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Report type:	Phase I Site Appraisal (Desk Study)
Site:	Island Road South, Garston, Liverpool
Client:	Lovell Partnership Ltd
Client's Agent:	The Alan Johnston Partnership
Ref:	GRM/P6547/F.1, Rev A
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ISLAND ROAD SOUTH, GARSTON, LIVERPOOL

PHASE I DESK STUDY ASSESSMENT FOR THE ALAN JOHNSTON PARTNERSHIP

Project Ref:
P6547

Date:
April 2014

Prepared for:
The Alan Johnston Partnership
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This report has been prepared in accordance with GRM's Accredited Quality Procedures

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When required in-house geological, geotechnical, environmental, structural and civil staff helped to produce this document.

Revision Suffix	Date	Initials	Revision	Checked	Approved

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APPENDICES

1 INTRODUCTION

1.1 PREAMBLE

GRM Development Solutions Limited (GRM) has been appointed by The Alan Johnston Partnership (Client's Agent) on behalf of Lovell Partnership Limited (Client) to undertake a Phase I Site Appraisal (desk study). The desk study and site inspection form Phase I of the assessment and allow the geotechnical and geo-environmental setting of the site to be determined and the identification of areas of particular concern that require targeted investigation.

This site appraisal is intended to provide information that will assist decision making by identifying potential ground engineering and contamination issues.

GRM Standard Limitations of Reporting are provided in Appendix A of this report.

The Client proposes to develop the site with twelve residential properties comprising two rows of six terrace houses and associated infrastructure. The proposed end use includes gardens. The outline development proposals provided by the Client are presented in Appendix B.

The Client has informed GRM of the following potential development hazards:

- Existing hardstanding.

1.2 OBJECTIVES OF THE SITE APPRAISAL

The Client's specific requirements were to conduct a Phase I Desk Study assessment in accordance with the supplied quotation.

The principal aims of the Phase I Site Appraisal (desk study) are as follows:

a) Obtain information, from easily accessible sources, about the soil and groundwater conditions within the area of the site.

b) Determine the possible ground related geotechnical and contamination hazards within the site boundaries that may affect the proposed development.

c) Provide preliminary development recommendations.

d) Provide advice on further works required for the cost-effective reduction of risks to the development and procedures likely to satisfy regulators.

Whilst every effort has been made to pre-empt the likely requirements of the Local Authority and the Environment Agency, they are likely to have specific requirements that will need to be discussed and addressed at a later date.

2 PHASE I DESK STUDY AND SITE OBSERVATIONS

2.1 INFORMATION SOURCES

In addition to the general sources of information listed in Appendix A (i) the client has supplied the following information that has been used in the assessment of the site:

- The location of the site and a proposed development layout.
- Existing electric cable.

2.2 SITE DESCRIPTION

2.2.1 Geographical Setting

The site is located approximately 9km south east of Liverpool city centre. The National Grid Reference (NGR) for the approximate centre of the site is SJ406846. A Site Location and Boundary Plan is presented in Appendix C.

The site is presently an undeveloped rectangular plot of land situated close to the junction of Island Road South and Horrocks Road in the area of Garston. The site covers an area covers of approximately 0.25 hectares and is surrounded on all sides by a 2m high single skin brick wall. The northern boundary is formed by the aforementioned brick wall fronting on to Island Road South, the western boundary by residential properties along Island Road South, the southern boundary by the rear gardens of residential properties along Condor Close beyond and the eastern boundary by a residential property situated at the junction of Island Road South and Horrocks Road.

The topography of the site is essentially flat, however, minor variations in levels were observed between the remnant floorslabs.

2.2.2 Site Inspection Observations

The Site Features Plan presented in Appendix D illustrates the salient observations made during a site inspection on 15th April 2014.

The site is surrounded by a 2m high brick wall. No above ground structures were observed to be present but remnant floorslabs were noted across most areas. The ground surface was a combination of concrete hardstanding (remnant floorslabs) and tarmacadam. Some shrubs (buddleia) were noted but excepting these the site was devoid of vegetation.

No evidence of fly-tipping was observed. No overhead cables crossed the site.

Significant Features identified during site inspection:
Hardstanding – general hazard to ground investigation

2.3 HISTORICAL DEVELOPMENT OF THE SITE

A review of the available historical Ordnance Survey (OS) maps gives an insight into the development of the site and can highlight potential hazards. Extracts of the maps reviewed and a Historical Hazard Plan are provided in Appendix E.

The earliest map reviewed (1851) shows the site to be part of a field. The site remains unchanged until the map for 1927 which shows four structures within the boundary: two large rectangular structures are illustrated adjacent to the south eastern boundary, a smaller rectangular structure is recorded against the south western boundary and a fourth structure is recorded against the central western boundary. The map for 1937 records the site as 'Market Place'. On the 1951 mapping the structure against the central western boundary is illustrated as two buildings the northern most of which is recorded as a lavatory. The map for 1956 records the site as 'Garston Market' and both halves of the building along the central western boundary as lavatories.

No significant changes are recorded to the site until the map for 1985, which records three additional structures along the southern boundary, two new structures along the western boundary; one to the north and one to south of the lavatories, and two additional structures along the northern boundary. The map for 1993 shows six additional structures located across the site including two on the previously undeveloped eastern boundary.

From 1851 until 2012 additional site structures were added but no evidence is recorded that they were demolished. However, between 2012 and the present day all of the above ground structures were demolished. At present only the remnant floorslabs remain insitu.

The area surrounding the site has included an 'Old Pit' located 25m to the west is recorded on the 1851 map. An unnamed water course is located 75m to the south and east and a railway line serving Garston Station and Garston Docks is recorded to run within 290m of the sites southern boundary.

The map for 1891 no longer records the old pit to the west, which has been built over. The surface water course is recorded as flowing to the east and the area within 50m of the sites south east corner is recorded as 'Liable to Floods'. An additional railway is recorded approximately 130m to the north. A gas works is recorded 330m to the south and a fever hospital approximately 150m to the south west. On the 1927 map Island Road South is recorded to bound the site to the north, an area of excavation is recorded within 20m, a tram depot approximately 80m and a refuse destructor approximately 150m to the south west; the Fever Hospital has been renamed as the 'Sir Alfred James Memorial Hospital'. The surface water course is no longer illustrated west of Island Road South.

The map for 1937 illustrates residential housing adjacent to the site boundary to the north west and south west along Island Road South and to the south along Condor Road. The map for 1951 records Horrocks road to the east and the tram / omnibus depot to have expanded to within 50m of the site boundary. The refuse destructor is now recorded to be an electricity substation and a clothing factory 110m to the south. Residential development is recorded to the north of the site beyond Island Road South. The surface water course is no longer recorded in the vicinity of the site and has been built over. Further residential development, to the east of Horrocks Road, is recorded on the 1954 map.

No further significant changes to the area immediately around the site are recorded.

The hazards identified are summarised in the table below.

Significant Features identified on OS Maps:
Made ground – potential source of contamination Former site structures – potential geotechnical hazard (remnant floorslabs / foundations and substructures) / potential source of asbestos / possible source of hydrocarbon contamination Old pit to west – potential source of ground gas (considered very low risk given date of backfill) Minor surface water course – potential receptor for contamination / flood risk Surrounding industrial land use – potential sources of contamination (considered low risk given nature and distance from site)

2.4 ANTICIPATED GEOLOGY

The BGS Geological Sheet for this area (Sheet 97: Runcorn) shows superficial Glacial Till deposits of over a solid geology of Chester Beds Formation. The Glacial Till is likely to comprise a mixture of clay, silty, sand and gravel but is anticipated to be predominantly cohesive. The Chester Pebble Beds Formation is recorded to generally comprise a red-brown gravelly sandstone, which is likely to be weathered to a sand if present at shallow depth.

The BGS holds borehole records associated with Liverpool Bus depot situated approximately 45m to the south copies of which are presented in Appendix F. The BGS boreholes suggest made ground comprising clay and brick rubble between 1.45m begl and 2.1m begl over superficial deposits (both cohesive and granular) to depths of between 3.2m begl and 6.1m begl. Rock strata comprising a red-brown fine to coarse grained SANDSTONE was proven to depths of between 4.7m begl and 7.12m begl.

The local strata are reported to dip at 15º to the south east. The site is not indicated to be directly affected by faulting; the nearest indicated fault being 109m to the west.

Made ground, including buried foundations, can be expected due to the presence of buildings (demolished) and hard standing, from its past development.

Significant Features identified from geological data:
Made ground - potential source of contamination / asbestos contamination Cohesive strata – potential geotechnical hazard (if trees present) Variable strata – potential geotechnical hazard (differential settlement)

2.5 HYDROGEOLOGICAL INFORMATION

One of the BGS borehole records reported water seepage at 1.7m begl and close to the interface between the made ground and superficial strata. It is considered that the water strike observed in the BGS borehole represents perched water and not the true groundwater table, which is only likely to be encountered at depth within the Chester Pebble Beds Formation. It is anticipated that the groundwater level will be seasonally dependant.

The Environment Agency has classified the Glacial Till as non-productive strata and the Chester Beds Formation as a Principal aquifer.

There are no recorded groundwater abstraction licenses within 500m of the site. The site is not recorded to be within a Groundwater Source Protection Zone.

Information available at this stage suggests a groundwater table in the Chester Beds Formation and a flow direction to the west. Hydraulic continuity is not expected between any perched volumes encountered in the Glacial Till / made ground and the underlying Principal aquifer due to the anticipated cohesive nature of the Glacial Till acting as an aquiclude.

The BGS suggest that given the geological conditions there is the potential for groundwater flooding at the surface. However, the BGS also state that there is limited potential for such flooding and that in the absence of corroborative incidents no further action is required. The potential for groundwater flooding should be investigated in any future Phase II investigation.

Significant Features identified from hydrogeological data:
Principal aquifer – potential receptor for contamination (risk reduced due to overlying anticipated cohesive superficial deposits) Potential groundwater flooding - potential geotechnical hazard (considered low risk)

2.6 HYDROLOGICAL INFORMATION

Local surface water features include:

- The former stream first observed on the 1851 OS map to the south was terminated to the east of Island Road South in 1927 and subsequently built over during the mid-1900s. Accordingly, the former stream is not considered a viable receptor for contamination or a potential flood risk.

The site is not within 250m of an indicative fluvial floodplain and the Environment Agency's Internet based flood risk maps suggest there is no risk from river flooding.

One record of a pollution incident is reported 175m to the south west. The incident was classified by the Environment Agency as a Category 4 incident (no impact) and accordingly is considered unlikely to have affected the site.

There are recorded surface water abstraction licenses within 2000m.

Significant Features identified from hydrological data:
None identified

2.7 MINING AND QUARRYING

The site is not in area affected by coal mining activity

One record of an 'old pit', the purpose of which is not recorded, was noted on the 1851 OS map, which by 1891 had been built over. There is no other evidence of any non-coal mineral extraction having taken place within, or close to, the site area.

Potential Mining Hazards:
None identified

2.8 ENVIRONMENTAL INFORMATION

An Environmental Report has been acquired for the site; the full report is presented in Appendix G. A summary of the relevant information not included elsewhere in this report is presented below:

- Two planning hazardous substances consents are recorded 478m to the south west. Both records relate to the same source at British Gas, Bank's Road. Given the distance and nature of the records they are considered unlikely to significantly affect the site.
- Two COMAH & NIHHS Authorisation records provided by the Health and Safety Executive exist 349m to the south west. The entries relate to the British Gas installation at Bank's Road / Wavertree. Given the regulated nature of the two entries neither is considered likely to pose a significant risk to the site.
- There is one record of an Environment Agency historic landfill 317m to the south. No records of the type of waste is reported, but given the distance and the anticipated intervening cohesive strata it is considered unlikely that the landfill will have significantly affected the site.
- There are four records of waste treatment, transfer or disposal sites within 500m. Three are recorded between 145m and 147m to the south west and relate to the same source, the refuse destructor noted on the historical mapping, which was converted to an electricity substation in around 1951. The fourth entry is a scrap yard located 473m to the south west. Given the historical nature of the first three entries and the distance of the fourth none are considered likely to have significantly affected the site.
- There are no Environment Agency licensed sites recorded within 500m.
- There are a number of current industrial land uses within 500m. The records include civil engineering companies, electricity sub-stations and a bus and coach depot. Given the nature and distance of the records none are considered likely to have significantly affected the site.
- There are no current petrol stations recorded within 500m.

Significant Features identified from Environmental data:
None identified

2.9 ARCHAEOLOGY

Archaeological information has not been sought as part of this desk study and has not been identified as an issue by the Client. Some Local Authorities require at least an initial archaeological appraisal for development sites. GRM can undertake such appraisals if required. Archaeological investigations occasionally reveal ground-related problems from ancient times (prior to the 1st Edition OS maps) and can occasionally cause foundation and contamination development hazards.

Archaeological Hazards:
Not researched

2.10 INVASIVE PLANT SPECIES/ECOLOGY

GRM is not a specialist in this topic and has not conducted such a survey; however, we will endeavour to report easily recognisable issues such as Japanese Knotweed, Giant Hogweed, badger sets etc, when seen on site. No such issues were observed during the walkover; however, a survey by an ecological specialist will be required to confirm this.

Invasive Plant Species/Ecological Hazards:
None observed

2.11 RADON ASSESSMENT

The site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings' (BR211 2007). The site is not within an area recorded to require radon protection measures.

Radon Hazard:
None required

2.12 CONTAMINANTS OF CONCERN

In addition to the general contaminants listed in Appendix A (ii), the following site specific contaminants have been identified:

- Asbestos associated with demolition etc.

2.13 SUMMARY OF POTENTIAL GEOTECHNICAL/GENERAL HAZARDS

Potential Hazard	Potential Consequence	Action
Live services	Danger to personnel	Inform relevant parties for disconnection / diversion
Former site structures	Deepened foundations/buried structures	Ground investigation
Made ground associated with previous development	Deepened foundations	Ground investigation
Shrinkable clay/trees	Deepened foundations	Ground investigation plasticity testing/tree survey
Variable strata	Deepened foundations	Ground investigation
Groundwater flooding	Danger to site structures	Ground investigation and monitoring

Potential geotechnical/general hazards have been identified in earlier sections and are summarised below.

Potential sources, pathways and receptors are summarised in the Phase I conceptual model in Section 3.

3 PHASE I CONCEPTUAL MODEL

The conceptual model has been drafted following the current relevant guidance the principles of which are set out in Appendix A (iii).

3.1 POTENTIAL SOURCE – PATHWAY – RECEPTOR

The site comprises an undeveloped plot of land; historically the site was first recorded to be developed in the late 1920's and was recorded as a 'market' in 1937. The site continued to be used as a market site until at least 2002, after which the structures were demolished. Given the current and former uses the risk of significant contamination being present is low to moderate.

Potential contaminants of concern for the whole site include those listed in Section 2.12 and Appendix A (ii).

The development proposals include the construction of twelve residential properties comprising two rows of six terrace houses and associated infrastructure. The proposed end use includes gardens.

The primary human health receptors are end users of the completed development and construction workers. The primary pathways of concern include dermal contact with contaminated soil and soil dust, the ingestion of contaminated soil and soil dust, ingestion of vegetables that have taken up the contamination, indoor and outdoor inhalation of ground gas and soil vapours, and migration of contamination into water supply pipes.

For controlled waters, the primary receptor for the site is the Principal aquifer. The primary pathways of concern are leaching of contaminants and vertical migration to the groundwater. The anticipated presence of low permeability cohesive strata is considered likely to reduce the potential pathway.

For construction materials, the primary receptors are water pipes and buried concrete. The primary pathways of concern are the migration of contamination leading to degradation of pipe materials and sulphate and/or acid attack on buried concrete.

The pollutant linkage model is illustrated in detail on the following page.

3.2 PHASE I CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	**Pathway**	**Receptor**	**Solution**
Potentially contaminated made ground associated with previous development.	Indoor and outdoor inhalation of ground gas and soil vapours, the ingestion of contaminated soil and soil dust, and dermal contact with contaminated soil and soil dust.	End users and construction workers.	Soil capping or removal of contaminated soils.
Potential ground gases (methane/ carbon dioxide) from made ground.	Inhalation.	End users.	Gas protection measures.
Potential asbestos containing materials mixed with soils following demolition of buildings.	Inhalation.	Construction workers.	Removal or burial of contaminated soils.

CONTROLLED WATERS			
Potentially contaminated made ground associated with previous development.	Leaching of contaminants and vertical migration to the groundwater (risk reduced due to anticipated cohesive superficial strata).	Principal aquifer.	Assessment of groundwater quality and, if required, subsequent risk assessment and remediation.

CONSTRUCTION MATERIALS			
Potentially contaminated made ground associated with previous development.	Migration of contamination through leaks and joints, degradation of pipe materials.	Water pipes.	Upgraded water pipes/clean backfill material.
Elevated levels of sulphate and/or acidic ground conditions.	Direct contact.	Buried concrete.	Appropriate concrete specification.

