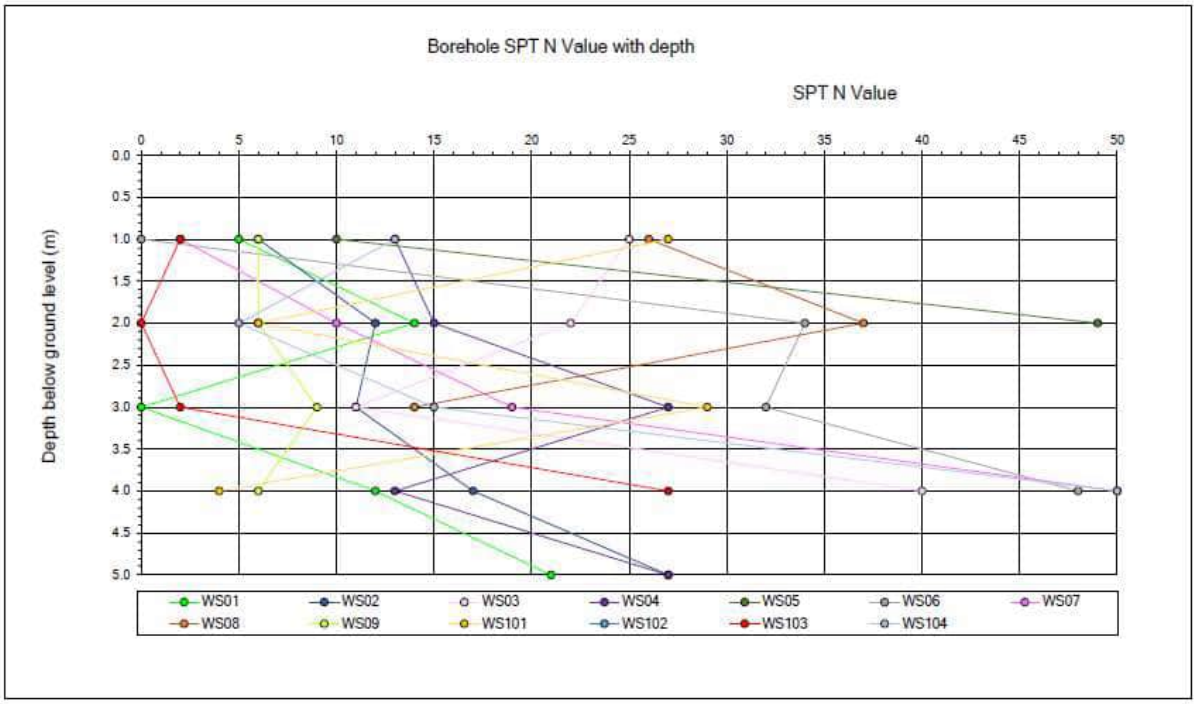


Figure 16: SPT N value with depth

20.3 Recommended Allowable Bearing Capacity

The recommendations for allowable bearing capacity by strata type are based upon the load imposed from a conventional 0.6m wide footing, for a building 10m in length at a depth of 1m. The load imposed from the foundation is proportional to the width of the foundation (B) with peak strain occurring at 1B and load becoming negligible below 4B. Foundations deeper than 2m are not considered likely to be viable due to the presence of a shallow water table, commonly present at depths of 2m to 3m.

At a depth of 1m, the natural strata consist of a combination of soft/firm alluvial clay, very loose/loose sand and medium dense gravel.

The soft/firm clays have characteristic N values ranging from N2 to N6, and would be deemed as unsuitable to support for conventional foundations without significant settlement. The areas of the sands have typical N values ranging from N5 to N6 where settlement would be >25mm for conventional foundations. The shallow soft/firm clay are therefore not considered suitable founding strata for conventional foundations.

The very loose/loose sand strata at depths between 1m to 3m have characteristic N values in the ranges of N5 and N6. Analysis of allowable bearing capacity (Hanson's method) for a 0.6m wide footing, 10m in length at a depth of 1m would on a the loose sand strata with SPT N value of N5 would result in allowable bearing capacity of 149kN/m$^{2.}$ Following Burland and Burbridge, settlement of 39.87mm which would be beyond acceptable tolerances. An allowable bearing capacity of 100kN/m^2 would also result in settlement of 26.77mm, exceeding design limits. The shallow sand strata are therefore not considered suitable for conventional foundations. Reducing the allowable bearing capacity of the sands to 75kN/m^2 would result in transferal of loads to a greater depth due to wider footings to support the building loads where the SPT N values are more variable and is considered as potentially resulting in excess settlement. The shallow sand strata are therefore not considered suitable bearing strata for conventional foundations.

The loose to medium dense/medium dense gravel stratum was identified at a depth of 1m with N values between 1m to 3m ranging from N9 to N49. Using the conservative SPT N value of 9 would result in allowable bearing capacity of 175kN/m^2. Following Burland and Burbridge settlement of 20.55mm which would be approaching acceptable tolerances. An allowable bearing capacity of 100kN/m^2 is recommended for design purposes resulting in settlement of 11.75mm which would provide reasonable confidence to allow for the inherent heterogeneity. Copies of the calculation sheets are provided in Appendix 9, and extract of settlement calculation in Figure 17.

Burland and Burbidge Settlement Assessment for Sand & Gravel

$$q'_n \times B^{0.7} \times I_c$$

		Recommended		Maximum	
Allowable Bearing Pressure	q'_n	100	kPa	175	
Footing Breadth Index	$B^{0.7}$	0.69936819		0.69936819	
Compressibility Index	I_c	0.078896293		0.07889629	
SPT value	n'	9		9	
Shape Factor	F_s	1.516658982		1.51665898	
Creep Factor over 10 yrs	F_t	1.404575749		1.40457575	
Settlement		11.75427	mm	20.55702	mm

Figure 17: Summary of settlement for typical strip foundations by allowable bearing capacity

The deeper stiff clays would be suitable to also achieve an allowable bearing capacity of 100kN/m^2, although given the strata is typically present at depths of 2.5m to 4.5m and below a perched water table the stratum is not proposed to be founded on with conventional foundations.

Table 22: Summary of allowable bearing capacity by strata type

Strata	Allowable Bearing Capacity
Soft/firm Clay	N/A - unsuitable
Stiff Clay	100kN/m^2
Silt/Peat	N/A - unsuitable
Very loose/loose Sand	N/A - unsuitable
Loose to medium dense/medium dense Gravel	100kN/m^2

Further discussions on foundation proposals are provided in Section 23.

20.4 Results of Laboratory Analysis

Tables 23 and 24 details the geotechnical analysis relevant to assessments of the construction requirements for this site.

Table 23: - Summary of Geotechnical Analysis - General

Strata	SO_4 (2:1) (water soluble) (mg/l)	SO_4 (total sulphate) (%)	pH (-)	Mobile/ Static (-)	TOC (%)	PI %	Modified PI %	<425 Micron (%)
Madeground	25-230	0.05-0.27	6.3-10.9	Mobile	1.1-7.6	-	-	-
Topsoil/Made ground (similar to topsoil)	11-73	0.05-0.11	4.9-9.5	Mobile	1.5-4.8	-	-	-
Cohesive Strata	14	0.05	6.9	Static	1.8	23-68	19.58-67.32	89-99
Granular Strata	<10	0.05	6.1	Mobile	1.4	-	-	-
Peat	380	0.20	6.3	Mobile	11	-	-	-

Table 24: - Summary of Grading Analysis

Strata	(Cobbles) 63<125mm	(Gravel) 2-63mm	(Sand) 0.06-2mm	(Silt) 0.002-0.06mm	(Clay) <0.002mm
Sand	0%	41%	49%	8%	2%
Silt	0%	1%	38%	55%	6%

20.5 Interpretation

Shrinkage Potential: **Gravelly/Sandy CLAY = Medium (based upon modified PI)**
Organic CLAY = High (based upon modified PI)

Soil Classification: Based upon BRE Special Digest 1 (2005), the Design Sulphate (DS) class, Aggressive Chemical Environment for Concrete (AC) class, and Design Concrete (DC) class for each of the strata types is given below:

Madeground - DS-1, AC-1, DC-1
Cohesive Strata - DS-1, AC-1s, DC-1
Granular Strata – DS-1, AC-1, DC-1

Any fill material to be imported onto the site should be tested and should not exceed the classifications given above. The designated concrete mix by end use is detailed in Table 25 (below).

Table 25: Sub-structure ready mix concrete designations by end use over the entire site (other than where madeground is present)

Use as substructure and ground floors		Ready-mixed concrete (designated mix)
General Use:		
• Rough blinding (non-structural)	-	GEN1
• Infill	-	GEN1
• Unreinforced oversite concrete below timber floors	-	GEN1
• Structural blinding and overbreak	-	GEN1
• In situ external concrete for drives and paths	-	PAV1
• In situ external concrete foundations for precast concrete paving slabs	-	GEN1
• Fill to wall cavity	-	GEN1
• Solid filling under steps	-	GEN1
Floor Slabs:		
• House or garage with reinforced concrete floor slab, either suspended or precast.	-	RC35
• House with non-reinforced slab (ground bearing) with either:		
a) Permanent finish to be added, e.g. screed or floating floor.	-	GEN1
b) No permanent finish to be added, e.g. carpet.	-	GEN2
• Garage with non-reinforced slab (ground bearing)	-	GEN3
Foundations:		
• Strip foundations	-	GEN1
• Trench fill	-	GEN1
• Other mass concrete foundations	-	GEN1
• Reinforced concrete footing	-	RC35

Notes to Table 25:
1) Worst case sulphate conditions over the entire site are ACEC Class AC-1/AC-1s, and Design Chemical Class DC-1.
2) Classification and designation in accordance with BS8500-1, 2006.
3) The above conditions represent the worst case conditions identified within the testing of soils on the site.
4) Any fill material to be imported onto the site should be tested and should not exceed the classifications given above.

21.0 Trees

(Refer to Appendix 13)

As detailed within Coopers site walkover, trees/hedgerows are present on the site, generally present as self-seeded species growing within the open space areas of the site and around the periphery.

Tree surveys identify the presence of widespread trees across the site, primarily self-seeded trees growing within the unoccupied parts of the site. The shallow cohesive strata are considered to be of high shrinkage potential. These strata are subject to volumetric changes by varied moisture content associated with tree roots. Where existing trees are removed or their roots severed by construction of foundations, rehydration of clay subsoils may occur causing the clay to swell or 'heave'.

As immature to semi-mature trees grow the root ball expands and can cause the clay beneath foundations to shrink causing subsidence. Where heave or subsidence is likely to occur, it is possible that it will affect the foundation/slab designs for any proposed dwelling in their vicinity.

The alluvium clay strata have been tested and determined as high shrinkage potential in accordance with Premier Guarantee guidance. Assessments of the tree influence in relation to current/proposed ground levels is therefore required for foundation designs (refer to Section 23 for further details).

Care must be taken to ensure that any existing trees scheduled for retention are not adversely affected by construction operations. Further guidance on this aspect of site works is given in the British Standards "*Guidance for Trees in Relation to Constructions*", BS5837.

22.0 Ground Floor Slabs

22.1 General Requirements

The proposed floor slabs are to consist of precast suspended floors with a minimum of 150mm of sub floor void.

22.2 Heave Mitigations

Where tree heave influence on cohesive soils is identified the floor slabs will require a 250mm subfloor void.

22.2 Gas Precaution Mitigation Measures

Refer to Section 17 – Assumed that plots 61-83 will require Characteristic Situation 2 protection measures, subject to ongoing gas monitoring. Typical mitigation details for the floor slab construction are provided in Appendix 13.

23.0 Foundations

(Refer to Appendices 5, 6 and 13)

23.1 Summary

The key factors in determining the foundations on this site are variable depths of madeground and lower bearing capacity alluvium strata.

No proposed external works drawings or slab levels have been provided and will be required to finalise the assessments of the foundation proposals.

It is anticipated that the majority of the proposed foundations will be piled due to variable low strength alluvium, and deeper madeground associated with the former paper works reservoir. Pile lengths are anticipated to be circa 10m in depth (subject to loading and design).

23.2 Development Proposals

The site is proposed for development by Westchurch Homes, comprising of a residential development of 84 No. residential houses comprising a combination of detached, semi-detached and 3-4 block mews housing, assumed to be 2 storeys in height. The proposed development layout is shown on Westchurch Homes, Proposed Site Layout, referenced 1025/SL01, revision -, dated August 2024. A copy of which is overlain on the remediation plan, contained in Appendix 13. It is also assumed that all materials and workmanship will comply with the Building Regulations and the Premier Guarantee Technical Manual.

23.3 Ground Conditions

The ground investigation has identified the natural drift strata is of variable strength, typically improving with depth. Local areas of soft organic clays/silts and peat are present within the alluvium, granular deposits varied from very loose to dense. The boreholes identified shallow groundwater across the site, commonly around 2m in depth, although in places as shallow as 0.6m.

Deeper madeground deposits have been identified associated with the former reservoir for the paper mill in the north western part of the site.

23.4 Allowable Bearing Pressure

As detailed in Section 20, the areas of soft/firm clay, very loose/loose sand, silt and peat are deemed unsuitable to support the proposed building foundations are not assigned an allowable bearing pressure for foundation design purposes. The shallower loose to medium dense/medium dense gravel and deeper stiff clay are assigned 100kN//m^2 for foundation design purposes.

23.5 Coal Mining Influence on Foundations

No shallow mining risk identified, no influence to the foundation proposals.

23.6 Tree Influence and Heave Potential

The alluvial clays have been tested and varied between medium and high shrinkage potential based upon the modified PI approach. These clays are not suitable bearing strata and the tree influence is in relation to heave mitigation for piled foundations. For heave influence assessment a high shrinkage potential clay is required.

A tree survey will be required for foundation assessment purposes.

23.7 Foundation Recommendations

The outline foundation types will be provided upon completion of external works drawings. Due to the presence of variable strength alluvium, and areas of deeper madeground it is anticipated that the majority of the plots will require piled foundations. The foundation options by depth to suitable bearing strata are as listed below.

Nominally Reinforced Strip Foundations

- Where depth to bearing strata is up to 1.2m below proposed FFL on granular or mixed bearing strata.
- Bearing strata Loose to Medium Dense Gravel.
- Minimum depth 0.75m below proposed ground level.
- Maximum safe bearing pressure limited to 100kN/m^2.
- Variations in formation depths to be stepped in accordance with Premier Guarantee Technical Manual.
- Refer to specific house type foundation details.

Deep Nominally Reinforced Strip Foundations (none proposed)

- Where depth to bearing strata is <1.2m from regrade level to be constructed with additional blockwork, foundation on granular or mixed bearing strata.
- Bearing strata Loose to Medium Dense Gravel.
- Minimum foundation depth of 0.75m relative to proposed ground level.
- Maximum safe bearing pressure limited between 100kN/m².
- Variations in formation depths to be stepped in accordance with Premier Guarantee Technical Manual.
- Refer to specific house type foundation details.

Mass Concrete Trench Fill Foundation

- Where depth to bearing strata is >1.2m from regrade level and typically less than 2.5m below proposed FFL and not effected by heave influence from trees.
- Bearing strata Loose to Medium Dense, or Medium Dense Gravel.
- Minimum foundation depth of 0.75m relative to proposed ground level.
- Maximum safe bearing pressure limited to 100kN/m².
- Variations in formation depths to be stepped in accordance with Premier Guarantee Technical Manual.
- Refer to specific house type foundation details.

Piled Foundations with Associated Reinforced Concrete Ground Beams

- Where the maximum foundation depth generally exceeds 2.5m below proposed regrade level and not influenced by heave from trees, and not influenced by shallow mine workings a piled foundation option is proposed.
- Column or line loads supported by ground beams.
- The determination of the number of piles (and therefore the loads) against pile length is largely commercial and typically determined by the contractors. It is assumed that the piles would likely be end bearing on bedrock at depths of up to 10m.
- Additional cable percussive boreholes may be required to allow a detailed design of the pile types and lengths (recommend contacting preferred contractors to identify the locations, depths and testing requirements).
- Piling platform to be designed in accordance with BR470, and subject to the rig specifications.
- Confirmation should be sought with the local authority regarding any noise or vibration issues associated with driven pile foundations.
- Refer to specific house type foundation details.

Piled Foundations with Associated Reinforced Concrete Ground Beams with Heave Precautions

- Where the maximum foundation depth generally exceeds 2.5m below proposed regrade level and influenced by heave from trees, but not shallow mine workings, a piled foundation option designed to account for heave influence from trees is proposed.
- High shrinkage potential clay requires the heave precautions comprising a compressible material for 150mm of compression beneath all ground beams, and 35mm of compression on the inside faces of the ground beams on the external walls.
- Column or line loads supported by ground beams.
- The determination of the number of piles (and therefore the loads) against pile length is largely commercial and typically determined by the contractors. It is assumed that the piles would likely be end bearing on bedrock at depths of up to 10m.
- Additional cable percussive boreholes may be required to allow a detailed design of the pile types and lengths (recommend contacting preferred contractors to identify the locations, depths and testing requirements).
- Piling platform to be designed in accordance with BR470, and subject to the rig specifications.
- Confirmation should be sought with the local authority regarding any noise or vibration issues associated with driven pile foundations.
- Refer to specific house type foundation details.

24.0 Trench Side Stability

(Refer to Appendix 5)

The excavations undertaken during the ground investigation demonstrated short term stability within shallow excavations with regular spalling of the sides. Should trenches need to remain open or require manned entry then they should be supported at all times or, where suitable, safely battered. Battering of excavations should be avoided in the proximity of existing structures without assessment from experienced engineering personnel.

Trench excavations for foundations/services must be adequately supported at all times and should be in accordance with the recommendations of CIRIA Report 97: Trenching Practice.

Further guidance on this aspect of site works is given in the British Standards for "Workmanship on Building Sites", BS8000, Parts 1 and 14, and in the Construction Industry Training Board's Site Safety Note 10.

Excavations within natural strata revealed by this investigation should be within the capacity of conventional hydraulic plant without the use of mechanical breakers. Remnant substructures will require grubbing out and removal in advance of the proposed development.

25.0 Dewatering and Infiltration Rates

(Refer to Appendices 5, 6, 7 and 13)

The ground investigation identified the presence of shallow groundwater ingress within the majority of the boreholes at 2m to 3m depth and during monitoring of hazardous ground gas.

The variable nature of the alluvium with areas of clays, silts and peat are unlikely to be suitable for conventional soakaways for surface water infiltration. Whilst the localised sand/gravel are anticipated to deliver higher infiltration rates the presence of variable groundwater would limit the locations are suitability for soakaways and considered unlikely to be suitable for conventional soakaway design.

Any pumping of groundwater should not be discharged into the existing sewer systems or brooks/ditches without prior agreement from the Environment Agency and Local Authority. Further guidance can be obtained from the CIRIA Report 113 entitled "Control of Groundwater for Temporary Works".

It should be noted that seasonal factors may affect changes in groundwater levels at the site. Consequently, dewatering may be more prevalent in the winter or at times of prolonged rainfall for shallow foundations or drainage trenches.

26.0 Road Sub-Grade

(Refer to Appendix 4 and 12)

26.1 Following site clearance, vegetation removal and earthworks the anticipated roads and car parking sub-grade materials are likely to comprise a combination or natural strata, madeground or materials placed as part of the regrading of site levels.

26.2 Road formation within soft/firm clay, silt and loose sand strata are estimated to have CBRs of <2%. Subject to proof rolling and surface conditions, based upon text book values, higher values of >5% would be expected within the loose to medium dense/medium dense gravel.

26.3 Proposals are subject to the review of Local Authority – Highways Department. However, we would recommend that all sub-grade materials are in situ CBR tested at proposed road formation level prior to final pavement design.

26.4 It is recommended that if initial roads and sewer construction is proposed to commence during the winter months then a longer period should be allowed for construction due to the potential for weather disruptions to the site.

27.0 Conclusions and Further Actions

27.1 **Conclusions**

The site investigation has identified the ground conditions to typically comprise of reworked topsoil and madeground deposits overlying alluvium and deeper glacial till. The alluvium is variable with gravel, sand, silt, clay and peat.

A former reservoir to the adjacent former paper mill was filled with inert and construction wastes as a historical prelicensed landfill. These wastes include identified identifiable cement asbestos containing materials and areas of petroleum range hydrocarbons at depth.

Chemical testing from the investigation identified topsoil and general madeground to contain contaminants including metals, PAHs and asbestos fibres/microscopic debris which pose an unacceptable level of risk to the future residents if soils were present within the growing medium of gardens/landscaping.

Further investigation is required to be undertaken concurrent with demolition works within areas of existing commercial use.

Remediation works are proposed to include excavation of the former reservoirs to remove local areas of petroleum hydrocarbon impacted soils and hand pick removal of ACMs. Development phase remediation works are required in the form of placement of inert cover systems within proposed gardens and landscaping.

Phased gas monitoring is ongoing, with initial results indicating the presence of higher concentrations of hazardous ground gases within the area of the former reservoir/landfill. Subject to completion of ground gas monitoring it is assumed that mitigation measures are required to the equivalent of Characteristic Situation 2.

27.2 Further Actions

Further action which Coopers consider will be required to progress the development status could include, but not necessarily be limited to: -

- Submit site investigation report for Local Authority approval.
- Complete ground gas monitoring and further water sampling from monitoring wells and report on findings.
- The final proposals for gas mitigation measures required will need to be specified and designs justified in accordance with BS8485.
- Provide external works/levels to determine cut and fill proposals.
- Remediation and enabling works strategy required.
- Subject to proposed cutting and fill an earthworks strategy may be required.
- Undertake additional investigation and testing of soils within the area of current commercial use, including electrical substations, concurrent with demolition.
- Report on the findings of the investigation during the demolition to finalise remediation proposals for formal approval with the local authority.
- Undertake predevelopment remediation works to include picking/removal of Asbestos Containing Materials from reservoir/landfill area and localised removal of petroleum hydrocarbon impacted soils.
- Development Phase Remediation and Validation, to include cover systems in gardens and gas mitigation measures near to the former reservoir/landfills.
- Produce Material Management Plan (MMP) for the reuse of soils on site.
- Registration of intention for reuse of soils on site following CL:AIRE: DoW-CoP.

28.0 References

- Published geological maps and borehole records from British Geological Survey website.
- Groundsure Historical Maps.
- Groundsure Enviro+Geo Insight Report.
- Historical aerial photography by Historic England.
- Information and guidance from .gov.uk website.
- Aerial photography reviewed on Google Earth.
- Consultants Coal Mining Report supplied by The Coal Authority.
- British Geological Survey (BGS) - 1:10,560 scale Geological Map, Lancashire County Series, Sheet 87SE.
- British Geological Survey (BGS) - 1:10,560 scale Geological Map, Lancashire County Series, Sheet 88SW.
- British Geological Survey (BGS) - 1:10,560 scale Geological Map, Lancashire County Series, Sheet 95NE.
- British Geological Survey (BGS) - 1:10,560 scale Geological Map, Lancashire County Series, Sheet 96NW.
- British Geological Survey (BGS) - 1:50,000 scale online maps – British Geological Survey (BGS) website.
- Donnelly, L.J., (2006) "*A Review of Coal Mining Induced Fault Reactivation in Great Britain*", in Quarterly Journal of Engineering Geology and Hydrogeology, Vol.39.
- A review of data held in the Coopers archives.
- A review of desk study data obtained from internet sources.
- Findings of trial pits and boreholes undertaken by or on behalf of Coopers.
- Findings of laboratory testing by DETS Ltd.
- Findings of bulk gas testing by ALS Ltd.
- Findings of laboratory testing by Murray Rix.
- DOE/ARUP Map of Mining Instability in the Northwest.
- The Coal Authority Technical Guidance Note 1 (TGN1/2019).
- BS 3882:2015 - Specification for topsoil and requirement for use.
- BS 5837:2012 - Trees in relation to design, demolition and construction. Recommendations.
- BS 5930:2015 - Code of Practice for Ground Investigations.
- BS 8000-11:2011 - Workmanship on building sites. Internal and external wall and floor tiling. Ceramic and agglomerated stone tiles, natural stone and terrazzo tiles and slabs, and mosaics. Code of practice.
- BS10175: 2011+A2:2017 - Investigation of potentially contaminated sites. Code of practice.
- BS EN 1997-1:2004 - Eurocode 7. Geotechnical design. General rules.
- BS 8485:2015+A1:2019 – Code of Practice for the Characterisation and Remediation from Ground Gas in Affected Developments.
- BS 8576:2013 – Guidance on Investigations for Ground Gas (Permanent Gases and Volatile Organic Compounds (VOCs).
- BRE Special Publication 1– Concrete in Aggressive Ground, 2005.
- BRE/EA Report 414: Protective Measures for Housing on Gas Contaminated Land, 2001.
- BRE: Cover Systems for Land Regeneration, 2004.
- BRE Report 211, Radon: Guidance on Protective Measures for New Dwellings, 2023.
- CIEH and LQM Report Generic Assessment Criteria for Human Health Risk Assessment, 2nd Edition, July 2009.

- CIEH and LQM Report: The LQM/CIEH S4ULs for Human Health Risk Assessment, 2015.
- CIRIA Report 97 – Trenching Practice, 1992.
- CIRIA Report 113 - Control of Groundwater for Temporary Works, 2000.
- CIRIA Report C665: Assessing risks posed by hazardous ground gases to buildings, 2006.
- CIRIA Report C733: Asbestos in soil and made ground, 2014.
- CIRIA Report C735: Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases, 2014.
- CIRIA C748 - Guidance on the use of plastic membranes as VOC vapour barriers, 2014.
- CIRIA Report C758 - Abandoned Mine Workings Manual, 2019
- CIRIA Report C765 - Asbestos in soil and made ground good practice site guide, 2017.
- CIRIA Report SP168: Asbestos in soil and made ground: a guide to understanding and managing risks, 2014.
- CITB – Report GE700: Construction Site Safety.
- CL:AIRE - Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance, 2006.
- CL:AIRE - Good Practice in the Risk Assessment for Coal Mine Gas Emissions, 2021
- DEFRA SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, 2014.
- DEFRA Environmental Protection Action 1990: Part 2A – Contaminated Land Statutory Guidance, revised 2012.
- Department for the Environment, Transport and the Regions: Passive Venting of Soil Gases beneath Buildings, Research Report, Guide for Design, Volume 1, September 1997.
- Design Manual for Roads and Bridges Volume 7, Section 2, Standard Interim Advice Note 73/06 Revision 1.
- Environment Agency – Land Contamination Risk Management, (https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm), 2020.
- Environment Agency - Technical Advice to Third Parties of Controlled Waters for Part IIA of the EPA 1990, 2002.
- Environment Agency Report: SC050021/Final Technical Report 1 - A review of body weight and height data used within the Contaminated Land Exposure Assessment model (CLEA), 2009.
- Environment Agency Report: SC050021/SR2 - Human health toxicological assessment of contaminants in soil, 2009
- Environment Agency Report: SC050021/SR3 - Updated technical background to the CLEA model, 2009.
- Environment Agency Report: SC050021/SR4 - CLEA Software (Version 1.04 beta) Handbook, 2009.
- Environment Agency Report: SC050021/SR7 - Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guidance values, 2009.
- Environment Agency, Good practice for decommissioning redundant boreholes and wells, 2012.
- Environment Agency, Technical Guidance WM3: Waste Classification. Guidance on the classification and assessment of waste (1st edition 2015).
- Health and Safety Executive: Managing and Working with Asbestos - Control of Asbestos Regulations 2012. Approved Code of Practice and guidance, 2013.
- The Law Society's Guidance Notes and Directory for Coal Mining Searches.
- Premier Guarantee – Technical Manual, V.16.
- Waste Management Report No. 27: Landfill Gas, Department of the Environment, 1991.
- Waste Management Paper No. 26A: Landfill Completion, Department of the Environment, 1994.

Appendix 1

Local Authority Consultations

Bury Council

DEPARTMENT OF OPERATIONS

Sian Callister
Coopers (Chester) Ltd
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU

Date 21 February 2024
Reference ES897.210224.1

Dear Sian

ENVIRONMENTAL SEARCH REQUEST
Land Adjacent to Bealey Industrial Estate, Radcliffe

Further to your recent enquiry regarding the above site, the Environment Section holds the following information:

The site is approximately 4 hectares in area and is located at National Grid Reference 379725 408182. The current OS plan is attached showing its location.

Please be careful to check the approximate scales on each plan enclosed as some will vary dependant on the search parameters.

Contamination issues at or immediately adjacent to the site

The site is currently mainly occupied by rough grassland and vegetation with yards and storage containers, a carwash, cafe, vehicle storage and a communications mast located in the southern part the site. Previous land uses at the site have included filter beds, settling tanks, reservoirs and tanks associated with a Dumers Paper Works (later Broad Dumers Paper Works), a tramway associated with Radcliffe Bleach and Chemical Works, electricity sub-stations, a garage colony, Bealey's Goit (partially infilled) and open land.

Within the wider area previous land uses have included Eaton Hill Cotton Mill (later a dyeing works, then dyeing and finishing), a gasometer, Dumers Paper Works, Radcliffe Bleach and Chemical Works (later bleaching works), a chemical works, engineering works, infilled reservoirs, areas of waste disposal activity and a sewage works.

This Section holds the following information relating to the ground conditions at the site. The location of these reports is shown on the attached plan.

CL399 – Land at Bury Road / Dumers Lane, Radcliffe

The following report was submitted in support of a proposed commercial development:

- Preliminary Risk Assessment, Leyden Kirby Associates, CL1192, 22 October 2007.
- Ground Investigation and Risk Assessment, Leyden Kirby Associates, CL1192-02, 30 November 2007.

The investigation identified up to 10m of waste within the former Bury Road, Radcliffe Landfill in the north of the site and approximately 1-2m of made ground containing ash/clinker in the southern part of the site. High concentrations of methane were recorded but flow rates were low. The groundwater encountered within the former landfill and the surface waters in Swan Lodge appeared to be in hydraulic continuity. No elevated concentrations of contaminants were found when compared to the then generic assessment criteria for commercial land use. Elevated levels of ammonia were identified in groundwater samples. Further investigation and risk assessment was recommended. No development took place.

Landfill Sites within 250 metres

We are aware of two registered landfills within 250m of the site and a location plan is enclosed (summarised below):

Landfill Name:	**Bury Road, Radcliffe (Crawford Bros)**		
File reference:	**C008**	**Grid Ref.:**	**379380 408810**
Site is an old refuse tip and has been filled with domestic, commercial, construction, difficult and non-hazardous industrial waste. The licence was granted to Wimpy Waste Management, Licence No. RD/LIC/0057/76. Filling took place between pre 1949 and late 1980s. We do not know if any landfill containment measures have been implemented at the site.			

Landfill Name:	**Dumers Lane, Radcliffe**		
File reference:	**C011**	**Grid Ref.:**	**379700 408130**
The site is a former bleachworks, initially the reservoirs and settling tanks were infilled, then the buildings levelled to raise site levels. The site has been filled with construction and inert waste. It is a pre-licensed site, originally owned by Wimpy Waste Management Limited and then owned by Beazer. Planning permission was given in 1982 for the infilling of the lagoons and in 1989 for raising site levels.			

