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REPORT ON A SITE INVESTIGATION
AT
7 PAYNES PARK
HITCHIN
HERTFORDSHIRE

Report Reference C14571

On behalf of:

Market Homes (Hitchin) Limited
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MARKET HOMES (HITCHIN) LIMITED

SRC LIMITED

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Report Reference No. C14571 **October 2018**

INTRODUCTION

Ground Engineering Limited was instructed by the client, Market Homes (Hitchin) Limited, through consulting engineers SRC Limited, to carry out a site investigation in preparation for the construction of a three-storey timber framed block of flats.

The scope of the site investigation consisted of desk study research and an intrusive ground investigation comprising four shallow window sample boreholes, with geotechnical and chemical testing on recovered samples to determine the nature of the underlying soil.

This report provides the findings of the investigation, together with the results of laboratory testing, and makes recommendations with respect to the design of foundations and provides an assessment of the risk of soil contamination being present beneath the site.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

The site was formerly occupied by the Paynes Park Social Club (now demolished) and is located on a road called Paynes Park about 1km to the south-west of the Hitchin railway station as shown in Figure 1. The site is centred at National Grid Reference TL 1832 2921.

The site comprises a 15m wide by 40m long plot of land, which stands at about 70mOD. Following demolition of the social club building, the site was left uneven and surfaced by bare earth and hardcore/rubble. It is understood that following demolition archaeological trenches were excavated to depths of about 1.20m and then backfilled prior to this investigation. The southern and western sides of the site were cordoned off using sheet metal heras fencing and the northern and eastern sides defined by the walls retained from the previous building. There are no trees identified within the immediate vicinity of the site.

The site lies on land which gently slopes down eastwards from about 70mOD to 65mOD by the River Hiz some 250m distant.

The 1995 geological map for the area, sheet 221 at 1:50,000 scale, shows the site to be directly underlain by superficial deposits of Glaciofluvial Deposits comprising silt, sand and gravel. The underlying solid geology is indicated to comprise the Cretaceous Middle Chalk, which is currently referenced as the Zig Zag Chalk Formation. Deep glacial channels are shown on the map to lie within close proximity to the east and west of the site.

SITE HISTORY

Research into the site history involved reference to historical maps and plans and information obtained from the internet. The map extracts studied are presented in the desk study map section, Appendix 1, and are described below:

OS Map Extract	*Description*
1881 County Series Scale 1:2500 **Figure A**	The site lies within an area of gardens located to the rear of Hitchin Town Hall and to the south of dwellings along Brand Street. Within the eastern part of the site, whose boundaries are undefined, is a set of small buildings, which are possibly stables. West Lane is located to the west of the site, and to the east and south-east are dwellings and a Granary, which spur off High Street. Gardens extend to the immediate south beyond which are two rows of small enclosures (later denoted as a cattle market). To the north-west is a burial ground beyond which a Friends Meeting House lies about 100m distant. Open fields lie beyond the North Herts. and South Beds. Infirmary about 120m to the north-west. About 150m to the south-east is a Market Place, Malthouse and Corn Exchange and 150m to the south is an Iron Foundry, which is surrounded by numerous buildings and dwellings.
1898 County Series Scale 1:2500 **Figure B**	The site and immediate surroundings appear as shown in the 1881 map. West Lane is now called Payneôs Park. The land directly to the north of the Iron Foundry appears to be a livestock market with animal pens.
1923 County Series Scale 1:2500 **Figure C**	The northern half of the site has been built on and the buildings extend to the north adjoining the former Town Hall, which is now denoted as a Technical School. A fire station is located directly to the north-east of the site on the opposite side of Payneôs Park. The Town Hall has relocated to a new building constructed to the north of the site on the corner of Brand Street and Grammar School Walk. There is some new residential development to the south-west along Nunôs Close. The foundry is no longer denoted, but a tank is marked where the animal pens were formerly indicated.
1932 County Series Scale 1:2500 **Figure D**	The site and immediate surroundings appear as shown in the 1923 map.
1946 County Series Scale 1:10,560 **Figure E**	The site and immediate surroundings appear as shown in the 1932 map.

OS Map Extract	*Description*
1965 OS Sheet TL1829SW Scale 1:1250 **Figure F** **1964-66** OS Sheet TL1829 Scale 1:2500 **Figure G**	A Social Club has been constructed in the southern half of the site and building in the northern half of the site, denoted as Legion House, apparently replaces the previous. The former school to the north is now indicated to be the Urban District Council Offices and to the west is a Fire and Ambulance Station. To the north-west on the opposite side of Paynes Park is a livestock market, which occupies the former burial ground and the Friends Meeting House is still shown. To the south-west a Cattle Market is denoted beyond an area of cleared ground that extends east to the High Street.
1982-85 OS Sheet TL1829SW Scale 1:1250 **Figure H**	The site and immediate surroundings appear as shown on the previous map. The land to the south of the site has been developed.
1982-85 OS Sheet TL1829SW Scale 1:1250 **Figure I**	The site and immediate surroundings appear as shown on the previous map. A multi-storey car park has been constructed on the opposite side of Paynes Park, to the west of the site.
1994 OS Sheet TL1829SW Scale 1:1250 **Figure J**	The site and immediate surroundings appear as shown in the previous map.
2002 OS Sheet TL12SE Scale 1:10,000 **Figure K**	The site and immediate surroundings are shown in less detail but appear unchanged from the previous map.
2010 OS Sheet TL12SE Scale 1:10,000 **Figure L**	The site and immediate surroundings appear as shown in the previous map.
2014 OS Sheet TL12SE Scale 1:10,000 **Figure M**	The site and immediate surroundings appear as shown in the previous map.
July 2015 **Aerial Photograph** Appendix 2	The site is occupied by a building presumed to be Legion House and the adjoining Social Club.

Historical Summary

In 1881 the site was located close to the centre of the town of Hitchin within gardens to the south of the town hall. A small building possibly stables was located at the eastern end of the site.

In the early Twentieth Century the northern half of the site had been built upon and in the 1950s/1960s a social club was constructed across the southern half of the site. The existing building in the northern half of the site was then denoted as Legion House. During the late 1960s/1970s the land to the south of the site was developed and in the early 1980s a multi-storey car park was constructed to the west.

The site remained occupied by a social club and the British Legion, which subsequently became the Paynes Park Social Club, through to 2018 when the buildings were demolished.

SUMMARY OF ENVIRONMENTAL DATA

Appendix 2 contains information derived from Environmental Databases for a radius of up to 2000m from the site. The information covers datasets held by the Groundsure with contributors including the local authority, the Environment Agency, British Geological Survey, Ordnance Survey and the Coal Authority and the results, within a radius of 250m, are summarised below:

1. Historical Industrial Sites	**On Site**	**0-50m**	**51 - 250m**
Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	0	10
Historical Tanks	0	0	10
Historical Energy Features Database	0	0	17
Historical Petrol and Fuel Site Database	0	0	0
Historic Garage and Motor Vehicle Repair Database	0	0	15
Potentially Infilled Ground	0	0	0
2. Environmental Permits, Incidents and Registers	**On Site**	**0-50m**	**51 - 250m**
Industrial Sites Holding Environmental Permits/Authorisations	0	0	5
Records of COMAH and NIHHS Sites	0	0	0
Environment Agency Recorded Pollution Incidents	0	0	1
Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0	0
3. Landfill and Other Waste Sites	**On Site**	**0-50m**	**51 - 250m**
Landfill Sites	0	0	0
Landfill and Other Waste Sites	0	0	0
4. Current Land Uses	**On Site**	**0-50m**	**51 - 250m**
Current Industrial Sites Data	0	2	25
Records of Petrol and Fuel Sites	0	0	2
National Grid Underground Electricity Cables	0	0	0
National Grid Gas Transmission Pipelines	0	0	0
5. Geology	**Description**		
Artificial Ground or Made Ground records	None Identified		
Superficial Ground and Drift Geology records	Identified		
6. Hydrogeology and Hydrology	**On Site**	**0-50m**	**51 - 250m**
There are productive strata within superficial geology	Identified		
There are productive strata within solid geology	Identified		
Groundwater Abstraction Licences	0	0	0
Surface Water Abstraction Licences	0	0	0
Potable Water Abstraction Licences	0	0	0
Source Protection Zones	1	0	0
Groundwater Vulnerability and Soil Leaching Potential	1	0	0
River Quality Data	No	No	No
Detailed River Network Entries	0	0	2

Surface Water Features	No	No	Yes
7. Flooding	**On Site**		**0 - 250m**
Environment Agency indicative Zone 2 floodplains within 250m of site	Identified		
Environment Agency indicative Zone 3 floodplains within 250m of site	Identified		
What is risk of flooding from rivers and sea	Very Low		
Flood defences within 250m of site	None Identified		
Any areas benefiting from flood defences within 250m of site	None Identified		
Flood storage areas	None Identified		
Maximum BGS groundwater flooding susceptibility within 50m of site	Potential below Surface		
BGS confidence rating for groundwater susceptibility areas	High		
8. Designated Environmentally Sensitive Sites	**On Site**		**0 - 250m**
Environmentally sensitive sites	2		0
9. Natural Hazards			
Hazard			
Shrinking or Swelling Clay	Negligible		
Landslide Ground Stability	Very Low		
Ground Dissolution (Soluble rocks)	Negligible		
Compressible Ground	Negligible		
Collapsible Ground	Very Low		
Running Sand	Very Low		
10. Mining			
Coal mining areas within 75m of site	None Identified		
Non-Coal Mining areas within 50m of the study site boundary	Identified		
Brine affected areas within 75m of study site	None Identified		
11. Radon			
The property is not in a Radon Affected Area, as less than 1% of properties are above the action level. The site lies within an area where no radon protection measures are necessary.			

Database Summary

There are no records relating to the historical or current site usage. There are however seven historical records for a hospital/infirmary located 70m to 79m to the north-west. There are historical records of an iron foundry, 118m to the south-west; a smithy, 198m to the east; and a garage, 229m to the south-east. There are ten historical tanks records between 1898 and 1994 within 250m of the site. There are seventeen electricity sub-station records between 1982 and 1994 within 250m of the site. There are fifteen historic garage and motor vehicle repairer businesses recorded between 1898 and 1994 within 250m of the site. There are three List 2 Dangerous Substances Inventory Site records concerning pH within a distance of 142m and 219m of the site; and two historic environmental permits for a dry cleaners and petrol station located

143m and 185m respectively from the site. There is one pollution incident within 250m of the site and this relates to firefighting run-off, some 232m to the south.

There are no landfills or waste sites within 250m of the site.

Whilst there are no current industrial uses recorded for the site there are twenty-seven within 250m. These uses include an agricultural machinery business, vehicle hire, parts and accessories businesses, a petrol stations, industrial estates, pharmaceuticals and electricity substations.

Made ground is not indicated to be present beneath the site, which is underlain by superficial deposits, classified as a Secondary (A) Aquifer, comprising Glaciofluvial Deposits, which rest on the solid geology of the Zig Zag Chalk Formation, a Principal Aquifer.

The River Hiz is located about 249m to the east of the site, which lies within an area where there is a very low risk of flooding. There is however potential at the surface from groundwater flooding.

Records indicate that the site lies within a nitrate vulnerable zone.

The property is not in a Radon Affected Area, as less than 1% of properties are above the action level. The site lies within an area where no radon protection measures are necessary.

PRELIMINARY RISK ASSESSMENT

Potential sources of contamination present on or beneath the site would relate primarily to; the historical use of the site; possible damaged drainage; the presence of contaminated soil; and the potential presence of soil gas beneath the site.

In order to assess the risks associated with the presence of ground contamination the linkages between the sources and potential receptors to contamination need to be established and evaluated. This is in accordance with the Environmental Protection Act 1990, which provides a statutory definition of Contaminated Land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present on or under the land such that

- *Significant harm is being caused or there is a significant possibility of such harm being caused; or*
- *Pollution of controlled waters is being, or is likely to be, caused*

There are three principal factors that are assessed whilst undertaking a qualitative risk assessment for any site. These are the presence of a contamination source, the existence of migration pathways and the presence of a sensitive target(s). It should be noted that it is necessary for each element of source, pathway and target to be present in order for exposure of a human or environmental receptor to occur.

UK Government guidance on the assessment of contaminated land, requires risk to human health and the environment to be reviewed using source ï pathway ï target relationships. If each of these elements is present, the linkage provides a potential risk to the identified targets.

Contaminants or ***potential pollutants*** identified as ***sources*** in relation to the identified previous uses are listed overleaf in Table 1.

Table 1: Identified Potential Contaminant Sources

Contaminant Source	***Comments***
Asbestos Containing Materials (ACM)	ACM could be present within demolition rubble.
Soil Beneath Site	Contamination may be present within any made ground materials on the site.
Soil Gas	Potential soil gas generated from any made ground and natural organic soils present.
Ground Contamination Outside Site Boundary	Ground contamination migrating from adjoining sites.

A ***Pathway*** is defined as one or more routes through which a receptor is being, or could be, exposed to, or affected by, a given contaminant.

Potential ***Target or Receptors*** fall within the categories of Human Health, Water Environment, Flora and Fauna, and Building Materials.

There are a number of possible pathways for the contaminants identified on the site to impact human and/or environmental receptors and these are summarised in Tables 2 and 3.

Table 2: Human Receptors and Pathways

Human Receptor-Mechanism	***Typical Exposure Pathway***
Human Inhalation	Breathing Dust and Fumes Breathing Gas emissions
Human Ingestion	Eating -contaminated soil, for example by small children -produce grown on contaminated soil Ingesting dust or soil on vegetables Drinking contaminated water
Human Contact	Direct skin contact with contamination Direct skin contact with contaminated liquids

Table 3: Water Receptors and Pathways

Receptor-Water Environment	***Typical Exposure Pathway***
Made ground is not indicated to be present beneath the site, which is underlain by superficial deposits, classified as a Secondary (A) Aquifer, comprising Glaciofluvial Deposits, which rest on the solid geology of the Zig Zag Chalk Formation, a Principal Aquifer.	Surface infiltration of atmospheric waters into the soils beneath the site could wash or dissolve potential contaminants and migrate to underlying groundwater. Contamination leads to restriction/prevention of use as a resource, for example, drinking water, and can have secondary impacts on other resources, which depend on it.
The River Hiz is located about 249m to the east of the site	Surface infiltration of atmospheric waters into the soils beneath the site could wash or dissolve potential contaminants and laterally migrate. Contamination leads to a restriction/prevention of use: -as drinking water resource -for amenity use Effects on aquatic life

Preliminary Conceptual Model

Assessment of the potential linkage between ground contamination sources, human and environmental receptors have been assessed based on the desk study research documented in the preceding sections of this report.

A generalised preliminary conceptual model is presented below in Table 4.

Table 4: Preliminary Conceptual Model Relative to Proposed Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		ACM in Soil	**Soil Beneath Site**	**Soil Gas**	**Ground Contamination Outside Site Boundary**
Human Health ï ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Likely	Low likelihood	Low likelihood	Low likelihood
Human Health ï users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low likelihood	Low likelihood	Low likelihood	Low likelihood
Water Environment	Migration through ground into surface water or surrounding groundwater	Low likelihood	Low likelihood	Low likelihood	Low likelihood
Flora	Vegetation on site growing on contaminated soil	Low likelihood	Low likelihood	Unlikely	Unlikely
Building Materials	Contact with contaminated soil	Low likelihood	Low likelihood	Unlikely	Unlikely
Key to Table 4 Estimated Potential for Linkage with Contaminant Source	**Definition**				
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.				
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.				
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.				
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.				
NA	Not Applicable				

SITE WORK

The site work was carried out on 11 September 2018 and comprised four window sample boreholes at locations shown in Figure 2.

The exploratory hole records have been produced in accordance with British Standard BS5930:2015 ‘Code of Practice for Site Investigations’, and are given in Appendix 3. The records provide the descriptions and depths of the various strata encountered, details of standpipe installations, in-situ samples taken, and the groundwater conditions observed during excavation, boring and on completion.

Service plans were consulted and a cable avoidance tool (CAT) was used to check for the absence of buried services prior to boring.

Window Sample Boreholes

The window sample boreholes, WS1 to WS4, were each commenced initially by the excavation, using hand tools, of a service inspection pit to a depth of 1.20m in order to ensure the absence of buried services. Representative small disturbed samples of soil were taken from each starter pit.

The window sample boreholes were formed by a small track-mounted window sampling and super heavy dynamic probing rig and taken to depths of 5.00m and 5.45m. The window sampling equipment consisted of drive-in sample tubes of specially constructed and strengthened steel, lined with a plastic core-liner. The barrels were initially of 87mm internal diameter and were reduced in diameter with successive barrels with increasing depth. Upon extraction, a continuous ‘undisturbed’ profile of the soil was obtained within the plastic liners.

The standard penetration test (SPT) was carried out at selected depths in order allow the assessment of the relative in-situ density or stiffness of the ground. The test was made by driving a split-barrel sampler (SPT(S)) into the soils at the base of the borehole by means of an automatic trip hammer weighing 63.50kg falling freely through 750mm. The penetration

resistance was determined as the number of blows required to drive the tool the final 300mm of a total penetration of 450mm into the soil ahead of the borehole.

A soil gas and groundwater monitoring installation was fitted into WS2 to a depth of 5.00m. The installation comprised a 50mm diameter perforated plastic pipe where the annulus between the pipe and the borehole was backfilled with silica gravel to a depth of 1.00m. A bentonite seal was inserted between 0.50m and 1.00m, above which the tube was sealed by a gas valve and a lockable protective cover was fixed in concrete. The remaining holes were backfilled with silica gravel and the surface reinstated.

Return Visit to Site

Return visits to site were undertaken on 24 September 2018, and 1 and 8 October 2018 to monitor the standpipe installation in WS2 for depth to groundwater and the concentrations of methane, carbon dioxide and oxygen. Measurement was carried out using a Gasdata GFM430, which also recorded the atmospheric pressure and flow rate. The monitoring results are presented following the borehole records in Appendix 3 and the water levels readings have been entered onto the respective borehole record.

GEOTECHNICAL LABORATORY TESTING

Samples recovered from the exploratory holes were tested in accordance with the recommendations of British Standard BS1377:1990 & 2016 ôMethods of Tests for Soils for Civil Engineering Purposesô and other industry standards. The results of testing are presented on Laboratory Summary Sheets in Appendix 4.

Soil Moisture Content

The moisture content of selected samples was determined and the results are reported as the percentage water content with respect to the dry mass of soil.

Atterberg Limit Tests

The liquid and plastic limits, and plasticity index, were determined for selected specimens for the purpose of engineering soil classification. The results are quoted as the percentage water with respect to the dry weight of soil.

Particle Size Distribution

The particle size distributions of selected soil samples were determined by sieve analysis. Results of these tests are given as particle size distribution curves.

Sulphate and pH Testing

Selected soil samples were tested to determine their pH-values and aqueous sulphate contents in order to provide advice on assessing the aggressive chemical environment in relation to buried concrete.

CHEMICAL LABORATORY TESTING

Selected soil samples were submitted to a UKAS Accredited Laboratory who carried out a suite of tests which encompassed a wide range of potential contaminants outlined by the Environment Agency (EA) and National House Building Council (NHBC) document R&D 66; 2008 ‘Guidance for the Safe Development of Housing on Land Affected by Contamination’.

Tests were carried out to screen the samples for the following potential contaminants: total arsenic, total cadmium, total chromium, hexavalent chromium, total lead, total mercury, total selenium, water soluble boron, total copper, total nickel, total zinc, total cyanides, free cyanides, soluble sulphate, sulphides and pH-value, phenols and polyaromatic hydrocarbons (PAH), including benzo[a]pyrene, and petroleum hydrocarbons (TPH).

Selected samples were also screened for the presence of asbestos.

The results of chemical testing are presented in Appendix 5.

GROUND CONDITIONS

The ground conditions within the boreholes WS1 to WS4 comprised a 1.60m to 1.80m thick cover of made ground that rested on the expected Glaciofluvial Deposits, which were present to at least 5.45m depth. A schematic soil profile section across the site is provided to the rear of the borehole records in Appendix 3.

Made Ground

Made ground was encountered to depths between 1.60m and 1.80m and comprised firm, brown, dark brown and orange brown layers/mixtures of slightly sandy, slightly gravelly/gravelly, silty clay. The gravel fraction comprised angular brick, concrete, flint, chalk, bone, ash and clinker.

Glaciofluvial Deposits

Beneath the made ground, at depths between 1.60m to 1.80m, Glaciofluvial Deposits were encountered as layers of loose to dense, silty sand and firm, slightly sandy/gravelly clay. Within WS1, WS2 and WS4 the Glaciofluvial Deposits comprised variably loose, medium dense and dense, light brown and orange brown, silty and very silty, fine sand which was present to the base of the boreholes at depths between 5.00m and 5.45m.

Borehole WS3, at the western end of the plot, encountered firm, brown and orange brown, slightly sandy, gravelly clay from the base of the made ground at 1.60m to 2.90m depth. The borehole then passed into firm, orange brown and light brown, slightly sandy, silty clay to 4.90m, below which medium dense, light brown, silty sand was encountered to the base of the borehole at 5.45m depth.

Groundwater

No groundwater was encountered during boring, or on completion, of the boreholes which were completed at depths of 5.00m and 5.45m.

Return visits to site on 24 September 2018 and 1 and 8 October 2018 found the standpipe in WS2 to be dry to the base of the installation at 5.00m depth.

Evidence of Contamination

Apart from the occasional fragment of ash or clinker in the made ground the encountered soils displayed no significant visual or olfactory evidence for the presence of contamination.

COMMENTS ON THE GROUND CONDITIONS IN RELATION TO FOUNDATION DESIGN AND CONSTRUCTION

The client proposes the erection of a three-storey block of flats to comprise timber frame construction with a precast suspended floor.

The made ground is considered unsuitable as a founding medium and shallow spread foundations should not be placed in the made ground. Large scale processes of natural sedimentation allow a certain degree of confidence to be placed in the absence of important variation of the engineering properties of natural soils across sites. By contrast, made ground, whose history is not completely known, must, despite any amount of investigation, inevitably present the possibility of conditions existing which could not be accepted when considering the material as a bearing stratum.

The underlying Glaciofluvial Deposits appeared to be highly variable in the window sample boreholes and consequently due to the presence of loose sand layers it is considered that only light bearing pressures should be applied by shallow foundations within this stratum.

For higher bearing pressures, consideration should be given to the option of piled foundations, which is outside the scope of this investigation. Additional work in the form of a deep cable percussion borehole would be necessary to obtain the information necessary to design piled foundations.

Depth of Strip and Pad Foundations

Foundations should be taken through all layers of made ground and placed within the underlying natural ground, which was present at depths between 1.60m and 1.80m.

According to laboratory testing the clay made ground and clay Glaciofluvial Deposits have modified plasticity indices of between 11% and 23%, and indicate a low to medium volume change potential, according to the National House Building Council (NHBC) Standards Chapter 4.2 ñBuilding near Treesò (2018). Guidance on the necessary foundation depths relating

to tree species, distance and soil plasticity can be determined from the latter document which should also be consulted where new planting is proposed.

At an open position well away from the influence of trees and shrubs a minimum foundation depth of 0.90m below finished floor level would be required for foundations in order to avoid the zone of seasonal volume change in accordance with the above document. In order to penetrate the made ground the foundation depth, below existing ground surface, would need to be taken to at least 1.60m to 1.80m depth.