4 CONTAMINATION/REMEDIATION RECOMMENDATIONS

The risk of ground contamination is considered moderate; however, prior to development a ground investigation will be required, the scope of which is outlined in Section 6; However, at this stage based on the desk study information available it is considered that allowance be made for the following:

- 600mm capping in all soft landscaped areas or source removal of 3no contamination hotspots.
- Upgraded water pipes (protecta line or similar).
- Gas protection measures comprising under floor venting (i.e. beam and block floors or cast insitu with pipe work), low permeability gas resistant membrane fully sealed around service entries and extended across cavities.
- Importation of a suitable growing medium.

5 PRELIMINARY GEOTECHNICAL ASSESSMENT

It should be noted that the following comments and recommendations are based on the findings of this desk study which may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). Prior to development a ground investigation will be required to confirm the initial recommendations outlined below, the scope of which is outlined in Section 6. However, at this stage based on the desk based information available it is considered:

- The ground conditions are likely to comprise cohesive Glacial Till. Rock is not expected to be present at shallow depth.
- Providing deep made ground and/or soft or loose materials are not present the site may be suitable for the use of traditional trench or pad foundations.
- Due to the suspected presence of cohesive soils and the presence of trees, particularly around the margins of the site, allowance should be made for deepening foundations in accordance with NHBC standards. It should be noted that as the development proposals are for two rows of terrace houses if any of the plots within a row requires piling then the whole block will require a piled foundation solution. Accordingly, if one plot per row requires piling then the entire development is likely to require a piled foundation solution.
- Providing deep made ground and/or soft or loose materials are not present the site may be suitable for the use of ground bearing slabs; however, at this stage allowance should be made for the use of suspended floors.
- Overly aggressive ground conditions are not expected and standard concrete should be suitable.

6 FURTHER INVESTIGATION

A Phase II ground investigation is recommended to determine more accurately the effect of the identified hazards on the development. Initially, this should include:

- A window sampling investigation to confirm ground conditions and collect samples for analysis. Following the removal of the existing concrete hardstanding a trial pitting exercise is recommended.
- Chemical analysis of soils followed by risk assessment so that the risk to human health and controlled waters can be determined.
- Gas monitoring to assess the risk posed by ground gases.
- Geotechnical soils testing of the founding strata to assess its strength and suitable grades of buried concrete.

Following your review of this document, a copy of it should be submitted to the Planning Department of the Local Authority for comment and approval prior to any ground investigation works being undertaken, as this is often a condition of planning.

7 CONCLUSIONS

This Phase I Site Appraisal has shown the site is should be suitable for the proposed development, assuming compliance with all the recommendations contained within this report.

APPENDIX A

GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

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GENERAL APPRAISAL COMMENTS

i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records
- Environment Agency Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: http://www.environment-agency.gov.uk/
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2007), 'Radon: Guidance on protective measures for new buildings'
- HPA-RPD-033 (2007), 'Indicative Atlas of Radon in England and Wales'
- NRPB Publication W26 (2002), 'Radon Atlas of England and Wales'
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- Arsenic
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Copper
- Nickel
- Zinc
- Phenols
- cyanide (total)
- pH
- Water soluble sulphate
- PAH (polycyclic aromatic hydrocarbons)

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

iii CONCEPTUAL MODEL METHODOLOGY

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

v GROUND GAS RISK ASSESSMENT METHODOLOGY

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (BR211: 2007)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings' (2007). This uses Gas Screening Values (GSVs), which are gas concentrations multiplied by borehole flow rate, along with additional limiting factors (such as maximum methane concentrations) to classify the gas regime of a site.

The guidance document includes two methods of characterising a site. The main method 'Situation A' is based on work by Wilson and Card and is used for all types of development except low rise housing that meets the assumptions of 'Situation B'. The 'Situation B' method proposed by Boyle and Witherington for the NHBC assumes all properties have pre-cast suspended floors (beam and block) with ventilated underfloor voids.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Guidance contained in the Environment Agency's CLEA Report has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of

one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables.

For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Soil Guideline Values (SGV) published by the EA, values calculated by GRM using the CLEA v1.06 risk assessment and values and chemical data developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.06 risk assessment software using the age classes and pathways described above.

vii RISK TO SITE WORKERS – GENERAL COMMENTS

The risks to site workers are similar to those posed to site end users, although likely to be less severe due to the site workers' shorter exposure to the identified contamination. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic Personal Protective Equipment based on the site's general health and safety risk assessment, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be the an aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values. Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier I Screening values.

ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY

The 'screening levels' adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

x WASTE DISPOSAL AND SITE WASTE MANAGEMENT PLANS

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. Likewise making the site as volume neutral as possible will reduce the costs of development.

Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

SWMPs are a legal requirement for all projects with an overall development cost of over £300k. GRM can assist in the production of SWMPs which comply with the Code of Practice and identify best environmental disposal options when dealing with waste.

xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

xiii GEOTECHNICAL ASSESSMENT – EXCAVATIONS

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

xiv GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

xv GEOTECHNICAL ASSESSMENT – SOAKAWAYS

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE 365 (1991). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.
- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.

- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefer 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

xvi GEOTECHNICAL ASSESSMENT – FOUNDATIONS

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).

NOTES ON LIMITATIONS

General

GRM Development Solutions Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement had been executed, or with whom an assignment had been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from GRM Development Solutions Limited; a charge may be levied against such approval.

GRM Development Solutions Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) the consequences of this document being used by any third party with whom an agreement has not been executed.

Phase I Environmental Audits/ Desk Studies

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and as considered necessary and appropriate to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits (Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as provisional only and must, in any event, be confirmed by a commercial adviser.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. Whilst exploratory testing is intended to gain an accurate representation of the site, the very nature of sampling and testing is such that it cannot ensure that all localised conditions are detected

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site for each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

APPENDIX B

GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

Tel: 01283 551249

Fax: 01283 211968

info@grm-uk.com

www.grm-uk.com

DO NOT SCALE

NOTES:

Approximate Site Boundary

GRM Development Solutions Ltd
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com

CLIENT:
The Alan Johnston Partnership

PROJECT:
Island Road South, Garston, Liverpool

TITLE:
Outline Development Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
PW	04/2014
PROJECT No:	DRAWING No:
P6547	Figure 1

APPENDIX C

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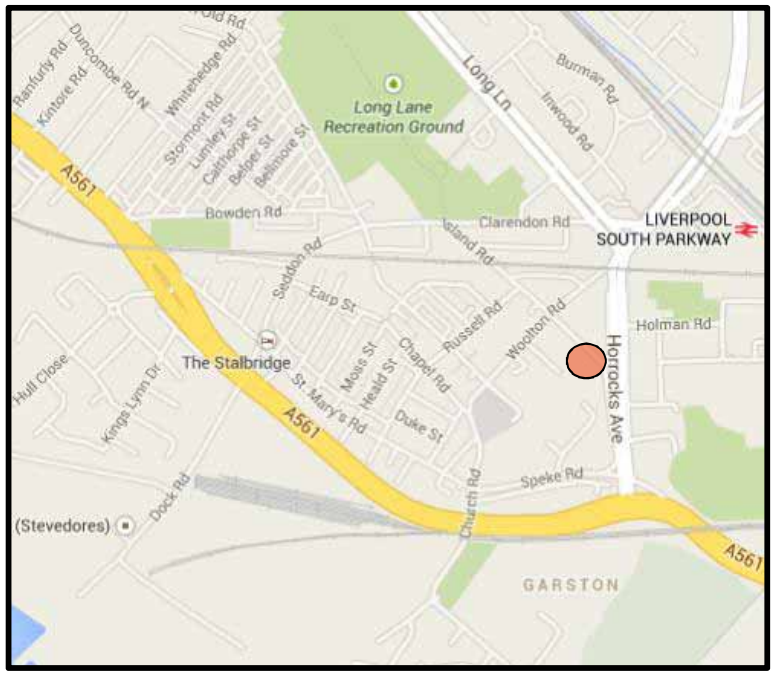

DO NOT SCALE

NOTES:

Approximate Site Locations

Approximate Site Boundary

GRM Development Solutions Ltd
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com

CLIENT:
The Alan Johnston Partnership

PROJECT:
Island Road South, Garston, Liverpool

TITLE:
Site Location Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
PW	04/2014
PROJECT No:	DRAWING No:
P6547	Figure 2

APPENDIX D

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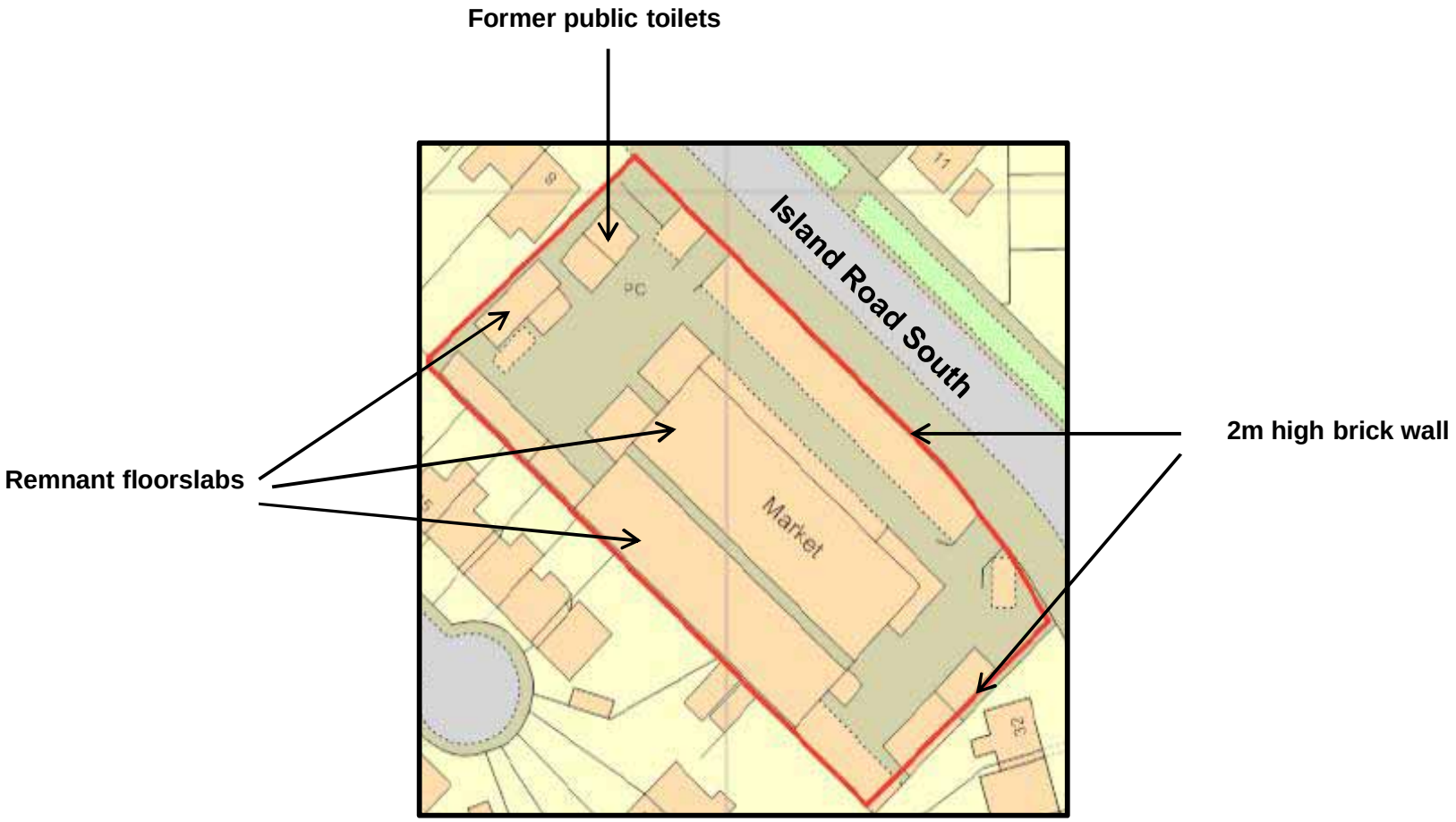
Recorded development at the site was on-going from 1927 to approximately 1993. No evidence exists to suggest demolition of any of the site structures before 2012.



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Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com

CLIENT:
The Alan Johnston Partnership

PROJECT:
Island Road South, Garston, Liverpool

TITLE:
Site Observations Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
PW	04/2014
PROJECT No:	DRAWING No:
P6547	Figure 3

APPENDIX E

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- Construction Management
- Site Services

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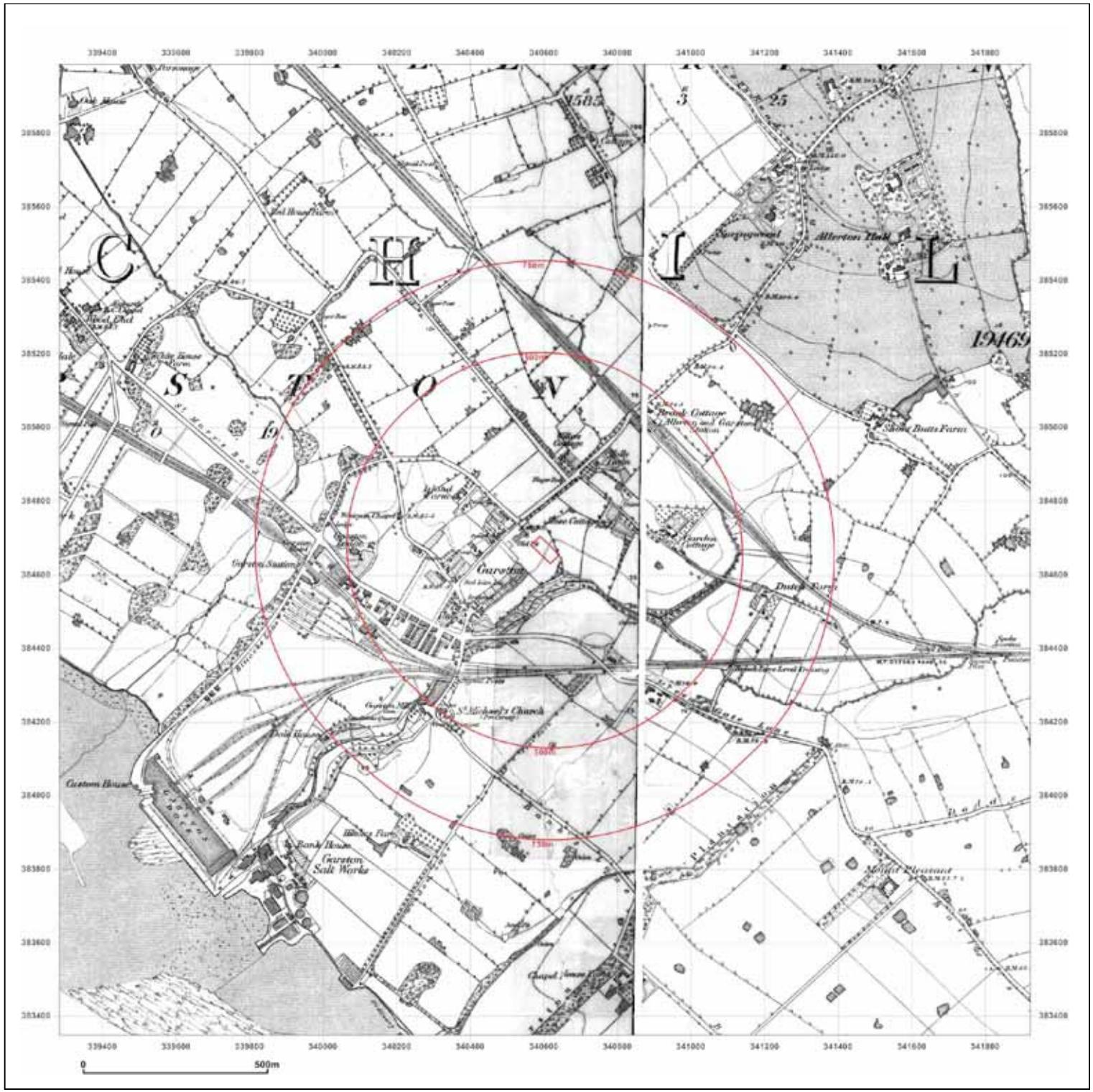

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Surveyed N/A
Revised N/A
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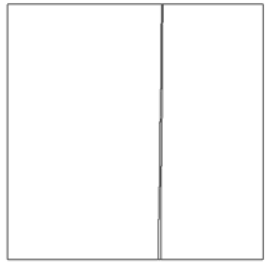

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Production date: 09 April 2014