Please note that the boundaries indicated on the enclosed plan are approximate only and may not reflect the actual extent of fill.

Local areas of landfilling at or within influencing distance of the site may have been carried out for which we hold no records. Please consult historical maps and other sources of information to identify potential areas of filling.

Further information on landfills may be available from the Environment Agency by telephoning 03708 506 506, emailing enquiries@environment-agency.gov.uk or visiting their Website: https://www.gov.uk/government/organisations/environment-agency and completing any on-line enquiry form. Note that the Environment Agency may make a reasonable charge for supplying this information

Sites determined as statutory contaminated land within 250 metres

No areas of land at or near the site have been determined as Contaminated Land under Part 2A of the Environmental Protection Act (EPA) 1990.

As the site has had a previous potentially contaminating land use, the property is considered a potential site of concern. However, the site is not considered a high priority for further investigation under Part 2A of the EPA 1990 and it is considered very unlikely that the site will be investigated in the near future, unless additional evidence that there may be a significant contaminated land issue at the site comes to light.

It would be considered prudent to conduct a detailed desk study, site reconnaissance and historical search to indicate potential problems which may require further investigations and / or remedial action. Extracts from historical mapping have been included for your information.

Historical maps for the site

Extracts from Ordnance Survey historical maps 1848, 1893, 1910, 1930, 1937, 1957 and 1984 are enclosed. Please refer to the maps for details of past uses at the site and surrounding land.

Aerial Photographs for the site

Aerial photography of the site from the 1940s, 1979, 1989, 1997-9, 2000, 2005-6 and 2009-11 surveys are enclosed for your information.

Please note that the quality of the earlier photography is limited, however, they do provide an extra source of information which is generally useful for the site and surrounding land.

Solid & Drift Geology for the site

The following information has been taken from the British Geological Survey 1:50000 scale digital map:

DRIFT	ALLUVIAM	
SOLID	MIDDLE COAL MEASURES FORMATION	PEEL HALL ROCK SANDSTONE

Please note that the 1:50 000 scale data may be used as a guide to the geology at a local level but should not be relied on for site specific geology. If more-detailed information is required then the 1:10000 scale maps, which provide the most-detailed interpretations available, should be consulted.

Aquifers and groundwater vulnerability classification at the site

The Environment Agency designate aquifers based on the Water Framework Directive. The designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey. Both the bedrock and superficial deposits are classified on the same scale.

Based on these designations, the bedrock beneath the site is classified as **Secondary A** (Middle Coal Measures and Peel Hall Rock Sandstone)**.** Please see below for the descriptions of this classification:

- **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.

The Environment Agency still recommend that the older groundwater vulnerability maps are used to classify soil leaching potential. The site is located over soils classified as **HU**. Please see below for the description of this classification:

- **Soils of High Leaching Potential, HU:** Soils at the site are classified as HU. Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst-case vulnerability classification of soils of high leaching potential (H) is assumed, until proved otherwise.

Radon Affected Areas at the site

Part of the site is located within a Category 2 Radon Affected Area, where 1 to 3 percent of homes are likely to be above the Action Level.

The UK Health Security Agency recommends a radon 'Action Level' of 200 Becquerels per cubic metre for the annual average of radon gas concentration in a home. Where 1% or more of homes are estimated to exceed the Action Level, the area should be regarded as a Radon Affected Area.

Further information on Radon can be obtained from the UK Health Security Agency, from the British Geological Survey or at www.ukradon.org.

Environmental Permits at the site

We are not aware of any sites with Integrated Pollution Prevention Control (IPPC) Part A1, or Local Authority Integrated Pollution Prevention and Control (LAIPPC) Part A2 Permits within 250m of the site.

We are aware of three sites with a Local Authority Pollution Prevention and Control (LAPPC) Part B Permits within 250m of the site.

The location of the Permitted Process is indicated on the enclosed plan and information on each is presented in the table below:

PPC Regs Schedule 1	Process Reference	Operator	Grid Ref.	Process (and Pollutants)
Part B	LAPPC04-14	M&S Commercials, Unit 5, Bealey Ind Est, Dumers Lane	379685 407999	Vehicle Respraying (VOCs, Particulates) ACTIVE
Part B	LAPPC10-01	Academy Group, Eton Business Park, Bury Road, Radcliffe, M26 2ZS	379442 408463	Waste Oil Burner <0.4mw (Particulates) REVOKED
Part B	LAPPC10-02	CCP Building Products, Eton Way North, Radcliffe, M26 2ZT	379550 408304	Bulk Cement (Particulates) SURRENDERED

Further information of the above authorisations is available for viewing within the PPC Public Register held at 3 Knowsley Place, Duke Street, Bury. Please contact us to arrange a visit if required.

Please note that other processes that do not fall under these regulations or are exempt may exist within influencing distance of the site of interest and may cause pollution and/or nuisance to new receptors.

Statutory nuisance notices in force at the site

We have searched the Environmental Services Authority database for nuisance and pollution incidents.

No nuisance incidents have been logged against the address supplied within the last 12 months.

No pollution incidents have been logged against the address supplied within the last 12 months.

No Statutory Notices for nuisance have been served against the address supplied or the immediate area within the last 12 months.

Other information on pollution incidents may be held by the Environment Agency (contact details given above), Health & Safety Executive on www.hse.gov.uk or by contacting the Manchester office on 0161 952 8200, Greater Manchester Fire Brigade on www.manchesterfire.gov.uk and Greater Manchester Police on 0161 872 5050 or their website: www.gmp.police.uk.

Ecological designations within 250 metres

We have records of one Site of Biological Importance (SBI) within 250m of the site. The location of each SBI is indicated on the enclosed plan and information on each SBI is presented in the table below:

Map ref.	Site Name	Grid Reference	Site Grade
C28	Swan Lodge	37960 40850	B

There are no Sites of Special Scientific Interest (SSSI) within 250m of the site.

Private Water Supplies within 1000 metres

We are not aware of any private water abstractions regulated under the Private Water Supplies (England) Regulations 2016 within 1000m of the site.

Air Quality Management Area (AQMA) at the site

The site is not located within an area predicted to exceed the national Air Quality Objectives for Nitrogen Dioxide (NO_2) as detailed in the Air Quality (England) Regulations 2015. Therefore in line with the EPUK Guidance, an air quality impact assessment will not be normally be required if the site were to be redeveloped.

However, in line with the principles of Good Practice set out in the EPUK Guidance, we would welcome proposals to mitigate any potential impact of any redevelopment on local air quality through the provision of electric vehicle charging points to encourage the use of low emission vehicles.

Environmental Information Regulations 2004

The Environmental Information Regulations enable individuals and organisations to request environmental information held by public bodies. In the majority of cases, we will endeavour to respond to your request within 20 working days, extended to a maximum of 40 working days should

the request be complex or voluminous. Public Bodies are allowed to make a reasonable charge for supplying the information requested, and we will contact you if a charge is applicable.

You are welcome to have access to any public registers or to examine the information free of charge. If you wish to do so, please contact the Council to arrange viewing.

If you are dissatisfied with your response, you have the right to complain to the Local Authority, who will conduct an internal review to try and resolve any issues or problems. Please complete a 'Report a Problem' complaint form available from our website: www.bury.gov.uk or by contacting customer services on 0161 253 5353. Should you still not be satisfied with your response, you may then appeal to the Information Commissioner. Details can be found on the following website: www.informationcommissioner.gov.uk or by contacting 01625 545 700.

Payment Receipt

I acknowledge your payment of £135.00. Should you require any further information please contact me on the number given above.

Customer Satisfaction Survey

The Environment Section, as part of its commitment to Customer Care, is looking at ways to improve its service. Our commitment is to listen to our customers and offer courteous, helpful advice and assistance.

With regards to your information request I should be grateful if you could complete the enclosed questionnaire to help us assess if we are meeting your needs.

Information collected in the survey will be strictly confidential and will enable us to provide a quality service. Thank you for your co-operation.

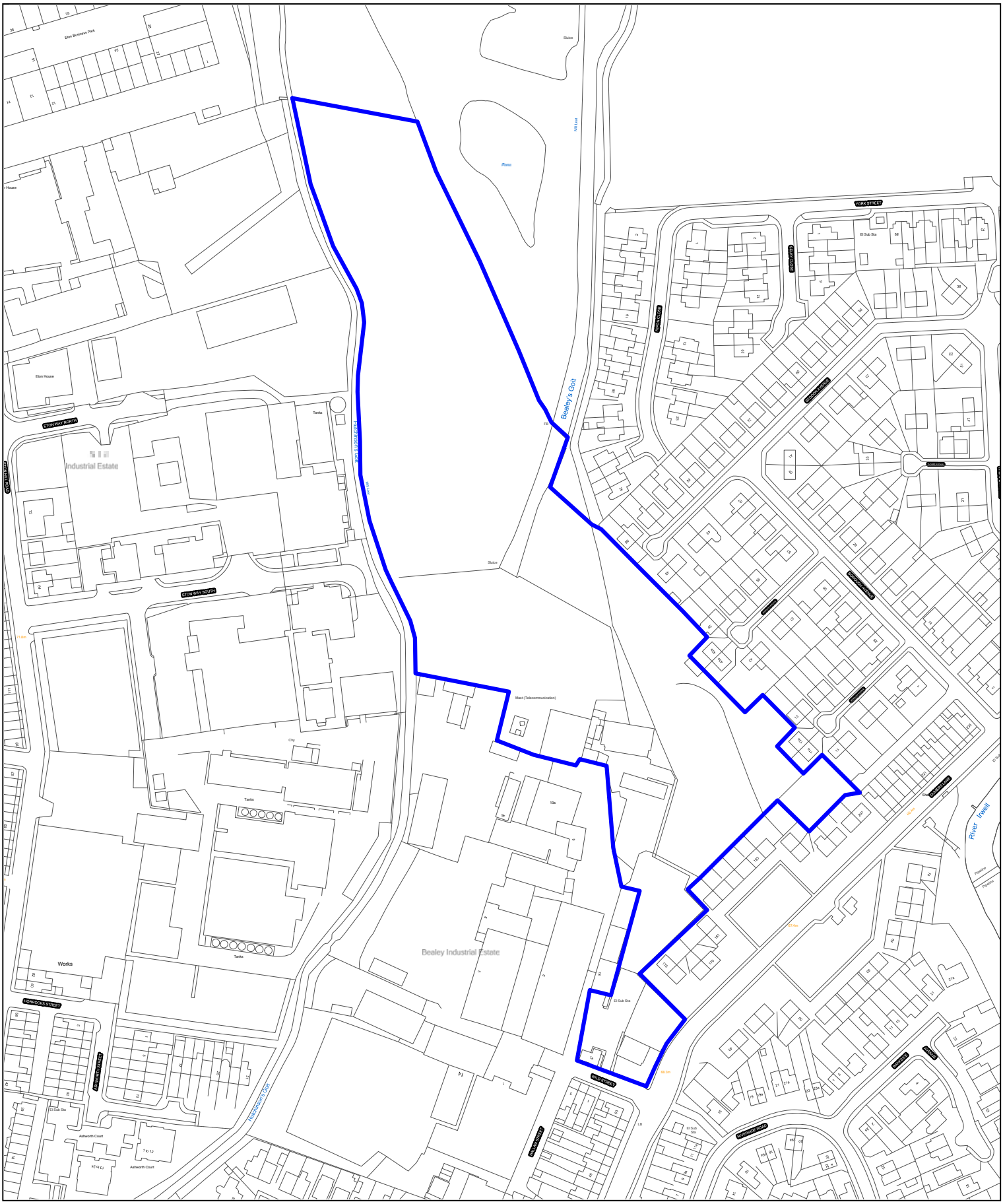
Should you require any further information please contact me on the number given above.

Yours sincerely

Rebecca Jones
Environmental Protection Officer

The above details are based upon records currently held by the Environment Section and are believed to be accurate at the time of printing. However, this Division can accept no responsibility for their accuracy or completeness.

Privacy Policy: Please visit www.bury.gov.uk/privacy to read our recently updated Privacy Policy which explains how Bury Council uses and shares your personal data to give you the best possible experience across our services.



KEY:

Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

Current OS Map

Bury Council

Crown Copyright and Database Rights 2024
Ordnance Survey 100023063

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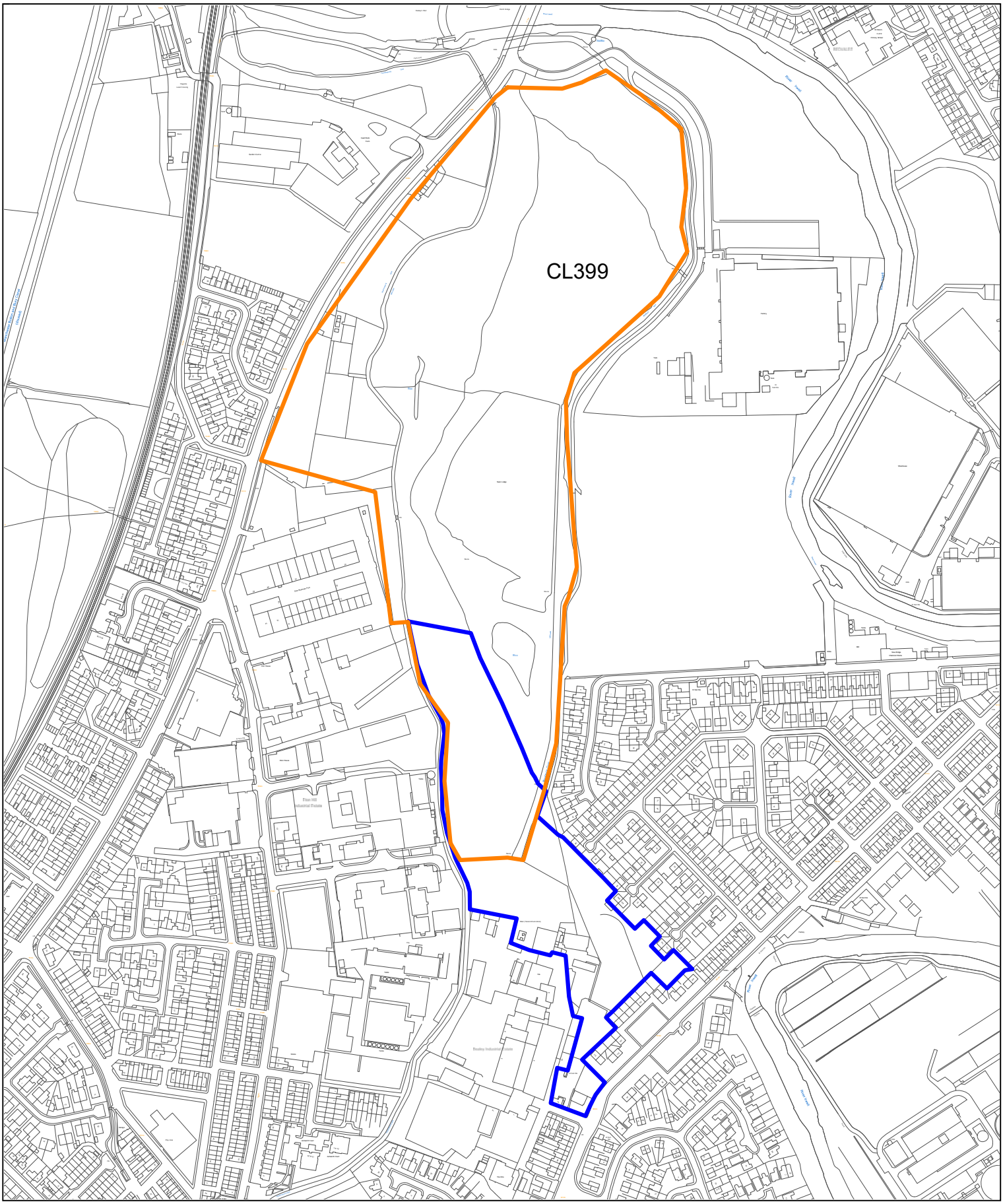
kilometres

Scale 1:2,500

NGR: 379725 408182

DATE: February 2024



KEY:

Site Boundary

Site Investigation Reports

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

Site Investigation Reports

Bury Council

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Ordnance Survey 100023063

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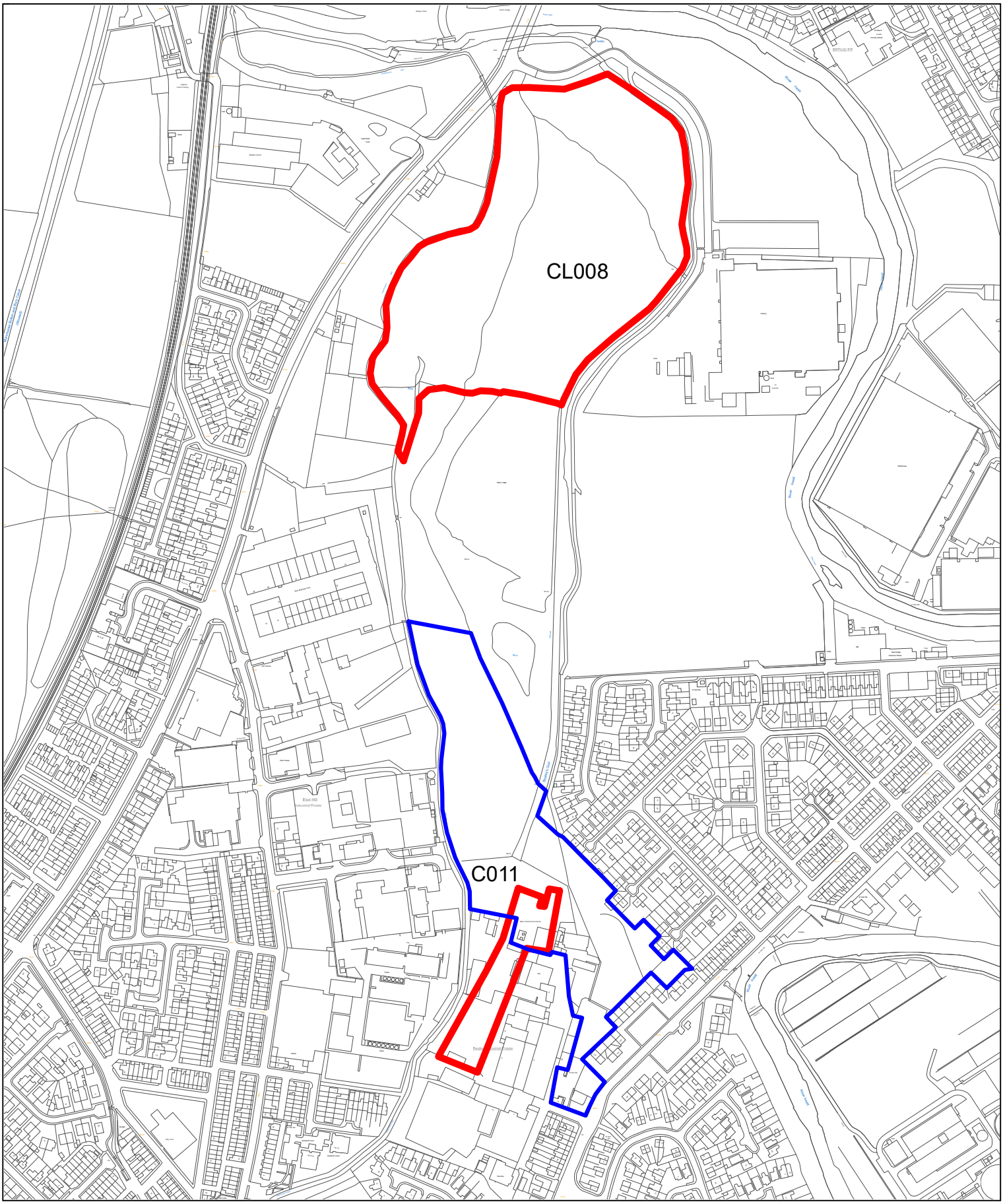
kilometres

Scale 1:5,000

NGR: 379725 408182

DATE: February 2024



KEY:

Site Boundary

Landfill Sites

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

Landfill Sites

Bury Council

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Ordnance Survey 100023063

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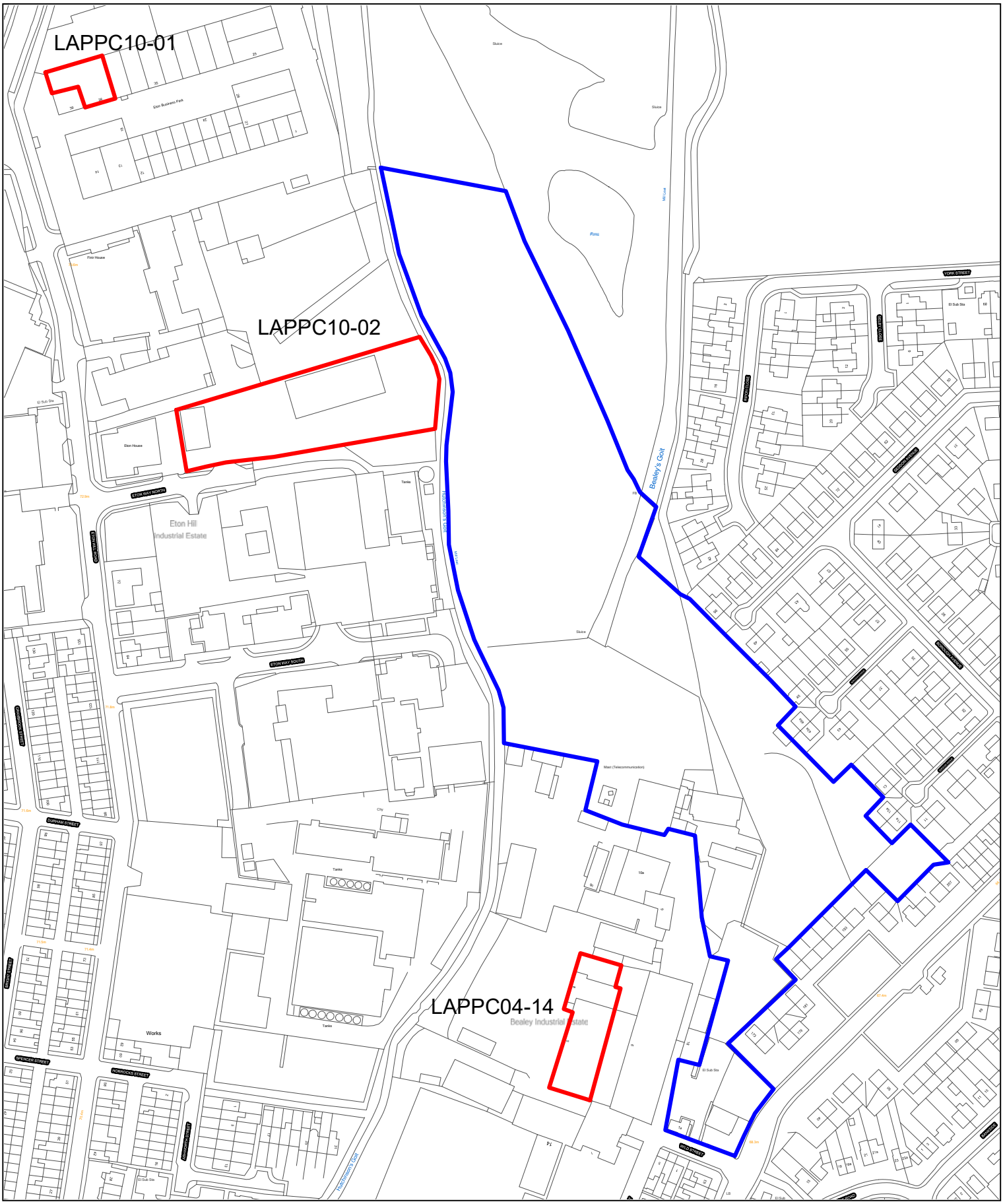
kilometres

Scale 1:5,000

NGR: 379725 408182

DATE: February 2024



KEY:

Site Boundary

Part B Process

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

Environmental Permits

Bury Council

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Ordnance Survey 100023063

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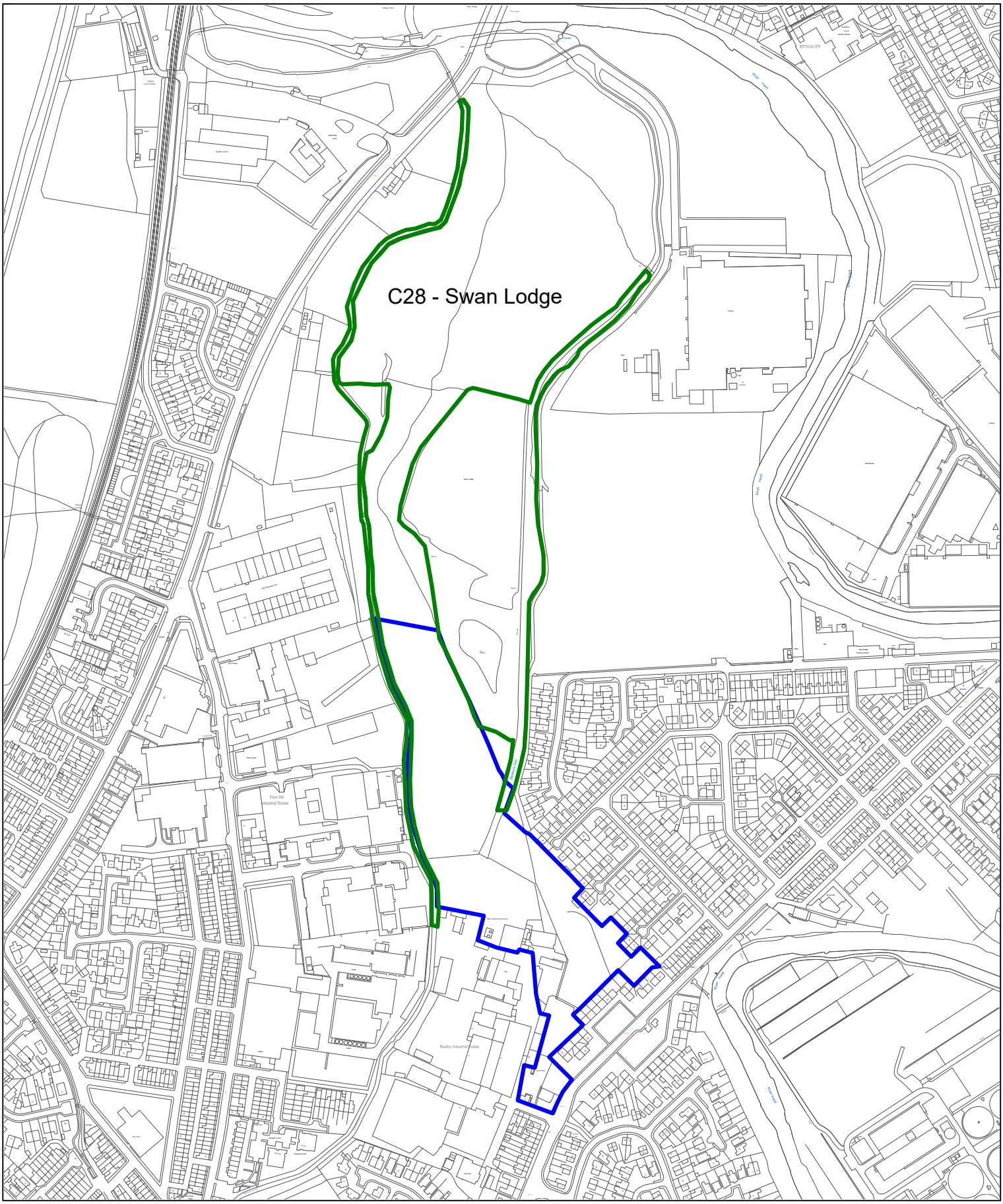
kilometres

Scale 1:2,500

NGR: 379725 408182

DATE: February 2024



KEY:

Site Boundary

Site of Biological Importance

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

Ecological Designations

Bury Council

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Ordnance Survey 100023063

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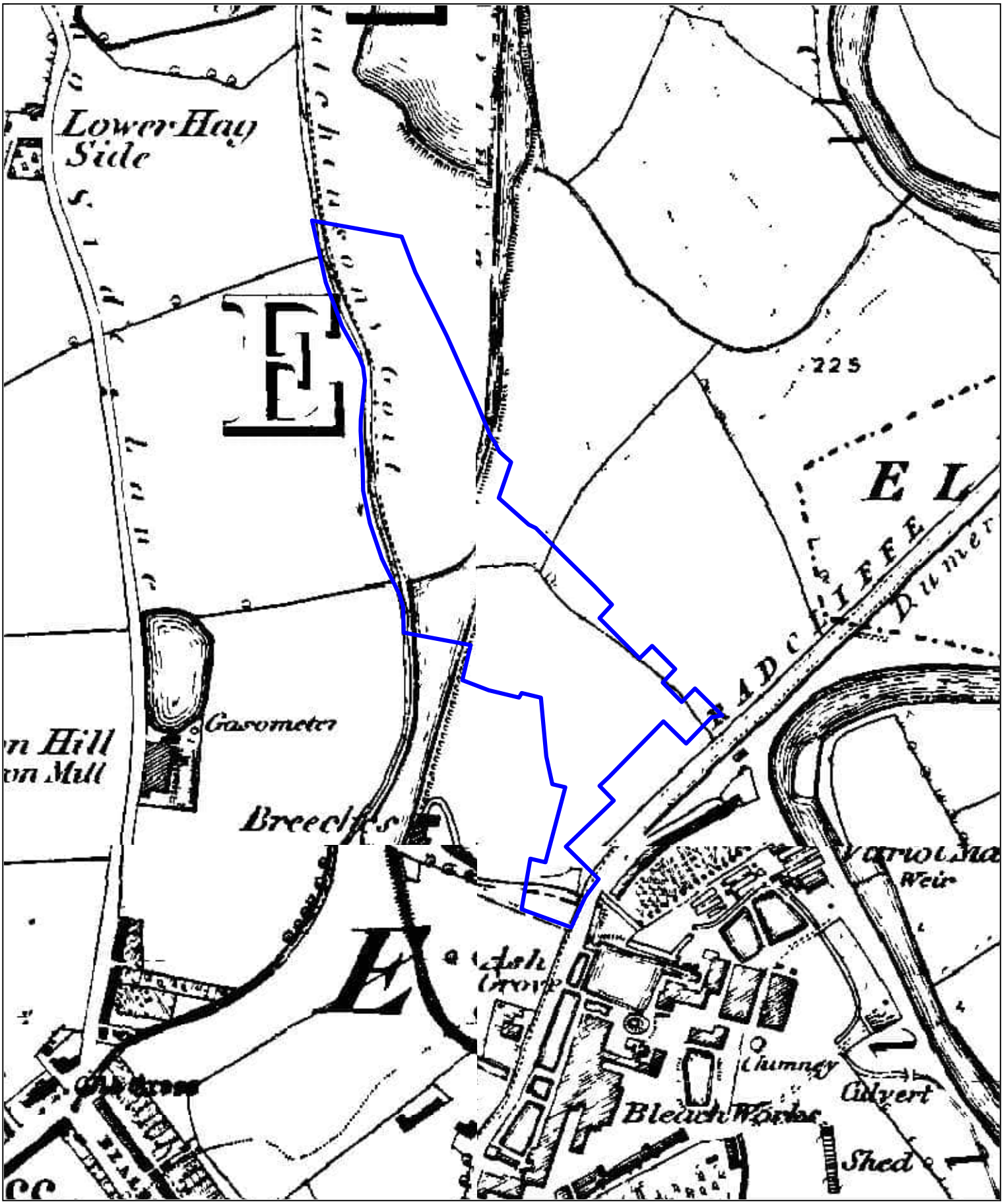
kilometres

