



Land at Spring Vale Street, Tottington

Phase 1 Geo-Environmental Investigation

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1.0 INTRODUCTION

This Phase 1 Geo-Environmental Investigation report has been prepared at the request of Pavetec Solutions Ltd. Instructions to proceed were received in April 2020. Desk study work was undertaken between 22nd and 28th April 2020.

Proposed Development

This Phase 1 Geo-Environmental Investigation is to be used for submission to the Local Authority as part of a planning application as it is the Client's intention to develop the site into 2 No. portal framed industrial units with first floor offices and associated car parking. An outline proposed development plan is contained within Appendix 8.

1.1 Brief

The brief was to carry out a Phase 1 Geo-Environmental Investigation for the site based upon the proposed development outlined in Section 1.0. The site area is shown on the site location plan contained in Appendix 2.

The investigation was to include the following:

- a) Assess the probable ground conditions and contaminated land conditions on and below the site based on existing and historic sites and relevant off-site activities including a site walkover.
- b) Identify probable contaminants / sources of contamination that may be present at the site using current contaminated land guidance and develop a conceptual site model for potential human health, ground gas and controlled waters receptors.
- c) Undertake a Preliminary Risk Assessment – which will determine the requirement for further environmental (contaminated land) investigation and assessment.

- d) Design on the basis of the anticipated ground conditions appropriate site investigation works and discuss potential development issues (i.e. sub-surface features – obstructions, infilling, compressible ground, faulting, mineral extraction, mining and land instability).

A summary of the information / data sources is detailed in Section 2.2. A report was to be provided to summarise findings and to provide recommendations.

The limitations of this investigation work and report are included in Appendix 1.

1.2 Third Parties

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2.0 SCOPE OF INVESTIGATION WORK

2.1 Walkover Survey

The site was visited on 27th April 2020 in bright and sunny weather conditions and the objectives of the site walkover were, where applicable:

- to identify and assess visual and olfactory evidence of contamination (e.g. staining of concrete / soils, odours, presence of gas protection measures etc.);
- to identify locations of potential sources of contamination and assess their conditions (i.e. tank location, presence / condition of secondary containment / bunds, location of fill points, process areas);
- to identify surrounding land uses and any potentially contaminating activities;
- to identify / verify the presence of potential receptors (on- and off-site) which may be affected by identified sources;
- to obtain information on activities / procedures and standards of housekeeping etc.;
- to assess site access and potential investigation locations and constraints; and
- to assess any visual subsurface geotechnical features / anomalies (e.g. foundations, made ground, subsidence etc.).

Photographs were taken of the site during the walkover survey and these photographs, together with a plan indicating their location and direction, are contained in Appendix 3.

2.2 Documentation

The following documents were obtained and examined during the desk study:

- a) An aerial photograph of the site dated May 2019. The photograph is contained within the Groundsure Enviro and Geo Insight report in Appendix 5.

- b) Historical Ordnance Survey maps dated between 1850 and 2020, at scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560. These maps are contained within Appendix 4.
- c) Groundsure maps, all dated 2020 as follows:
- Historical Land Use map;
 - Environmental Permits, Incidents and Registers map;
 - Landfill and other Waste Sites map;
 - Current Land Use map;
 - Hydrogeology and Hydrology maps;
 - Environment Agency / Natural Resources Wales flood maps;
 - Designated Environmentally Sensitive Sites map;
 - Geological maps and Ground Working map;
 - Mining, Extraction & Natural Cavities map;
 - Natural Ground Subsidence maps;
 - Borehole Records map;
 - Railways and Tunnels map.

These maps are contained within the report in Appendix 5.

- d) A combined Enviro and Geo Insight report obtained from Groundsure, an environmental database company, which provides a list of recorded past and present activities at or adjacent to the site which could have an impact on the levels of contamination in the soils and groundwater at the site. These reports are contained in Appendix 5.
- e) The British Geological Survey (BGS) 1:50,000 solid map (sheet: 85, dated: 2010) and the BGS 1:50,000 solid and drift map (sheet: 85, dated: 2011). BGS information is copied under license.
- f) The Indicative Atlas of Radon in England and Wales published by the British Geological and the Health Protection Agency and BR 211 Radon Report (2015)

were examined to assess the probable presence or otherwise of radon gas in the ground. Extracts of the relevant maps are contained in Appendix 6.

- g) A Zetica UXO Risk Map was also obtained and is included in Appendix 7.

3.0 FINDINGS

3.1 Site Location and Description

This report pertains to a c. 0.08 Ha site located to the north of Spring Vale Street, Tottington, c. 3.6km to the north west of Bury town centre, at the approximate post code BL8 3LR. The National Ordnance Grid Reference for the centre of the site is E377503 N412933.

The site currently comprises offices and a yard, used for storage of plant, vehicles and materials for the Client, a groundwork contracting company. The site is bound by residential properties to the north, industrial sites to the east and west, and Spring Vale Street to the south.

3.2 Walkover Survey

The walkover survey was carried out on 27th April 2020. During the walkover survey the following features were noted relating to geology and contaminated land matters:

The small site contains 2 No. single-storey buildings; the smaller building on the southern boundary of masonry construction is in use as an office, and the larger building in the north east corner is constructed of wood panels and metal sheeting with a large shutter door, indicating it may be used as a garage.

The site also contains 3 No. storage containers on a concrete plinth in the south western site corner. The remainder of the site is also laid to hardstanding with the centre of the site covered with tarmac for car parking and yard use. This tarmac area slopes down from the western boundary (highest) towards the eastern boundary (lowest). A second concrete plinth is present in the northern site section, which is raised from the remainder of the site by c. 0.3m – 0.7m, and is flat (does not follow the slope of the rest of the site), with steps to access. It is possible that both concrete plinths are the ground floor slabs of historic on-site buildings.

Numerous mature trees line the western boundary. The site is fenced along the eastern, southern and western boundaries. The northern boundary is defined by a retaining wall, c. 4m in height, but only retains c. 2.0-2.5m of material to its off-site (northern) elevation. The wall is of stone construction with brick repair patches and appeared to be in poor condition in places. Plants were noted to be growing on and out of the retaining wall. It is recommended that a survey of the retaining wall is undertaken by an appropriately qualified engineer.

The site contains numerous vehicles and a small excavator, along with various stored / tipped materials. No evidence of contamination was noted on the site.

Overhead cables and manholes were noted on / surrounding the site, indicating the presence of live services. Therefore, it is recommended that full service plans are obtained prior to any sub-surface works being undertaken (such as site investigation).

No evidence of the culvert thought to underlie the site was seen during the site walkover.

The site walkover photographs and a plan indicating their locations are contained in Appendix 3.

3.3 Site History

The site development history has been researched by reference to historical maps, street plans and aerial photographs. The historical maps are included in Appendix 4 to this report and the principal observations which are divided into on-site history and off-site history are summarised below:

On-Site History

Date	Site Feature
1850 - 1890	From the earliest available mapping in 1850 the site is farmland with a stream passing through the site.
1890 - 1910	By 1890, the site and surroundings have been developed. The site contains unlabelled buildings in the northern section. The stream is no longer shown on the site and is suspected to have been culverted beneath the site.

1910 - 1967	By 1910, the buildings have been expanded and the site contains a glasshouse. The buildings are again expanded by 1930.
1967 - Present	By 1967, some of the buildings have been demolished but it appears that their walls remain, possibly as bays. Mapping shows that the site retains the same layout until 2003. Google Earth imagery shows that the site remains unchanged to the present.

The following images show the major development stages of the site:

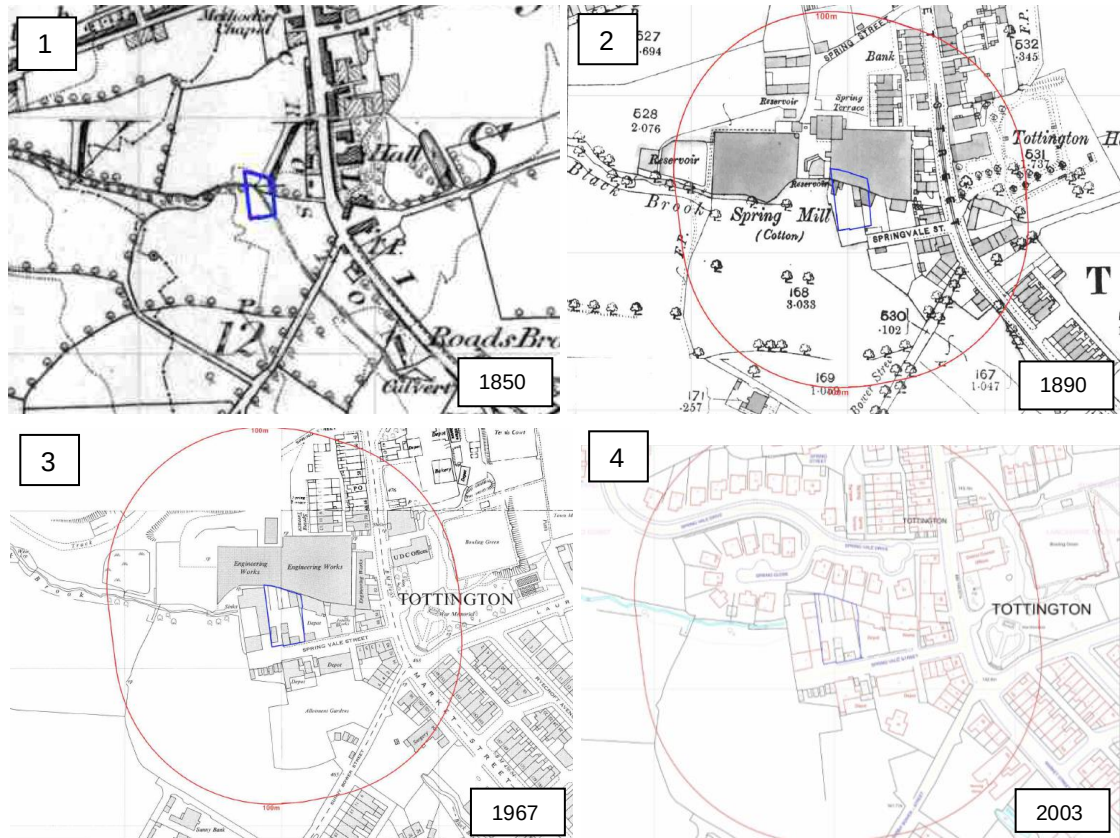


Figure 1 - Extracts of historical OS maps showing the 4 No. key development stages of the site.

Off Site History

Date	Site Feature	Distance (m)	Direction
1890 – 1989	Spring Mill (Cotton) with reservoirs, expanded by 1910, with one small reservoir infilled. Labelled Engineering Works by 1967. Removed and all reservoirs infilled by 1989.	0	N
1960 – Present	3 No. Depots	0 to 18	E, SE & S
1960 – Present	2 No. Works . By 1967, the Works are labelled Joinery Works and Engineering Works , respectively. By 1989, the Engineering Works is relabelled as a Works and by 2003 it is no longer labelled. By 1992, the Joinery Works is relabelled as a Works.	19 to 36	E

The site surroundings were predominantly rural agricultural in the mid-1800s. By the late 1800s, the site surroundings became predominantly industrial and residential, and remain this way to the present.