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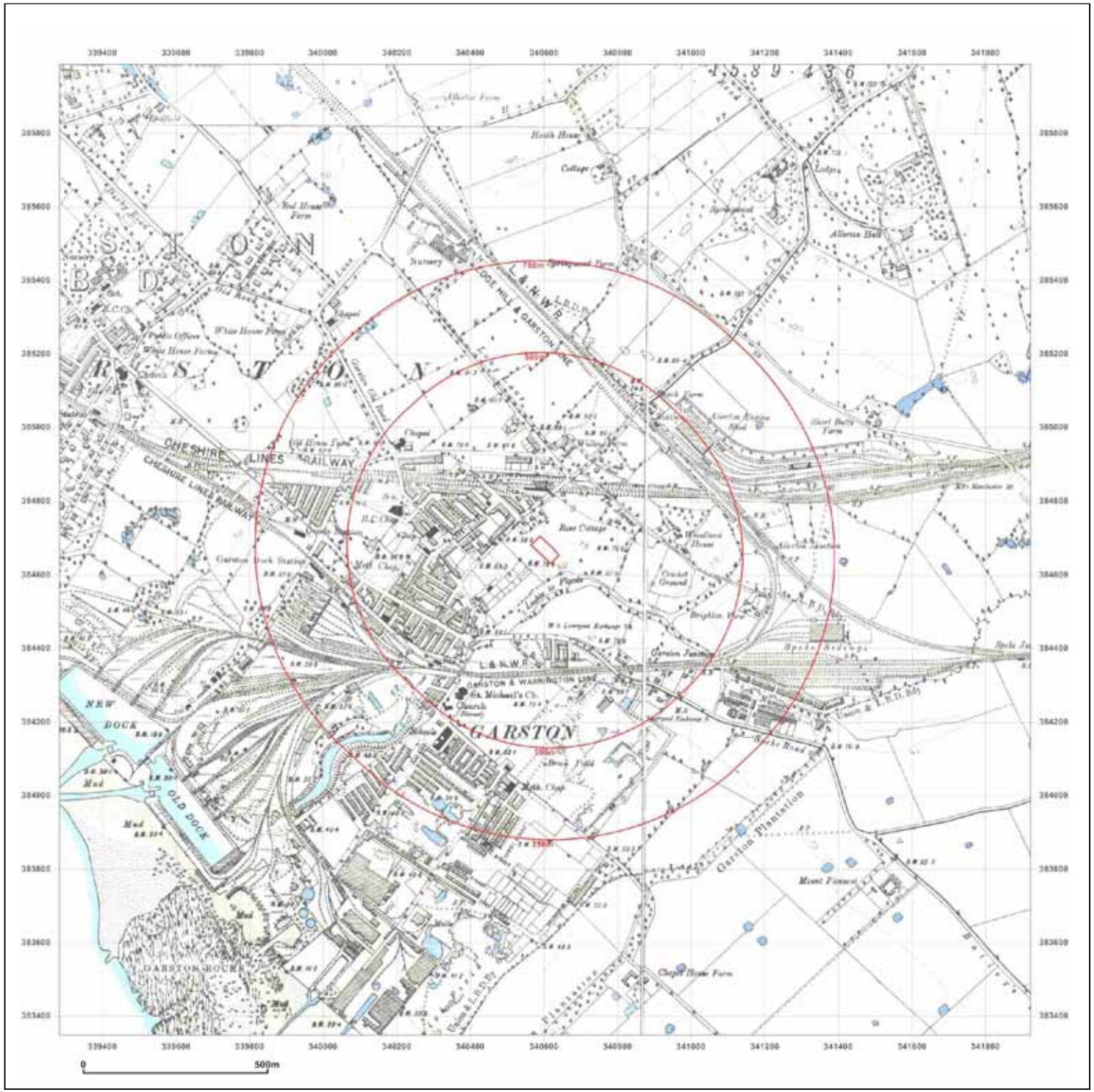

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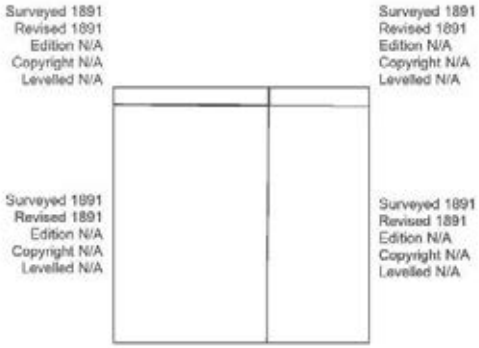

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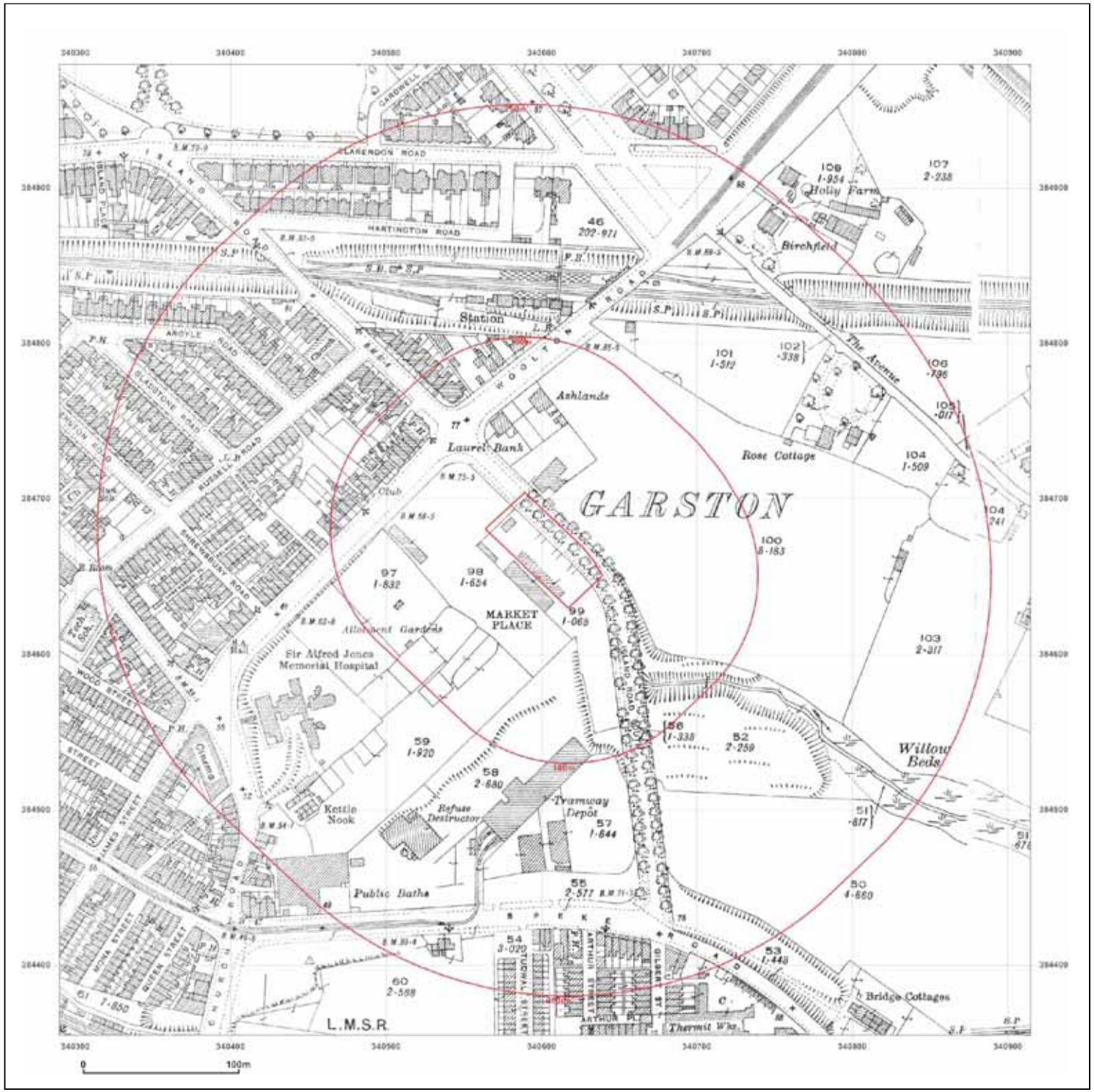

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Map Name: County Series
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Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
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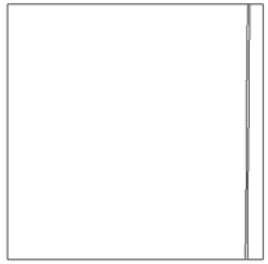

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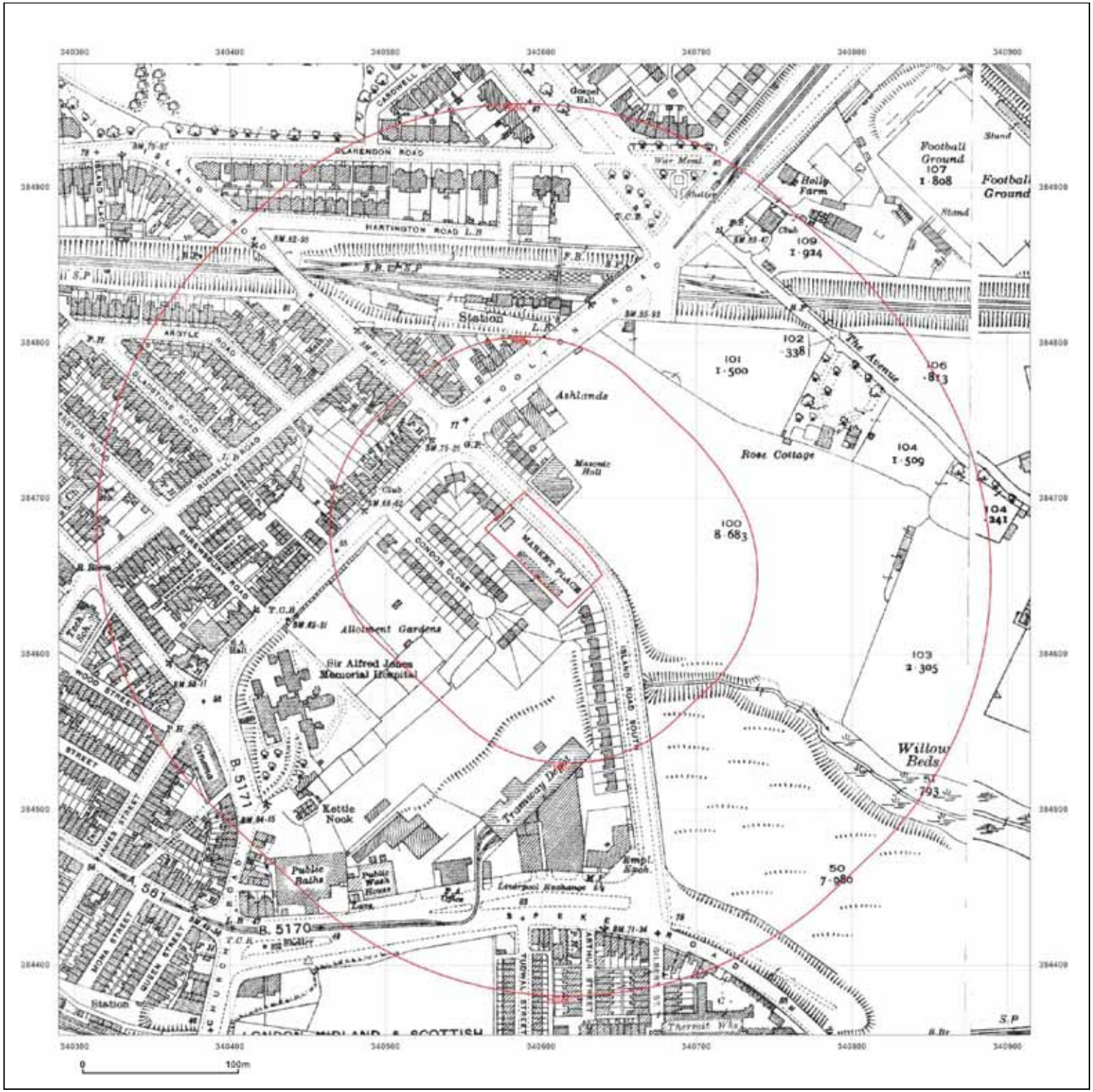

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Revised 1936
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Copyright N/A
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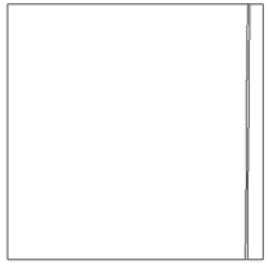

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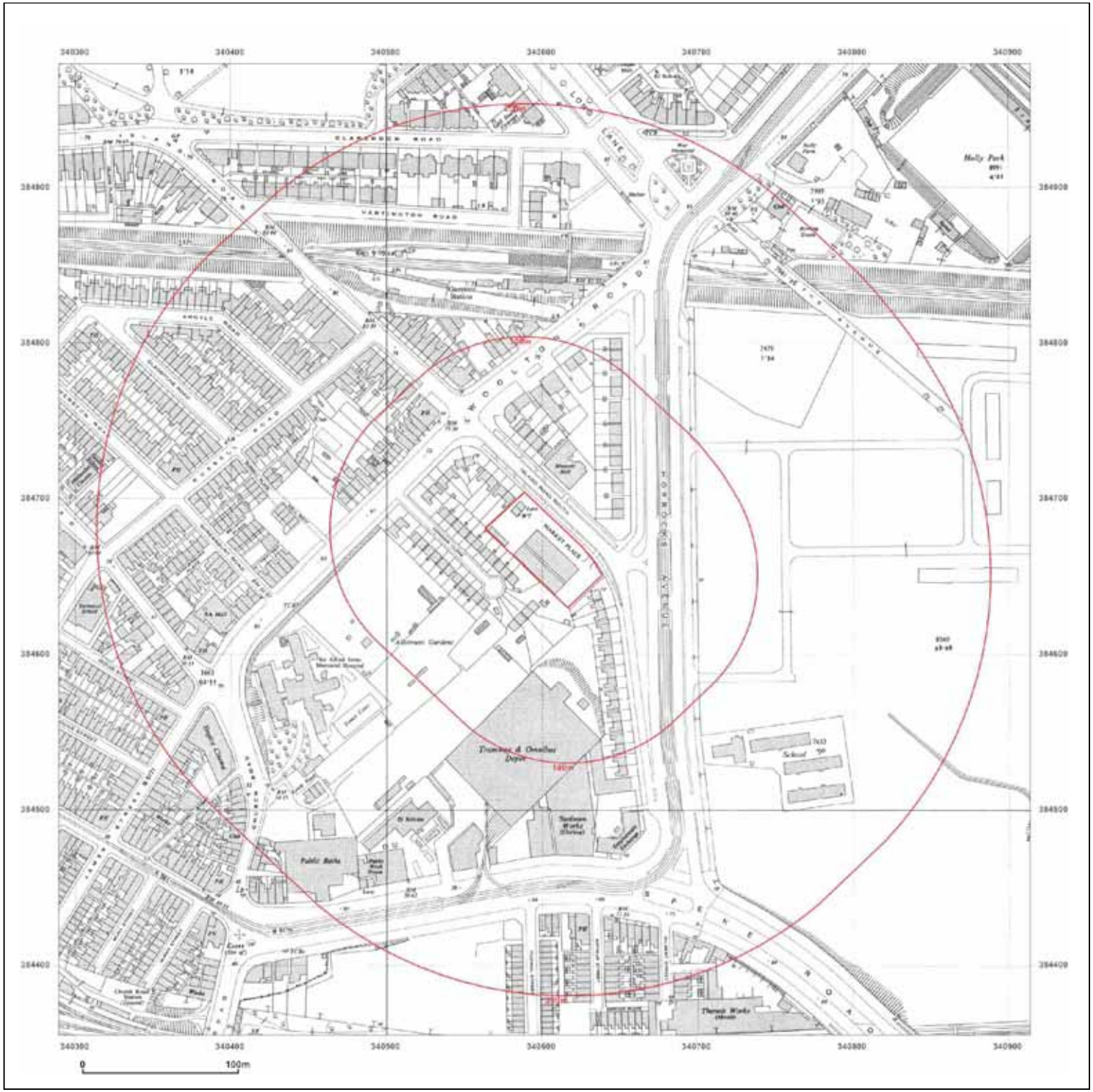