Scale 1:5,000

NGR: 379725 408182

DATE: February 2024



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Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

1848 Historical Map Extract

Bury Council

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Ordnance Survey 100023063

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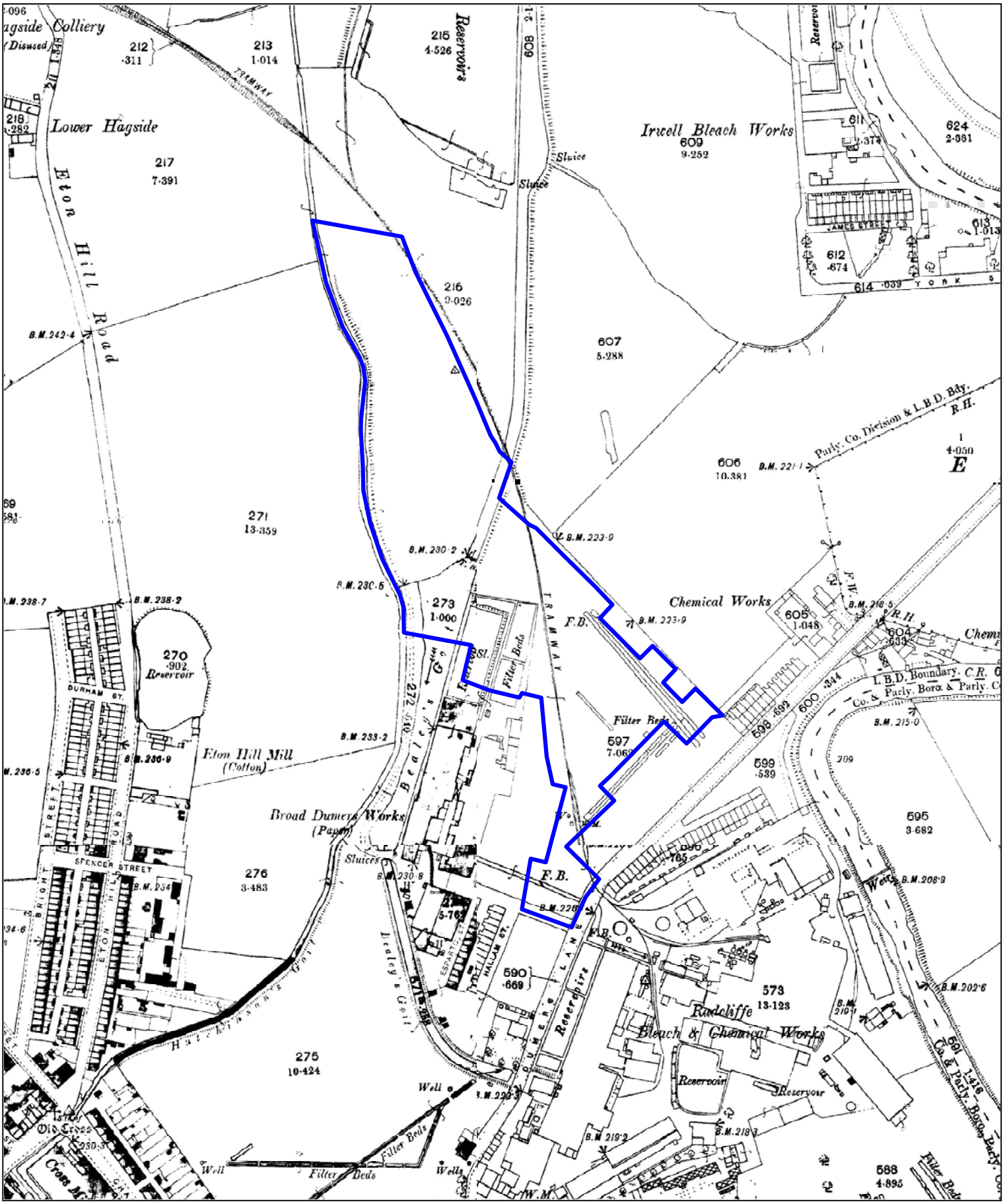
DATE: February 2024



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Land Adjacent to Bealey Industrial Estate, Radcliffe

1893 Historical Map Extract

Bury Council

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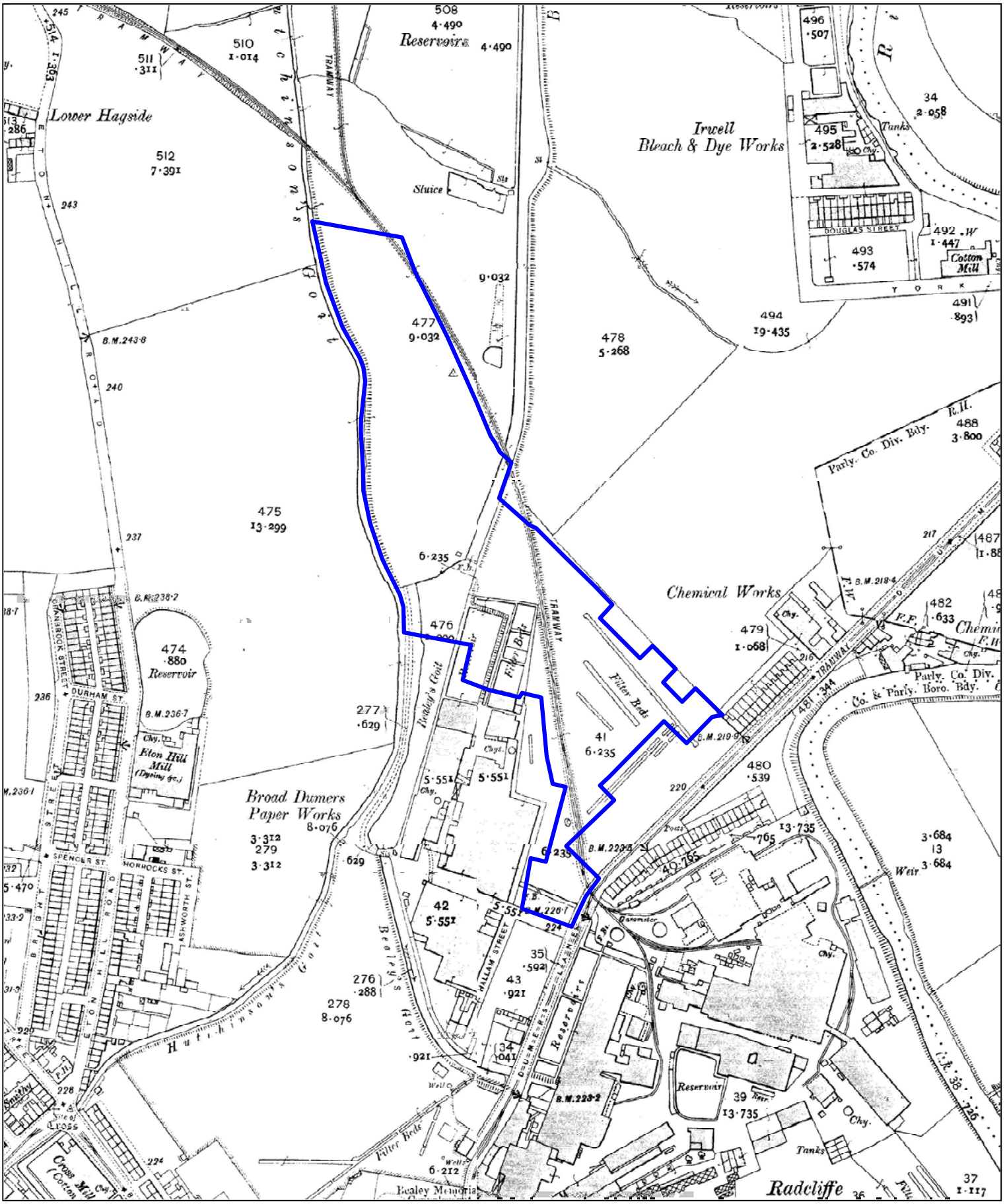

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TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

1910 Historical Map Extract

Bury Council

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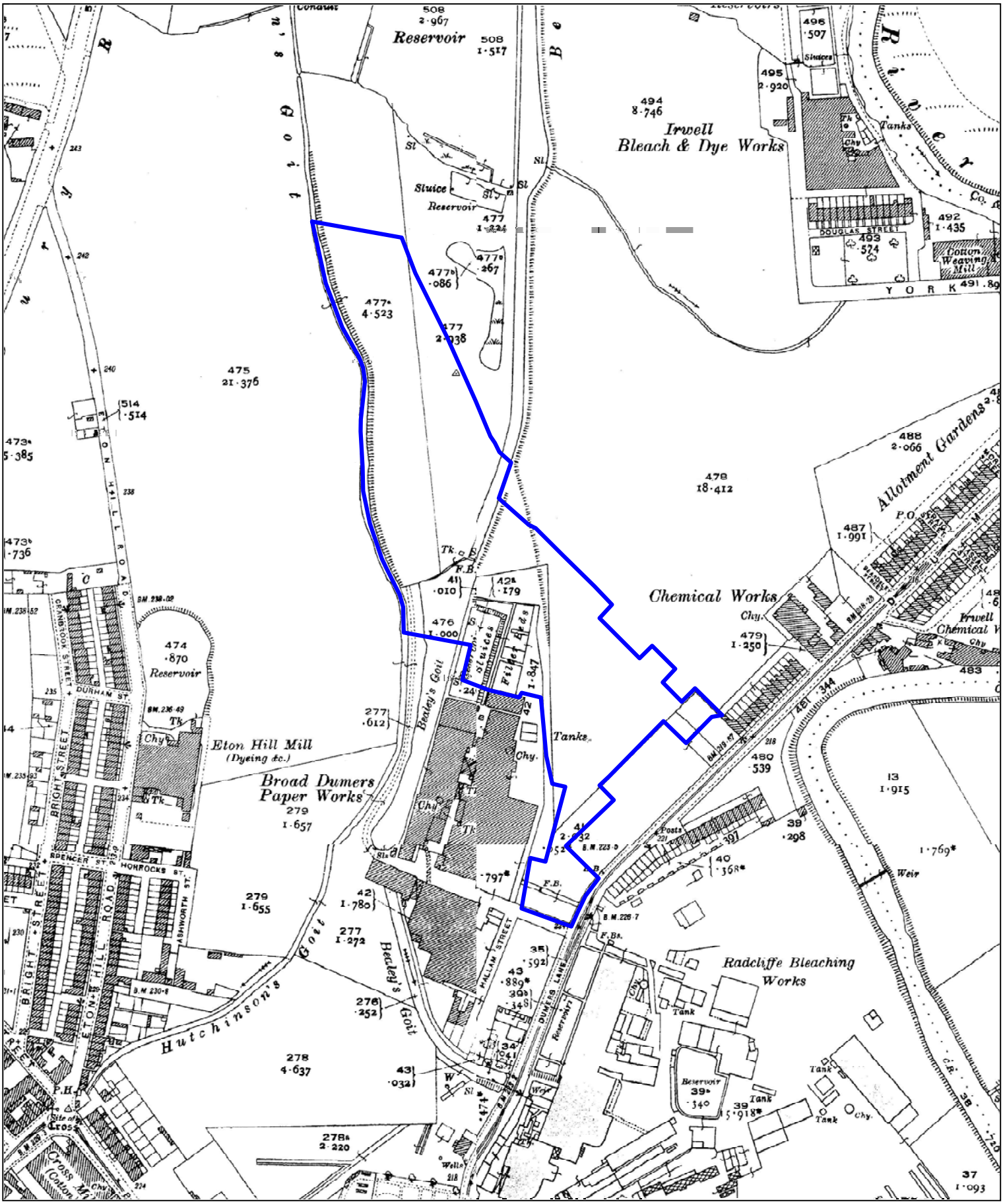

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Land Adjacent to Bealey Industrial Estate, Radcliffe

1930 Historical Map Extract

Bury Council

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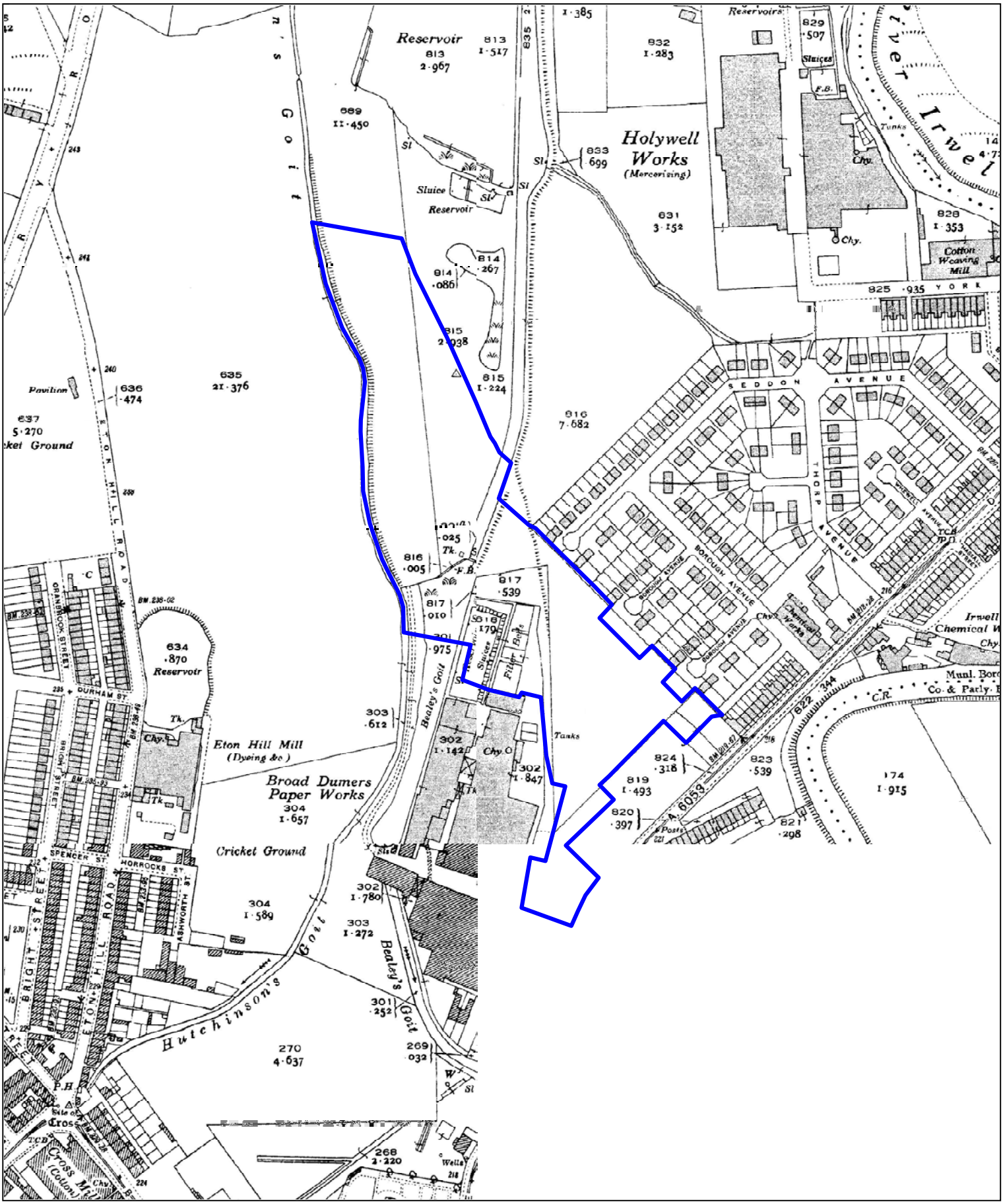

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Land Adjacent to Bealey Industrial Estate, Radcliffe

1937 Historical Map Extract

Bury Council

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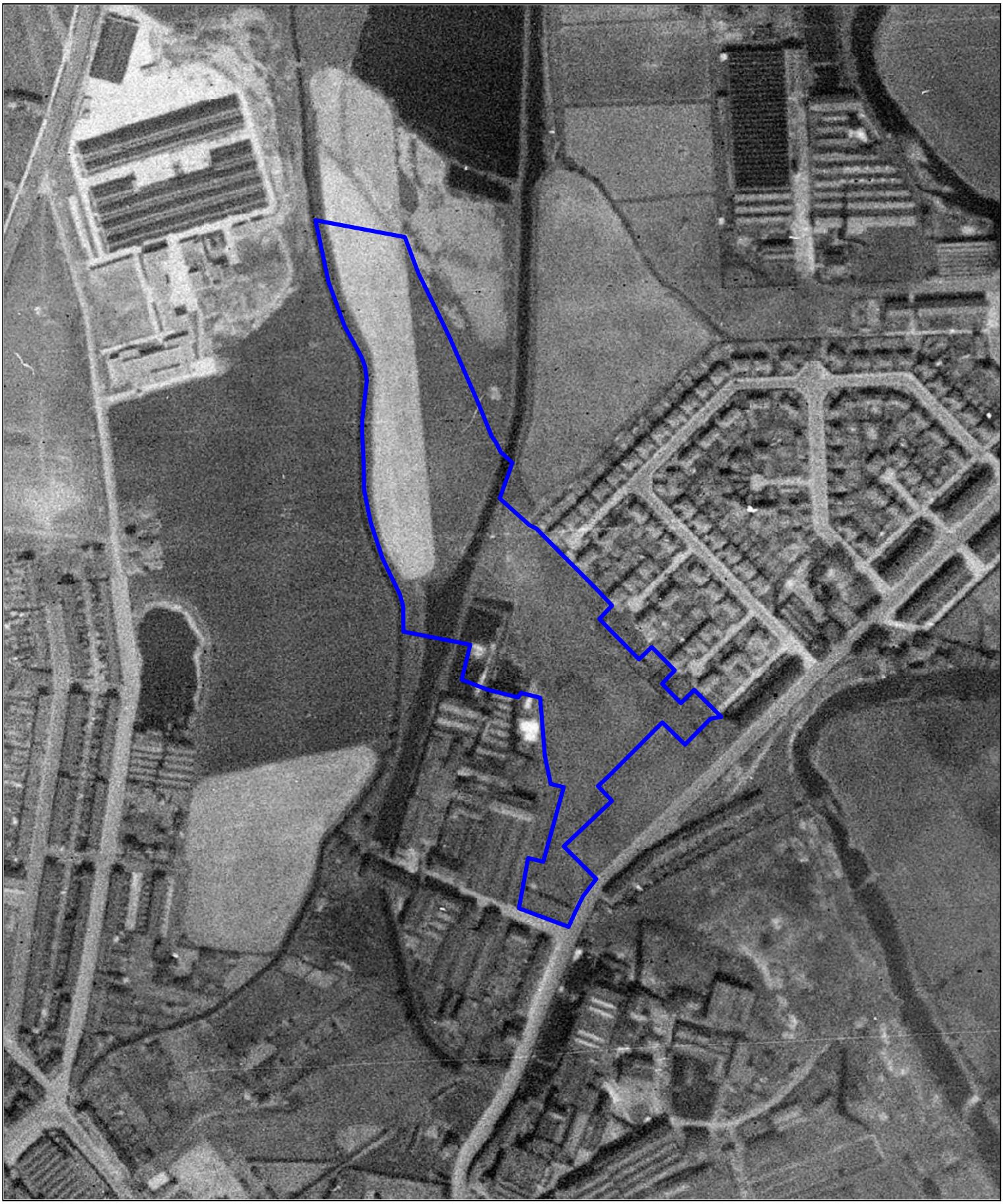

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Land Adjacent to Bealey Industrial Estate, Radcliffe

1940s Aerial Photograph

Bury Council

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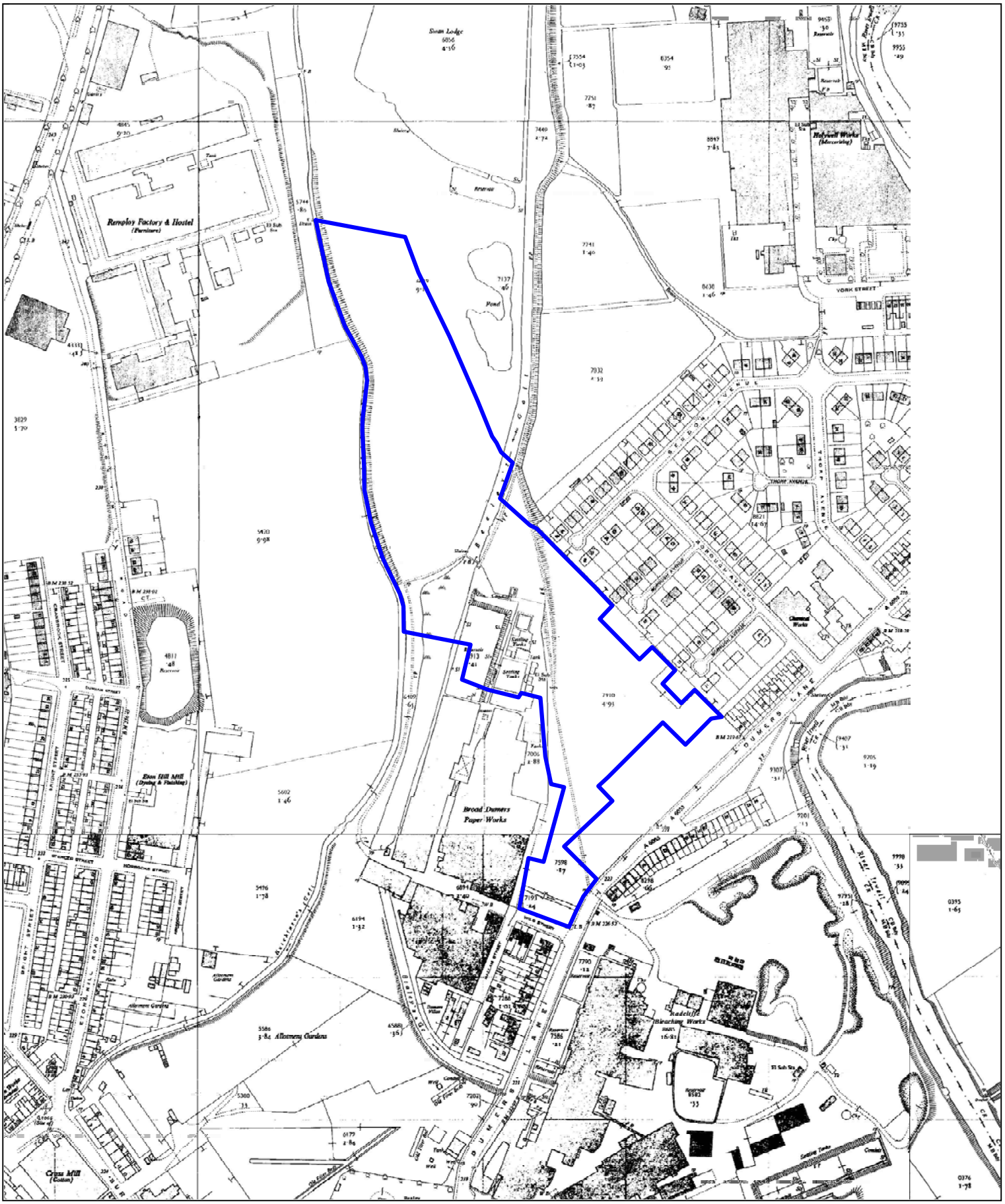

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Site Boundary

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Land Adjacent to Bealey Industrial Estate, Radcliffe

1957 Historical Map Extract

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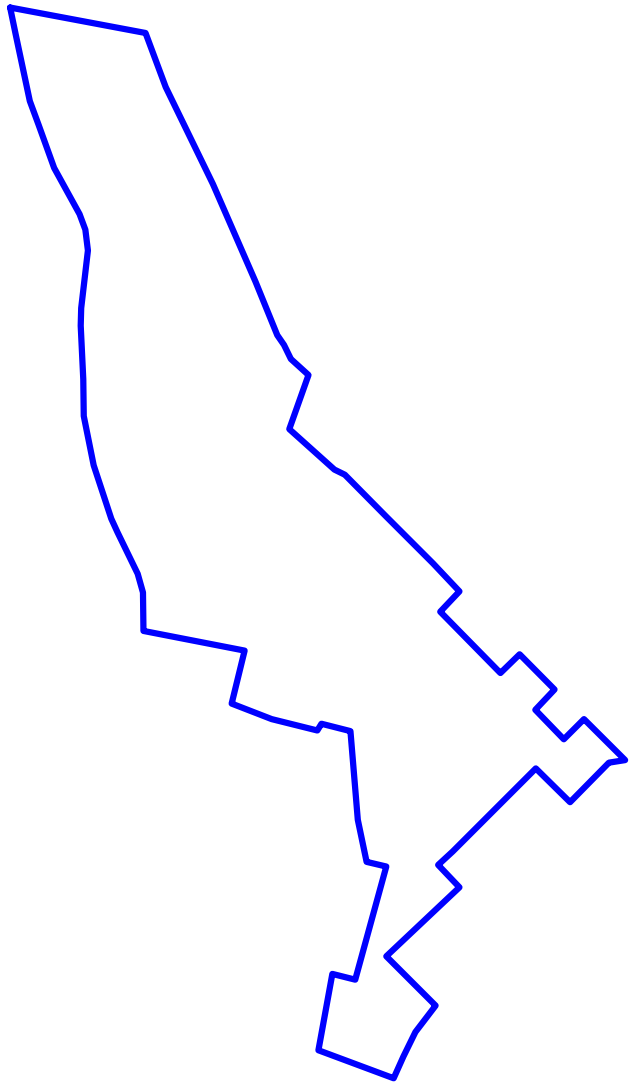

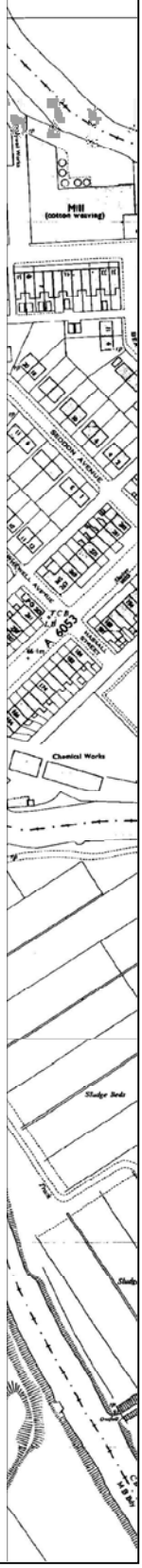

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Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

1972 Historical Map Extract

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kilometres

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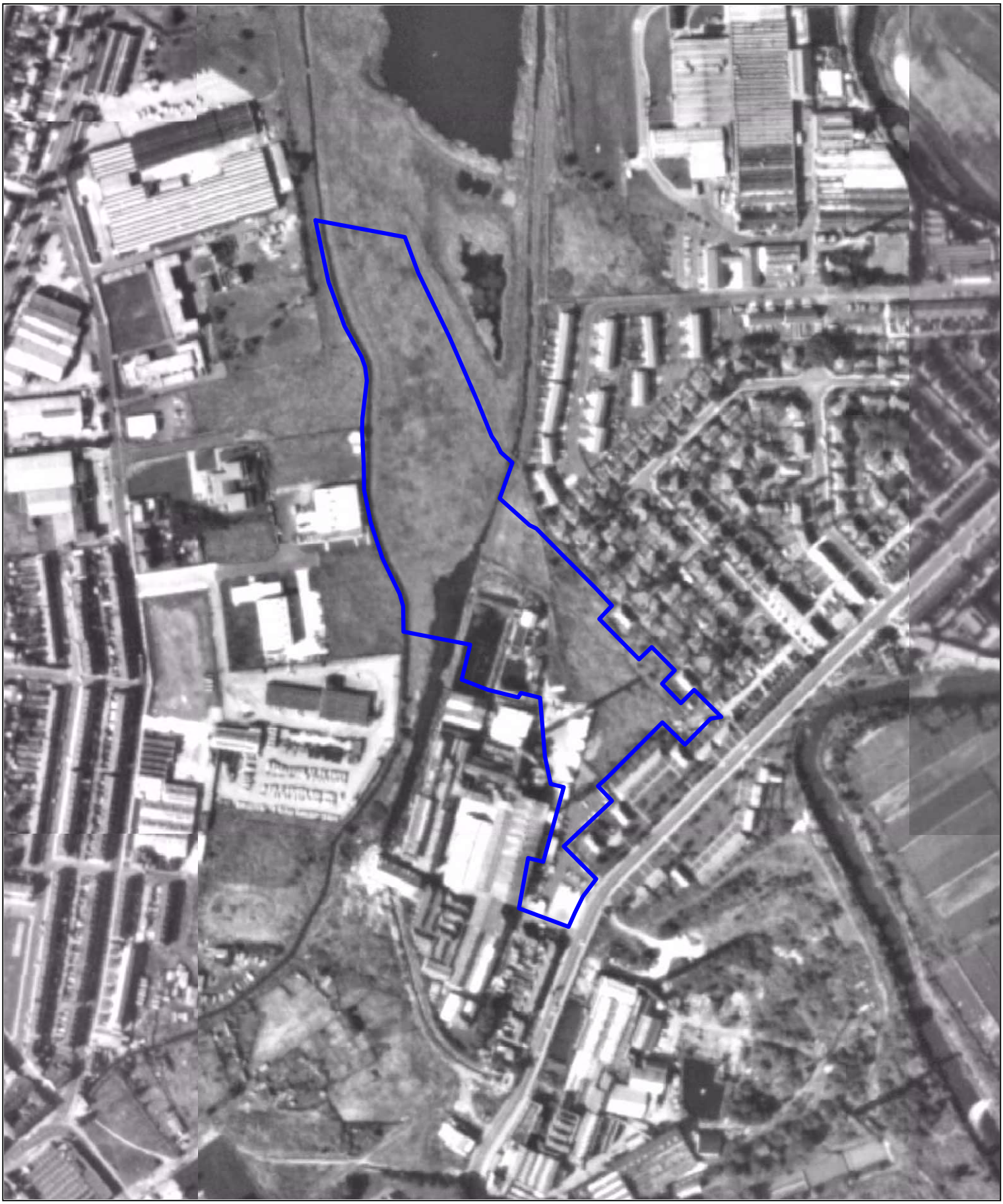
NGR: 379725 408182