Shallow Foundation Bearing Pressures

The following allowable bearing pressures, presented in Table 5, which for clay strata incorporate a factor of safety of 3.0 against general shear failure, should be considered for foundations taken through the made ground and placed within the Glaciofluvial deposits at a depth between 1.60m and 3.00m below the existing ground surface.

Table 5		**Allowable Bearing Pressures for Settlement of less than 25mm**	
Stratum	**Foundation Depth**	**Pad Footing**	**Strip Footing**
		1m wide	**0.50m to 1m wide**
Sand & Clay Glaciofluvial Deposit	1.60m to 2.00m	50kN/m^2	50kN/m^2
Sand & Clay Glaciofluvial Deposit	3.00m	100kN/m^2	100kN/m^2

Settlements would not be expected to exceed 25mm at these pressures.

Floor Slab

Whilst it is proposed to install precast suspended floor, lightly loaded ground bearing floor slabs could potentially be adopted, providing that the ground is properly prepared. The exposed surface should be proof-rolled to expose any excessively soft or compressible zones, which should also be removed and replaced with a geotechnically suitable, compacted coarse grained material.

Foundation Excavations and Groundwater

The base of foundation excavations should be inspected on completion to ensure that the condition of the soil complies with that assumed in design. Should pockets of inferior soft or loose material be present, they should be removed and replaced with well graded hardcore or lean mix concrete. Water should be excluded from foundation excavations, otherwise rapid and significant loss of bearing capacity may occur within the clay stratum. The excavated surface should be protected from deterioration and a blinding layer of concrete used where foundations are not completed without delay.

The stability of all soils beneath this site should not be relied upon to stand unsupported even in the short term. Safety precautions should not be neglected especially where personnel are to enter excavations, when close side support will be required in order to maintain excavation stability.

It is expected that shallow foundation excavations could encounter localised water seepages, which would be prevalent following periods of wet weather due to surface infiltration. It is likely that water ingress could be controlled by screened sump pump techniques.

Buried Concrete

Tests on samples of made ground and Glaciofluvial Deposits, to determine the risk of sulphate attack on buried concrete, indicate levels that fall into Class DS-1 categorisation as defined by Table C2 of BRE Special Digest 1, 2005. The pH results indicate slightly alkaline ground conditions with pH values ranging between 7.5 and 8.0.

For the purposes of design an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1 should be considered when specifying a Design Chemical Class (DC Class) for concrete used within shallow, strip and pad, footings placed within the Glaciofluvial Deposits.

An extract of Table C2, Aggressive Chemical Environment for Concrete (ACEC) site classification, from BRE Special Digest 1, 2005 is presented in Appendix 6.

COMMENTS ON SOIL CHEMICAL TESTING

The results of the laboratory chemical testing on near surface soil samples have primarily been compared to soil screening values (SSVs) produced by Land Quality Management Limited (LQM) and the Chartered Institute for Environmental Health (CIEH) presented in their document ôThe LQM/CIEH S4ULs for Human Health Risk Assessment: 2015 (Publication Number S4UL3608)ô. The LQM/CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and are transparently-derived and cautious ótrigger valuesôabove which further assessment of the risks or remedial action may be needed. The S4ULs (Suitable for Use Levels) have been derived, in accordance with UK legislation and Environment Agency policy, using a modified version of the Environment Agency CLEA 1.06 software.

Reference has also been given to ATRISKsoil soil screening values produced by Atkins Limited and provided under licence to Ground Engineering Limited. Atkins SSVs have been derived in line with the Environment Agency 2009 guidance using the CLEA 1.04 and 1.06 software. With the absence of a S4UL for cyanide the ATRISKsoil SSV has been used as the soil screening criteria within this report.

In 2014 the Department for Environment Food and Rural Affairs (DEFRA) published, in their document SP1010, Category 4 Screening Levels (C4SL) for several contaminants including lead. The C4SL represent screening levels below which the land could be considered suitable for a specified use and definitely not contaminated land in respect of those determinands. With the absence of S4UL for lead the C4SL has been used as the soil screening criteria within this report.

For each contaminant the adopted soil screening criteria have been calculated for the following land uses:

- Residential use with home grown produce
- Residential use without home grown produce
- Commercial and industrial usage

The intended purpose of the SSVs are as ñintervention valuesò in the regulatory framework for assessment of human health risks in relation to land use. These values are not binding standards, but are intended to inform judgements about the need for action to ensure that a new use of land does not pose any unacceptable risks to the health of the intended users.

Table 6 compares the test results for the made ground with the SSVs in relation to the specified uses. The number of test results, which exceed these values, are also provided.

Table 6: Comparison of Chemical Test Results for Near Surface Soil with Soil Screening Values (SSV)

Determinand	Number of Samples	Min Value (mg/kg)	Max Value (mg/kg)	Number of Samples Exceeding SSV for:			Measured 95th Percentile (mg/kg)	Soil Screening Values (SSV) (1% SOM)			
				Residential with home grown produce	Residential without home grown produce	Commercial / Industrial		Assessment Method	Residential with home grown produce (mg/kg)	Residential without home grown produce (mg/kg)	Commercial/ Industrial (mg/kg)
Organic matter	5	1.2%	3.6%	-	-	-	-	-	-	-	-
Arsenic	5	23	35	0	0	0	32.67	S4UL	37	40	640
Cadmium	5	0.23	0.29	0	0	0	0.27	S4UL	11	85	190
Trivalent* Chromium	5	18	25	0	0	0	24.78	S4UL	910	910	8600
Hexavalent Chromium	5	<0.50	<0.50	0	0	0	<0.50	S4UL	6	6	33
Lead	5	50	180	0	0	0	179.67	C4SL	200	310	2330
Mercury	5	0.15	0.54	0	0	0	0.45	S4UL	11	15	320
Selenium	5	0.40	0.68	0	0	0	0.59	S4UL	250	430	12,000
Nickel	5	29	42	0	0	0	38.99	S4UL	130	180	980
Phenols	5	<0.30	<0.30	0	0	0	<0.30	S4UL	120	440	440
Benzo[a]pyrene	5	<0.10	<0.10	0	0	0	<0.10	S4UL	0.79	1.2	15
Copper	5	22	36	0	0	0	35.65	S4UL	2400	7100	68,000
Zinc	5	79	110	0	0	0	107.68	S4UL	3700	40,000	730,000
Free Cyanide	5	<0.50	<0.50	0	0	0	<0.50	ATRISK	34	34	34

Notes

*The concentration of Trivalent Chromium is assumed to be equivalent to the Total Chromium concentration. This is because most naturally occurring chromium is in the trivalent (chromic) state.

S4UL and C4SL for metals were derived using 6% SOM. These values are not sensitive to SOM and would also be applicable for 1% SOM and 2.5% SOM

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ATRISKsoil SSVs produced by Atkins Limited and provided under licence to Ground Engineering Limited

Discussion of Results

All of the contaminant concentrations, in the five samples, were all below soil screening criteria for residential with home grown produce; residential without home grown produce end use; and commercial usage.

The five samples were also screened for asbestos. No asbestos was detected.

There was no visual or olfactory evidence of petroleum hydrocarbons identified in the exploratory holes.

SOIL GAS

Three return visits to site were undertaken on 24 September, 1 and 8 October 2018 to monitor the standpipe installations in WS2 for the concentrations of methane, carbon dioxide and oxygen. Soil gas concentrations of less than 0.1% by volume methane and between <0.1% and 0.3% by volume carbon dioxide. The in-situ measurements revealed flow rates from the boreholes of less than 0.1l/hr. Corresponding reduced oxygen concentrations of 20.2% and 20.4% by volume were measured. The results indicate a Gas Screening Value (GSV) of less than 0.0001l/hr for methane and 0.0003l/hr for carbon dioxide.

The results fall into Characteristic Situation 1 as defined by BS8485:2015 óCode of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildingsô.

UPDATED CONCEPTUAL MODEL

Assessment of the potential linkage between ground contamination sources and human or environmental receptors have been assessed based on the desk study research and the intrusive ground investigation documented in the preceding sections of this report. A generalised conceptual model, updated following the intrusive works, monitoring and testing, relative to the construction phase and completed development, is presented below in Table 7.

Table 7: Updated Conceptual Model Relative to School Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		ACM in Soil	**Soil Beneath Site**	**Soil Gas**	**Ground Contamination Outside Site Boundary**
Human Health ï site/ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low risk	Low risk	Very Low risk	Low risk
Human Health ï users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low risk	Low risk	Very Low risk	Low risk
Water Environment	Migration through ground into surface water or surrounding groundwater	Very Low risk	Very Low risk	Very Low risk	Low risk
Flora	Vegetation on site growing on contaminated soil	Very Low risk	Very Low risk	Very Low risk	Very Low risk
Building Materials	Contact with contaminated soil	Very Low risk	Very Low risk	Very Low risk	Very Low risk
Key to Table 7 Risk	**Definition**				
Very High risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or there is evidence that severe harm to a designated receptor is currently happening. The risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.				
High risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) and remedial works may be necessary in the short term and likely over the long term.				
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.				
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.				
Very Low risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.				
NA	Not Applicable				

COMMENTS ON GROUND CONTAMINATION IN RELATION TO PROPOSED RESIDENTIAL DEVELOPMENT

The client proposes the erection of a three-storey block of flats with no scheduled gardens and limited communal landscaping.

This investigation may not have revealed the full depth or extent of made ground or contamination on the site and appropriate professional advice should be sought if subsequent site works reveal materials that may appear to be contaminated. In the event that contamination is found, at any time when carrying out the approved development, that was not previously identified it must also be reported immediately to the Local Planning Authority.

Anticipated exposure scenarios relating to the site and future use, in the context of the conceptual model, are discussed as follows.

Asbestos in Soil

Whilst asbestos containing material (ACM) was not found in the soil samples tested it is possible that ACM could be present in any demolition rubble remaining on site. Consequently suitable precautions, in line with current legislation and best practice, should be put in place to protect workers from the effects of asbestos material if encountered during the groundworks.

Human Health - Construction Workers

No special precautions would be required during the development of the site by workers who may come into contact with the soil during groundworks, providing standard precautions are adopted which should generally include the procedures given by the Health and Safety Executive (The Blue Book).

For the protection of these workers during groundworks the following is recommended:

a) Limit repeated or prolonged skin contact with soils by wearing gloves with sleeves rolled down.

b) Washing facilities should be made available to groundworkers, so as to minimise the potential for inadvertent ingestion of soil.

c) If any soils are revealed which are different to those encountered by this ground investigation, the advice of a specialist should be sought in view of classifying the material and ascertaining its risk to groundworkers.

Human Health - Users of Completed Flats Development

On the basis of the encountered ground conditions no specific scheme of remediation would be considered necessary for the block of flats development, which will comprised buildings and hardstanding areas with no gardens and minimal landscaping.

It is recommended that all landscaped area are inspected prior to final capping to ensure that unsuitable materials have not been inadvertently placed in the garden areas during the preceding stages of redevelopment works.

Methane and Carbon Dioxide Soil Gas

According to database information, there are no landfills within 250m of the site and the composition of the underlying natural soil would suggest a very low hazard potential. Also the soil gas monitoring results fall into Characteristic Situation 1 as defined by BS8485:2015 ǵCode of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildingsô

In conclusion, gas protection measures are not considered necessary in relation to methane and carbon dioxide soil gases.

Water Environment

The ground conditions within the boreholes comprised a 1.60m to 1.80m thick cover of made ground, which rested on Glaciofluvial Deposits (Secondary (A) Aquifer), which were proved to be dry to at least 5.45m depth.

With the absence of significant soil contamination within the near surface soils, it is believed that future groundworks across the site would pose a very low risk to groundwater.

Off-Site Disposal of Soil Arisings

The results of chemical analysis are provided in Appendix 5 and can be used within the suite of information necessary for basic characterisation of the soil destined for landfill. Excavated material and excess spoil should always be classified prior to removal from site as required by 'Duty of Care' (Environmental Protection Act, 1990) legislation. This means that material has to be given a proper description and waste classification prior to removal. Basic characterisation is the responsibility of the waste producer and compliance checking and on-site verification are generally the responsibility of the landfill operator. The landfill operator will need to liaise with the waste producer as the approach relies on the information from basic characterisation.

GROUND ENGINEERING LIMITED

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Figures

Figure 1: Site Location Plan

Figure 2: Exploratory Hole Location Plan

Site Location Plan

Figure 1

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N



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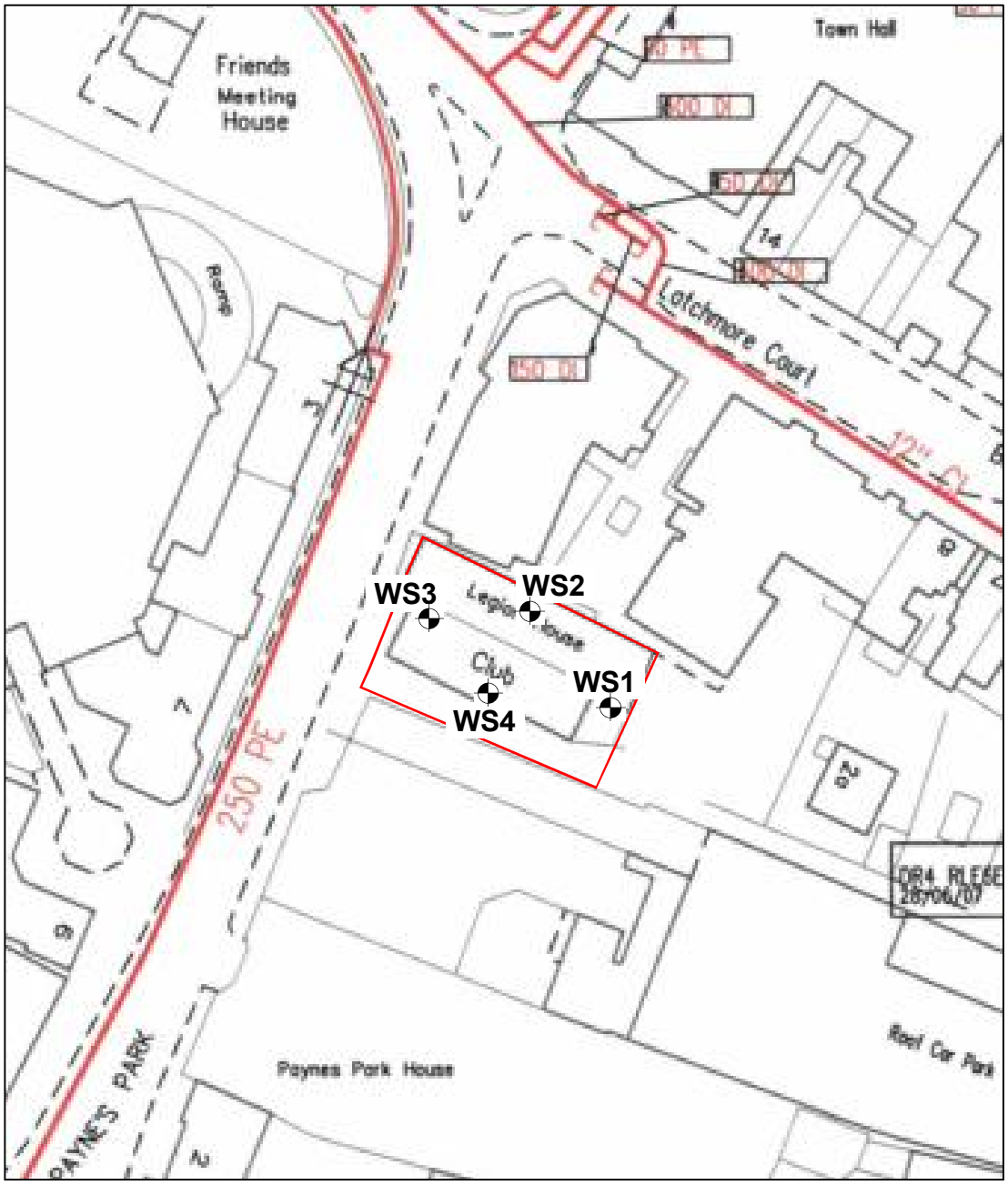
Exploratory Hole Location Plan

Figure 2

N



Scale

20m

KEY

Boreholes WS1 to WS4

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Appendix 1

Historical Map Extracts

Site History

Figure A

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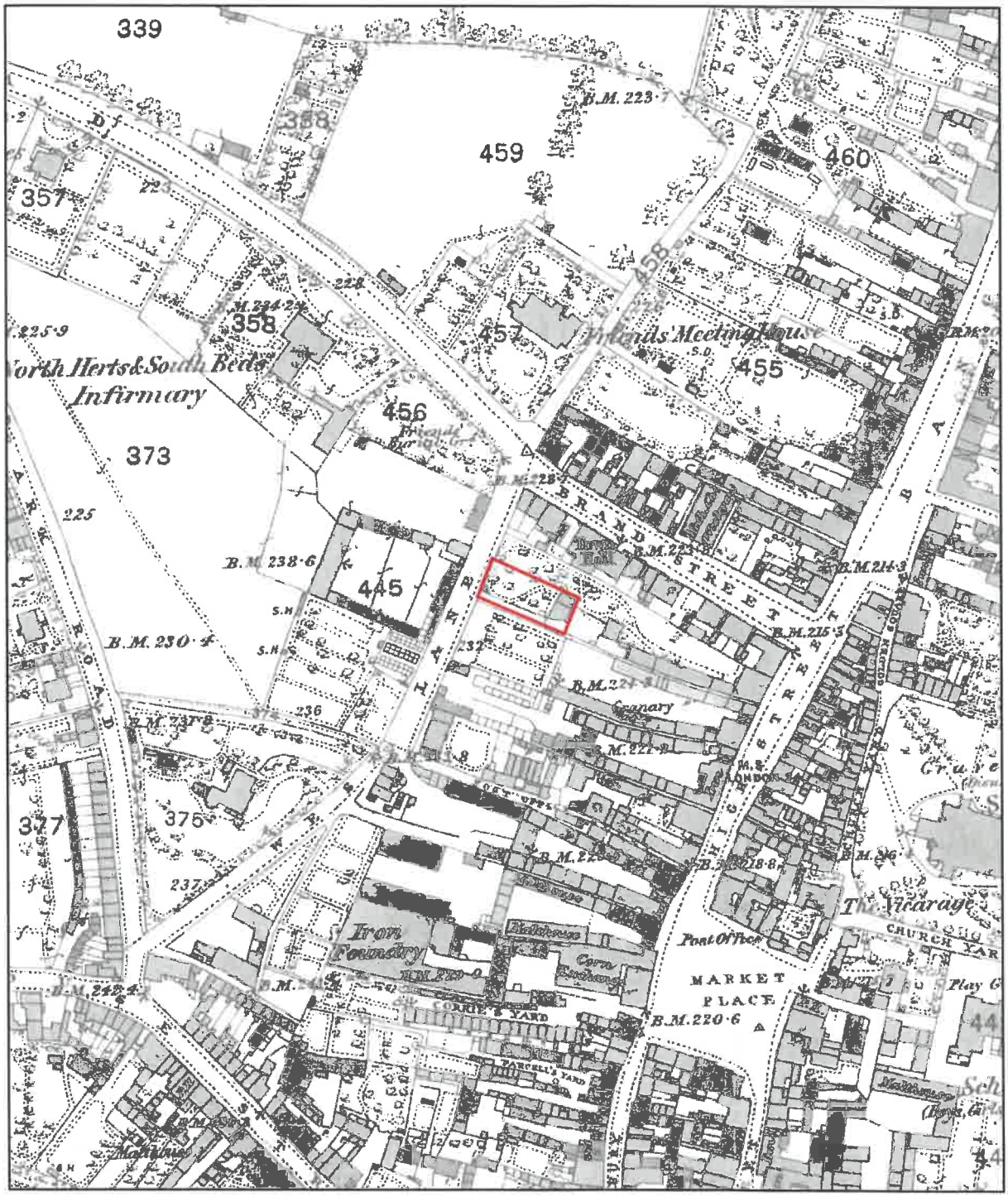

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Site History

Figure B

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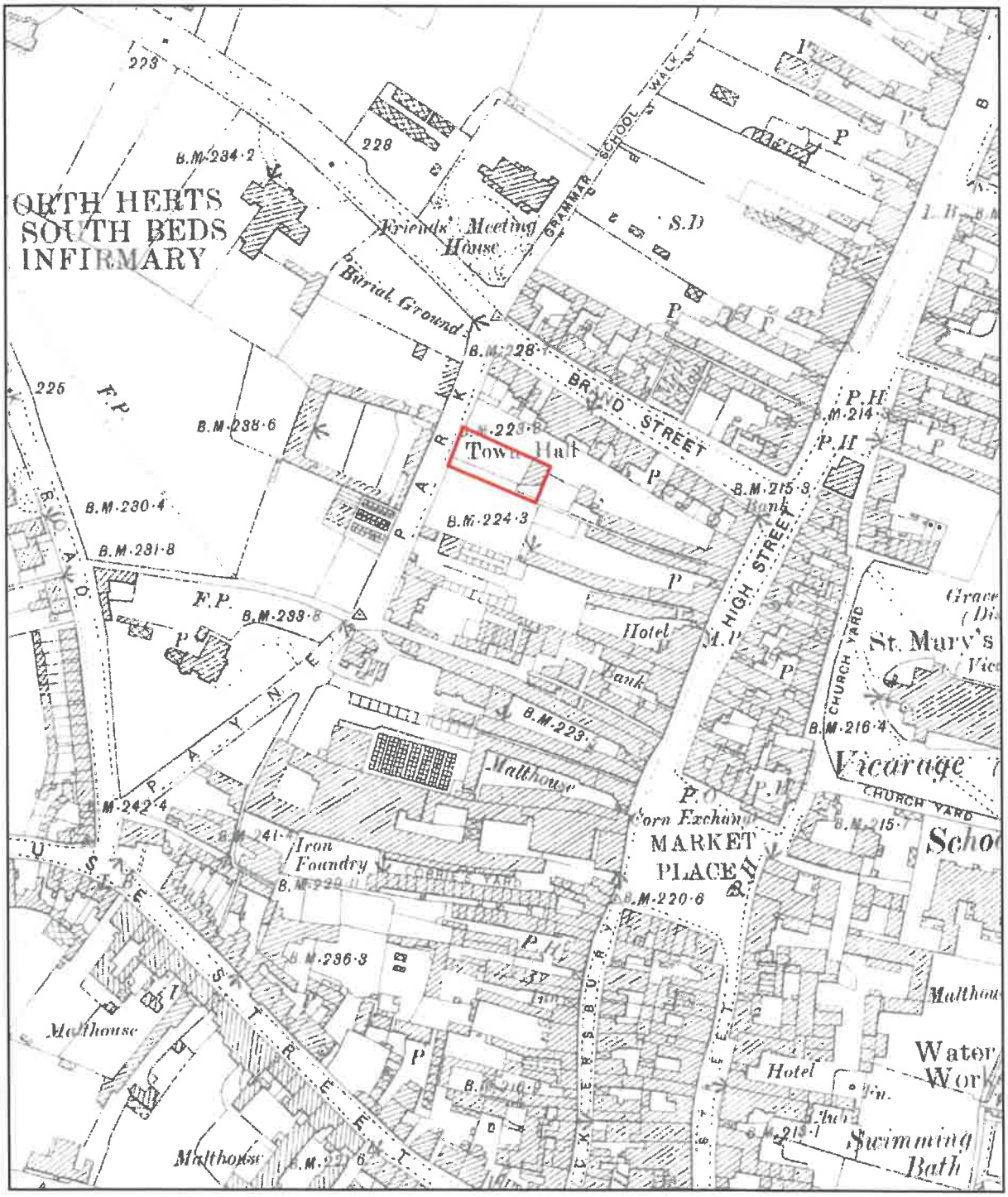