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Map date: **1951**

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Printed at: 1:2,500

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Revised 1951
Edition N/A
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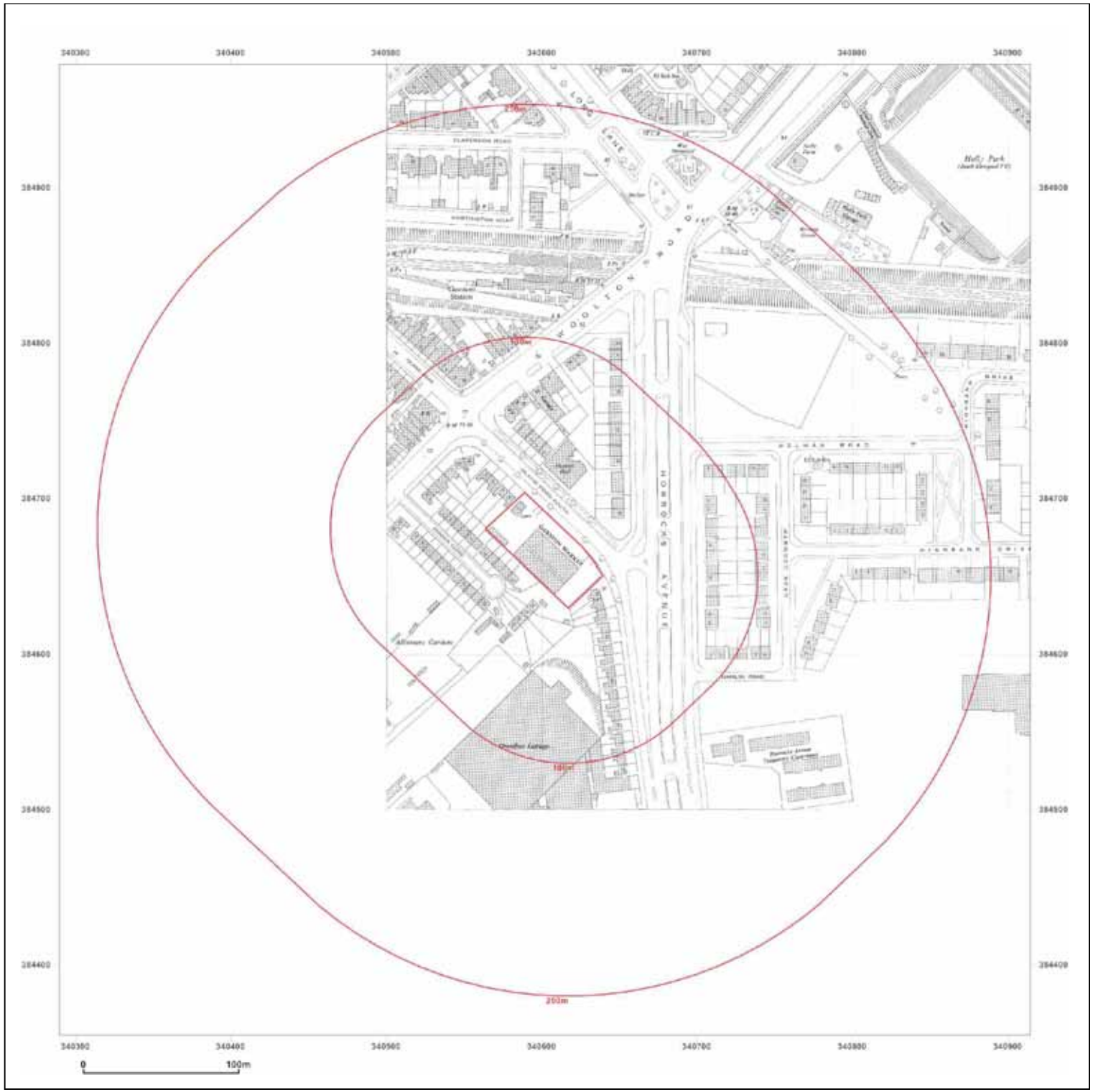

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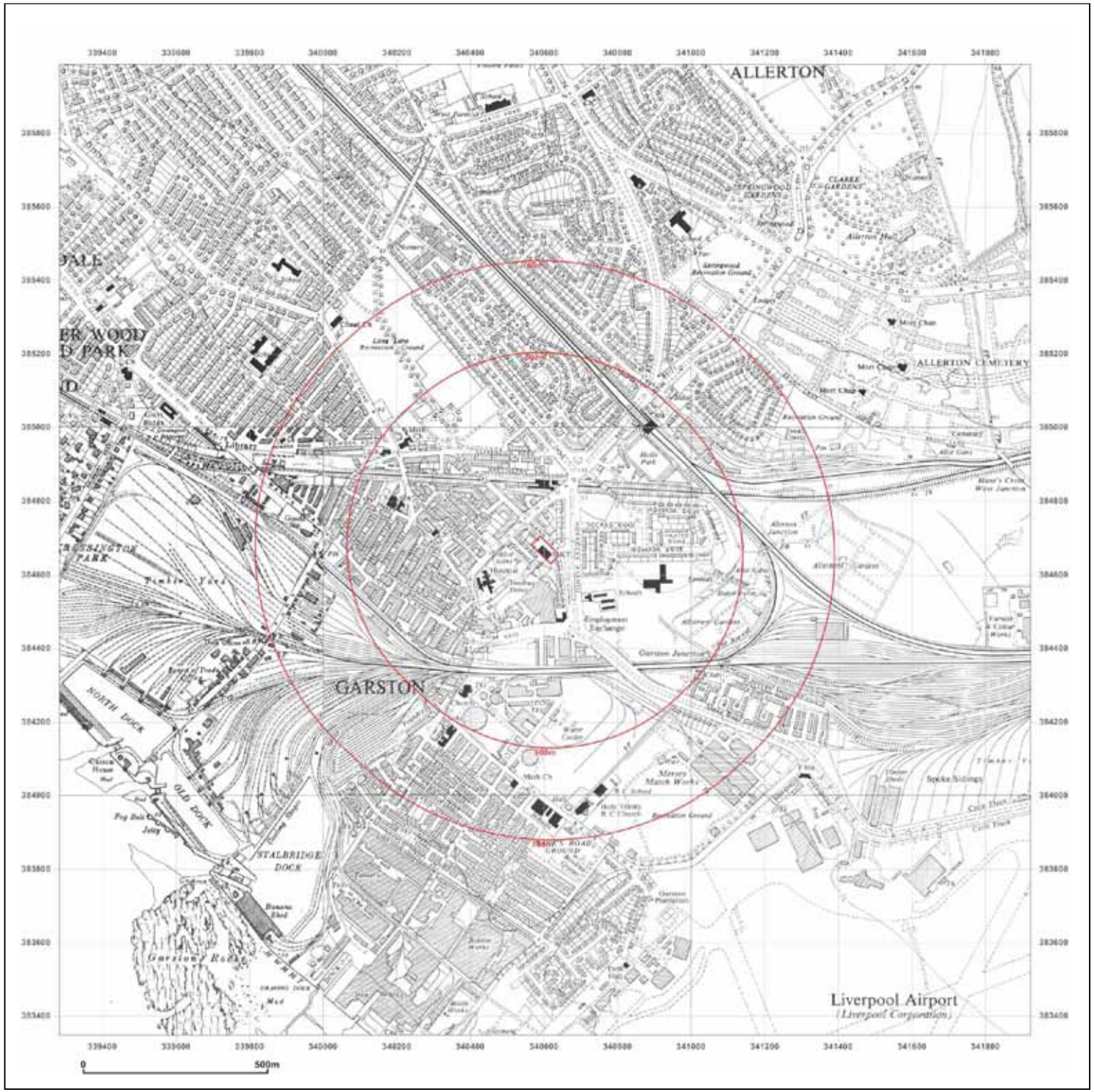

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Revised 1956
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Surveyed 1949
Revised 1949
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Revised 1953
Edition N/A
Copyright 1954
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Surveyed 1956
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Edition N/A
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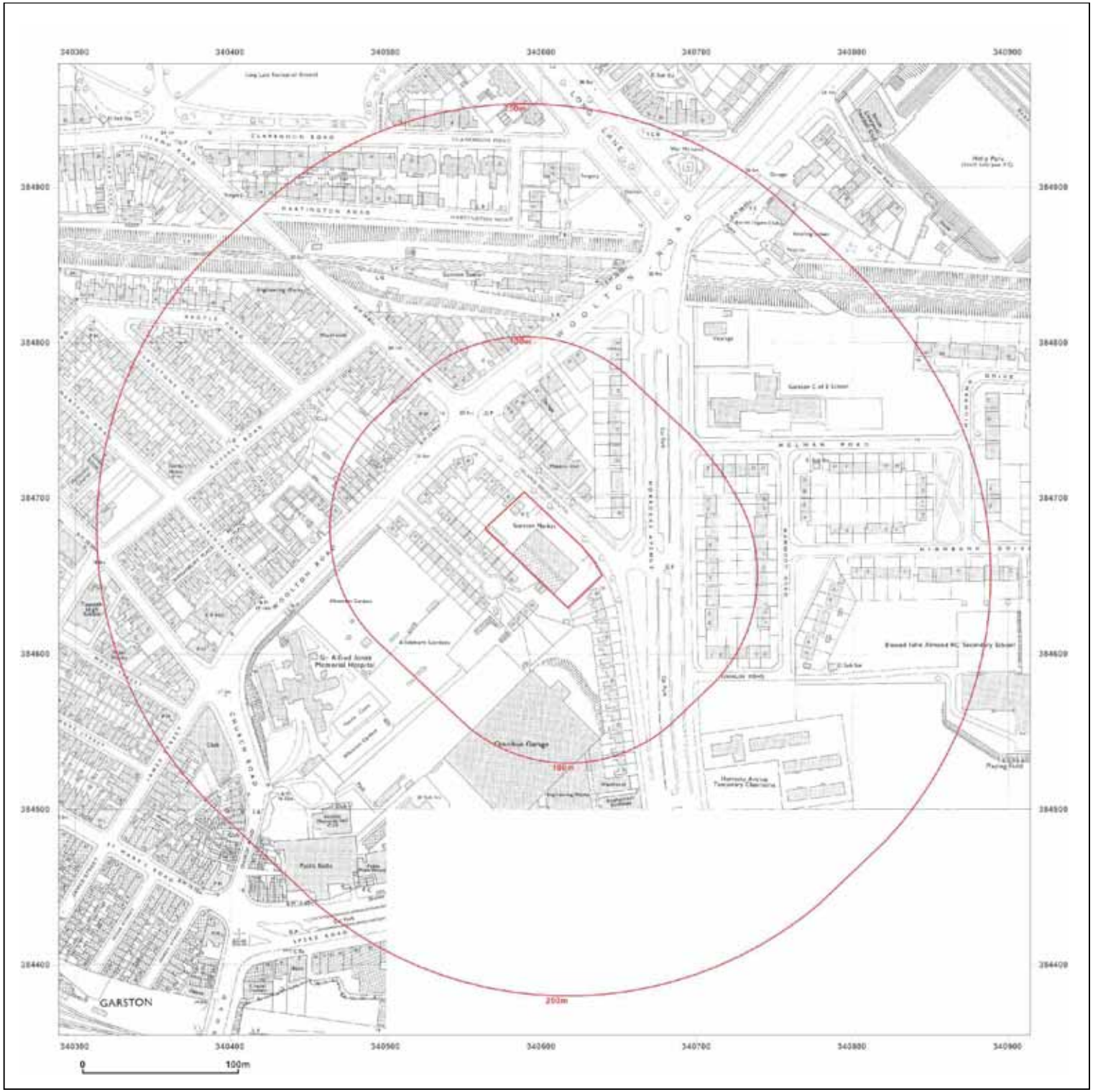

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Report Ref: EMS-245570_329597
Grid Ref: 340602, 384667

Map Name: National Grid
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Surveyed 1951
Revised 1970
Edition N/A
Copyright 1971
Levelled 1960

Surveyed 1951
Revised 1970
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Copyright 1971
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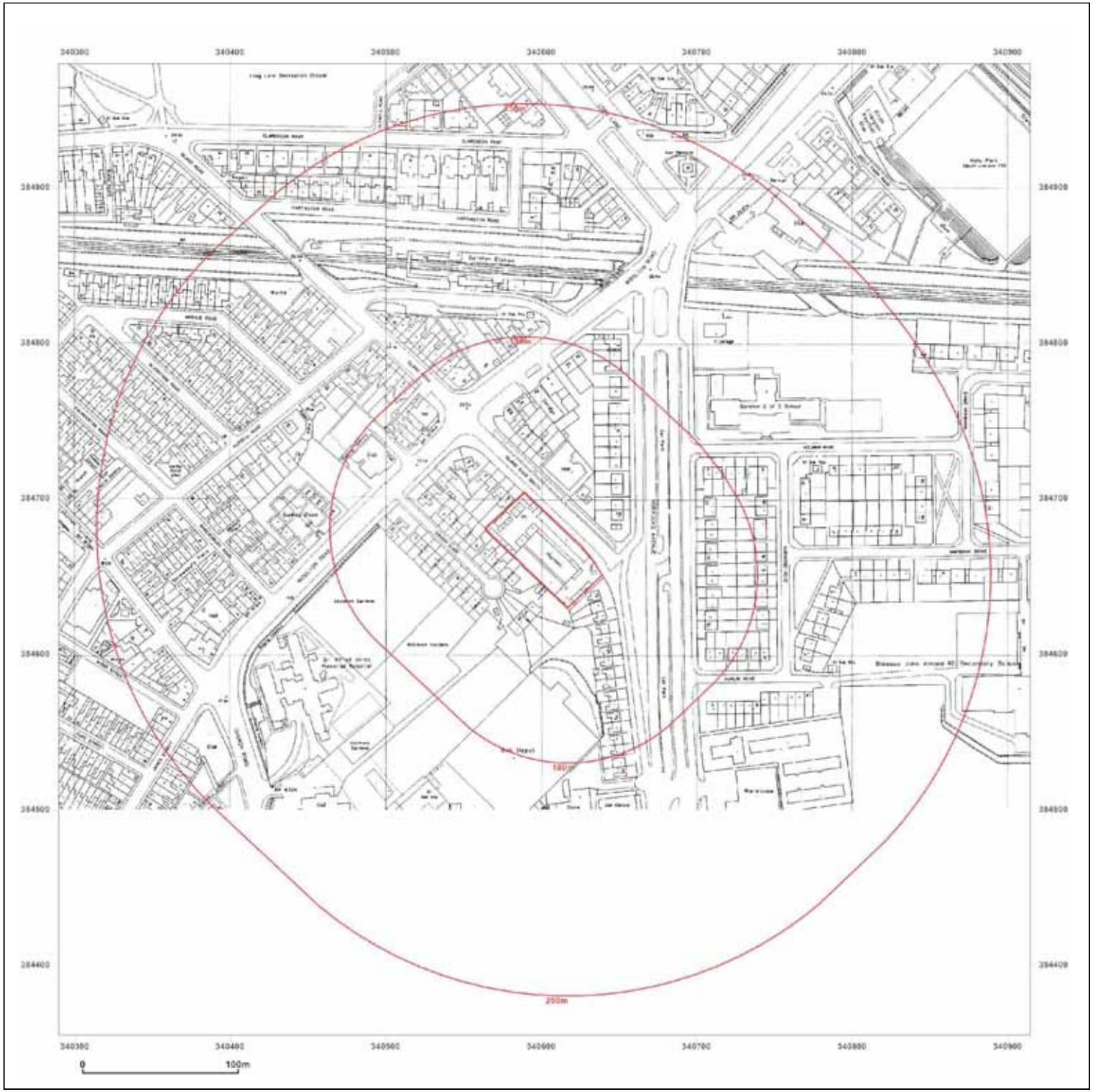

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Report Ref: EMS-245570_329597
Grid Ref: 340602, 384667

