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SUPPLEMENTARY SITE INVESTIGATION REPORT

LAND AT HARRINGTON DRIVE CROWLAND LINCOLNSHIRE

Report Reference C14668B

On behalf of:-

Mr Ian Bedford
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Eye
Peterborough
PE6 7TR

July 2019

IAN BEDFORD

SHARMAN ARCHITECTURE

SUPPLEMENTARY SITE INVESTIGATION REPORT

FOR

NEW RESIDENTIAL DEVELOPMENT

AT

LAND OFF HARRINGTON DRIVE

CROWLAND

LINCOLNSHIRE

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INTRODUCTION

The client, Mr Ian Bedford, proposes to build a new dwelling, with associated gardens and hardstanding on a plot of land off Harrington Drive, Crowland in Lincolnshire.

Ground Engineering Limited was commissioned by the client, to carry out a site investigation to determine the nature and chemical properties of the underlying soils, and provide a contamination assessment report including a desk study. A supplementary report referenced C14668A included geotechnical testing of the underlying soils and provided comments in relation to the design and construction of the foundations. Following comments from South Holland Council, additional chemical testing was undertaken and this report updates the contamination assessment.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

The site is located on a grassed plot of land on the northern side of Harrington Drive, and immediately east of its junction with Peterborough Road, Crowland in Lincolnshire. The site is approximately 40m long fronting Harrington Drive to the south, and is approximately 12m deep. The National Grid Reference for the centre of the site is TF 2404 0945 and its location is shown on a plan following this report text.

At the time of the investigation in January 2019, the site was overgrown with grass and weeds, and a Cypress tree hedgerow along the northern boundary overgrew the northern edge of the site. An electricity sub-station was present in the north-western corner of the grassed area fronting Peterborough Road. A foul sewer crossed the eastern part of the site, which connected to a pumping station adjacent the north-east of the site. The boundaries were defined by Harrington Drive to the south, Peterborough Road to the west; No.34 Peterborough Road to the north; the pumping station to the north-east; and No.1 Harrington Drive to the east. Photographs from a site walkover on 11th January 2019 are presented following the plans.

This part of Crowland stands at about 3.0mOD, on low lying land at a margin of the Lincolnshire Fens.

The geological map, sheet 158 (1984) at 1:50,000 scale, shows superficial Nordelph Peat beneath the site, with superficial Barroway Drove Beds (now named Tidal Flat Deposits) to the east of the site, overlying the solid geology of the Oxford Clay Formation.

HISTORY OF THE SITE

Research into the site history involved reference to historical Ordnance Survey (OS) maps, photographs and information obtained from the internet. The map extracts studied are presented in the desk study map section, Appendix 1, and are described below. Distances are approximate.

<i>Extract studied</i>	<i>Description</i>
1886-87 Lincolnshire Sheets 148SW & 153NW Scale 1:10,560 Figure A	The site is within a field on the eastern side of Kennulphôs Drove. A drain along a field boundary crosses the north-eastern part of the site. A corn mill is shown 160m north of the site.
1887 Lincolnshire Sheets 153.1 & 153.2 Scale 1:2500 Figure B	The site and immediate surrounding area are unchanged. A second drain is evident along the eastern edge of the road, and within the western edge of the site.
1901-04 Lincolnshire Sheets 153.1 & 153.2 Scale 1:2500 Figure C	The site and immediate surrounding area appear unchanged.
1950 Lincolnshire Sheets 148SW & 153NW Scale 1:10,560 Figure D	A building is shown partly within the southern central part of the site, and three other buildings are shown within the field containing the site. New houses are shown on the western side of the road, and to the south of the site on the eastern side of the road.
1973-75 OS Sheets TF2309 & TF2409 Scale 1:2500 Figure E	The building is no longer shown in the southern part of the site. A drain remained within the western edge of the site along the renamed Peterborough Road. The drain is no longer shown crossing the north-eastern part of the site. A detached house, No.34 Peterborough Road, is shown adjacent the north of the site. A pumping station is shown adjacent the north-east of the site. An Engineering Works building is shown 40m south of the site. Poultry Houses are shown 40m north-west of the site on the other side of the road. A new road, the Crowland Bypass, is shown 120m south-east of the site. A glue and chemical works is shown 160m north of the site, and an electricity sub-station is shown 170m north of the site.

<i>Extract studied</i>	<i>Description</i>
1978-79 OS sheets TF20NW & TF21SW Scale 1:10,000 Figure F	The site area remained undeveloped on the northern side of a works. The poultry houses are no longer shown on the western side of Peterborough Road.
1982-89 OS sheets TF2309 & TF2409 Scale 1:2500 Figure G	Harrington Drive now defines the southern boundary of the site, and new houses have been built adjacent the east of the site. New houses have also been built further east (Harrington Way), and north-east (Harrington Square). New houses have also been built along Tatwin Drive to the west of the site.
1995 OS sheets TF2309 & TF2409 Scale 1:2500 Figure H	The site area appears unchanged. New houses have been built to the south-east of the site fronting Harrington Drive.
2002 Raster Map Scale 1:10,000 Figure I	The site area appears unchanged. New housing has been built to the west of the site, behind houses fronting Peterborough Road.
2010 OS sheets TF20NW & TF21SW Scale 1:10,000 Figure J	The site and immediate surrounding area appear unchanged.
2015 GroundSure Aerial Photograph of Site (Appendix 2)	The site is grassed, and with an electricity sub-station in the north-western corner.
2018 OS sheets TF2309 & TF2409 Not to Scale Figure K	The site is undeveloped apart from the electricity sub-station in the north-western corner. Housing remained adjacent the north and east of the site, and with the pumping station to the north-east.

Summary of Historical Information

The Ordnance Survey map of 1886 showed that the site was within a field and crossed by drainage ditches. Buildings were shown within the field in the 1950s, which had been cleared by the 1970s. Housing was built adjacent the north and east of the site in the 1970s and 1980s, with Harrington Drive to the south built in the 1980s. An electricity sub-station was evident adjacent the north-western corner of the site in 2015. The site remained undeveloped, and was partly overgrown at the time of this investigation.

Off-site, a pumping station was shown adjacent the north-east of the site in the 1970s; as well as an engineering works 40m to the south; poultry houses 40m to the west; and a glue and plastic works 160m north.

SUMMARY OF ENVIRONMENTAL DATA

Appendix 2 contains information derived from Environmental Databases for a radius of up to 2,000m from the site. The information covers datasets held by Groundsure with contributors including the local authority, the Environment Agency (EA), 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 - 250m
Potentially Contaminative Uses (1:10,000 mapping)	2	9
Historical Tank Database	0	0
Historical Energy Features Database	0	2
Historical Petrol & Fuel Site Database	0	0
Historical Garage & Motor Vehicle Repair Database	0	0
Potentially Infilled Land	0	0
2. Environmental Permits, Incidents and Registers	On-Site	0 - 250m
Sites Holding Environmental Permits/Authorisations	0	0
Records of COMAH and NIHHS Sites	0	0
Environment Agency Recorded Pollution Incidents	0	3
Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0
3. Landfill and Other Waste Sites	On-Site	0 - 250m
Landfill Sites	0	0
Landfill and Other Waste Sites	0	0
4. Current Land Use	On-Site	0 - 250m
Current Industrial Sites Data	1	1
Records of Petrol and Fuel Sites	0	0
Underground High Pressure Oil and Gas Pipelines	0	0
5. Geology		
Artificial Ground or Made Ground records	No	
Superficial Ground and Drift Geology records	Yes	
6. Hydrogeology and Hydrology	On-Site	0 - 250m
Productive strata within superficial geology	No	
Productive strata within solid geology	No	
Groundwater Abstraction Licences	0	0
Surface Water Abstraction Licences	0	0
Potable Water Abstraction Licences	0	0
Source Protection Zones	0	0
River Quality Data	No	No
Water Network Entries	0	52
Surface Water Features	No	Yes

7. Flooding					
Environment Agency indicative Zone 2 floodplains within 250m of site				Yes	
Environment Agency indicative Zone 3 floodplains within 250m of site				Yes	
Risk of flooding from rivers & the sea (RoFRaS) rating				Medium	
Flood defences within 250m of site				No	
Any areas benefitting from flood defences within 250m of site				No	
Flood storage areas within 250m of site				No	
Maximum BGS groundwater flooding susceptibility within 50m of site				Not prone	
BGS confidence rating for groundwater susceptibility areas				Not applicable	
8. Designated Environmentally Sensitive Sites				On Site	0 - 250m
Environmentally sensitive sites (nitrate vulnerable zone)				1	0
9. Natural Hazards (on site)					
Hazard	Negligible	Very Low	Low	Moderate	High
Shrinking or Swelling Clay	-	-	-	On-site	-
Landslides	-	On-site	-	-	-
Soluble rocks	On-site	-	-	-	-
Compressible Ground	-	-	-	-	On-site
Collapsible Rocks	On-site	-	-	-	-
Running Sand	-	On-site	-	-	-
9.2. Radon					
The property is not in a Radon Affected Area, as less than 1% of properties are above the action level. No Radon Protective Measures are required for new properties or extensions.					
10. Mining					
Coal mining areas within 75m of site				No	
Non coal-mining areas within 50m of site				No	
Brine affected areas within 75m of study site				No	

Database Summary

The site is within an area designated 'unspecified works' with works buildings 40m south of the site. The pumping station noted on the site, is actually located adjacent the north-east of the site. A corn mill/windmill was recorded 136m north of the site, and an unspecified works (glue and chemical works) was recorded 168m north of the site. The closest electricity sub-station is adjacent the north-western corner of the site. There are no petrol or fuel sites, garages, or areas of potentially infilled land within 250m of the site.

Pollution incidents were recorded in 2002, 61m south-east, and 181m south of the site, with a minor impact on air and no impact on water or land. No landfills or other waste sites are recorded within 250m of the site.

No made ground is recorded beneath the site. Superficial Peat is recorded beneath the site, which is classified by the EA as an 'Unproductive' stratum. The underlying solid geology Oxford Clay Formation is also classified by the EA as an 'Unproductive' stratum. There are no groundwater abstractions within 250m of the site. The site is not within a source protection zone.

The closest surface water features comprise drains, recorded 41m south-west and 127m south-east of the site. The site is within a Zone 2 and Zone 3 floodplain, and has a medium risk of flooding. The site is within a nitrate vulnerable zone, an environmentally sensitive area.

There is a high hazard from compressible ground; a moderate hazard from shrinking and swelling clay; a very low hazard from landslides and running sand; and a negligible hazard from soluble rocks and collapsible rocks.

The site is not in a radon affected area and no radon protection measures are required for new dwellings on the site.

PRELIMINARY RISK ASSESSMENT

Potential sources of contamination present on or beneath the site would relate primarily to; the historical use of the site; the presence of contaminated soil; and the potential presence of hazardous or ground 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

<i>Contaminant Source</i>	<i>Comments</i>
Field Drainage	Drains could provide a contaminant source.
Soil Beneath Site	Contamination may be present within made ground materials on the site.
Soil Gas	Potential soil gas generated from made ground or natural soils (peat), or infill to drains.
Ground Contamination Outside Site Boundary	Ground contamination migrating from adjoining sites, such as the nearby works to the south.

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

<i>Human Receptor-Mechanism</i>	<i>Typical Exposure Pathway</i>
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

<i>Receptor-Water Environment</i>	<i>Typical Exposure Pathway</i>
Groundwater The Superficial Peat Deposits are indicated to be an 'Unproductive' stratum. The underlying solid geology Oxford Clay is also indicated to be an 'Unproductive' stratum. The site is not within a Source Protection Zone.	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.
Surface Water/Watercourses The nearest surface water features are drains to the south-west and south-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 Residential Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage	Soil Beneath Site	Soil Gas	Ground Contamination Outside Site Boundary
Human Health i ground or construction workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low likelihood	Low likelihood	Low likelihood	Low likelihood
Human Health i end users	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Unlikely	Unlikely	Low likelihood	Low likelihood
Water Environment	Migration through ground into surface water or surrounding groundwater	Low likelihood	Low likelihood	Unlikely	Unlikely
Flora	Vegetation on site growing on contaminated soil	Low likelihood	Low likelihood	Low likelihood	Unlikely
Building Materials	Contact with contaminated soil	Low likelihood	Low likelihood	Low likelihood	Low likelihood
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.			
N/A		Not Applicable.			

SITE WORK

The site work conducted on 11th January 2019 comprised four hand excavated trial pits (HA1, HA2, HA2A and HA3). An additional trial pit HA4 was undertaken on 11th June 2019 to obtain new samples for chemical testing. The positions are shown on the exploratory hole location plan following this report text.

Public utility service and client provided drawings were consulted prior to determining the exploratory hole positions. Prior to excavation, a service scan was made at each position using a CAT (Cable Avoidance Tool) to check for the absence of detectable buried services that may otherwise have been damaged by the investigation.

The exploratory hole records, presented following the plans, give the descriptions and depths of the various strata encountered, details of all samples taken, in-situ tests and the groundwater conditions observed during and on completion of excavation, and subsequent monitoring.

Hand Excavated Trial Pits

Trial pits HA1, HA2, HA2A, HA3 and HA4 were excavated using hand digging tools in the proposed garden areas. The exposed strata were logged and sampled by an Engineer, and samples collected for subsequent laboratory testing.

Representative disturbed samples were taken at regular intervals throughout the depth of the pits.

On completion, the trial pits were backfilled with arisings and the surfaces reinstated.

LABORATORY WORK

The samples were inspected in the laboratory and assessments of the soil characteristics have been taken into account during preparation of the exploratory hole records. The soil descriptions have been made in accordance with BS5930:2015. The geotechnical test results, undertaken in accordance with BS1377:1990 & 2016, are presented following the exploratory hole records. The chemical test results follow the geotechnical test results.

Geotechnical Testing

The moisture content and index properties of a selected soil sample were determined as a guide to soil classification and behaviour. The liquid limit was determined by a cone penetrometer.