3.4 Geology

3.4.1 BGS Geological Map

The BGS 1:50,000 'Solid and Drift' Geological Map of the area (Sheet Number: 85, dated: 2011), indicates that the site is underlain by superficial deposits comprising Glaciofluvial Deposits, which typically comprise sand and gravels, but the site is in very close proximity to an area of Glacial Till, just 11m north west, which typically comprises clay. The approximate margins of a buried channel are present 8m south west of the site, which may indicate deep superficial deposits and / or a subterranean slope. An extract of this map is shown below:

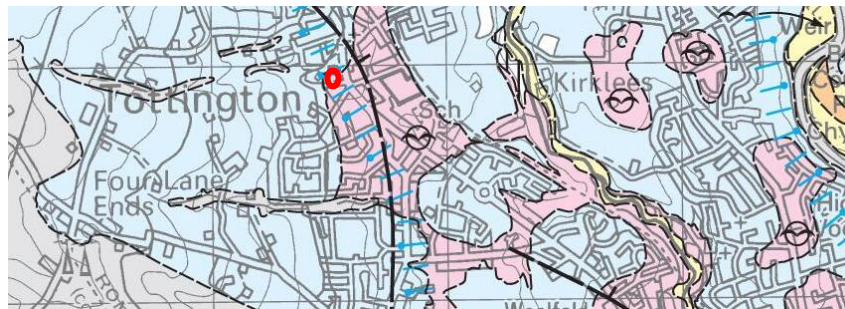


Figure 2 - Extract from the BGS 1:50,000 'Solid and Drift' geological map (sheet 85, 2011). Site circled in red. Pink = glaciofluvial deposits. Blue = glacial till. Blue lines = approximate margins of buried channel, beads to outside.

The BGS 1:50,000 'Solid' Geological Map of the area (Sheet Number: 85, dated: 2010), indicates that the site is underlain in turn by bedrock comprising the **Woodhead Hill Rock** (comprising sandstone) of the **Pennine Lower Coal Measures**, indicating that the site is within the coalfield. An extract of this map is shown below:



Figure 3 - Extract of the BGS 1:50,000 'Solid' geological map (sheet 85, 2010). Site circled in red. Brown = Woodhead Hill Rock (Sandstone). Grey = Pennine Lower Coal Measures (Mudstone). Black thick lines = coal outcrops. Black dashed lines = geological faults (tick marks on downthrow side).

A geological fault is recorded 127m north east of the site, trending north west to south, downthrowing to the east.

A bedrock dip of 8° to the south-south-west is recorded on the 1:50,000 solid geological map. Coal seams are recorded 26m south and 81m south of the site, 310m west, 363m south and 452m south east. The nearest coal seam to the site is the Bassy Coal – all these seams are noted to be 'down' dip and so will not underlie the site.

3.4.2 BGS Borehole Logs

There were no available BGS boreholes on-site or in close proximity to the site within comparable geological conditions.

3.4.3 Geohazards

Data Type	Details
Ground Stability Data	➤ The Potential for Shrinking or Swelling Clay Ground Stability Hazards is regarded as negligible. ➤ The Potential for Landslide Ground Stability Hazards is regarded as very low. ➤ The Potential for Dissolution Ground Stability Hazards is regarded as negligible. ➤ The Potential for Compressible Ground Stability Hazards is regarded as negligible. ➤ The Potential for Collapsible Ground Stability Hazards is regarded as very low. ➤ The Potential for Running Sand Ground Stability Hazards is regarded as very low.

For further details please see the Groundsure combined Geo and Enviro Insight Report contained in Appendix 5.

3.4.4 BGS Estimated Soil Chemistry

The BGS have estimated that the superficial deposits across the site to naturally comprise of the following determinands:

- Arsenic – 15-25mg/kg
- Cadmium – 1.8mg/kg
- Chromium – 60-90mg/kg
- Nickel – 15-30mg/kg
- Lead – 100-300mg/kg
 - Bioaccessible Lead – 60-240mg/kg

3.5 Mining

3.5.1 Coal Mining

The site lies within a Coal Authority 'Coal Mining Reporting Area' but lies just outside or on the boundary of a 'Development High Risk Area'. No mine entries or coal outcrops are recorded on-site, but the nearest coal outcrop is the Bassy Coal, located 26m south of the site. However, the nearest shaft is over 900m from the site.

The applicant should be made aware of the Coal Authority Standing Advice:

The proposed development lies within an area that has been defined by the Coal Authority as containing potential hazards arising from former coal mining activity. These hazards can include: mine entries (shafts and adits); shallow coal workings; geological features (fissures and break lines); mine gas and previous surface mining sites. Although such hazards are seldom readily visible, they can often be present and problems can occur in the future, particularly as a result of development taking place.

It is recommended that information outlining how the former mining activities affect the proposed development, along with any mitigation measures required (for example the need for gas protection measures within the foundations), be submitted alongside any subsequent application for Building Regulations approval (if relevant).

3.5.2 Non-Coal Mining

The site does not lie within a recognised brine extraction area.

The Groundsure combined Enviro and Geo Insight report (contained in Appendix 5) indicates that the site is not within an area of non-coal mining.

3.5.3 Historical Surface Excavations

No historical surface excavations have been recorded on site, however, due to the changes in levels, including the on-site retaining wall, and the potential culvert beneath the site, the presence of historical surface excavations cannot be discounted.

3.5.4 Mineral Safeguarding

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 mineral resource areas from unnecessary sterilization by non-mineral development. The BGS Mineral Resources maps designate the areas of potential mineral resources and where active / lapsed planning permission was granted for mineral extraction.

The Groundsure Enviro and Geo Insight report (contained in Appendix 5) states that the site does not lie within the boundaries of historical mineral planning areas.

3.6 **Previous Site Investigations**

No known relevant previous site investigations have been undertaken on-site or within close proximity to the site.

3.7 **Hydrology and Hydrogeology**

Environmental data relevant to the site and its immediately surrounding area has been obtained from sources available in the public domain. In addition, an environmental report was obtained from Groundsure. The combined Geo and Enviro

Insight report and associated maps that have been inspected are presented in Appendix 5 and the principal observations in relation to waters and flooding can be summarised as follows:

Data Type	Details
Flooding	➤ With respect to rivers and seas, the site lies within Flood Zone 1. ➤ The site lies within an area where the highest risk of groundwater flooding is considered to be moderate.
Surface Water Features	➤ Black Brook, part of the River Irwell catchment is possibly culverted beneath the site and is present at surface 19m west of the site.
Surface Water Abstractions	➤ There are no recorded surface water abstraction licenses located on-site. ➤ There are 11 No. surface water abstraction licenses recorded within 2km of the site, the majority are historical abstraction licenses. The nearest active surface water abstraction is located 583m north of the site and pertains to the abstraction of water from a reservoir for process water.
Superficial Aquifer	➤ The site is underlain by superficial deposits classed as a Secondary Undifferentiated Aquifer - <i>Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the deposit type.</i> ➤ 23m south east of the site are superficial deposits classed as a Secondary A Aquifer - <i>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.</i>
Bedrock Aquifer	➤ The site is underlain by bedrock classed as a Secondary A Aquifer – <i>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.</i>
Groundwater Abstractions	➤ There are no recorded groundwater abstraction licenses located on-site. ➤ There are 23 No. groundwater abstraction licenses recorded within 2km of the site, the majority are historical abstraction licenses. The nearest active surface water abstraction is located 632m north east of the site and pertains to a borehole at Turnbull Prints Limited for abstraction of process water.
Source Protection Zones	➤ The site lies does not lie within a Source Protection Zone and none exist within 500m of the site.
Nitrate Vulnerable Zones	➤ A Nitrate Vulnerable Zone does not exist on-site or within 2km of the site.
Licensed Discharge Consents	➤ There are no recorded licensed discharge consents located on-site. ➤ There are 4 No. recorded licensed discharge consents located within 500m of the site, all located 300m south east of the site pertaining to sewer storm overflow to Black Brook at 13 New Street.
Pollution Incidents to Controlled Waters	➤ There are no recorded pollution incidents to controlled waters located on-site. ➤ There are 3 No. recorded pollution incidents to controlled waters located within 500m of the site. The nearest was located 87m east of the site in July 2001 and related to the release of crude sewage, which had a Category 2 (Significant) impact to controlled waters.

For further details please see the Groundsure combined Geo and Enviro Insight Report contained in Appendix 5.

3.8 Hazardous Installations, Landfill and Waste

The following information relating to hazardous installations, landfill and waste obtained from the Groundsure combined Geo and Enviro Insight report, published information and the walkover survey can be summarised as follows:

Data Type	Details
Active or Recent Landfill Sites (EA / NRW)	➤ There are no Environment Agency recorded active or recent landfill sites located on-site or within 500m of the site.
Historical Landfill Sites (BGS)	➤ There are no British Geological Survey recorded historic landfill sites located on-site or within 500m of the site.
Historical Landfill (LA / mapping)	➤ There are no Local Authority recorded historic landfill sites located on-site or within 500m of the site.
Historical Landfill (EA / NRW)	➤ There are no Environment Agency recorded historic landfill sites located on-site or within 500m of the site.
Historical Waste Sites (LA / mapping)	➤ There is one Local Authority recorded historic waste site located on-site . This pertains to a waste transfer depot (conversion).
Licensed Waste Sites (EA / NRW)	➤ There are no Environment Agency recorded active waste sites located on-site. ➤ There is one Environment Agency recorded active waste sites located within 500m of the site, pertaining to Metcalfe Demolition and Skip Hire, located 5m east of the site, from 1999 and now expired, for a 'household, commercial and industrial waste transfer station'.
Local Authority Pollution Prevention and Control	➤ There are no Local Authority pollution prevention and control activities, or enforcements located on-site. ➤ There are 2 No. Local Authority pollution prevention and control activities, or enforcements located within 500m of the site. The nearest is located 25m south east of the site and pertains to a waste oil burner at 13 Spring Vale Road.
Registered Radioactive Substances	➤ There are no Registered Radioactive Substances recorded on-site or within 500m of the site.
Waste Exemptions	➤ There are no waste exemptions located on-site. ➤ There is one waste exemption located within 500m of the site, located 242m south east of the site, pertaining to the sorting and denaturing of controlled drugs for disposal.
Industrial Land Use	➤ There are 2 No. current / recent industrial land uses recorded on-site, pertaining to Bell Excavation and Plant Hire Ltd., and Diggers Bury, both plant hire companies. ➤ There are 8 No. recent industrial land uses recorded within 250m of the site, the nearest pertains to a depot located 8m to the east of the site. The remainder pertain to other depots, re-upholstery, vehicle repair and services, electrical sub-stations and a gas governor. ➤ There are 2 No. historic industrial land uses recorded on-site, pertaining to a mill and a works, between 1891 and 1980. ➤ There are a further 40 No. historic industrial land-uses recorded within 500m of the site pertaining to depots, chimney, police station, unspecified heap, shuttle works, brewery, railway foundry, unspecified works, smithy, unspecified ground workings, railway sidings, goods shed, railway building / station, unspecified pit, bleach works, cuttings, dyeing and printing mill and sandstone quarry. ➤ There is one recent petrol or fuel site located 255m south east of the site, relating to a Shell. ➤ There are 8 No. historic tanks recorded within 500m of the site, the nearest located 84m east of the site in 1989.
Dangerous or Hazardous Sites	➤ No recorded Control of Major Accident Hazards (COMAH) and Notification of Installations Handling Hazardous Substances (NIHHS) exist on-site or within 500m of the site.
Hazardous Building Materials	➤ Given the presence of numerous buildings on-site which have been present since prior to the 1990s, Asbestos Containing Material may be present on-site.

For further details please see the Groundsure combined Geo and Enviro Insight Report contained in Appendix 5.

3.9 Radon

The Indicative Atlas of Radon in England and Wales produced by the Health Protection Agency and British Geological Survey indicates the site lies within an area where less than 1% of homes are above the action level. Consequently, BR211 (2015) indicates that no radon protection measures are necessary in the construction of new dwellings or extensions.

Number 13 maps of the Indicative Atlas of Radon in England and Wales and BR 211 (2015) are contained within Appendix 6.

3.10 Services

Numerous service features including manholes were noted on and surrounding the site, consequently, it is recommended that full-service plans are obtained prior to commencement of intrusive site works.

3.11 Unexploded Ordnance (UXO)

The Zetica UXO risk map, contained in Appendix 7, indicates that the site lies within an area of Low Risk.