Map Name: National Grid
Map date: 1993
Scale: 1:1,250
Printed at: 1:2,500

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

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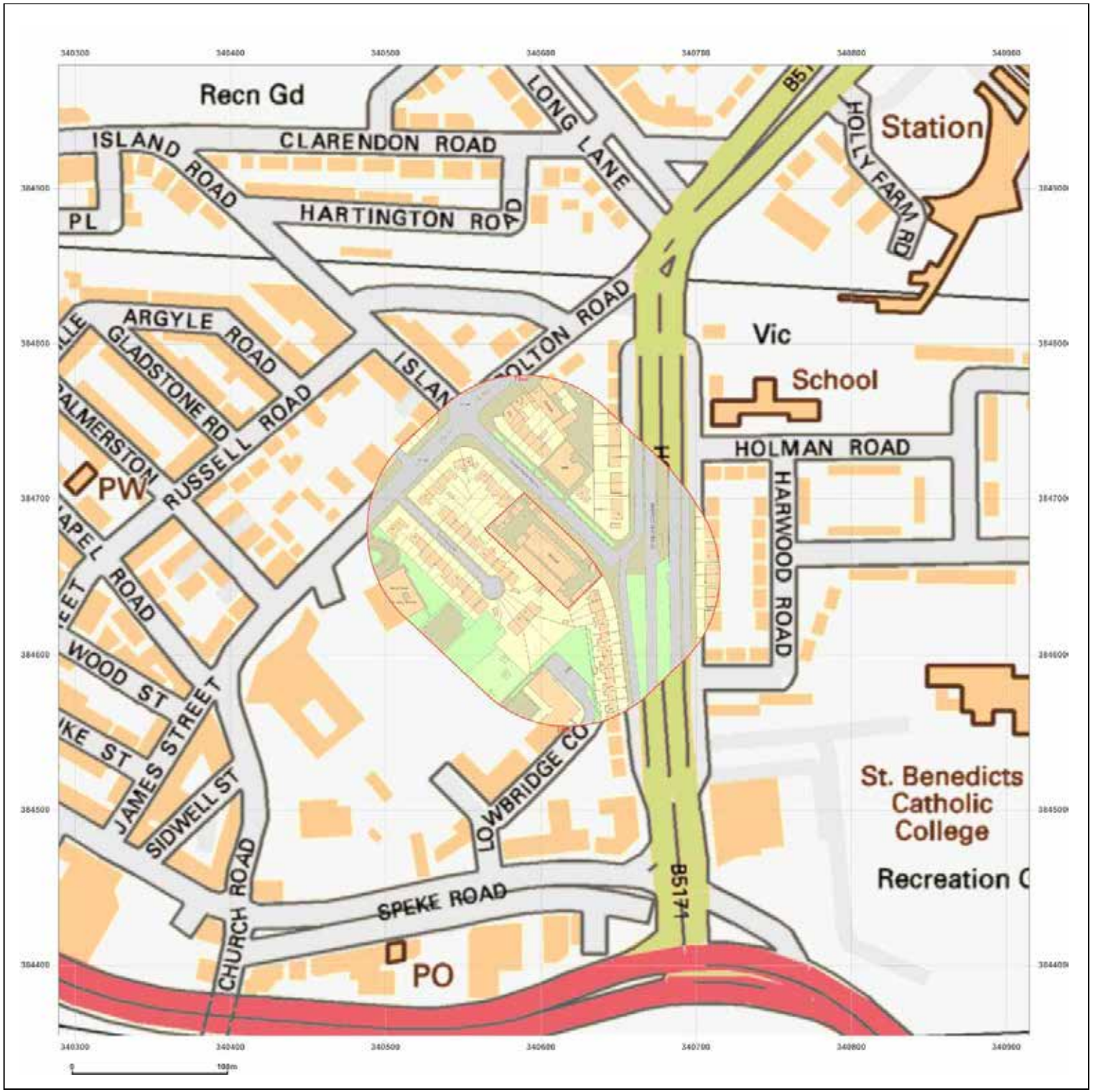

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Site Details:

Client Ref: EMS_245570_329597
Report Ref: EMS-245570_329597
Grid Ref: 340602, 384667

Map Name: MasterMap
Map date: 2012
Scale: 1:1,250
Printed at: 1:2,500

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2012

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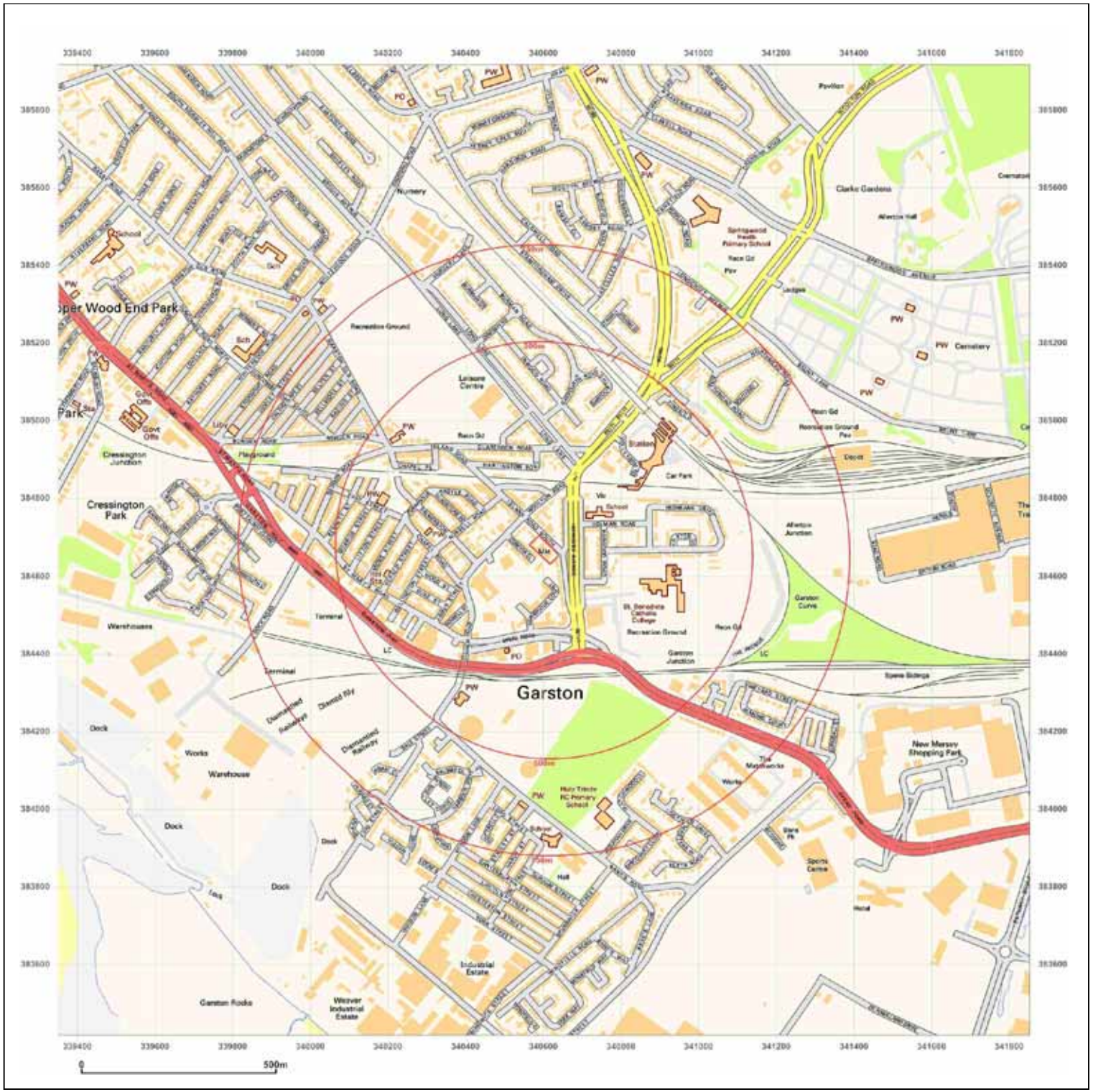

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Site Details:

Client Ref:
Report Ref:
Grid Ref:

Map Name:

Map date:

Scale:

Printed at:

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2012

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Production date:

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APPENDIX F

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- Site Services

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Fax: 01283 211968

info@grm-uk.com

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SJ48SW/74

OSIRIS – CESCO LTD.

SITE INVESTIGATION DIVISION

BOREHOLE No. 7

REPORT No. D82147

LOCATION GARSTON BUS STATION, LIVERPOOL

Ground/Bed Level

Client MERSEYSIDE PASSENGER TRANSPORT EXECUTIVE

Coordinates 4061, 8455

Method/Diameter 5 cwt. Saga Hoist with Shear Leg Tripod
150mm. dia. casing and boring to 4.70m. bgl.

Boring Commenced 26/11/82

Boring Completed 29/11/82

Ground Water observations are given at end of log

Remarks

Chiselling from 3.20 to 4.20m. bgl.

Scale 1: 50

Description of Strata	Depth (m)	Reduced Level	Legend	Ref. No.	Type	Depth (m) From	Depth (m) To	N blows/0.3m
TOPSOIL	0.15							
Dark brown sandy silty CLAY with organic material and brick rubble. (MADE GROUND)				1	D	1.00		
	1.45							
Soft brown silty CLAY with occasional organic material.	1.75			2	U	1.50	1.95	(11)
Soft brown silty, sandy CLAY.				3	D	1.95	2.00	
	2.70			4	D	2.50		
Loose brown silty f.m.c. SAND.	3.20			5	D	2.80		
Red brown f.m.c. grained SANDSTONE. (Recovered as gravel).				6	S/D	3.00	3.90	89R
				7	D	3.20	4.20	
								R
				8	C	4.00	4.70	
	4.70							

GROUND WATER OBSERVATIONS

Inflow observed at (m)	Visual rate of inflow	Water sealed off by casing at (m)
1.70	Seepage	2.00

Date	Time	Hole Depth (m)	Casing Depth (m)	Water Level (m)
29/11	0715	2.50	2.50	Dry
	1800	4.20	3.50	Dry

Key: **SAMPLES:** U=Undisturbed. B=Bulk Disturbed. D=Disturbed. P=Piston. W=Water.
STANDARD PENETRATION TEST: S=Hollow shoe. C=Cone point. R=Refer to text or explanatory data sheet.
( ) No. of blows to drive U sample.
f = fine. m = medium. c = coarse.

SJ48SW/72

OSIRIS - CESCO LTD.

SITE INVESTIGATION DIVISION

BOREHOLE No. 5

REPORT No. D82147

LOCATION GARSTON BUS DEPOT, LIVERPOOL

Ground/Bed Level

Client MERSEYSIDE PASSENGER TRANSPORT EXECUTIVE

Coordinates 4061, 8857

Method/Diameter
1½-ton Pilcon 'Wayfarer' Shell and Auger rig.
200mm. dia. casing and boring to 7.12m. bgl.

Boring Commenced 22/11/82

Boring Completed 22/11/82

Ground Water observations are given at end of log

Remarks
Concrete slab broken out between 0.00 and 0.28m. bgl with power tool.
Chiselling between 6.00 and 7.00m. bgl.

Description of Strata	Depth (m)	Reduced Level	Legend	Ref. No.	Type	Depth (m) From	Depth (m) To	N blows/0.3m
Reinforced concrete slab.	0.28							
Loose brown ash and f.m. SAND with some gravel and brick. (MADE GROUND)				1	D	1.00		
				2	S/D	1.00	1.45	R
						1.45	1.90	9
	2.10			3	D	2.00		
Loose brown silty slightly clayey f. SAND with a little f. gravel. (MADE GROUND)				4	S/D	2.00	2.45	R
	2.50					2.45	2.90	7
Loose brown f.m.c. SAND/GRAVEL with occasional sandstone cobbles, a thin layer of silty clay was recorded at 3.50m.				5	W	2.80		
				6	D	3.00		
				7	S/D	3.00	3.45	2
						3.45	3.90	4
	4.10			8	S/D	4.00	4.45	R
Soft dark grey silty CLAY.						4.45	4.90	10
				9	D	4.10		
				10	U	4.50	4.95	(13)
	4.95			11	D	4.95	5.00	
Soft brown clayey sandy SILT with traces of organic matter.				12	U	5.00	5.45	(48)
	5.45			13	D	5.45	5.50	
Light brown clayey f.m. SAND with some subangular f.m. sandstone gravel.	5.90			14	D	5.90		
	6.05			15	D	6.00		
Red f.m.c. sandstone GRAVEL and COBBLES.				16	S/D	6.05	6.20	R
				17	D	6.05		
				18	D	6.50		
Red f.m. grained SANDSTONE. (Recovered as gravel).	7.12			19	C	7.00	7.12	R

Key: **SAMPLES:** U=Undisturbed. B=Bulk Disturbed. D=Disturbed. P=Piston. W=Water.
STANDARD PENETRATION TEST: S=Hollow shoe. C=Cone point. R=Refer to text or explanatory data sheet.
( ) No. of blows to drive U sample.
f = fine. m = medium. c = coarse.

T100

APPENDIX G

GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

Tel: 01283 551249

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GroundSure EnviroInsight

Address:	,
Date:	9 Apr 2014
Reference:	EMS-245570_329599
Client:	EmapSite

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	24-Jun-2009
Grid Reference:	340602.384667
Site Size:	0.25ha

Contents Page

Overview of Findings

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

Section 1:	On-site	0-50m	51-250	251-500
1.1.1	0	0	0	0
1.1.2	0	0	0	0
	0	0	0	0
	0	0	0	0
1.1.5	0	0	0	0
1.1.6	0	0	0	0
1.1.7	0	0	0	1
	0	0	0	0
1.1.9	0	0	0	0
	0	0	0	2
1.2	0	0	0	2
1.3				
1.3.1	0	0	1	0
1.3.2	0	0	0	0
1.4	0	0	0	0

Section 2: Landfill	On-site	0-50m	51-250	251-500	501-1000	1000-5000
2.1						
2.1.1	0	0	0	0	0	Not searched
2.1.2	0	0	0	1	0	0
2.1.3	0	0	0	0	0	0
2.1.4	0	0	0	0	0	0
2.2						
	0	0	3	1	Not searched	Not searched
2.2.2	0	0	0	0	4	8

Section 3: [redacted]

	On-site	0-50m	51-250	251-500
3.1 [redacted]	0	1	15	Not searched
3.2 [redacted]	0	0	1	0
3.3 [redacted]	0	0	0	0

Section 4: [redacted]

[redacted]	No
[redacted]	Yes

Section 5: [redacted] 0-500m

[redacted]	Yes
5.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
[redacted]	0	0	0	0	2	0
[redacted]	0	0	0	0	0	0
[redacted]	0	0	0	0	0	0
5.6 [redacted])	0	0	0	0	Not searched	Not searched

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
[redacted]	No	No	No	No	No	No
5.8 [redacted]	0	0	0	0	Not searched	Not searched
5.9 [redacted]	No	No	No	Not searched	Not searched	Not searched

Section 6: [redacted]

[redacted]	No
[redacted]	No
6.3 [redacted]	No
[redacted]	No
[redacted]	No
[redacted]	Limited potential
[redacted]	Low

Section 7: [redacted]

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
7.1 [redacted]	0	0	0	0	0	2
7.2 [redacted]	0	0	0	0	0	0
7.3 [redacted]	0	0	0	0	0	0
7.4 [redacted]	0	0	0	0	0	4
7.5 [redacted]	0	0	0	0	0	4
7.6 [redacted]	0	0	0	0	0	0
7.7 [redacted]	0	0	0	0	0	1
7.8 [redacted]	0	0	0	0	0	0
7.9 [redacted]	0	0	0	0	0	0
7.10 [redacted]	0	0	0	0	0	0
7.11 [redacted]	0	0	0	0	0	0
7.12 [redacted]	0	0	0	0	0	0
7.13 [redacted]	0	0	0	0	0	0

Section 8: [redacted]

8.1 [redacted]	Very low

Section 9: [redacted]

9.1 [redacted]	No
[redacted]	Negligible
9.3 [redacted]	No

Using this report

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

1. Environmental Permits, Incidents and Registers

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

2. Landfills and Other Waste Sites

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

3. Current Land Uses

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

4. Geology

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

5. Hydrogeology and Hydrology

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

6. Flooding

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

7. Designated Environmentally Sensitive Sites

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

8. Natural Hazards

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

9. Mining

Provides information on areas of coal and shallow mining.

10. Contacts

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

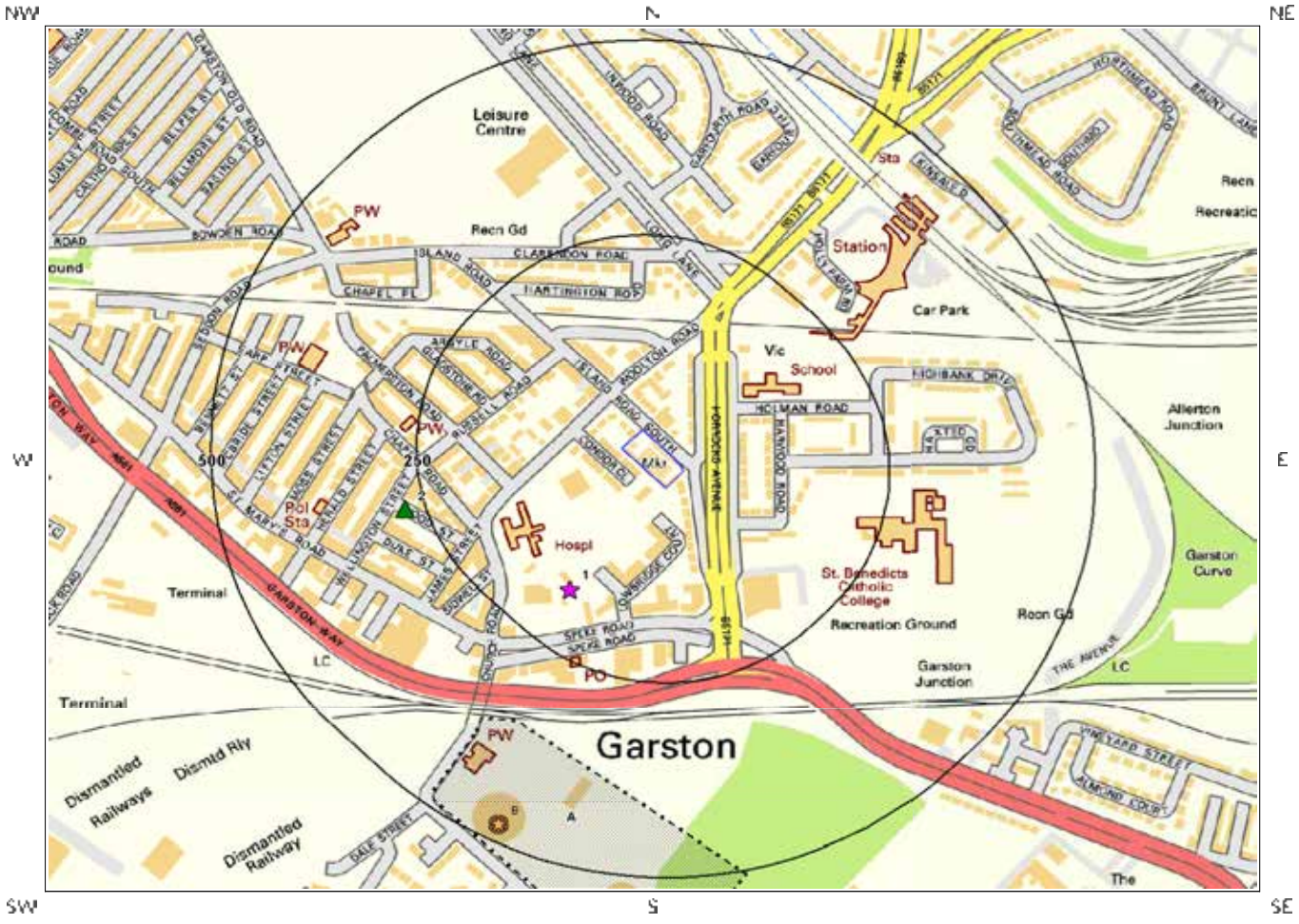
Note: Maps

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

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

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

1. Environmental Permits, Incidents and Registers Map



Environmental Permits.
Incidents and Registers Legend

Mapping sourced from Ordnance Survey

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

1. Environmental Permits, Incidents and Registers

1.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

0

Database searched and no data found.