DATE: February 2024



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Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

1979 Aerial Photograph

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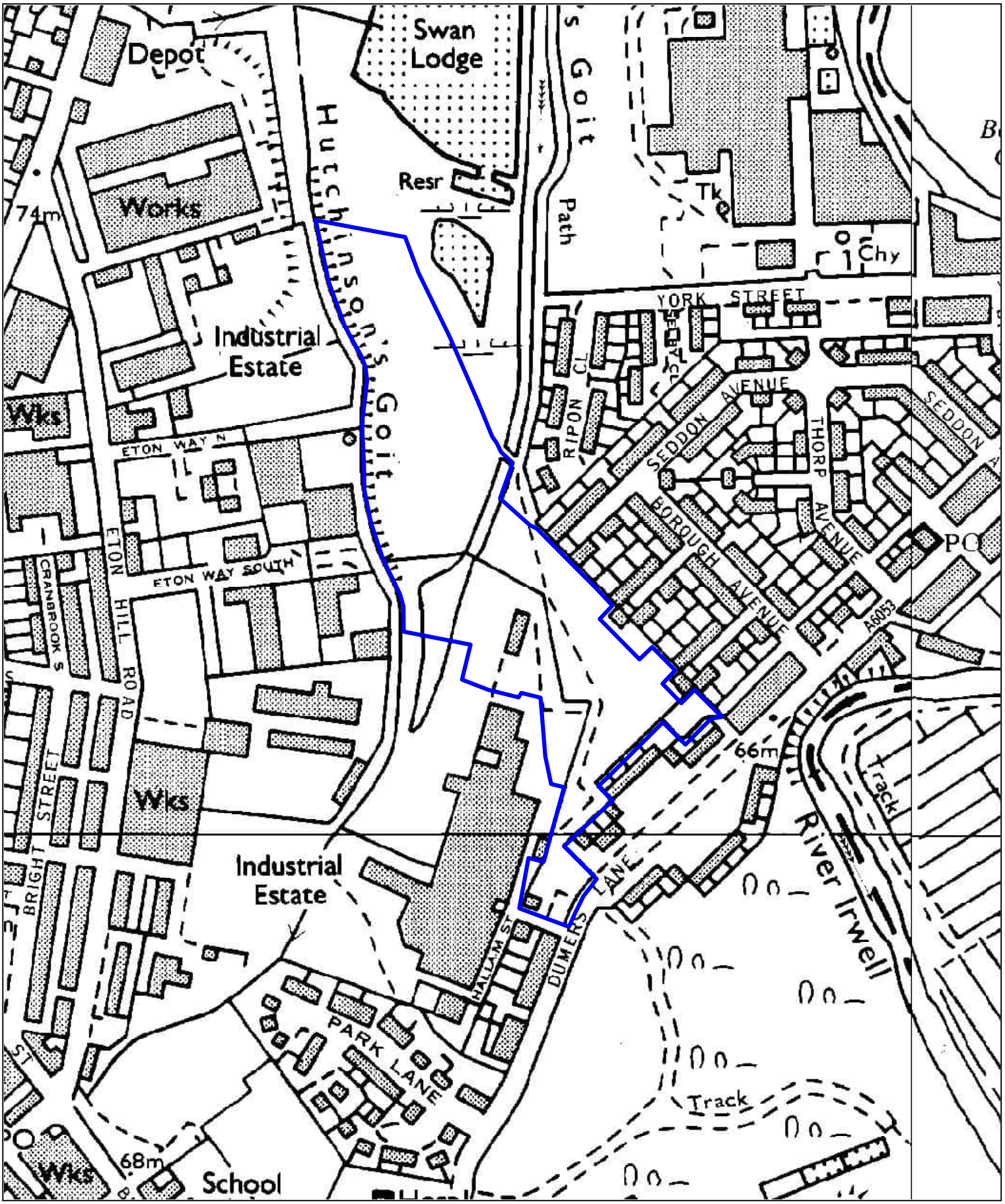
NGR: 379725 408182

DATE: February 2024



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Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

1984 Historical Map Extract

Bury Council

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kilometres
Scale 1:3,500

NGR: 379725 408182

DATE: February 2024

KEY:

Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

1989 Aerial Photograph

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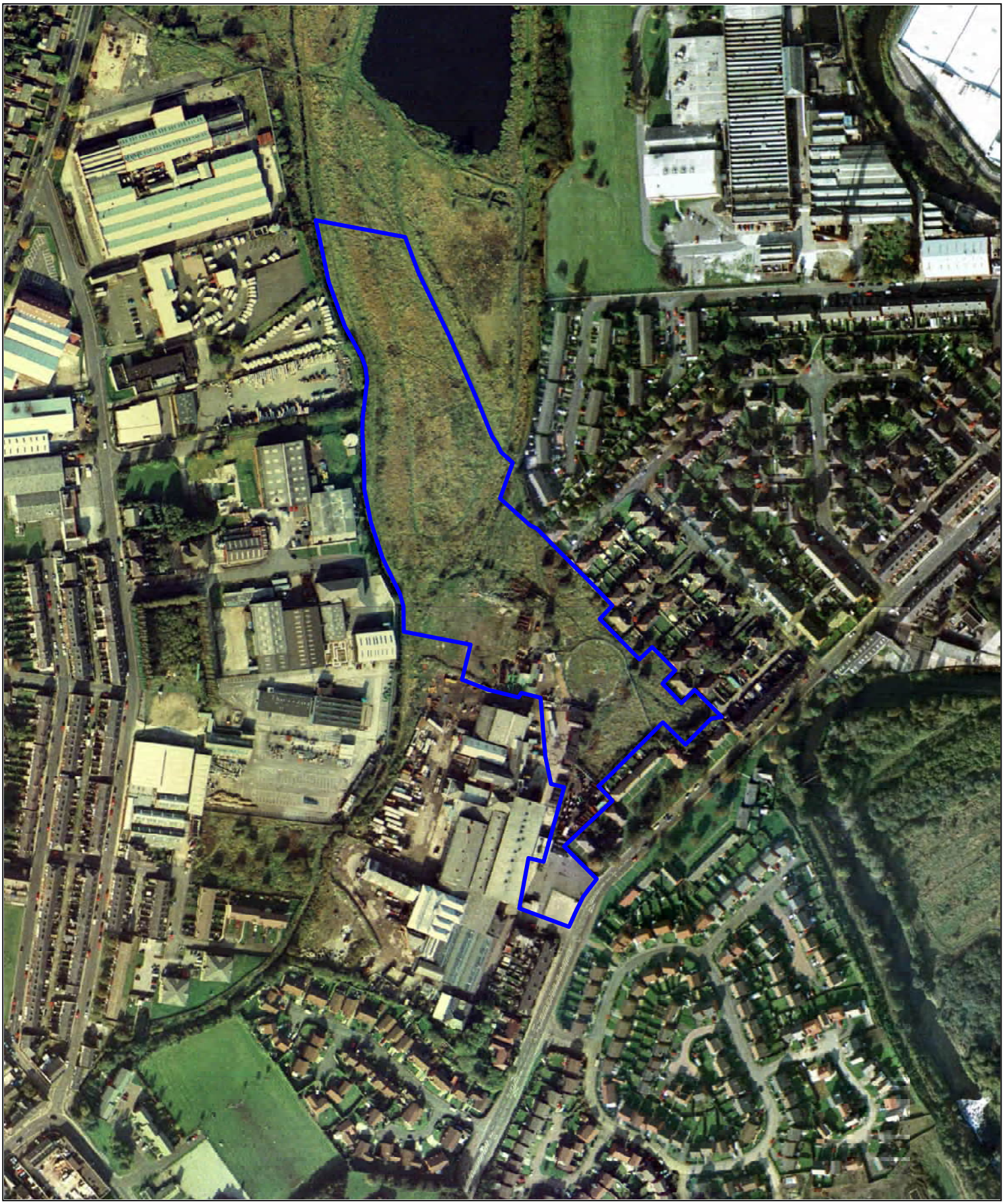

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TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

1997-9 Aerial Photograph

Bury Council

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kilometres

Scale 1:3,500

NGR: 379725 408182

DATE: February 2024

KEY:

Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

2000 Aerial Photograph

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kilometres

Scale 1:3,500

NGR: 379725 408182

DATE: February 2024

KEY:

Site Boundary

TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

2005-6 Aerial Photograph

Bury Council

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kilometres

Scale 1:3,500

NGR: 379725 408182

DATE: February 2024

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TITLE:

Land Adjacent to Bealey Industrial Estate, Radcliffe

2007-9 Aerial Photograph

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Ordnance Survey 100023063

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kilometres

Scale 1:3,500

NGR: 379725 408182

DATE: February 2024

https://maps.bury.gov.uk/externalwebmap/Map.aspx?MapName=PA

Map Features

Search...

Clear

Map Features

- [x] Drawing Layer
- [ ] Adopted Green Belt
- [ ] Unitary Development Plan (UDP)
- [ ] Highways Adoption
- [ ] GM Joint Waste Plan
- [ ] GM Joint Minerals Plan
- [ ] Conservation Areas
- [ ] Assets of Community Value (Approved)
- [ ] Planning Applications
- [ ] Listed Buildings
- [ ] Local Nature Reserves (LNRs)
- [ ] Public Rights of Way
- [x] Tree Preservation Orders

Tree Preservation Orders

Tree Preservation Orders (TPO's)

- [ ] Bury Administrative Boundaries
- [ ] Google Street View

Select All

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Map Fader

https://maps.bury.gov.uk/externalwebmap/Map.aspx?MapName=PA

Map Features

Search...

Clear

Map Features

- [x] Drawing Layer
- [x] Adopted Green Belt
  - Adopted Green Belt
- [ ] Unitary Development Plan (UDP)
- [ ] Highways Adoption
- [x] GM Joint Waste Plan
  - Identified Waste Site
  - Potential Area for Waste Management
- [x] GM Joint Minerals Plan
  - Aggregate Extraction - Gravel
  - Aggregate Extraction - Sandstone
  - Aggregate Extraction - Sand
  - Non-Aggregates PEDL
  - MSA - Brickclay
  - MSA - Sandstone
  - MSA - Sand & Gravel
  - MSA - Surface Coal
  - Existing mineral site/infrastructure
- [x] Conservation Areas
  - Conservation Areas
- [ ] Assets of Community Value (Approved)
- [ ] Planning Applications
- [x] Listed Buildings
  - Listed Buildings & Structures
- [ ] Local Nature Reserves (LNRs)
- [ ] Public Rights of Way
- [ ] Tree Preservation Orders
- [ ] Bury Administrative Boundaries
- [ ] Google Street View
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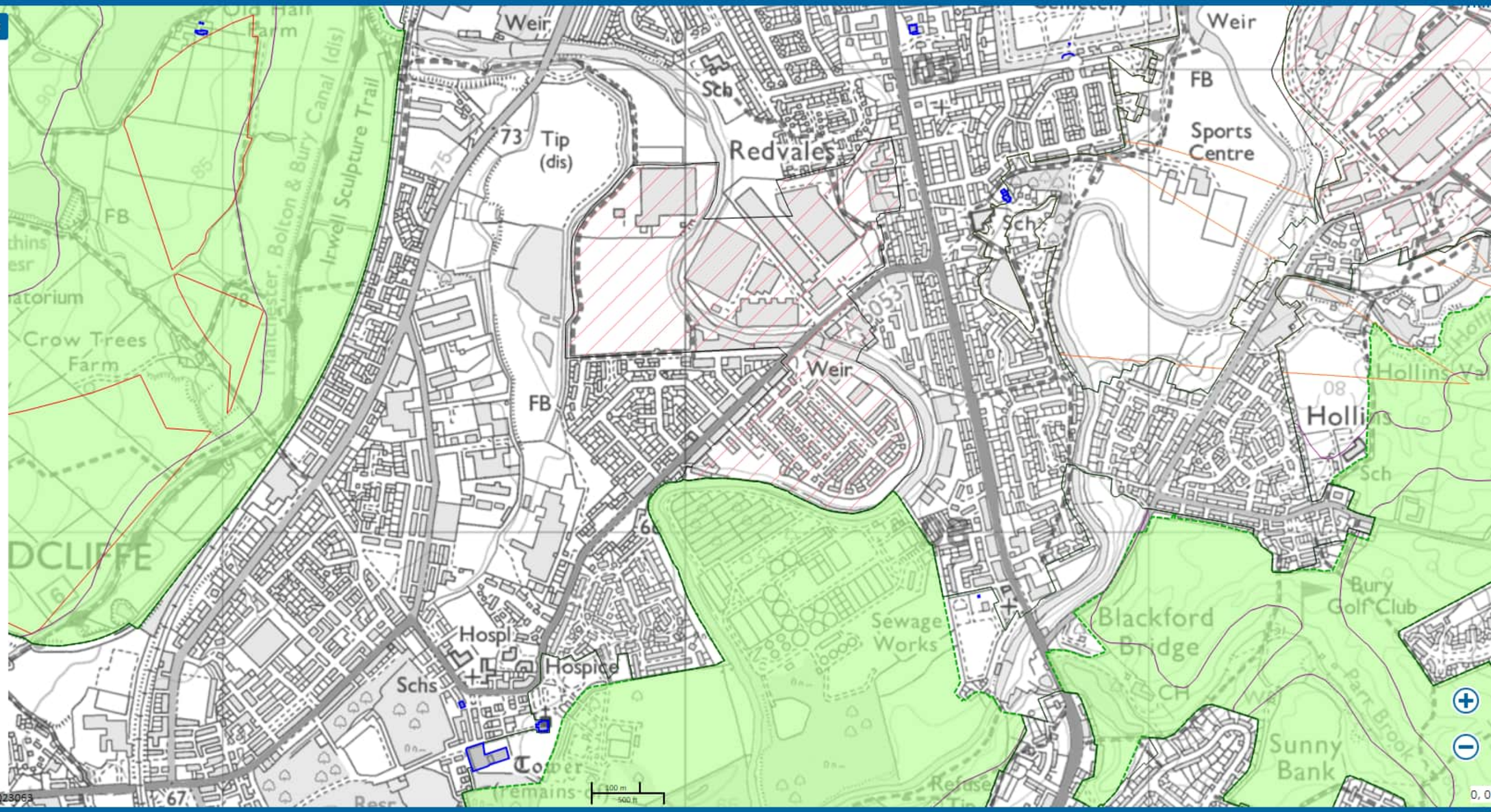

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Map Fader

Appendix 2

Groundsure Enviro+Geo Report

Groundsure
LOCATION INTELLIGENCE

Enviro+Geo Insight

Land Adjacent to Bealey Industrial Estate, Radcliffe, M26 2BD

Order Details

Date: 15/02/2024

Your ref: 8353_-_PO_9951-BH

Our Ref: GS-B5J-QUX-W33-1YT

Site Details

Location: 379691 408199

Area: 4.05 ha

Authority: Bury Metropolitan Borough Council ↗

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Summary of findings p. 2 >

Aerial image p. 9 >

OS MasterMap site plan p.13 >

groundsure.com/insightuserguide ↗

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

Summary of findings

Page	Section	Past land use >	On site	0-50m	50-250m	250-500m	500-2000m
14 >	1.1 >	Historical industrial land uses >	25	30	73	101	-
23 >	1.2 >	Historical tanks >	6	9	37	84	-
28 >	1.3 >	Historical energy features >	4	4	10	23	-
30	1.4	Historical petrol stations	0	0	0	0	-
30 >	1.5 >	Historical garages >	0	0	0	3	-
31	1.6	Historical military land	0	0	0	0	-
Page	**Section**	**Past land use - un-grouped >**	**On site**	**0-50m**	**50-250m**	**250-500m**	**500-2000m**
32 >	2.1 >	Historical industrial land uses >	29	40	100	142	-
44 >	2.2 >	Historical tanks >	12	14	59	172	-
53 >	2.3 >	Historical energy features >	7	12	15	42	-
56	2.4	Historical petrol stations	0	0	0	0	-
56 >	2.5 >	Historical garages >	0	0	0	5	-
Page	**Section**	**Waste and landfill >**	**On site**	**0-50m**	**50-250m**	**250-500m**	**500-2000m**
58	3.1	Active or recent landfill	0	0	0	0	-
58 >	3.2 >	Historical landfill (BGS records) >	0	0	0	1	-
59 >	3.3 >	Historical landfill (LA/mapping records) >	0	0	1	3	-
59 >	3.4 >	Historical landfill (EA/NRW records) >	1	0	1	1	-
60 >	3.5 >	Historical waste sites >	2	0	1	0	-
61 >	3.6 >	Licensed waste sites >	0	1	0	3	-
62 >	3.7 >	Waste exemptions >	2	0	2	6	-
Page	**Section**	**Current industrial land use >**	**On site**	**0-50m**	**50-250m**	**250-500m**	**500-2000m**
64 >	4.1 >	Recent industrial land uses >	8	9	31	-	-
67	4.2	Current or recent petrol stations	0	0	0	0	-
68	4.3	Electricity cables	0	0	0	0	-
68	4.4	Gas pipelines	0	0	0	0	-
68	4.5	Sites determined as Contaminated Land	0	0	0	0	-

68 >	4.6 >	Control of Major Accident Hazards (COMAH) >	0	0	1	1	-
69	4.7	Regulated explosive sites	0	0	0	0	-
69 >	4.8 >	Hazardous substance storage/usage >	0	0	1	1	-
69 >	4.9 >	Historical licensed industrial activities (IPC) >	0	0	0	3	-
70 >	4.10 >	Licensed industrial activities (Part A(1)) >	0	0	1	23	-
74 >	4.11 >	Licensed pollutant release (Part A(2)/B) >	0	0	3	3	-
75	4.12	Radioactive Substance Authorisations	0	0	0	0	-
75 >	4.13 >	Licensed Discharges to controlled waters >	0	0	10	39	-
82 >	4.14 >	Pollutant release to surface waters (Red List) >	0	0	0	2	-
83	4.15	Pollutant release to public sewer	0	0	0	0	-
83 >	4.16 >	List 1 Dangerous Substances >	0	0	0	4	-
84 >	4.17 >	List 2 Dangerous Substances >	0	0	1	2	-
84 >	4.18 >	Pollution Incidents (EA/NRW) >	2	1	5	2	-
85 >	4.19 >	Pollution inventory substances >	0	0	0	2	-
87 >	4.20 >	Pollution inventory waste transfers >	0	0	0	2	-
92	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology >	On site	0-50m	50-250m	250-500m	500-2000m
93 >	5.1 >	Superficial aquifer >	Identified (within 500m)				
95 >	5.2 >	Bedrock aquifer >	Identified (within 500m)				
97 >	5.3 >	Groundwater vulnerability >	Identified (within 50m)				
98	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
98	5.5	Groundwater vulnerability- local information	None (within 0m)				
99 >	5.6 >	Groundwater abstractions >	0	0	0	0	17
104 >	5.7 >	Surface water abstractions >	0	0	0	6	16
110 >	5.8 >	Potable abstractions >	0	0	0	0	5
111	5.9	Source Protection Zones	0	0	0	0	-
111	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology >	On site	0-50m	50-250m	250-500m	500-2000m
112 >	6.1 >	Water Network (OS MasterMap) >	4	1	7	-	-

114 >	6.2 >	Surface water features >	1	2	4	-	-
114 >	6.3 >	WFD Surface water body catchments >	2	-	-	-	-
114 >	6.4 >	WFD Surface water bodies >	0	0	1	-	-
115 >	6.5 >	WFD Groundwater bodies >	1	-	-	-	-
Page	Section	River and coastal flooding >	On site	0-50m	50-250m	250-500m	500-2000m
116 >	7.1 >	Risk of flooding from rivers and the sea >	High (within 50m)				
117 >	7.2 >	Historical Flood Events >	1	1	8	-	-
118	7.3	Flood Defences	0	0	0	-	-
118	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
118	7.5	Flood Storage Areas	0	0	0	-	-
119 >	7.6 >	Flood Zone 2 >	Identified (within 50m)				
120 >	7.7 >	Flood Zone 3 >	Identified (within 50m)				
Page	Section	Surface water flooding >					
121 >	8.1 >	Surface water flooding >	1 in 30 year, 0.1m - 0.3m (within 50m)				
Page	Section	Groundwater flooding >					
123 >	9.1 >	Groundwater flooding >	Moderate (within 50m)				
Page	Section	Environmental designations >	On site	0-50m	50-250m	250-500m	500-2000m
124	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	0
125	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
125	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
125	10.4	Special Protection Areas (SPA)	0	0	0	0	0
125	10.5	National Nature Reserves (NNR)	0	0	0	0	0
126 >	10.6 >	Local Nature Reserves (LNR) >	0	0	0	0	4
126	10.7	Designated Ancient Woodland	0	0	0	0	0
126	10.8	Biosphere Reserves	0	0	0	0	0
127	10.9	Forest Parks	0	0	0	0	0
127	10.10	Marine Conservation Zones	0	0	0	0	0
127 >	10.11 >	Green Belt >	0	0	1	1	4
127	10.12	Proposed Ramsar sites	0	0	0	0	0

128	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
128	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
128	10.15	Nitrate Sensitive Areas	0	0	0	0	0
128	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
129 >	**10.17 >**	**SSSI Impact Risk Zones >**	2	-	-	-	-
130	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
131	11.1	World Heritage Sites	0	0	0	-	-
131	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
131	11.3	National Parks	0	0	0	-	-
131	11.4	Listed Buildings	0	0	0	-	-
132	11.5	Conservation Areas	0	0	0	-	-
132	11.6	Scheduled Ancient Monuments	0	0	0	-	-
132	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	**Agricultural designations >**	On site	0-50m	50-250m	250-500m	500-2000m
133 >	**12.1 >**	**Agricultural Land Classification >**	Urban (within 250m)				
134	12.2	Open Access Land	0	0	0	-	-
134	12.3	Tree Felling Licences	0	0	0	-	-
134	12.4	Environmental Stewardship Schemes	0	0	0	-	-
134	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	**Habitat designations >**	On site	0-50m	50-250m	250-500m	500-2000m
135 >	**13.1 >**	**Priority Habitat Inventory >**	0	1	11	-	-
136 >	**13.2 >**	**Habitat Networks >**	1	1	1	-	-
136	13.3	Open Mosaic Habitat	0	0	0	-	-
137	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	**Geology 1:10,000 scale >**	On site	0-50m	50-250m	250-500m	500-2000m
138 >	**14.1 >**	**10k Availability >**	Identified (within 500m)				
139 >	**14.2 >**	**Artificial and made ground (10k) >**	0	2	2	5	-
141 >	**14.3 >**	**Superficial geology (10k) >**	1	1	1	5	-

142	14.4	Landslip (10k)	0	0	0	0	-
143 >	14.5 >	Bedrock geology (10k) >	3	1	8	6	-
144 >	14.6 >	Bedrock faults and other linear features (10k) >	3	2	4	13	-
Page	Section	Geology 1:50,000 scale >	On site	0-50m	50-250m	250-500m	500-2000m
146 >	15.1 >	50k Availability >	Identified (within 500m)				
147 >	15.2 >	Artificial and made ground (50k) >	0	0	0	2	-
148	15.3	Artificial ground permeability (50k)	0	0	-	-	-
149 >	15.4 >	Superficial geology (50k) >	1	1	0	3	-
150 >	15.5 >	Superficial permeability (50k) >	Identified (within 50m)				
150	15.6	Landslip (50k)	0	0	0	0	-
150	15.7	Landslip permeability (50k)	None (within 50m)				
151 >	15.8 >	Bedrock geology (50k) >	3	1	3	2	-
152 >	15.9 >	Bedrock permeability (50k) >	Identified (within 50m)				
152 >	15.10 >	Bedrock faults and other linear features (50k) >	3	2	1	6	-
Page	Section	Boreholes >	On site	0-50m	50-250m	250-500m	500-2000m
154 >	16.1 >	BGS Boreholes >	0	1	49	-	-
Page	Section	Natural ground subsidence >					
157 >	17.1 >	Shrink swell clays >	Very low (within 50m)				
158 >	17.2 >	Running sands >	Low (within 50m)				
160 >	17.3 >	Compressible deposits >	Moderate (within 50m)				
162 >	17.4 >	Collapsible deposits >	Very low (within 50m)				
163 >	17.5 >	Landslides >	Very low (within 50m)				
164 >	17.6 >	Ground dissolution of soluble rocks >	Negligible (within 50m)				
Page	Section	Mining and ground workings >	On site	0-50m	50-250m	250-500m	500-2000m
166	18.1	BritPits	0	0	0	0	-
167 >	18.2 >	Surface ground workings >	21	27	62	-	-
171 >	18.3 >	Underground workings >	0	0	1	3	1
171	18.4	Underground mining extents	0	0	0	0	-
172 >	18.5 >	Historical Mineral Planning Areas >	0	0	0	1	-

172	18.6	Non-coal mining	0	0	0	0	0
172 >	**18.7 >**	**JPB mining areas >**	Identified (within 0m)				
173	18.8	The Coal Authority non-coal mining	0	0	0	0	-
173	18.9	Researched mining	0	0	0	0	-
173	18.10	Mining record office plans	0	0	0	0	-
173	18.11	BGS mine plans	0	0	0	0	-
174 >	**18.12 >**	**Coal mining >**	Identified (within 0m)				
174	18.13	Brine areas	None (within 0m)				
174	18.14	Gypsum areas	None (within 0m)				
174	18.15	Tin mining	None (within 0m)				
174	18.16	Clay mining	None (within 0m)				
Page	Section	Ground cavities and sinkholes	On site	0-50m	50-250m	250-500m	500-2000m
175	19.1	Natural cavities	0	0	0	0	-
175	19.2	Mining cavities	0	0	0	0	0
175	19.3	Reported recent incidents	0	0	0	0	-
175	19.4	Historical incidents	0	0	0	0	-
176	19.5	National karst database	0	0	0	0	-
Page	Section	**Radon >**					
177 >	**20.1 >**	**Radon >**	Between 1% and 3% (within 0m)				
Page	Section	**Soil chemistry >**	On site	0-50m	50-250m	250-500m	500-2000m
179 >	**21.1 >**	**BGS Estimated Background Soil Chemistry >**	5	6	-	-	-
180	21.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
180	21.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	**Railway infrastructure and projects >**	On site	0-50m	50-250m	250-500m	500-2000m
181	22.1	Underground railways (London)	0	0	0	-	-
181	22.2	Underground railways (Non-London)	0	0	0	-	-
182	22.3	Railway tunnels	0	0	0	-	-
182 >	**22.4 >**	**Historical railway and tunnel features >**	8	1	3	-	-
183	22.5	Royal Mail tunnels	0	0	0	-	-

183	22.6	Historical railways	0	0	0	-	-
183	22.7	Railways	0	0	0	-	-
183	22.8	Crossrail 1	0	0	0	0	-
183	22.9	Crossrail 2	0	0	0	0	-
184	22.10	HS2	0	0	0	0	-

Recent aerial photograph

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Capture Date: 23/05/2019

Site Area: 4.05ha

Recent site history - 2015 aerial photograph

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Capture Date: 11/06/2015

Site Area: 4.05ha

Recent site history - 2011 aerial photograph

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Capture Date: 01/05/2011

Site Area: 4.05ha

Recent site history - 2000 aerial photograph

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Capture Date: 27/06/2000

Site Area: 4.05ha

OS MasterMap site plan

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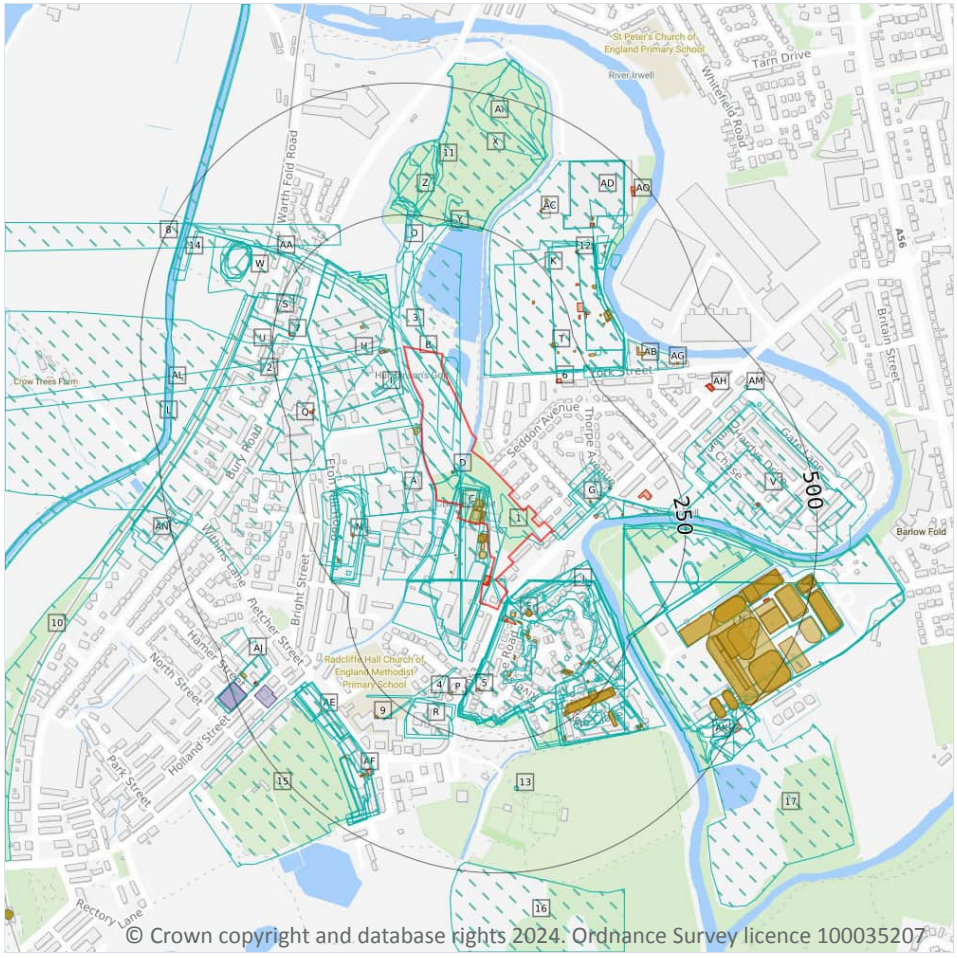
Site Area: 4.05ha

1 Past land use



Site Outline

Search buffers in metres (m)

- Historical industrial land uses
- Historical tanks
- Historical energy features
- Historical garages

1.1 Historical industrial land uses

Records within 500m	229

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
1	**On site**	**Filter Beds**	**1908**	**665809**