The particle size distribution of a selected sample was obtained by sieve analysis. The particle size distribution passing the 63µm sieve was obtained by pipette sedimentation. The result of this test is given as a particle size distribution curve at the end of this report.

Selected samples of soil were analysed to determine the concentration of soluble sulphates. The pH values were also determined.

Chemical Testing

Chemical analysis of three soil samples recovered from the exploratory holes was undertaken, by an independent laboratory, primarily for characterisation purposes. The samples were tested for a suite encompassing 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'. In addition, a soil sample from adjacent the electricity sub-station (HA1) was tested for PCBs (7 congeners). Two samples were also subsequently tested in July 2019 for speciated PAH to further characterise the soils.

GROUND CONDITIONS

The ground conditions comprised a 0.80m to 1.30m thick surface layer of made ground, and was in turn underlain by superficial River Terrace Deposit soils and a Marine Sand, which were proved to at least the base of the exploratory holes at a maximum depth of 4.00m. Groundwater was recorded as shallow as 2.00m below ground level based on the findings. The expected Peat was not encountered during this investigation.

Made Ground

A 0.80m to 1.30m thick surface layer of made ground, which comprised soft or firm, dark brown and brown, slightly gravelly, silty clay fill, varying to clayey, sandy gravel fill, was encountered at all positions. A layer of dark grey concrete was encountered in HA2A at 0.45m to 0.55m depth, and HA2 was abandoned at 0.60m depth on a layer of concrete.

River Terrace Deposit

Beneath the made ground at 1.10m depth in HA2A, and 1.30m in HA1, a superficial River Terrace Deposit comprising a firm, brown, light grey and orange brown, slightly gravelly, sandy, silty clay, which was encountered to at least the base of the HA2A at 1.20m depth, and to 1.70m depth in HA1. The gravel fraction comprised sub-angular and sub-rounded flint.

Marine Sand

Beneath the made ground at 0.80m depth in HA3, and beneath a clay River Terrace Deposit at 1.70m depth in HA1, medium dense, light brown and orange brown, slightly clayey, very silty fine sand, considered to represent a Marine Sand, was encountered to at least the base of these holes, and to a maximum depth of 4.00m below ground level in HA1.

Groundwater

Groundwater seepages were recorded at 2.00m and 2.10m depth in HA1, within Marine Sand. Water was recorded standing at between 2.21m and 2.25m depth during monitoring of the standpipe installed in HA1 in January and February 2019. The shallow holes were dry during excavation and on completion.

Observations

Live roots were observed in all of the holes, and to a maximum 1.50m depth in HA1 close to the Cypress trees on the northern boundary of the site.

Evidence of Contamination

The made ground encountered during this investigation was not noted to have olfactory or visual evidence of fuel contamination. The made ground contained fragments of brick, concrete, clinker, ash and rare bone. No asbestos containing materials were noted in the soils during this investigation, or during testing.

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

The proposed development is understood to comprise constructing a new dwelling, with associated gardens and hardstanding, and the layout is presented on a plan following the report text. The finished floor level of the dwelling is to be 1.00m above existing ground level due to flooding concerns, with the front garden area raised by 0.20m and the adjacent gardens slightly built up to blend in. A suspended floor slab is proposed. The investigation confirmed the site to be underlain by a layer of made ground resting on superficial River Terrace Deposit soils and a Marine Sand. The made ground had variable bearing properties, was found to a maximum depth of 1.30m, and should be avoided as a bearing stratum. The proposed building loads were not known at the time of report writing, although the anticipated two-storey house was expected to be 'lightly' loaded. The superficial Marine Sand would be capable of supporting lightly loaded traditional foundations for the new building. The anticipated underlying solid geology Oxford Clay would provide a suitable bearing stratum for piled foundations, however these soils would need to be proved by investigation using a cable percussive borehole. Excavations below 2.00m are likely to encounter groundwater, and be unstable, with running sand conditions.

Traditional Foundations

Foundations should be extended through any made ground, which was found to a maximum 1.30m depth.

A sample of the River Terrace Deposit clay had a modified plasticity index of 20%. The result indicates the clay has a medium volume change potential based on NHBC Standards Chapter 4.2 'Building near trees' (2019). On an open site, away from the influence of trees, a minimum foundation depth of 0.90m below current or proposed ground level, whichever is deeper, would be required within the naturally deposited clays in order to be below the zone of seasonal volume change in accordance with the NHBC Standards.

Due to the presence of the Cypress tree hedgerow along the northern boundary of the site, and roots in River Terrace Deposit clay soils, the foundations should be extended to the underlying non-shrinkable Marine Sand, encountered below between 0.80m and 1.70m depth across the site, which could offer a suitable founding stratum for lightly loaded traditional foundations.

Bearing Capacity

A net allowable bearing pressure for the underlying non-shrinkable, medium dense, silty sand Marine Sand, encountered below 0.80m to 1.70m depth, would be in the order of 150kN/m² for footings up to 1.20m wide for up to 25mm of immediate settlement. Settlement within the underlying sand should occur as the loads are applied. Differential settlement may be minimised by deepening all foundations into the silty sand.

Foundations excavated through the clay River Terrace Deposits, within the range of influence of the trees, will have to be separated from the soil by a suitable void former, based on Table 7 of the previously cited NHBC document and clay with a medium volume change potential.

Excavations

The made ground together with the underlying soils should be easily removed within excavations for the proposed building. The sides of excavations within the made ground may be stable in the short term, but excavations should not be relied upon to stand unsupported, particularly when groundwater is encountered.

Excavations could be expected to encounter groundwater within the Marine Sand, with running sand conditions and resulting side instability, although groundwater seepages were encountered below about 2.00m depth in the exploratory holes. Care should be taken not to excavate below the water table in the absence of suitable groundwater control and side support, such as dewatering via screened sumps.

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 material or made ground be present, they should be removed and replaced with well graded, well compacted hardcore or lean mix concrete. The excavated surfaces should be protected from deterioration and a blinding layer of concrete used where foundations are not completed without delay, since the silty sand soils are prone to rapid deterioration. Care should therefore be exercised to ensure that neither surface water nor groundwater is allowed to collect in the base of excavations.

Attention should be given where personnel are to enter deep excavations, when sides should either be safely battered back, or close side support provided, in order to comply with statutory safety requirements and prevent sidewall collapse.

Floor Slab

The proposed house is to have a floor slab suspended on the foundations, 1.00m above the existing ground level due to flood risk concerns. Such a suspended floor slab would avoid any volume change movements within root affected clays.

Sulphate Conditions

Sulphate analysis of selected samples of soil yielded soluble sulphate concentrations within Design Sulphate Class DS-1 of the BRE Special Digest 1, Table C2 (2005), presented in Appendix 3. The pH results of samples ranged between 7.4 and 8.4 indicating alkaline conditions.

These results indicate an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1 for buried concrete. This ACEC Class should be considered when specifying a Design Chemical Class (DC Class) for buried concrete on this site, as detailed in the above cited BRE document.

COMMENTS ON THE SOIL CHEMICAL TEST RESULTS

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 'The LQM/CIEH S4ULs for Human Health Risk Assessment: 2015 (Publication Number S4UL3608)'. 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 'trigger values' above 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 “intervention values” 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 5 compares the test results for the made ground with the SSVs in relation to the specified uses, and Table 5A compares the speciated PAH results with the screening values. The number of test results, which exceed these values, are also provided.

Table 5: Comparison of Chemical Test Results with SSVs for Made Ground Soils

Determinand	Number of Samples	Min Value mg/kg	Max Value mg/kg	Number of Samples Exceeding SSV for			Assessment Method	Soil Screening Criteria 6% SOM		
				Residential with home grown produce	Residential without home grown produce	Commercial/ Industrial		Residential with home grown produce mg/kg	Residential without home grown produce mg/kg	Commercial/ Industrial mg/kg
Organic Matter	3	6.4%	10%	-	-	-	-	-	-	-
Arsenic	3	24	32	0	0	0	S4UL	37	40	640
Cadmium	3	0.24	0.32	0	0	0	S4UL	11	85	190
Chromium (III)*	3	25	35	0	0	0	S4UL	910	910	8600
Chromium (VI)	3	<0.50	<0.50	0	0	0	S4UL	6	6	33
Lead	3	43	61	0	0	0	C4SL	200	310	2330
Mercury	3	<0.10	0.20	0	0	0	S4UL	11	15	320
Selenium	3	<0.20	0.88	0	0	0	S4UL	250	430	12,000
Nickel	3	23	31	0	0	0	S4UL	130	180	980
Phenols	3	<0.30	<0.30	0	0	0	S4UL	380	1200	1300
Copper	3	19	27	0	0	0	S4UL	2400	7100	68,000
Zinc	3	71	110	0	0	0	S4UL	3700	40,000	730,000
Free Cyanide	3	<0.50	<0.50	0	0	0	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.

Table 5A: Comparison of Speciated PAH Test Results with SSVs for Made Ground Soils

Determinand	No. of Samples	Min Value mg/kg	Max Value mg/kg	Number of Samples Exceeding SSV for			Assessment Method	Soil Screening Criteria 6% SOM		
				Residential with home grown produce	Residential without home grown produce	Commercial/ Industrial		Residential with home grown produce mg/kg	Residential without home grown produce mg/kg	Commercial/ Industrial mg/kg
Organic Matter	3	6.4%	10%	-	-	-	-	-	-	-
Acenaphthene	5	<0.10	1.5	0	0	0	S4UL	1100	6000	100,000
Acenaphthylene	5	<0.10	0.41	0	0	0	S4UL	920	6000	100,000
Anthracene	5	<0.10	1.5	0	0	0	S4UL	11,000	37,000	540,000
Benzo[a]anthracene	5	<0.10	3.2	0	0	0	S4UL	13	15	180
Benzo[a]pyrene (only)	5	<0.10	2.5	0	0	0	S4UL	3.0	3.2	36
Benzo[b]fluoranthene	5	<0.10	3.7	0	0	0	S4UL	3.7	4.0	45
Benzo[g,h,i]perylene	5	<0.10	1.9	0	0	0	S4UL	350	360	4000
Benzo[k]fluoranthene	5	<0.10	1.9	0	0	0	S4UL	100	110	1200
Chrysene	5	<0.10	4.0	0	0	0	S4UL	27	32	350
Dibenz(a,h)anthracene	5	<0.10	0.68	1	1	0	S4UL	0.3	0.32	3.6
Fluoranthene	5	<0.10	6.8	0	0	0	S4UL	890	1600	23,000
Fluorene	5	<0.10	0.56	0	0	0	S4UL	860	4500	71,000
Indeno[1,2,3-c,d]pyrene	5	<0.10	1.8	0	0	0	S4UL	41	46	510
Naphthalene	5	<0.10	0.69	0	0	0	S4UL	13	13	1100
Phenanthrene	5	<0.10	3.9	0	0	0	S4UL	440	1500	23,000
Pyrene	5	<0.10	6.8	0	0	0	S4UL	2000	3800	54,000

Discussion of Soil Results

A single concentration of the speciated PAH dibenz(a,h)anthracene, from HA1 at 0.60m depth, exceeded the soil screening values for residential end uses, but not the soil screening value for a commercial/industrial end use. All other levels of elements and compounds tested were within the associated soil screening values for both residential and commercial/industrial end uses. The concentrations of the seven PCB congeners tested were all below the laboratory detection limit.

Statistical analysis would not be meaningful for such a small dataset and has not been undertaken.

The made ground encountered during this investigation was not noted to have olfactory or visual evidence of fuel contamination.

No asbestos containing materials (ACM) were noted within the near surface soils during sampling, or during analysis in the chemical laboratory.

A sample of slightly clayey, sandy gravel fill at 0.60m depth in HA1 contained the slightly elevated speciated PAH fraction that exceeded the residential end use screening values. This soil was in a proposed front garden area, beneath a 0.50m thick cover of clay fill which did not contain any elevated concentrations of elements or compounds, and is in an area to be raised by a further 0.20m with a cover of clean imported topsoil.

The results indicate that the clay fill would be suitable for retention at the surface in the proposed residential setting, and the sandy gravelly fill, which would be at least 0.70m below proposed finished ground level, would be suitable for retention at that depth on the site.

SOIL GAS MONITORING

The monitoring of soil gasses (methane, carbon dioxide and oxygen) within the standpipe installed within HA1 was undertaken on 22nd and 29th January, and 5th February 2019. The results of the monitoring are summarised in Table 6 below.

Table 6: Summary of Gas Monitoring Data

Hole Location	No. Visits	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Flow (l/hr)	Water Level (mbgl)	Atmospheric Pressure (mb)
HA1	3	<0.1	0.9-1.4	19.7-20.0	<0.1	2.21-2.25	1001-1020

The results of the soil gas monitoring of the installation indicated less than 0.1% by volume methane and a maximum 1.4% by volume carbon dioxide, recorded during the monitoring visits. The in-situ measurements recorded gas emission rates of less than 0.1l/hr.

Using a flow rate of 0.1l/hr, the detection limit of the equipment used, these in-situ measurements indicate a Gas Screening Value (GSV) of 0.0001l/hr for methane and 0.0014l/hr for carbon dioxide. These results fall into Characteristic Situation 1 as defined by BS8485:2015 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'. These results indicate a very low likelihood of risk, and that no special gas protection measures are necessary.

UPDATED CONCEPTUAL MODEL

Assessment of the potential linkage between ground contamination sources, human and 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 relative to the existing site and future residential use of the site is presented in Table 7 below.

Table 7: General Conceptual Model Relative to Future Residential Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage	Soil	Soil Gas	Off-Site Sources
Human Health i ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low	Low	Low	Very Low
Human Health i users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	N/A	Very Low	Very Low	Very Low
Water Environment	Migration through ground into surface water or groundwater	Low	Very Low	Very Low	Very Low
Flora	Vegetation on site growing on contaminated soil	Very Low	Very Low	Very Low	Very Low
Building Materials	Contact with contaminated soil	Very Low	Very Low	Very Low	Very Low

<u>Key to Table 7</u>	Definition
Risk	
Very High	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	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	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	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	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.
N/A	Not Applicable because the proposed development will remove the source.