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Site History

Figure C

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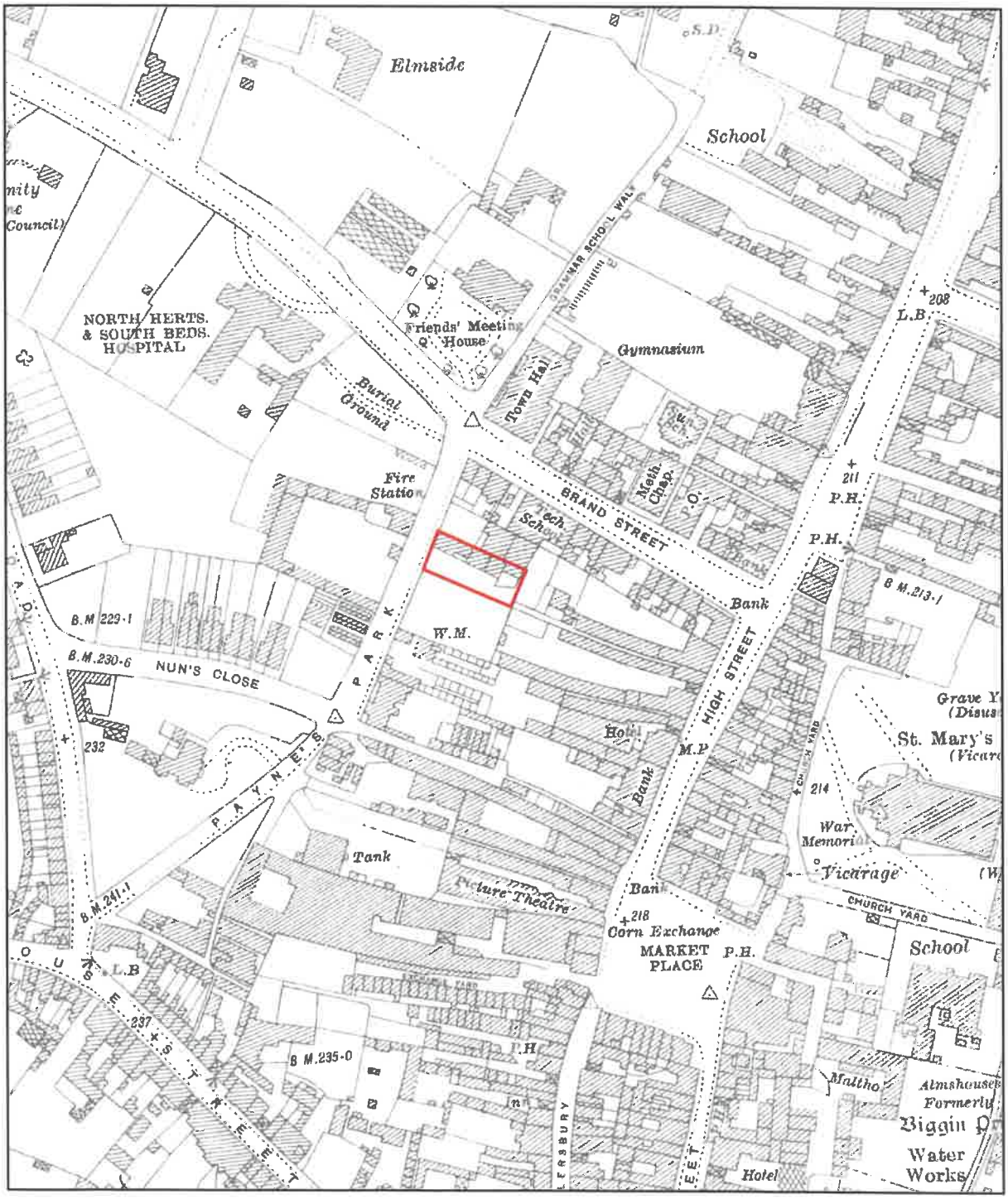

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Site History

Figure D

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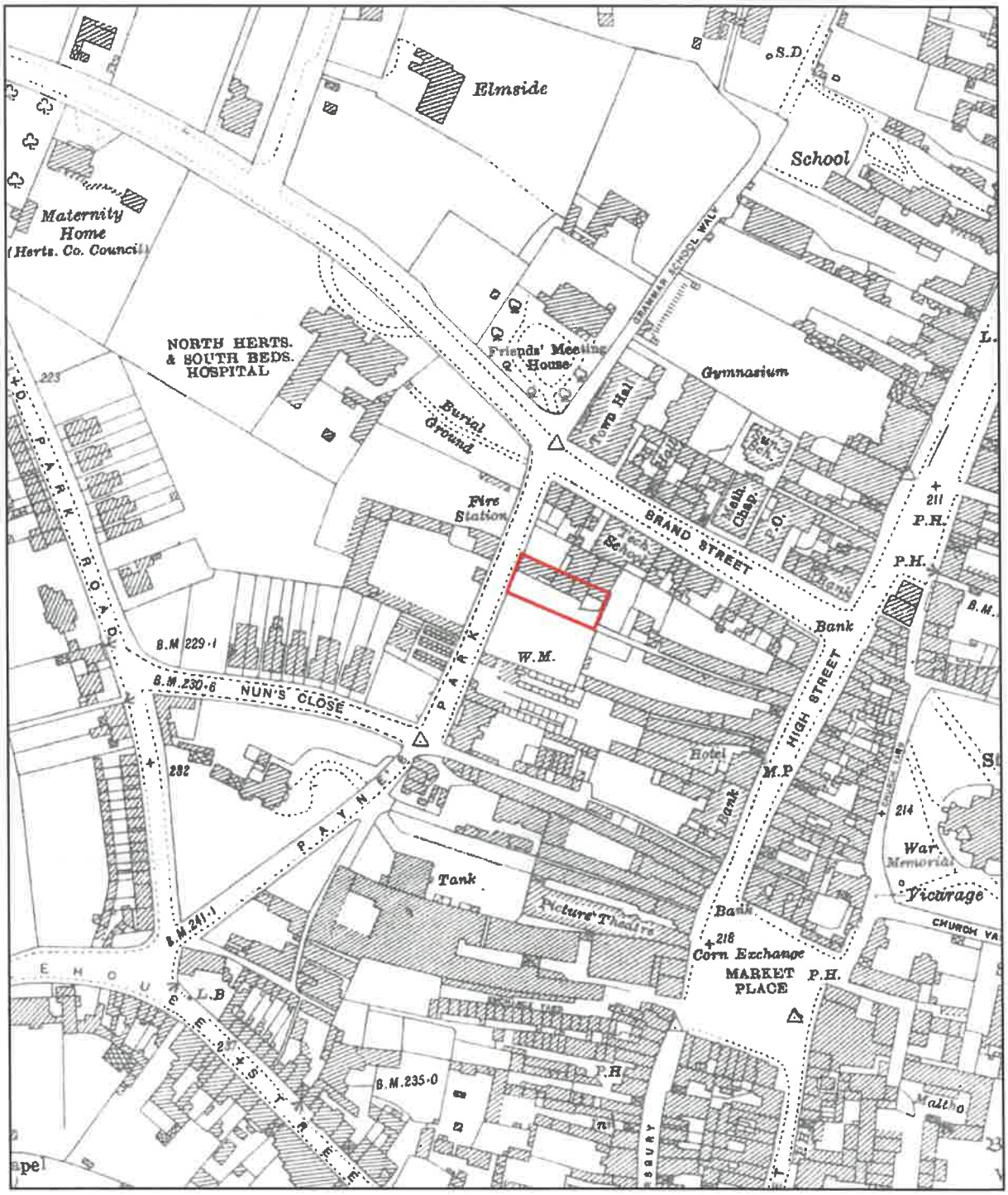

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Site History

Figure E

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Site History

Figure F

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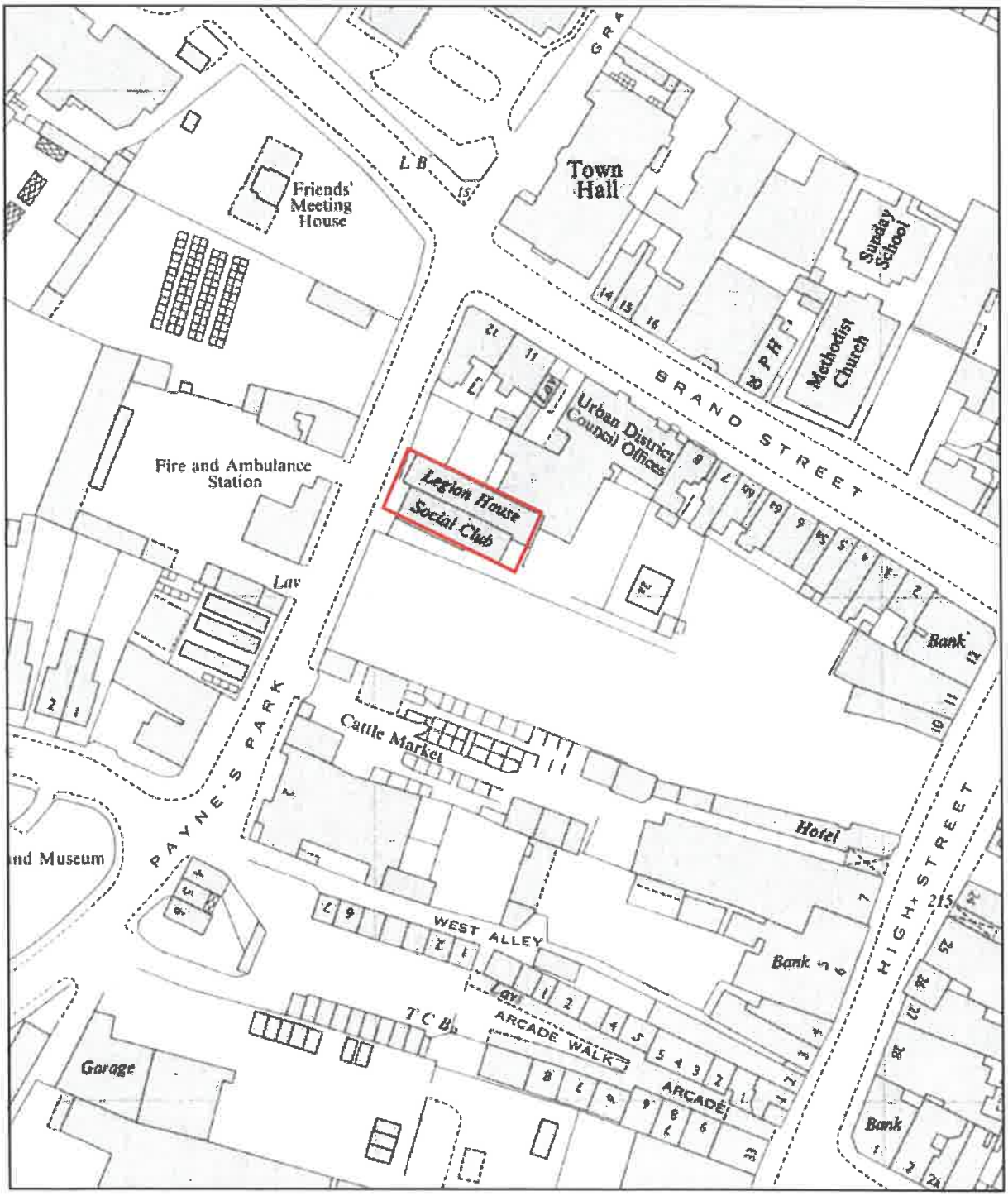

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Site History

Figure G

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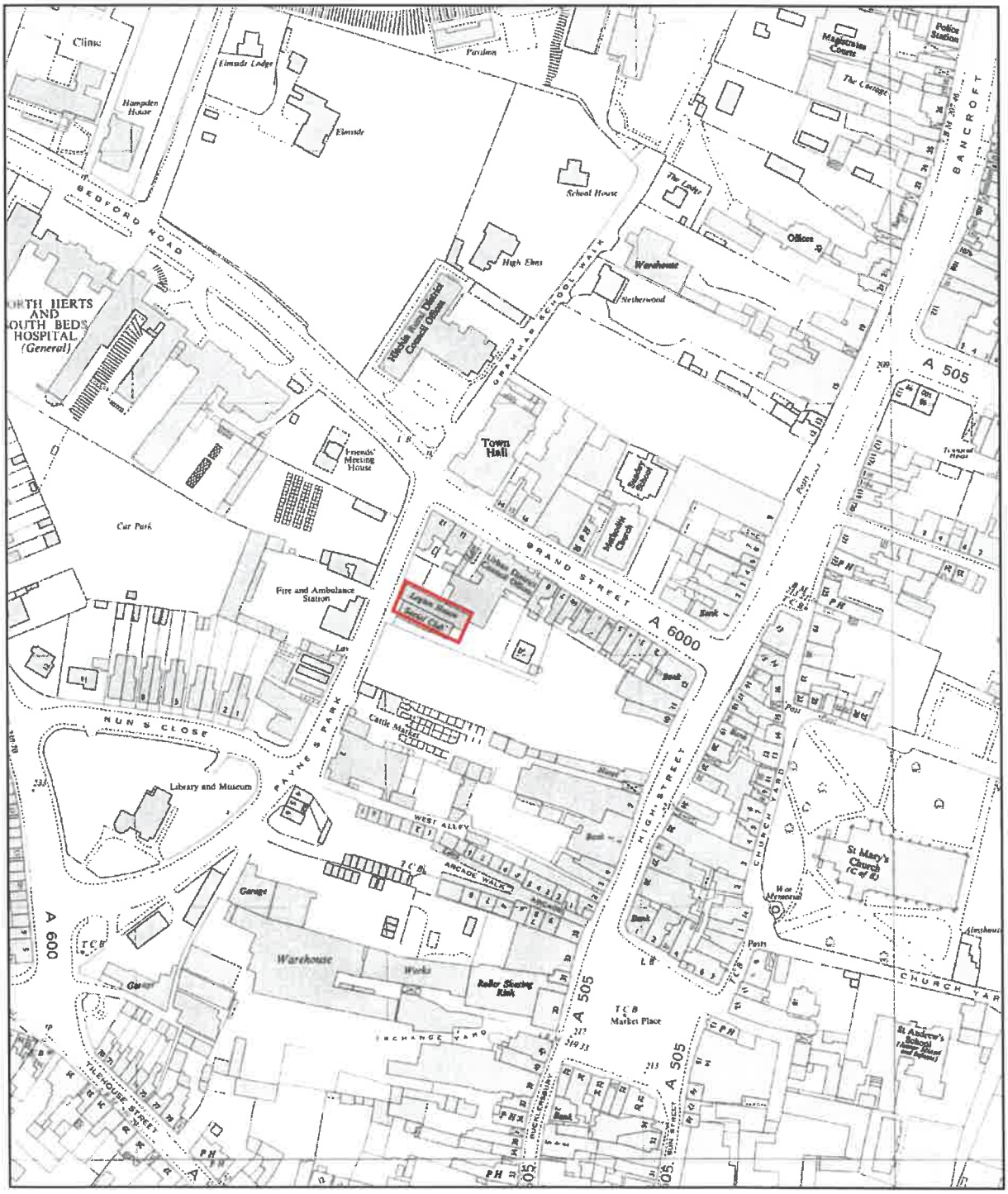

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Site History

Figure H

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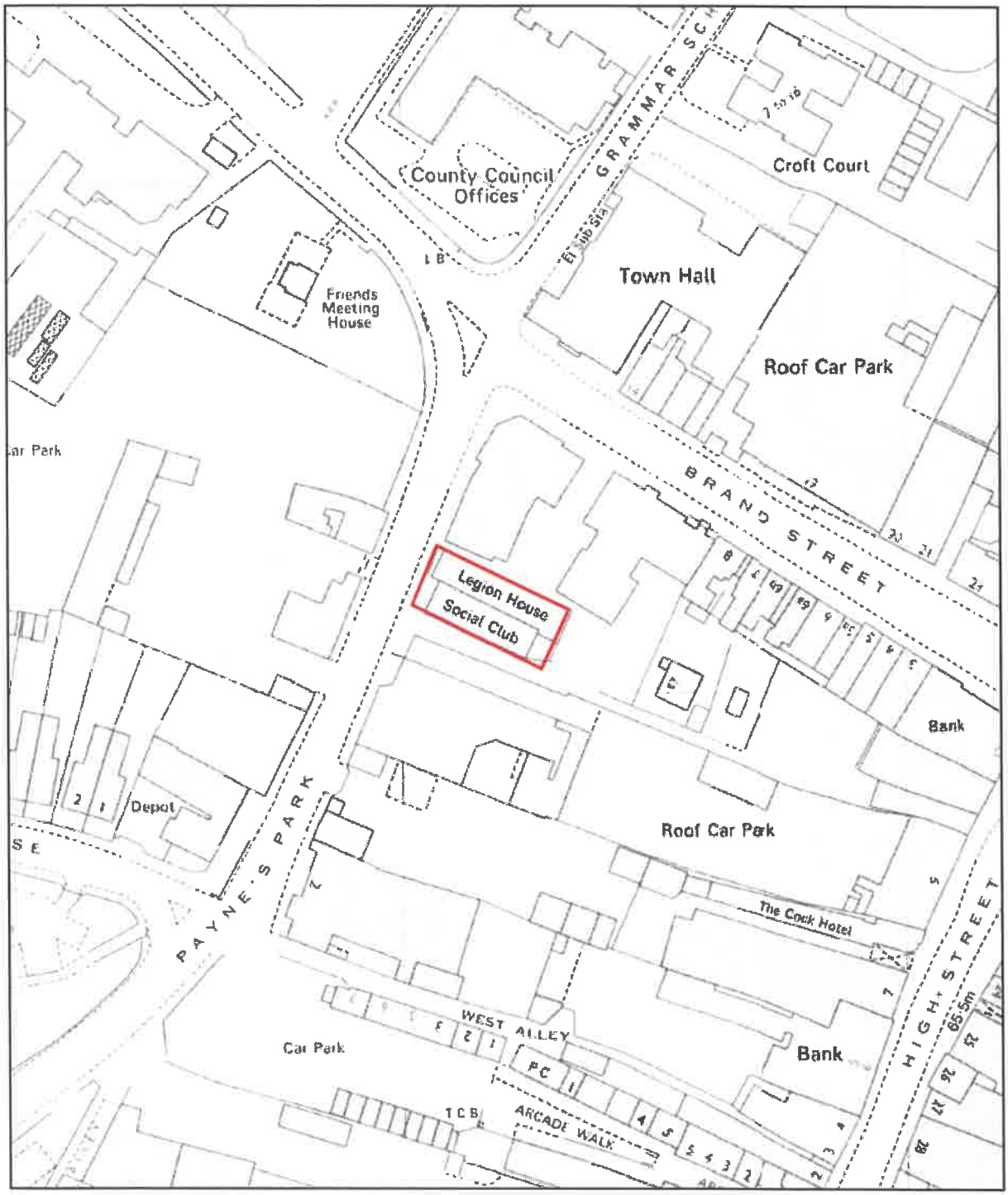

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Site History

Figure I

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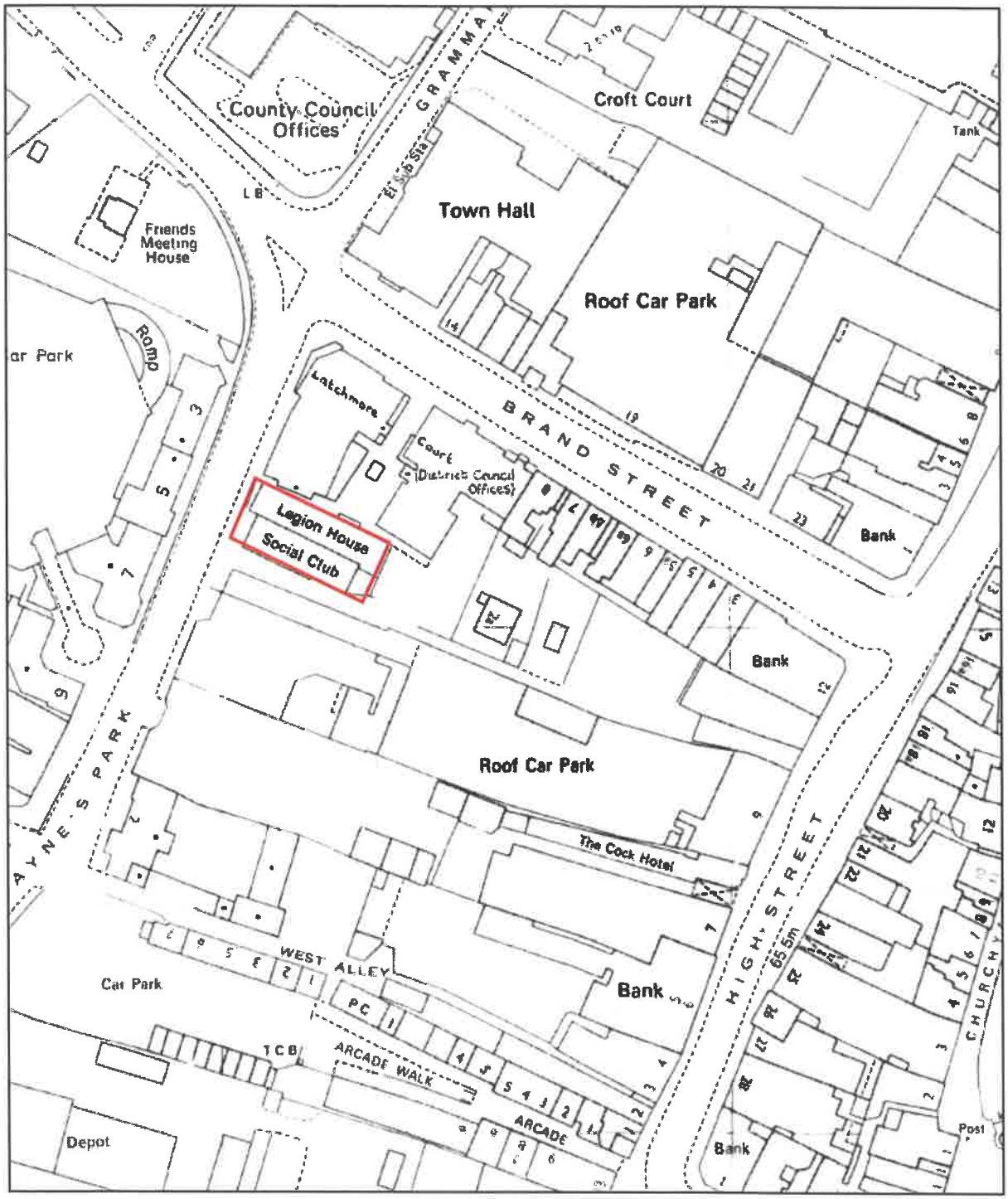