ID	Location	Land use	Dates present	Group ID
2	**On site**	**Tramway Sidings**	**1890**	**670775**
3	**On site**	**Tramway Sidings**	**1908**	**760082**
A	**On site**	**Unspecified Commercial/Industrial**	**1991**	**643336**
B	**On site**	**Colliery**	**1890**	**645263**
B	**On site**	**Refuse Heap**	**1890**	**677999**
C	**On site**	**Filter Beds**	**1928**	**665807**
C	**On site**	**Chemical Works**	**1891**	**682692**
C	**On site**	**Paper Works**	**1955**	**714228**
C	**On site**	**Paper Works**	**1908 - 1927**	**717984**
C	**On site**	**Paper Works**	**1938**	**722933**
C	**On site**	**Unspecified Works**	**1965 - 1977**	**725705**
C	**On site**	**Unspecified Commercial/Industrial**	**1928**	**738364**
C	**On site**	**Industrial Estate**	**1988 - 1991**	**746445**
C	**On site**	**Unspecified Commercial/Industrial**	**1890**	**748711**
C	**On site**	**Unspecified Commercial/Industrial**	**1908**	**758297**
C	**On site**	**Filter Beds**	**1928 - 1938**	**767953**
C	**On site**	**Filter Beds**	**1955**	**788270**
D	**On site**	**Unspecified Tank**	**1955**	**674783**
D	**On site**	**Unspecified Tank**	**1927**	**733526**
D	**On site**	**Unspecified Tank**	**1938**	**777880**
E	**On site**	**Railway Sidings**	**1907**	**751453**
E	**On site**	**Railway Sidings**	**1891**	**756383**
F	**On site**	**Tramway Sidings**	**1890**	**776867**
G	**On site**	**Chemical Works**	**1908**	**783716**
C	1m S	Unspecified Tanks	1928 - 1955	733436
G	2m SE	Chemical Works	1891	783345
B	3m NW	Unspecified Tank	1988 - 1991	779255
C	4m S	Unspecified Commercial/Industrial	1907 - 1938	704501

ID	Location	Land use	Dates present	Group ID
C	5m S	Unspecified Tank	1977	674782
H	7m NW	Industrial Estate	1988 - 1991	767287
C	8m S	Unspecified Commercial/Industrial	1932	703963
C	8m S	Unspecified Commercial/Industrial	1915	709107
C	8m S	Unspecified Commercial/Industrial	1923	747453
E	8m S	Wire Works	1938	641134
E	8m S	Bleaching Works	1923	744678
E	8m S	Bleach and Chemical Works	1891	753134
E	8m S	Bleaching Works	1932	763679
E	9m S	Unspecified Works	1965	730389
E	9m S	Bleach and Chemical Works	1907	699288
E	9m S	Bleach and Chemical Works	1915	781398
E	10m S	Bleaching Works	1955	777831
E	13m S	Vitriol Manufactory	1851	675148
E	13m S	Unspecified Works	1977	745660
H	14m NW	Unspecified Works	1991	766276
E	14m S	Bleach Works	1851	658162
H	15m NW	Unspecified Factory	1965	670600
H	15m NW	Unspecified Works	1977	723827
C	21m S	Refuse Heap	1890	678029
E	25m S	Unspecified Tank	1891 - 1907	702569
I	25m NW	Unspecified Ground Workings	1988 - 1991	716820
C	34m S	Unspecified Commercial/Industrial	1891	781088
I	47m NW	Unspecified Ground Workings	1977	763499
A	48m W	Unspecified Works	1977	679066
E	48m SE	Unspecified Tank	1891 - 1907	752478
E	62m S	Unspecified Tank	1977	723357
E	63m S	Unspecified Tank	1907	739491

ID	Location	Land use	Dates present	Group ID
J	65m SE	Refuse Heap	1965	677980
K	66m N	Unspecified Works	1991	782230
G	67m E	Chemical Works	1928	729789
K	75m N	Unspecified Mill	1988	734409
L	77m NW	Colliery	1890	645264
G	82m E	Unspecified Works	1965	679049
G	84m E	Chemical Works	1908 - 1928	734395
E	90m S	Unspecified Ground Workings	1851	648149
F	108m NW	Unspecified Ground Workings	1977 - 1991	748275
F	108m NW	Unspecified Ground Workings	1965	754469
J	109m SE	Railway Sidings	1891	708931
J	110m SE	Railway Sidings	1907	724609
M	122m SW	Unspecified Mill	1965 - 1977	759196
M	125m SW	Unspecified Works	1991	679067
M	129m W	Unspecified Mill	1955	721686
4	130m S	Filter Beds	1891	665808
N	131m E	Sewage Works	1915 - 1955	786107
N	132m E	Sludge Beds	1974	720162
N	132m E	Sewage Works	1974	758926
N	133m E	Unspecified Works	1965	679047
N	133m E	Sewage Works	1981	787106
N	133m E	Sludge Beds	1981	757718
G	135m E	Unspecified Works	1965	679048
M	136m W	Unspecified Mill	1927 - 1938	732313
M	142m W	Unspecified Mill	1908	736511
K	144m NE	Unspecified Mill	1977	702994
J	147m SE	Unspecified Tank	1907	674817
M	147m W	Unspecified Mill	1890	781543

ID	Location	Land use	Dates present	Group ID
E	157m SE	Chimney	1851	684330
O	159m N	Refuse Heap	1908	678000
M	165m W	Cotton Mill	1851	644066
E	168m SE	Unspecified Tank	1932 - 1938	700387
E	169m SE	Unspecified Tanks	1955	666452
F	169m NW	Unspecified Depot	1991	668817
Q	179m NW	Unspecified Commercial/Industrial	1988	643339
Q	179m NW	Unspecified Works	1991	679064
E	181m S	Unspecified Commercial/Industrial	1977	643335
M	193m SW	Gasometer	1851	655145
K	194m NE	Tallow and Candle Works	1955	670839
K	194m NE	Unspecified Works	1955 - 1965	723223
E	198m SE	Unspecified Tank	1915	674818
R	199m S	Hospital	1988 - 1991	745118
E	200m SE	Unspecified Tank	1923	674819
R	204m S	Hospital	1908	779688
S	204m NW	Unspecified Works	1965	679065
S	204m NW	Unspecified Commercial/Industrial	1977	752450
N	207m SE	Sewage Works	1938	701259
O	208m N	Unspecified Ground Workings	1965	747650
U	209m NW	Unspecified Warehouse	1965	652408
U	209m NW	Unspecified Commercial/Industrial	1977 - 1991	705324
N	209m SE	Sewage Works	1907	738790
T	209m NE	Unspecified Tank	1988 - 1991	717653
M	211m SW	Unspecified Tank	1955	674784
E	218m SE	Unspecified Tank	1915 - 1923	762572
V	221m E	Cabinet Works	1955 - 1965	767569
W	222m NW	Colliery	1890	645262

ID	Location	Land use	Dates present	Group ID
M	226m SW	Unspecified Tank	1927 - 1938	789827
E	226m SE	Unspecified Tank	1938	729661
8	227m NW	Cuttings	1890	642632
E	229m SE	Chimney	1965 - 1977	695696
E	229m SE	Unspecified Tank	1907 - 1923	754354
E	231m SE	Shed	1851	659596
E	232m SE	Unspecified Tanks	1907	666451
X	233m N	Refuse Heap	1977	695335
X	233m N	Unspecified Disused Tip	1988 - 1991	784021
Y	235m N	Unspecified Ground Workings	1908 - 1938	704929
V	244m E	Cotton Weaving Mill	1928 - 1938	720424
Z	246m N	Unspecified Heap	1927 - 1938	766137
Z	246m N	Refuse Heap	1908	790849
Y	246m N	Unspecified Pit	1965	691002
V	246m E	Unspecified Commercial/Industrial	1974 - 1981	774222
N	255m SE	Unspecified Heap	1955	775400
N	256m SE	Unspecified Heap	1938	757010
N	256m SE	Unspecified Heap	1928	763138
Z	256m N	Unspecified Ground Workings	1955	698465
E	258m SE	Unspecified Heap	1965 - 1991	707221
AA	258m NW	Tunnel	1908	671553
E	259m SE	Refuse Heap	1938 - 1955	782857
E	261m SE	Refuse Heap	1932	756807
K	262m NE	Bleach Works	1891	658144
K	262m NE	Bleach and Dye works	1908 - 1938	788876
N	264m SE	Filter Beds	1907	746097
N	264m SE	Filter Beds	1923	753518
N	264m SE	Filter Beds	1915	789860

ID	Location	Land use	Dates present	Group ID
N	265m SE	Unspecified Tanks	1965 - 1974	752748
E	270m S	Unspecified Tank	1907 - 1923	708695
T	276m NE	Chimney	1965 - 1991	717375
N	278m SE	Unspecified Heap	1915	778676
E	286m SE	Filter Beds	1915	750653
AA	287m NW	Air Shafts	1908	685376
E	287m SE	Filter Beds	1923	777946
E	293m SE	Filter Beds	1915	768200
10	295m NW	Railway Sidings	1955	768828
L	297m NW	Railway Sidings	1908 - 1938	751945
V	303m E	Weaving Mill	1955	670969
V	305m E	Cotton Weaving Mill	1965	705007
11	312m N	Unspecified Ground Workings	1965	745144
K	313m NE	Unspecified Tank	1977 - 1991	717499
AB	314m NE	Cotton Mill	1908	644065
K	316m NE	Unspecified Tanks	1908 - 1938	715467
W	329m NW	Refuse Heap	1955	789769
AD	331m N	Unspecified Warehouse	1977	716907
AD	331m N	Unspecified Warehouse	1988	770363
W	332m NW	Refuse Heap	1938	743550
W	332m NW	Refuse Heap	1908	774527
W	332m NW	Refuse Heap	1927	782616
W	333m NW	Refuse Heap	1890	742535
N	333m SE	Sewage Tanks	1981	657309
N	333m SE	Unspecified Tanks	1965 - 1974	743387
AD	334m NE	Oil and Tallow Works	1908	652452
AD	337m NE	Tallow and Candle Works	1928	670840
AD	337m NE	Candle Works	1938	691499

ID	Location	Land use	Dates present	Group ID
13	337m S	Unspecified Tank	1923	674816
14	343m NW	Tramway Sidings	1908	782847
AD	344m NE	Unspecified Works	1965	709445
E	344m SE	Unspecified Tank	1932	762255
E	344m SE	Unspecified Tank	1938	789995
AE	346m SW	Unspecified Commercial/Industrial	1977	718948
AE	346m SW	Unspecified Mill	1965	750445
E	346m SE	Unspecified Tank	1915	694415
W	347m NW	Refuse Heap	1965 - 1988	779349
AE	348m SW	Unspecified Mill	1955	696615
AE	348m SW	Unspecified Works	1988 - 1991	728251
E	350m SE	Unspecified Tank	1923	712578
AF	350m SW	Unspecified Works	1965	727566
AF	350m SW	Unspecified Commercial/Industrial	1977	774253
AF	354m SW	Unspecified Works	1988 - 1991	751996
AG	356m NE	Chemical Works	1908	682691
AE	357m SW	Unspecified Mill	1908 - 1938	711306
AE	357m SW	Unspecified Commercial/Industrial	1891	782718
N	360m SE	Sewage Tanks	1981	657312
AD	361m NE	Refuse Heap	1965	677981
N	365m SE	Filter Beds	1907 - 1923	788606
AF	375m S	Tower Works	1955	778655
15	379m SW	Bleach Works	1851	658161
AF	384m S	Unspecified Commercial/Industrial	1908	694693
AF	384m S	Tower Works	1927 - 1938	704950
AF	384m S	Unspecified Commercial/Industrial	1891	771773
N	399m SE	Unspecified Tank	1965	674824
AD	401m NE	Unspecified Heap	1928	650894

ID	Location	Land use	Dates present	Group ID
AI	405m N	Refuse Heap	1965	714403
AJ	414m SW	Unspecified Works	1965	679063
AI	416m N	Refuse Heap	1928 - 1955	725785
AJ	421m SW	Soap Works	1891	682700
AJ	421m SW	Unspecified Commercial/Industrial	1908 - 1927	717282
N	423m SE	Unspecified Tanks	1965 - 1974	722463
N	435m E	Unspecified Tanks	1915 - 1923	767640
AL	437m W	Disused Canal	1977	706247
AL	437m W	Disused Canal	1988 - 1991	788290
AK	442m SE	Unspecified Heap	1932 - 1938	758564
AK	444m SE	Refuse Heap	1955	719870
AM	453m E	Settling Tanks	1938	681805
AN	454m W	Unspecified Mill	1927 - 1955	709866
AN	455m W	Unspecified Mill	1965	781443
AM	455m E	Settling Tanks	1938	681804
AK	458m SE	Refuse Heap	1923	698127
AK	458m SE	Unspecified Heap	1915	739377
AN	462m W	Unspecified Mill	1908	711488
N	464m E	Unspecified Tanks	1907	694169
N	464m E	Unspecified Tanks	1915 - 1932	781203
N	468m E	Unspecified Tanks	1938	743645
N	470m E	Sewage Tanks	1955	657313
AK	470m SE	Unspecified Ground Workings	1907	648151
N	470m E	Unspecified Tanks	1965	734496
N	471m E	Unspecified Tanks	1974	703358
AK	473m SE	Unspecified Heap	1915 - 1923	716003
AK	475m SE	Unspecified Ground Workings	1907	648150
N	481m E	Unspecified Tanks	1908	747584

ID	Location	Land use	Dates present	Group ID
16	483m S	Refuse Heap	1977	787422
17	485m SE	Sludge Lagoons	1981	681460
N	493m E	Unspecified Tanks	1932 - 1938	726516
N	497m E	Sewage Tanks	1955	657314

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**136**

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

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
C	**On site**	**Tanks**	**1972**	**87872**
C	**On site**	**Settling Tanks**	**1956 - 1972**	**88914**
C	**On site**	**Tanks**	**1985 - 1992**	**93701**
C	**On site**	**Settling Tanks**	**1956**	**94451**
C	**On site**	**Unspecified Tank**	**1956**	**99752**
D	**On site**	**Unspecified Tank**	**1930 - 1937**	**92083**
C	4m S	Tanks	1956	102405
C	4m S	Tanks	1956	97968
B	7m NW	Tanks	1985 - 1992	96177
C	7m S	Tanks	1972 - 1985	100959
C	7m S	Unspecified Tank	1972	84768
C	8m S	Tanks	1930 - 1937	90813
E	26m S	Unspecified Tank	1893 - 1909	89857
H	32m NW	Unspecified Tank	1992	84771

ID	Location	Land use	Dates present	Group ID
E	45m S	Tanks	1956	103342
E	52m SE	Gasometer	1909	78092
E	52m SE	Unspecified Tank	1893	85025
C	62m S	Unspecified Tank	1930	84769
C	63m S	Unspecified Tank	1930 - 1937	95707
E	69m S	Unspecified Tank	1975 - 1980	90948
E	76m S	Unspecified Tank	1975 - 1980	89663
H	84m NW	Unspecified Tank	1956	96469
G	88m E	Unspecified Tank	1956	88654
E	90m S	Unspecified Tank	1922 - 1932	96774
E	93m S	Tanks	1922	87873
G	105m E	Unspecified Tank	1956	91060
E	121m S	Tanks	1956	98807
G	133m E	Unspecified Tank	1956 - 1985	94629
G	133m E	Unspecified Tank	1956	97001
5	153m S	Unspecified Tank	1922 - 1932	89005
M	169m SW	Unspecified Tank	1930 - 1937	103296
E	169m SE	Unspecified Tank	1922 - 1932	95054
E	170m SE	Unspecified Tank	1956 - 1975	94687
E	170m SE	Unspecified Tank	1980	91980
P	177m S	Unspecified Tank	1956	99256
P	177m S	Unspecified Tank	1956	90569
Q	193m W	Unspecified Tank	1972	84770
K	196m N	Unspecified Tank	1976 - 1992	91665
E	198m SE	Unspecified Tank	1922 - 1932	93363
E	205m SE	Unspecified Tank	1956	93997
T	206m NE	Unspecified Tank	1992	84776
T	210m NE	Tanks	1956	100428

ID	Location	Land use	Dates present	Group ID
M	215m SW	Unspecified Tank	1930 - 1937	102970
E	217m SE	Unspecified Tank	1922	85027
E	223m SE	Settling Tanks	1956 - 1975	99725
E	223m SE	Settling Tanks	1980	92197
E	224m SE	Settling Tanks	1956	91365
E	225m S	Settling Tanks	1932	93153
E	230m S	Tanks	1956	103632
E	232m S	Unspecified Tank	1932	85026
E	234m SE	Tanks	1909	87876
T	239m NE	Unspecified Tank	1992	84772
T	263m NE	Tanks	1992	87156
E	271m S	Unspecified Tank	1909 - 1922	94386
E	286m SE	Tanks	1980	98066
E	287m SE	Tanks	1956 - 1975	90555
9	290m S	Unspecified Tank	1975 - 1998	96640
N	304m SE	Settling Tanks	1956	95997
N	304m SE	Humus Tanks	1968 - 1969	101213
K	307m NE	Unspecified Tank	1930	84774
K	310m NE	Unspecified Tank	1890	84775
K	311m NE	Unspecified Tank	1976 - 1992	94127
K	316m NE	Tanks	1910 - 1937	100450
K	317m NE	Tanks	1956	98251
12	318m NE	Unspecified Tank	1976	84759
K	320m NE	Unspecified Tank	1992	101937
K	321m NE	Unspecified Tank	1956 - 1976	103287
K	322m NE	Unspecified Tank	1956	98149
K	322m NE	Tanks	1956	93468
AC	327m N	Tanks	1976	87154

ID	Location	Land use	Dates present	Group ID
AC	334m N	Tanks	1976	87155
N	340m SE	Settling Tanks	1981 - 1987	99521
N	340m SE	Settling Tanks	1968	99464
N	340m SE	Tanks	1989	101671
N	340m SE	Settling Tanks	1969	103588
N	341m SE	Tanks	1992	104226
AB	345m NE	Tanks	1969 - 1995	104203
E	347m SE	Unspecified Tank	1956 - 1992	95946
E	347m SE	Unspecified Tank	1909 - 1932	95091
E	348m SE	Unspecified Tank	1956 - 1968	93999
AC	349m N	Unspecified Tank	1976	84758
AB	350m NE	Unspecified Tank	1890	84773
N	357m SE	Tanks	1989	100456
AD	362m NE	Unspecified Tank	1930 - 1937	88825
N	362m SE	Settling Tanks	1956 - 1969	95683
N	367m SE	Settlings Tanks	1956	78421
N	367m SE	Humus Tanks	1968 - 1969	98394
N	367m SE	Settling Tanks	1956 - 1987	103088
AD	368m NE	Unspecified Tank	1930 - 1937	90624
N	370m SE	Unspecified Tank	1956	97759
N	370m SE	Settling Tanks	1932	101430
N	373m SE	Aeration Tanks	1981 - 1987	95780
N	374m SE	Aeration Tanks	1956 - 1969	95872
N	374m SE	Settling Tanks	1956	95304
N	381m SE	Tanks	1989	101340
AD	381m NE	Unspecified Tank	1976	84760
AF	387m SW	Unspecified Tank	1956 - 1994	95441
N	389m E	Aeration Tanks	1956	103615

ID	Location	Land use	Dates present	Group ID
AG	389m NE	Unspecified Tank	1970	93129
AG	389m NE	Unspecified Tank	1956	103706
AG	390m NE	Unspecified Tank	1956	91508
AG	390m NE	Unspecified Tank	1969	92411
AG	390m NE	Unspecified Tank	1995	97339
N	390m SE	Aeration Tank	1956 - 1969	93211
AF	391m S	Unspecified Tank	1956 - 1998	94223
AF	391m S	Unspecified Tank	1980 - 1992	101029
N	395m E	Settling Tanks	1930 - 1937	93336
N	397m SE	Unspecified Tank	1956	99296
N	408m SE	Settling Tanks	1956 - 1981	93693
N	411m E	Aeration Tanks	1956 - 1969	97495
N	411m E	Aeration Tanks	1970	90286
N	422m SE	Aeration Tanks	1956 - 1981	96856
N	423m SE	Aeration Tanks	1956 - 1968	92635
N	435m E	Tanks	1922 - 1932	96253
AK	436m SE	Sludge Holding Tanks	1981 - 1987	96323
N	436m E	Settling Tanks	1956	93293
AK	437m SE	Tanks	1989	103834
AK	438m SE	Tanks	1992	96370
AK	442m SE	Sludge Holding Tanks	1981 - 1987	97258
AK	443m SE	Tanks	1989	93906
AK	445m SE	Tanks	1992	89885
N	448m SE	Settling Tanks	1981 - 1987	103131
N	450m SE	Tanks	1989	96403
AJ	464m SW	Unspecified Tank	1929 - 1937	97446
N	471m E	Tanks	1956 - 1969	101963
N	472m E	Tanks	1909 - 1932	89542

ID	Location	Land use	Dates present	Group ID
N	472m E	Settling Tanks	1956 - 1968	93519
N	477m SE	Aeration Tanks	1981	85898
N	481m E	Tanks	1910	91042
N	481m E	Settling Tanks	1930 - 1937	93373
N	493m E	Unspecified Tank	1956	84767
N	497m E	Settling Tanks	1956 - 1969	91208
N	497m SE	Tanks	1956	87874
N	498m E	Settling Tanks	1932	92173
N	498m E	Tanks	1909 - 1922	101507
N	500m E	Tanks	1956 - 1968	94775

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	**41**

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

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
C	**On site**	**Electricity Substation**	**1956**	**45637**
C	**On site**	**Electricity Substation**	**1956 - 1972**	**55676**
C	**On site**	**Electricity Substation**	**1980 - 1992**	**57576**
C	**On site**	**Electricity Substation**	**1975**	**57711**
C	0m S	Electricity Substation	1994 - 1998	46895
E	17m S	Electricity Substation	1994 - 1998	53975
E	24m S	Electricity Substation	1992	53935
H	38m NW	Electricity Substation	1956 - 1992	57801

ID	Location	Land use	Dates present	Group ID
E	52m SE	Gasometer	1909	46144
G	81m E	Electricity Substation	1992	45648
G	132m E	Electricity Substation	1985 - 1992	50498
G	132m E	Electricity Substation	1972	59435
G	173m E	Electricity Substation	1995	45649
6	185m NE	Electricity Substation	1992	45670
E	187m SE	Electricity Substation	1956	56825
Q	198m W	Electricity Substation	1987 - 1992	52297
7	208m NW	Electricity Substation	1987 - 1992	50885
M	215m SW	Electricity Substation	1956	55906
K	267m NE	Electricity Substation	1992	45671
K	269m NE	Electricity Substation	1992	45672
K	279m NE	Electricity Substation	1992	52977
K	282m NE	Electricity Substation	1956 - 1985	55173
K	285m NE	Electricity Substation	1992	45673
AD	370m NE	Electricity Substation	1992	45667
AD	374m NE	Electricity Transformer	1976	46545
AF	376m S	Electricity Substation	1956	45638
V	388m E	Electricity Substation	1995	59332
V	388m E	Electricity Substation	1956 - 1970	57139
AF	392m S	Electricity Substation	1956 - 1998	47202
AH	398m E	Electricity Substation	1956 - 1969	52486
AH	400m E	Electricity Substation	1995	50012
AH	400m E	Electricity Substation	1956 - 1970	55428
N	419m SE	Electricity Substation	1989	48208
N	419m SE	Electricity Substation	1992	50559
AJ	446m SW	Electricity Substation	1956 - 1994	57450
AJ	449m SW	Electricity Substation	1985 - 1987	51206

ID	Location	Land use	Dates present	Group ID
AJ	451m SW	Electricity Substation	1956	58081
AO	468m NE	Electricity Substation	1995	45669
AO	473m NE	Electricity Substation	1989	45668
AK	497m SE	Electricity Substation	1987	53466
AK	497m SE	Electricity Substation	1989	47944

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	0

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

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	3

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

Features are displayed on the Past land use map on **page 14 >**

ID	Location	Land use	Dates present	Group ID
AJ	426m SW	Garage	1987 - 1994	18556
AJ	475m SW	Garage	1956	16941
AJ	475m SW	Garage	1956 - 1966	17769

This data is sourced from Ordnance Survey / Groundsure.

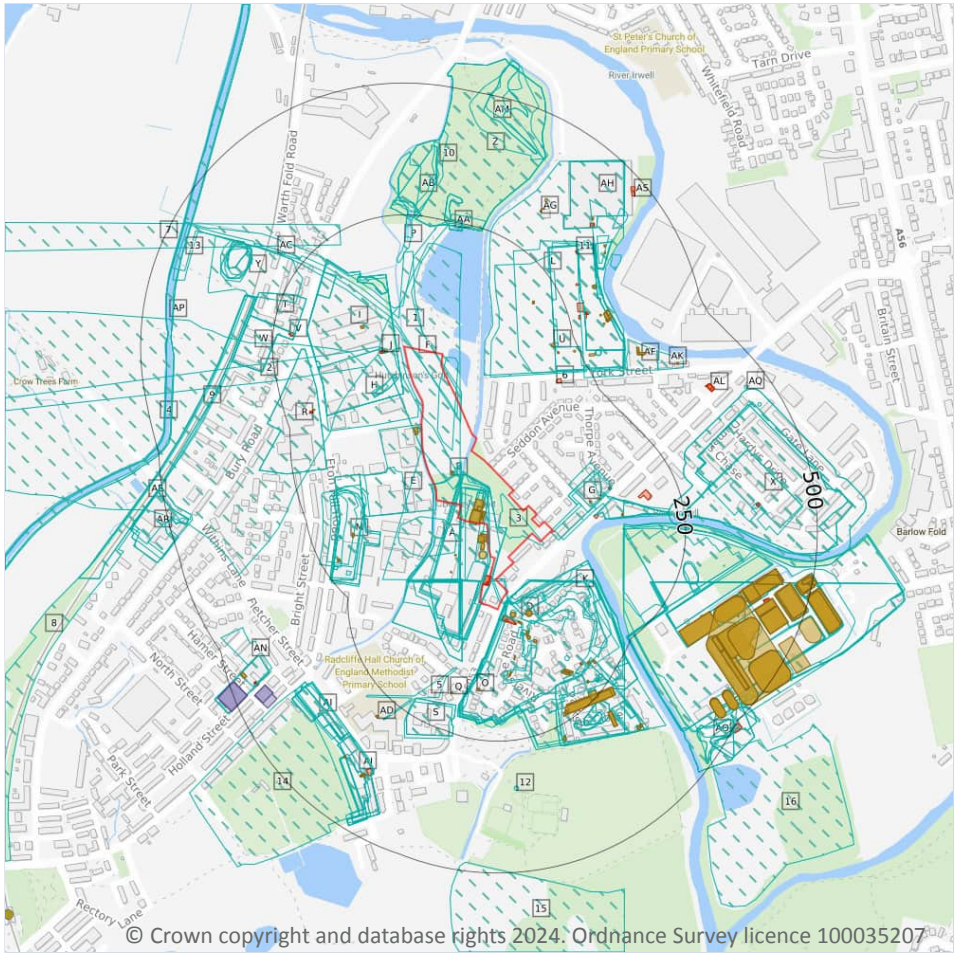
1.6 Historical military land

Records within 500m	0

Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.