3.12 Animal Burial Sites

The Animal Health and Veterinary Laboratories Agency (AHVLA) no longer routinely respond to consultations relating to records of animal burial sites. Based upon a review of the site history it is considered unlikely that the site has been subject to recorded animal burials.

3.13 Archaeology

We do not anticipate that the site will be affected by archaeological issues, however consultation with the county archaeologist is recommended.

4.0 **CONCLUSIONS**

4.1 **General**

The site was farmland with a stream crossing the site until 1890 when the site was developed with suspected industrial buildings and the stream was suspected to have been culverted beneath the site. The site layout was reconfigured throughout its history, but the site remains as a light industrial yard with small buildings to the present day.

4.2 **Ground Conditions**

The anticipated typical ground conditions across the majority of the site is as follows:

- TARMACADAM / CONCRETE to a depth of between 0.05m and 0.30m bgl, underlain by;
- Possible MADE GROUND of unknown composition to an unknown depth (possibly deeper in location of culvert), underlain by;
- GLACIOFLUVIAL DEPOSITS possibly comprising sand and gravel to an unknown depth, underlain by;
- GLACIAL TILL possibly comprising sandy clay to an unknown depth, underlain by;
- WEATHERED WOODHEAD HILL ROCK comprising gravelly sand to an unknown depth, underlain by;
- WOODHEAD HILL ROCK comprising sandstone to an unknown depth.

4.2.1 **Geotechnical Hazard Identification**

Potential geotechnical hazards based on the expected ground conditions that may require further consideration at the site are outlined below:

Factors	Remarks	Considerations	Risk
Made Ground	Widespread made ground is possible across the site but is not anticipated to be deep (>1m bgl) except in the location of the culvert. Made ground composition may vary.	Made ground may settle variably, have highly inconsistent bearing capacity and may suffer significant movements that may be problematic for foundations, externals and infrastructure elements without treatment. The presence of infilled ground (may be problematic for foundations as there may	LOW TO MODERATE

		be loose / soft spots within the made ground and it may not be suitable to utilise traditional foundation.	
Aggressive Ground and Groundwater	While the risk posed from the natural strata is anticipated to be low, given the possible made ground there is potential for aggressive ground conditions.	Acidic ground / groundwater and sulphate may attack the concrete and steel used in foundations and react with aggregates. The oxidation of pyrite and other sulphides can also occur due to geotechnical activities. This can lead to the generation of high concentrations of sulphate and low pH that attacks construction materials and may lead to the precipitation of gypsum resulting in the heave of foundations and floor slabs. Pyrite oxidation can also be triggered by mixing susceptible materials with lime or cement resulting in high pH that can lead to the expansion of some sulphates that cause heave of stabilised soils.	LOW
Shrink / Swell of Clays (Glacial Till)	Mature trees exist along the western boundary. Given the anticipated presence of cohesive glacial till underlying the site, local deepening of foundations near to trees may be required to mitigate against shrink / swell effect, subject to the final design levels.	Some types of ground (e.g. clay soils) can change volume due to changes in moisture content that may be induced by weather variations (e.g. drought), vegetation (e.g. growth or removal of trees) or man-made activities (e.g. changes to local drainage). This shrink / swell behaviour typically causes ground movement to a depth of approx. 3m potentially damaging building foundations, externals, pipes or services by differential movements.	LOW
Possible Subterranean Slope	A buried channel is recorded on geological mapping close to the site. This is a slope in the superficial deposits / bedrock boundary.	Consequently, this could impact the depth of potential foundations – subject to site investigation works.	LOW TO MODERATE
Potentially Deep Superficial Deposits	A buried channel is recorded on geological mapping close to the site. This is an area of deeper superficial deposits.		LOW TO MODERATE
Culvert	Historic mapping suggests that a culvert of Black Brook exists beneath the site. The exact route and depth of the culvert are unknown.	The culvert may have implications on the proposed development and foundations as an easement may be associated with the culvert. If the culvert is no longer in use it may be an obstruction to future foundations. Foundations may need to be deepened locally in the vicinity of the culvert.	MODERATE
Potentially Soft Deposits	Soft clays / silts may be present in the vicinity of the former location of Black Brook on site, or within the glaciofluvial deposits.	Soft ground may be compressible and cause differential settlement and so cause alterations to foundation type and or depth to mitigate these issues.	LOW TO MODERATE
Coal Mining	The site is within the coal field and the nearest coal seam is recorded 26m south of the site.	There is a potential for subterranean voids and possible instability if seams in the area have been worked. Based upon the location of the coal seams (all down dip), no shallow coal seams are recorded below the site.	LOW
Retaining Wall	A retaining wall, which appears to be in poor condition, forms the northern site boundary.	There is a potential for collapse and significant ground movement if the retaining wall failed. An assessment of this should be undertaken.	UNKNOWN

4.3 Contaminated Land Legislative Framework

Environmental risks are assessed in accordance with Contaminated Land (England) (Amendment) Regulations (2012), Part IIA of the Environmental Protection Act 1990, and Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, DEFRA (2012). Part IIA provides a statutory definition of contaminated land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present on or under the land such that:

- (a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.

Risk from contamination is assessed by consideration of possible linkages between contaminant sources and potential receptors which could be harmed or polluted and the potential pathways between them – known as the Contaminant Linkage. For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- A source – a substance that is capable of causing pollution or harm;
- A receptor – something which could be adversely affected by the contaminant;
- A pathway – a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

The Environment Agency Contaminated Land Report CLR 11 Model Procedures for the Management of Land Contamination provides the technical framework for structured decision making about land contaminations. CLR 11 advocates a phased approach to risk assessment comprising:

- Preliminary Risk Assessment (PRA) – desk study and qualitative assessment;
- Generic Quantitative Risk Assessment (GQRA) – assessment of contaminant concentrations against generic assessment criteria;

- Detailed Quantitative Risk Assessment (DQRA) – detailed site-specific risk assessment and development of site-specific assessment criteria.

Each of these phases follows the same basic steps but adds site specific details and further certainty into the assessment as the stages progress. The basic steps are:

- Hazard Identification and hazard assessment- development or refinement of the source – pathway – receptor conceptual model, and identification of potential pollutant linkages;
- Risk Estimation – qualitative risk estimation predicting magnitude and probability of potential consequences that may arise as a result of a hazard.
- Risk Evaluation – deciding whether a risk is unacceptable.

The key to the classification is that the designation of risk is based upon the consideration of both:

- (a) The magnitude of the potential consequence which takes into account both the potential severity of the hazard and the sensitivity of the receptor;
- (b) The magnitude of probability which takes into account both the presence of the hazard and receptor and the integrity of the pathway.

Generic Quantitative Risk Assessment (GQRA) will utilise generic assessment criteria (GAC) for the purposes of screening allowable concentrations in comparison to the measured site concentrations. The GAC are defined based on the critical receptors identified at the site. Receptors are considered in relation to:

- Human health receptors (e.g. site users) via measured solid concentrations;
- The water environment (e.g. groundwater and surface water) via measured leachate / water concentrations.

Additional receptors may be relevant dependant on the site e.g. flora/fauna, water supply pipes, buried concrete.

The GAC adopted for assessment of soils in relation to Human Health are based on published Soil Guideline Values (SGV) in 2009 for those compounds for which published criteria are available for varying scenarios (residential, commercial,

allotment). In the absence of SGVs the following GAC defining documents are adopted - LQM/CIEH S4ULs (2015), CL:AIRE Soil GAC for Human Health Assessment (2010) and Category 4 Screening Levels (C4SL's) (2014).

GACs for waters must be selected to assess potential risks to the identified environmental receptors. There are numerous UK and European guidelines for waters based on the site situation and different receptors. GACs utilised include - The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2009 (Part 7: Groundwater Threshold Values), UK Drinking Water Standards (2000), Environmental Quality Standards, World Health Organisation concentrations, Environment Agency guidance concentrations and United States Environmental Protection Agency – Region 9 GACs.

4.4 Sources of Contamination and Probable Contaminants

Based on the desk study information the following potentially contaminative on-site sources have been identified:

Potentially Contaminative Source	Associated Determinands	Remarks
On-Site Made Ground	Unknown – possible hydrocarbons, PAHs, metals, semi-metals and asbestos Ground gas – carbon dioxide, methane, hydrogen sulphide and VOCs	Widespread made ground is anticipated as well as possible contaminative hotspots i.e. associated with spillages or leakages of fuels / oil. Prudent to test for a wide range of determinands.
Historic On- and Off-site Industrial Uses	Unknown – potential wide range of contaminants.	Suspected to reside, if present, within on-site made ground. Prudent to test for a wide range of determinands.
On-Site Building	Asbestos Containing Material	Given the age of the on-site buildings ACM may be present.
Off-Site Infilled Reservoirs (1910 – 1989) (0m N)	Ground Gas – carbon dioxide, methane, hydrogen sulphide, carbon monoxide and VOCs.	Infilled with unknown material.
On-Site Former Black Brook	Ground Gas – carbon dioxide, methane, hydrogen sulphide	Possible putrescible organics reside within site soils along former route of Black Brook.

It should be noted that potentially contaminative unrecorded historic activities may have occurred (e.g. the use or deposition of made ground from off-site during historic on-site developments) and in this event, further contaminative sources may be present.

4.4.1 Chemical Testing

In consideration of the above sources, it is proposed to test for at least the following basic determinands:

Sulphate, pH, arsenic, barium, beryllium, boron, cadmium, chromium, chromium (hexavalent), copper, cyanide, lead, mercury, nickel, selenium, vanadium, zinc, sulphate, pH, Total Petroleum Hydrocarbon screen (3-Band) and Speciated Polyaromatic Hydrocarbons.

If elevated concentrations of total petroleum hydrocarbons are recorded, Speciated Aliphatic and Aromatic Total Petroleum Hydrocarbon Fractions (TPHCWG) testing should be undertaken.

Volatile Organic Compounds (VOCs) / Semi-VOC (SVOCs) target list testing to be undertaken following positive PID reading in excess of 20.0 ppm where appropriate. A PID 10.6mV PID lamp will be utilised.

Shallow made ground samples will also be tested for asbestos ID. Positive asbestos identification will be quantified for further analysis.

4.4.2 Unknowns

Following the desk study, the areas of uncertainty are summarised as follows:

- Exact ground conditions, including composition and depth.
- Groundwater depth.
- Location of culvert.

4.5 Pathways for Contamination

4.5.1 Human Health

The pathways along which contamination could potentially reach the receptors on-site during use and after completion of development works are detailed in 'Updated Technical Background to the CLEA Model' (Environment Agency 2009) but can be summarised as follows:

- Ingestion of soil directly and indoor dust*;
- Inhalation of soil dust (indoor and outdoor);
- Dermal contact with soil (indoor and outdoor);
- Inhalation of soil vapours (indoor and outdoor);
- Oral background;
- Inhalation background.

** Treated as one pathway*

4.5.2 Controlled Waters

The pathways along which contamination could potentially reach the controlled waters receptors during use and after completion of development works are as follows:

- Vertical migration along current and future foundations and pooling at base / beneath foundations within glacial till.
- Vertical migration through granular made ground, natural granular deposits and granular lenses in natural cohesive deposits.
- Lateral migration along low permeability natural deposits and pooling at relative low points.
- Negligible infiltration through low-permeability natural cohesive deposits.
- Migration through porous sandstone bedrock.
- Migration along groundwater flow.
- Overland flow

4.5.3 Ground Gas Pathways

The pathways along which ground gas could potentially reach the receptors on-site during use and after completion of the development works are as follows;

- Migration through fractures and fissures in bedrock
- Preferential migration along foundations, service ducts / trenches
- Migration within groundwater
- Ingress through wall cavities and floors and accumulation
- Inhalation of ground gas and vapours

4.6 **Receptors of Contamination**

Human Health receptors for these pathways include the following:

- End Users (commercial land use scenario).
- Construction workers.
- The general public and adjacent site users.