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Site History

Figure J

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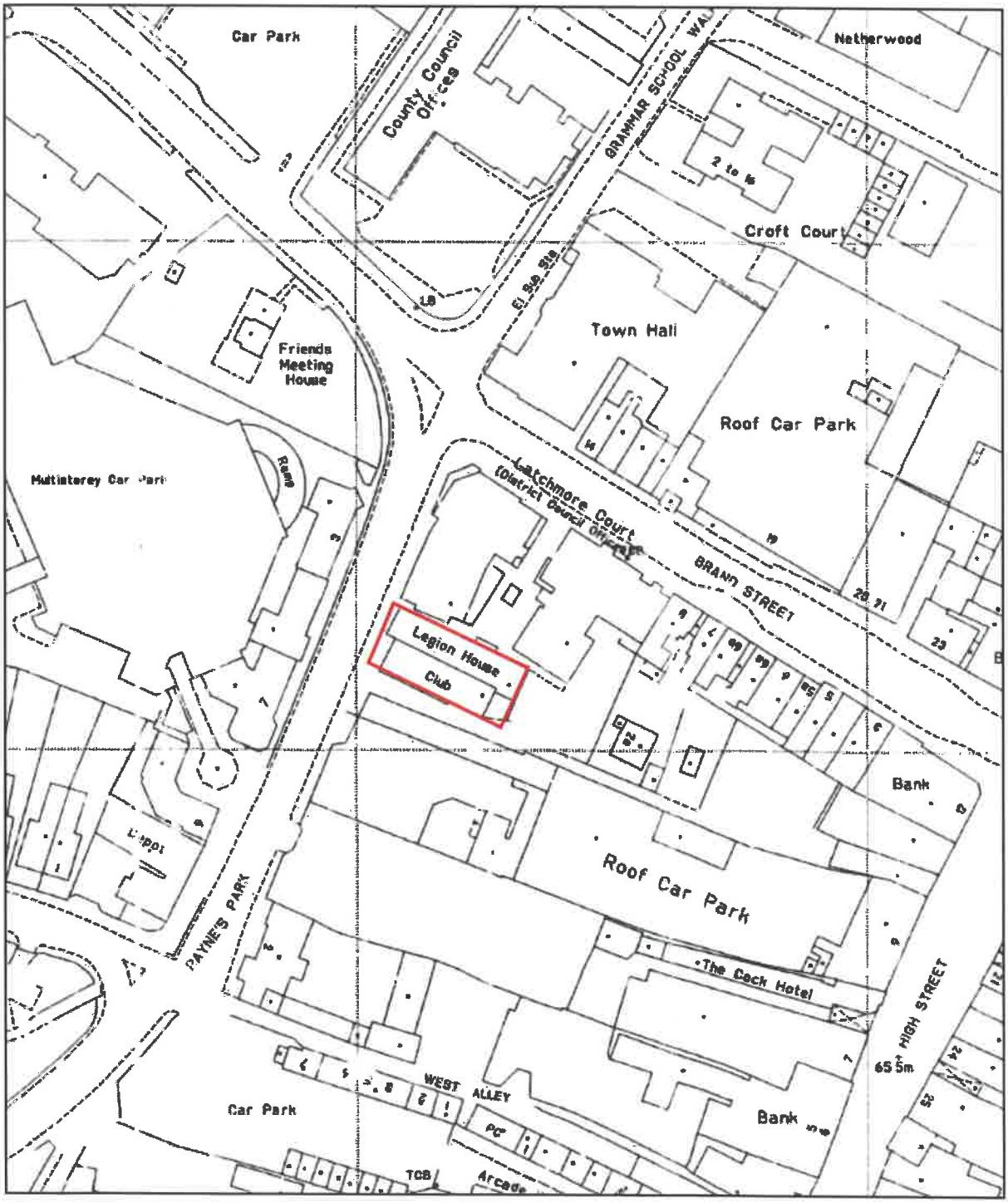

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Site History

Figure K

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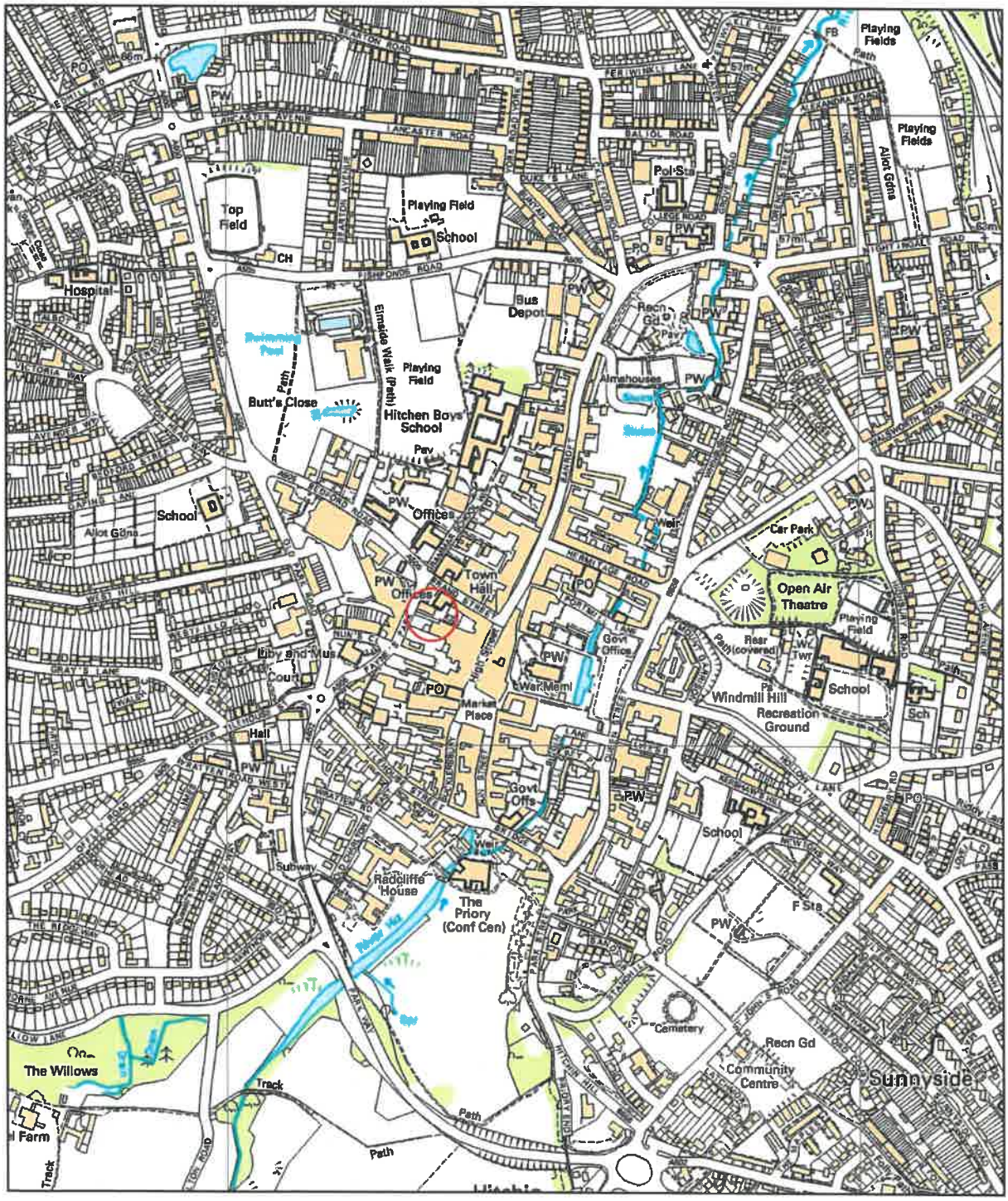

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Site History

Figure L

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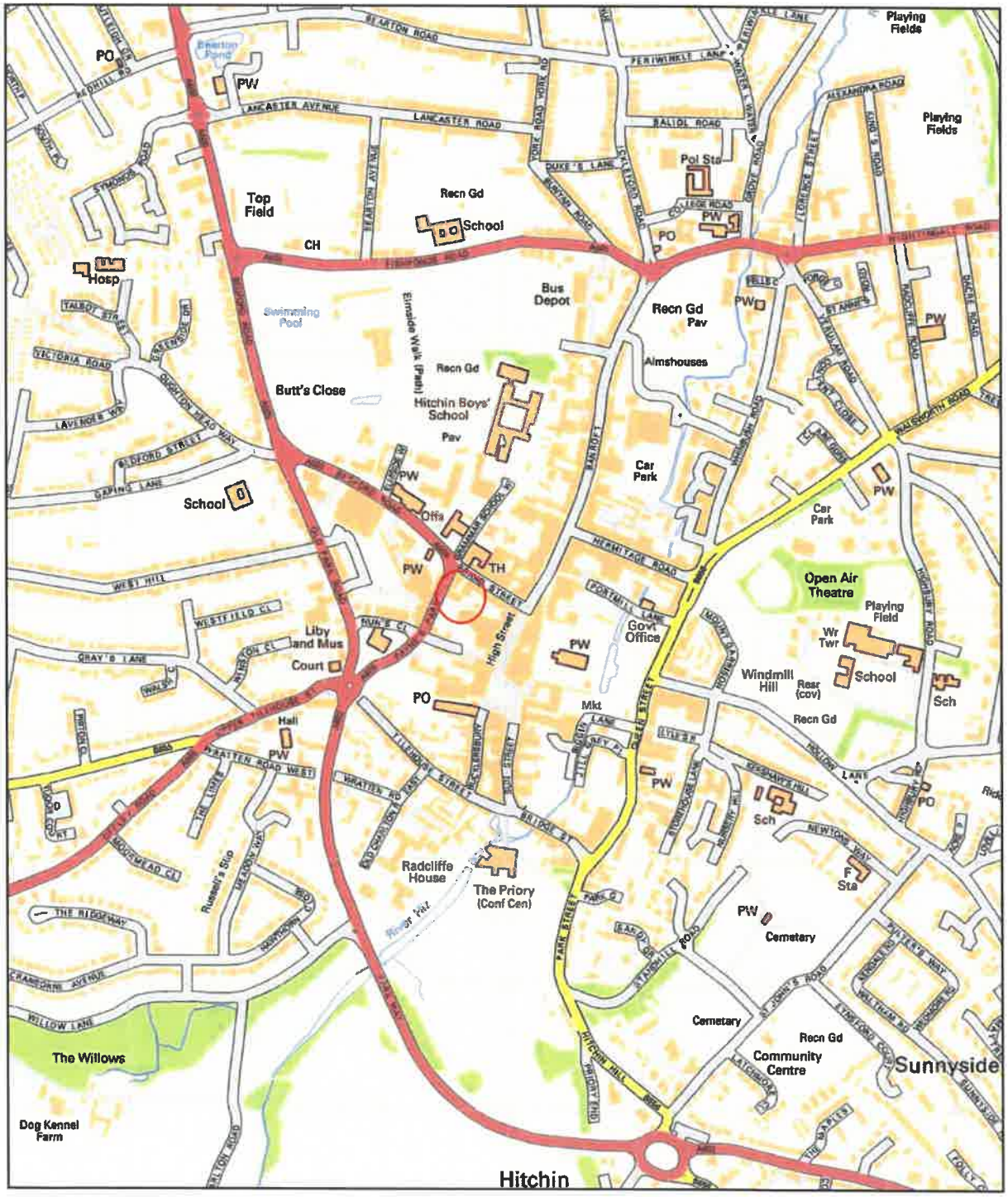

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Site History

Figure M

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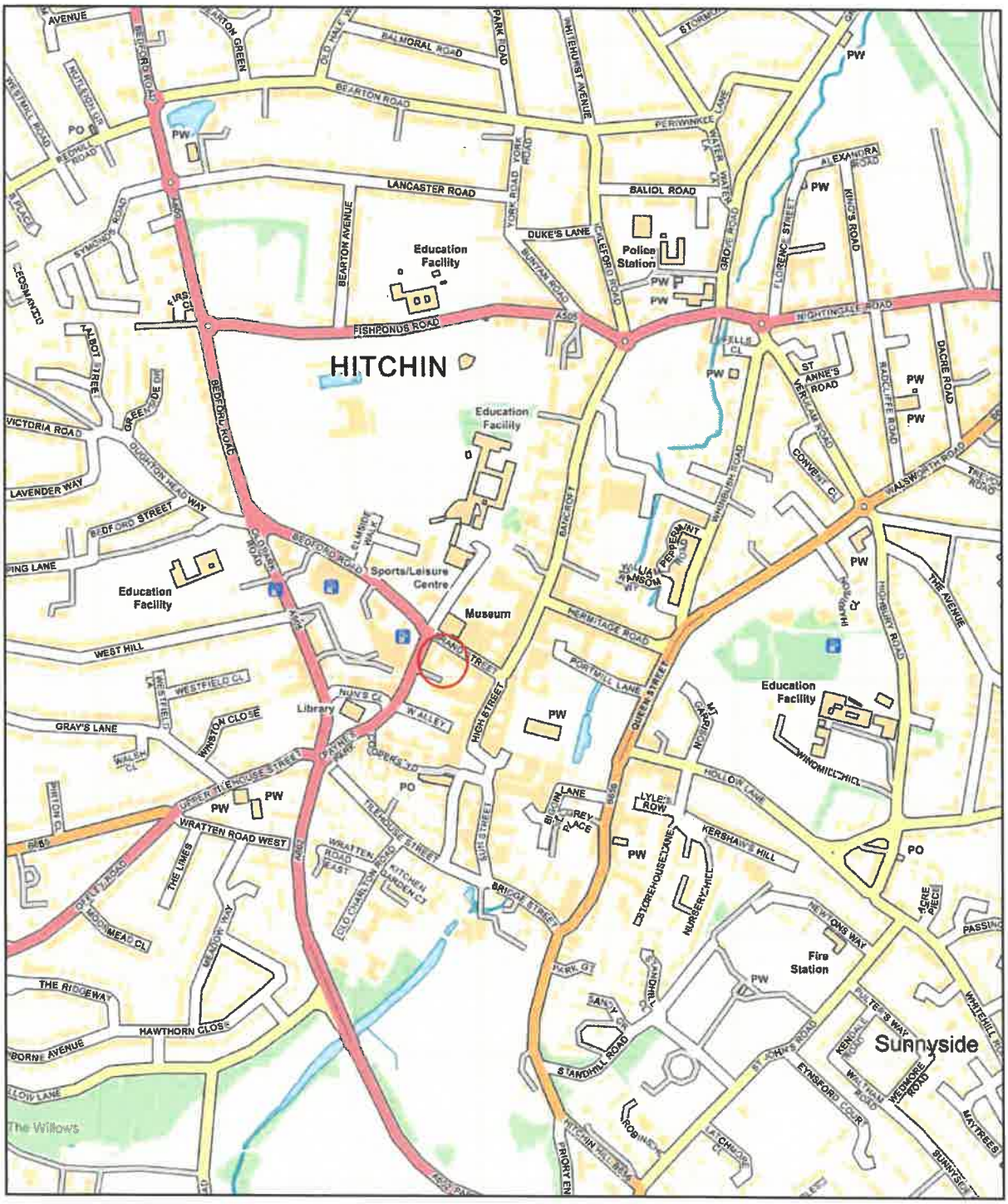

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Appendix 2

Environmental Database Information

Groundsure
LOCATION INTELLIGENCE

Enviro Insight

Address:	**7, PAYNES PARK, HITCHIN, SG5 1EH**
Date:	**17 Sep 2018**
Reference:	**GS-5453034**
Client:	**Ground Engineering Limited**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	03-Jul-2015
Grid Reference:	518318,229217
Site Size:	0.04ha

Report Reference: GS-5453034
Client Reference: C14571

Groundsure
LOCATION INTELLIGENCE

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Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	0	10	25
1.2 Additional Information – Historical Tank Database	0	0	10	16
1.3 Additional Information – Historical Energy Features Database	0	0	17	22
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	15	21
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	0	0	15

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	3	2
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	2	2
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	10
2.1.9 Records of Water Industry Referrals	0	0	0	1
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	6
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	1	3
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	5

Section 4: Current Land Use

	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	2	25	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	2	2
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology

5.1 Records of Artificial Ground and Made Ground present beneath the study site	None identified
5.2 Records of Superficial Ground and Drift Geology present beneath the study site	Identified
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology

	0-500m
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site	Identified
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site	Identified

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	8
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	1	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	3
6.6 Source Protection Zones (within 500m of the study site)	1	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	#250GWV #	#500GWV #	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site	No	No	No	No	No	No
6.10 Ordnance Survey MasterMap Water Network entries within 500m of the site	0	0	2	26	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Enviroment Agency Zone 2 floodplains within 250m of the study site	Identified
7.2 Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Identified
7.3 Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site	Very Low
7.4 Flood Defences within 250m of the study site	None identified
7.5 Areas benefiting from Flood Defences within 250m of the study site	None identified
7.6 Areas used for Flood Storage within 250m of the study site	None identified
7.7 Maximum BGS Groundwater Flooding susceptibility within 50m of the study site	Potential below Surface
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	High

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	1
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	3
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	1
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	2	0	0	0	2	4
8.14 Records of Green Belt land	0	0	0	1	0	6

Section 9: Natural Hazards

9.1 Maximum risk of natural ground subsidence	Very Low
9.1.1 Maximum Shrink-Swell hazard rating identified on the study site	Negligible
9.1.2 Maximum Landslides hazard rating identified on the study site	Very Low
9.1.3 Maximum Soluble Rocks hazard rating identified on the study site	Negligible
9.1.4 Maximum Compressible Ground hazard rating identified on the study site	Negligible
9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site	Very Low
9.1.6 Maximum Running Sand hazard rating identified on the study site	Very Low

9.2 Radon

9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Coal mining areas within 75m of the study site	None identified
10.2 Non-Coal Mining areas within 50m of the study site boundary	Identified
10.3 Brine affected areas within 75m of the study site	None identified

Using this report

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

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

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

3. Landfills and Other Waste Sites

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

4. Current Land Uses

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

5. Geology

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

6. Hydrogeology and Hydrology

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

7. Flooding

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

8. Designated Environmentally Sensitive Sites

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

9. Natural Hazards

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

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

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

Note: Maps

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

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

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

Groundsure
LOCATION INTELLIGENCE

1. Historical Land Use



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Site Outline

Search Buffers (m)
250
500

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

Industrial Land Use

Potentially Infilled Land

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

Energy Features

Petrol Stations

Historical military sites

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 35

ID	Distance [m]	Direction	Use	Date
1A	70	NW	Hospital	1946
2B	71	NW	Hospital	1946
3A	71	NW	Hospital	1922
4B	72	NW	Hospital	1959
5	76	NW	Hospital	1980
6B	77	NW	Infirmary	1881
7A	79	NW	Infirmary	1897
8AD	118	SW	Iron Foundry	1881
9	198	E	Smithy	1897
10W	229	SE	Garage	1881
11C	259	NE	Distillery	1897
12	262	NE	Police Station	1897
13C	262	NE	Distillery	1922
14D	275	SE	Water Works	1881
15D	277	SE	Water Works	1922
16Y	277	SE	Water Works	1946
17D	277	SE	Water Works	1946
18F	288	NE	Leather Dressing Works	1922
19E	318	NE	Unspecified Tank	1897
20E	318	NE	Unspecified Tank	1922
21E	318	NE	Unspecified Tank	1946
22E	321	NE	Unspecified Tank	1959
23F	341	NE	Leather Dressing Works	1881
24	384	NE	Leather Dressing Works	1897
25G	412	N	Unspecified Ground Workings	1991
26G	412	N	Unspecified Ground Workings	1980
27AM	413	E	Gravel Pit	1922
28	426	NE	Electric Power Station	1922
29AN	430	SE	Gravel Pit	1881
30	457	SE	Nursery	1897
31H	472	NE	Unspecified Tank	1922
32H	472	NE	Unspecified Tank	1946
33	475	NE	Police Station	1881

34I	489	NE	Nursery	1881
35I	493	NE	Nursery	1897

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 26

ID	Distance (m)	Direction	Use	Date
36J	126	SW	Unspecified Tank	1923
37J	126	SW	Unspecified Tank	1932
38K	142	NE	Unspecified Tank	1994
39K	142	NE	Unspecified Tank	1982
40K	143	NE	Unspecified Tank	1982
41L	192	NE	Unspecified Tank	1982
42L	193	NE	Unspecified Tank	1982
43L	193	NE	Unspecified Tank	1994
44	215	NE	Unspecified Tank	1898
45	241	NW	Unspecified Tank	1982
46E	312	NE	Unspecified Tank	1923
47E	312	NE	Unspecified Tank	1932
48M	351	NE	Unspecified Tank	1982
49M	351	NE	Unspecified Tank	1992
50N	374	NE	Tanks	1982
51AB	381	NE	Tanks	1982
52N	382	NE	Tanks	1992
53O	388	E	Unspecified Tank	1982
54O	388	E	Unspecified Tank	1992
55P	406	E	Unspecified Tank	1881
56P	406	E	Unspecified Tank	1932
57	433	SE	Unspecified Tank	1992
58Q	466	N	Unspecified Tank	1932
59Q	466	N	Unspecified Tank	1923
60H	468	NE	Unspecified Tank	1932
61H	468	NE	Unspecified Tank	1923

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 39

ID	Distance (m)	Direction	Use	Date
62R	74	NE	Electricity Substation	1994
63R	75	NE	Electricity Substation	1982
64R	75	NE	Electricity Substation	1982
65S	109	SW	Electricity Substation	1982
66S	110	SW	Electricity Substation	1982
67S	110	SW	Electricity Substation	1994
68T	162	E	Electricity Substation	1982
69T	163	E	Electricity Substation	1994
70T	163	E	Electricity Substation	1982
71U	170	NE	Electricity Substation	1982
72U	171	NE	Electricity Substation	1982
73U	171	NE	Electricity Substation	1994
74V	209	NW	Electricity Substation	1994
75V	210	NW	Electricity Substation	1982
76W	220	SE	Electricity Substation	1992
77	220	SE	Electricity Substation	1982
78V	228	NW	Electricity Substation	1982
79X	252	NE	Electricity Substation	1982
80X	258	NE	Electricity Substation	1992
81	278	NW	Electricity Substation	1994
82Y	287	SE	Electricity Substation	1985
83Y	287	SE	Electricity Substation	1992
84Y	288	SE	Electricity Substation	1971
85Z	305	S	Electricity Substation	1983
86Z	305	SW	Electricity Substation	1985
87Z	306	SW	Electricity Substation	1992
88AA	351	E	Electricity Substation	1982
89AA	352	E	Electricity Substation	1992
90AB	370	NE	Electricity Substation	1992
91AB	371	NE	Electricity Substation	1982
92AC	381	S	Electricity Substation	1985
93AC	382	S	Electricity Substation	1983
94AC	382	S	Electricity Substation	1992
95	387	NE	Electricity Substation	1992
96O	398	E	Electricity Substation	1982
97O	398	E	Electricity Substation	1992
98	440	NE	Electric Power Station	1923
99	468	NW	Electricity Substation	1992
100	477	N	Electricity Substation	1982

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 36

ID	Distance (m)	Direction	Use	Date
101AD	112	SW	Garage	1982
102AD	112	SW	Garage	1965
103AD	113	SW	Garage	1964
104AD	114	SW	Garage	1982
105J	114	SW	Garage	1964
106J	114	SW	Garage	1965
107AD	146	SW	Garage	1994
108AE	162	W	Garage	1994
109AE	165	W	Garage	1982
110AE	167	W	Garage	1982
111AF	202	W	Garage	1982
112AF	207	W	Garage	1994
113AF	207	W	Garage	1964
114AF	233	W	Garage	1965
115AF	233	W	Garage	1982
116AG	255	S	Garage	1964
117AG	256	S	Garage	1965
118AG	256	S	Garage	1985
119AG	256	S	Garage	1983
120AG	257	S	Garage	1992
121AH	278	E	Garage	1965
122AH	278	E	Garage	1964
123	338	E	Garage	1982
124	342	E	Garage	1992
125AI	352	SE	Garage	1964
126AI	353	SE	Garage	1965
127AI	353	SE	Garage	1971

128AJ	355	SE	Garage	1964
129AJ	356	SE	Garage	1965
130AJ	356	SE	Garage	1971
131AJ	357	SE	Garage	1992
132AI	361	SE	Garage	1985
133AJ	365	SE	Garage	1985
134AK	403	SW	Garage	1976
135AK	410	SW	Garage	1964
136AK	410	SW	Garage	1971

1.6 Historical military sites

Certain military installations were not noted on historic mapping for security reasons. Whilst not all military land is necessarily of concern, Groundsure has researched and digitised a number of Ordnance Factories and other military industrial features (e.g. Ordnance Depots, Munitions Testing Grounds) which may be of contaminative concern. This research was drawn from a number of different sources, and should not be regarded as a definitive or exhaustive database of potentially contaminative military installations. The boundaries of sites within this database have been estimated from the best evidence available to Groundsure at the time of compilation.