COMMENTS ON GROUND CONTAMINATION IN RELATION TO PROPOSED DEVELOPMENT

Anticipated exposure scenarios relating to the existing plot, the site history and a proposed residential end use of the site, in the context of the conceptual model, are discussed as follows.

The proposed development is understood to comprise a new house, with associated gardens and hardstanding.

This investigation may not have revealed the full extent of contamination on the site and appropriate professional advice should be sought if subsequent site work reveals materials that may appear to be contaminated.

Contaminated Soil

On the basis of the ground investigation, the site is underlain by between 0.80m and 1.30m of made ground resting on naturally deposited River Terrace Deposits and Marine Sand. The chemical testing has identified no elevated concentrations within the near surface soils in respect to the proposed residential end use.

The underlying naturally deposited soils encountered beneath the site would also be considered suitable for re-use within the development.

Any soil imported to site must be certified as "suitable for use".

Field Drainage

Redundant field, foul or surface water drain runs, if present, should be removed where encountered from beneath the site and precautions should ensure that any remaining effluent or sediment is directly disposed off-site. The integrity of the existing drains should be checked, and where they are to be retained, any damaged sections should be replaced prior to development.

Soil Gas

There are no landfills within 250m of the site. The site is underlain by a layer of made ground, covering superficial, silty clay or silty sand soils. The results of the soil gas monitoring of the installation indicated less than 0.1% by volume methane and a maximum 1.4% by volume carbon dioxide, recorded during the monitoring visits.

There is a low risk that hazardous gases would affect groundworkers during the construction phase and a very low risk of hazardous gas affecting future users of the site.

The site lies within an area where less than 1% of homes are above the BRE action level for radon and that no radon protection measures are required.

Human Health - Construction Workers

Based on the chemical test results, 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) HS(G)66.

For the protection of 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.
- d) Consideration should be given to gas monitoring within deep or confined spaces, particularly where thick made ground is present, to ensure safety of personnel entering them, since carbon dioxide could accumulate within any excavations, service chambers or sub-structures.

Human Health - Users of Completed Development

The risk of the made ground affecting the site users in a residential setting, would be considered to be very low.

The results of the chemical analysis undertaken would indicate that the made ground should be considered suitable for retention at the surface in any garden, landscaped or planted areas. No scheme of remediation would be considered necessary for the residential setting.

The made ground could be considered for re-use beneath proposed buildings and permanent hardstanding, if suitable for engineering purposes, where it is unlikely to affect future users of the site, however these soils could affect buried services.

Any soil imported to site must be certified as "suitable for use".

Water Environment

The site is underlain by superficial River Terrace Deposits, indicated by the EA to be an 'Unproductive' stratum, and superficial Marine Sand, which cover the solid geology Oxford Clay Formation, indicated by the EA to be an 'Unproductive' stratum. The nearest surface water feature is a drain 41m south-west of the site. The site does not lie within a source protection zone.

Groundwater seepages were recorded below 2.00m depth.

The risk to the water environment is considered very low as it is unlikely that the proposed development would impact the quality of the water environment.

Effects on Buried Services

The local water supply company should be consulted if new buried plastic water pipes within the made ground soils on this site are proposed.

Off-Site Disposal of Soil Arisings

The results of chemical analysis are provided following the exploratory hole records and can be used within the information necessary for basic characterisation of the soil destined for landfill. The Environment Agency publication Hazardous Waste, Technical Guidance WM3 outlines the methodology for classifying wastes and should be referenced for guidance. The test results (total metals, hydrocarbons and cyanide) should be compared to the relevant thresholds to determine whether they fall into the primary categories of non-hazardous or hazardous waste and will help indicate the likely European Waste Catalogue (EWC) code which is determined by the waste type.

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, whilst 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. Hydrocarbon impacted soils are likely to be classified as special waste.

It is expected that arisings of natural soils from the excavations across this site would fall into the inert category under the European Waste Catalogue description 'Soil and Stones' EWC code 17 05 04 with restrictions excluding topsoil and peat.

CONCLUSIONS

The proposed development is understood to comprise a new house, with associated gardens and hardstanding areas.

Remediation Strategy

The results of the chemical analysis would indicate that the made ground should be considered to be suitable for retention at the surface within any new garden or landscaped areas. It is understood that the ground levels in the front garden area are to be raised by 0.20m with clean imported topsoil, and the adjacent gardens slightly built up to blend in.

The made ground could be considered for re-use beneath proposed buildings and permanent hardstanding, if suitable for engineering purposes, where it is unlikely to affect future users, however these soils could affect buried services.

Topsoil

Any imported topsoil should have appropriate certificates confirming its suitability prior to placement.

REMEDATION METHOD STATEMENT

The following points will constitute a plan for remedial works considered necessary in order to ensure that soils retained within the development are fit for use.

- The groundworks contractor should undertake a watching brief during works to check for polluted soil.
- Where garden and landscaped areas are proposed the made ground on-site should be considered suitable for retention. A 0.20m thick cover of clean imported topsoil is to be placed in the front garden area. Clean granular fill should be imported for use beneath proposed buildings and permanent hardstanding, where it is unlikely to affect future site users.
- If soils are revealed which are different to those encountered by this ground investigation, the advice of a specialist should be sought. Any such soils will either be immediately removed off site to a licensed disposal or treatment facility or placed within a designated quarantine zone on a membrane for future classification, treatment and/or removal.
- A photographic record of such remediation should be undertaken by the contractor.
- Any imported 'clean' inert topsoil and granular fill should be supported by verification certificates to provide proof of its suitability. Documentation relating to the source of clean inert topsoil should be presented to the Local Planning Authority for approval prior to infilling. Samples of any imported clean topsoil placed in the garden areas should be tested to verify that the soil is suitable for use.
- The Local Authority should also be informed regarding each stage of the works and photographic evidence together with copied waste transfer receipts for any arisings should be gathered, as they are essential to demonstrate the works.
- The local water supply company should be consulted if new buried plastic water pipes within the made ground soils on this site are proposed.

VALIDATION

Other than the importation of clean topsoil to garden areas, no remediation will be required within the site for the proposed residential scheme. A watching brief should be undertaken during construction and on completion, and appropriate records kept so that a Validation Report can be compiled and subsequently submitted to the local authority.

GROUND ENGINEERING LIMITED



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Site Location Plan

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Not To Scale



Project : Land at Harrington Drive, Crowland, Lincolnshire

Client : Mr Ian Bedford

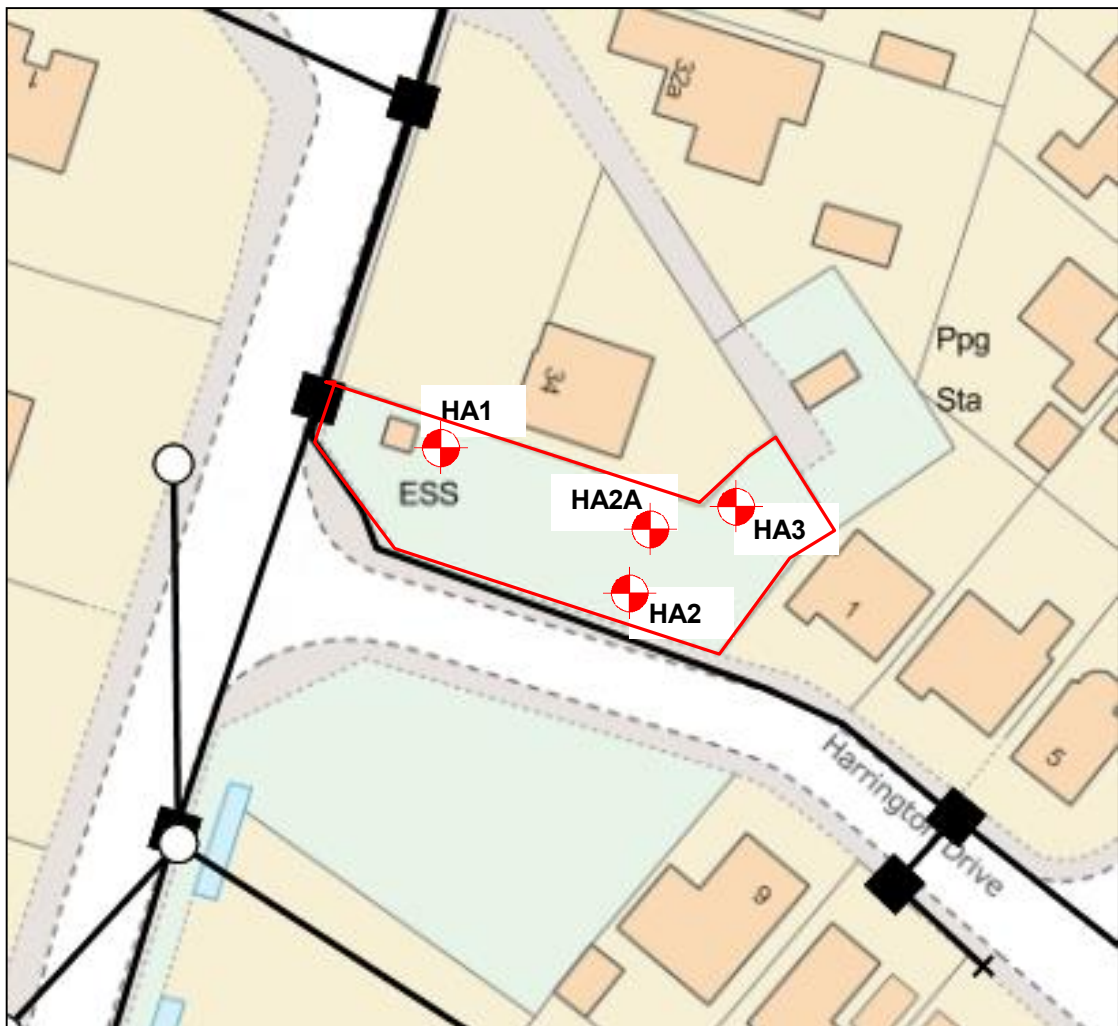
**GROUND
ENGINEERING
LIMITED**
Peterborough

Tel : 01733 566566

Project No.
C14668

Exploratory Hole Location Plan

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Project : Land at Harrington Drive, Crowland,
Lincolnshire

Client : Mr Ian Bedford

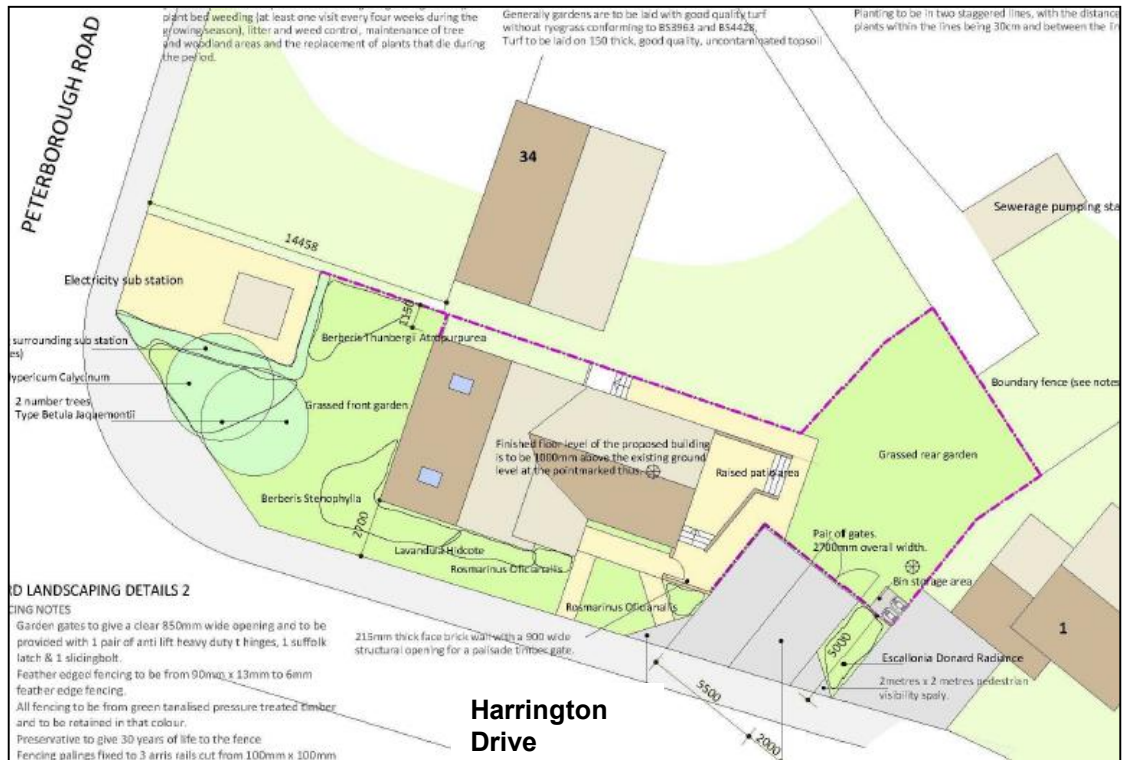
**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