Controlled waters receptors for these pathways include the following:

- Groundwater contained within the nearby underlying Secondary A Aquifer (23m SE).
- Groundwater contained within the underlying Secondary A Aquifer within the sandstone bedrock.
- Surface Water contained within the possible on-site culverted Black Brook.

Other receptors for these pathways include the following:

- Subsurface plastic (e.g. potable plastic water pipe).
- Building fabric (e.g. concrete foundations, etc.)

4.7 Conceptual Model for Human Health Risk Assessment

A site conceptual model in the form of a linkage table for the purposes of a preliminary risk assessment for the human health of site occupants has been produced as a result of the probable contaminants, pathways and receptors identified above:

Sources of Contamination	Pathway	Receptor	Hazard (severity)	Likelihood	Risk
On-Site Made Ground Historic On- and Off-site Industrial Uses On-Site Building	Ingestion of contaminated soil and dust (indoor and outdoor)	End users and general public	Effect on human health (Medium)	Low likelihood: Widespread made ground is anticipated across the site and the presence of localised hotspots of contamination associated with historical on and off site uses cannot be discounted. However, the current site and proposed development both comprise 100% hardstanding, so no pathways to the end user are present. Asbestos is not considered a significant contaminative source for end users, as if any ACM is present within the on-site buildings, it will be removed by suitably qualified contractors prior to demolition with appropriate safety measures to prevent the dispersal of any fibres. However, the risk of loose fibres being present within shallow soils cannot be discounted.	VERY LOW
	Dermal contact with contaminated soil (outdoor and indoor)				
	Inhalation of contaminated dust (indoor and outdoor)	Construction workers		Possible: Widespread made ground is anticipated across the site and the presence of localised hotspots of contamination associated with historical on and off site uses cannot be discounted. Construction workers will be at increased risk due to their acute interaction with soil. Consequently, if any asbestos or ACM is present, asbestos may become a significant contaminative source. Dust is likely to be generated during any earthworks and construction, consequently this pathway will become prevalent.	LOW TO MODERATE
	Inhalation of soil vapours (indoors and outdoors)	End users and general public		Low likelihood: No widespread significant potential source of VOCs has been identified on-site or in close proximity to the site. Possible hotspots associated with historical on and off site uses cannot be discounted.	LOW
		Construction workers		Low likelihood: Construction workers at increased risk as disturbance of soil may generate a temporary increase in the release of soil vapours, however risk remains low given the lack of a widespread significant source of VOCs.	

4.8 Conceptual Model for Ground Gas Risk Assessment

A conceptual model in the form of a linkage table for the purposes of a preliminary risk assessment for ground gas has been produced as a result of the probable contaminants, pathways and targets identified above as follows:

Source	Pollutant	Pathway	Receptor	Hazard (severity)	Likelihood of Occurrence	Risk
On-Site Made Ground	Methane	Preferential migration along foundations, service ducts / trenches	End users	Effect on human health (Mild to Severe*)	Unlikely: Although made ground is anticipated on-site no significant organic / putrescible content is anticipated given the site historics. Consequently, the ground gas generation potential is considered to be low.	LOW
	Carbon dioxide Hydrogen Sulphide	Ingress through wall cavities and floors and accumulation Inhalation of ground gas	Construction workers			
Off-Site Infilled Reservoirs (1910 – 1989) (0m N)	Methane	Preferential migration along foundations, service ducts / trenches	End users	Effect on human health (Mild to Severe*)	Possible: Former reservoirs associated with a historic off-site mill were infilled in 1910 and 1989. The contents are unknown as these are not noted on landfill records. However, despite the proximity, the land off site to the north is raised with respect to the site and ground gas is unlikely to migrate downhill.	LOW – MODERATE
	Carbon dioxide Hydrogen Sulphide	Ingress through wall cavities and floors and accumulation Inhalation of ground gas	Building and Structures	Damage to building (Mild)		
On-Site Former Black Brook	Methane	Preferential migration along foundations, service ducts / trenches	End users	Effect on human health (Mild to Severe*)	Unlikely: The previous course of Black Brook may contain putrescible organics, if this was not dug out when the possible culvert was installed. However, this is likely to be a discrete source with a low ground gas generation potential. Also, given the time elapsed since the site was first developed and the redevelopment since, it is unlikely that a significant amount of putrescible organics remain.	LOW
	Carbon dioxide Hydrogen Sulphide	Ingress through wall cavities and floors and accumulation Inhalation of ground gas	Building and Structures	Damage to building (Mild)		

*Due to the risk of explosion.

4.9 Conceptual Model for Waters Risk Assessment

A site conceptual model in the form of a linkage table for the purposes of a preliminary risk assessment for pollution of waters has been produced as a result of the probable contaminants, pathways and targets identified above as follows:

Source	Pathway	Receptor	Hazard (severity)	Likelihood of Occurrence	Risk
On-Site Made Ground Historic On- and Off-site Industrial Uses On-Site Building	Vertical migration along current and future foundations	Groundwater contained within bedrock (Secondary A Aquifer) Groundwater contained within superficial deposits (Secondary A and Secondary Undifferentiated Aquifers)	Effects to controlled waters (Mild)	Low likelihood: Widespread made ground is anticipated across the site and the presence of localised hotspots of contamination associated with historical on and off site uses cannot be discounted. However, the current site and proposed development both comprise 100% hardstanding, so infiltration and therefore vertical migration of contaminants to the underlying Aquifers will be significantly reduced. Also, the anticipated presence of cohesive glacial till underlying the site will likely act as an aquitard and reduce the vertical migration of any contaminants to the underlying Aquifers.	LOW
	Vertical migration through granular made ground and / or natural deposits				
	Negligible infiltration through low permeability cohesive deposits				
	Migration through porous bedrock				
On-Site Building	Lateral migration along low permeability cohesive deposits	Groundwater contained within superficial deposits (Secondary A and Secondary Undifferentiated Aquifers)	Effects to controlled waters: (Mild)	Low likelihood: Although superficial aquifers and a possible culvert are located underlying the site, lateral migration of contaminants is unlikely given the anticipated lack of infiltration to drive contaminant migration. This is due to the current 100% hardstanding cover, which will also be present following development. Furthermore, no widespread significant contamination anticipated, only possible localised hotspots.	LOW
	Lateral migration along historic drainage				
	Migration along groundwater flow	On-site possible culvert			
	Overland flow	Surface water courses & aquatic organisms	Effects to controlled waters: (Mild)	Unlikely: As the nearest surface water feature is Black Brook at surface 19m west of the site, overland flow is unlikely given the anticipated increase in drainage following development, and at present the site slopes in the opposite direction. Furthermore, no widespread significantly contaminated sources identified on-site.	VERY LOW

4.10 Preliminary Risk Assessment Summary

Human Health

Based on the human health conceptual model the risk to human health is deemed very low to end users. The risk to all human health receptors from volatiles is low. However, the risk to construction workers is deemed low to moderate as potential contaminative hotspots and asbestos containing material may be present and construction workers are in direct contact with site soils. However, it is envisaged that with appropriate PPE and site management, risks to construction workers can be mitigated.

Ground Gas

The ground gas risk is low to moderate, owing to the presence of made ground, the former route of Black Brook (organic) and infilled reservoirs to the immediate north of the site which contain unknown materials.

Based on the low to moderate ground gas risk identified and the low sensitivity of the proposed development, CIRIA 665 recommends undertaking ground gas monitoring for 6 visits over 2-3 months, however, to reduce the timescales involved, the site could instead be assessed empirically and gas protective measures be installed on this basis. It is recommended to update the ground gas risk assessment empirically following intrusive site investigation.

If any organic rich made ground deposits are identified or if previously unrecorded potential ground gas sources are recorded during the site investigation works, then ground gas monitoring may be required. The length and frequency of the ground gas monitoring regime and the sampling method, initial results and alterations to the conceptual model are subject to the findings of the site investigation works and development constraints (i.e. development timescales and liaison with the local authority).

Controlled Waters

The risk to controlled waters is deemed very low for surface water features and low for the underlying Aquifers and possible culvert, given the current and proposed 100% hardstanding cover and anticipated lack of significant widespread contamination.

If unrecorded contaminative sources are found, the above conceptual model may require re-assessment / re-appraisal.

4.11 Scope of Phase 2 Intrusive Geo-Environmental Ground Investigation

As a result of the preliminary risk assessment a Phase 2 intrusive geo-environmental ground investigation should be carried out to quantify the identified risks. This intrusive site investigation works should include the collection of appropriate samples – solid, leachate and / or liquid, if determined necessary, across the site for appropriate chemical testing as detailed above.

Furthermore, to determine the geotechnical and geological properties of the underlying ground conditions, appropriate intrusive works and associated testing should be undertaken. The rationale and aims for these Phase 2 environmental, geotechnical and geological investigative works are detailed below.

In order to provide adequate assessment in terms of both environmental and geotechnical site parameters, site investigation works will be required on a spatial basis.

The proposed site investigation works should comprise the following:

- Trial pits
- Dynamic Cone Penetrometer Tests (CBRs)

The rationale for the exploratory holes is discussed below:

- To allow the collection of samples from the made ground and natural deposits for chemical laboratory testing (solid samples) for an appropriate suite of

determinands and for soluble sulphate (2:1 extract) and / or total sulphate and pH testing to determine the suitable concrete classification in associated with relevant guidance e.g. BRE Special Digest 1.

- To determine the extent, composition and depth of the made ground and superficial deposits.
- To examine and test the site soils for evidence of putrescible materials for purposes of assessing ground gas risk.
- To determine the presence of any subterranean obstructions i.e. culvert and relic features.
- Enable in-situ and ex-situ geotechnical testing of the underlying made ground and natural deposits for the purposes of sub-structure design;
- Dynamic Cone Penetrometer tests to determine the equivalent CBR value of the existing ground in proposed external areas.

Appropriate geotechnical intrusive investigation works for the purposes of designing the geotechnical aspect of the development e.g. foundations should be agreed with the structural engineer prior to completion.

5.0 **RECOMMENDATIONS**

- 5.1 As a result of the information gathered and the risks identified in this report, it is regarded that there is a very low to moderate risk to human health on the basis that no significant widespread sources of contamination have been identified on the site. However, given the potential presence of contaminative hotspots and asbestos containing materials, construction workers are at increased risk. The risk to controlled waters is deemed very low to low given the total extent of hardstanding and the lack of widespread potentially contaminative sources. However, it is recommended that a Phase 2 intrusive environmental ground investigation should be undertaken, including targeted and spatial chemical testing of the site material to determine the suitability of existing site materials, either for off-site disposal or re-engineering on-site.
- 5.2 On the basis that a low to moderate ground gas risk potential has been identified, it is recommended to either undertake ground gas monitoring for a period of 2 to 3 months with a minimum of 6 No. visits, or to empirically assess the ground gas risk based on intrusive site investigation findings.
- 5.3 Due to geotechnical requirements, site investigation works should be undertaken in order to determine the ground conditions with a greater degree of certainty and allow design of the proposed development, drainage, services and immediate external areas to be undertaken. It is therefore recommended that exploratory holes are constructed where access is permitted across the site.
- 5.4 From the results of the Phase 2 site investigation work – if this report identifies a potential risk and / or a requirement for further detailed site specific assessment, a Phase 3 environmental investigation report and / or a Remedial Strategy (informing on potential remediation solutions) may be required.
- 5.5 The nature and extent of the proposed targeted chemical and environmental testing should be confirmed, if time / commercial constraints allow, with the relevant Local Authority Environmental Health Officer and the Environment Agency prior to

undertaking works on-site. Proceeding without agreement between regulatory authorities may result in further assessment being required.

- 5.6 It should be noted that, if any visual or olfactory evidence of contamination is encountered during remediation or construction work, then the Local Authority Environmental Health Officer and Environment Agency should be contacted immediately in order to agree any necessary remediation measures.
- 5.7 It is recommended that the on-site retaining wall is surveyed prior to development and the presence of the potential underlying culvert is established.