Records of historical military sites within 500m of the search boundary: 0

Database searched and no data found.

1.7 Potentially Infilled Land

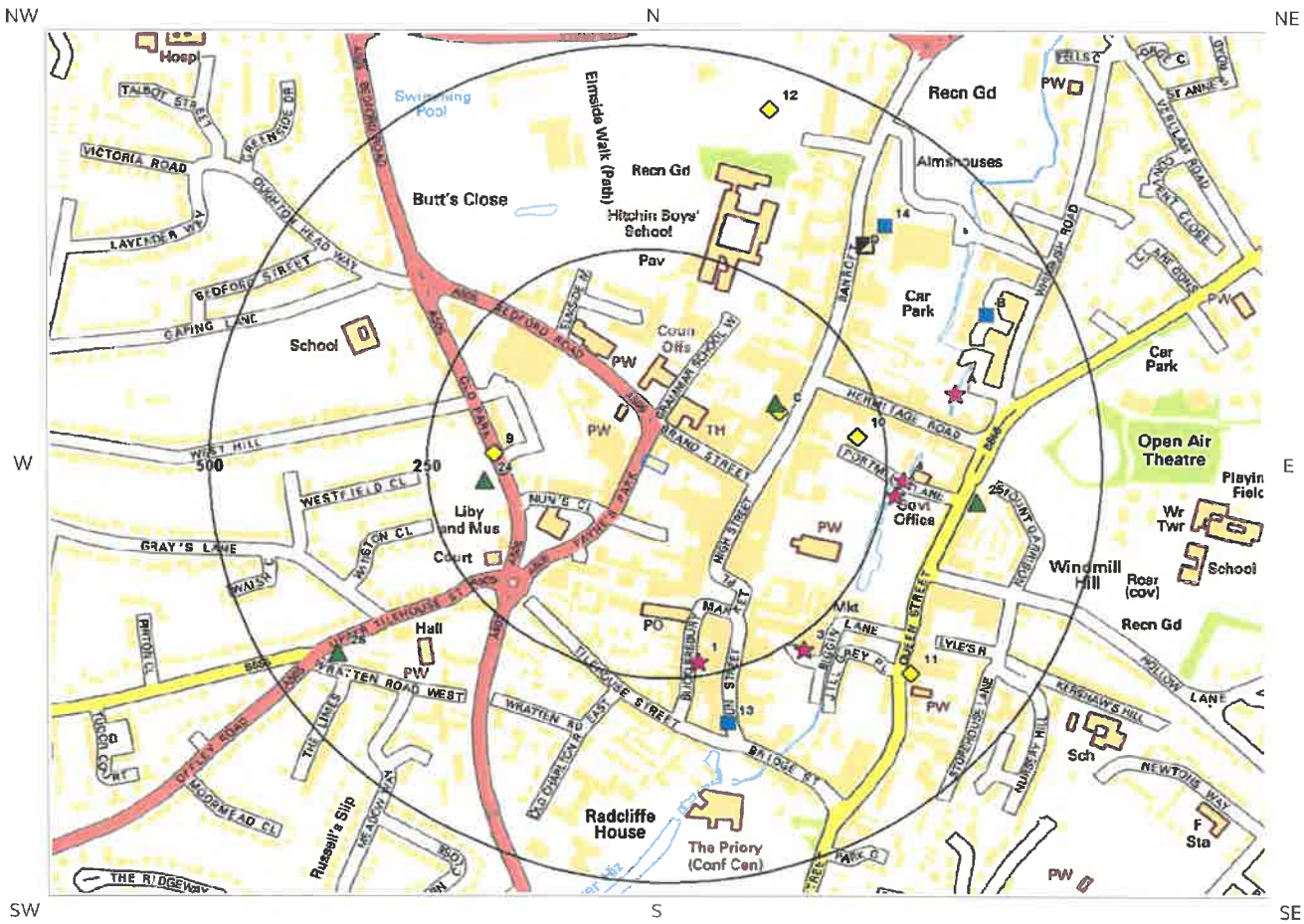
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 15

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

ID	Distance(m)	Direction	Use	Date
137AL	309	N	Pond	1946
138AL	310	N	Ponds	1959
139AL	310	NW	Pond	1881
140AL	312	N	Pond	1922
141AL	315	N	Ponds	1980
142AL	315	N	Ponds	1991
143	352	N	Pond	1881
144G	412	N	Unspecified Ground Workings	1980
145G	412	N	Unspecified Ground Workings	1991
146AM	413	E	Gravel Pit	1922
147AN	430	SE	Gravel Pit	1881
148AO	447	N	Pool	1991
149AO	447	N	Pool	1980
150AP	453	E	Pond	1991
151AP	453	E	Pond	1980

Groundsure
LOCATION INTELLIGENCE

2. Environmental Permits, Incidents and Registers Map



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

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

5

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

ID	Distance (m)	Direction	NGR	Details	
8C	142	NE	518460	Name: Laundry Premises	Authorised Substances: pH

ID	Distance (m)	Direction	NGR	Details	
			229280	Status: Not Active Receiving Water: Na	
9	173	W	518130 229230	Name: Lisles Of Hitchin Status: Not Active Receiving Water: Na	Authorised Substances: pH
10	219	E	518550 229250	Name: Royal Mail Status: Not Active Receiving Water: Na	Authorised Substances: pH
11	373	SE	518610 228960	Name: Mercedes-benz Of Hitchin Status: Not Active Receiving Water: Na	Authorised Substances: pH
12	445	N	518450 229650	Name: Hitchin Swimming Centre Status: Not Active Receiving Water: Na	Authorised Substances: pH

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

4

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

ID	Distance (m)	Direction	NGR	Details	
23C	143	NE	518456 229289	Address: Johnsons Cleaners UK Ltd, 11 Bancroft, Hitchin, Herts, SG5 1JG Process: Dry Cleaning Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
24	185	W	518119 229194	Address: Marshall of Hitchin (formally Lisles of Hitchin, Lisles Motor Repairs), 23 Old Park Road, Hitchin, Hertfordshire, SG5 2JS Process: Unloading of Petrol into Storage at Service Stations Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
25	358	E	518688 229168	Address: Repsol, Portmill Lane, Queen Street, SG4 9TN Process: Petrol Vapour Recovery Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
26	424	SW	517948 228983	Address: Texaco, Upper Tilehouse Stree, Hitchin, Hertfordshire, SG5 2EF Process: Petrol Vapour Recovery Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

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

ID	Distance (m)	Direction	NGR	Details	
13	312	S	518400 228900	Address: QUEEN ST GARAGE HITCHIN, HERTS Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: PR1NF2975 Permit Version: 1	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 02/12/1987 Effective Date: 02-Dec-1987 Revocation Date: 11/01/1995
14	384	NE	518583 229508	Address: SAINSBURY'S SUPERMARKET, WHINBUSH ROAD, HITCHIN, ., HERTFORDSHIRE, SG5 1PU Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: EPRUB3338AJ Permit Version: 1	Receiving Water: GW VIA AN INFILTRATION SYSTEM Status: NEW ISSUED UNDER EPR 2010 Issue date: 15/05/2013 Effective Date: 15-May-2013 Revocation Date:
15B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: PR1NF1263 Permit Version: 1	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/07/1980 Effective Date: 03-Jul-1980 Revocation Date: 17/07/1991
16B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: PR1NF1263 Permit Version: 2	Receiving Water: River Hiz Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 18/07/1991 Effective Date: 18-Jul-1991 Revocation Date: 06/04/2005
17B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: PR1NF1263 Permit Version: 1	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/07/1980 Effective Date: 03-Jul-1980 Revocation Date: 17/07/1991
18B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: PR1NF1263 Permit Version: 1	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/07/1980 Effective Date: 03-Jul-1980 Revocation Date: 17/07/1991
19B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: PR1NF1263 Permit Version: 1	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/07/1980 Effective Date: 03-Jul-1980 Revocation Date: 17/07/1991
20B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: PR1NF1263 Permit Version: 1	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/07/1980 Effective Date: 03-Jul-1980 Revocation Date: 17/07/1991
21B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - COOLING WATER	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/07/1980

ID	Distance (m)	Direction	NGR	Details	
				Permit Number: PR1NF1263 Permit Version: 1	Effective Date: 03-Jul-1980 Revocation Date: 17/07/1991
22B	410	NE	518700 229400	Address: WILLIAM RANSOM WAY, HITCHIN, HERTS, SG5 1QX Effluent Type: TRADE DISCHARGES - COOLING WATER Permit Number: PR1NF1263 Permit Version: 1	Receiving Water: River Hiz Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/07/1980 Effective Date: 03-Jul-1980 Revocation Date: 17/07/1991

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

1

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

ID	Distance (m)	Direction	Address	Permission reference	Local Authority	First Date Received	Last Date Received	Status
28D	351	NE	PHOTODATA TEST SERVICES LIMITED, S MCCOMBIE AND CO, HITCHIN, HERTFORD, HERTFORDSHIRE, SG5 1NQ	CE0621	NORTH HERTFORDSHIRE DISTRICT COUNCIL	01-Jul-2010	01-Jan-2018	RECEIVED

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

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

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

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

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

7

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

ID	Distance (m)	Direction	NGR	Details	
1	232	S	518366 228975	Incident Date: 10-Apr-2002 Incident Identification: 70571 Pollutant: Contaminated Water Pollutant Description: Firefighting Run-Off	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
2	261	E	518592 229178	Incident Date: 12-Jul-2001 Incident Identification: 15814 Pollutant: Contaminated Water Pollutant Description: Suspended Solids	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
3	266	SE	518486 228990	Incident Date: 08-May-2003 Incident Identification: 156752 Pollutant: Oils and Fuel Pollutant Description: Unidentified Oil	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
4	269	E	518602 229197	Incident Date: 23-Apr-2002 Incident Identification: 74064 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
5A	340	E	518662 229304	Incident Date: 12-Jun-2002 Incident Identification: 84366 Pollutant: Oils and Fuel Pollutant Description: Mixed/Waste Oils	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
6A	340	E	518662 229304	Incident Date: 12-Jun-2002 Incident Identification: 84366 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Other General Biodegradable Material or Waste	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
7A	340	E	518662 229304	Incident Date: 12-Jun-2002 Incident Identification: 84366 Pollutant: General Biodegradable Materials and Wastes:Oils and Fuel Pollutant Description: Other General Biodegradable Material or Waste:Mixed/Waste Oils	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

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

0

Database searched and no data found.

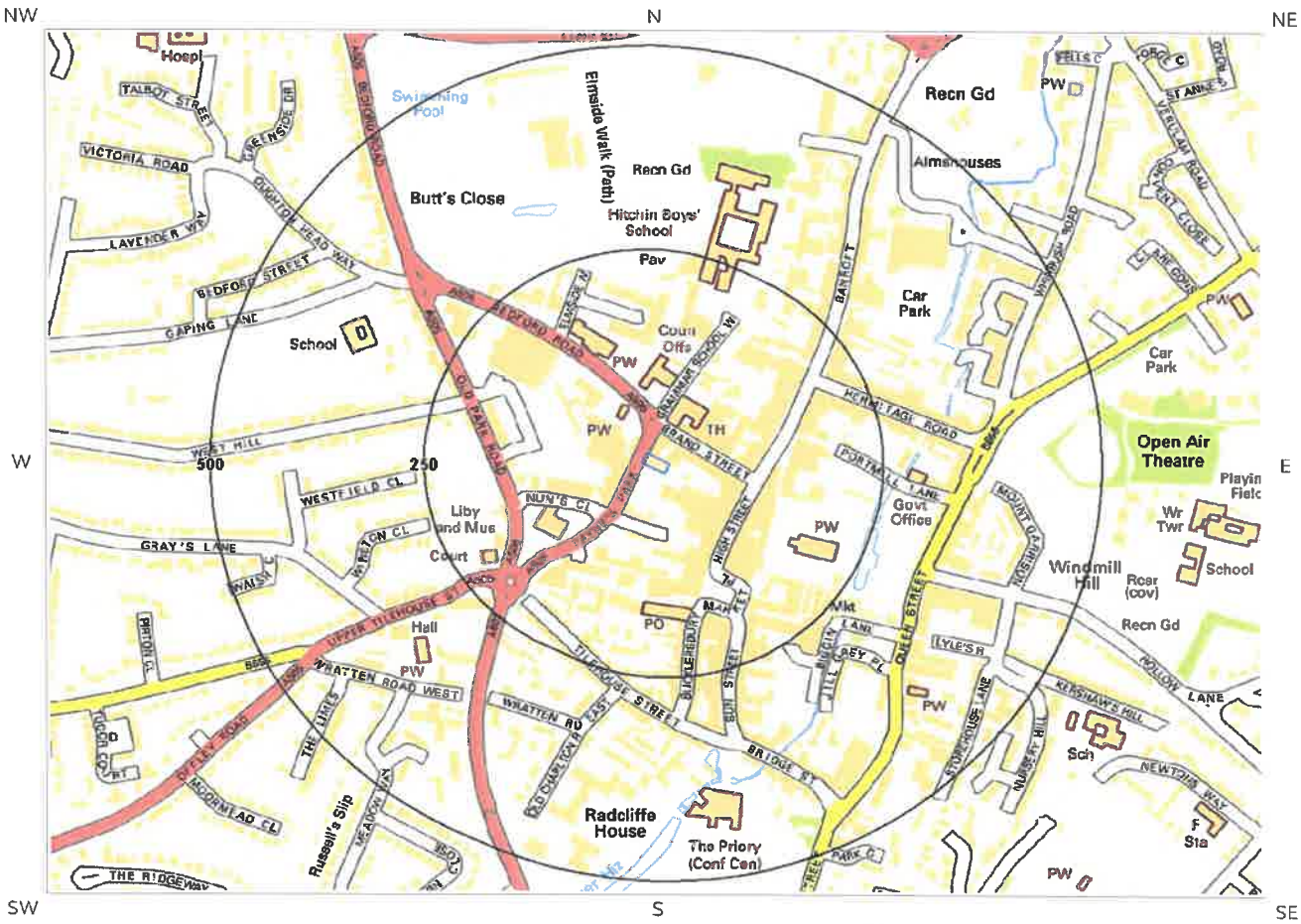
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

Records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site	0

Database searched and no data found.

Groundsure
LOCATION INTELLIGENCE

3. Landfill and Other Waste Sites Map



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Site Outline

250 Search Buffers (m)
500

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

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

4

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	802	SE		Site Address: Eynesford Court, Hitchin, Hertfordshire Waste Licence: - Site Reference: EXEMPT 3271 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1377	N		Site Address: Ickleford, Near Hitchin, Hertfordshire Waste Licence: - Site Reference: 85/183, 1900/5459 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1384	S		Site Address: Maydencroft Manor, Gosmore, Hitchin Waste Licence: - Site Reference: HCC/179, 179/PRE-76, 1900/5105 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1418	S		Site Address: Maydencroft Manor, Gosmore, Hitchin Waste Licence: - Site Reference: HCC/179, 179/PRE-76, 1900/5104 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -

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

0

Database searched and no data found.

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

0

Database searched and no data found.

3.2 Other Waste Sites

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

0

Database searched and no data found.

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

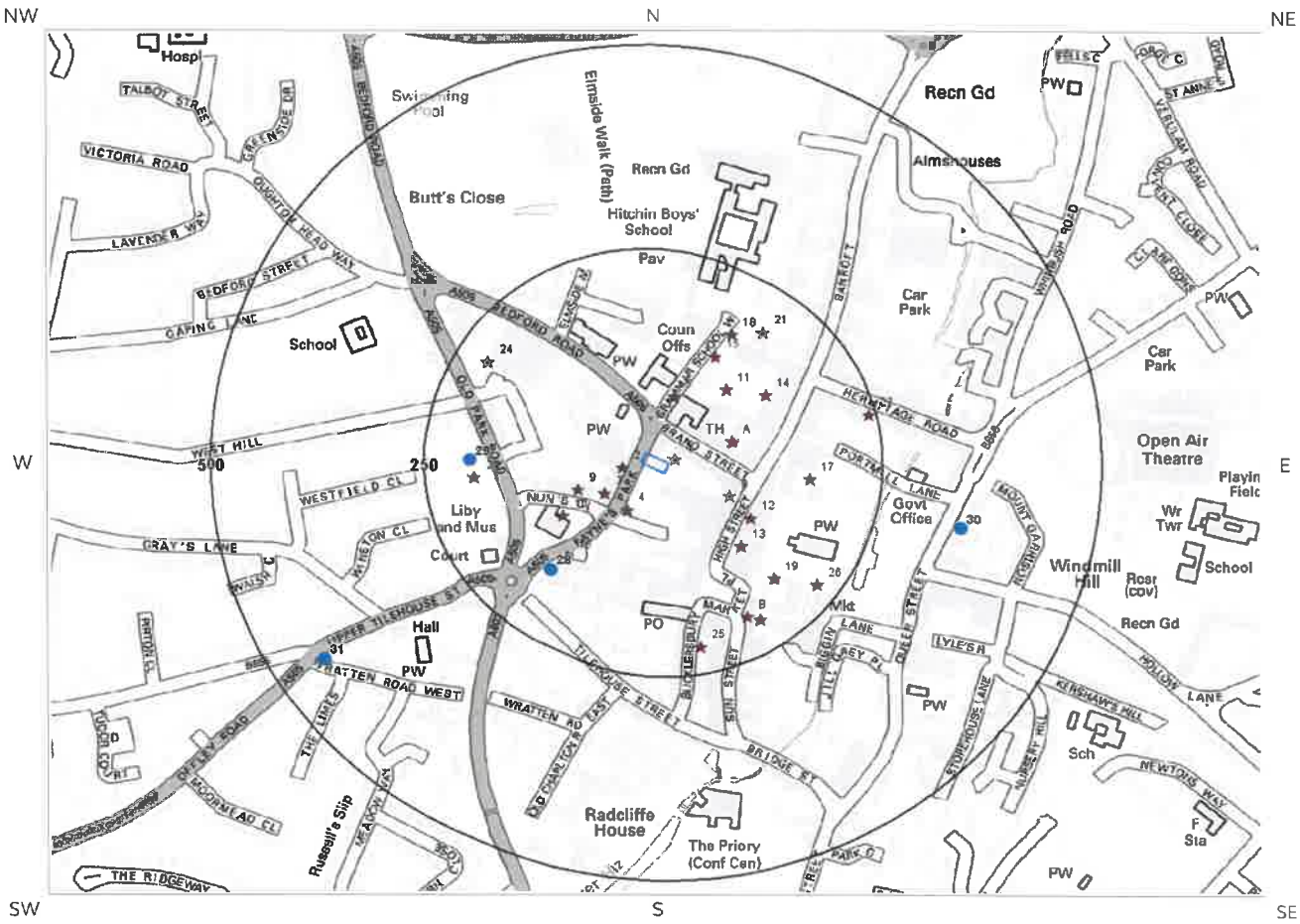
5

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	
Not shown	1228	N	518760 230370	Site Address: Hitchin Transfer Station, Burymead Road, Hitchin, Hertfordshire, SG5 1RT Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BIF108 EPR reference: EA/EPR/BB3100KN/T001 Operator: Biffa Waste Services Ltd Waste Management licence No: 80224 Annual Tonnage: 75000.0	Issue Date: 07/03/1985 Effective Date: 06/01/2014 Modified: 18/04/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Hitchin Transfer Station Correspondence Address: -
Not shown	1228	N	518760 230370	Site Address: Hitchin Transfer Station, Burymead Road, Hitchin, Hertfordshire, SG5 1RT Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BIF108 EPR reference: EA/EPR/BB3100KN/T001	Issue Date: 07/03/1985 Effective Date: 06/01/2014 Modified: 18/04/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Hitchin Transfer Station Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
				Operator: Biffa Waste Services Limited Waste Management licence No: 80224 Annual Tonnage: 75000.0	
Not shown	1331	N	518700 230500	Site Address: Burymead Road, Hitchin, Hertfordshire, SG1 1RT Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA020 EPR reference: - Operator: Shanks Waste Services Ltd Waste Management licence No: 80224 Annual Tonnage: 0.0	Issue Date: 07/03/1985 Effective Date: - Modified: 18/04/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Shanks Waste Services - Hitchin T S Correspondence Address: Dunedin House, Auckland Park, Mount Farm, Milton Keynes, Bucks, MK1 1BU
Not shown	1416	N	518760 230570	Site Address: Hitchin Transfer Station, Burymead Road, Hitchin, Hertfordshire, SG5 1RT Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FWS012 EPR reference: EA/EPR/CB3109KT/T001 Operator: F C C Waste Services (U K) Limited Waste Management licence No: 80224 Annual Tonnage: 75000.0	Issue Date: 07/03/1985 Effective Date: 29/09/2014 Modified: 18/04/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Hitchin Transfer Station Correspondence Address: -
Not shown	1416	N	518760 230570	Site Address: Land/premises At, Burymead Road, Hitchin, Hertfordshire, SG5 1RT Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA023 EPR reference: EA/EPR/KP3091NE/T002 Operator: Shanks Waste Management Ltd Waste Management licence No: 80224 Annual Tonnage: 75000.0	Issue Date: 07/03/1985 Effective Date: 18/01/2005 Modified: 18/04/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Hitchin Transfer Station Correspondence Address: -

4. Current Land Use Map



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Site Outline

Search Buffers (m)