2 Past land use - un-grouped



Site Outline

Search buffers in metres (m)

Historical industrial land uses

Historical tanks

Historical energy features

Historical garages

2.1 Historical industrial land uses

Records within 500m	311

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 32 >**

ID	Location	Land Use	Date	Group ID
1	**On site**	**Tramway Sidings**	**1908**	**760082**
2	**On site**	**Tramway Sidings**	**1890**	**670775**
3	**On site**	**Filter Beds**	**1908**	**665809**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Paper Works**	**1938**	**722933**
A	**On site**	**Paper Works**	**1927**	**717984**
A	**On site**	**Paper Works**	**1908**	**717984**
A	**On site**	**Unspecified Commercial/Industrial**	**1890**	**748711**
A	**On site**	**Industrial Estate**	**1991**	**746445**
A	**On site**	**Unspecified Works**	**1977**	**725705**
A	**On site**	**Unspecified Works**	**1965**	**725705**
A	**On site**	**Industrial Estate**	**1988**	**746445**
A	**On site**	**Paper Works**	**1955**	**714228**
A	**On site**	**Filter Beds**	**1955**	**788270**
A	**On site**	**Filter Beds**	**1938**	**767953**
A	**On site**	**Chemical Works**	**1891**	**682692**
A	**On site**	**Filter Beds**	**1928**	**767953**
A	**On site**	**Filter Beds**	**1928**	**665807**
A	**On site**	**Unspecified Commercial/Industrial**	**1928**	**738364**
A	**On site**	**Unspecified Commercial/Industrial**	**1908**	**758297**
B	**On site**	**Unspecified Tank**	**1938**	**777880**
B	**On site**	**Unspecified Tank**	**1927**	**733526**
B	**On site**	**Unspecified Tank**	**1955**	**674783**
C	**On site**	**Tramway Sidings**	**1890**	**776867**
D	**On site**	**Railway Sidings**	**1907**	**751453**
D	**On site**	**Railway Sidings**	**1891**	**756383**
E	**On site**	**Unspecified Commercial/Industrial**	**1991**	**643336**
F	**On site**	**Colliery**	**1890**	**645263**
F	**On site**	**Refuse Heap**	**1890**	**677999**
G	**On site**	**Chemical Works**	**1908**	**783716**
A	1m S	Unspecified Tanks	1955	733436
G	2m SE	Chemical Works	1891	783345

ID	Location	Land Use	Date	Group ID
F	3m NW	Unspecified Tank	1991	779255
F	3m NW	Unspecified Tank	1988	779255
A	4m S	Unspecified Commercial/Industrial	1938	704501
A	5m S	Unspecified Tank	1977	674782
H	7m NW	Industrial Estate	1991	767287
A	7m S	Unspecified Tanks	1938	733436
A	7m S	Unspecified Tanks	1928	733436
A	8m S	Unspecified Commercial/Industrial	1915	709107
A	8m S	Unspecified Commercial/Industrial	1907	704501
A	8m S	Unspecified Commercial/Industrial	1932	703963
A	8m S	Unspecified Commercial/Industrial	1923	747453
D	8m S	Bleaching Works	1932	763679
D	8m S	Bleach and Chemical Works	1891	753134
D	8m S	Wire Works	1938	641134
D	9m S	Unspecified Works	1965	730389
D	9m S	Bleach and Chemical Works	1915	781398
D	9m S	Bleach and Chemical Works	1907	699288
D	9m S	Bleaching Works	1923	744678
D	10m S	Bleaching Works	1955	777831
D	13m S	Vitriol Manufactory	1851	675148
D	13m S	Unspecified Works	1977	745660
I	14m NW	Unspecified Works	1991	766276
D	14m S	Bleach Works	1851	658162
I	15m NW	Unspecified Works	1977	723827
I	15m NW	Unspecified Factory	1965	670600
I	15m NW	Industrial Estate	1988	767287
A	21m S	Refuse Heap	1890	678029
D	25m S	Unspecified Tank	1891	702569

ID	Location	Land Use	Date	Group ID
H	25m NW	Unspecified Ground Workings	1991	716820
H	25m NW	Unspecified Ground Workings	1988	716820
D	26m S	Unspecified Tank	1907	702569
A	34m S	Unspecified Commercial/Industrial	1908	704501
A	34m S	Unspecified Commercial/Industrial	1891	781088
A	38m S	Unspecified Commercial/Industrial	1938	704501
A	39m S	Unspecified Commercial/Industrial	1927	704501
H	47m NW	Unspecified Ground Workings	1977	763499
E	48m W	Unspecified Works	1977	679066
D	48m SE	Unspecified Tank	1891	752478
D	51m SE	Unspecified Tank	1907	752478
D	62m S	Unspecified Tank	1977	723357
D	63m S	Unspecified Tank	1907	739491
K	65m SE	Refuse Heap	1965	677980
L	66m N	Unspecified Works	1991	782230
G	67m E	Chemical Works	1928	729789
L	75m N	Unspecified Mill	1988	734409
4	77m NW	Colliery	1890	645264
G	82m E	Unspecified Works	1965	679049
G	84m E	Chemical Works	1908	734395
G	84m E	Chemical Works	1928	734395
D	90m S	Unspecified Ground Workings	1851	648149
C	108m NW	Unspecified Ground Workings	1991	748275
C	108m NW	Unspecified Ground Workings	1977	748275
C	108m NW	Unspecified Ground Workings	1965	754469
C	108m NW	Unspecified Ground Workings	1988	748275
K	109m SE	Railway Sidings	1891	708931
K	110m SE	Railway Sidings	1907	724609

ID	Location	Land Use	Date	Group ID
M	122m SW	Unspecified Mill	1977	759196
M	122m SW	Unspecified Mill	1965	759196
M	125m SW	Unspecified Works	1991	679067
M	129m W	Unspecified Mill	1955	721686
5	130m S	Filter Beds	1891	665808
N	131m E	Sewage Works	1955	786107
N	132m E	Sludge Beds	1974	720162
N	132m E	Sewage Works	1974	758926
N	133m E	Unspecified Works	1965	679047
N	133m E	Sewage Works	1981	787106
N	133m E	Sludge Beds	1981	757718
G	135m E	Unspecified Works	1965	679048
M	136m W	Unspecified Mill	1938	732313
M	136m W	Unspecified Mill	1927	732313
M	142m W	Unspecified Mill	1908	736511
L	144m NE	Unspecified Mill	1977	702994
K	147m SE	Unspecified Tank	1907	674817
M	147m W	Unspecified Mill	1890	781543
D	157m SE	Chimney	1851	684330
P	159m N	Refuse Heap	1908	678000
M	165m W	Cotton Mill	1851	644066
D	168m SE	Unspecified Tank	1932	700387
D	168m SE	Unspecified Tank	1938	700387
C	169m NW	Unspecified Depot	1991	668817
D	169m SE	Unspecified Tanks	1955	666452
R	179m NW	Unspecified Works	1991	679064
R	179m NW	Unspecified Commercial/Industrial	1988	643339
D	181m S	Unspecified Commercial/Industrial	1977	643335

ID	Location	Land Use	Date	Group ID
M	193m SW	Gasometer	1851	655145
L	194m NE	Unspecified Works	1955	723223
L	194m NE	Tallow and Candle Works	1955	670839
D	198m SE	Unspecified Tank	1915	674818
S	199m S	Hospital	1991	745118
S	199m S	Hospital	1988	745118
D	200m SE	Unspecified Tank	1923	674819
S	204m S	Hospital	1908	779688
T	204m NW	Unspecified Commercial/Industrial	1977	752450
T	204m NW	Unspecified Works	1965	679065
N	207m SE	Sewage Works	1932	786107
N	207m SE	Sewage Works	1938	701259
P	208m N	Unspecified Ground Workings	1965	747650
W	209m NW	Unspecified Commercial/Industrial	1991	705324
W	209m NW	Unspecified Commercial/Industrial	1977	705324
W	209m NW	Unspecified Warehouse	1965	652408
W	209m NW	Unspecified Commercial/Industrial	1988	705324
N	209m SE	Sewage Works	1915	786107
N	209m SE	Sewage Works	1907	738790
N	209m SE	Sewage Works	1923	786107
U	209m NE	Unspecified Tank	1991	717653
U	209m NE	Unspecified Tank	1988	717653
M	211m SW	Unspecified Tank	1955	674784
L	215m NE	Unspecified Works	1965	723223
D	218m SE	Unspecified Tank	1915	762572
D	218m SE	Unspecified Tank	1923	762572
X	221m E	Cabinet Works	1965	767569
X	221m E	Cabinet Works	1955	767569

ID	Location	Land Use	Date	Group ID
Y	222m NW	Colliery	1890	645262
M	226m SW	Unspecified Tank	1938	789827
M	226m SW	Unspecified Tank	1927	789827
D	226m SE	Unspecified Tank	1938	729661
7	227m NW	Cuttings	1890	642632
D	229m SE	Chimney	1977	695696
D	229m SE	Chimney	1965	695696
D	229m SE	Unspecified Tank	1915	754354
D	229m SE	Unspecified Tank	1907	754354
D	229m SE	Unspecified Tank	1923	754354
D	231m SE	Shed	1851	659596
D	232m SE	Unspecified Tanks	1907	666451
Z	233m N	Unspecified Disused Tip	1991	784021
Z	233m N	Refuse Heap	1977	695335
Z	233m N	Unspecified Disused Tip	1988	784021
AA	235m N	Unspecified Ground Workings	1938	704929
AA	235m N	Unspecified Ground Workings	1927	704929
AA	235m N	Unspecified Ground Workings	1908	704929
X	244m E	Cotton Weaving Mill	1938	720424
X	244m E	Cotton Weaving Mill	1928	720424
AB	246m N	Unspecified Heap	1938	766137
AB	246m N	Unspecified Heap	1927	766137
AB	246m N	Refuse Heap	1908	790849
AA	246m N	Unspecified Pit	1965	691002
X	246m E	Unspecified Commercial/Industrial	1981	774222
X	246m E	Unspecified Commercial/Industrial	1974	774222
N	255m SE	Unspecified Heap	1955	775400
N	256m SE	Unspecified Heap	1938	757010

ID	Location	Land Use	Date	Group ID
N	256m SE	Unspecified Heap	1928	763138
AB	256m N	Unspecified Ground Workings	1955	698465
D	258m SE	Unspecified Heap	1991	707221
D	258m SE	Unspecified Heap	1977	707221
D	258m SE	Unspecified Heap	1965	707221
D	258m SE	Unspecified Heap	1988	707221
AC	258m NW	Tunnel	1908	671553
D	259m SE	Refuse Heap	1955	782857
D	259m SE	Refuse Heap	1938	782857
D	261m SE	Refuse Heap	1932	756807
L	262m NE	Bleach and Dye works	1938	788876
L	262m NE	Bleach Works	1891	658144
L	262m NE	Bleach and Dye works	1928	788876
L	262m NE	Bleach and Dye works	1908	788876
N	264m SE	Filter Beds	1915	789860
N	264m SE	Filter Beds	1907	746097
N	264m SE	Filter Beds	1923	753518
N	265m SE	Unspecified Tanks	1965	752748
N	265m SE	Unspecified Tanks	1974	752748
D	270m S	Unspecified Tank	1915	708695
D	270m S	Unspecified Tank	1907	708695
D	270m S	Unspecified Tank	1923	708695
U	276m NE	Chimney	1991	717375
U	276m NE	Chimney	1977	717375
U	276m NE	Chimney	1965	717375
U	276m NE	Chimney	1988	717375
N	278m SE	Unspecified Heap	1915	778676
D	286m SE	Filter Beds	1915	750653

ID	Location	Land Use	Date	Group ID
AC	287m NW	Air Shafts	1908	685376
D	287m SE	Filter Beds	1923	777946
D	293m SE	Filter Beds	1915	768200
8	295m NW	Railway Sidings	1955	768828
9	297m NW	Railway Sidings	1938	751945
AE	299m NW	Railway Sidings	1927	751945
AE	299m NW	Railway Sidings	1908	751945
X	303m E	Weaving Mill	1955	670969
X	305m E	Cotton Weaving Mill	1965	705007
10	312m N	Unspecified Ground Workings	1965	745144
L	313m NE	Unspecified Tank	1991	717499
L	313m NE	Unspecified Tank	1977	717499
L	313m NE	Unspecified Tank	1988	717499
AF	314m NE	Cotton Mill	1908	644065
L	316m NE	Unspecified Tanks	1938	715467
L	316m NE	Unspecified Tanks	1928	715467
L	316m NE	Unspecified Tanks	1908	715467
Y	329m NW	Refuse Heap	1955	789769
AH	331m N	Unspecified Warehouse	1977	716907
AH	331m N	Unspecified Warehouse	1988	770363
Y	332m NW	Refuse Heap	1938	743550
Y	332m NW	Refuse Heap	1908	774527
Y	332m NW	Refuse Heap	1927	782616
Y	333m NW	Refuse Heap	1890	742535
N	333m SE	Sewage Tanks	1981	657309
N	333m SE	Unspecified Tanks	1974	743387
N	333m SE	Unspecified Tanks	1965	743387
AH	334m NE	Oil and Tallow Works	1908	652452

ID	Location	Land Use	Date	Group ID
AH	337m NE	Candle Works	1938	691499
AH	337m NE	Tallow and Candle Works	1928	670840
12	337m S	Unspecified Tank	1923	674816
13	343m NW	Tramway Sidings	1908	782847
AH	344m NE	Unspecified Works	1965	709445
D	344m SE	Unspecified Tank	1932	762255
D	344m SE	Unspecified Tank	1938	789995
AI	346m SW	Unspecified Commercial/Industrial	1977	718948
AI	346m SW	Unspecified Mill	1965	750445
D	346m SE	Unspecified Tank	1915	694415
Y	347m NW	Refuse Heap	1977	779349
Y	347m NW	Refuse Heap	1965	779349
Y	347m NW	Refuse Heap	1988	779349
AI	348m SW	Unspecified Mill	1955	696615
AI	348m SW	Unspecified Works	1991	728251
AI	348m SW	Unspecified Works	1988	728251
D	350m SE	Unspecified Tank	1923	712578
AJ	350m SW	Unspecified Commercial/Industrial	1977	774253
AJ	350m SW	Unspecified Works	1965	727566
AJ	354m SW	Unspecified Works	1991	751996
AJ	354m SW	Unspecified Works	1988	751996
AK	356m NE	Chemical Works	1908	682691
AI	357m SW	Unspecified Mill	1938	711306
AI	357m SW	Unspecified Mill	1927	711306
AI	357m SW	Unspecified Mill	1908	711306
AI	357m SW	Unspecified Commercial/Industrial	1891	782718
N	360m SE	Sewage Tanks	1981	657312
AH	361m NE	Refuse Heap	1965	677981

ID	Location	Land Use	Date	Group ID
N	365m SE	Filter Beds	1915	788606
N	365m SE	Filter Beds	1907	788606
N	365m SE	Filter Beds	1923	788606
AJ	375m S	Tower Works	1955	778655
14	379m SW	Bleach Works	1851	658161
AJ	384m S	Tower Works	1938	704950
AJ	384m S	Tower Works	1927	704950
AJ	384m S	Unspecified Commercial/Industrial	1908	694693
AJ	384m S	Unspecified Commercial/Industrial	1891	771773
N	399m SE	Unspecified Tank	1965	674824
AH	401m NE	Unspecified Heap	1928	650894
AM	405m N	Refuse Heap	1965	714403
AN	414m SW	Unspecified Works	1965	679063
AM	416m N	Refuse Heap	1955	725785
AM	419m N	Refuse Heap	1938	725785
AM	419m N	Refuse Heap	1928	725785
AN	421m SW	Unspecified Commercial/Industrial	1927	717282
AN	421m SW	Unspecified Commercial/Industrial	1908	717282
AN	421m SW	Soap Works	1891	682700
N	423m SE	Unspecified Tanks	1974	722463
N	424m SE	Unspecified Tanks	1965	722463
N	435m E	Unspecified Tanks	1915	767640
AP	437m W	Disused Canal	1991	788290
AP	437m W	Disused Canal	1977	706247
AP	437m W	Disused Canal	1988	788290
N	437m E	Unspecified Tanks	1923	767640
AO	442m SE	Unspecified Heap	1932	758564
AO	442m SE	Unspecified Heap	1938	758564

ID	Location	Land Use	Date	Group ID
AO	444m SE	Refuse Heap	1955	719870
AQ	453m E	Settling Tanks	1938	681805
AR	454m W	Unspecified Mill	1955	709866
AR	455m W	Unspecified Mill	1965	781443
AQ	455m E	Settling Tanks	1938	681804
AO	458m SE	Unspecified Heap	1915	739377
AO	458m SE	Refuse Heap	1923	698127
AR	462m W	Unspecified Mill	1938	709866
AR	462m W	Unspecified Mill	1927	709866
AR	462m W	Unspecified Mill	1908	711488
N	464m E	Unspecified Tanks	1915	781203
N	464m E	Unspecified Tanks	1907	694169
N	464m E	Unspecified Tanks	1923	781203
N	468m E	Unspecified Tanks	1932	781203
N	468m E	Unspecified Tanks	1938	743645
N	470m E	Sewage Tanks	1955	657313
AO	470m SE	Unspecified Ground Workings	1907	648151
N	470m E	Unspecified Tanks	1965	734496
N	471m E	Unspecified Tanks	1974	703358
AO	473m SE	Unspecified Heap	1915	716003
AO	473m SE	Unspecified Heap	1923	716003
AO	475m SE	Unspecified Ground Workings	1907	648150
N	481m E	Unspecified Tanks	1908	747584
15	483m S	Refuse Heap	1977	787422
16	485m SE	Sludge Lagoons	1981	681460
N	493m E	Unspecified Tanks	1932	726516
N	493m E	Unspecified Tanks	1938	726516
N	497m E	Sewage Tanks	1955	657314

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	257

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

Features are displayed on the Past land use - un-grouped map on **page 32 >**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Settling Tanks**	**1956**	**94451**
A	**On site**	**Unspecified Tank**	**1956**	**99752**
A	**On site**	**Settling Tanks**	**1956**	**88914**
A	**On site**	**Settling Tanks**	**1972**	**88914**
A	**On site**	**Tanks**	**1972**	**87872**
A	**On site**	**Unspecified Tank**	**1956**	**99752**
A	**On site**	**Settling Tanks**	**1956**	**88914**
A	**On site**	**Settling Tanks**	**1956**	**94451**
A	**On site**	**Tanks**	**1985**	**93701**
A	**On site**	**Tanks**	**1992**	**93701**
B	**On site**	**Unspecified Tank**	**1930**	**92083**
B	**On site**	**Unspecified Tank**	**1937**	**92083**
A	4m S	Tanks	1956	102405
A	4m S	Tanks	1956	97968
F	7m NW	Tanks	1985	96177
A	7m S	Tanks	1972	100959
F	7m NW	Tanks	1992	96177
A	7m S	Unspecified Tank	1972	84768
A	8m S	Tanks	1985	100959
A	8m S	Tanks	1930	90813
A	8m S	Tanks	1937	90813
D	26m S	Unspecified Tank	1893	89857
D	26m S	Unspecified Tank	1909	89857

ID	Location	Land Use	Date	Group ID
J	32m NW	Unspecified Tank	1992	84771
D	45m S	Tanks	1956	103342
D	45m S	Tanks	1956	103342
D	52m SE	Unspecified Tank	1893	85025
D	52m SE	Gasometer	1909	78092
A	62m S	Unspecified Tank	1930	84769
A	63m S	Unspecified Tank	1930	95707
A	63m S	Unspecified Tank	1937	95707
D	69m S	Unspecified Tank	1975	90948
D	69m S	Unspecified Tank	1980	90948
D	76m S	Unspecified Tank	1975	89663
D	76m S	Unspecified Tank	1980	89663
I	84m NW	Unspecified Tank	1956	96469
I	85m NW	Unspecified Tank	1956	96469
G	88m E	Unspecified Tank	1956	88654
G	88m E	Unspecified Tank	1956	88654
D	90m S	Unspecified Tank	1922	96774
D	90m S	Unspecified Tank	1932	96774
D	93m S	Tanks	1922	87873
G	105m E	Unspecified Tank	1956	91060
G	105m E	Unspecified Tank	1956	91060
D	121m S	Tanks	1956	98807
D	121m S	Tanks	1956	98807
G	133m E	Unspecified Tank	1985	94629
G	133m E	Unspecified Tank	1956	97001
G	133m E	Unspecified Tank	1956	94629
G	133m E	Unspecified Tank	1972	94629
O	153m S	Unspecified Tank	1922	89005

ID	Location	Land Use	Date	Group ID
O	153m S	Unspecified Tank	1932	89005
M	169m SW	Unspecified Tank	1930	103296
M	169m SW	Unspecified Tank	1937	103296
D	169m SE	Unspecified Tank	1922	95054
D	169m SE	Unspecified Tank	1932	95054
D	170m SE	Unspecified Tank	1975	94687
D	170m SE	Unspecified Tank	1956	94687
D	170m SE	Unspecified Tank	1980	91980
D	170m SE	Unspecified Tank	1956	94687
Q	177m S	Unspecified Tank	1956	99256
Q	177m S	Unspecified Tank	1956	90569
R	193m W	Unspecified Tank	1972	84770
L	196m N	Unspecified Tank	1992	91665
L	197m N	Unspecified Tank	1976	91665
D	198m SE	Unspecified Tank	1922	93363
D	198m SE	Unspecified Tank	1932	93363
D	205m SE	Unspecified Tank	1956	93997
D	205m SE	Unspecified Tank	1956	93997
U	206m NE	Unspecified Tank	1992	84776
U	210m NE	Tanks	1956	100428
U	210m NE	Tanks	1956	100428
M	215m SW	Unspecified Tank	1930	102970
M	215m SW	Unspecified Tank	1937	102970
D	217m SE	Unspecified Tank	1922	85027
D	223m SE	Settling Tanks	1975	99725
D	223m SE	Settling Tanks	1956	99725
D	223m SE	Settling Tanks	1980	92197
D	224m SE	Settling Tanks	1956	91365

ID	Location	Land Use	Date	Group ID
D	225m S	Settling Tanks	1932	93153
D	230m S	Tanks	1956	103632
D	231m S	Tanks	1956	103632
D	232m S	Unspecified Tank	1932	85026
D	234m SE	Tanks	1909	87876
U	239m NE	Unspecified Tank	1992	84772
U	263m NE	Tanks	1992	87156
D	271m S	Unspecified Tank	1909	94386
D	271m S	Unspecified Tank	1922	94386
D	286m SE	Tanks	1980	98066
D	287m SE	Tanks	1956	90555
D	287m SE	Tanks	1975	90555
D	287m SE	Tanks	1956	90555
AD	290m S	Unspecified Tank	1980	96640
AD	290m S	Unspecified Tank	1987	96640
AD	290m S	Unspecified Tank	1992	96640
AD	290m S	Unspecified Tank	1996	96640
AD	290m S	Unspecified Tank	1994	96640
AD	290m S	Unspecified Tank	1998	96640
AD	290m S	Unspecified Tank	1975	96640
N	304m SE	Settling Tanks	1956	95997
N	304m SE	Humus Tanks	1968	101213
N	304m SE	Humus Tanks	1969	101213
N	304m SE	Settling Tanks	1956	95997
L	307m NE	Unspecified Tank	1930	84774
L	310m NE	Unspecified Tank	1890	84775
L	311m NE	Unspecified Tank	1992	94127
L	313m NE	Unspecified Tank	1976	94127

ID	Location	Land Use	Date	Group ID
L	316m NE	Tanks	1910	100450
L	316m NE	Tanks	1930	100450
L	316m NE	Tanks	1937	100450
L	317m NE	Tanks	1956	98251
L	318m NE	Tanks	1956	98251
11	318m NE	Unspecified Tank	1976	84759
L	320m NE	Unspecified Tank	1992	101937
L	321m NE	Unspecified Tank	1956	103287
L	321m NE	Unspecified Tank	1976	103287
L	322m NE	Unspecified Tank	1956	98149
L	322m NE	Tanks	1956	93468
L	323m NE	Tanks	1956	93468
AG	327m N	Tanks	1976	87154
AG	334m N	Tanks	1976	87155
N	340m SE	Settling Tanks	1981	99521
N	340m SE	Settling Tanks	1987	99521
N	340m SE	Settling Tanks	1968	99464
N	340m SE	Tanks	1989	101671
N	340m SE	Tanks	1989	101671
N	340m SE	Settling Tanks	1969	103588
N	341m SE	Tanks	1992	104226
AF	345m NE	Tanks	1970	104203
AF	345m NE	Tanks	1969	104203
AF	345m NE	Tanks	1995	104203
D	347m SE	Unspecified Tank	1981	95946
D	347m SE	Unspecified Tank	1987	95946
D	347m SE	Unspecified Tank	1909	95091
D	347m SE	Unspecified Tank	1922	95091

ID	Location	Land Use	Date	Group ID
D	347m SE	Unspecified Tank	1932	95091
D	348m SE	Unspecified Tank	1992	95946
D	348m SE	Unspecified Tank	1956	93999
D	348m SE	Unspecified Tank	1968	93999
D	348m SE	Unspecified Tank	1989	95946
D	348m SE	Unspecified Tank	1989	95946
D	348m SE	Unspecified Tank	1969	95946
D	348m SE	Unspecified Tank	1956	95946
AG	349m N	Unspecified Tank	1976	84758
AF	350m NE	Unspecified Tank	1890	84773
N	357m SE	Tanks	1989	100456
N	357m SE	Tanks	1989	100456
AH	362m NE	Unspecified Tank	1930	88825
AH	362m NE	Unspecified Tank	1937	88825
N	362m SE	Settling Tanks	1969	95683
N	362m SE	Settling Tanks	1956	95683
N	363m SE	Settling Tanks	1956	95683
N	363m SE	Settling Tanks	1968	95683
N	367m SE	Humus Tanks	1969	98394
N	367m SE	Settlings Tanks	1956	78421
N	367m SE	Settling Tanks	1956	103088
N	367m SE	Humus Tanks	1968	98394
AH	368m NE	Unspecified Tank	1930	90624
AH	368m NE	Unspecified Tank	1937	90624
N	370m SE	Unspecified Tank	1956	97759
N	370m SE	Unspecified Tank	1956	97759
N	370m SE	Settling Tanks	1932	101430
N	373m SE	Aeration Tanks	1981	95780

ID	Location	Land Use	Date	Group ID
N	373m SE	Aeration Tanks	1987	95780
N	374m SE	Aeration Tanks	1968	95872
N	374m SE	Settling Tanks	1956	95304
N	374m SE	Settling Tanks	1956	95304
N	375m SE	Aeration Tanks	1969	95872
N	381m SE	Tanks	1989	101340
N	381m SE	Tanks	1989	101340
AH	381m NE	Unspecified Tank	1976	84760
N	383m SE	Settling Tanks	1987	103088
AJ	387m SW	Unspecified Tank	1966	95441
AJ	387m SW	Unspecified Tank	1956	95441
AJ	387m SW	Unspecified Tank	1985	95441
AJ	387m SW	Unspecified Tank	1987	95441
AJ	388m SW	Unspecified Tank	1994	95441
N	389m E	Aeration Tanks	1956	103615
AK	389m NE	Unspecified Tank	1956	103706
AK	389m NE	Unspecified Tank	1970	93129
N	389m E	Aeration Tanks	1956	95872
AK	390m NE	Unspecified Tank	1956	91508
AK	390m NE	Unspecified Tank	1969	92411
AK	390m NE	Unspecified Tank	1995	97339
N	390m SE	Aeration Tank	1956	93211
N	390m SE	Aeration Tank	1968	93211
N	391m SE	Aeration Tank	1969	93211
N	391m SE	Aeration Tank	1956	93211
AJ	391m S	Unspecified Tank	1956	94223
AJ	391m S	Unspecified Tank	1980	101029
AJ	391m S	Unspecified Tank	1987	101029

ID	Location	Land Use	Date	Group ID
AJ	391m S	Unspecified Tank	1992	101029
AJ	392m S	Unspecified Tank	1975	94223
AJ	392m S	Unspecified Tank	1956	94223
AJ	392m S	Unspecified Tank	1996	94223
AJ	392m S	Unspecified Tank	1994	94223
AJ	392m S	Unspecified Tank	1998	94223
N	395m E	Settling Tanks	1930	93336
N	395m E	Settling Tanks	1937	93336
N	397m SE	Unspecified Tank	1956	99296
N	397m SE	Unspecified Tank	1956	99296
N	408m SE	Settling Tanks	1981	93693
N	409m SE	Settling Tanks	1956	93693
N	409m SE	Settling Tanks	1968	93693
N	410m SE	Settling Tanks	1969	93693
N	410m SE	Settling Tanks	1956	93693
N	411m E	Aeration Tanks	1956	97495
N	411m E	Aeration Tanks	1969	97495
N	411m E	Aeration Tanks	1956	95872
N	411m E	Aeration Tanks	1970	90286
N	422m SE	Aeration Tanks	1981	96856
N	423m SE	Aeration Tanks	1969	96856
N	423m SE	Aeration Tanks	1956	96856
N	423m SE	Aeration Tanks	1956	92635
N	423m SE	Aeration Tanks	1968	92635
N	435m E	Tanks	1922	96253
N	435m E	Tanks	1932	96253
AO	436m SE	Sludge Holding Tanks	1981	96323
AO	436m SE	Sludge Holding Tanks	1987	96323

ID	Location	Land Use	Date	Group ID
N	436m E	Settling Tanks	1956	93293
AO	437m SE	Tanks	1989	103834
AO	437m SE	Tanks	1989	103834
AO	438m SE	Tanks	1992	96370
N	438m E	Settling Tanks	1956	93293
AO	442m SE	Sludge Holding Tanks	1981	97258
AO	442m SE	Sludge Holding Tanks	1987	97258
AO	443m SE	Tanks	1989	93906
AO	443m SE	Tanks	1989	93906
AO	445m SE	Tanks	1992	89885
N	448m SE	Settling Tanks	1981	103131
N	448m SE	Settling Tanks	1987	103131
N	450m SE	Tanks	1989	96403
N	450m SE	Tanks	1989	96403
AN	464m SW	Unspecified Tank	1929	97446
AN	464m SW	Unspecified Tank	1937	97446
N	471m E	Tanks	1969	101963
N	471m E	Tanks	1956	101963
N	472m E	Tanks	1909	89542
N	472m E	Tanks	1922	89542
N	472m E	Tanks	1932	89542
N	472m E	Settling Tanks	1956	93519
N	472m E	Settling Tanks	1968	93519
N	477m SE	Aeration Tanks	1981	85898
N	481m E	Tanks	1910	91042
N	481m E	Settling Tanks	1930	93373
N	481m E	Settling Tanks	1937	93373
N	493m E	Unspecified Tank	1956	84767

ID	Location	Land Use	Date	Group ID
N	497m E	Settling Tanks	1969	91208
N	497m E	Settling Tanks	1956	91208
N	497m SE	Tanks	1956	87874
N	497m E	Settling Tanks	1956	91208
N	497m E	Settling Tanks	1968	91208
N	498m E	Tanks	1909	101507
N	498m E	Tanks	1922	101507
N	498m E	Settling Tanks	1932	92173
N	500m E	Tanks	1956	94775
N	500m E	Tanks	1968	94775

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m	**76**

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

Features are displayed on the Past land use - un-grouped map on **page 32 >**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Electricity Substation**	**1956**	**55676**
A	**On site**	**Electricity Substation**	**1972**	**55676**
A	**On site**	**Electricity Substation**	**1975**	**57711**
A	**On site**	**Electricity Substation**	**1956**	**45637**
A	**On site**	**Electricity Substation**	**1980**	**57576**
A	**On site**	**Electricity Substation**	**1987**	**57576**
A	**On site**	**Electricity Substation**	**1992**	**57576**
A	0m S	Electricity Substation	1996	46895
A	0m S	Electricity Substation	1994	46895
A	0m S	Electricity Substation	1998	46895

ID	Location	Land Use	Date	Group ID
D	17m S	Electricity Substation	1996	53975
D	17m S	Electricity Substation	1994	53975
D	17m S	Electricity Substation	1998	53975
D	24m S	Electricity Substation	1992	53935
J	38m NW	Electricity Substation	1956	57801
J	38m NW	Electricity Substation	1956	57801
J	38m NW	Electricity Substation	1972	57801
J	38m NW	Electricity Substation	1992	57801
J	39m NW	Electricity Substation	1985	57801
D	52m SE	Gasometer	1909	46144
G	81m E	Electricity Substation	1992	45648
G	132m E	Electricity Substation	1985	50498
G	132m E	Electricity Substation	1972	59435
G	133m E	Electricity Substation	1992	50498
G	173m E	Electricity Substation	1995	45649
6	185m NE	Electricity Substation	1992	45670
D	187m SE	Electricity Substation	1956	56825
D	187m SE	Electricity Substation	1956	56825
R	198m W	Electricity Substation	1992	52297
R	199m W	Electricity Substation	1987	52297
V	208m NW	Electricity Substation	1992	50885
V	209m NW	Electricity Substation	1987	50885
M	215m SW	Electricity Substation	1956	55906
M	216m SW	Electricity Substation	1956	55906
L	267m NE	Electricity Substation	1992	45671
L	269m NE	Electricity Substation	1992	45672
L	279m NE	Electricity Substation	1992	52977
L	282m NE	Electricity Substation	1985	55173

ID	Location	Land Use	Date	Group ID
L	283m NE	Electricity Substation	1956	55173
L	284m NE	Electricity Substation	1956	55173
L	284m NE	Electricity Substation	1972	55173
L	285m NE	Electricity Substation	1992	45673
AH	370m NE	Electricity Substation	1992	45667
AH	374m NE	Electricity Transformer	1976	46545
AJ	376m S	Electricity Substation	1956	45638
X	388m E	Electricity Substation	1995	59332
X	388m E	Electricity Substation	1956	57139
X	388m E	Electricity Substation	1969	57139
X	388m E	Electricity Substation	1956	57139
X	388m E	Electricity Substation	1970	57139
AJ	392m S	Electricity Substation	1980	47202
AJ	392m S	Electricity Substation	1987	47202
AJ	392m S	Electricity Substation	1992	47202
AJ	392m S	Electricity Substation	1975	47202
AJ	392m S	Electricity Substation	1956	47202
AJ	392m S	Electricity Substation	1996	47202
AJ	392m S	Electricity Substation	1994	47202
AJ	392m S	Electricity Substation	1998	47202
AL	398m E	Electricity Substation	1969	52486
AL	400m E	Electricity Substation	1995	50012
AL	400m E	Electricity Substation	1956	55428
AL	400m E	Electricity Substation	1970	55428
AL	400m E	Electricity Substation	1956	52486
N	419m SE	Electricity Substation	1989	48208
N	419m SE	Electricity Substation	1989	48208
N	419m SE	Electricity Substation	1992	50559

ID	Location	Land Use	Date	Group ID
AN	446m SW	Electricity Substation	1956	57450
AN	449m SW	Electricity Substation	1994	57450
AN	449m SW	Electricity Substation	1985	51206
AN	449m SW	Electricity Substation	1987	51206
AN	451m SW	Electricity Substation	1956	58081
AS	468m NE	Electricity Substation	1995	45669
AS	473m NE	Electricity Substation	1989	45668
AO	497m SE	Electricity Substation	1987	53466
AO	497m SE	Electricity Substation	1989	47944
AO	497m SE	Electricity Substation	1989	47944