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

1

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

ID	Distance	Direction	NGR	Details	
2	276.0	W	340300 384600	Address: Garston Way Serv Stn, St Marys Rd, L19 2LA Process: petrol vapour recovery process Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

---

1.1.8 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

0

Database searched and no data found.

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

2

The following records are represented as polygons on the Industrial Sites and Processes map:

ID	Distance	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
78	478.0	SW	00HZ/0718	340414 0 384197 0	Approved	07/04/2000	British Gas N.W, Bank's Road Liverpool, L19 8HY	Application For The Continuation Of Deemed Hazardous Substance Consent	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

ID	Distance	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
8B	478.0	SW	00HZ/0712	340414 0 384197 0	Historica Consent	06/04/2000	British Gas N.W, Bank's Road Liverpool, L19 8HY	Application For The Continuation Of Deemed Hazardous Substance Consent	Enforcement: No Enforcement Notifiec Date of Enforcement: No Enforcement Notifiec Comment: No Enforcement Notifiec

1.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 2

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

ID	Distance	Direction	NGR	Address	Type	Status
3A	349.0	SW	340600 383400	british gas,banks road,garston,liverpool,l19 8hy	NIHHS	2001
4A	349.0	SW	337700 389800	british gas,wavertree,liverpoo	NIHHS	2001

1.3 Environment Agency Recorded Pollution Incidents

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

1

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

ID	Distance	Direction	NGR	Details	
1	175.0	SW	340500 384500	Incident Date: 14/09/2001 Incident Identification: 33171 Pollutant: Pollutant Not Identifiec Pollutant Description: Not Identifiec	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

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

0

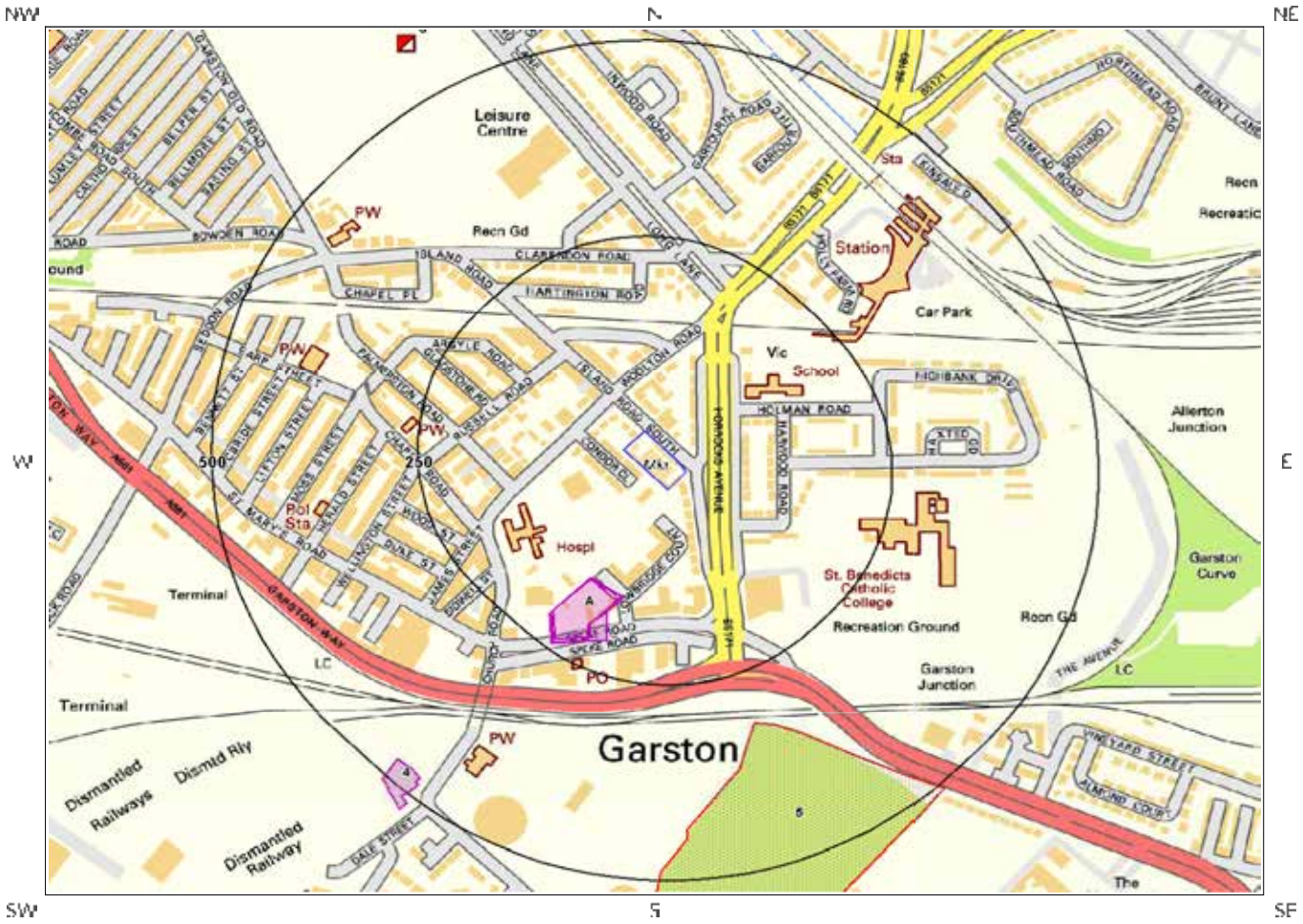
Database searched and no data found.

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

How many records of sites determined as contaminated land under Section 78R of the Environmenta Protection Act 1990 are there within 500m of the study site? 0

Database searched and no data found.

2. Landfill and Other Waste Sites Map



Landfill and Other Waste Sites Legend

Mapping sourced from Ordnance Survey

Site Outline

Search Buffers (m)

E.A. Active Landfill

E.A. Historic Landfill

Local Authority Landfill

Historic and Planned Waste Sites

E.A. Licensed Waste Site

BGS / DoE Survey Landfill

2. Landfill and Other Waste Sites

2.1 Landfill Sites

2.1.1 Records from Environment Agency landfill data within 1000m of the study site:

0

Database searched and no data found.

2.1.2 Records of Environment Agency historic landfill sites within 1500m of the study site:

1

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

ID	Distance (m)	Direction	NGR	Details	
5	317.0	S	340700 384100	Site Address: Banks Road, Merseyside Waste Licence: - Site Reference: GDO M116 Waste Type: , Waste unknown Environmental Permitting Regulations (Waste) Reference: -	Licence Issue Licence Surrendered Licence Hold Address: - Operator:

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

0

Database searched and no data found.

2.1.4 Records of Local Authority landfill sites within 1500m of the study site:

0

Database searched and no data found.

2.2 Other Waste Sites

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

4

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

ID	Distance (m)	Direction	NGR	Details		
1A	145.0	SW	340520 384478	Type of Site: Refuse Destructor Site Address: N/A	Planning Application Reference: N/A Date: 1905	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
2A	146.0	SW	340518 384479	Type of Site: Refuse Destructor Site Address: N/A	Planning Application Reference: N/A Date: 1907	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
3A	147.0	SW	340514 384474	Type of Site: Refuse Destructor Site Address: N/A	Planning Application Reference: N/A Date: 1927	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
4	473.0	SW	340294 384259	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1970	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

2.2.2 Records of Environment Agency licensed waste sites within 1500m of the study site:

12

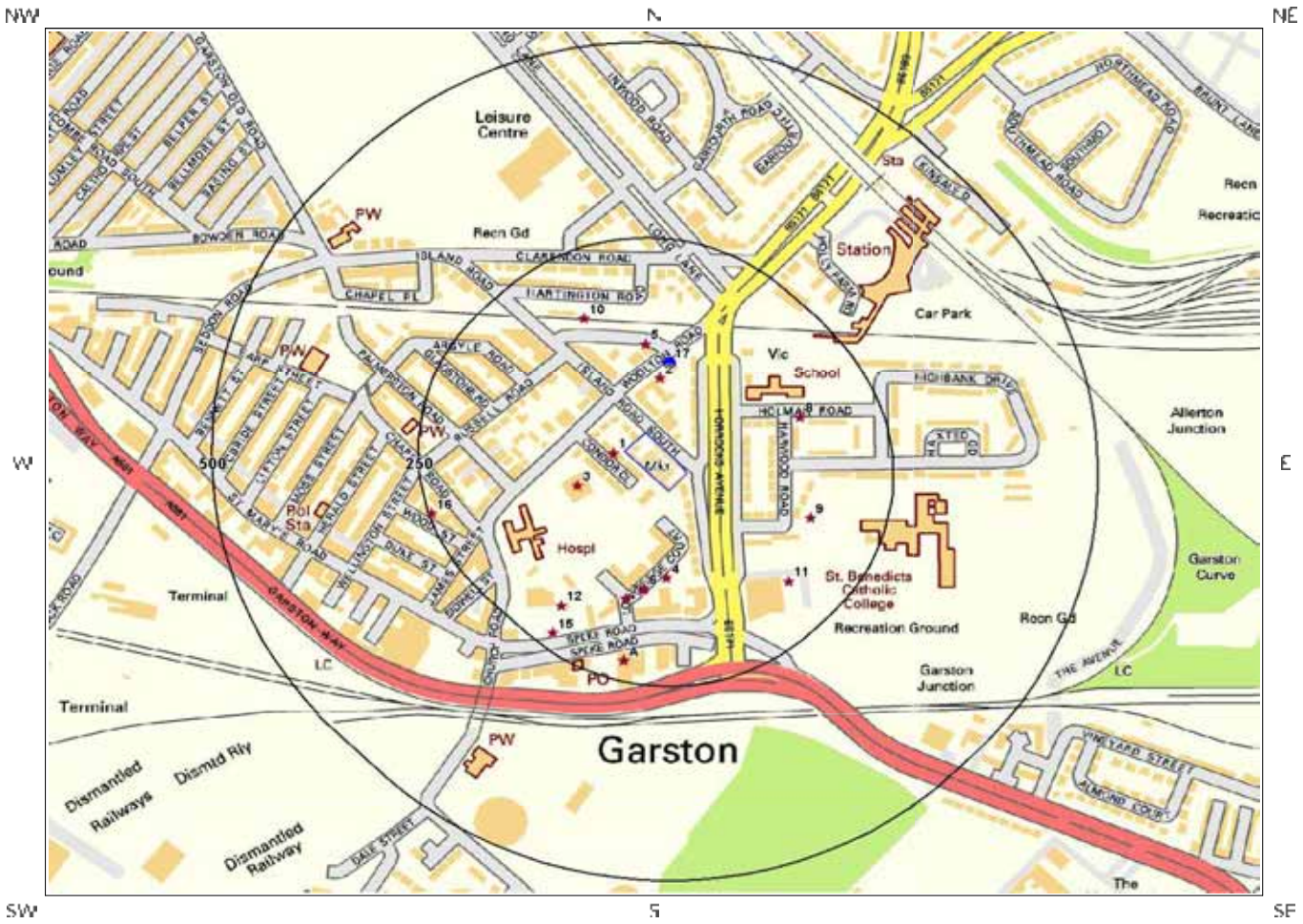
The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
6	574.0	NW	340300 385200	Site Address: Garston Old Road, Liverpool Merseyside, L19 Type: Household, Commercial & Industrial Waste T Str Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: LCC002 EPR reference: EA/EPR/YP3196CX/S002 Operator: Liverpool City Council Street Cleansing D S C Waste Management licence No: 53883 Annual Tonnage: 25000.0	Issue Date: 10/10/1991 Effective Date: - Modified: - Surrendered Date: 19/02/2001 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Liverpool City Counil Street Cleaning Dept Correspondence Address: -, -

ID	Distance (m)	Direction	NGR	Details	
Not shown	913.0	F	341550 384710	Site Address: 21, Herald Avenue, Triumph Trading Estate, Liverpool, Merseyside, L24 9BD Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: TL1004 EPR reference: EA/EPR/NP3594CQ/A001 Operator: Mr Kevin Ellison And Mr Colin Ellison Waste Management licence No: 50384 Annual Tonnage: 2499.0	Issue Date: 12/05/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Ellison Motors Correspondence Address: -, -
Not shown	913.0	E	341550 384710	Site Address: 21, Herald Avenue, Triumph Trading Estate, Liverpoool, Merseyside, L24 9BD Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: TL1004 EPR reference: - Operator: Mr Kevin Ellison And Mr Colin Ellison Waste Management licence No: 50384 Annual Tonnage: 0.0	Issue Date: 12/05/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Triumph Trading Estate E L V Correspondence Address: Mr Kevin Ellison 21, Herald Avenue, Triumph Trading Estate, Liverpoool, Merseyside, L24 9BD
Not shown	978.0	SW	340100 383800	Site Address: Weaver Ind Est, Unit 60 Blackburne Street, Liverpool, Merseyside L19 8JA Type: Transfer Station taking Non-Biodegradable Wastes Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BOM004 EPR reference: EA/EPR/HP3992CY/T001 Operator: Bomacks Contractors Ltd Waste Management licence No: 53494 Annual Tonnage: 2083.333	Issue Date: 17/12/1991 Effective Date: 28/03/1997 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Blackburne Street Inert Transfer Station Correspondence Address: -, -
Not shown	1008.0	SW	339657 384240	Site Address: Post Office, Dock Road Garston, Liverpool, Merseyside, L19 2JW Type: Household, Commercial & Industrial Waste T Str Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: AS5002 EPR reference: EA/EPR/PP3094CE/A001 Operator: Associated British Ports Waste Management licence No: 50177 Annual Tonnage: 200000.0	Issue Date: 22/09/2003 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Associated British Ports Transfer Station Correspondence Address: -, -
Not shown	1030.0	S	340327 383642	Site Address: Unit 3 Garston Ind Est Blackburne Street, Speke, Liverpool Merseyside, L19 8JA Type: HCI Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: GGW002 EPR reference: EA/EPR/GP3896SA/A001 Operator: G & G Waste Recycling Ltd Waste Management licence No: 101621 Annual Tonnage: 74999.0	Issue Date: 01/11/2010 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: G & G Waste Recycling Ltd Correspondence Address: -, -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1062.0	F	341700 384700	Site Address: Unit 16, Dolomite Avenue Speke Hall Road, Speke, Liverpool, L24 9GQ Type: Physical Treatment Facility Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: 113F001 EPR reference: - Operator: H3 Environmental Services Ltd Waste Management licence No: 50046 Annual Tonnage: 0.0	Issue Date: 17/11/2000 Effective Date: - Modified: - Surrendered Date: 19/11/2001 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Triumph Trading Park Correspondence Address: -, 22a, St. James Court, Wilderspool Crescent, Warrington WA4 6PS
Not shown	1062.0	E	341700 384700	Site Address: Unit 16, Dolomite Avenue Speke Hall Road, Speke, Liverpool Merseyside, L24 9GQ Type: Physical Treatment Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: 113F001 EPR reference: EA/EPR/NP3998CE/S002 Operator: H3 Environmental Services Ltd Waste Management licence No: 50046 Annual Tonnage: 50000.0	Issue Date: 17/11/2000 Effective Date: - Modified: - Surrendered Date: 19/11/2001 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Triumph Trading Park Correspondence Address: -, -
Not shown	1078.0	S	340300 383600	Site Address: Unit 1, Window Lane Blackburne Street, Liverpool, Merseyside L19 8JD Type: Household, Commercial & Industrial Waste T Str Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: CIT02E EPR reference: EA/EPR/CP3399VZ/T001 Operator: City Centre Commercials Waste Ltd Waste Management licence No: 53570 Annual Tonnage: 6250.0	Issue Date: 07/01/1997 Effective Date: 15/06/2009 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: City Centre Commercials Ltd Correspondence Address: -, -
Not shown	1078.0	S	340300 383600	Site Address: Unit 1, Window Lane Blackburne Street, Liverpool, L19 Type: Household, Commercial & Industrial Waste T Str Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: CCC001 EPR reference: - Operator: City Centre Commercials Ltd Waste Management licence No: 53570 Annual Tonnage: 6250.0	Issue Date: 07/01/1997 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: City Centre Commercials Ltd Correspondence Address: -, Tower House Stopgate Lane, Simonswood, Liverpool Merseyside, L33 4XY
Not shown	1092.0	S	340425 383555	Site Address: Garston Industrial Estate, Unit 16, Blackburne Street, Garston, Liverpool, Merseyside, L19 8JB Type: Physical Treatment Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MAK001 EPR reference: EA/EPR/BP3994CR/A001 Operator: M A K Drums And Containers Waste Management licence No: 50216 Annual Tonnage: 24999.0	Issue Date: 28/01/2004 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: M A K Drums & Containers Correspondence Address: -, -
Not shown	1123.0	SW	340161 383604	Site Address: Unit 30 Weaver Ind Est Blackburn Street, Liverpool, Merseyside, L19 8JA Type: Vehicle Depollution Facility < 5000 tps Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BR0199 EPR reference: EA/EPR/HB3431AY/A001 Operator: Brown Kristopher Waste Management licence No: 104302 Annual Tonnage: 4999.0	Issue Date: 20/06/2012 Effective Date: - Modified: - Surrendered Date: - Expiry Date: Cancelled Date: - Status: Issued Site Name: Unit 30 Weaver Ind Est Correspondence Address: -, -