APPENDIX 1

LIMITATIONS OF INVESTIGATION WORK AND REPORT

LIMITATIONS OF REPORT

This consultancy report was compiled and carried out by IGE Consulting Limited ('IGE') for the client, as defined in the main report (the 'client'), on the basis of a defined programme and scope of works and the terms of a contract between IGE and the client. IGE undertook this with all reasonable skill and care, taking into account the limits of the scope of works required by the client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between IGE and the client. IGE cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outwith the agreed scope of works.

Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices. This report may not be relied upon, or transferred to, by any other party without the written agreement of its author. If a third party relies on this report, it does so wholly at its own and sole risk and IGE disclaims any liability to such parties.

It is IGE's understanding that this report is to be used for the purpose described in the 'Brief' section of this report. That purpose was a significant factor in determining the scope and the services to be provided. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without IGE's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of IGE.

This report is a function of the date it was written and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal

provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of IGE. In the absence of such written advice of IGE, reliance on the report in the future shall be at the client's own and sole risk. Should IGE be requested to review the report in the future, IGE shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between IGE and the client.

The observations and conclusions described in this report are based solely upon the scope of works agreed between the client and IGE. IGE has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. IGE is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the agreed scope of works. For the avoidance of doubt, this report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species (e.g. Japanese Knotweed). It is recommended that the client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the suspected presence asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace full and proper surveys.

Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. The geo-environmental sections are written in broad agreement with BS 10175:2011+A2 2017.

LIMITATIONS OF INVESTIGATION WORK

Desk Study References

This report is based upon IGE's observations of existing physical conditions at the site gained from a walkover survey of the site together with IGE's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. Reliance has been placed on this publicly available data obtained from the sources identified in the main report. When using the information, it has been assumed that it is correct. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst IGE have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report. IGE did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services. IGE is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to IGE and including the doing of any independent investigation of the information provided to IGE except when otherwise provided in the terms of the contract between the client and IGE.

Historical Mapping

Historical Ordnance Survey maps do not provide a comprehensive description of a site history. They provide details of the site from a date prior to the publication of the map (i.e. a snapshot in time). The period between map editions can be substantial (i.e. several decades). Not all map series are available for every date range in many areas of the UK and therefore there will be gaps in this mapped record for some sites. Potentially contaminative land uses could have been present and removed during such periods and may therefore not form a part of this particular record. In addition, there will be potentially contaminative land uses which are not identified on the map records such as small scale storage / use of hazardous materials, illegal / unlicensed

waste disposal activities etc. Different map series identify different features utilising different symbols which can result in features that remain on-site being removed from maps. Some features are also not mapped for security reasons (e.g. airfields and other military installations). These areas are mostly shown as blank areas on historical maps.

Site Walkover

During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.

Flooding

Flooding in this report is defined as flooding caused by the sea, ditches, rivers, streams, ponds, lakes, reservoirs and the like. It does not extend to flooding caused by surcharged piped drainage systems and investigations into flooding of this nature are excluded from this report.

Extent of Contamination Studies

Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

The conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the reporting in full. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

PLANNING CONTEXT

The National Planning Policy Framework (NPPF, 2019) states that the purpose of the planning system is to contribute to the achievement of sustainable development. In order to do this the planning system has three overarching objectives, one of which directly relates to the potential for pollution and contaminated land:

- *‘environmental objective - to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy’.*

In accordance with this environmental objective, Paragraph 118 clarifies that ‘making effective use of land’ includes to:

- *‘give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land’.*

In accordance with this environmental objective, Paragraph 170 clarifies that conserving and enhancing the natural environment includes:

- *‘preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability’; and*
- *‘remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate’.*

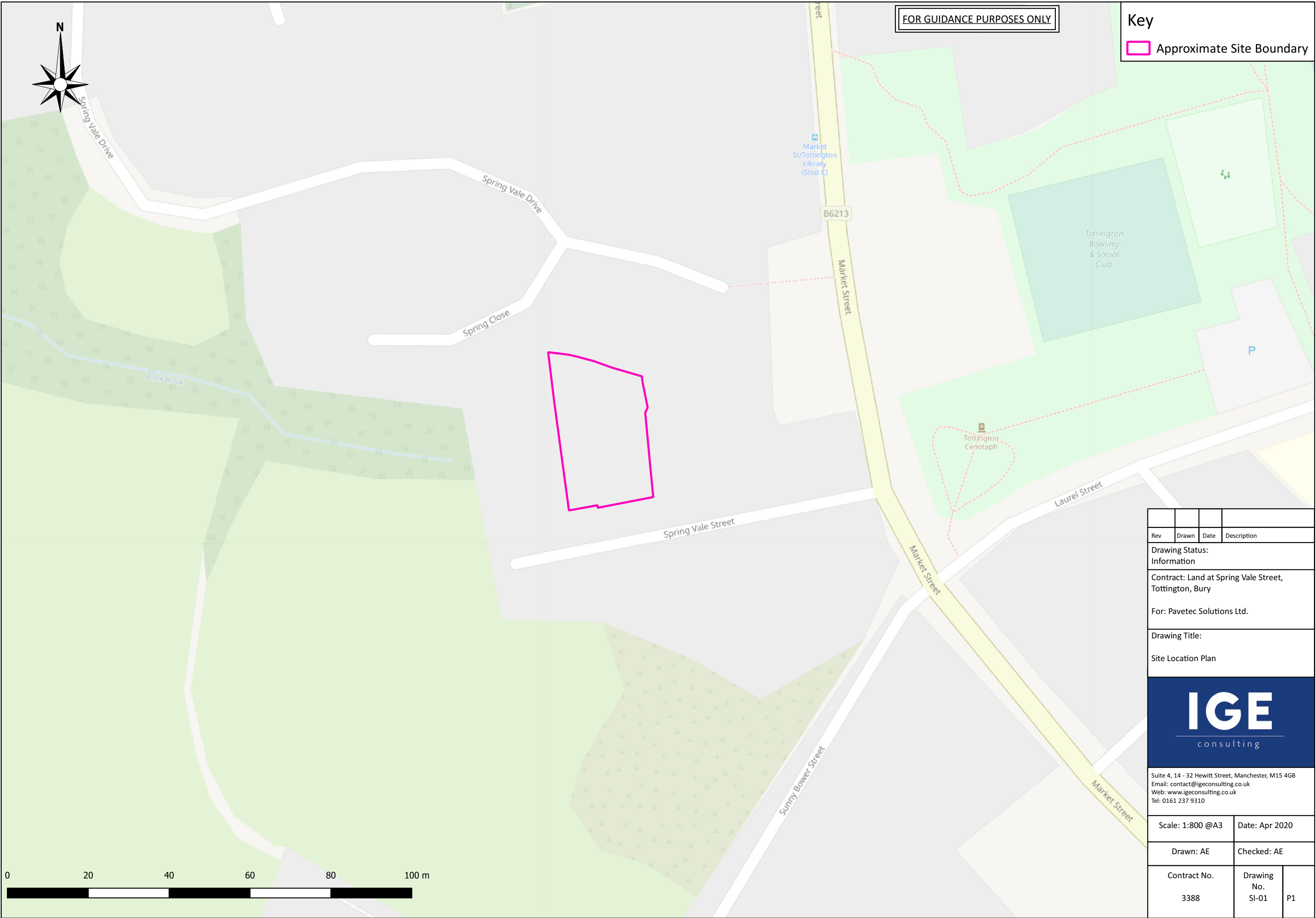
Paragraph 178 of the NPPF states that planning policies and decisions for developments should also ensure that:

- *‘a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation)’; and,*

- *'after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990'; and*
- *'adequate site investigation information, prepared by a competent person, is available to inform these assessments'.*

This report has been prepared and authorised by staff that are competent as defined in the NPPF.

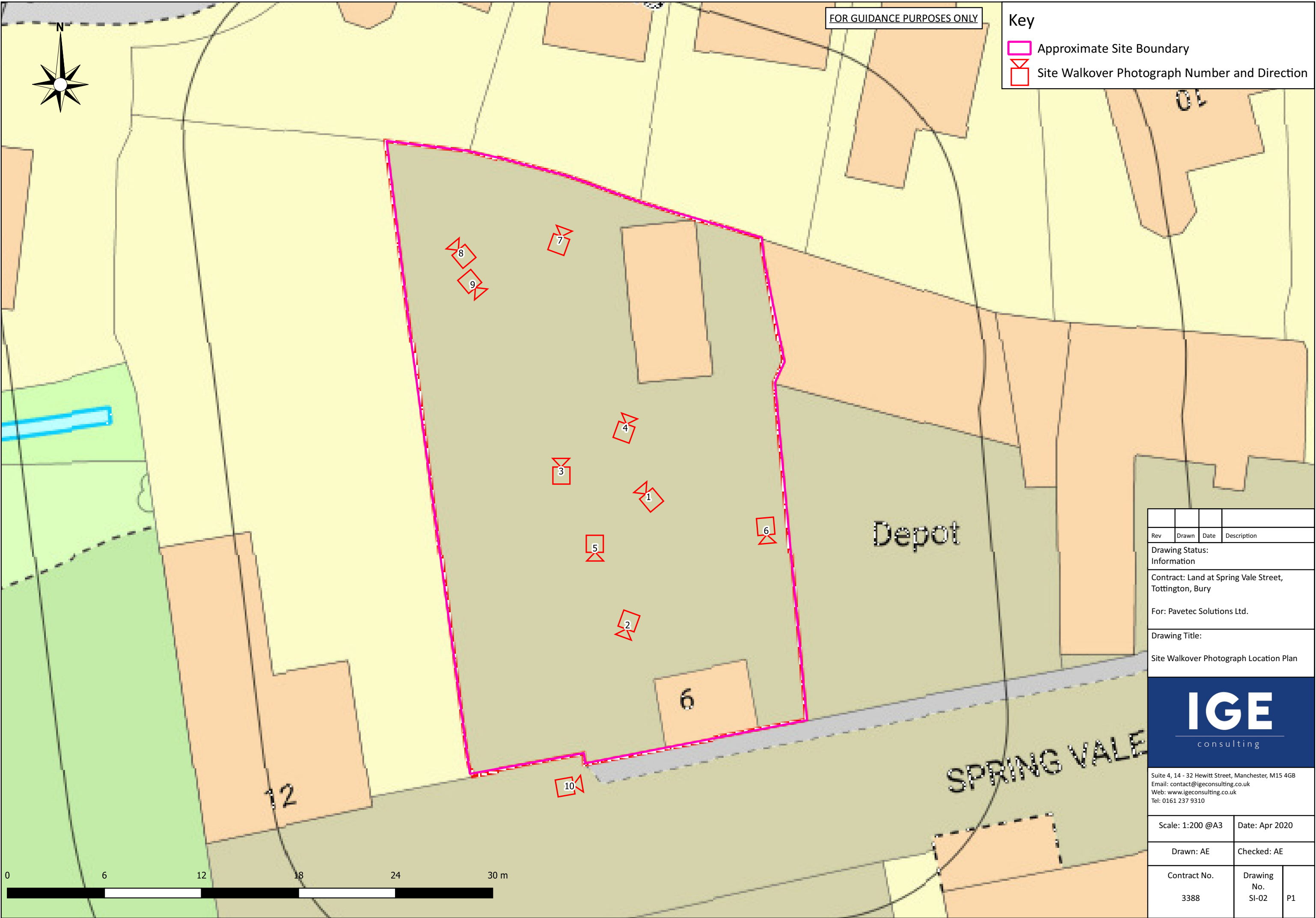
APPENDIX 2
SITE LOCATION PLAN



Rev	Drawn	Date	Description
Drawing Status: Information			
Contract: Land at Spring Vale Street, Tottington, Bury			
For: Pavetec Solutions Ltd.			
Drawing Title: Site Location Plan			
IGE consulting			
Suite 4, 14 - 32 Hewitt Street, Manchester, M15 4GB Email: contact@igeconsulting.co.uk Web: www.igeconsulting.co.uk Tel: 0161 237 9310			
Scale: 1:800 @A3		Date: Apr 2020	
Drawn: AE		Checked: AE	
Contract No. 3388		Drawing No. SI-01	P1

APPENDIX 3

WALKOVER SURVEY PHOTOGRAPHS AND PHOTOGRAPH LOCATION PLAN



Site Walkover Photographs



Figure 1 - Looking north west showing a general view of the site and the site's sloping topography.