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	0

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

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m	5

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

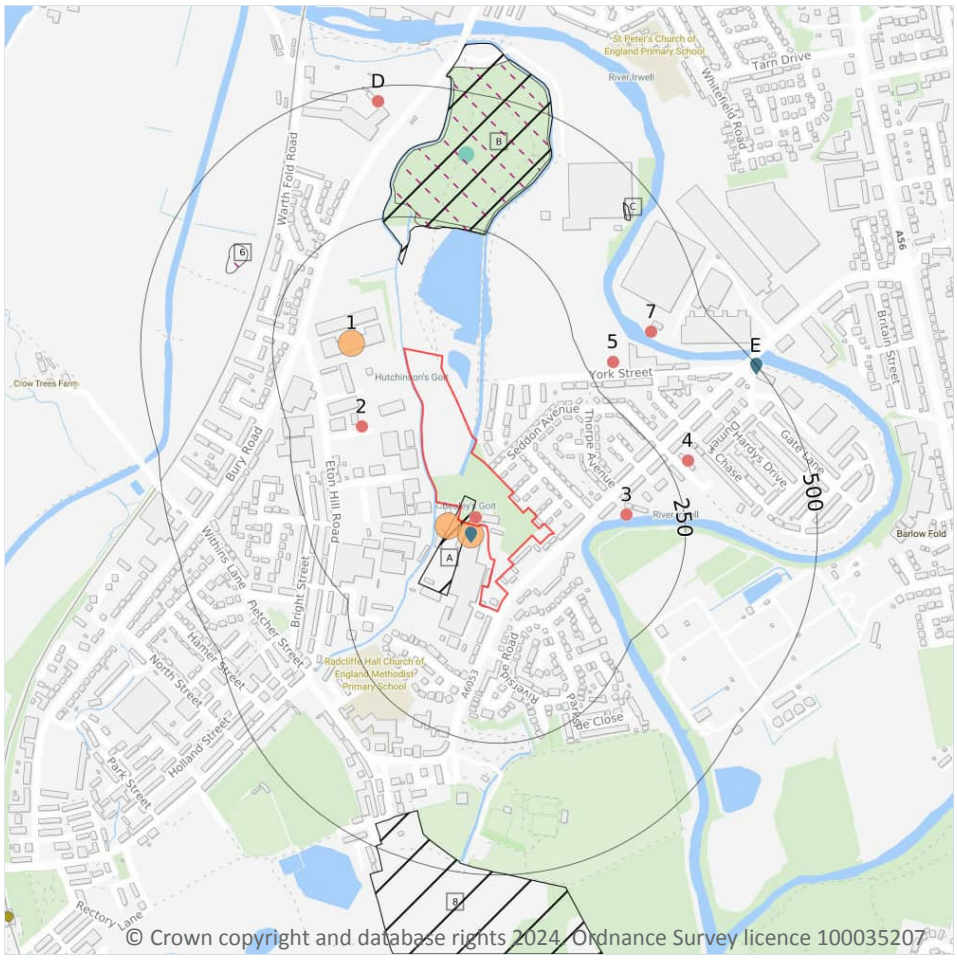
Features are displayed on the Past land use - un-grouped map on **page 32 >**

ID	Location	Land Use	Date	Group ID
AN	426m SW	Garage	1994	18556
AN	428m SW	Garage	1987	18556
AN	475m SW	Garage	1956	16941

ID	Location	Land Use	Date	Group ID
AN	475m SW	Garage	1966	17769
AN	475m SW	Garage	1956	17769

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill



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Site Outline

Search buffers in metres (m)

- Historical landfill (EA/NRW)
- Historical landfill (BGS)
- Historical landfill (LA/OS)
- Historical waste sites
- Licensed waste sites
- Waste exemptions

3.1 Active or recent landfill

Records within 500m	0

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

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

3.2 Historical landfill (BGS records)

Records within 500m	1

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

Features are displayed on the Waste and landfill map on **page 58 >**

ID	Location	Address	BGS Number	Risk	Waste Type
B	382m N	Crawford Bros Ltd, Bury Rd, Radcliffe, Manchester	1678	No risk to aquifer	N/A

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	4

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

Features are displayed on the Waste and landfill map on **page 58 >**

ID	Location	Site address	Source	Data type
B	233m N	Refuse Tip	1975 mapping	Polygon
6	344m NW	Refuse Tip	1964 mapping	Polygon
C	433m NE	Refuse Tip	1969 mapping	Polygon
C	435m NE	Refuse Tip	1969 mapping	Polygon

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

3.4 Historical landfill (EA/NRW records)

Records within 500m	3

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

Features are displayed on the Waste and landfill map on **page 58 >**

ID	Location	Details		
A	**On site**	**Site Address: Land off Dumers Lane, Radcliffe, Bury, Greater Manchester** **Licence Holder Address: -**	**Waste Licence: -** **Site Reference: C011** **Waste Type: Inert** **Environmental Permitting Regulations (Waste) Reference: -** **Licence Issue: -** **Licence Surrender: -**	**Operator: -** **Licence Holder: -** **First Recorded -** **Last Recorded: -**

ID	Location	Details		
B	159m N	Site Address: Land At Bury Road, Radcliffe, Bury, Greater Manchester Licence Holder Address: Gunnersbury House, Chiswick High Road, London	Waste Licence: Yes Site Reference: C008,RD/LIC/057/76 Waste Type: Inert, Industrial, Commercial, Household, Special Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 13/07/1978 Licence Surrender: 21/03/1991	Operator: Crawford Brothers Limited Licence Holder: Wimpey Waste Management Limited First Recorded - Last Recorded: -
8	407m S	Site Address: Tower Farm, Off Church Street East, Radcliffe, Bury, Greater Manchester Licence Holder Address: The Octagon, 143, Derby Road, Nottingham	Waste Licence: Yes Site Reference: C010, RD/LIC/201/80, RD/LIC/018/76 Waste Type: Inert, Industrial, Commercial, Household, Special, Liquid sludge Environmental Permitting Regulations (Waste) Reference: - Licence Issue: 13/06/1978 Licence Surrender: 10/03/1993	Operator: - Licence Holder: P D Pollution Control Limited First Recorded 31/12/1980 Last Recorded: 31/12/1992

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

3.5 Historical waste sites

Records within 500m	3

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

Features are displayed on the Waste and landfill map on **page 58 >**

ID	Location	Address	Further Details	Date
A	**On site**	**Site Address: Bealley Industrial Estate, MANCHESTER, Greater Manchester, M26 2BD**	**Type of Site: Waste Transfer Unit** **Planning application reference: 32752/96** **Description: No Buildings. An application (ref: 32752/96) for Detailed Planning permission was submitted to Bury M.B.C. on 13th December 1996.** **Data source: Historic Planning Application** **Data Type: Point**	**-**
A	**On site**	**Site Address: 10A, Bealey Industrial Estate, Dumers Lane, Radcliffe, Manchester, Greater Manchester, M26 2BD**	**Type of Site: Waste Transfer Station** **Planning application reference: 56753** **Description: Scheme comprises change of use to indoor waste transfer station for recycling non-hazardous household, commercial and industrial skip waste.** **Data source: Historic Planning Application** **Data Type: Point**	**18/12/2013**

ID	Location	Address	Further Details	Date
1	75m NW	Site Address: Remploy Ltd, Eton Hill Road, Radcliffe, MANCHESTER, Greater Manchester, M26 2XS	Type of Site: Recycling Storage (Conversion) Planning application reference: 49849 Description: Scheme comprises change of use to include the reception, storage and treatment to recycle electrical and electronic equipment. An application (ref: 49849) for detailed planning permission was granted by Bury M.B.C. Planning decision obtained Data source: Historic Planning Application Data Type: Point	-

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

3.6 Licensed waste sites

Records within 500m	**4**

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

Features are displayed on the Waste and landfill map on **page 58 >**

ID	Location	Details		
A	19m S	Site Name: Abbey Skip Hire Ltd Site Address: Unit 10a Bealey Industrial Estate, Dumers Lane, Radcliffe, Bury, Lancashire, M26 2BD Correspondence Address: -	Type of Site: 75kte HCI Waste TS + treatment Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: 642023 EPR reference: EA/EPR/BB3703GM Operator: Abbey Skip Hire Limited Waste Management licence No: 401511 Annual Tonnage: 0	Issue Date: 14/08/2014 Effective Date: 14/08/2014 Modified: - Surrendered Date: 14/08/2014 Expiry Date: - Cancelled Date: - Status: Surrendered
E	497m E	Site Name: Royden Polythene (exports) Ltd Site Address: Unit B, Dumers Lane, Radcliffe, Bury, Lancashire, M26 2QJ Correspondence Address: -	Type of Site: Material Recycling Treatment Facility Size: >= 25000 tonnes 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ROY001 EPR reference: EA/EPR/AP3698CD/S002 Operator: Royden Polythene (Exports) Ltd Waste Management licence No: 50101 Annual Tonnage: 0	Issue Date: 19/11/2002 Effective Date: - Modified: - Surrendered Date: Apr 23 2007 12:00AM Expiry Date: - Cancelled Date: - Status: Surrendered

ID	Location	Details		
E	497m E	Site Name: Royden Polythene (exports) Ltd Site Address: Unit B, Dumers Lane, Radcliffe, Bury, Lancashire, M26 2QJ Correspondence Address: -	Type of Site: Material Recycling Treatment Facility Size: >= 25000 tonnes 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ROY001 EPR reference: EA/EPR/AP3698CD/S002 Operator: Royden Polythene (exports) Ltd Waste Management licence No: 50101 Annual Tonnage: 0	Issue Date: 19/11/2002 Effective Date: - Modified: - Surrendered Date: Apr 23 2007 12:00AM Expiry Date: - Cancelled Date: - Status: Surrendered
E	497m E	Site Name: Royden Polythene (exports) Ltd Site Address: Unit B, Dumers Lane, Radcliffe, Bury, Lancashire, M26 2QJ Correspondence Address: -	Type of Site: Material Recycling Treatment Facility Size: 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: 632483 EPR reference: EA/EPR/AP3698CD Operator: Royden Polythene (Exports) Limited Waste Management licence No: 50101 Annual Tonnage: 0	Issue Date: 19/11/2002 Effective Date: 19/11/2002 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Surrendered

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

3.7 Waste exemptions

Records within 500m	**10**

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

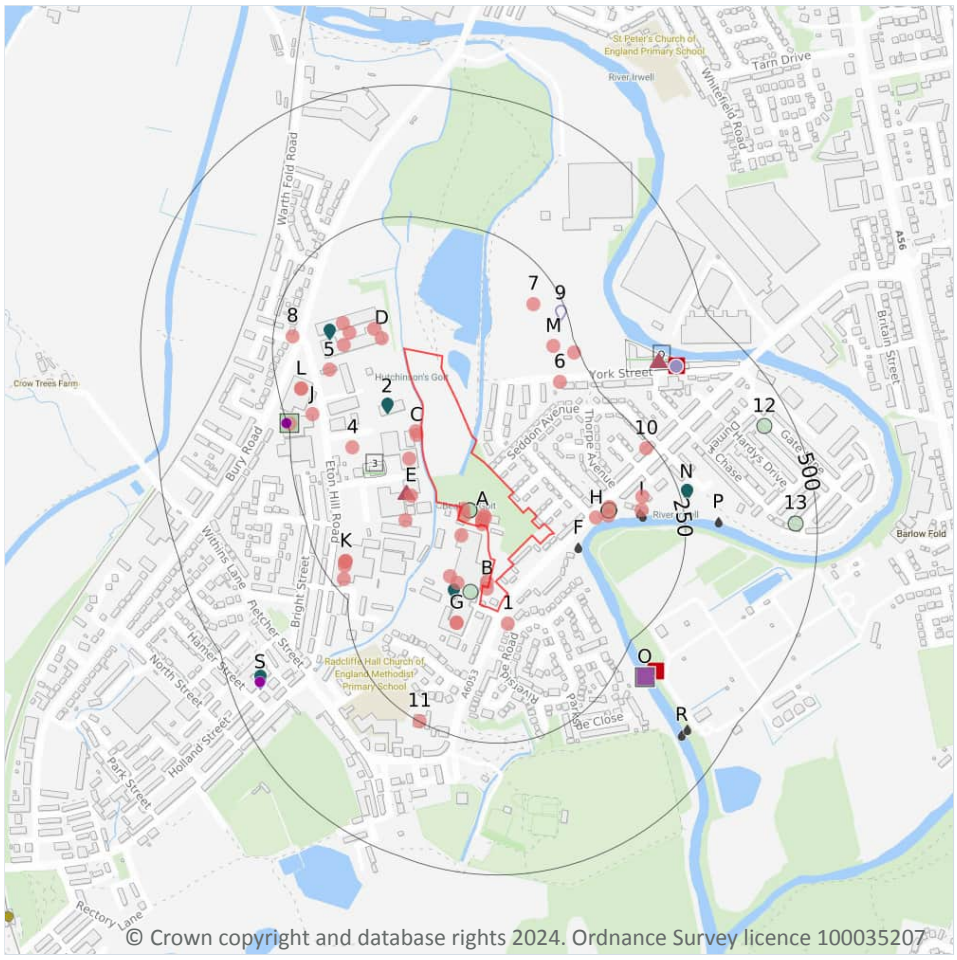
Features are displayed on the Waste and landfill map on **page 58 >**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	**On site**	**Bealey Industrial Estate Yard opposite 10a Dumers Lane MANCHESTER M26 2BD**	**EPR/GF0307SS /A001**	**Storing waste exemption**	**Non-Agricultural Waste Only**	**Storage of waste in secure containers**
A	**On site**	**Bealey Industrial Estate Yard opposite 10a Dumers Lane MANCHESTER M26 2BD**	**EPR/GF0307SS /A001**	**Storing waste exemption**	**Non-Agricultural Waste Only**	**Storage of waste in a secure place**

ID	Location	Site	Reference	Category	Sub-Category	Description
2	115m NW	Country Supplies Eton Way North Manchester M26 2AB	EPR/PE5588YH /A001	Using waste exemption	Non-Agricultural Waste Only	Use of waste in construction
3	142m E	-	WEX219320	Using waste exemption	Not on a farm	Use of waste in construction
4	288m E	Radcliffe & Radvales FRMS Phase 1, Morris Street, off Dumers Lane, Radcliffe, M262HF	WEX178612	Using waste exemption	Not on a farm	Use of waste in construction
5	297m NE	-	WEX208933	Using waste exemption	Not on a farm	Use of waste in construction
7	389m NE	-	WEX208936	Using waste exemption	Not on a farm	Use of waste in construction
D	470m N	-	WEX348669	Treating waste exemption	Not on a farm	Preparatory treatments (baling, sorting, shredding etc)
D	470m N	-	WEX348669	Storing waste exemption	Not on a farm	Storage of waste in a secure place
D	470m N	-	WEX348669	Treating waste exemption	Not on a farm	Sorting mixed waste

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

4 Current industrial land use



4.1 Recent industrial land uses

Records within 250m	48

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on page 64 >

ID	Location	Company	Address	Activity	Category
A	**On site**	**Tank**	**Greater Manchester, M26**	**Tanks (Generic)**	**Industrial Features**
A	**On site**	**Tank**	**Greater Manchester, M26**	**Tanks (Generic)**	**Industrial Features**
A	**On site**	**Tank**	**Greater Manchester, M26**	**Tanks (Generic)**	**Industrial Features**

ID	Location	Company	Address	Activity	Category
A	**On site**	**Tank**	**Greater Manchester, M26**	**Tanks (Generic)**	**Industrial Features**
A	**On site**	**Tank**	**Greater Manchester, M26**	**Tanks (Generic)**	**Industrial Features**
A	**On site**	**Pylon**	**Greater Manchester, M26**	**Electrical Features**	**Infrastructure and Facilities**
A	**On site**	**Mast (Telecommunication)**	**Greater Manchester, M26**	**Telecommunications Features**	**Infrastructure and Facilities**
B	**On site**	**Electricity Sub Station**	**Greater Manchester, M26**	**Electrical Features**	**Infrastructure and Facilities**
B	5m S	Tranzcare Travel	Gate House 1b Bealey Industrial Estate, Hallam Street, Radcliffe, Greater Manchester, M26 2BD	Vehicle Hire and Rental	Hire Services
C	10m NW	Tank	Greater Manchester, M26	Tanks (Generic)	Industrial Features
C	11m NW	Tank	Greater Manchester, M26	Tanks (Generic)	Industrial Features
A	25m S	Glosta Engineering	Unit 9c Bealey Industrial Estate, Hallam Street, Radcliffe, Greater Manchester, M26 2BD	Packaging	Industrial Products
C	28m W	Champion Mouldings Ltd	Eton Hill Industrial Estate, Eton Way South, Radcliffe, Greater Manchester, M26 2ZT	Rubber, Silicones and Plastics	Industrial Products
1	30m S	Electricity Sub Station	Greater Manchester, M26	Electrical Features	Infrastructure and Facilities
D	47m NW	I T Parts & Spares Ltd	Unit 1, Eton Business Park, Eton Hill Road, Radcliffe, Greater Manchester, M26 2ZS	Electronic Equipment	Industrial Products
E	47m W	Fragrance Oils International Ltd	-, Eton Hill Road, Radcliffe, Greater Manchester, M26 2FR	Cosmetics, Toiletries and Perfumes	Consumer Products
B	48m S	M & S Commercials Ltd	Unit 5 Bealey Industrial Estate, Hallam Street, Radcliffe, Greater Manchester, M26 2BD	Vehicle Repair, Testing and Servicing	Repair and Servicing
G	56m S	Norlift Ltd	Unit 1c Bealey Industrial Estate, Hallam Street, Radcliffe, Greater Manchester, M26 2BD	Lifting and Handling Equipment	Industrial Products
G	56m S	Wax on Wax Off Car Wash	Unit 1c Bealey Industrial Estate, Hallam Street, Radcliffe, Greater Manchester, M26 2BD	Vehicle Cleaning Services	Personal, Consumer and Other Services

ID	Location	Company	Address	Activity	Category
B	65m S	Bealey Industrial Estate	Greater Manchester, M26	Business Parks and Industrial Estates	Industrial Features
D	68m NW	Poole Projects Ltd	Unit 28 Eton Business Park, Eton Hill Road, Radcliffe, Greater Manchester, M26 2ZS	Wood Products Including Charcoal, Paper, Card and Board	Industrial Products
E	69m SW	Chimney	Greater Manchester, M26	Chimneys	Industrial Features
H	86m E	Electricity Sub Station	Greater Manchester, M26	Electrical Features	Infrastructure and Facilities
H	108m E	Works	Greater Manchester, M26	Unspecified Works Or Factories	Industrial Features
D	108m NW	Eton Business Park	Greater Manchester, M26	Business Parks and Industrial Estates	Industrial Features
D	115m NW	Mossglade Fabrics Ltd	Unit 20 Eton Business Park, Eton Hill Road, Radcliffe, Greater Manchester, M26 2ZS	Lingerie and Hosiery	Consumer Products
H	116m E	M N D Recovery Service	Irwell Bank Business Park 150-160, Dumers Lane, Radcliffe, Greater Manchester, M26 2GF	Scrap Metal Merchants	Recycling Services
D	126m NW	Tottington Motor Company	Unit 35, Eton Business Park, Eton Hill Road, Radcliffe, Greater Manchester, M26 2ZS	Secondhand Vehicles	Motoring
4	132m W	Industrial Estate	Greater Manchester, M26	Business Parks and Industrial Estates	Industrial Features
5	148m NW	Conservatory Insulations	Eton House, Eton Hill Road, Radcliffe, Greater Manchester, M26 2ZT	Construction Completion Services	Construction Services
I	173m E	Works	Greater Manchester, BL9	Unspecified Works Or Factories	Industrial Features
I	183m E	Electricity Sub Station	Greater Manchester, BL9	Electrical Features	Infrastructure and Facilities
6	193m NE	Electricity Sub Station	Greater Manchester, M26	Electrical Features	Infrastructure and Facilities
7	199m N	Tank	Greater Manchester, M26	Tanks (Generic)	Industrial Features
J	200m W	Electricity Sub Station	Greater Manchester, M26	Electrical Features	Infrastructure and Facilities
K	205m SW	McKenzie Martin	Eton Hill Works, Eton Hill Road, Radcliffe, Greater Manchester, M26 2US	Cooling and Refrigeration	Industrial Products

ID	Location	Company	Address	Activity	Category
K	205m SW	Displad Ltd	Eton Hill Works, Eton Hill Road, Radcliffe, Greater Manchester, M26 2DL	Office and Shop Equipment	Industrial Products
L	207m NW	J Rosenthal & Son	Britannia House 158, Bury Road, Radcliffe, Greater Manchester, M26 2JR	Beds and Bedding	Consumer Products
L	207m NW	J Rosenthal & Son	Britannia House 158, Bury Road, Radcliffe, Greater Manchester, M26 2JR	Textiles, Fabrics, Silk and Machinery	Industrial Products
K	208m SW	G J Plastics	Unit 2 Department 1 Eton Hill Works, Eton Hill Road, Radcliffe, Manchester, Greater Manchester, M26 2US	Office and Shop Equipment	Industrial Products
M	210m NE	Tank	Greater Manchester, M26	Tanks (Generic)	Industrial Features
K	212m SW	Banners N Display	Unit 2 Eton Hill Works, Eton Hill Road, Radcliffe, Manchester, Greater Manchester, M26 2US	Signs	Industrial Products
8	213m NW	Electricity Sub Station	Greater Manchester, M26	Electrical Features	Infrastructure and Facilities
K	228m SW	Works	Greater Manchester, M26	Unspecified Works Or Factories	Industrial Features
10	239m E	Georgina's Cakery	277, Dumers Lane, Radcliffe, Greater Manchester, M26 2GN	Baking and Confectionery	Foodstuffs
M	241m NE	Tank	Greater Manchester, M26	Tanks (Generic)	Industrial Features
J	246m W	B E P	Eton Hill Road, Radcliffe, Manchester, Greater Manchester, M26 2ZT	Industrial Coatings and Finishings	Industrial Products
11	248m S	Bealey Community Hospital	-, Dumers Lane, Radcliffe, Greater Manchester, M26 2QD	Hospitals	Health Practitioners and Establishments

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	0

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

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

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	2

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Company	Address	Operational status	Tier
3	73m W	Fragrance Oils (International) Limited	Fragrance Oils (International) Limited, Radcliffe, Eton Hill Industrial Estate, Eton Hill Road, Radcliffe, Bury, Lancashire, M26 2FR	Current COMAH Site	COMAH Lower Tier Operator
Q	313m NE	J and W Whewell Limited	J and W Whewell Limited, Newbridge Chemical Works, York Street, Radcliffe, Bury, Greater Manchester, M26 2GL	Historical COMAH Site	COMAH Lower Tier Operator

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

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

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	2

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Details	
E	52m W	Application reference number: No Details Application status: Approved Application date: No Details Address: Fragrance Oils International Ltd, Eton Hill Road, Radcliffe, Bury, Manchester, M26 2FR	Details: No Details Enforcement: No Details Date of enforcement: No Details Comment: No Details
Q	370m NE	Application reference number: No Details Application status: Approved Application date: No Details Address: J and W Whewell Ltd, Newbridge Chemical Works, York Street, Radcliffe, Bury, Manchester, England, M26 2GL	Details: No Details Enforcement: No Details Date of enforcement: No Details Comment: No Details

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	3

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Details	
Q	388m NE	Operator: J and W Whewell Ltd Address: New Bridge Chemical Works, York Street, Radcliffe, Manchester, M26 2GL Process: Acid Processes Permit Number: AZ7432	Original Permit Number: IPCAPP Date Approved: 30-7-1998 Effective Date: 1-8-1998 Status: Superseded By Variation
Q	388m NE	Operator: J and W Whewell Ltd Address: New Bridge Chemical Works, York Street, Radcliffe, Manchester, M26 2GL Process: Acid Processes Permit Number: BE1224	Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Superseded By Variation
Q	388m NE	Operator: J and W Whewell Ltd Address: New Bridge Chemical Works, York Street, Radcliffe, Manchester, M26 2GL Process: Acid Processes Permit Number: BU4350	Original Permit Number: IPCMINVAR Date Approved: 16-5-2003 Effective Date: 26-5-2003 Status: Revoked - Now Ippc

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

4.10 Licensed industrial activities (Part A(1))

Records within 500m	**24**

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Details	
9	238m NE	Operator: Unifi dyed yarns Limited Installation Name: UNIFI DYED YARNS Process: COATING, PRINTING AND TEXTILES; PRE-TREATING BY WASHING ETC >10T/DAY Permit Number: BX0393IP Original Permit Number: BP9684IP	EPR Reference: - Issue Date: 21/01/2004 Effective Date: 01/02/2004 Last date noted as effective: 21/03/2023 Status: Revoked
J	252m W	Operator: BEP SURFACE TECHNOLOGIES LIMITED Installation Name: Eton Hill Road EPR/BX2914IK Process: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M Permit Number: BX2914IK Original Permit Number: BX2914IK	EPR Reference: EPR/BX2914IK Issue Date: 26/07/2017 Effective Date: 26/07/2017 Last date noted as effective: 23/11/2023 Status: Effective

ID	Location	Details	
J	252m W	Operator: BEP SURFACE TECHNOLOGIES LIMITED Installation Name: Eton Hill Road EPR/BX2914IK Process: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT Permit Number: BX2914IK Original Permit Number: BX2914IK	EPR Reference: EPR/BX2914IK Issue Date: 26/07/2017 Effective Date: 26/07/2017 Last date noted as effective: 23/11/2023 Status: Effective
J	252m W	Operator: BEP Surface Technologies Ltd Installation Name: BEP SURFACE TECHNOLOGIES Process: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M Permit Number: NP3631MQ Original Permit Number: BX2914IK	EPR Reference: - Issue Date: 12/07/2007 Effective Date: 23/07/2007 Last date noted as effective: 21/03/2023 Status: Superceded
J	252m W	Operator: BEP Surface Technologies Ltd Installation Name: Eton Hill Road EPR/BX2914IK Process: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT Permit Number: NP3833CY Original Permit Number: BX2914IK	EPR Reference: - Issue Date: 26/07/2017 Effective Date: 26/07/2017 Last date noted as effective: 21/03/2023 Status: Effective
J	252m W	Operator: BEP Surface Technologies Ltd Installation Name: Eton Hill Road EPR/BX2914IK Process: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M Permit Number: NP3833CY Original Permit Number: BX2914IK	EPR Reference: - Issue Date: 26/07/2017 Effective Date: 26/07/2017 Last date noted as effective: 21/03/2023 Status: Effective
Q	388m NE	Operator: Sulfo Surfactants Limited Installation Name: New Bridge Chemical Works - EPR/BM0044IW Process: ASSOCIATED PROCESS Permit Number: BM0044IW Original Permit Number: BM0044IW	EPR Reference: EPR/BM0044IW Issue Date: 25/05/2023 Effective Date: 25/05/2023 Last date noted as effective: 23/11/2023 Status: Effective
Q	388m NE	Operator: Sulfo Surfactants Limited Installation Name: New Bridge Chemical Works - EPR/BM0044IW Process: ORGANIC CHEMICALS; NITROGEN CONTAINING COMPOUNDS EG AMINES Permit Number: BM0044IW Original Permit Number: BM0044IW	EPR Reference: EPR/BM0044IW Issue Date: 25/05/2023 Effective Date: 25/05/2023 Last date noted as effective: 23/11/2023 Status: Effective
Q	388m NE	Operator: Sulfo Surfactants Limited Installation Name: New Bridge Chemical Works - EPR/BM0044IW Process: ORGANIC CHEMICALS; OXYGEN CONTAINING COMPOUNDS EG ALCOHOLS Permit Number: BM0044IW Original Permit Number: BM0044IW	EPR Reference: EPR/BM0044IW Issue Date: 25/05/2023 Effective Date: 25/05/2023 Last date noted as effective: 23/11/2023 Status: Effective

ID	Location	Details	
Q	388m NE	Operator: Sulfo Surfactants Limited Installation Name: New Bridge Chemical Works - EPR/BM0044IW Process: ORGANIC CHEMICALS; PHOSPHORUS CONTAINING COMPOUNDS EG SUBSTITUTED PHOSPHINES Permit Number: BM0044IW Original Permit Number: BM0044IW	EPR Reference: EPR/BM0044IW Issue Date: 25/05/2023 Effective Date: 25/05/2023 Last date noted as effective: 23/11/2023 Status: Effective
Q	388m NE	Operator: Sulfo Surfactants Limited Installation Name: New Bridge Chemical Works - EPR/BM0044IW Process: ORGANIC CHEMICALS; SULPHUR CONTAINING COMPOUNDS EG SULPHIDES Permit Number: BM0044IW Original Permit Number: BM0044IW	EPR Reference: EPR/BM0044IW Issue Date: 25/05/2023 Effective Date: 25/05/2023 Last date noted as effective: 23/11/2023 Status: Effective
Q	388m NE	Operator: J AND W WHEWELL LTD Installation Name: - Process: ORGANIC CHEMICALS; PHOSPHORUS CONTAINING COMPOUNDS EG SUBSTITUTED PHOSPHINES Permit Number: BM0044 Original Permit Number: BM0044	EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 01/10/2004 Status: SUPERSEDED BY PAS
Q	388m NE	Operator: J AND W WHEWELL LTD Installation Name: - Process: ORGANIC CHEMICALS; SULPHUR CONTAINING COMPOUNDS EG SULPHIDES Permit Number: BM0044 Original Permit Number: BM0044	EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 01/10/2004 Status: SUPERSEDED BY PAS
Q	388m NE	Operator: J AND W WHEWELL LTD Installation Name: - Process: ORGANIC CHEMICALS; NITROGEN CONTAINING COMPOUNDS EG AMINES Permit Number: BM0044 Original Permit Number: BM0044	EPR Reference: - Issue Date: - Effective Date: - Last date noted as effective: 01/10/2004 Status: SUPERSEDED BY PAS
S	442m SW	Operator: COLOUR ANODISING LIMITED Installation Name: Anotec Works EPR/BN5386IN Process: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M Permit Number: BN5386IN Original Permit Number: BN5386IN	EPR Reference: EPR/BN5386IN Issue Date: 15/06/2017 Effective Date: 15/06/2017 Last date noted as effective: 23/11/2023 Status: Effective
S	442m SW	Operator: COLOUR ANODISING LIMITED Installation Name: Anotec Works EPR/BN5386IN Process: ORGANIC CHEMICALS; NITROGEN CONTAINING COMPOUNDS EG AMINES Permit Number: BN5386IN Original Permit Number: BN5386IN	EPR Reference: EPR/BN5386IN Issue Date: 15/06/2017 Effective Date: 15/06/2017 Last date noted as effective: 23/11/2023 Status: Effective