Project No.
C14668

Proposed Development Plan

Based on plan provided by the client



Not To Scale



**Project : Land at Harrington Drive, Crowland,
Lincolnshire**

Client : Mr Ian Bedford

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

**Project No.
C14668A**

Site Photographs – Site Walkover January 2019



Project : Land at Harrington Drive, Crowland,
Lincolnshire

Client : Mr Ian Bedford

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

**Project No.
C14668**

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND AT HARRINGTON DRIVE, CROWLAND			HAND AUGER HA1			
Samples and in-situ Tests			Date: 11/01/19	Hole Size: 70mm dia to 4.00m			Ground Level:		
Depth m	Type	Result	(Date) Water	Inst.	Description of Strata	Legend	Depth m	O.D. Level m	
0.10 0.10	D1 ES1								
0.40 0.40	D2 ES2				MADE GROUND - Firm, dark brown, slightly gravelly, silty CLAY. Gravel is angular to sub-rounded flint, brick, concrete and ash.		0.50		
0.60	D3				MADE GROUND - Brown, slightly clayey, sandy GRAVEL with occasional cobbles of concrete. Gravel is angular to sub-rounded flint, brick and concrete.		0.80		
0.90 0.90 0.90	D4 ES3 V1	(65)			MADE GROUND - Firm, dark brown, slightly gravelly, silty CLAY. Gravel is angular to sub-rounded flint, brick and ash.		1.30		
1.20 1.20 1.20	D5 ES4 V2	(69)			Firm, brown and orange brown, slightly gravelly, sandy, silty CLAY. Gravel is sub-angular and sub-rounded, flint. (RIVER TERRACE DEPOSIT)		1.70		
1.50 1.50	D6 V3	(58)							
1.80 1.80-2.10	D7 MP1	59			Medium dense, orange brown, slightly clayey, very silty SAND. Sand is fine grained.				
2.10	D8								
2.40 2.50-2.80	D9 MP2	55							
2.70	D10								
3.00 3.00-3.30	D11 MP3	64			...Becoming grey below 2.90m depth.				
3.30	D12								
3.50-3.80 3.60	MP4 D13	72			(MARINE SAND)				
4.00	D14						4.00		
					Hole completed at 4.00m depth				
REMARKS 1. Live roots observed to 1.50m depth 2. Hole sides unstable below 2.00m depth 3. Standpipe installed to 3.20m depth								Project No 14668 Scale 1:25 Page 1/1	
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample W - Water Sample R - Root Sample ☒ Water Strike ☒c Level on completion MP - Mackintosh Probe V - Vane Shear Test Cohesion () kPa ES - Environmental Sample ☒ Water Rise ☒s Standpipe Level			Groundwater Strikes Depth m No Struck Rose to Rate Cased Sealed				Groundwater Observations Date Hole Casing Water		
			1 2.00 2 2.10				11/01/19 4.00 22/01/19 3.20 1.00 2.21 29/01/19 3.20 1.00 2.24 05/02/19 3.20 1.00 2.25		

GROUND ENGINEERING L I M I T E D Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND AT HARRINGTON DRIVE, CROWLAND				HAND AUGER HA2				
			Date: 11/01/19		Hole Size: 70mm dia to 0.60m			Ground Level:			
Samples and in-situ Tests			(Date) Water		Description of Strata			Legend	Depth m	O.D. Level m	
Depth m	Type	Result									
0.10 0.10	D1 ES1				MADE GROUND - Soft, dark brown, silty CLAY.				0.20		
0.40 0.40 0.55 0.55	D2 ES2 D3 ES3				MADE GROUND - Firm, brown and dark brown, slightly gravelly, silty CLAY. Gravel is angular to sub-rounded flint, brick and clinker.				0.50		
					MADE GROUND - Brown, clayey, sandy GRAVEL of angular to rounded flint, brick and clinker.				0.60		
					Hole abandoned at 0.60m depth						
REMARKS 1. Live roots observed to 0.10m depth 2. Hole sides stable 3. Hole abandoned at 0.60m depth due to concrete 4. Hole re-augered as HA2A nearby										Project No 14668	
										Scale 1:25	Page 1/1
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample W - Water Sample R - Root Sample ▽ Water Strike ▽c Level on completion			MP - Mackintosh Probe V - Vane Shear Test Cohesion () kPa ES - Environmental Sample ▽ Water Rise ▽s Standpipe Level			Groundwater Strikes Depth m No Struck Rose to Rate Cased Sealed		Groundwater Observations Date Hole Casing Water			
						11/01/19		0.60 dry			

GROUND ENGINEERING L I M I T E D Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND AT HARRINGTON DRIVE, CROWLAND				HAND AUGER HA2A					
			Date: 11/01/19		Hole Size: 70mm dia to 1.20m					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 0.30	D1 ES1			MADE GROUND - Firm, brown and dark brown, slightly gravelly, silty CLAY. Gravel is angular to sub-rounded flint, brick and ash.								
0.60 0.60 0.70	D2 ES2 V1	(52)		MADE GROUND - Dark grey CONCRETE. MADE GROUND - Firm, brown and dark brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is fine and medium, angular to sub-rounded flint, clinker and ash.		0.45 0.55						
0.90 0.90 1.00	D3 ES3 V2	(68)										
1.20 1.20-1.50	D4 MP1	59		Firm, light brown, grey and orange brown, sandy, silty CLAY. Sand is fine grained. (RIVER TERRACE DEPOSIT) Hole completed at 1.20m depth		1.10 1.20						
REMARKS 1. Live roots observed to 0.40m depth 2. Hole sides stable							Project No 14668					
							Scale 1:25	Page 1/1				
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample W - Water Sample R - Root Sample ∇ Water Strike ∇c Level on completion MP - Mackintosh Probe V - Vane Shear Test Cohesion () kPa ES - Environmental Sample ∇ Water Rise ∇s Standpipe Level			Groundwater Strikes				Groundwater Observations					
			Depth m						Date			
			No	Struck	Rose to	Rate	Cased	Sealed	Hole	Casing	Water	
							11/01/19	1.20		dry		

GROUND ENGINEERING L I M I T E D Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND AT HARRINGTON DRIVE, CROWLAND				HAND AUGER HA3					
			Date: 11/01/19		Hole Size: 70mm dia to 1.00m				Ground Level:			
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m					
Depth m	Type	Result										
0.10 0.10	D1 ES1			MADE GROUND - Soft, dark brown and brown, slightly gravelly, silty CLAY. Gravel is angular to sub-rounded flint, rare brick and bone fragments.		0.60						
0.30 0.40 0.40	V1 D2 ES2	(37)										
0.70 0.70 0.70	D3 V2 ES3	(45)		MADE GROUND - Firm, brown and light brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is angular brick fragments.		0.80						
1.00 1.00 1.00-1.30	D4 ES4 MP1	63		Medium dense, light brown, silty, fine SAND. (MARINE SAND)		1.00						
				Hole completed at 1.00m depth								
REMARKS 1. Live roots observed to 1.00m depth 2. Hole sides stable							Project No 14668					
							Scale 1:25	Page 1/1				
KEY D - Disturbed Sample MP - Mackintosh Probe B - Bulk Sample V - Vane Shear Test U - Undisturbed Sample Cohesion () kPa W - Water Sample ES - Environmental Sample R - Root Sample ☒ Water Strike ☒ Water Rise ☒c Level on completion ☒s Standpipe Level			Groundwater Strikes				Groundwater Observations					
			Depth m						Depth m			
			No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water
						11/01/19	1.00		dry			

GROUND ENGINEERING L I M I T E D Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND AT HARRINGTON DRIVE, CROWLAND		TRIAL PIT HA4	
Date: 11/07/19			Pit Size: 0.30m L x 0.30m W x 0.60m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m
Depth m	Type	Result				O.D. Level m
0.20	D1			MADE GROUND - Firm, brown and dark brown, slightly sandy, slightly gravelly SILT/CLAY. Gravel is angular to sub-rounded flint, glass and brick fragments.		
0.20	ES1					0.30
0.40	D2			MADE GROUND - Firm, brown and dark brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is angular to sub-rounded flint, glass, brick fragments, ash and clinker.		
0.40	ES2					0.50
0.60	D3			MADE GROUND - Firm, brown, slightly sandy, gravelly, silty CLAY. Gravel is angular to sub-rounded flint and brick fragments.		0.60
0.60	ES3					
				Pit completed at 0.60m depth		
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental Sample  Water Strike  Water Rise  Level on completion MP - Mackintosh Probe P () - Hand Penetrometer V - Vane Shear Test Cohesion () kPa			REMARKS 1. No live roots observed 2. Pit dry 3. Pit sides stable			
				Project No 14668B		
				Scale 1:25	Page 1/1	

Groundwater & Gas Monitoring Record

Site: Land at Harrington Drive, Crowland

Report Ref: C14668

Date	Borehole No.	Methane (% v/v)		Methane LEL %	Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow Rate (l/hr)	Atmosph. Pressure (mb)	Depth of Well (mbgl)	Depth to Groundwater (mbgl)
		Peak	Steady		Peak	Steady	Min.	Max.				
22/01/2019	HA1	<0.1	<0.1	<0.1	1.4	1.4	19.7	19.7	<0.1	1001	3.20	2.21
29/01/2019	HA1	<0.1	<0.1	<0.1	1.2	1.2	19.9	19.9	<0.1	1003	3.20	2.24
05/02/2019	HA1	<0.1	<0.1	<0.1	0.9	0.9	20.0	20.0	<0.1	1020	3.20	2.25

LEL -- Lower Explosive Limit

GROUND ENGINEERING LIMITED, NEWARK ROAD, PETERBOROUGH, PE1 5UA

LABORATORY TEST RESULTS

CONTRACT HARRINGTON DRIVE, CROWLAND

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	Total % Dry Wt.	Soil Aqueous Extract mg/l	Water mg/l		pH
HA1	D5	1.20	48	25	23	28								359			7.6	SOIL CLASSIFICATION = CI 15% retained on 425µm sieve
	D6	1.50																
HA2A	D4	1.20												148			7.8	

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

14668A



8180

TEST CERTIFICATE**GROUND ENGINEERING**

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

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
 Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
 Client Address: Newark Road
 Peterborough
 PE1 5UA

Certificate Number: PL6677-1/3/710-2

Client Reference: C14668A

Lab Job Number: PL6677-1

Date Sampled: Unknown

Date Received: 23.04.2019

Date Tested: 16.05.2019

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

Contact: Simon Weatherley

Site Name: Harrington Drive
 Site Address: Crowland

TEST RESULTS

Laboratory Reference: PL6677-1/3

Client Reference: D7

Pre-treatment for
 organic material:

No

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

Material Specification: Not Required

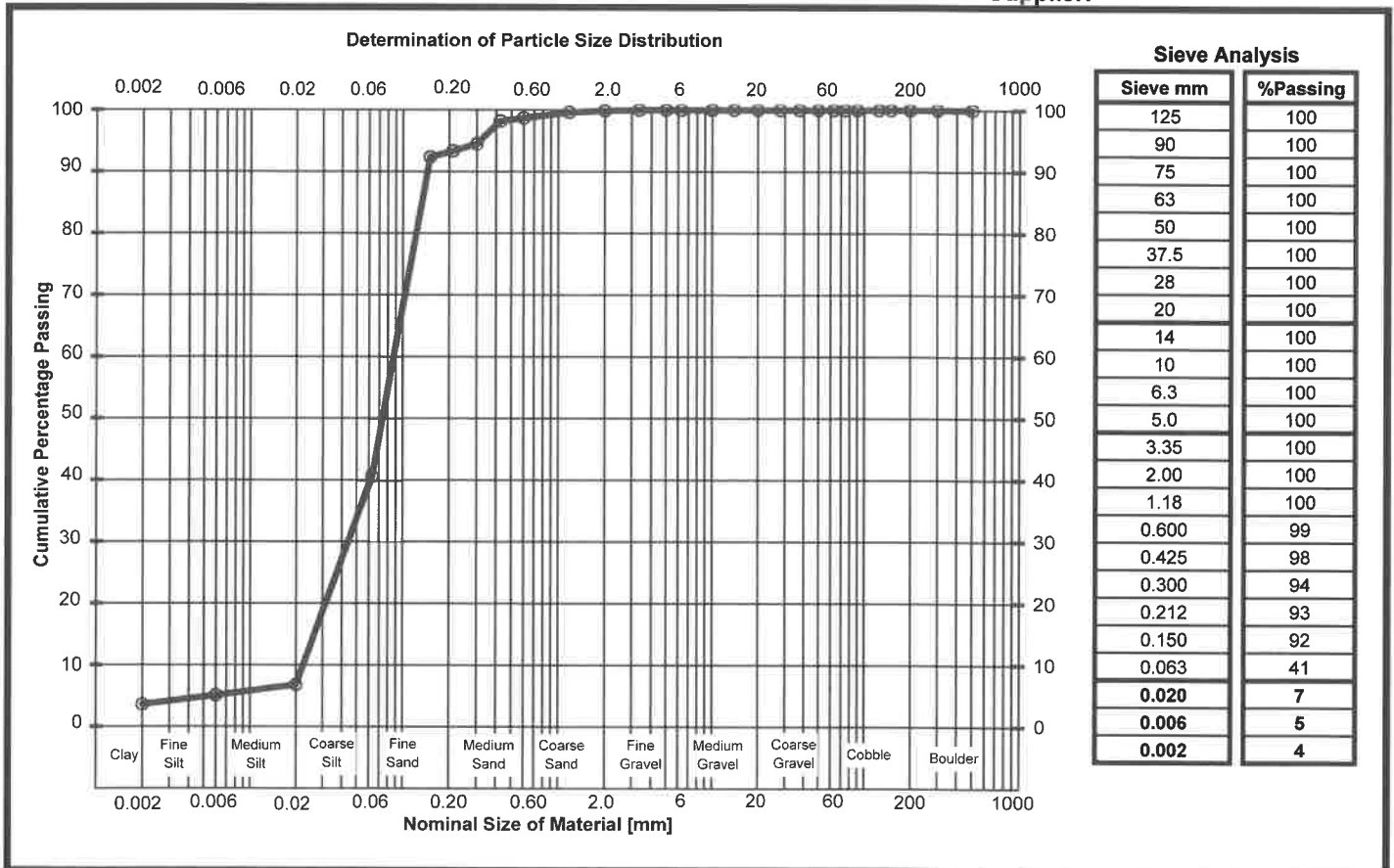
Location: HA1

Source:

Depth Top: 1.80m

Depth Base: 2.40m

Supplier:



Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 21.05.2019 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



Final Report

Report No.: 19-01420-1

Initial Date of Issue: 24-Jan-2019

Client Ground Engineering Limited

Client Address: Newark Road
Peterborough
Cambridgeshire
PE1 5UA

Contact(s): Simon Weatherley

Project SW/C14668 Land at Harrington Drive,
Crowland

Quotation No.:	Date Received:	16-Jan-2019
Order No.:	Date Instructed:	16-Jan-2019
No. of Samples: 4		
Turnaround (Wkdays): 5	Results Due:	22-Jan-2019
Date Approved: 24-Jan-2019		

Approved By:

Details: Glynn Harvey, Laboratory Manager

Client: Ground Engineering Limited		Chemtest Job No.:		19-01420	19-01420	19-01420	19-01420	19-01420
Quotation No.:		Chemtest Sample ID.:		754643	754644	754644	754645	754646
		Client Sample ID.:		D3	D1	D1	D2	E53
		Sample Location:		HA1	HA2A	HA2A	HA3	HA1
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.60	0.30	0.30	0.40	0.90
		Date Sampled:		11-Jan-2019	11-Jan-2019	11-Jan-2019	11-Jan-2019	11-Jan-2019
Determinand	Accred.	SOP	Units	LOD				
pH	U	2010		N/A	8.4	7.4	7.9	
Moisture	N	2030	%	0.020	10	22	24	24
Stones and Removed Materials	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	1.1	0.91	2.0	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.013	< 0.010	< 0.010	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	0.90	< 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	42	1.4	10	
Arsenic	U	2450	mg/kg	1.0	32	24	25	
Cadmium	U	2450	mg/kg	0.10	0.31	0.24	0.32	
Chromium	U	2450	mg/kg	1.0	25	34	35	
Copper	U	2450	mg/kg	0.50	19	22	27	
Mercury	U	2450	mg/kg	0.10	< 0.10	0.10	0.20	
Nickel	U	2450	mg/kg	0.50	23	31	31	
Lead	U	2450	mg/kg	0.50	43	43	61	
Selenium	U	2450	mg/kg	0.20	< 0.20	0.88	0.47	
Zinc	U	2450	mg/kg	0.50	77	71	110	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	
Organic Matter	U	2625	%	0.40	6.4	10	9.1	
Acenaphthene	U	2700	mg/kg	0.10	0.47	< 0.10	< 0.10	
Acenaphthylene	U	2700	mg/kg	0.10	0.41	< 0.10	< 0.10	
Anthracene	U	2700	mg/kg	0.10	1.5	< 0.10	< 0.10	
Benzo[a]anthracene	U	2700	mg/kg	0.10	3.2	< 0.10	1.1	
Benzo[a]pyrene	U	2700	mg/kg	0.10	2.5	< 0.10	0.38	
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	3.7	< 0.10	1.4	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	1.9	< 0.10	< 0.10	
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	1.9	< 0.10	0.98	
Chrysene	U	2700	mg/kg	0.10	4.0	< 0.10	0.98	
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.10	0.68	< 0.10	< 0.10	
Fluoranthene	U	2700	mg/kg	0.10	6.8	< 0.10	0.49	
Fluorene	U	2700	mg/kg	0.10	0.56	< 0.10	< 0.10	
Indeno[1,2,3-c,d]Pyrene	U	2700	mg/kg	0.10	1.8	< 0.10	< 0.10	
Naphthalene	U	2700	mg/kg	0.10	0.69	< 0.10	< 0.10	
Phenanthrene	U	2700	mg/kg	0.10	3.9	< 0.10	< 0.10	
Pyrene	U	2700	mg/kg	0.10	6.8	< 0.10	0.76	
Total Of 16 PAH's	U	2700	mg/kg	2.0	41	< 2.0	6.1	
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	
PCB 28	U	2815	mg/kg	0.010				< 0.010
PCB 52	U	2815	mg/kg	0.010				< 0.010



The right chemistry to deliver results
Project: SW/C14668 Land at Harrington Drive, Crowland

Results - Soil

Client: Ground Engineering Limited		Chemtest Job No.:		19-01420	19-01420	19-01420
Quotation No.:		Chemtest Sample ID.:		754644	754645	754646
		Client Sample ID.:		D1	D2	E53
		Sample Location:		HA2A	HA3	HA1
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		0.30	0.40	0.90
		Date Sampled:		11-Jan-2019	11-Jan-2019	11-Jan-2019
Determinand	Accred.	SOP	Units	LOD		
	U	2815	mg/kg	0.010		< 0.010
	U	2815	mg/kg	0.010		< 0.010
	U	2815	mg/kg	0.010		< 0.010
	U	2815	mg/kg	0.010		< 0.010
	U	2815	mg/kg	0.010		< 0.010
Total PCBs (7 Congeners)		N	2815	mg/kg	0.10	< 0.10

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	Alkaline 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-diphenylcarbazine.
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; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
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.

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



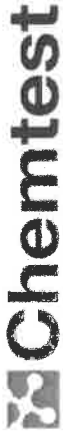
Final Report

Report No.: 19-23471-1
Initial Date of Issue: 17-Jul-2019
Client Ground Engineering Limited
Client Address: Newark Road
Peterborough
Cambridgeshire
PE1 5UA
Contact(s): Simon Weatherley
Project SW/C14668B Harrington Drive,
Crowland

Quotation No.:		Date Received:	12-Jul-2019
Order No.:	SW/C14668B	Date Instructed:	12-Jul-2019
No. of Samples:	2		
Turnaround (Wkdays):	5	Results Due:	18-Jul-2019
Date Approved:	17-Jul-2019		

Approved By:

Details: Robert Monk, Technical Manager



The right chemistry to deliver results
Project: SW/C14668B Harrington Drive, Crowland

Results - Soil

Client: Ground Engineering Limited		Chemtest Job No.:		19-23471	19-23471
Quotation No.:		Chemtest Sample ID.:		856816	856817
		Client Sample ID.:		D1+ES1	D2+ES2
		Sample Location:		HA4	HA4
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.20	0.40
		Date Sampled:		11-Jul-2019	11-Jul-2019
Determinand	Accred.	SOP	Units	LOD	
Moisture	N	2030	%	0.020	20
Acenaphthene	U	2700	mg/kg	0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	0.50
Fluorene	U	2700	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10
Naphthalene	U	2700	mg/kg	0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	0.63
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0

SOP	Title	Parameters included	Method summary
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.
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; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

Report Information

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- 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

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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

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Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

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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:
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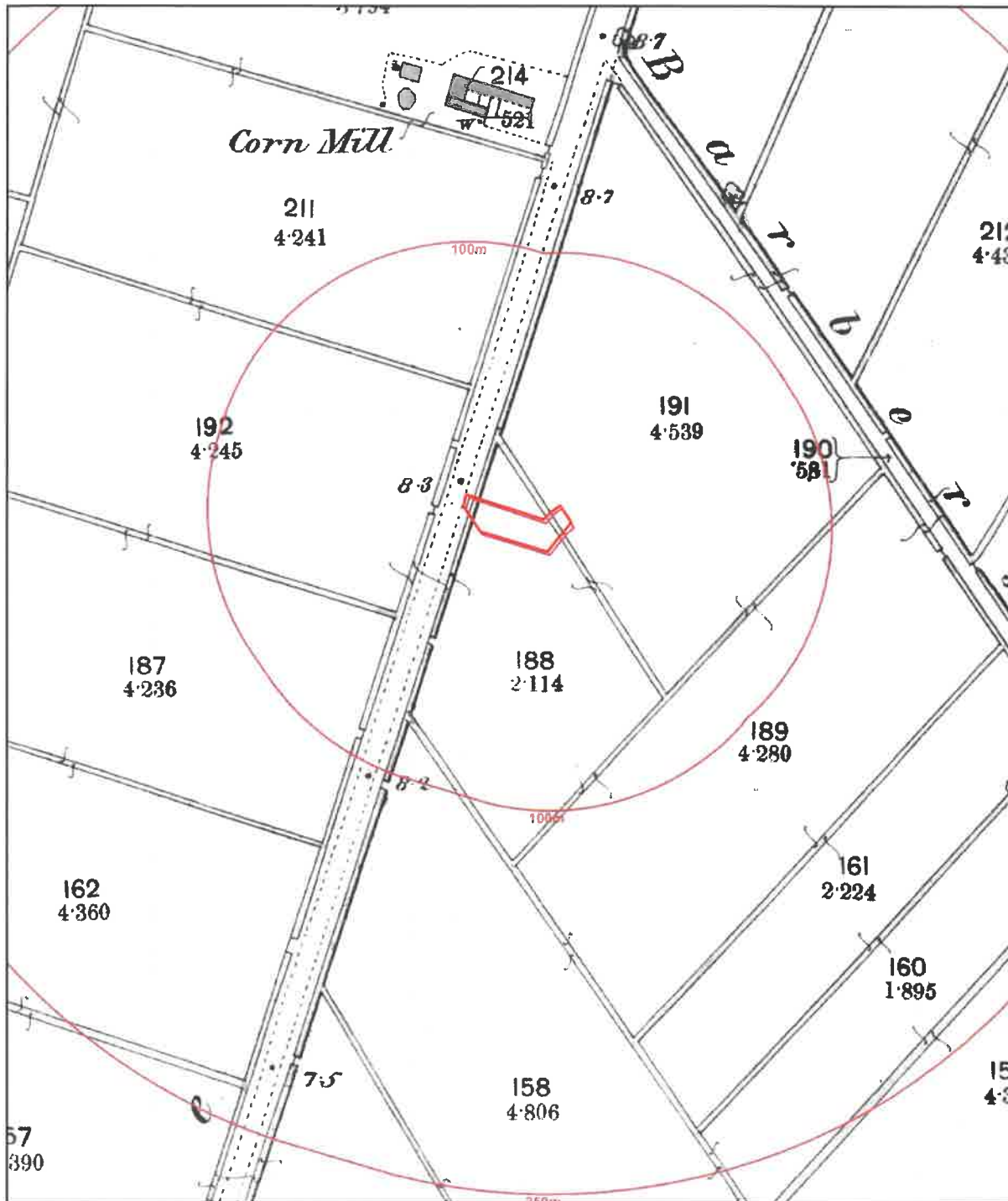
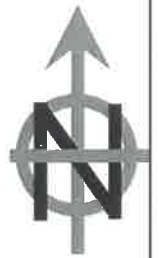
APPENDIX 1

HISTORICAL MAP EXTRACTS

Site History

Figure B

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Project : Land Adj. 1 Harrington Drive, Crowland,
Lincolnshire

Client : Mr. Ian Bedford

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

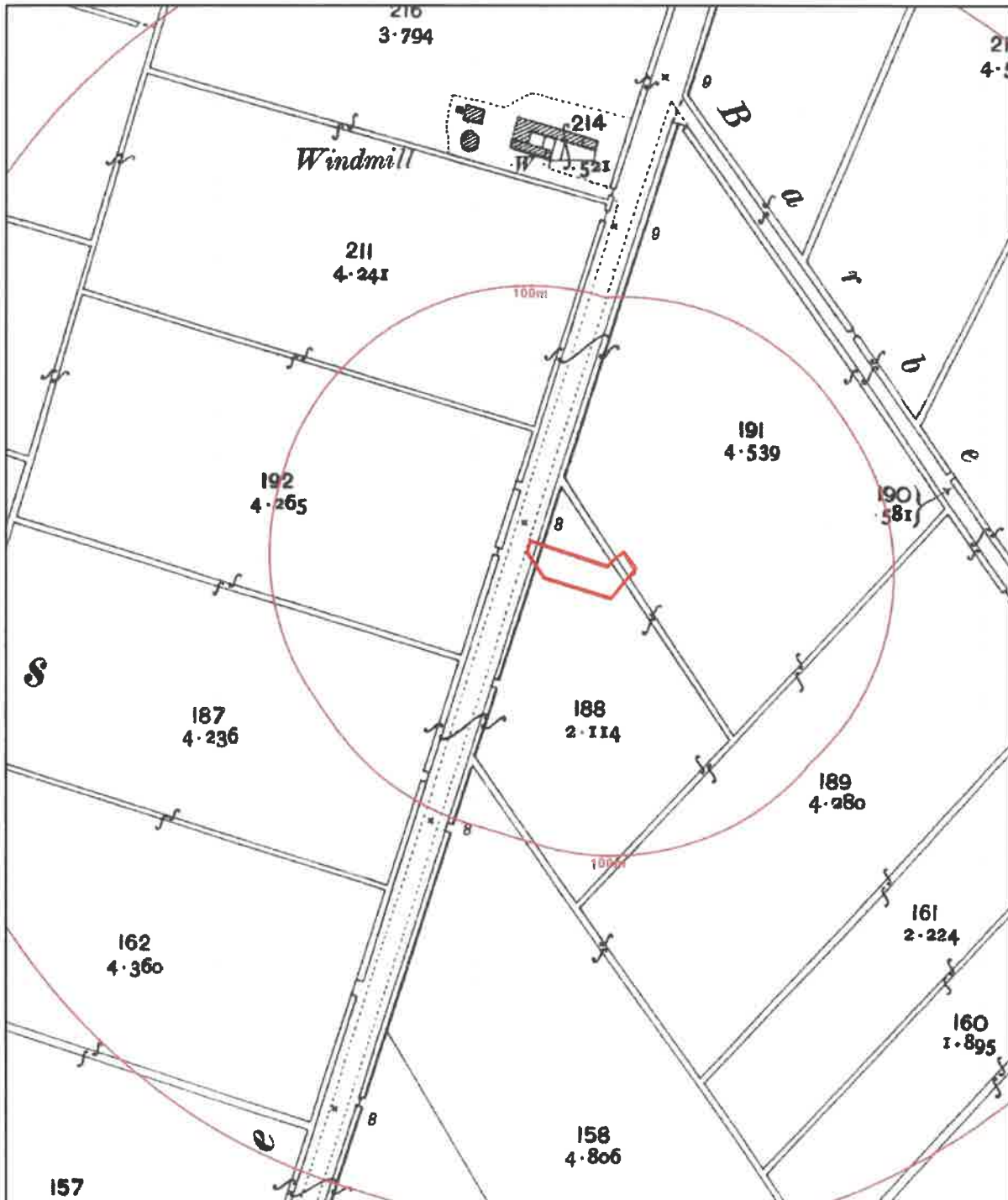
Project No.