Figure 2 - Looking south showing the site entrance and a concrete plinth in the south western site corner with 3 No. storage containers.



Figure 3 - Looking north showing the flat concrete plinth in the northern site section and the retaining wall on the northern boundary.



Figure 4 - Looking north east showing one of the two site buildings.



Figure 5 - Looking south showing the second of the two site buildings and the site entrance.



Figure 6 - Looking south towards the south eastern site corner. Plant is stored and materials are stored / tipped.



Figure 7 - Looking north; the northern site boundary is a retaining wall which appears to be in poor condition.



Figure 8 - Looking north west at the north western site corner. The retaining wall is of stone construction and many plants are growing on / out of it.



Figure 9 - Looking south east showing a general view of the site from the north west site corner.



Figure 10 - Looking east along Spring Vale Street; the site can be seen to the left-hand side of the photograph.

APPENDIX 4

HISTORICAL ORDNANCE SURVEY MAPS

Site Details:

LAND AT SPRING VALE STREET,
TOTTINGTON, BURY, BL8 3LR

Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: County Series

Map date: 1890-1891

Scale: 1:2,500

Printed at: 1:2,500



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

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Revised 1891
Edition N/A
Copyright N/A
Levelled N/A

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

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

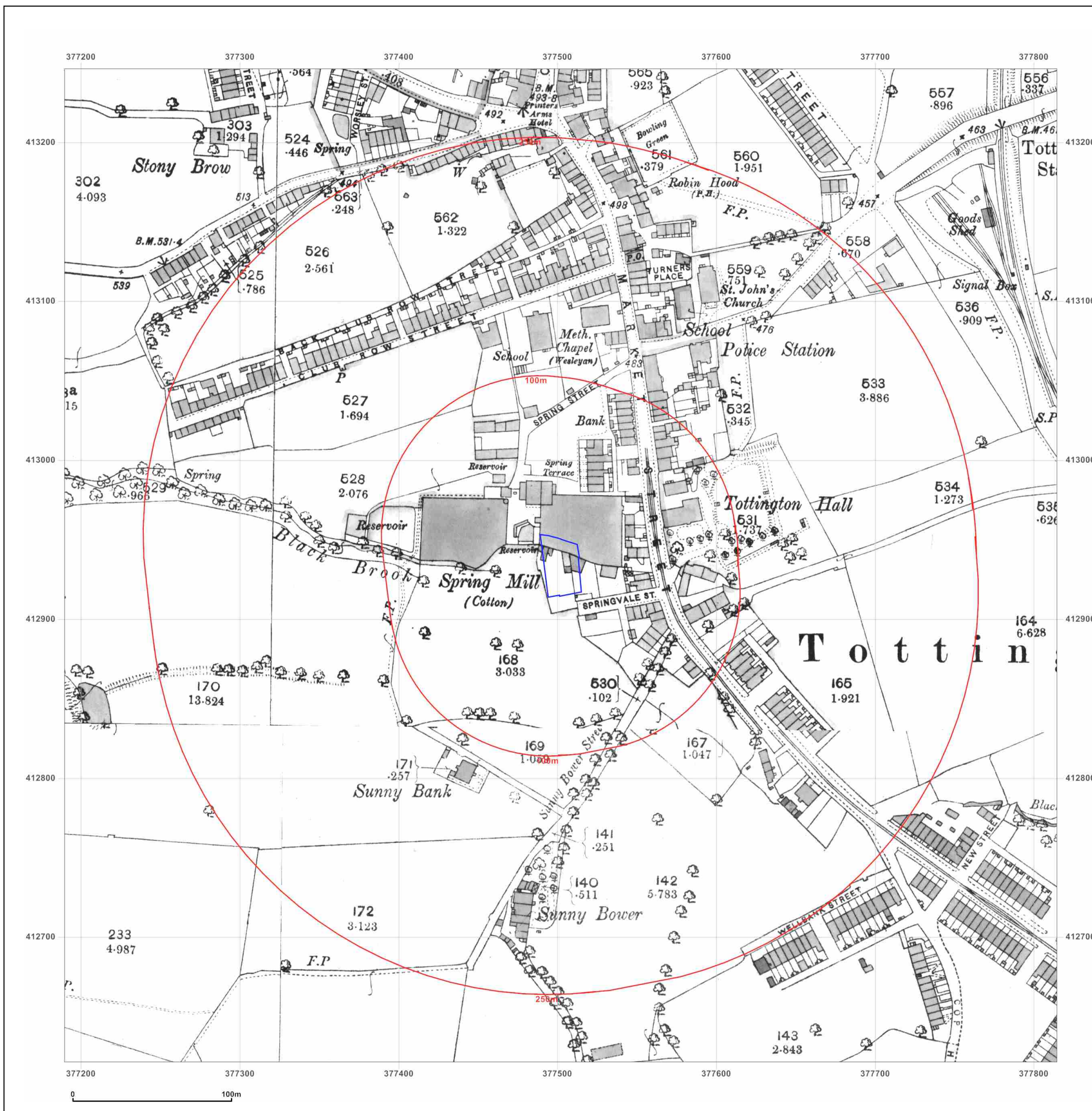


Produced by
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W: www.groundsure.com

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Production date: 22 April 2020

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



Site Details:

LAND AT SPRING VALE STREET,
TOTTINGTON, BURY, BL8 3LR

Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: County Series

Map date: 1910

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1910
Revised 1910
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1910
Revised 1910
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1910
Revised 1910
Edition N/A
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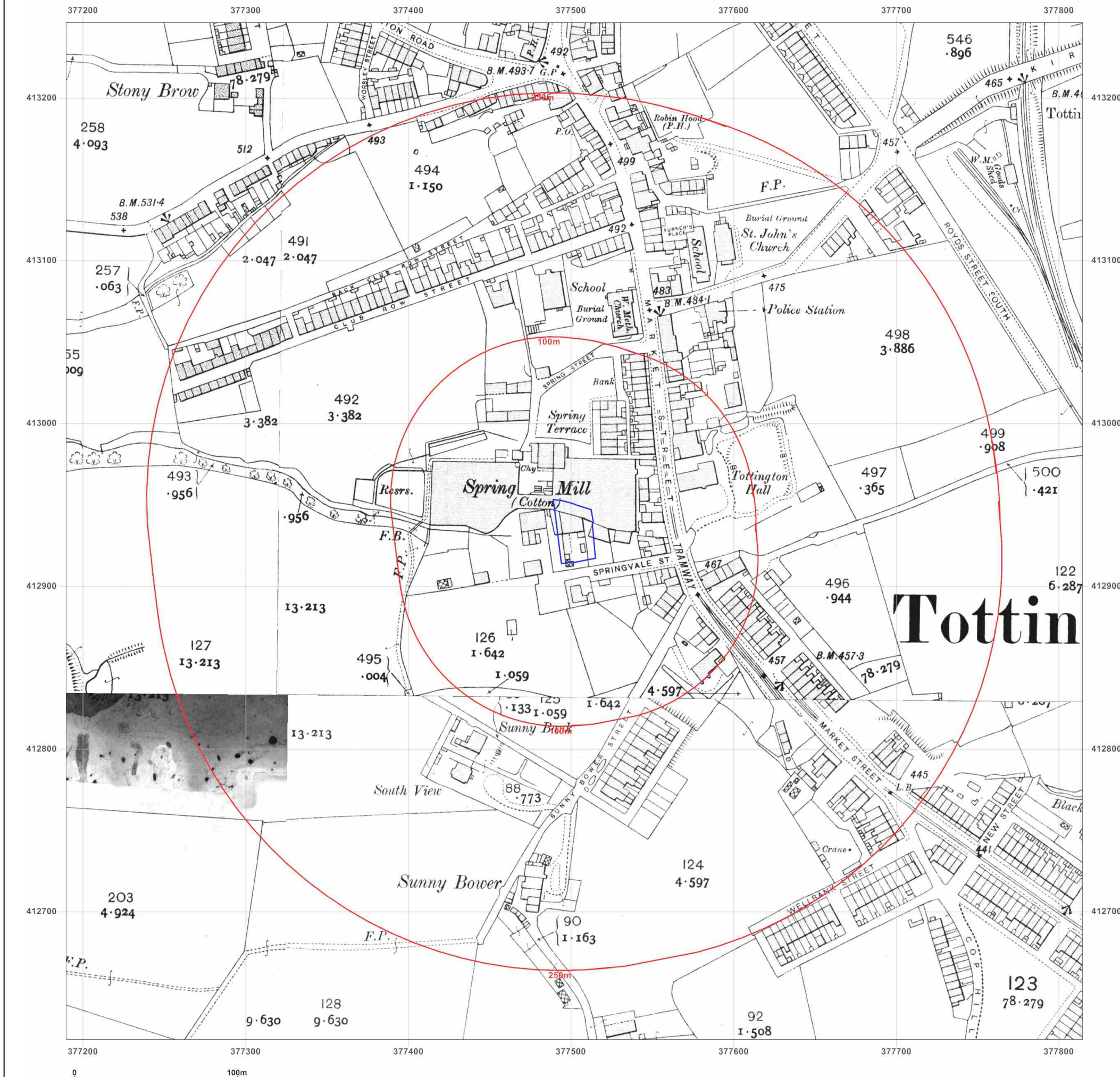


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Site Details:

LAND AT SPRING VALE STREET,
TOTTINGTTON, BURY, BL8 3LR

Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: County Series

Map date: 1930

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1930
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Revised 1930
Edition N/A
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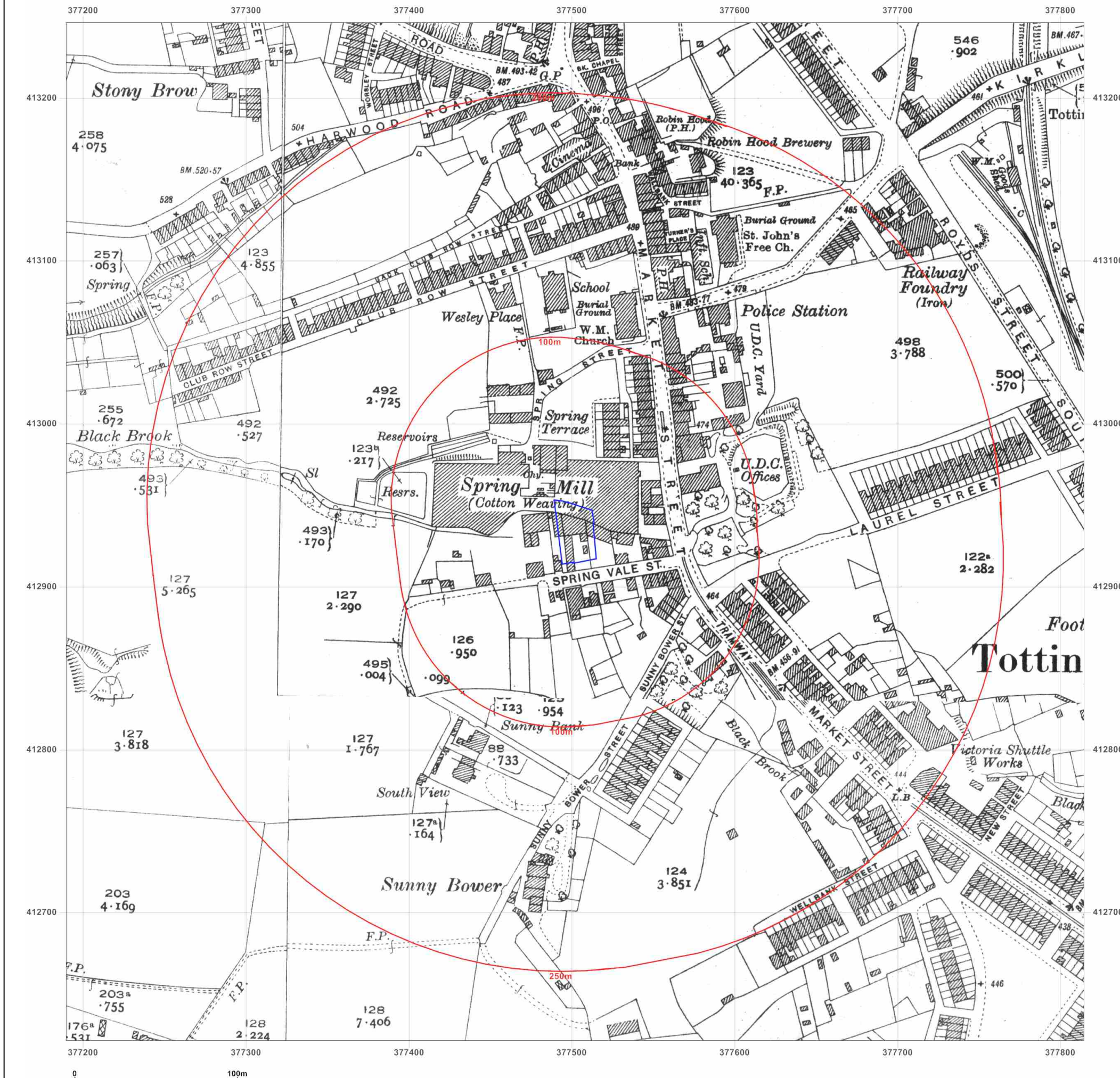