ID	Location	Details	
S	442m SW	Operator: COLOUR ANODISING LIMITED Installation Name: Anotec Works EPR/BN5386IN Process: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT Permit Number: BN5386IN Original Permit Number: BN5386IN	EPR Reference: EPR/BN5386IN Issue Date: 15/06/2017 Effective Date: 15/06/2017 Last date noted as effective: 23/11/2023 Status: Effective
S	442m SW	Operator: COLOUR ANODISING LTD Installation Name: ANOTEC WORKS EPR/BN5386IN Process: SOLVENT EMISSIONS DIRECTVE; ACTIVITIES EXCEEDING SOLVENT THRESHOLD Permit Number: WP3234YA Original Permit Number: BN5386IN	EPR Reference: - Issue Date: 15/06/2017 Effective Date: 15/06/2017 Last date noted as effective: 28/09/2020 Status: EFFECTIVE
S	442m SW	Operator: COLOUR ANODISING LTD Installation Name: COLOUR ANODISING RADCLIFFE Process: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M Permit Number: QP3634AD Original Permit Number: BN5386IN	EPR Reference: - Issue Date: 02/11/2015 Effective Date: 02/11/2015 Last date noted as effective: 21/03/2023 Status: Superceded
S	442m SW	Operator: COLOUR ANODISING LTD Installation Name: Anotec Works EPR/BN5386IN Process: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT Permit Number: WP3234YA Original Permit Number: BN5386IN	EPR Reference: - Issue Date: 15/06/2017 Effective Date: 15/06/2017 Last date noted as effective: 21/03/2023 Status: Effective
S	442m SW	Operator: COLOUR ANODISING LTD Installation Name: COLOUR ANODISING RADCLIFFE Process: SOLVENT EMISSIONS DIRECTVE; ACTIVITIES EXCEEDING SOLVENT THRESHOLD Permit Number: QP3634AD Original Permit Number: BN5386IN	EPR Reference: - Issue Date: 02/11/2015 Effective Date: 02/11/2015 Last date noted as effective: 21/03/2023 Status: Superceded
S	442m SW	Operator: COLOUR ANODISING LTD Installation Name: Anotec Works EPR/BN5386IN Process: ORGANIC CHEMICALS; NITROGEN CONTAINING COMPOUNDS EG AMINES Permit Number: WP3234YA Original Permit Number: BN5386IN	EPR Reference: - Issue Date: 15/06/2017 Effective Date: 15/06/2017 Last date noted as effective: 21/03/2023 Status: Effective
S	442m SW	Operator: COLOUR ANODISING LTD Installation Name: COLOUR ANODISING RADCLIFFE Process: SOLVENT EMISSIONS DIRECTVE; ACTIVITIES EXCEEDING SOLVENT THRESHOLD Permit Number: BN5386IN Original Permit Number: BN5386IN	EPR Reference: - Issue Date: 23/11/2004 Effective Date: 23/11/2004 Last date noted as effective: 21/03/2023 Status: Superceded

ID	Location	Details	
S	442m SW	Operator: COLOUR ANODISING LTD Installation Name: Anotec Works EPR/BN5386IN Process: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M Permit Number: WP3234YA Original Permit Number: BN5386IN	EPR Reference: - Issue Date: 15/06/2017 Effective Date: 15/06/2017 Last date noted as effective: 21/03/2023 Status: Effective

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

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

Records within 500m	**6**

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Address	Details	
B	53m S	M & S Commercials, Unit 5, Bealy Industrial Estate, Dumers Lane, Radcliffe, M26 2BD	Process: Coating Processes Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified
2	62m NW	Country Concrete Products (Formerly Country Supplies), Eton Way North, Radcliffe, M26 2ZT	Process: Use of Bulk Cement Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified
D	145m NW	Academy Group, Eton Business Park, Bury Road, Radcliffe, M26 2ZS	Process: Waste Oil Burner 0.4 MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified
N	263m E	Funeralcare, Morris St, Radcliffe, M26 2GH	Process: Coating Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified
N	263m E	Funeralcare, Morris Street, Radcliffe, M26 2GH	Process: Coating Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified
S	439m SW	Anodising & Plating Ltd, Holland St, M26 2RH	Process: Coating Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of enforcement: No Enforcements Notified Comment: No Enforcements Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	0

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

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

4.13 Licensed Discharges to controlled waters

Records within 500m	49

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Address	Details	
F	53m SE	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: NPSWQD010892 Permit Version: 2 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 24/10/2012 Effective Date: 31/03/2013 Revocation Date: 01/11/2018
F	53m SE	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: NPSWQD010892 Permit Version: 2 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 24/10/2012 Effective Date: 31/03/2013 Revocation Date: 01/11/2018
F	53m SE	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: NPSWQD010892 Permit Version: 3 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 02/11/2018 Effective Date: 02/11/2018 Revocation Date: -
F	53m SE	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: NPSWQD010892 Permit Version: 3 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 02/11/2018 Effective Date: 02/11/2018 Revocation Date: -
I	166m E	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: MISCELLANEOUS DISCHARGES - EMERGENCY DISCHARGES Permit Number: 016982087 Permit Version: 1 Receiving Water: RIVER IRWELL	Status: CONSENT REVOKED OR REVISED - NEW CONSENT ISSUED (37(1)) Issue date: - Effective Date: 01/01/1900 Revocation Date: 01/01/1900

ID	Location	Address	Details	
I	166m E	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01BRY0060 Permit Version: 2 Receiving Water: RIVER IRWELL	Status: SURRENDERED UNDER EPR 2010 Issue date: 14/04/2009 Effective Date: 14/04/2009 Revocation Date: 02/07/2013
I	166m E	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01BRY0026 Permit Version: 1 Receiving Water: -	Status: REVOKED - UNSPECIFIED Issue date: 01/04/1991 Effective Date: 01/04/1991 Revocation Date: 31/12/1994
I	166m E	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: MISCELLANEOUS DISCHARGES - EMERGENCY DISCHARGES Permit Number: 01BRY0060 Permit Version: 1 Receiving Water: RIVER IRWELL	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01/01/1995 Revocation Date: 13/04/2009
I	171m E	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01BRY0026 Permit Version: 2 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 01/01/1995 Effective Date: 01/01/1995 Revocation Date: 22/03/2010
I	171m E	DUMERS LANE PUMPING STATION, OPPOSITE 201 DUMERS LANE, RADCLIFFE, BURY, M26 2GE	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: NPSWQD010892 Permit Version: 1 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 23/03/2010 Effective Date: 23/03/2010 Revocation Date: 30/03/2013
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 2 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 31/01/1985 Revocation Date: 29/08/1989
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 4 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 13/02/1990 Revocation Date: 30/06/1990

ID	Location	Address	Details	
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 1 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 12/01/1980 Revocation Date: 30/01/1985
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 7 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/12/2000 Effective Date: 01/04/2004 Revocation Date: 14/12/2008
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 7 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/12/2000 Effective Date: 01/04/2004 Revocation Date: 14/12/2008
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 5 Receiving Water: RIVER IRWELL	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01/07/1990 Revocation Date: 30/12/2000
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 1 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 12/01/1980 Revocation Date: 30/01/1985
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 8 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 15/12/2008 Effective Date: 15/12/2008 Revocation Date: 30/12/2008
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 3 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 30/08/1989 Revocation Date: 12/02/1990

ID	Location	Address	Details	
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 5 Receiving Water: RIVER IRWELL	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01/07/1990 Revocation Date: 30/12/2000
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 10 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 14/10/2008 Effective Date: 01/01/2010 Revocation Date: 07/02/2019
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 3 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 30/08/1989 Revocation Date: 12/02/1990
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 2 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 31/01/1985 Revocation Date: 29/08/1989
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 6 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/12/2000 Effective Date: 31/12/2000 Revocation Date: 31/03/2004
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 4 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 13/02/1990 Revocation Date: 30/06/1990
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 6 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/12/2000 Effective Date: 31/12/2000 Revocation Date: 31/03/2004

ID	Location	Address	Details	
O	304m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 9 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 15/12/2008 Effective Date: 31/12/2008 Revocation Date: 31/12/2009
P	312m E	MORRIS STREET CSO (BRY0137), OUTSIDE 2 MORRIS STREET, RADCLIFFE, BURY, M26 2HF	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: EPRJB3893EY Permit Version: 1 Receiving Water: RIVER IRWELL	Status: NEW ISSUED UNDER EPR 2010 Issue date: 14/05/2021 Effective Date: 14/05/2021 Revocation Date: 13/05/2022
P	312m E	MORRIS STREET CSO (BRY0137), OUTSIDE 2 MORRIS STREET, RADCLIFFE, BURY, M26 2HF	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: EPRJB3893EY Permit Version: 2 Receiving Water: RIVER IRWELL	Status: NEW ISSUED UNDER EPR 2010 Issue date: 14/05/2021 Effective Date: 14/05/2022 Revocation Date: -
O	312m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 12 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 08/02/2019 Effective Date: 08/12/2021 Revocation Date: 09/12/2021
O	312m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 13 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 10/12/2021 Effective Date: 10/12/2021 Revocation Date: 31/03/2022
O	312m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 14 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 10/12/2021 Effective Date: 01/04/2022 Revocation Date: 30/05/2023
O	312m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 11 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 08/02/2019 Effective Date: 08/02/2019 Revocation Date: 07/12/2021

ID	Location	Address	Details	
O	312m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: 016950033 Permit Version: 15 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 24/05/2023 Effective Date: 31/05/2023 Revocation Date: -
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 3 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 30/08/1989 Revocation Date: 12/02/1990
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 6 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/12/2000 Effective Date: 31/12/2000 Revocation Date: 31/03/2004
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 5 Receiving Water: RIVER IRWELL	Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01/07/1990 Revocation Date: 30/12/2000
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 2 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 31/01/1985 Revocation Date: 29/08/1989
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 7 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/12/2000 Effective Date: 01/04/2004 Revocation Date: 14/12/2008

ID	Location	Address	Details	
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 9 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 15/12/2008 Effective Date: 31/12/2008 Revocation Date: 31/12/2009
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 1 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 12/01/1980 Revocation Date: 30/01/1985
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 4 Receiving Water: RIVER IRWELL	Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 13/02/1990 Revocation Date: 30/06/1990
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 8 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 15/12/2008 Effective Date: 15/12/2008 Revocation Date: 30/12/2008
R	420m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 10 Receiving Water: RIVER IRWELL	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 14/10/2008 Effective Date: 01/01/2010 Revocation Date: 07/02/2019
R	423m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 11 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 08/02/2019 Effective Date: 08/02/2019 Revocation Date: 07/12/2021

ID	Location	Address	Details	
R	423m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 13 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 10/12/2021 Effective Date: 10/12/2021 Revocation Date: 31/03/2022
R	423m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 016950033 Permit Version: 12 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 08/02/2019 Effective Date: 08/12/2021 Revocation Date: 09/12/2021
R	423m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 14 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 10/12/2021 Effective Date: 01/04/2022 Revocation Date: 30/05/2023
R	423m SE	BURY WASTEWATER TREATMENT WORKS, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER, BL9 9TF	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 016950033 Permit Version: 15 Receiving Water: RIVER IRWELL	Status: VARIED UNDER EPR 2010 Issue date: 24/05/2023 Effective Date: 31/05/2023 Revocation Date: -

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

4.14 Pollutant release to surface waters (Red List)

Records within 500m	**2**

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Address	Details	
O	304m SE	UNITED UTILITIES WATER PLC, BURY STW, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER	Permit Number: 016950033 Permit Version: 7 Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Discharge Type: Sewage Disposal Works - water company	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Catchment: - Approval Date: 01/04/2004
O	304m SE	UNITED UTILITIES WATER PLC, BURY STW, CROSSFIELD STREET, BLACKFORD BRIDGE, BURY, GREATER MANCHESTER	Permit Number: 016950033 Permit Version: 6 Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Discharge Type: Sewage Disposal Works - water company	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Catchment: - Approval Date: 31/12/2000

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

4.15 Pollutant release to public sewer

Records within 500m	0

Discharges of Special Category Effluents to the public sewer.

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

4.16 List 1 Dangerous Substances

Records within 500m	4

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Name	Status	Receiving Water	Authorised Substances
O	304m SE	Bury Stw	Active	-	-
O	304m SE	Bury Stw	Not Active	River Irwell, Manchester Ship Canal	Pentachlorophenol
O	317m SE	Bridgehall Dyeing And Finishing Company Ltd.	Active	River Irwell, Manchester Ship Canal	Pentachlorophenol
Q	388m NE	J & W Whewell Ltd	Active	-	Mercury (other)

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

4.17 List 2 Dangerous Substances

Records within 500m	3

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Name	Status	Receiving Water	Authorised Substances
J	246m W	Bep Surface Technologies	Active	-	Chromium, Copper
O	304m SE	Georgia-pacific Gb Limited	Active	-	Pentachlorophenol - ARCHIVE (List 1)
O	304m SE	Bury Wwtw (north West Water Ltd)	Active	River Irwell	Chromium, Copper, Iron, Lead, Nickel, pH, Zinc, Atrazine & Simazine

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

4.18 Pollution Incidents (EA/NRW)

Records within 500m	10

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID	Location	Details	
A	**On site**	**Incident Date: 01/07/2002** **Incident Identification: 88496** **Pollutant: Inert Materials and Wastes** **Pollutant Description: Construction and Demolition Materials and Wastes**	**Water Impact: Category 4 (No Impact)** **Land Impact: Category 3 (Minor)** **Air Impact: Category 4 (No Impact)**
A	**On site**	**Incident Date: 01/07/2002** **Incident Identification: 88496** **Pollutant: Inert Materials and Wastes** **Pollutant Description: Construction and Demolition Materials and Wastes**	**Water Impact: Category 4 (No Impact)** **Land Impact: Category 3 (Minor)** **Air Impact: Category 4 (No Impact)**
B	20m S	Incident Date: 26/09/2001 Incident Identification: 33139 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)

ID	Location	Details	
H	113m E	Incident Date: 21/02/2003 Incident Identification: 138296 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)
H	113m E	Incident Date: 03/01/2003 Incident Identification: 128987 Pollutant: Sewage Materials Pollutant Description: Process Effluent	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
H	113m E	Incident Date: 02/09/2002 Incident Identification: 104722 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)
H	113m E	Incident Date: 23/06/2003 Incident Identification: 168205 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
H	113m E	Incident Date: 17/01/2003 Incident Identification: 131615 Pollutant: Oils and Fuel Pollutant Description: Unidentified Oil	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
12	448m E	Incident Date: 04/10/2001 Incident Identification: 34642 Pollutant: Specific Waste Materials Pollutant Description: Household Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
13	458m E	Incident Date: 29/05/2003 Incident Identification: 161572 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

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

4.19 Pollution inventory substances

Records within 500m	2

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID: J, Location: 252m W, Permit: BX2914IK
Operator: BEP Surface Technologies Ltd
Activity: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M
Address: BEP SURFACE TECHNOLOGIES Eton Hill Road Radcliffe Lancashire M26 2ZT
Sector Metals, Sub-sector: Surface treatment
Releases:

Route	Substance	Reporting threshold (kg)	Quantity (kg)
Air	Particulate matter - PM2.5	1000kg	Below Reporting Threshold
Wastewater	Nickel	20kg	Below Reporting Threshold
Air	Particulate matter - total	10000kg	Below Reporting Threshold
Air	Hydrogen cyanide	100kg	Below Reporting Threshold
Air	Carbon dioxide	10000000kg	Below Reporting Threshold
Air	Chromium	10kg	Below Reporting Threshold
Air	Copper	10kg	Below Reporting Threshold
Air	Nickel	10kg	Below Reporting Threshold
Wastewater	Chromium	20kg	Below Reporting Threshold
Wastewater	Copper	20kg	Below Reporting Threshold
Air	Particulate matter - PM10	1000kg	Below Reporting Threshold

ID: S, Location: 443m SW, Permit: BN5386IN
Operator: COLOUR ANODISING LTD
Activity: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M
Address: Anotec Works Holland Street Lancashire M26 2RH
Sector Metals, Sub-sector: Surface treatment
Releases:

Route	Substance	Reporting threshold (kg)	Quantity (kg)
Wastewater	Nickel	20kg	Below Reporting Threshold
Wastewater	Zinc	100kg	Below Reporting Threshold
Air	Sulphur oxides (SO2 and SO3) as SO2	100000kg	Below Reporting Threshold
Air	Carbon dioxide	10000000kg	Below Reporting Threshold
Air	Nitrous oxide	10000kg	Below Reporting Threshold
Air	Nitrogen oxides (NO and NO2) as NO2	100000kg	Below Reporting Threshold

Route	Substance	Reporting threshold (kg)	Quantity (kg)
Wastewater	Chromium	20kg	Below Reporting Threshold
Wastewater	Copper	20kg	Below Reporting Threshold
Wastewater	Lead	20kg	Below Reporting Threshold

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

4.20 Pollution inventory waste transfers

Records within 500m	**2**

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

Features are displayed on the Current industrial land use map on **page 64 >**

ID: J, Location: 252m W, Permit: BX2914IK
Operator: BEP Surface Technologies Ltd
Activity: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M
Address: BEP SURFACE TECHNOLOGIES Eton Hill Road Radcliffe Lancashire M26 2ZT
Sector Metals, Sub-sector: Surface treatment
Releases:

Route	Route description	Quantity (tonnes)	Release level	EWC code	EWC description	Hazardous waste
R4	Recycling/reclamation of metals and metal compounds	2.8	absolute value	20 01 01	paper and cardboard	No
R1	Use principally as a fuel or other means to generate energy	4.4265	absolute value	20 03 01	mixed municipal waste	No
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	2.4	absolute value	12 01 17	waste blasting material other than those mentioned in 12 01 16	No

Route	Route description	Quantity (tonnes)	Release level	EWC code	EWC description	Hazardous waste
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.06	absolute value	16 03 06	organic wastes other than those mentioned in 16 03 05	No
R4	Recycling/reclamation of metals and metal compounds	4.564	absolute value	20 01 40	metals	No
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.42	absolute value	20 01 36	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	No
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.08	absolute value	15 02 02	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.48	absolute value	15 01 10	packaging containing residues of or contaminated by dangerous substances	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	1.275	absolute value	12 01 08	machining emulsions and solutions containing halogens	Yes

Route	Route description	Quantity (tonnes)	Release level	EWC code	EWC description	Hazardous waste
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	14.2	absolute value	11 01 09	sludges and filter cakes containing dangerous substances	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.209	absolute value	20 01 14	acids	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	1.04	absolute value	16 03 03	inorganic wastes containing dangerous substances	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.16	absolute value	06 03 13	solid salts and solutions containing heavy metals	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.05	absolute value	06 01 06	other acids	Yes

Route	Route description	Quantity (tonnes)	Release level	EWC code	EWC description	Hazardous waste
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.195	absolute value	13 02 05	mineral-based non-chlorinated engine, gear and lubricating oils	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	4	absolute value	11 02 05	wastes from copper hydrometallurgical processes containing dangerous substances	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.42	absolute value	20 01 35	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (6)	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	8	absolute value	12 01 09	machining emulsions and solutions free of halogens	Yes

ID: S, Location: 443m SW, Permit: BN5386IN
Operator: COLOUR ANODISING LTD
Activity: SURFACE TREATING METALS AND PLASTICS; ELECTROLYTIC/CHEMICAL >30 CU M
Address: Anotec Works Holland Street Lancashire M26 2RH
Sector Metals, Sub-sector: Surface treatment
Releases:

Route	Route description	Quantity (tonnes)	Release level	EWC code	EWC description	Hazardous waste
R5	Recycling/reclamation of other inorganic materials	15.5	absolute value	20 03 01	mixed municipal waste	No

Route	Route description	Quantity (tonnes)	Release level	EWC code	EWC description	Hazardous waste
R4	Recycling/reclamation of metals and metal compounds	2.5	absolute value	20 01 40	metals	No
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	3	absolute value	06 02 04	sodium and potassium hydroxide	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	0.2	absolute value	11 01 05	pickling acids	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	94.08	absolute value	11 01 06	acids not otherwise specified	Yes
D9	Physio-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations numberes D1 to D12 (eg evaporation, drying, calcination, etc.)	10.6	absolute value	11 01 07	pickling bases	Yes
D5	Specially engineered landfill (eg placement into lined discrete cells which are capped and isolated from one another and the environment, etc)	42	absolute value	11 01 09	sludges and filter cakes containing dangerous substances	Yes
R4	Recycling/reclamation of metals and metal compounds	0.033	absolute value	20 01 21	fluorescent tubes and other mercury-containing waste	Yes
R5	Recycling/reclamation of other inorganic materials	5.05	absolute value	16 03 03	inorganic wastes containing dangerous substances	Yes

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

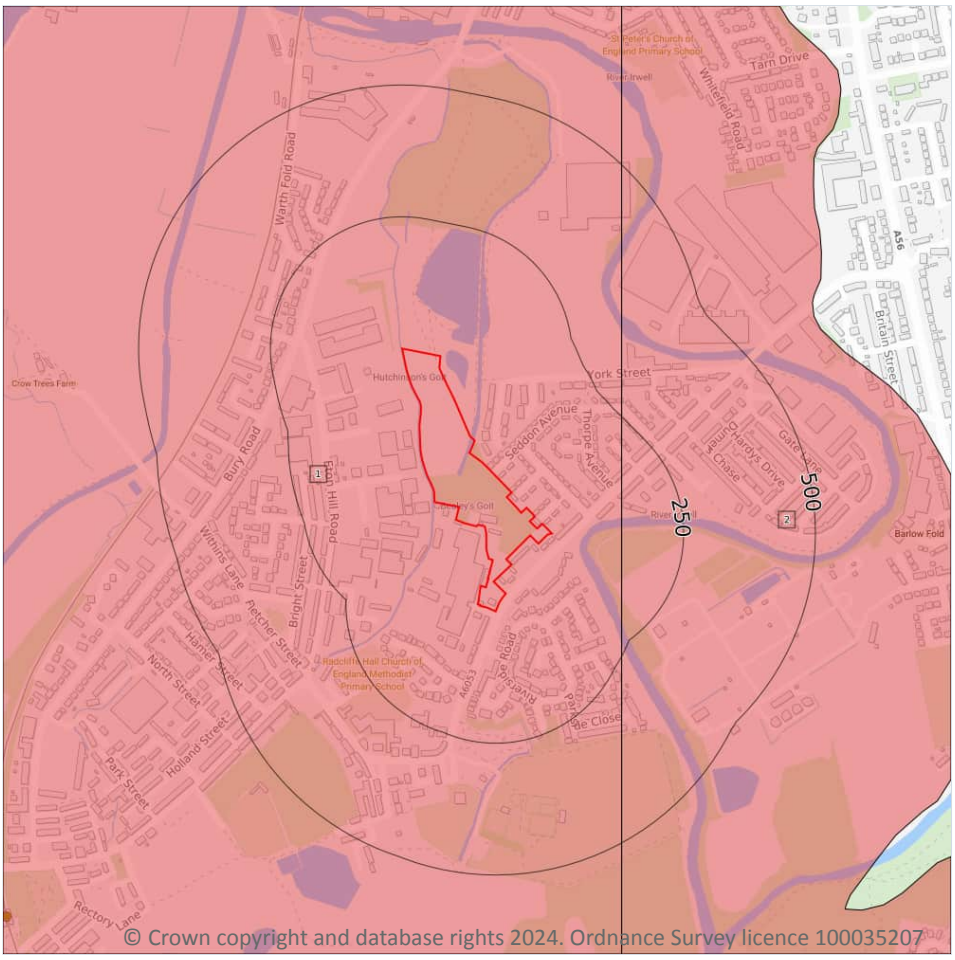
4.21 Pollution inventory radioactive waste

Records within 500m	0

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

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

5 Hydrogeology - Superficial aquifer



Site Outline

Search buffers in metres (m)

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

5.1 Superficial aquifer

Records within 500m	2

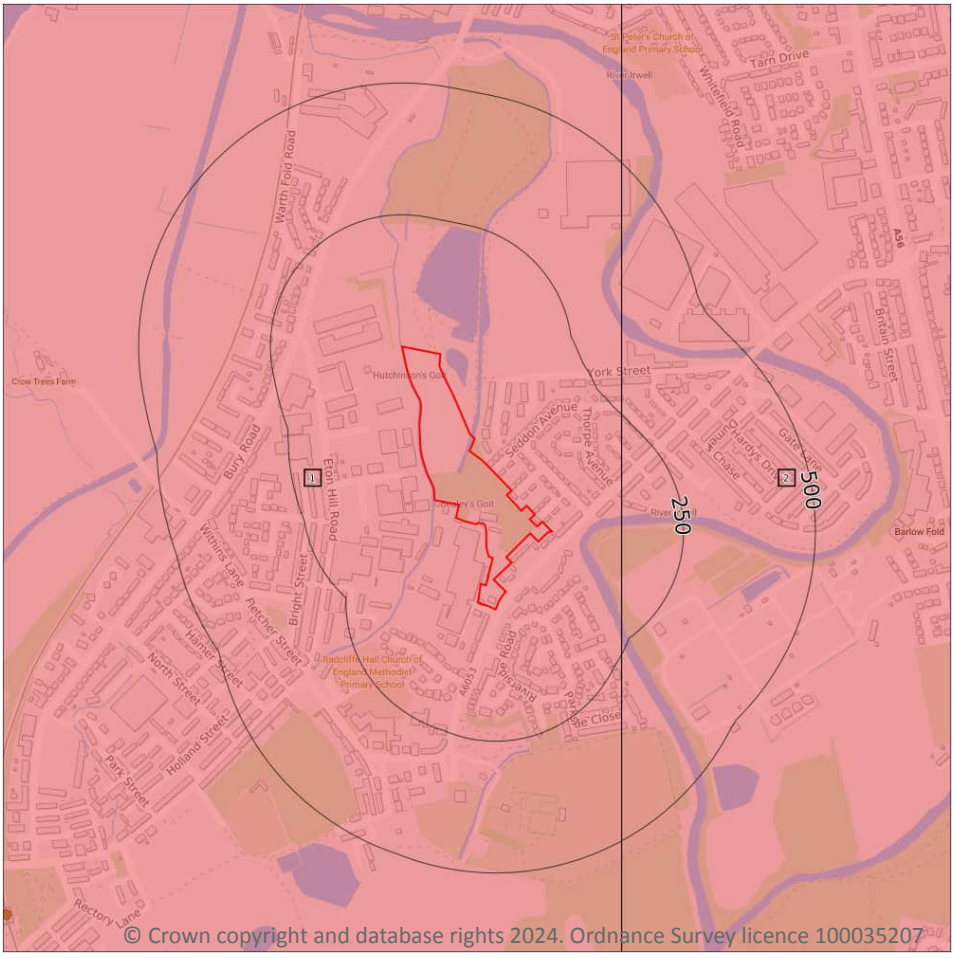
Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 93** >

ID	Location	Designation	Description
1	**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	132m 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

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Bedrock aquifer



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Site Outline

Search buffers in metres (m)

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

5.2 Bedrock aquifer

Records within 500m	2

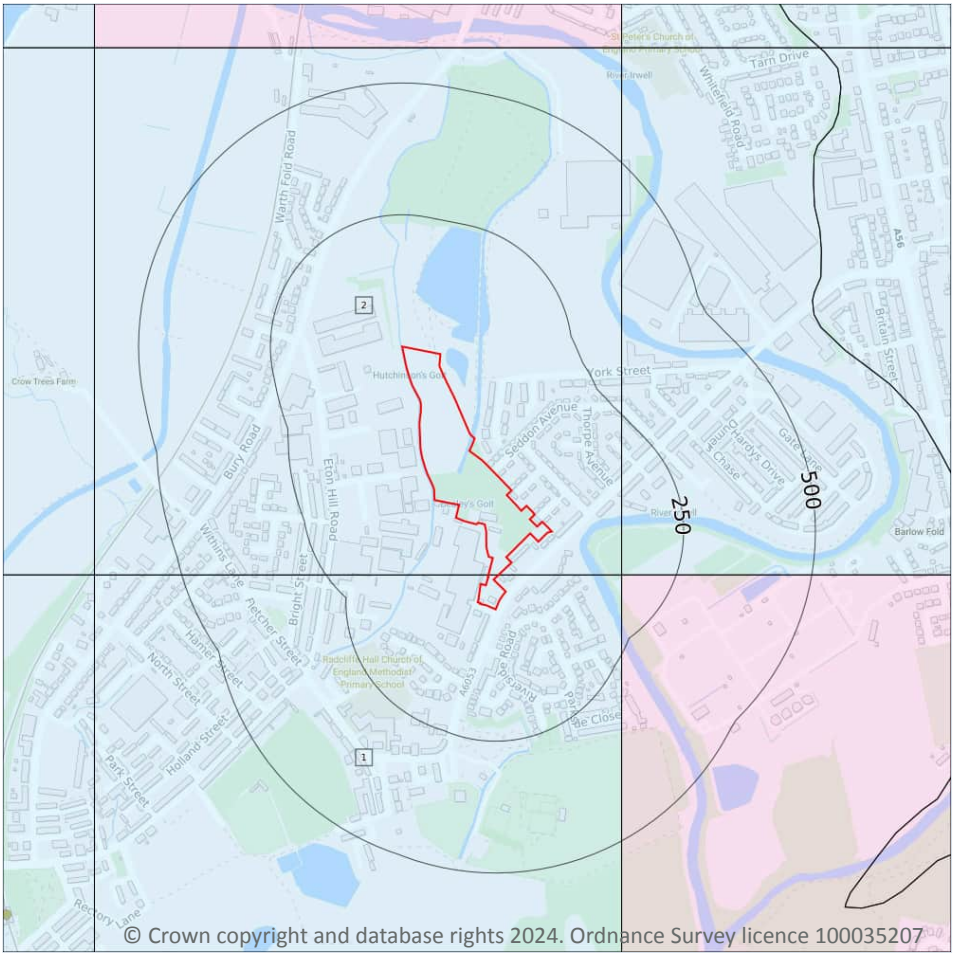
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 95** >

ID	Location	Designation	Description
1	**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	132m 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

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

Groundwater vulnerability



Site Outline

Search buffers in metres (m)

Superficial vulnerability

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

Bedrock vulnerability

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

Other information

- Unproductive aquifer
- Soluble rock risk
- Local information

5.3 Groundwater vulnerability

Records within 50m	2

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

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

Features are displayed on the Groundwater vulnerability map on **page 97 >**

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	**On site**	**Summary Classification: Secondary superficial aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer**	**Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year**	**Vulnerability: Low Aquifer type: Secondary Thickness: 3-10m Patchiness value: >90% Recharge potential: Medium**	**Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures**
2	**On site**	**Summary Classification: Secondary superficial aquifer - Low Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer**	**Leaching class: Low Infiltration value: <40% Dilution value: >550mm/year**	**Vulnerability: Low Aquifer type: Secondary Thickness: >10m Patchiness value: >90% Recharge potential: Medium**	**Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures**

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site	**0**

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

This data is sourced from the British Geological Survey and the Environment Agency.

5.5 Groundwater vulnerability- local information

Records on site	**0**

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

This data is sourced from the British Geological Survey and the Environment Agency.