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 27

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	9	NE	Dow Agro Sciences	518341 229221	9a Latchmore Court, Brand Street, Hitchin, SG5 1NH	Agricultural Machinery and Goods	Industrial Products
2	23	W	Isuperdrive	518279 229211	7, Paynes Park, Hitchin, SG5 1EH	Vehicle Hire and Rental	Hire Services
3	57	SW	Stapleton's Tyre Services Ltd	518259 229180	Paynes Park, Hitchin, SG5 1EH	Vehicle Parts and Accessories	Motoring
4	59	SW	Eastway Enterprise Centre	518284 229159	Paynes Park House, Paynes Park, Hitchin, SG5 1EH	Business Parks and Industrial Estates	Industrial Features
5	77	NE	Electricity Sub Station	518340 229298	SG5	Electrical Features	Infrastructure and Facilities
6A	78	E	European Vaccination Group	518407 229243	21a, Brand Street, Hitchin, SG5 1JE	Medical Equipment, Supplies and Pharmaceuticals	Industrial Products
7A	78	E	Halfords	518407 229243	Brand Street, Hitchin, SG5 1JE	Vehicle Parts and Accessories	Motoring
8	80	E	Hidden Hearing	518404 229176	11, High Street, Hitchin, SG5 1BH	Disability and Mobility Equipment	Consumer Products
9	81	SW	Executive Airport Cars	518227 229183	3a, Nuns Close, Hitchin, SG5 1EP	Airlines and Airline Services	Transport, Storage and Delivery
10	113	SW	Electricity Sub Station	518210 229152	SG5	Electrical Features	Infrastructure and Facilities
11	113	NE	J E L Industrial Supplies Ltd	518401 229306	The Croft Store Croft Court, Grammar School Walk, Hitchin, SG5 1JD	Workwear	Industrial Products
12	114	SE	Boots Hearing Care	518428 229149	22, High Street, Hitchin, SG5 1AT	Disability and Mobility Equipment	Consumer Products
13	126	SE	Specsavers Hearcare	518417 229114	27, High Street, Hitchin, SG5 1AT	Disability and Mobility Equipment	Consumer Products
14	141	NE	Tank	518447 229300	SG5	Tanks (Generic)	Industrial Features
15	142	NE	A & V Gearbox Services	518387 229347	Netherwood, Grammar School Walk, Hitchin, SG5 1JA	Vehicle Components	Industrial Products
16	144	SW	Electricity Sub Station	518215 229102	SG5	Electrical Features	Infrastructure and Facilities
17	166	E	Electricity Sub Station	518498 229197	SG5	Electrical Features	Infrastructure and Facilities

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
18	175	NE	Electricity Sub Station	518408 229374	SG5	Electrical Features	Infrastructure and Facilities
19	181	SE	Mill Fabrics	518456 229075	40, Churchyard, Hitchin, SG5 1DW	Curtains and Blinds	Consumer Products
20	193	W	Marshall of Hitchin	518110 229199	23, Old Park Road, Hitchin, SG5 2JT	Petrol and Fuel Stations	Road and Rail
21	195	NE	Tank	518444 229377	SG5	Tanks (Generic)	Industrial Features
22B	200	SE	Gilroy Interiors	518424 229028	16-17, Market Place, Hitchin, SG5 1DS	Curtains and Blinds	Consumer Products
23B	210	SE	Mobile Store	518439 229025	3, Churchgate, Hitchin, SG5 1DN	Electrical Equipment Repair and Servicing	Repair and Servicing
24	213	NW	Electricity Sub Station	518126 229340	SG5	Electrical Features	Infrastructure and Facilities
25	216	S	Hawkins of Hitchin Department Store	518369 228991	2-8, Bucklersbury, Hitchin, SG5 1BB	Workwear	Industrial Products
26	224	SE	Electricity Sub Station	518506 229068	SG5	Electrical Features	Infrastructure and Facilities
27	241	E	Amplivox Ultratone	518567 229276	90, Hermitage Road, Hitchin, SG5 1DG	Disability and Mobility Equipment	Consumer Products

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 4

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
28	168	SW	518196 229086	OBSOLETE	Paynes Park, Hitchin, Hertfordshire, SG5 1EH	Not Applicable	Obsolete
29	198	W	518104 229220	ESSO	23, Old Park Road, Hitchin, Hertfordshire, SG5 2JT	Not Applicable	Obsolete
30	347	E	518671 229137	ANGLO	Queen Street, Hitchin, Hertfordshire, SG4 9TN	Not Applicable	Obsolete
31	438	SW	517935 228977	TEXACO	Upper Tilehouse Street, Wratton Road West, Hitchin, Hertfordshire, SG5 2EF	Not Applicable	Obsolete

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

---

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

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

5.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
GFDMP-XSV	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL

5.3 Bedrock and Solid Geology

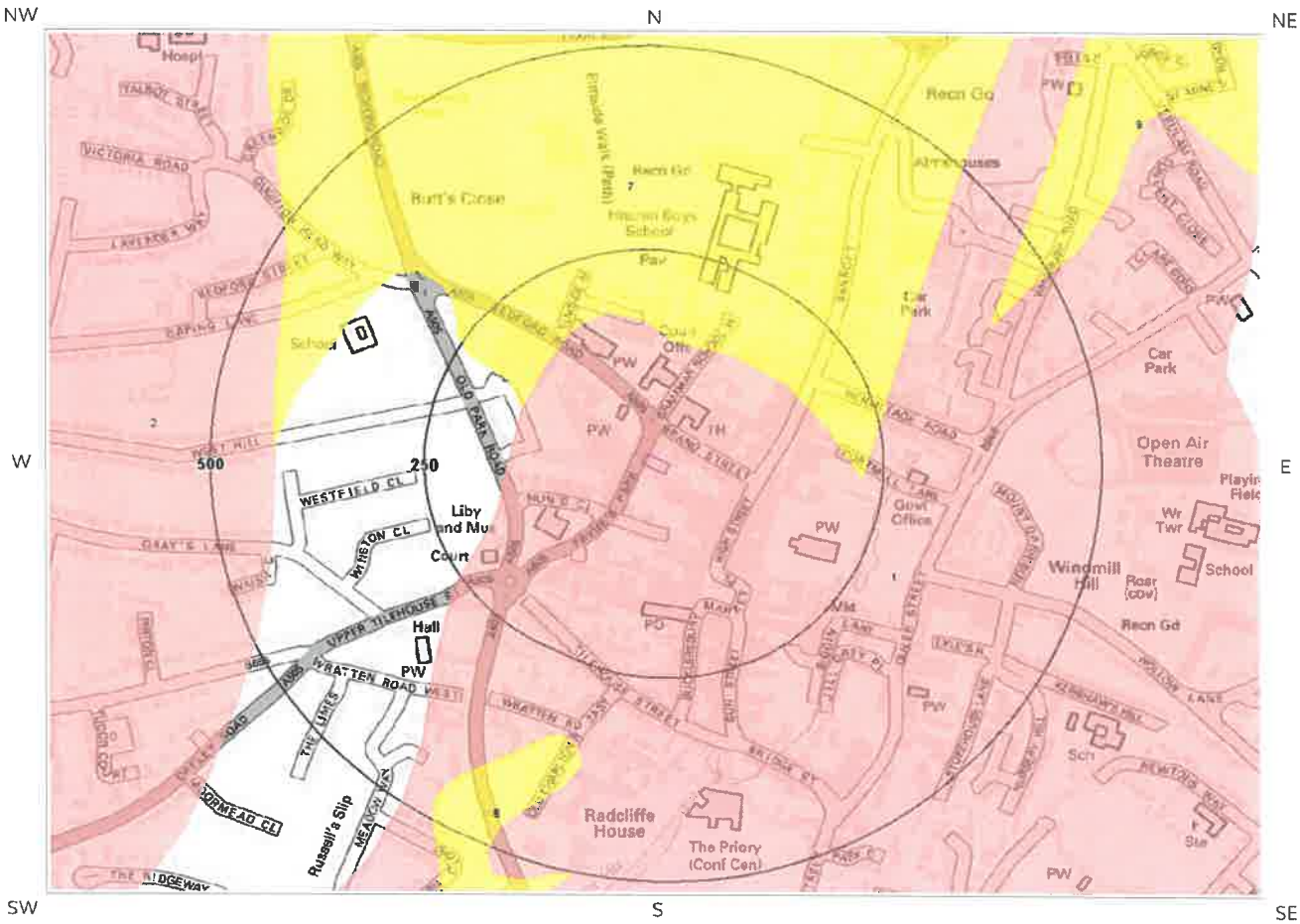
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
ZZCH-CHLK	ZIG ZAG CHALK FORMATION	CHALK

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

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



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Site Outline

250 / 500 Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licences



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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

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



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Site Outline

250 Search Buffers (m)
500

Source Protection Zone 1 - Inner Catchment

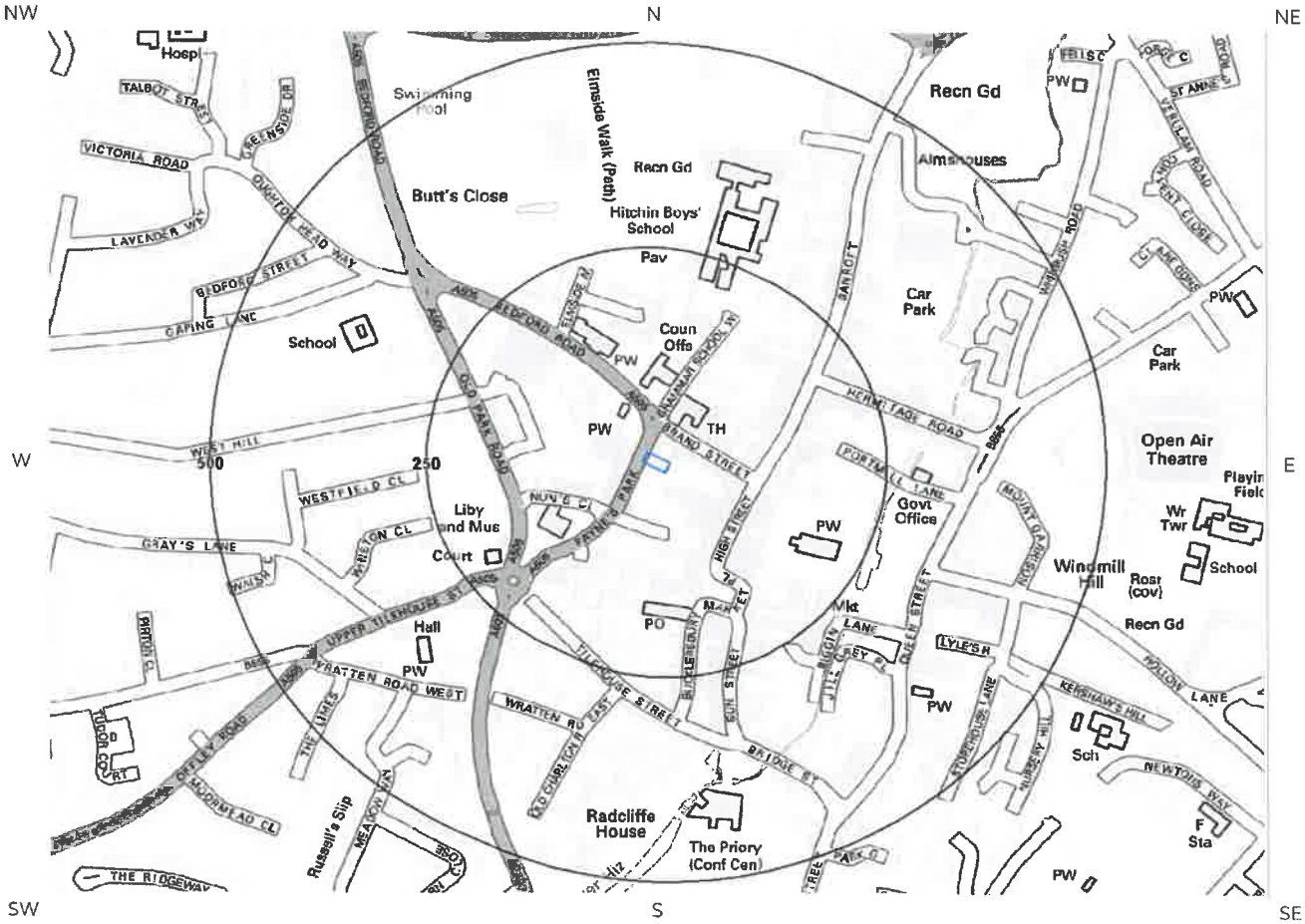
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

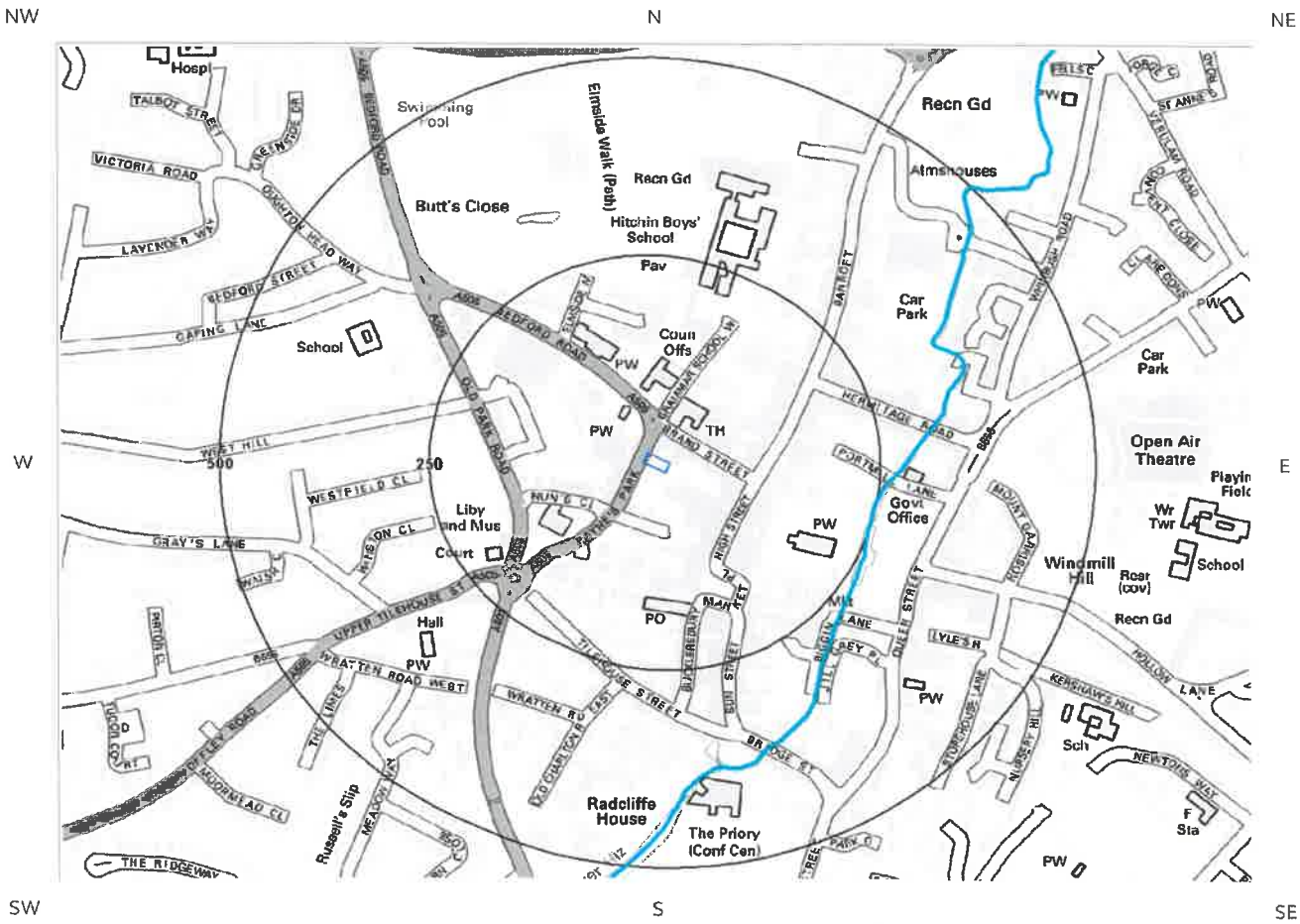
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

Site Outline

250 — 500 — Search Buffers (m)

6e. Hydrology – Watercourse Network and River Quality



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Site Outline

250 / 500 Search Buffers (m)

Tidal River

Inland River

Underground or Elevated Tidal River

Underground or Elevated Inland River

Foreshore

General Quality Assessment: Chemistry

Canal

Underground or Elevated Canal

Lock or Flight of Locks

Lake, Reservoir, or Marsh

Drain or Transfer

General Quality Assessment: Biology

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Records of strata classification within the superficial geology at or in proximity to the property Yes

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

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
7	142	N	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
8	341	S	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
9	411	NE	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
2	425	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Records of strata classification within the bedrock geology at or in proximity to the property Yes

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

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	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
3	378	SE	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site — Identified

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1177	S	517941 228092	Status: Active Licence No: 6/33/13/*G/0096/R02 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BATH SPRING WELL Data Type: Point Name: ENVIRONMENT AGENCY	Annual Volume (m^3): 200000 Max Daily Volume (m^3): 864 Original Application No: - Original Start Date: 01/04/2018 Expiry Date: 31/03/2024 Issue No: 1 Version Start Date: 01/04/2018 Version End Date:
Not shown	1180	S	517940 228090	Status: Historical Licence No: 6/33/13/*G/0096/R01 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BATH SPRING WELL Data Type: Point Name: ENVIRONMENT AGENCY	Annual Volume (m^3): 200000 Max Daily Volume (m^3): 864 Original Application No: - Original Start Date: 11/07/2016 Expiry Date: 31/03/2018 Issue No: 1 Version Start Date: 11/07/2016 Version End Date:
Not shown	1180	S	517940 228090	Status: Historical Licence No: 6/33/13/*G/0096 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BATH SPRING WELL Data Type: Point Name: ENVIRONMENT AGENCY	Annual Volume (m^3): 200000 Max Daily Volume (m^3): 1640 Original Application No: - Original Start Date: 11/07/1996 Expiry Date: 10/07/2016 Issue No: 1 Version Start Date: 11/07/1996 Version End Date:
Not shown	1500	S	517800 227800	Status: Active Licence No: 6/33/13/*G/0010 Details: Potable Water Supply - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL HEAD CHARLTON Data Type: Point Name: Affinity Water Limited	Annual Volume (m^3): 829663 Max Daily Volume (m^3): 2273 Original Application No: - Original Start Date: 01/11/1966 Expiry Date: - Issue No: 102 Version Start Date: 14/11/2012 Version End Date:
Not shown	1842	W	516500 229600	Status: Historical Licence No: 6/33/13/*G/0025 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT OUGHTONHEAD FARM Data Type: Point Name: PILKINGTON FARMS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 01/02/1967 Expiry Date: - Issue No: 100 Version Start Date: 01/10/1968 Version End Date:
Not shown	1842	W	516500 229600	Status: Historical Licence No: 6/33/13/*G/0025 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT OUGHTONHEAD FARM Data Type: Point Name: PILKINGTON FARMS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 01/02/1967 Expiry Date: - Issue No: 100 Version Start Date: 01/10/1968 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1913	NE	520050 230060	Status: Historical Licence No: 6/33/13/*G/0036 Details: Laundry Use Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE SW LETCHW'TH & LONGWD Data Type: Point Name: LETCHWORTH HILL LAUNDRY LTD	Annual Volume (m^3): 10636 Max Daily Volume (m^3): 40.91 Original Application No: - Original Start Date: 01/12/1967 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2008 Version End Date:
Not shown	1957	SW	517200 227600	Status: Active Licence No: 6/33/13/*G/0008 Details: Potable Water Supply - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BORE AT TEMPLE END,HITCHIN Data Type: Point Name: Affinity Water Limited	Annual Volume (m^3): 1.65933e+006 Max Daily Volume (m^3): 5682.5 Original Application No: - Original Start Date: 01/11/1966 Expiry Date: - Issue No: 102 Version Start Date: 14/11/2012 Version End Date:

6.4 Surface Water Abstraction Licences

Surface Water Abstraction Licences within 2000m of the study site — Identified

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
16	410	S	518400 228800	Status: Historical Licence No: 6/33/13/*S/0055 Details: Non-Evaporative Cooling Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: RIVER HIZ AT HITCHIN CENTRE Data Type: Point Name: WILLIAM RANSOM & SON PLC	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: - Original Start Date: 01/02/1968 Expiry Date: - Issue No: 100 Version Start Date: 01/07/1991 Version End Date:

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site — Identified

The following Potable Water Abstraction Licences records are represented as points, lines and regions on the SPZ and Potable Water Abstraction Licences Map (6c):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1500	S	517800 227800	Status: Active Licence No: 6/33/13/*G/0010 Details: Potable Water Supply - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL HEAD CHARLTON Data Type: Point Name: Affinity Water Limited	Annual Volume (m^3): 829663 Max Daily Volume (m^3): 2273 Original Application No: - Original Start Date: 01/11/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1842	W	516500 229600	Status: Historical Licence No: 6/33/13/*G/0025 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Household	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 01/02/1967

ID	Distance (m)	Direction	NGR	Details	
				Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT OUGHTONHEAD FARM Data Type: Point Name: PILKINGTON FARMS	Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1957	SW	517200 227600	Status: Active Licence No: 6/33/13/*G/0008 Details: Potable Water Supply - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BORE AT TEMPLE END,HITCHIN Data Type: Point Name: Affinity Water Limited	Annual Volume (m^3): 1.65933e+006 Max Daily Volume (m^3): 5682.5 Original Application No: - Original Start Date: 01/11/1966 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:

6.6 Source Protection Zones

Source Protection Zones within 500m of the study site — Identified

The following Source Protection Zones records are represented on the SPZ and Potable Water Abstraction Map (6c):

ID	Distance (m)	Direction	Zone	Description
1	0	On Site	3	Total catchment

6.7 Source Protection Zones within Confined Aquifer

Source Protection Zones within the Confined Aquifer within 500m of the study site — None identified

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site — Identified

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
358	SE	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.

6.9 River Quality

Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site — None identified

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Ordnance Survey MasterMap Water Network

Ordnance Survey MasterMap Water Network entries within 500m of the study site

This watercourse information is provided by Ordnance Survey MasterMap Water Network. The data provides a detailed centre line following the curve of the waterway precisely, so all distances provided in the report should be understood as measurements to the centreline rather than a measurement to the nearest point of the watercourse. Underground watercourses are inferred from entry and exit points so caution is advised in using these to indicate precise locations of underground watercourses when planning site investigation and development.