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Site Details:

LAND AT SPRING VALE STREET,
TOTTINGTTON, BURY, BL8 3LR

Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: National Grid

Map date: 1960

Scale: 1:1,250

Printed at: 1:2,000



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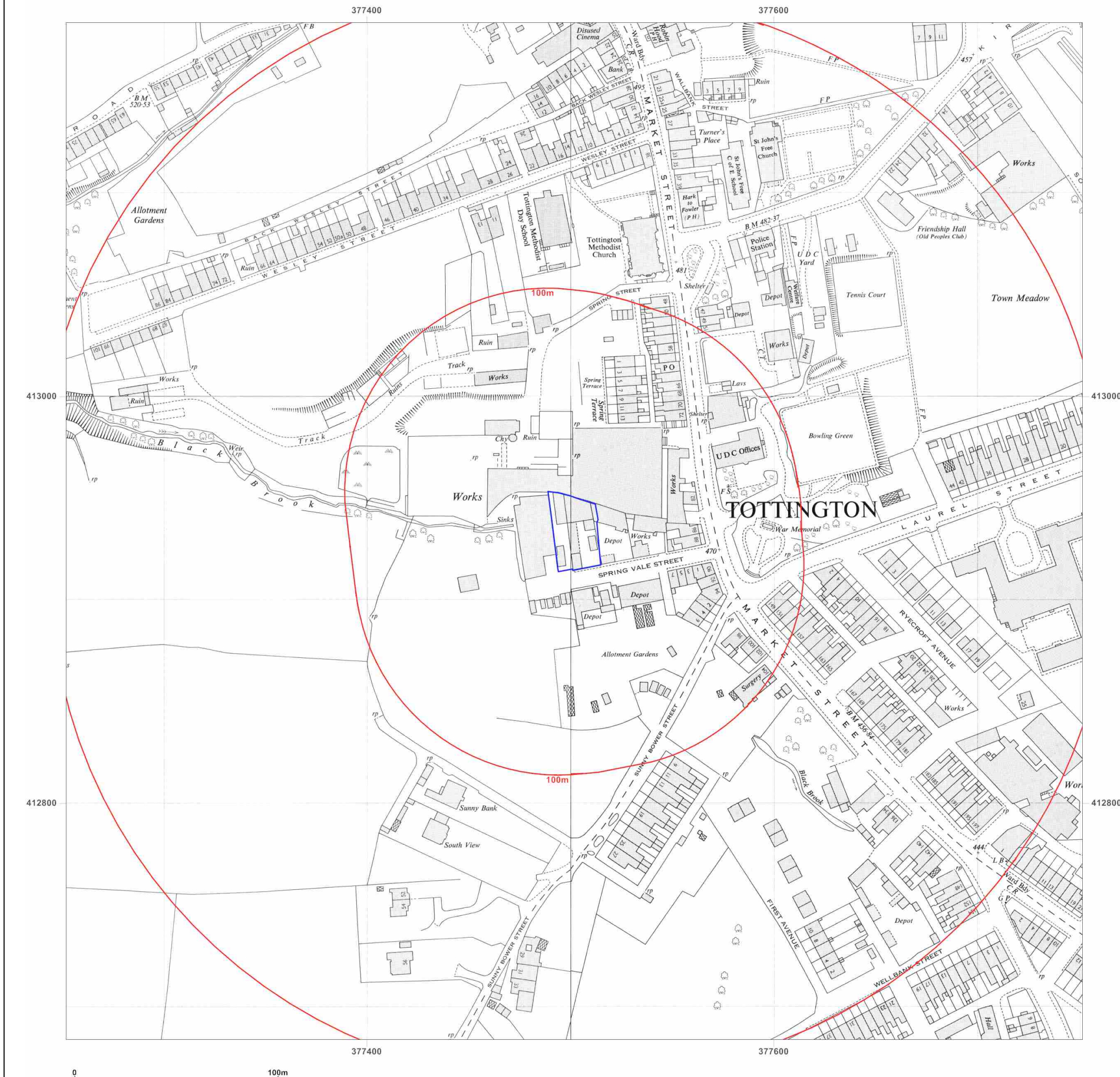


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Site Details:

LAND AT SPRING VALE STREET,
TOTTINGTON, BURY, BL8 3LR

Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: National Grid

Map date: 1963-1965

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1963
Revised 1963
Edition 1964
Copyright 1964
Levelled 1957

Surveyed 1965
Revised 1965
Edition N/A
Copyright 1967
Levelled 1962

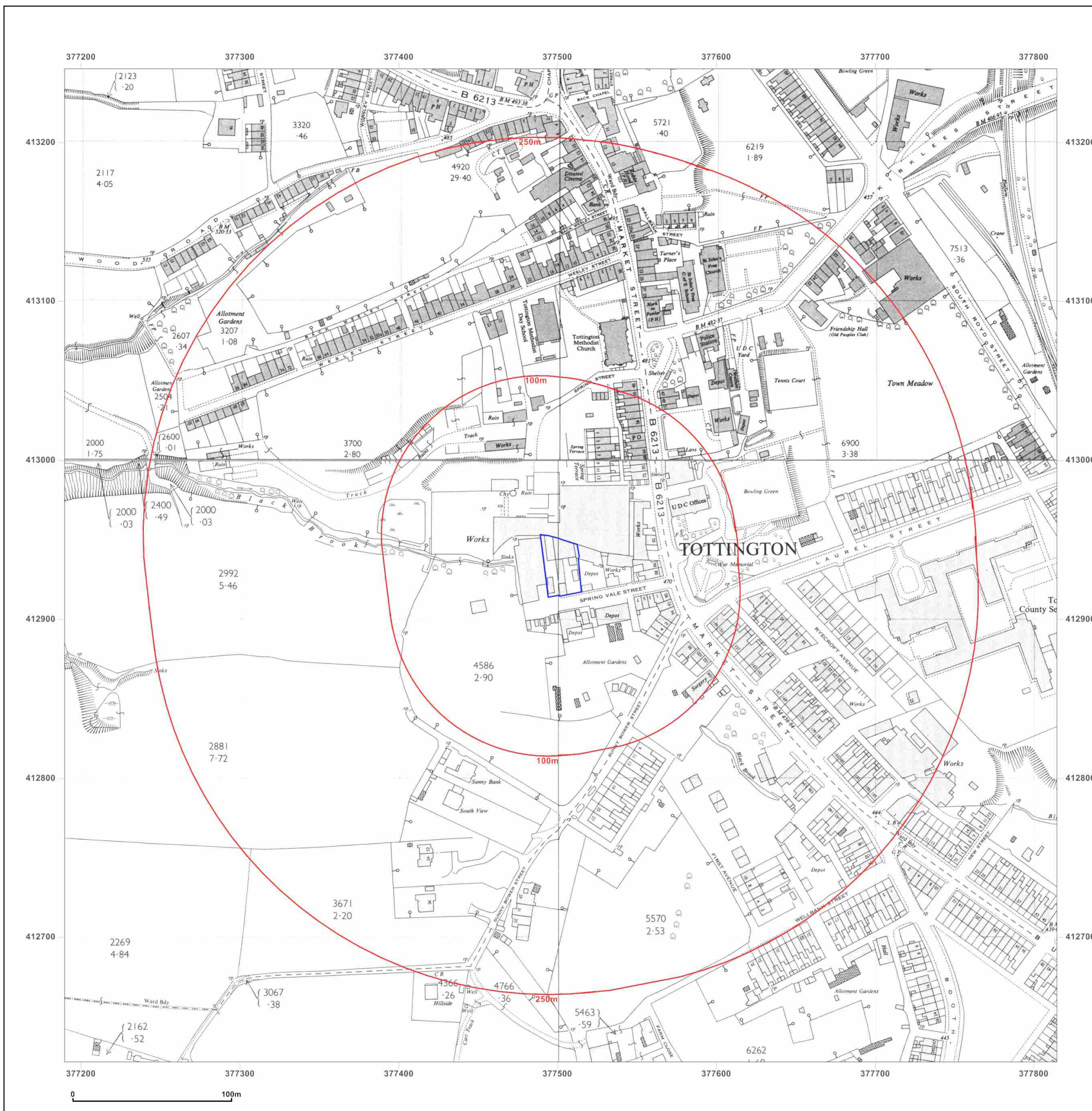


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Site Details:

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Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: National Grid

Map date: 1967-1968

Scale: 1:1,250

Printed at: 1:2,000



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Revised N/A
Edition N/A
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Surveyed 1966
Revised 1966
Edition N/A
Copyright 1967
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Surveyed 1959
Revised 1966
Edition N/A
Copyright 1967
Levelled 1963