C14668

Site History

Figure C

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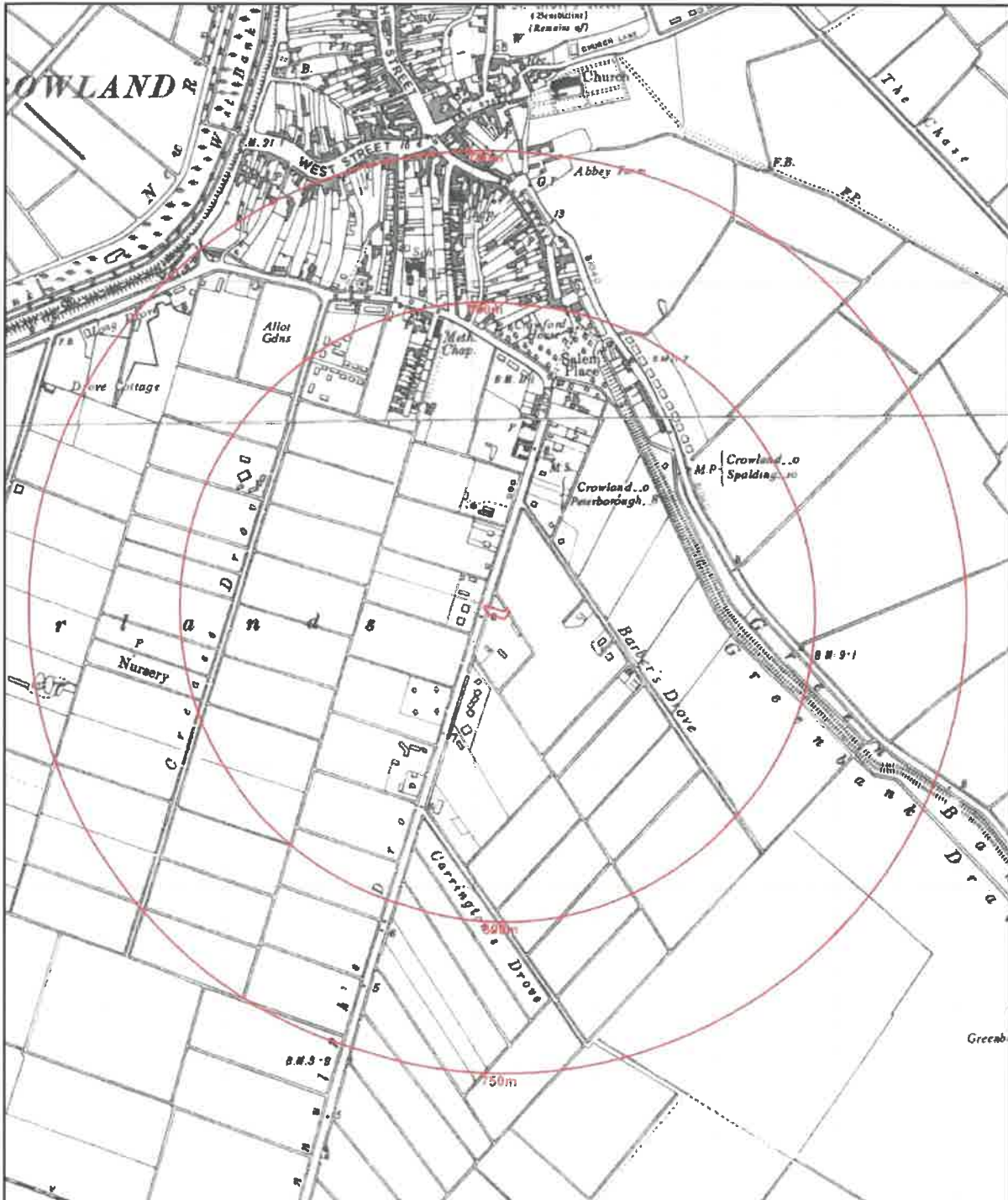
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Site History

Figure D

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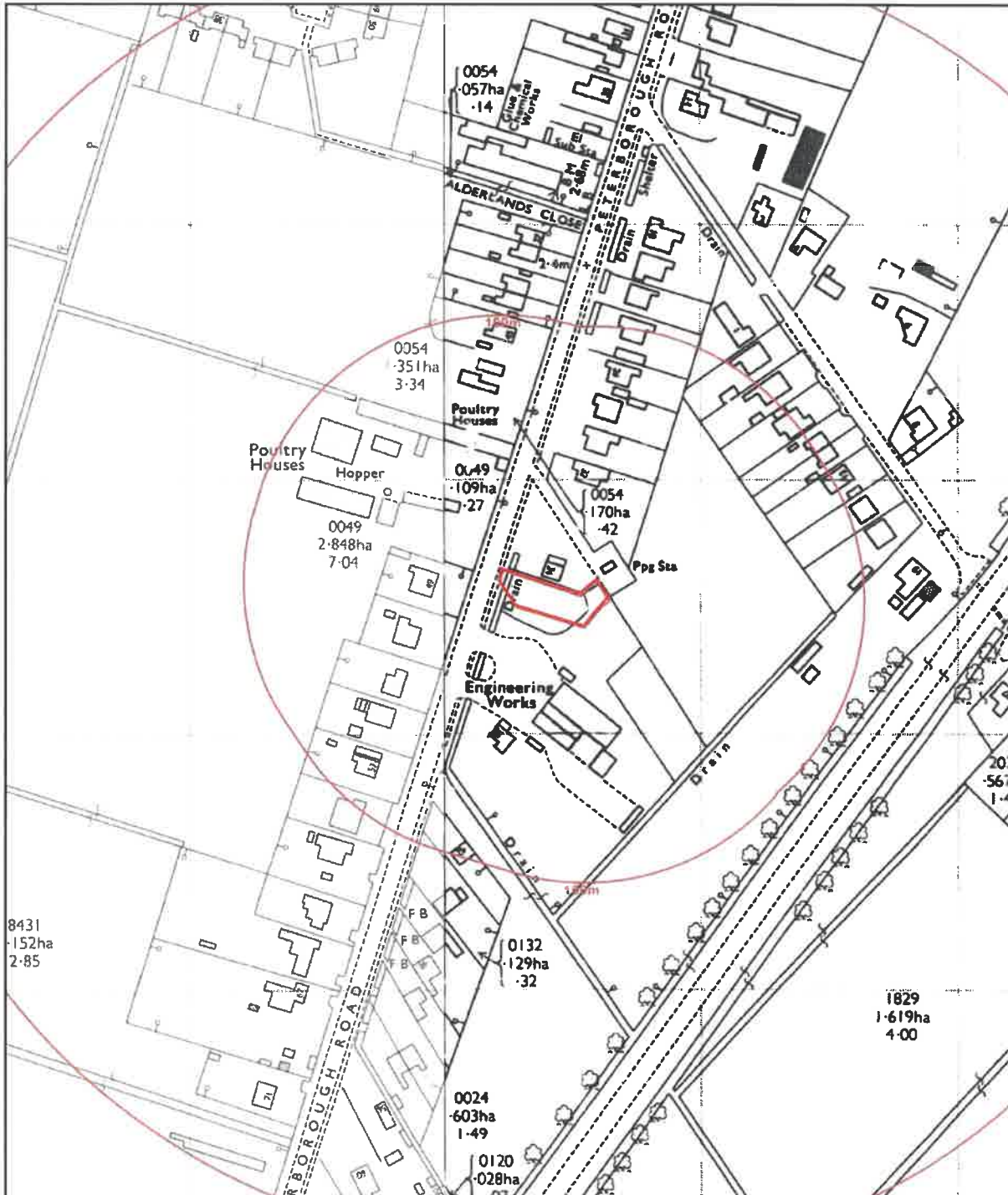
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Site History

Figure E

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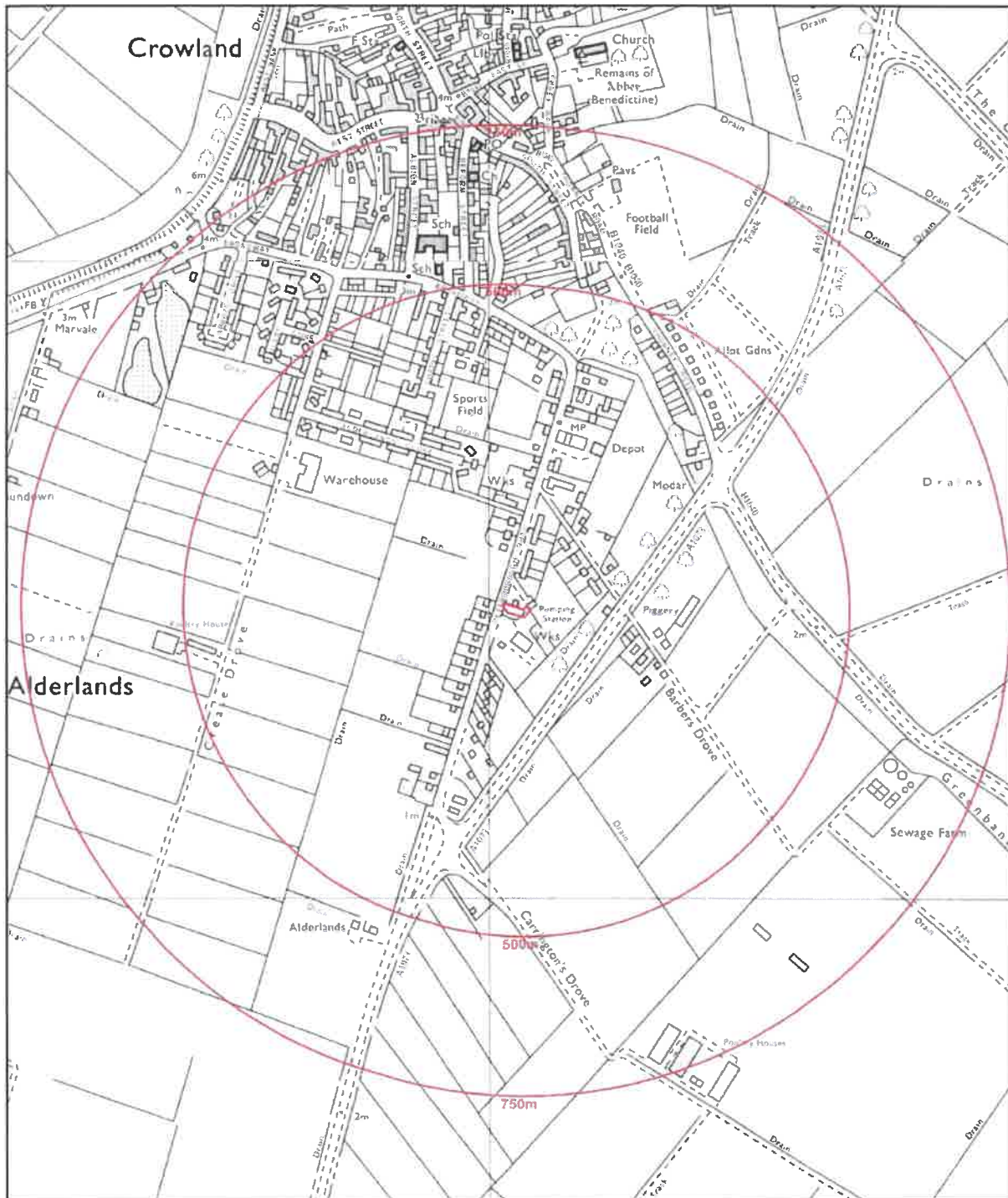
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Site History

Figure F

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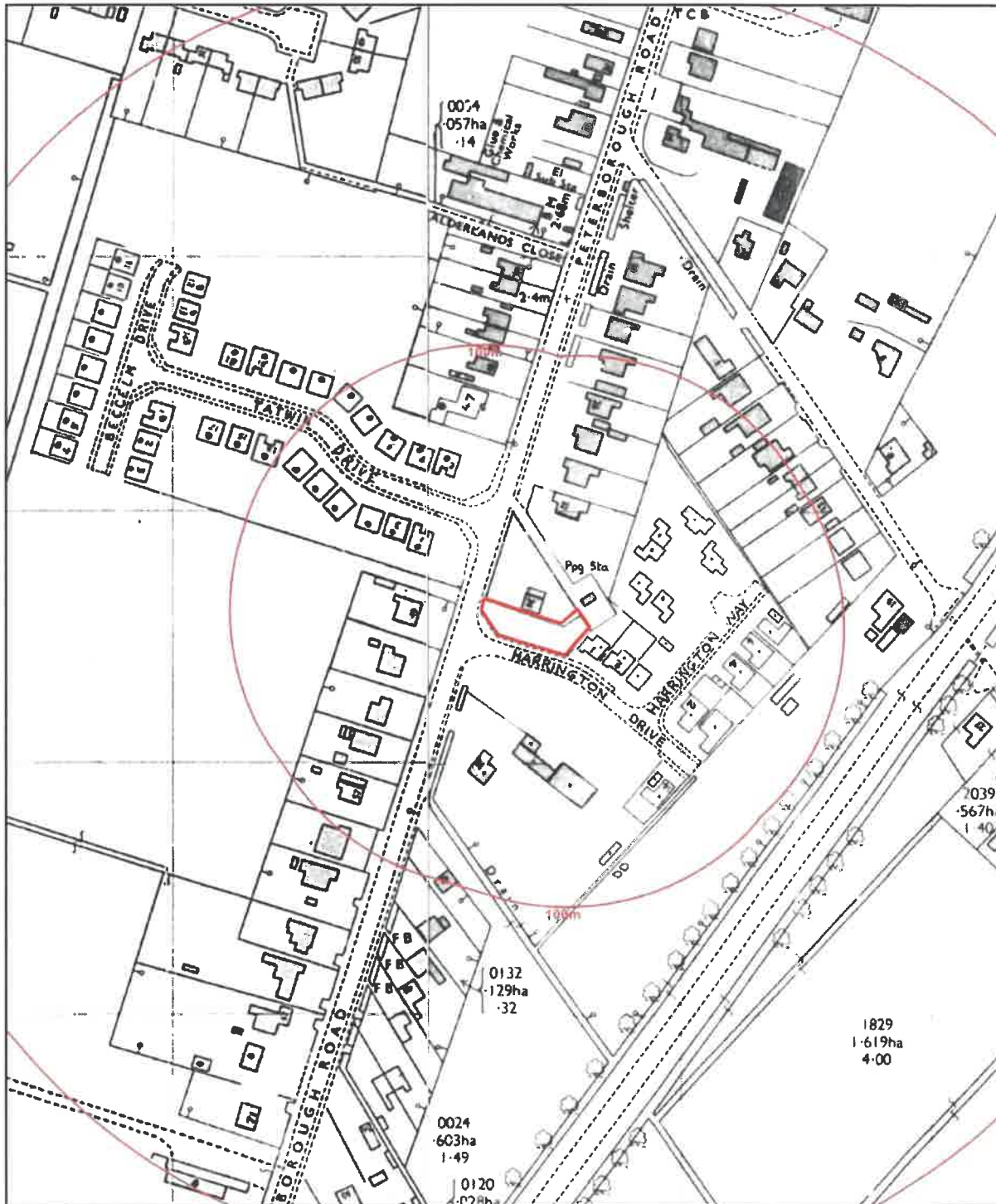
Project No.