The following Ordnance Survey MasterMap Water Network records are represented on the Hydrology Map (6e):

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	249	River Hiz	Inland river not influenced	Catchment Area: Cam Ely Ouse and South Level

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	E		by normal tidal action.	Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 9.6
10	249 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 9.6
2	260 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	260 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
3	264 SE	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
12	264 SE	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
4	276 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.2
13	276 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.2
5	334 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	334 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
6	335 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.2
15	335 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.2
7	346 NE	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				conditions) Average Width in Watercourse Section (m): 2.9
16	346 NE	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.9
8	354 NE	-	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.5
9	354 NE	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.7
17	354 NE	-	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 7.5
18	354 NE	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.7
10	367 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
19	367 E	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	380 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	380 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
12	382 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.6
Not shown	382 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.6
13	405 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
Not shown	405 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	406 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 14.3
Not shown	406 S	River Hiz	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 14.3

6.11 Surface Water Features

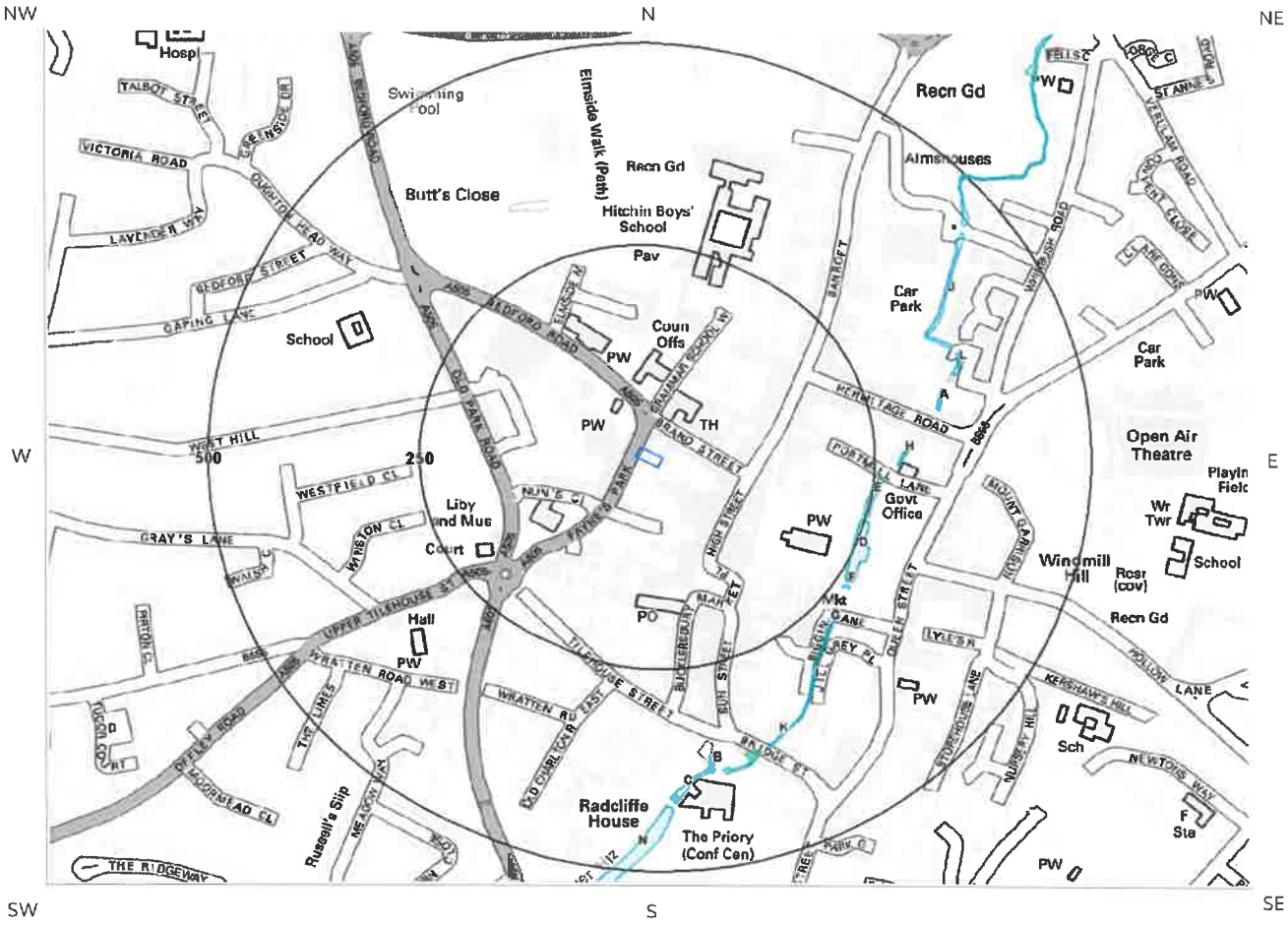
Surface water features within 250m of the study site — Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
244	E
245	E

Groundsure
LOCATION INTELLIGENCE

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



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

Zone 3 Floodplain

Flood Defences

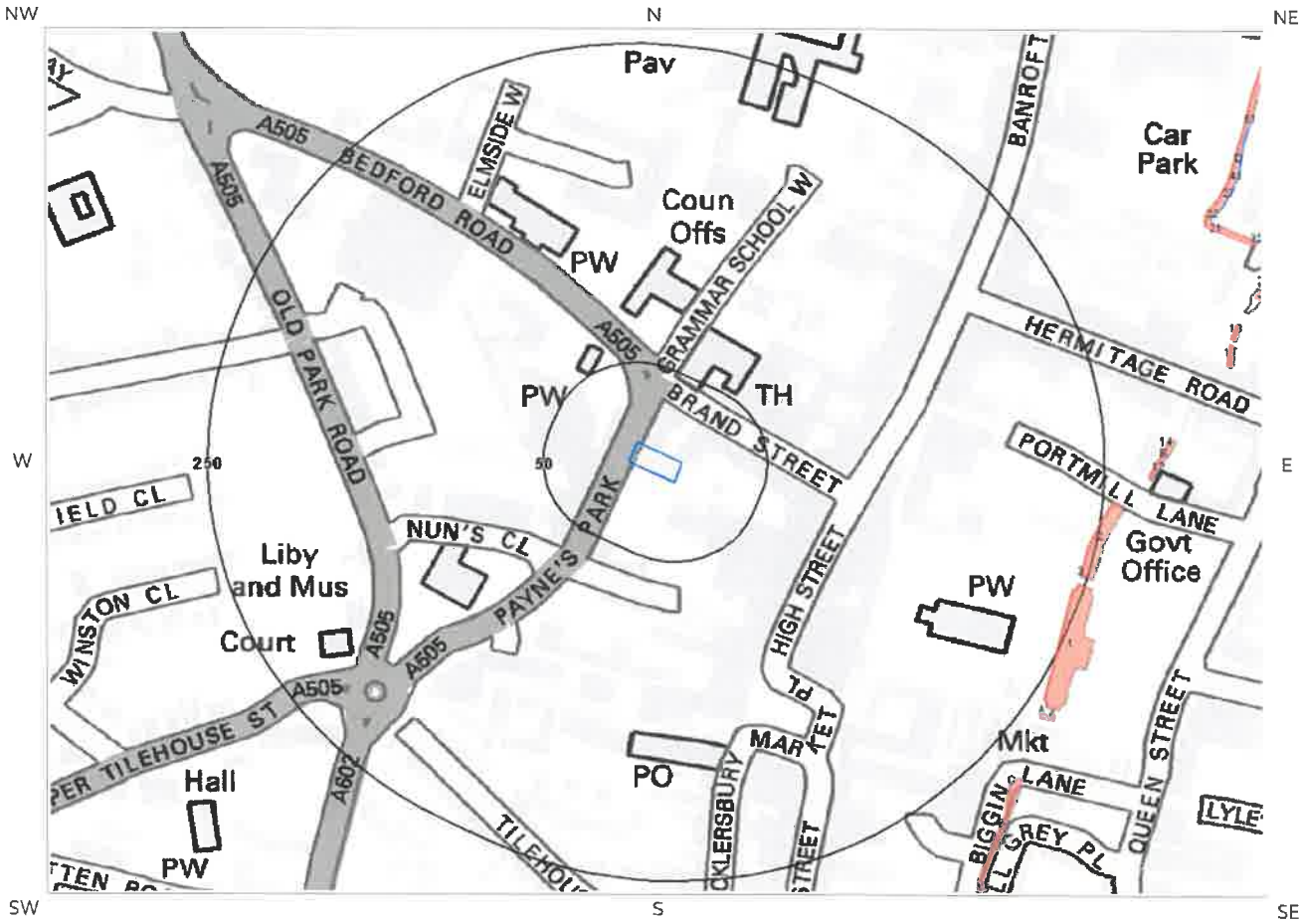
Area used for Flood Storage

Area Benefiting from Flood Defences

Report Reference: GS-5453034
Client Reference: C14571

Groundsure
LOCATION INTELLIGENCE

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



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Site Outline

100 / 250 Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

Report Reference: GS-5453034
Client Reference: C14571

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Environment Agency/Natural Resources Wales Zone 2 floodplain within 250m — Identified

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1D	244	E	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
2E	245	E	29-May-2018	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Environment Agency/Natural Resources Wales Zone 3 floodplain within 250m — Identified

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1D	244	E	30-May-2018	Zone 3 - (Fluvial Models)
2E	245	E	30-May-2018	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

Highest risk of flooding onsite — Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Flood Defences within 250m of the study site	None identified
Database searched and no data found.	

7.5 Areas benefiting from Flood Defences

Areas benefiting from Flood Defences within 250m of the study site	None identified

7.6 Areas benefiting from Flood Storage

Areas used for Flood Storage within 250m of the study site	None identified

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site	Identified
Clearwater Flooding or Superficial Deposits Flooding	Clearwater Flooding

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

7.7.2 Highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions

Potential below Surface

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

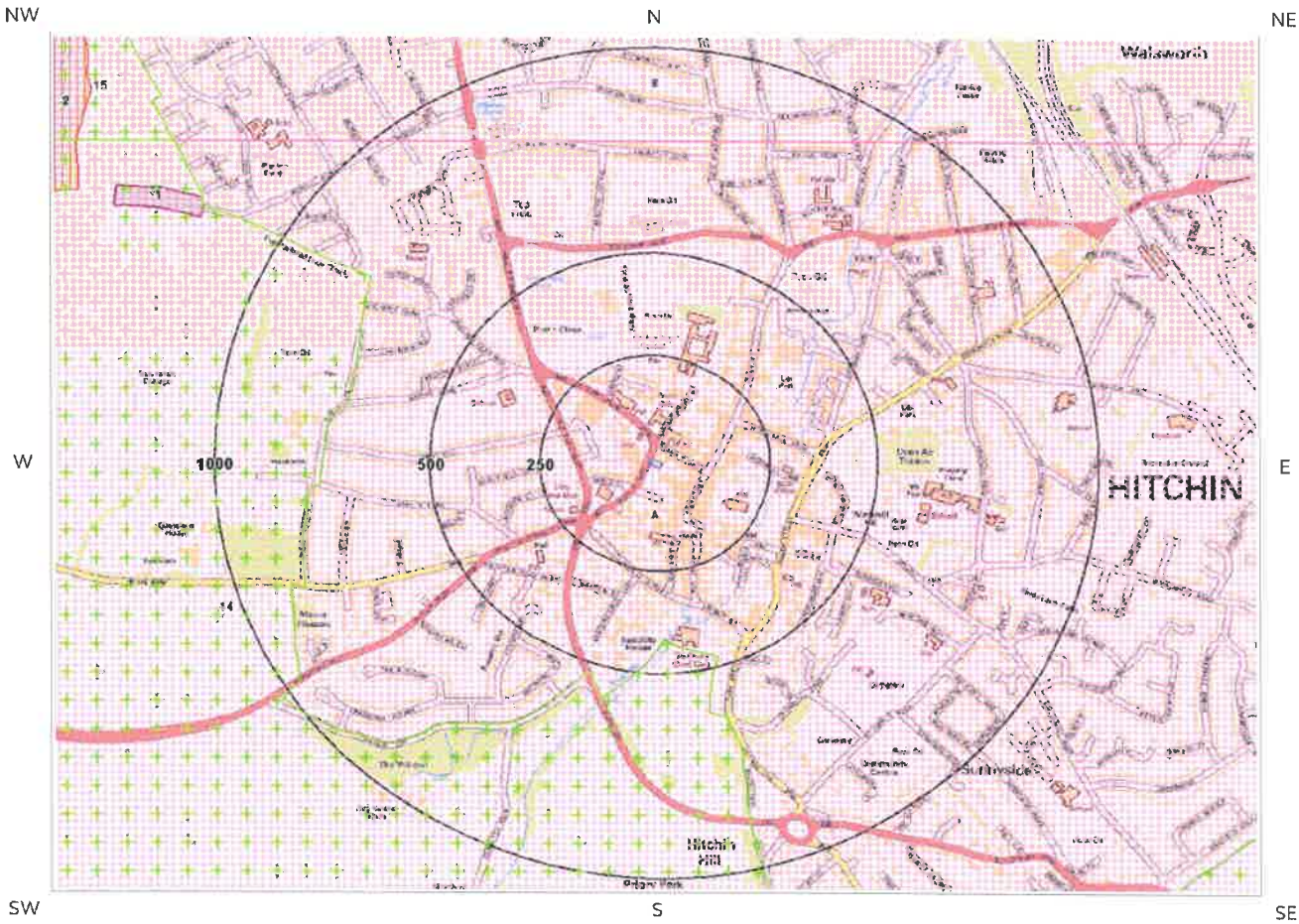
7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result	High

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

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

8. Designated Environmentally Sensitive Sites Map



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Site Outline

100 / 250 Search Buffers (m)

AONB

National Park

SSSI

Special Protection Areas

Nitrate Vulnerable Zones

Green Belt

Environmentally Sensitive Areas

Special Areas of Conservation

World Heritage Sites

Nitrate Sensitive Areas

Ancient Woodland

National Nature Reserve

Local Nature Reserves

Ramsar Sites

8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site | Identified

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

1

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
1	1189	NW	Oughtonhead Lane	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

3

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
2	1470	NW	Oughtonhead Common	Natural England
Not shown	1620	NE	Purwell Meadows	Natural England
Not shown	1781	N	Oughtonhead Common	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

1

The following Area of Outstanding Natural Beauty (AONB) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	AONB/NSA Name	Data Source
Not shown	1951	W	Chilterns	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

8

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
5A	0	On Site	Existing	DEFRA
6A	0	On Site	Existing	DEFRA
7	771	N	Existing	DEFRA
8	771	N	Existing	DEFRA
Not shown	1667	E	Existing	DEFRA
Not shown	1667	E	Existing	DEFRA
Not shown	1842	NE	Existing	DEFRA
Not shown	1842	NE	Existing	DEFRA

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

7

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

ID	Distance	Direction	Green Belt Name	Local Authority Name
14	415	S	London Area Greenbelt	North Hertfordshire District
15	1342	NW	London Area Greenbelt	North Hertfordshire District
Not shown	1586	NE	London Area Greenbelt	North Hertfordshire District
Not shown	1690	NE	London Area Greenbelt	North Hertfordshire District
Not	1746	E	London Area Greenbelt	North Hertfordshire District

shown

Not shown	1756	NE	London Area Greenbelt	North Hertfordshire District
Not shown	1842	NE	London Area Greenbelt	North Hertfordshire District

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

Maximum Shrink-Swell** 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
Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

9.1.2 Landslides

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.

9.1.3 Soluble Rocks

Maximum Soluble Rocks* hazard rating identified on the study site — Negligible

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

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

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

9.1 4 Compressible Ground

Maximum Compressible Ground* hazard rating identified on the study site — Negligible

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

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

9.1.5 Collapsible Rocks

Maximum Collapsible Rocks* hazard rating identified on the study site — Very Low

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

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

9.1.6 Running Sand

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.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

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

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Coal mining areas within 75m of the study site — None identified

Database searched and no data found.

10.2 Non-Coal Mining

Non-Coal Mining areas within 50m of the study site boundary — Identified

The following non-coal mining information is provided by the BGS:

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

Past underground mine workings are uncommon, localised and of limited area. The rock types present in this area are such that minor mineral veins may be present within them on which it is possible that there have been attempts to work these by underground methods and/or it is possible that small scale underground extraction of other materials may have occurred. All such occurrences are likely to be restricted in size and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Brine affected areas within 75m of the study site — None identified
Guidance: No Guidance Required.

Contact Details

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

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

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

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

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

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

Local Authority
Authority: North Hertfordshire District Council
Phone: 01462 474000
Web: http://www.north-herts.gov.uk/
Address: Council Offices, Gernon Road, Letchworth Garden Ci,

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

Report Reference: GS-5453034
Client Reference: C14571

Appendix 3

Records of
Boreholes WS1 to WS4
Soil Profile
Results of gas/water monitoring

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: **PAYNES PARK, HITCHIN**

WINDOW SAMPLE
WS1

Date: 11/09/18

Hole Size: 87mm dia to 2.00m
77mm dia to 3.00m
57mm dia to 5.00m

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.30	D1			MADE GROUND - Firm, brown, slightly sandy, gravelly, silty CLAY. Gravel of angular brick, concrete, flint, chalk and mortar.			
0.50-0.80	B1						
0.60	D2						
0.90	D3					1.00	
1.20	D4			MADE GROUND - Firm, brown and orange brown, slightly sandy, slightly gravelly, silty CLAY. Gravel of angular ash.			
1.20-2.00	U1						
1.35-1.65	S	N8				1.70	
2.00	D5			Loose, orange brown, slightly gravelly, silty SAND. Gravel of sub-angular flint. (GLACIOFLUVIAL DEPOSIT)			
2.00-3.00	U2					2.20	
2.15-2.45	S	N8		Loose, light brown and orange brown, very silty, fine SAND. (GLACIOFLUVIAL DEPOSIT)			
3.00-4.00	U3					3.00	
3.15-3.45	S	N15		Medium dense, light brown, very silty, fine SAND. (GLACIOFLUVIAL DEPOSIT)			
4.00	D6						
4.00-5.00	U4						
4.15-4.45	S	N29				5.00	
				Hole completed at 5.00m depth			

REMARKS
1. Starter pit excavated from 0.00m to 1.20m depth
2. Live roots observed to 1.10m depth

Project No 14571

Scale 1:50

Page 1/1

KEY

D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
▽ Water Strike
▽c Depth to Water on completion
J - Jar Sample
M - Mackintosh Probe
V - Vane Shear Test Cohesion ( ) kPa
P( ) - Hand Penetrometer Cohesion ( ) kPa
▽s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water
						11/09/18	5.00		dry

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: **PAYNES PARK, HITCHIN**

WINDOW SAMPLE WS2

Date: 11/09/18

Hole Size: 87mm dia to 2.00m
77mm dia to 3.00m
57mm dia to 5.45m

Ground Level:

Samples and in-situ Tests			(Date) Water	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result						
0.30	D1				MADE GROUND - Firm, brown, slightly sandy, slightly gravelly, silty CLAY. Gravel of angular brick, concrete, bone and ash.			
0.50-0.80	B1							
0.60	D2							
0.90	D3							
1.20	D4							
1.20-2.00	U1							
1.35-1.65	S	N7					1.40	
					MADE GROUND - Firm, dark brown, slightly gravelly, sandy, silty CLAY. Gravel of sub-angular brick, mortar, flint and chalk.		1.80	
2.00	D5				Medium dense, orange brown, slightly gravelly SAND. Gravel of angular to sub-angular chalk.			
2.00-3.00	U2							
2.15-2.45	S	N16			(GLACIOFLUVIAL DEPOSIT)			
3.00	D6						3.00	
3.00-4.00	U3				Dense, light brown, silty fine SAND with occasional fine gravel size carbonaceous inclusions.			
3.15-3.45	S	N33						
4.00	D7							
4.00-5.00	U4							
4.15-4.45	S	N31			(GLACIOFLUVIAL DEPOSIT)			
5.00	D8							
5.15-5.45	S	N31		BENEATH INSTALLATION			5.45	
					Hole completed at 5.45m depth			

REMARKS
1. Starter pit excavated from 0.00m to 1.20m depth
2. Dead roots observed to 1.40m depth
3. Gas monitoring standpipe installed to 5.00m depth

Project No 14571

Scale 1:50

Page 1/1

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
▽ Water Strike
▽c Depth to Water on completion
J - Jar Sample
M - Mackintosh Probe
V - Vane Shear Test Cohesion ( ) kPa
P( ) - Hand Penetrometer Cohesion ( ) kPa
▽s Standpipe Level

Groundwater Strikes

No	Depth m Struck	Rose to	Rate	Cased	Sealed

Groundwater Observations

Date	Depth m Hole	Casing	Water
11/09/18	5.45		dry
24/09/18	5.00		dry
01/10/18	5.00		dry
08/10/18	5.00		dry

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: **PAYNES PARK, HITCHIN**

WINDOW SAMPLE WS3

Date: 11/09/18

Hole Size: 87mm dia to 2.00m
77mm dia to 3.00m
57mm dia to 5.45m

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.30	D1			MADE GROUND - Firm, brown, slightly sandy, gravelly, silty CLAY. Gravel of angular brick, concrete, ash and bone fragments.			
0.50-0.80	B1						
0.60	D2						
0.90	D3						
1.20	D4						
1.20-2.00	U1						
1.35-1.65	S	N6					
						1.60	
2.00	D5			Firm, brown and orange brown, slightly sandy, gravelly CLAY. Gravel of angular to sub-rounded flint and chalk.			
2.00-3.00	U2						
2.15-2.45	S	N18		(GLACIOFLUVIAL DEPOSIT)			
						2.90	
3.00	D6			Firm, orange brown and light brown, slightly sandy, silty CLAY.			
3.00-4.00	U3						
3.15-3.45	S	N13		(GLACIOFLUVIAL DEPOSIT)			
4.00	D7						
4.00-5.00	U4						
4.15-4.45	S	N15					
						4.90	
5.00	D8			Medium dense, light brown, silty SAND. (GLACIOFLUVIAL DEPOSIT)			
5.15-5.45	S	N28					
						5.45	
				Hole completed at 5.45m depth			

REMARKS 1. Starter pit excavated from 0.00m to 1.20m depth

Project No 14571

Scale 1:50 | Page 1/1

KEY

D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
▽ Water Strike
▽c Depth to Water on completion
J - Jar Sample
M - Mackintosh Probe
V - Vane Shear Test Cohesion ( ) kPa
P( ) - Hand Penetrometer Cohesion ( ) kPa
▽s Standpipe Level

Groundwater Strikes						Groundwater Observations			
			Depth m				Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water
						11/09/18	5.45		dry

GROUND ENGINEERING LIMITED

Tel: 01733-566566
www.groundengineering.co.uk

Site: **PAYNES PARK, HITCHIN**

WINDOW SAMPLE
WS4

Date: 11/09/18

Hole Size: 87mm dia to 2.00m
77mm dia to 3.00m
57mm dia to 5.45m

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.20	D1			MADE GROUND - Firm, brown and dark brown, slightly sandy, slightly gravelly, silty CLAY. Gravel of angular brick, concrete, ash, clinker and mortar.			
0.50-0.80	B1						
0.50	D2						
0.80	D3					1.00	
1.20	D4			MADE GROUND - Firm, brown, slightly sandy, gravelly CLAY. Gravel of angular brick, flint and ash.			
1.20-2.00	U1						
1.35-1.65	S	N10				1.70	
2.00	D5			Loose, orange brown, silty SAND with occasional fine gravel size carbonaceous inclusions.			
2.00-3.00	U2						
2.15-2.45	S	N5		(GLACIOFLUVIAL DEPOSIT)		3.00	
3.00	D6			Medium dense, orange brown and light brown, silty, fine to medium SAND.			
3.00-4.00	U3						
3.15-3.45	S	N15		(GLACIOFLUVIAL DEPOSIT)		4.00	
4.00	D7			Medium dense, orange brown and light brown, very silty, fine SAND.			
4.00-5.00	U4						
4.15-4.45	S	N21		(GLACIOFLUVIAL DEPOSIT)		5.45	
5.00	D8			Hole completed at 5.45m depth			
5.15-5.45	S	N26					