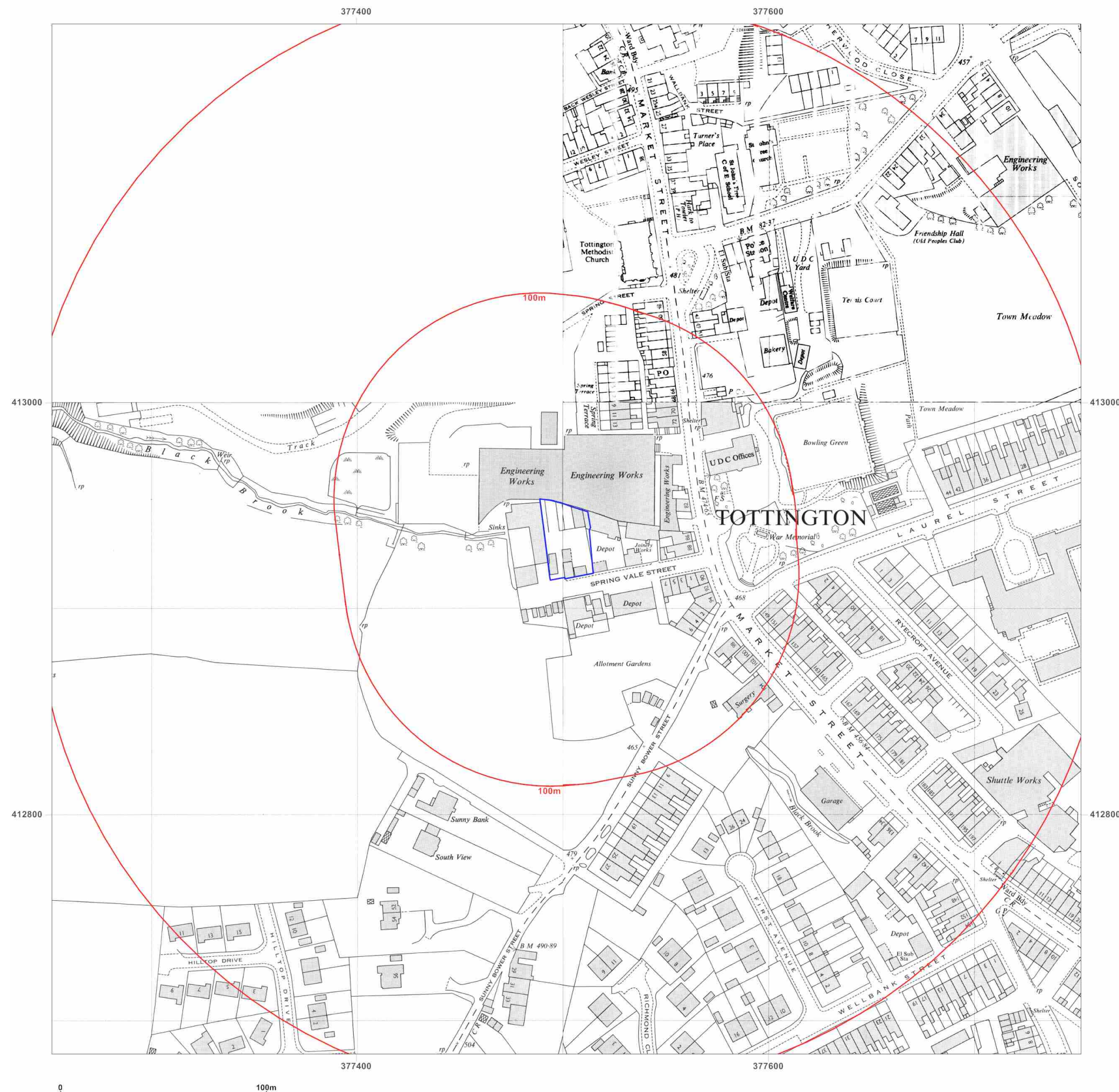


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Site Details:

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Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: National Grid

Map date: 1969-1973

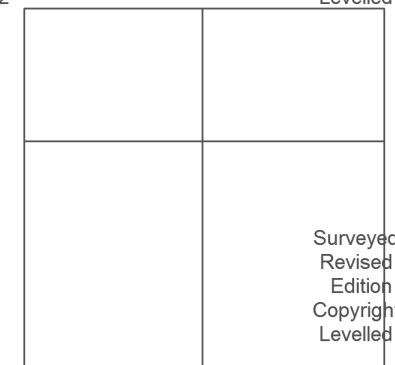
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Revised 1972
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Copyright 1973
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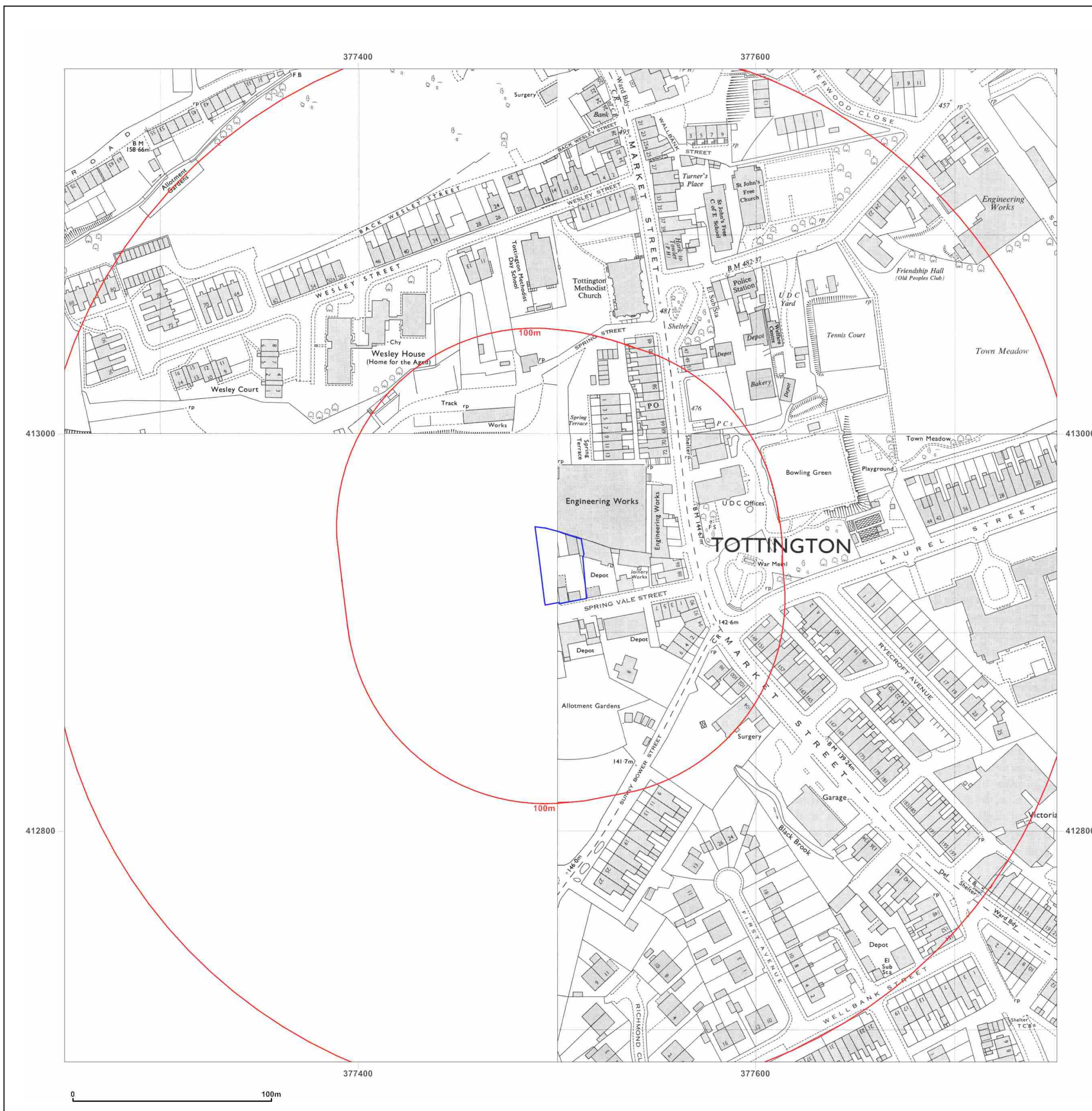


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Site Details:

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Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: National Grid

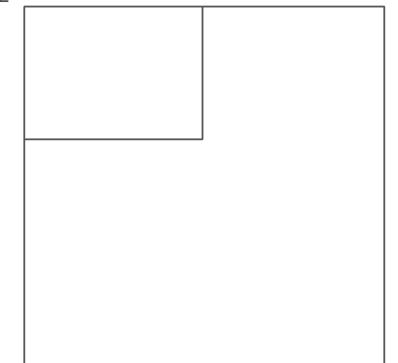
Map date: 1980

Scale: 1:1,250

Printed at: 1:2,000



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Revised N/A
Edition N/A
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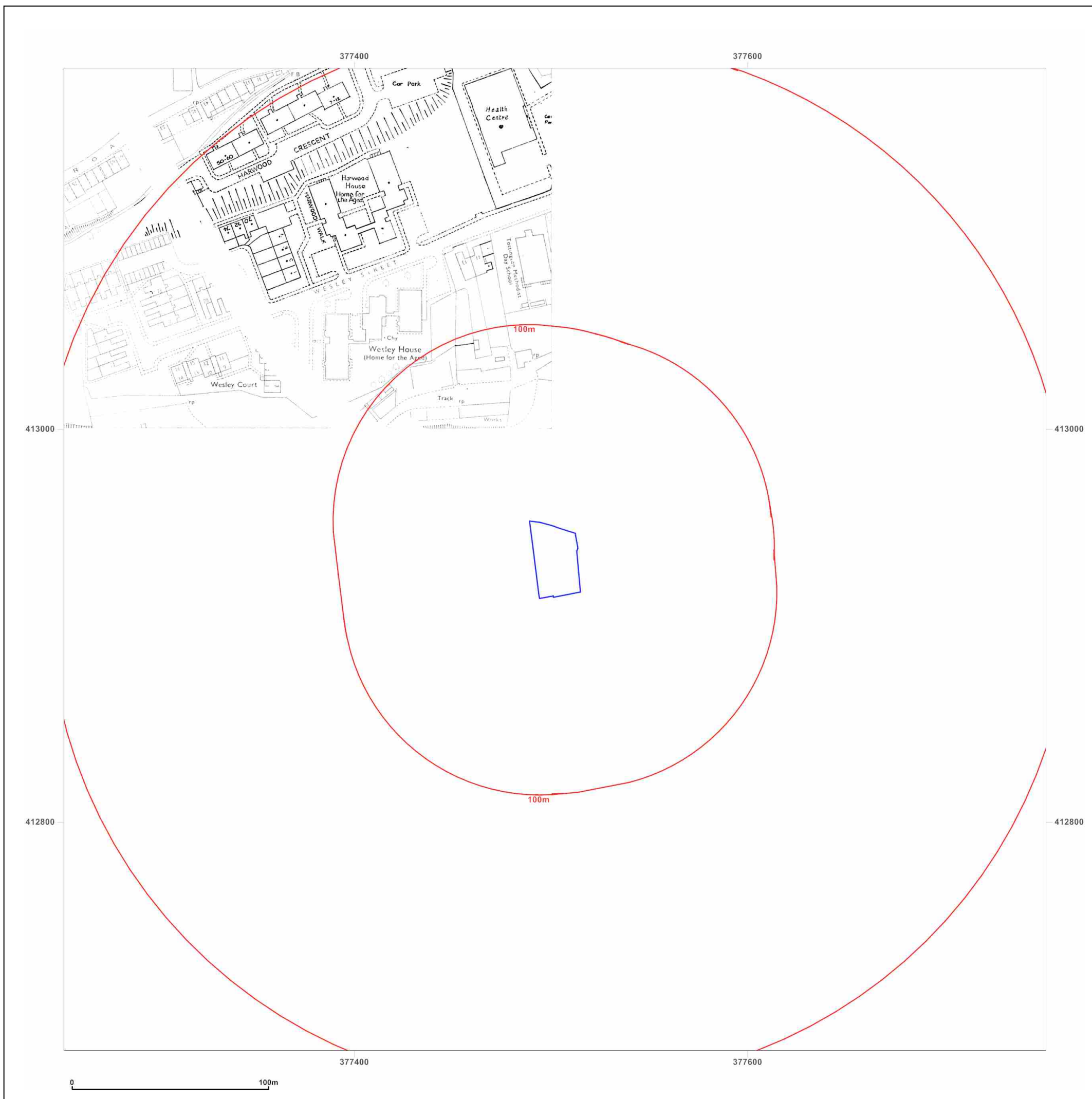


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Site Details:

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Client Ref: 3388
Report Ref: GS-6745147
Grid Ref: 377502, 412934

Map Name: National Grid

Map date: 1980-1985

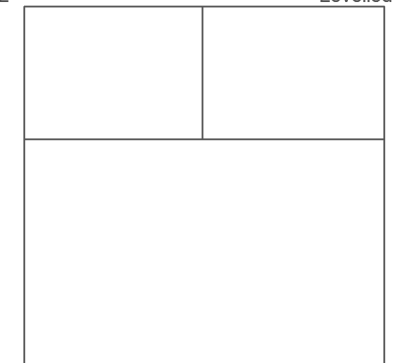
Scale: 1:1,250

Printed at: 1:2,000



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