3. Current Land Use Map



Current Land Use Legend

Mapping sourced from Ordnance Survey

Site Outline

250
500
Search Buffers (m)

Current Industrial Sites

Petrol & Fuel Sites

Underground High Pressure Oil & Fuel Pipelines

3. Current Land Uses

3.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 16

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	14.0	W	1st for Drains	340550 384678	7, Condor Close, Liverpool L19 5NL	Civil Engineers	Engineering Services
2	72.0	N	Tyre Gaffe	340606 384774	8, Woolton Road, Garston Liverpool, L19 5NG	Vehicle Parts and Accessories	Motoring
3	72.0	SW	Heys Court	340506 384636	18, Woolton Road, Garston Liverpool, L19 5NG	Hospitals	Health Practitioners and Establishments
4	112.0	S	Electricity Sub Station	340614 384518	L19	Electrical Features	Infrastructure and Facilities
5	114.0	N	Electricity Sub Station	340589 384818	L19	Electrical Features	Infrastructure and Facilities
6	130.0	S	Electricity Sub Station	340587 384504	L19	Electrical Features	Infrastructure and Facilities
7	147.0	S	Bus Depot	340565 384492	L19	Bus and Coach Stations, Depots and Companies	Public Transport, Stations and Infrastructure
8	155.0	NE	Electricity Sub Station	340776 384724	L19	Electrical Features	Infrastructure and Facilities
9	159.0	E	Electricity Sub Station	340788 384595	L19	Electrical Features	Infrastructure and Facilities
10	165.0	NW	Garston Station	340514 384851	L19	Railway Stations, Junctions and Halts	Public Transport, Stations and Infrastructure
11	184.0	SE	Electricity Sub Station	340762 384514	L19	Electrical Features	Infrastructure and Facilities
12	196.0	SW	Electricity Sub Station	340487 384483	L19	Electrical Features	Infrastructure and Facilities
13A	224.0	S	Bed Shed Direct	340562 384412	3B, Speke Road, Garston Liverpool, L19 2PA	Beds and Bedding	Consumer Products
14A	224.0	S	Paul Antony Beds & Bedrooms	340562 384412	3B, Speke Road, Garston Liverpool, L19 2PA	Beds and Bedding	Consumer Products
15	230.0	SW	Tank	340476 384446	L19	Tanks (Generic)	Industrial Features
16	247.0	W	Works	340330 384601	L19	Unspecified Works Or Factories	Industrial Features

3.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 1

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

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
17	94.0	N	340617 384794	Obsolete	Jnb Autos, Woolton Road Woolton Road, Garston Liverpool, Merseyside, L25	Not Applicable	Obsolete

3.3 Underground High Pressure Oil and Gas Pipelines

Records of high pressure underground pipelines within 500m of the study site: 0

Database searched and no data found.

4. Geology

4.1 Artificial Ground and Made Ground

Database searched and no data found.

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

4.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

4.3 Bedrock and Solid Geology

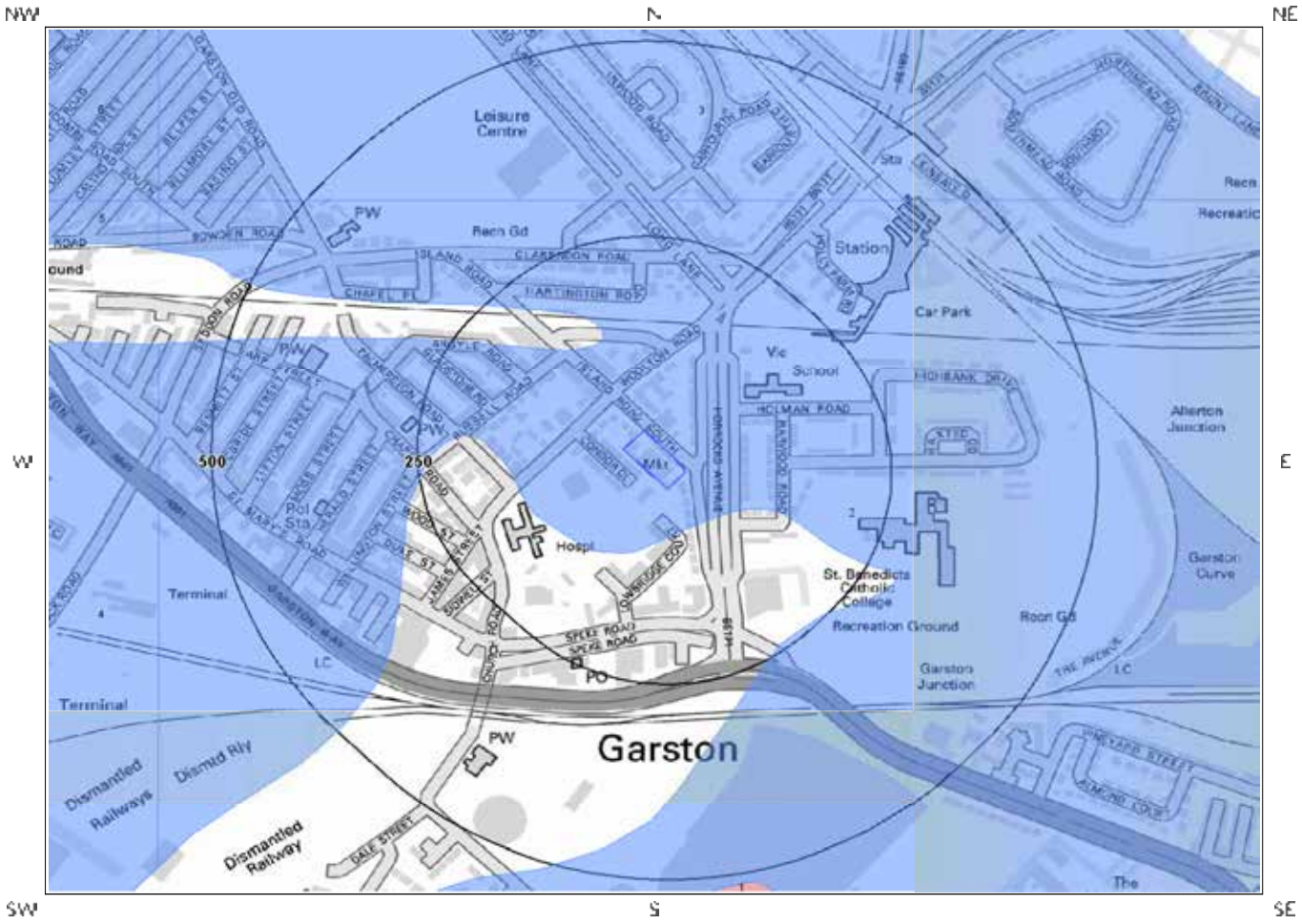
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
CPB-PEST	CHESTER PEBBLE BEDS FORMATION	PEBBLY (GRAVELLY) SANDSTONE

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

5. Hydrogeology and Hydrology

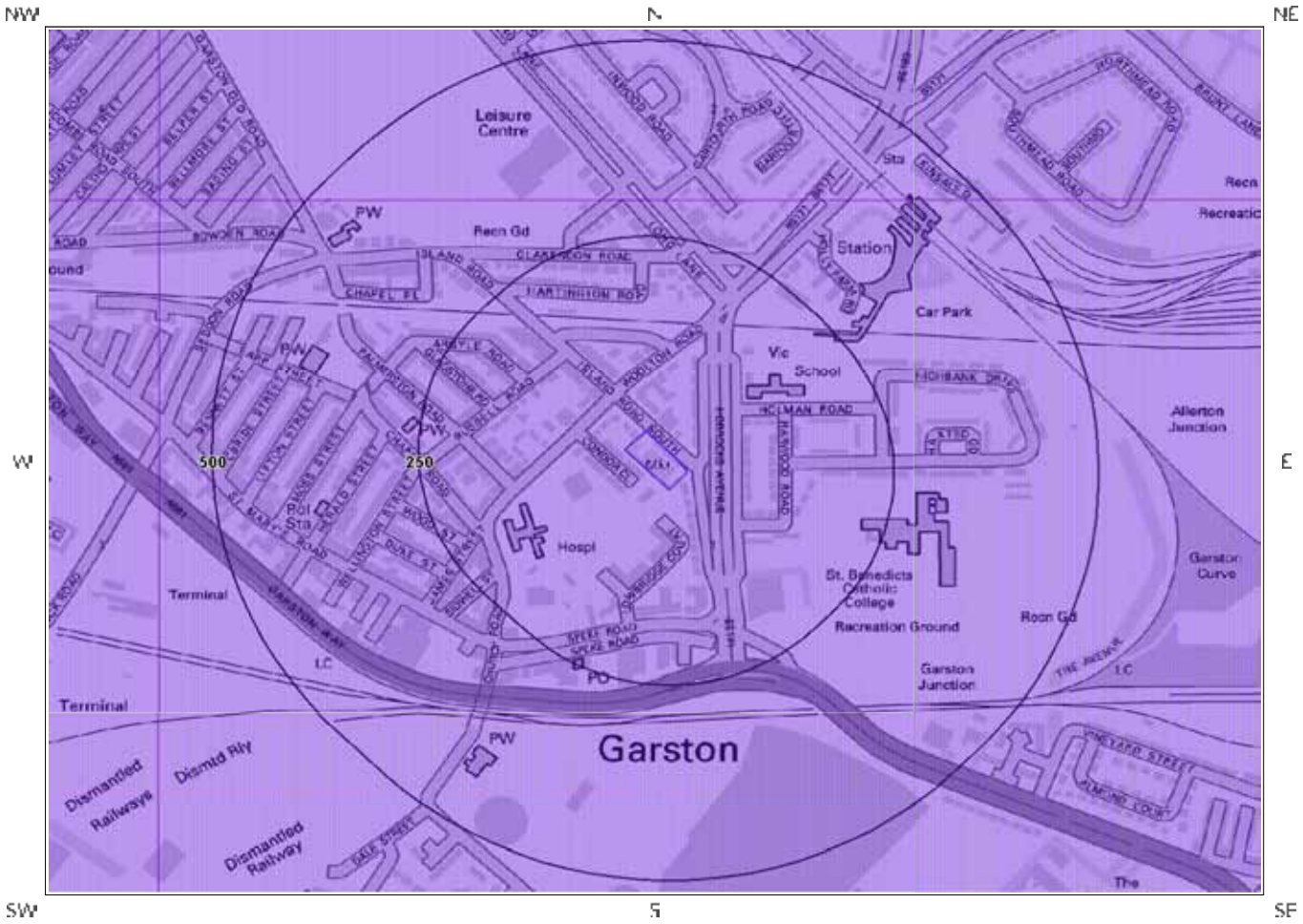
5a. Aquifer Within Superficial Geology



Map Legend

Mapping sourced from Ordnance Survey®

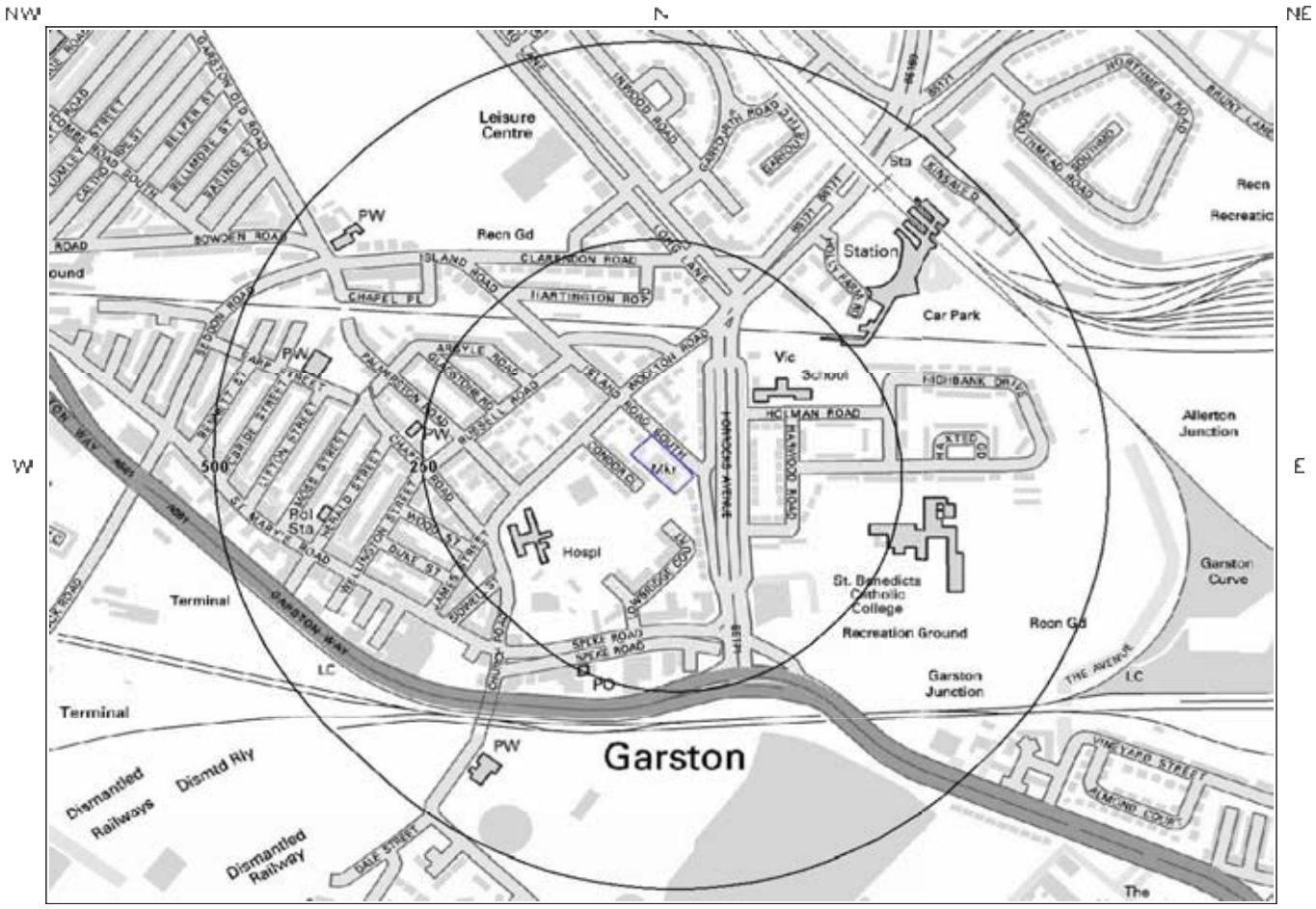
5b. Aquifer Within Bedrock Geology and Abstraction Licenses