C14668

Site History

Figure G

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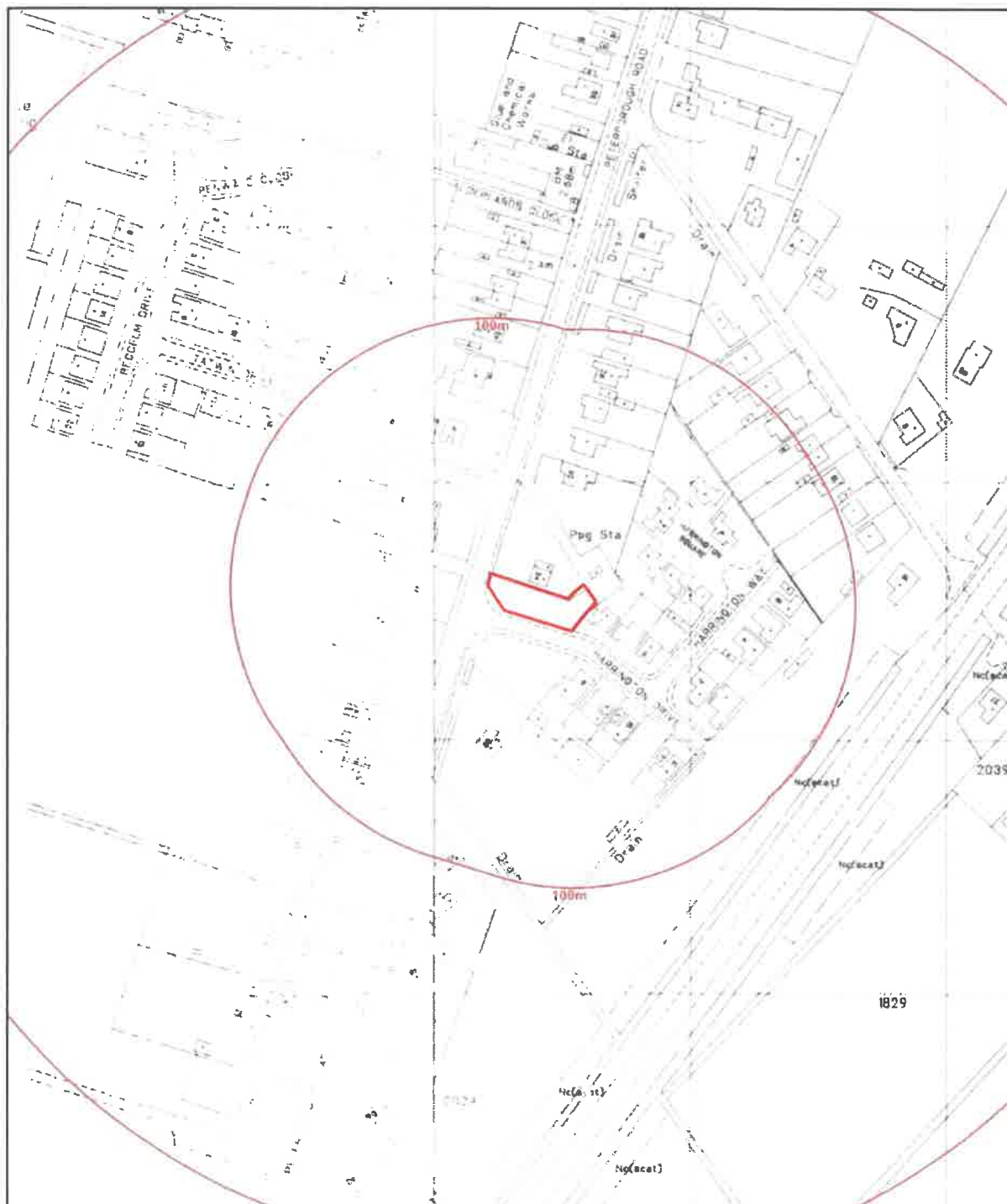
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Site History

Figure H

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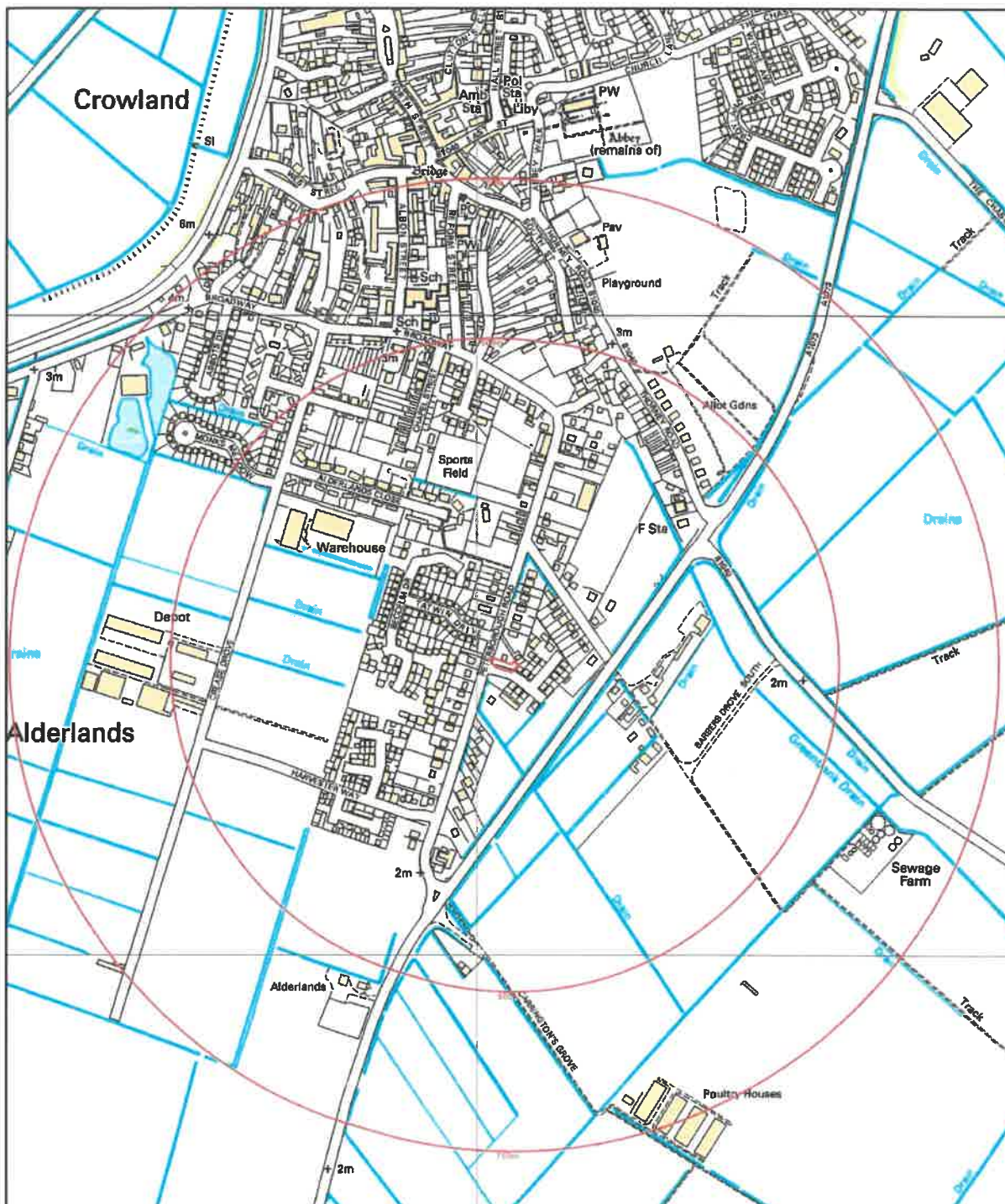
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Site History

Figure I

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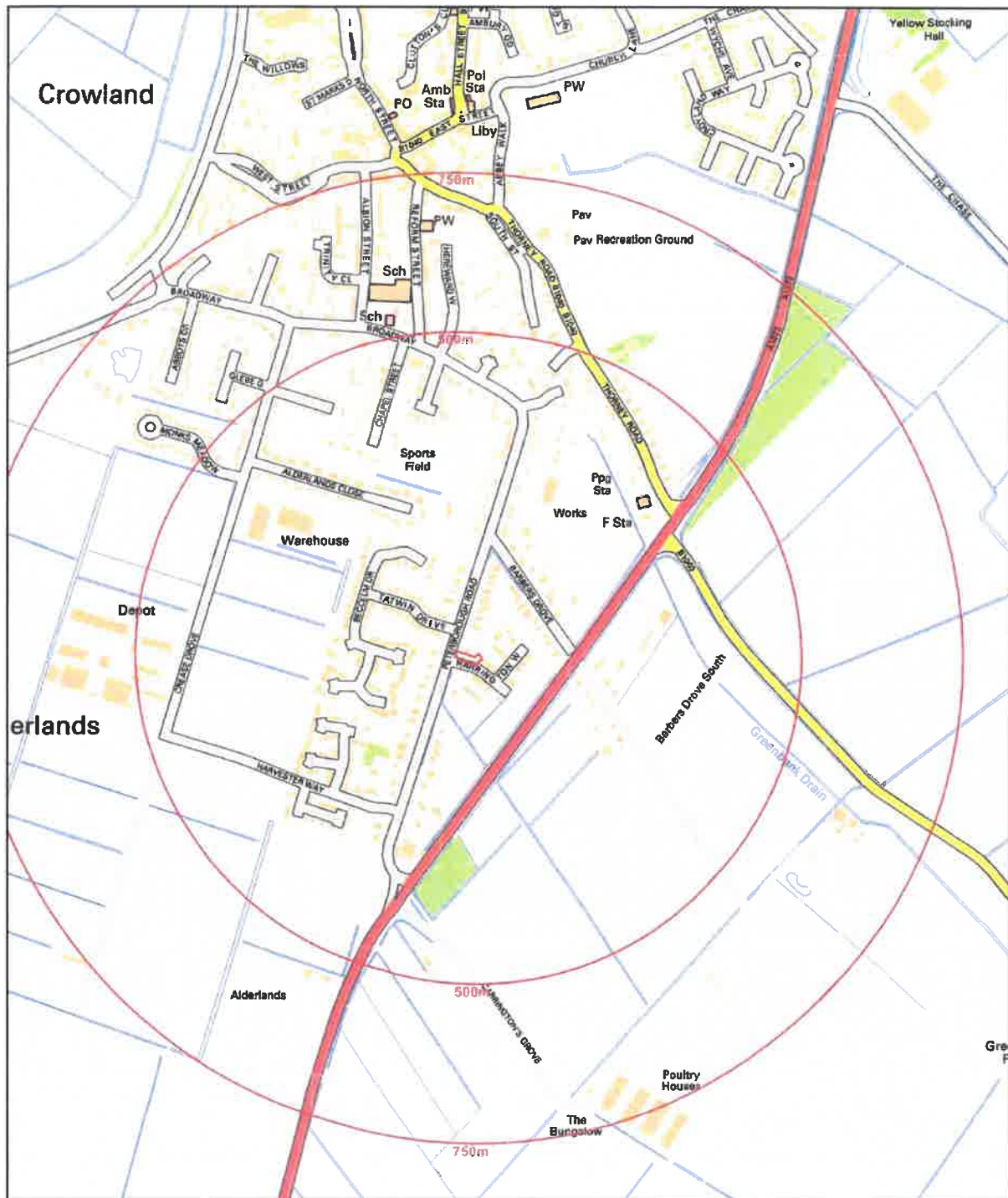
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Site History