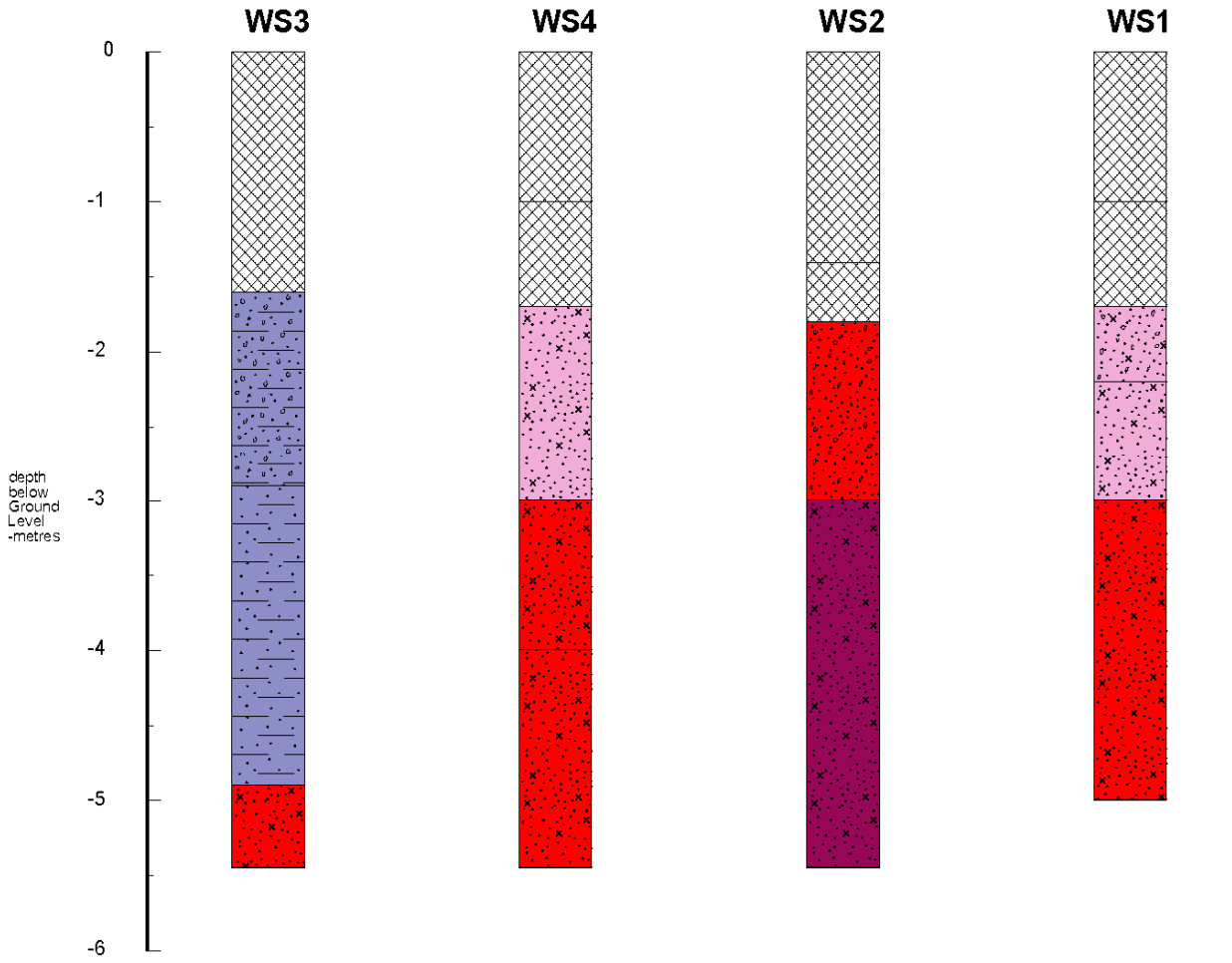
REMARKS 1. Starter pit excavated from 0.00m to 1.20m depth

Project No 14571

Scale 1:50 | Page 1/1

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
▽ Water Strike
▼c Depth to Water on completion
J - Jar Sample
M - Mackintosh Probe
V - Vane Shear Test Cohesion ( ) kPa
P( ) - Hand Penetrometer Cohesion ( ) kPa
▼s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water
						11/09/18	5.00		dry



KEY TO LEGENDS

- MADE GROUND
- Loose, silty SAND GLACIOFLUVIAL DEPOSIT
- Medium dense, silty SAND GLACIOFLUVIAL DEPOSIT
- Dense, silty SAND GLACIOFLUVIAL DEPOSIT
- Firm CLAY GLACIOFLUVIAL DEPOSIT
- ▽ Groundwater Encountered
- ▼ Groundwater Rise
- ▼c Level on Completion
- c▼w Level Casing Withdrawn
- ▼s Standpipe Level

SITE	7 PAYNES PARK, HITCHIN		Contract No. 14571
CLIENT	MARKET HOMES (HITCHIN) LIMITED	Soil Profile	Vertical Scale 1:50
© GROUND ENGINEERING, NEWARK ROAD, PETERBOROUGH. Tel (01733) 566566		Date 25/10/18	Fig. No .

Groundwater/Gas Monitoring Record

GROUND ENGINEERING LIMITED

Site: 7 Paynes Park, Hitchin

Report Ref: C14571

Date	Borehole No.	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow Rate (l/hr)	Atmosph. Pressure (mb)	Depth of Well (m bgl)	Depth to Groundwater (m bgl)
		Peak	Steady	Peak	Steady	Min.	Max.				
24/09/18	WS2	<0.1	<0.1	0.2	0.2	20.2	20.2	<0.1	1031	5.00	dry
01/10/18	WS2	<0.1	<0.1	<0.1	<0.1	20.4	20.4	<0.1	1026	5.00	dry
08/10/18	WS2	<0.1	<0.1	0.3	0.3	20.2	20.2	<0.1	1013	5.00	dry

Appendix 4

Laboratory Geotechnical Test Results

LABORATORY TEST RESULTS

CONTRACT PAYNES PARK, HITCHIN

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil		Water	pH	
														Total % Dry Wt.	Aqueous Extract mg/l	mg/l		
WS1	D3	0.90	42	18	24	21												SOIL CLASSIFICATION = CI 5% retained on 425μm sieve
	D5	2.00													140		7.8	
WS2	U1	1.20 - 2.00	28	16	12	11									305		7.5	SOIL CLASSIFICATION = CL 9% retained on 425μm sieve
WS3	D5	2.00	39	16	23	16												SOIL CLASSIFICATION = CI 8% retained on 425μm sieve
	U2	2.00 - 3.00													280		7.8	
	D6	3.00	27	16	11	21												SOIL CLASSIFICATION = CL 0% retained on 425μm sieve
WS4	D5	2.00													165		8.0	

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

14571

GROUND ENGINEERING LIMITED
Tel: 01733-566566
www.groundengineering.co.uk

GROUND ENGINEERING

Newark Road Peterborough
t: 01733 566566
e: admin@groundengineering.co.uk

8180

TEST CERTIFICATE

Determination of Particle Size Distribution

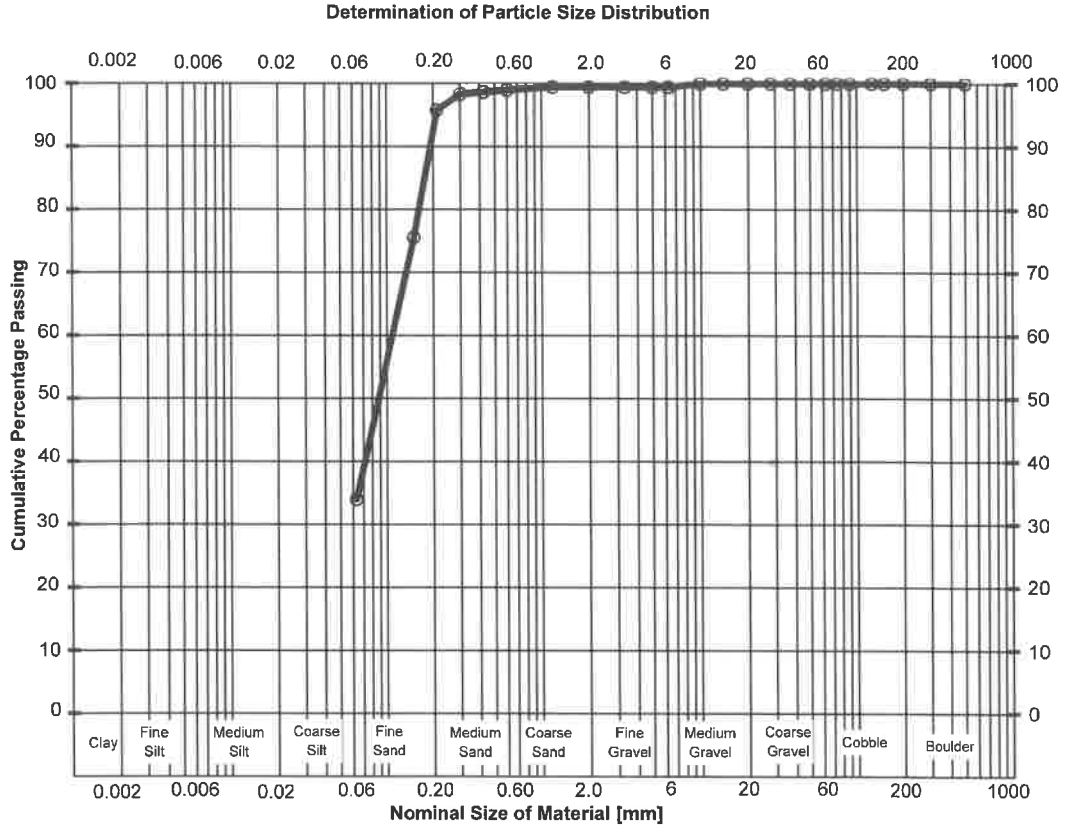
Tested in Accordance with BS 1377-2: 1990: Clause 9.2
Sieved Grading

Client:	Ground Engineering Ltd	Certificate Number:	PL6394-1/3/710-2
Client Address:	Newark Road	Client Reference:	C14571
	Peterborough	Lab Job Number:	PL6394-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.09.2018
Contact:	John Gibb	Date Tested:	02.10.2018
		Certificate of Sampling:	N/A
Site Name:	Paynes Park	Sampling Certificate No.:	N/A
Site Address:	Hitchin	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6394-1/3
Client Reference: U3
Pre-treatment for organic material: N/A

Sample Description: Light orange-brown silty SAND.

Material Specification: Not Required
Location: WS1
Source:
Depth Top: 3.00m
Depth Base: 4.00m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	99
5.0	99
3.35	99
2.00	99
1.18	99
0.600	99
0.425	99
0.300	98
0.212	96
0.150	76
0.063	34
0.020	
0.006	
0.002	

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 03.10.2018 Page 1 of 1
Form Number: GELab/C/709-2 Version 51

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Registered in England & Wales
Registration Number: 6929574
Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA

8180

GROUND ENGINEERING

Newark Road Peterborough
t: 01733 566566
e: admin@groundengineering.co.uk

TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2
Sieved Grading

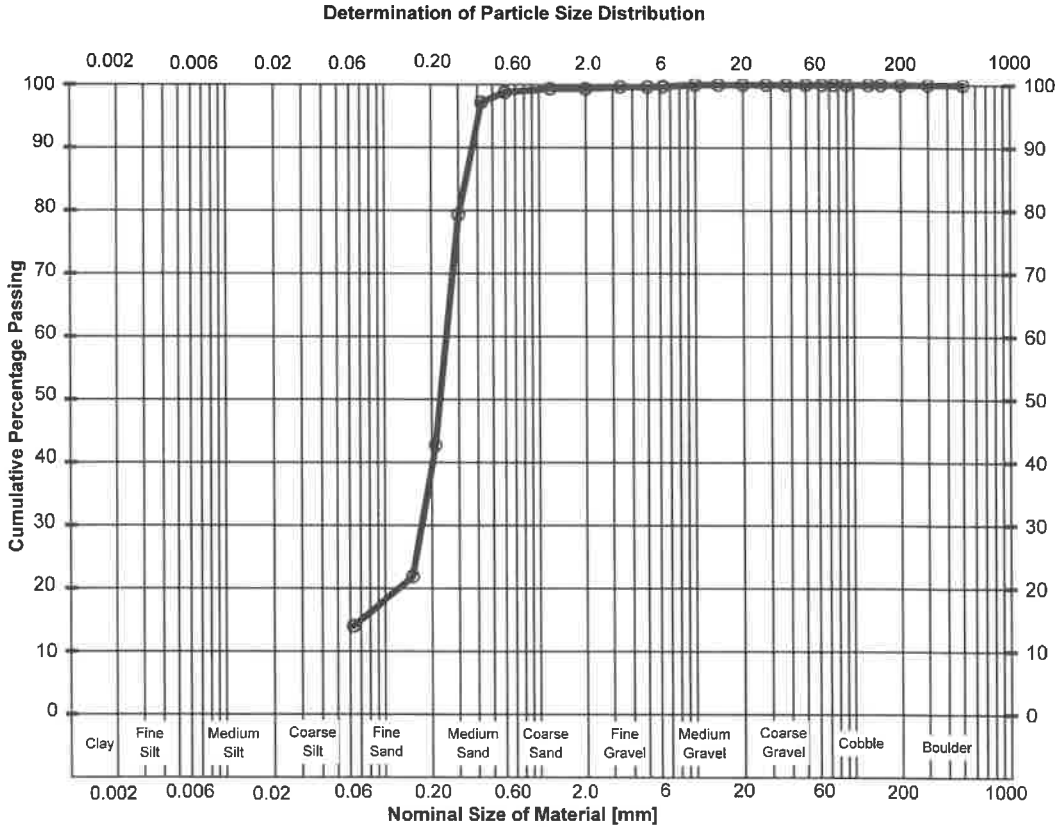
Client:	Ground Engineering Ltd	Certificate Number:	PL6394-1/5/710-2
Client Address:	Newark Road	Client Reference:	C14571
	Peterborough	Lab Job Number:	PL6394-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.09.2018
Contact:	John Gibb	Date Tested:	02.10.2018
		Certificate of Sampling:	N/A
Site Name:	Paynes Park	Sampling Certificate No.:	N/A
Site Address:	Hitchin	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6394-1/5 **Pre-treatment for organic material:** N/A
Client Reference: U3

Sample Description: Light orange-brown silty SAND with rare fine to medium sub-angular chalk flint and ash.

Material Specification: Not Required
Location: WS2
Source:

Depth Top: 3.00m
Depth Base: 4.00m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	99
1.18	99
0.600	99
0.425	97
0.300	79
0.212	43
0.150	22
0.063	14
0.020	
0.006	
0.002	

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 03.10.2018 Page 1 of 1
Form Number: GELab/C/709-2 Version 50

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Registration Number: 6929574
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Newark Rd, Peterborough PE1 5UA

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GROUND ENGINEERING

Newark Road Peterborough
t: 01733 566566
e: admin@groundengineering.co.uk

TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2
Sieved Grading

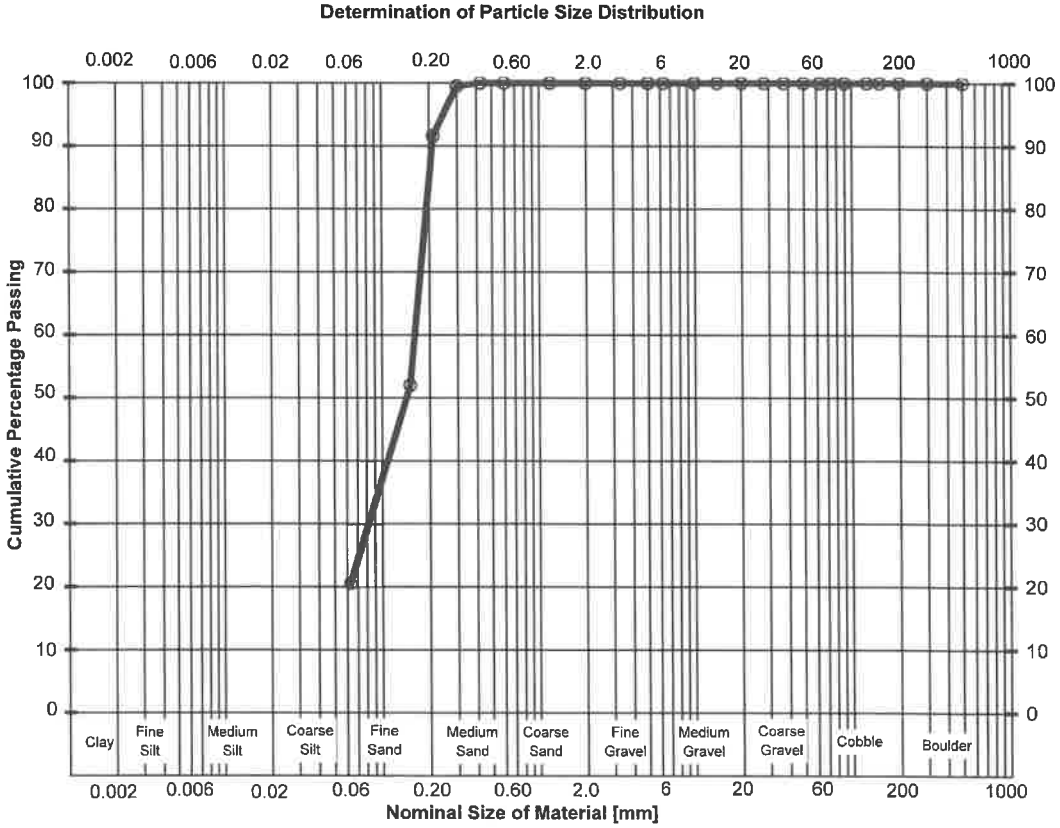
Client:	Ground Engineering Ltd	Certificate Number:	PL6394-1/10/710-2
Client Address:	Newark Road	Client Reference:	C14571
	Peterborough	Lab Job Number:	PL6394-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.09.2018
Contact:	John Gibb	Date Tested:	02.10.2018
		Certificate of Sampling:	N/A
Site Name:	Paynes Park	Sampling Certificate No.:	N/A
Site Address:	Hitchin	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6394-1/10 **Pre-treatment for organic material:** N/A
Client Reference: U3

Sample Description: Light orange-brown slightly clayey silty SAND.

Material Specification: Not Required
Location: WS4
Source:

Depth Top: 3.00m
Depth Base: 4.00m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	100
0.300	100
0.212	92
0.150	52
0.063	21
0.020	
0.006	
0.002	

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 03.10.2018 Page 1 of 1
Form Number: GELab/C/709-2 Version 50

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Registered in England & Wales
Registration Number: 6929574
Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA

Appendix 5

Laboratory Chemical Test Results

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	18-28233-1
Initial Date of Issue:	24-Sep-2018
Client	Ground Engineering Limited
Client Address:	Newark Road Peterborough Cambridgeshire PE1 5UA
Contact(s):	John Gibb
Project	C14571 7 Paynes Park Hitchin SG51EH

Quotation No.:		**Date Received:**	18-Sep-2018
Order No.:	C14571	**Date Instructed:**	18-Sep-2018
No. of Samples:	5		
Turnaround (Wkdays):	5	**Results Due:**	24-Sep-2018
Date Approved:	24-Sep-2018		

Approved By:



Details: Martin Dyer, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: C14571 7 Paynes Park Hitchin SG51EH

Client: Ground Engineering Limited				**Chemtest Job No.:**	18-28233	18-28233	18-28233	18-28233	18-28233
Quotation No.:				**Chemtest Sample ID.:**	689793	689794	689795	689796	689797
				Client Sample ID.:	D2	D2	D1	D3	D2
				Sample Location:	WS1	WS2	WS3	WS3	WS4
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.60	0.60	0.30	0.90	0.50
				Date Sampled:	11-Sep-2018	11-Sep-2018	11-Sep-2018	11-Sep-2018	11-Sep-2018
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
pH	U	2010		N/A	7.7	7.9	7.6	7.8	7.8
Moisture	N	2030	%	0.020	15	9.2	12	12	15
Stones and Removed Materials	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	2.9	1.9	2.9	2.1	1.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.046	0.029	0.14	0.047	0.045
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	0.60	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	2.1	2.4	1.1	1.8	< 0.50
Arsenic	U	2450	mg/kg	1.0	26	23	35	25	31
Cadmium	U	2450	mg/kg	0.10	0.23	0.24	0.26	0.23	0.29
Chromium	U	2450	mg/kg	1.0	18	23	25	20	24
Copper	U	2450	mg/kg	0.50	35	24	36	22	31
Mercury	U	2450	mg/kg	0.10	0.37	0.17	0.54	0.15	0.25
Nickel	U	2450	mg/kg	0.50	29	32	42	32	36
Lead	U	2450	mg/kg	0.50	130	50	180	77	160
Selenium	U	2450	mg/kg	0.20	0.47	0.40	0.68	0.41	0.45
Zinc	U	2450	mg/kg	0.50	81	80	110	79	110
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	3.6	1.6	2.8	1.2	1.9
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.52	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.55	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

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Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

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Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	18-28231-1
Initial Date of Issue:	24-Sep-2018
Client	Ground Engineering Limited
Client Address:	Newark Road Peterborough Cambridgeshire PE1 5UA
Contact(s):	John Gibb
Project	C14571 7 Paynes Park Hitchin

Quotation No.:		**Date Received:**	18-Sep-2018
Order No.:	C14571	**Date Instructed:**	18-Sep-2018
No. of Samples:	6		
Turnaround (Wkdays):	5	**Results Due:**	24-Sep-2018
Date Approved:	24-Sep-2018		

Approved By:

Details: Martin Dyer, Laboratory Manager

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Results - Soil

Project: C14571 7 Paynes Park Hitchin

Client: Ground Engineering Limited					**Chemtest Job No.:**	18-28231	18-28231	18-28231	18-28231	18-28231
Quotation No.:					**Chemtest Sample ID.:**	689786	689787	689788	689789	689790	689791
					Client Sample ID.:	B1	D4	B1	B1	D4	B1
					Sample Location:	WS1	WS1	WS2	WS3	WS3	WS4
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.20	0.50	0.50	1.20	0.50
					Bottom Depth (m):	0.80		0.80	0.80		0.80
					Date Sampled:	11-Sep-2018	11-Sep-2018	11-Sep-2018	11-Sep-2018	11-Sep-2018	11-Sep-2018
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
ACM Type	U	2192		N/A		-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected

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Test Methods

SOP	Title	Parameters included	Method summary
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry

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Report Information

Key

U	UKAS accredited
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N	Unaccredited
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T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
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Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

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B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 6

Concrete Requirements Against Sulphate Attack

TABLE C2 – AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS[a]

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations [a]

Sulfate and magnesium						Groundwater		ACEC
Design Sulfate Class for location	2:1 water/soil extract[b]		Groundwater		Total potential sulfate[c]	Static water	Mobile water	Class for location
1	2 (SO_4 mg/l)	3 (Mg mg/l)	4 (SO_4 mg/l)	5 (Mg mg/l)	6 (SO_4 %)	7 (pH)[d]	8 (pH)[d]	9
DS-1	< 500		< 400		< 0.24	≥ 2.5		AC-1s
							> 6.5[d]	AC-1
							5.5–6.5	AC-2z
							4.5–5.5	AC-3z
							2.5–4.5	AC-4z
DS-2	500–1500		400–1400		0.24–0.6	> 5.5		AC-1s
							> 6.5	AC-2
						2.5–5.5		AC-2s
							5.5–6.5	AC-3z
							4.5–5.5	AC-4z
							2.5–5.5	AC-5z
DS-3	1600–3000		1500–3000		0.7–1.2	> 5.5		AC-2s
							> 6.5	AC-3
						2.5–5.5		AC-3s
							5.5–6.5	AC-4
							2.5–5.5	AC-5
DS-4	3100–6000	≤ 1200	3100–6000	≤ 1000	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4
						2.5–5.5		AC-4s
							2.5–6.5	AC-5
DS-4m	3100–6000	> 1200[e]	3100–6000	> 1000[e]	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4m
						2.5–5.5		AC-4ms
							2.5–6.5	AC-5m
DS-5	> 6000	≤ 1200	> 6000	≤ 1000	> 2.4	> 5.5		AC-4s
						2.5–5.5	≥ 2.5	AC-5
DS-5m	> 6000	> 1200[e]	> 6000	> 1000[e]	> 2.4	> 5.5		AC-4ms
						2.5–5.5	≥ 2.5	AC-5m

Notes

a Brownfield locations are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered from previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4), which may result from the oxidation of sulfides such as pyrite, following ground disturbance (Appendix A1 and Box C8).

d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).

e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that include the suffix 'z' have primarily to resist acid conditions and may be made with any of the cements in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

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