Map Legend

Mapping sourced from Ordnance Survey

5c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



Map Legend

Mapping sourced from Ordnance Survey

Site Outline

Search Buffers (m)

250

500

Source Protection Zone 1 - Inner Catchment

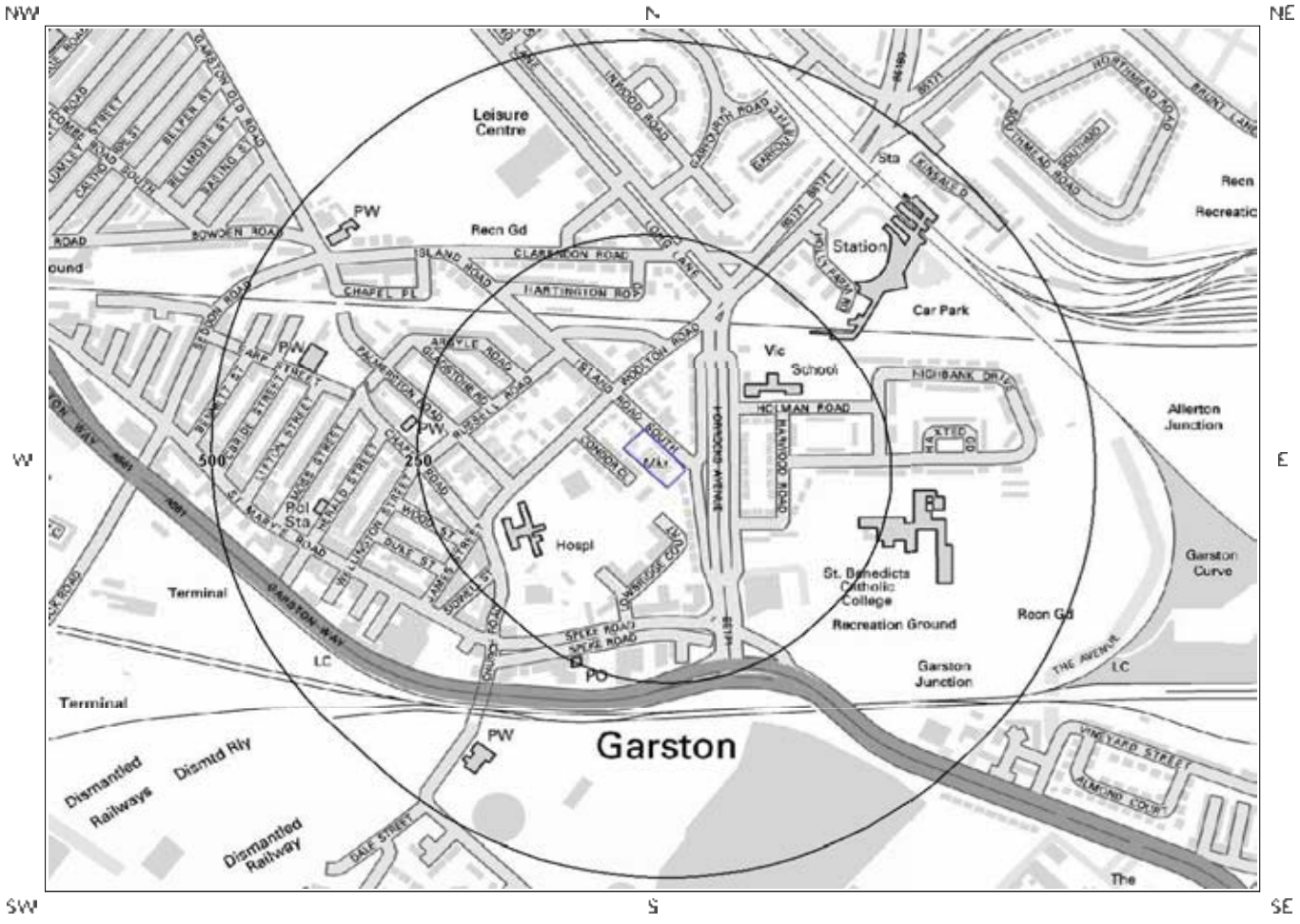
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

5d. Hydrology – Detailed River Network and River Quality



Map Legend

Mapping sourced from Ordnance Survey

Site Outline

Search Buffers (m) 250 500

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

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

5. Hydrogeology and Hydrology

5.1 Aquifer within Superficial Deposits

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

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

The following aquifer records are shown on the Aquifer within Superficial Geology Map (5a):

ID	Distance (m)	Direction	Designation	Description
2	0.0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
3	296.0	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

5.2 Aquifer within Bedrock Deposits

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

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

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (5b):

ID	Distance (m)	Direction	Designation	Description
1	0.0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
2	296.0	N	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

5.3 Groundwater Abstraction Licences

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

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (5b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	929.0	SW	340200 383800	Licence No: 2569030031 Details: Process water Direct Source: Ground Water - North West Region Point: "well On Lh s Premises. King Street. Garston Liverpool' Data Type: Point	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 31/3/1966 Expiry Date: - Issue No: 101 Version Start Date: 1/9/1998 Version End Date:
Not shown	929.0	SW	340200 383800	Licence No: 2569030031 Details: Process Water Direct Source: Ground Water - North West Region Point: Well On Lh s Premises. King Street. Garston Liverpoo Data Type: Point	Annual Volume (m³): 227305 Max Daily Volume (m³): 1000 Original Application No: - Original Start Date: 31/3/1966 Expiry Date: - Issue No: 101 Version Start Date: 18/5/2000 Version End Date:

5.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

5.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

5.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

5.7 River Quality

Is there any Environment Agency information on river quality within 1500m of the study site? No

5.7.1 Biological Quality:

Database searched and no data found.

5.7.2 Chemical Quality:

Database searched and no data found.

5.8 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? No

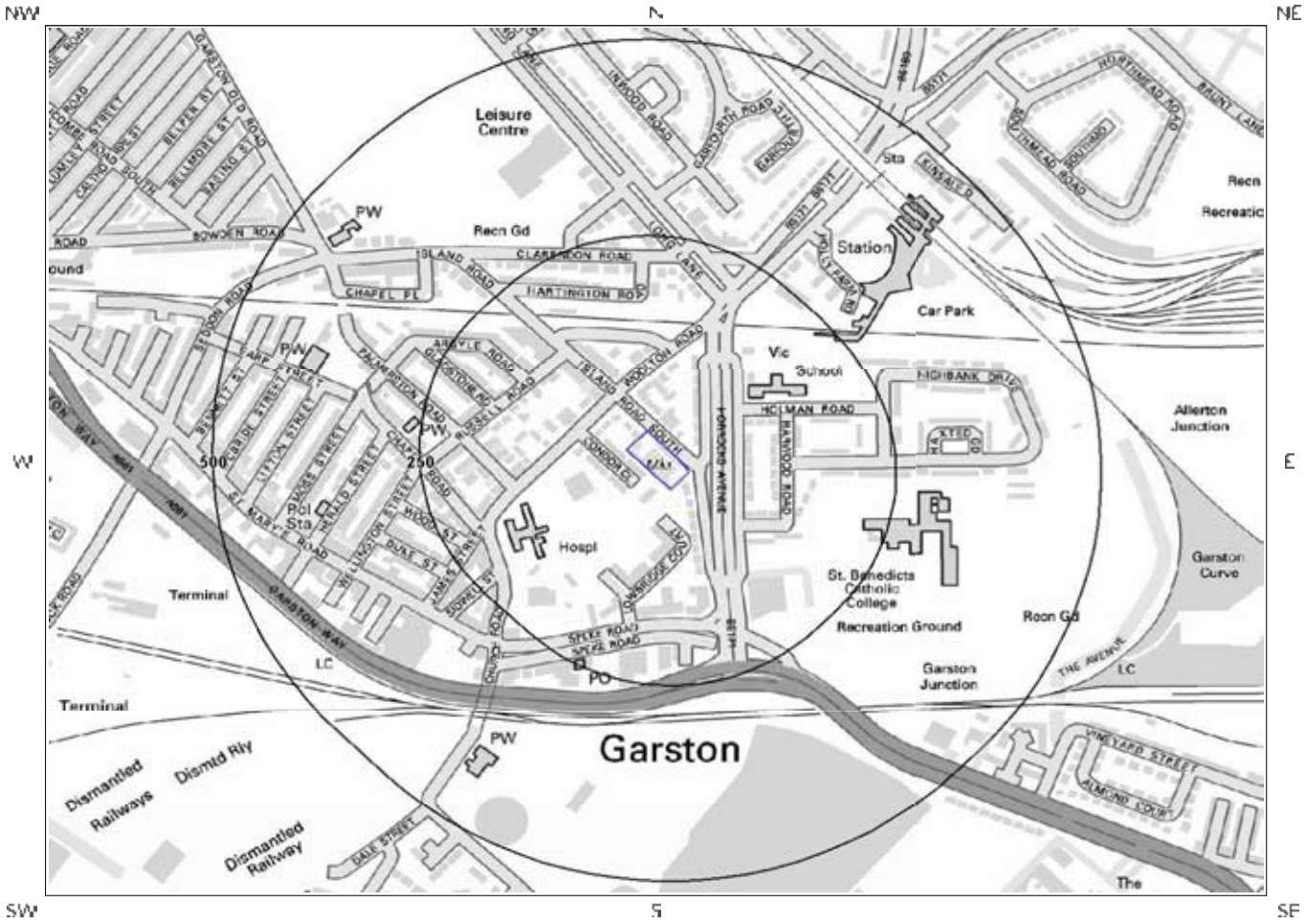
Database searched and no data found.

5.9 Surface Water Features

Are there any surface water features within 250m of the study site? No

Database searched and no data found.

6. Environment Agency Flood Map for planning (from rivers and the sea)



Map Legend

Mapping sourced from Ordnance Survey®

Site Outline

250
500
Search Buffers (m)

Zone 2 Floodplain

Zone 3 Floodplain

Flood Storage Area

Area Benefiting from Flood Defences

Flood Defences

6. Flooding

6.1 Zone 2 Flooding

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

Is the site within 250m of an Environment Agency Zone 2 floodplain? No

Database searched and no data found.

6.2 Zone 3 Flooding

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

Is the site within 250m of an Environment Agency Zone 3 floodplain? No

Database searched and no data found.

6.3 Flood Defences

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

Database searched and no data found.

6.4 Areas benefiting from Flood Defences

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

6.5 Areas benefiting from Flood Storage

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

6.6 Groundwater Flooding Susceptibility Areas

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

Yes

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

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

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

Limited potentia

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

6.7 Groundwater Flooding Confidence Areas

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

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

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

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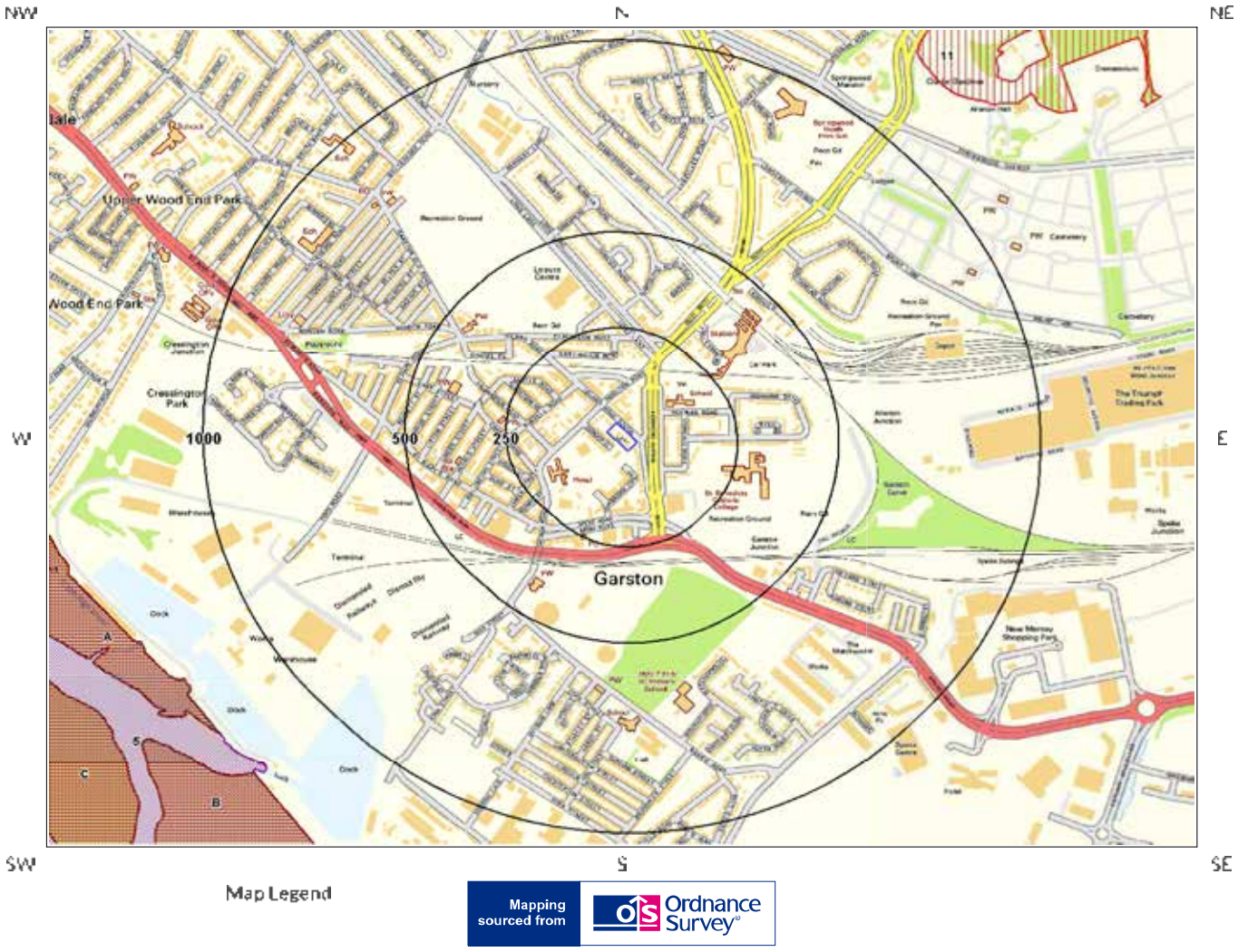
7. Designated Environmentally Sensitive Sites Map



Map Legend

- Site Outline
- Areas of Outstanding Natural Beauty
- SAC
- SPA
- Nitrate Vulnerable Zones
- SSSI
- Ramsar
- Nitrate Sensitive Areas
- NNR
- LNR
- National Parks
- World Heritage Sites
- Environmentally Sensitive Areas
- Ancient Woodlands

7. Designated Environmentally Sensitive Sites

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

---

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

2

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Countryside Council for Wales and Scottish Natural Heritage are represented as polygons on the Designatec Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
5	1212.C	SW	Mersey Estuary	Natural Englanc
Not shown	1326.C	SW	Mersey Estuary	Natural Englanc

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

4

The following Special Protection Area (SPA) records provided by Natural England/Countryside Council for Wales and Scottish Natural Heritage are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SPA Name	Data Source
1A	1225.C	SW	Mersey Estuary	Natural Englanc
2B	1248.C	SW	Mersey Estuary	Natural Englanc

ID	Distance (m)	Direction	SPA Name	Data Source
Not shown	1326.0	SW	Mersey Estuary	Natural England
4C	1451.0	SW	Mersey Estuary	Natural England

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

4

The following Ramsar site records provided by Natural England/Countryside Council for Wales and Scottish Natural Heritage are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ramsar Site Name	Data Source
7A	1225.0	SW	Mersey Estuary	Natural England
8B	1248.0	SW	Mersey Estuary	Natural England
Not shown	1326.0	SW	Mersey Estuary	Natural England
10C	1451.0	SW	Mersey Estuary	Natural England

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

0

Database searched and no data found.

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

1

The following Local Nature Reserve (LNR) records provided by Natural England/Countryside Council for Wales and Scottish Natural Heritage are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
11	1196.0	NE	Allerton (Eric Hardy)	Natural England

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

0

Database searched and no data found.

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

C

Database searched and no data found.

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

C

Database searched and no data found.

8. Natural Hazards Findings

8.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a [redacted], available from . The following information has been found:

8.1.1 Shrink Swell

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

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

Hazard
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays

8.1.2 Landslides

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

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

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

8.1.3 Soluble Rocks

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

Soluble rocks are not present in the search area. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site

8.1.4 Compressible Ground

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

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

Hazard
No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits

8.1.5 Collapsible Rocks

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

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

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits

8.1.6 Running Sand

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

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

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site

9. Mining

9.1 Coal Mining

Are there any coal mining areas within 75m of the study site? Nc

Database searched and no data found.

9.2 Shallow Mining

What is the subsidence hazard relating to shallow mining on-site*? Negligible

*Please note this data is searched with a 150m buffer.

9.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? Nc

Guidance: No Guidance Required.