Figure J

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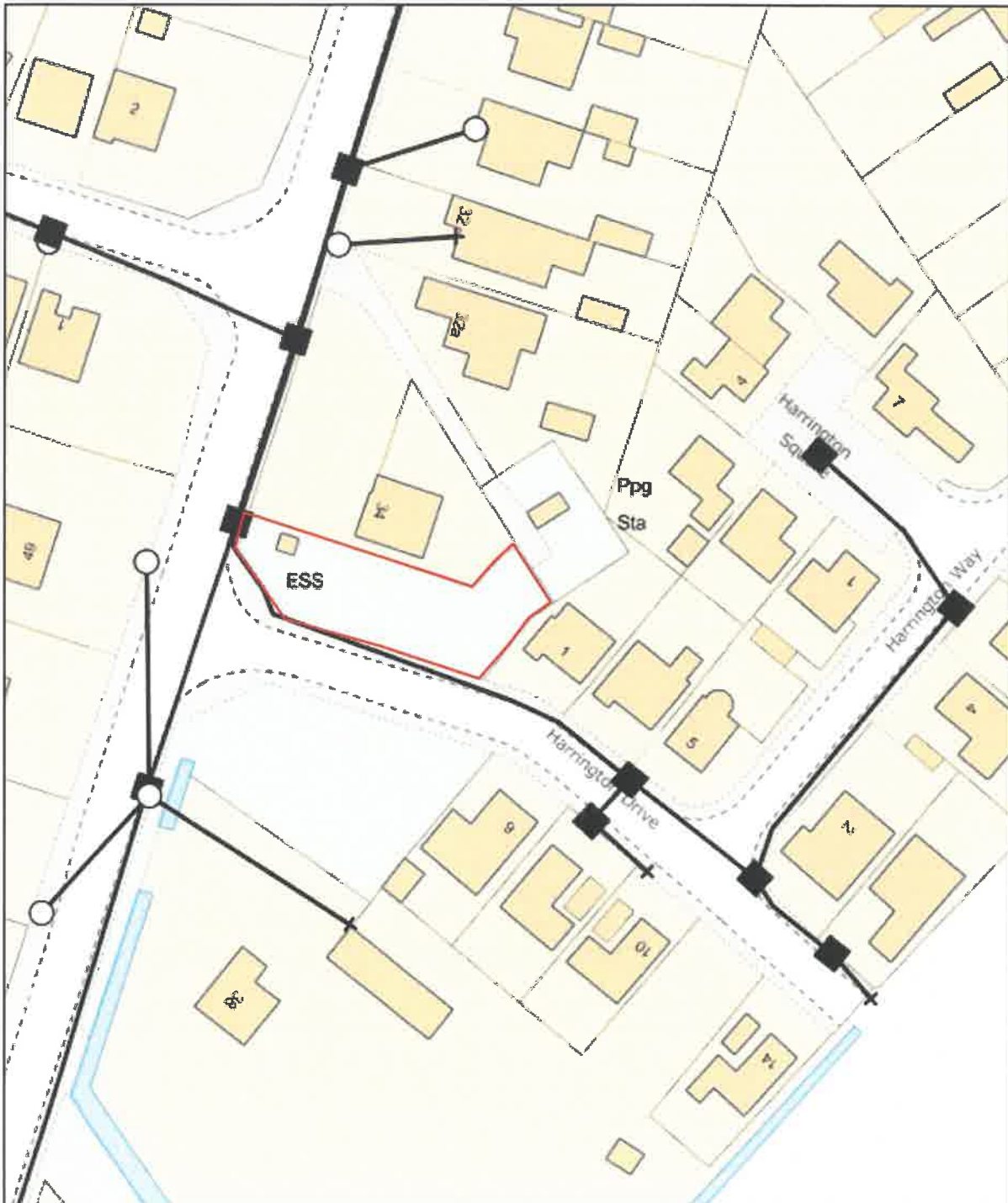
Project No.

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Site History

Figure K

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Project : Land Adj. 1 Harrington Drive, Crowland,
Lincolnshire

Client : Mr. Ian Bedford

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

Project No.

C14668

APPENDIX 2

ENVIRONMENTAL DATABASE SEARCH

Address: LAND ADJ. 1, HARRINGTON DRIVE, CROWLAND, PETERBOROUGH
Date: 7 Jan 2019
Reference: GS-5729271
Client: Ground Engineering Limited

NW

N

NE

W

E



SW

S

SE

Aerial Photograph Capture date: 06-Apr-2015
Grid Reference: 524042,309453
Site Size: 0.05ha

Report Reference: GS-5729271
Client Reference: SWC14668

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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	2	0	9	6
1.2 Additional Information – Historical Tank Database	0	0	0	0
1.3 Additional Information – Historical Energy Features Database	0	0	2	5
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	0	8
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	0	0	0
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	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	3
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	3
2.1.9 Records of Water Industry Referrals	0	0	0	0
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	3	0
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	1
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	1
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	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	1	1	0	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	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	1
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	3	27
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	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)	0	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	6	46	126	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Environment 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	Medium					
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	Not Prone					
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	Not Applicable					

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	0
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	0
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	0
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	1	0	0	0	1	2
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards	
9.1 Maximum risk of natural ground subsidence	High
9.1.1 Maximum Shrink-Swell hazard rating identified on the study site	Moderate
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	High
9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site	Negligible
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	None 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).

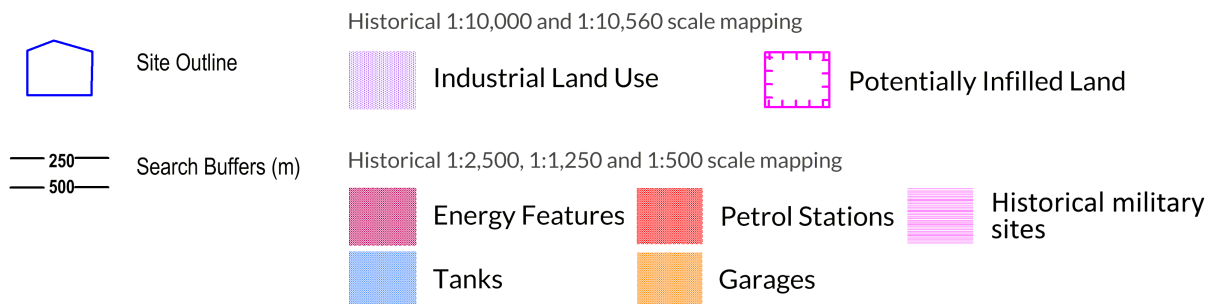
Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

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.

1. Historical Land Use



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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: 17

ID	Distance [m]	Direction	Use	Date
1	0	On Site	Unspecified Works	1976
2	0	On Site	Pumping Station	1976
3A	136	N	Corn Mill	1886
4A	136	N	Windmill	1900
5A	138	N	Windmill	1901
6A	138	N	Unspecified Windmill	1900
7A	138	N	Unspecified Windmill	1900
8	152	N	Unspecified Tank	1886
9	168	N	Unspecified Works	1976
10	207	NW	Unspecified Warehouse	1976
11	212	N	Unspecified Depot	1976
12B	468	W	Nursery	1950
13B	468	W	Nursery	1900
14B	468	W	Nursery	1900
15B	469	W	Nursery	1900
16B	471	W	Nursery	1901
17B	472	W	Nursery	1958

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: 0

Database searched and no data found.

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:

7

ID	Distance (m)	Direction	Use	Date
18C	159	N	Electricity Substation	1995
19C	166	N	Electricity Substation	1989
20D	288	SW	Electricity Substation	1997
21D	288	SW	Electricity Substation	1997
22D	288	SW	Electricity Substation	1996
23E	478	N	Electricity Substation	1989
24E	479	N	Electricity Substation	1995

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:

8

ID	Distance (m)	Direction	Use	Date
25F	270	S	Garage	1996
26F	273	S	Garage	1965
27F	278	S	Garage	1997
28F	278	S	Garage	1997
29G	432	N	Garage	1965
30G	453	N	Garage	1997
31G	453	N	Garage	1997
32G	453	N	Garage	1996

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

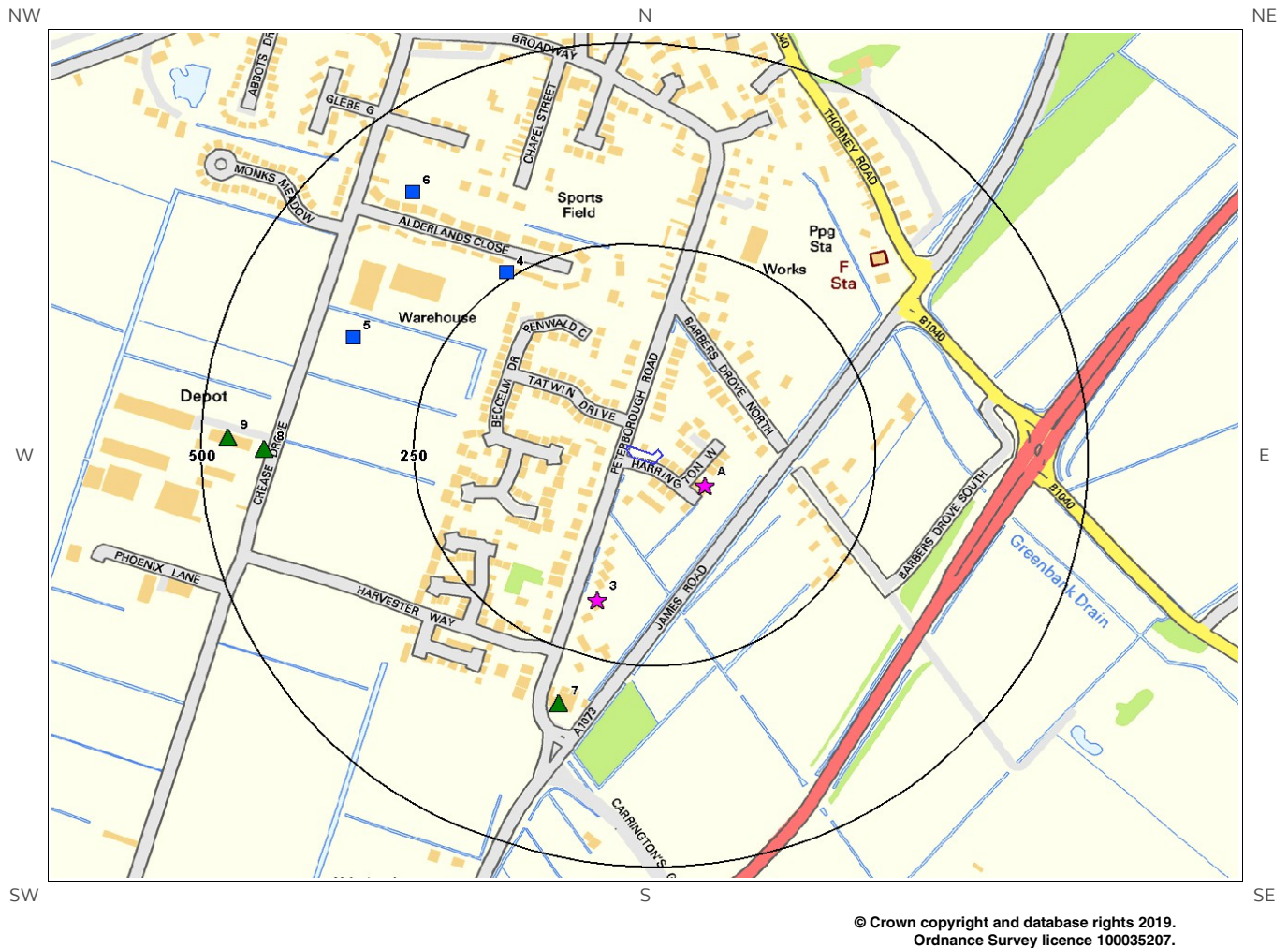
Database searched and no data found.

1.7 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 0

Database searched and no data found.

2. Environmental Permits, Incidents and Registers Map



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

0

Database searched and no data found.

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

3

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
7	319	S	523943 309145	Address: Crowland Service Station, 64 Peterborough Road, Crowland, Peterborough, Cambs, PE6 0BA 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
8	427	W	523596 309458	Address: Frosts Commercial Refinishes (Crowland), Crease Drove, Crowland, Peterborough, Cambs, PE6 0BN Process: Respraying of Road Vehicles Status: Historical Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
9	469	W	523554 309474	Address: Crowland Cranes, Crease Drove, Crowland, Peterborough, Cambridgeshire, PE6 0BN Process: Respraying of Road Vehicles Status: Current 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:

3

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

ID	Distance (m)	Direction	NGR	Details
4	258	NW	523880 309680	Address: CREASE DROVE, CROWLAND, PETERBOROUGH, PE6 0BN Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: PR5NF447 Permit Version: 1 Receiving Water: Unknown Trib Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 12/12/1968 Effective Date: 12-Dec-1968 Revocation Date: 26/02/1992
5	350	NW	523700 309600	Address: RES. DEV. TATWIN DRIVE, CROWLAND Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: PR5NF5156 Permit Version: 1 Receiving Water: Fen drain Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 21/05/1986 Effective Date: 21-May-1986 Revocation Date: 11/02/1992

ID	Distance (m)	Direction	NGR	Details
6	404	NW	523770 309780	Address: PREMISES AT CREASE DROVE, CROWLAND Effluent Type: UNSPECIFIED Permit Number: PR5LF3154 Permit Version: 1 Receiving Water: Land Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 03/12/1971 Effective Date: 03-Dec-1971 Revocation Date: 01/10/1996

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

0

Database searched and no data found.

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:

3

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

ID	Distance (m)	Direction	NGR	Details
1A	61	SE	524113 309416	Incident Date: 11-Sep-2002 Incident Identification: 107152 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Other Atmospheric Pollutant or Effect Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
2A	61	SE	524113 309416	Incident Date: 13-Feb-2002 Incident Identification: 58119 Pollutant: Atmospheric Pollutants and Effects Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

ID	Distance (m)	Direction	NGR	Details	
Pollutant Description: Landfill Odour					
3	181	S	523986 309274	Incident Date: 06-Jun-2002 Incident Identification: 83160 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Effects on Humans	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

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

0

Database searched and no data found.

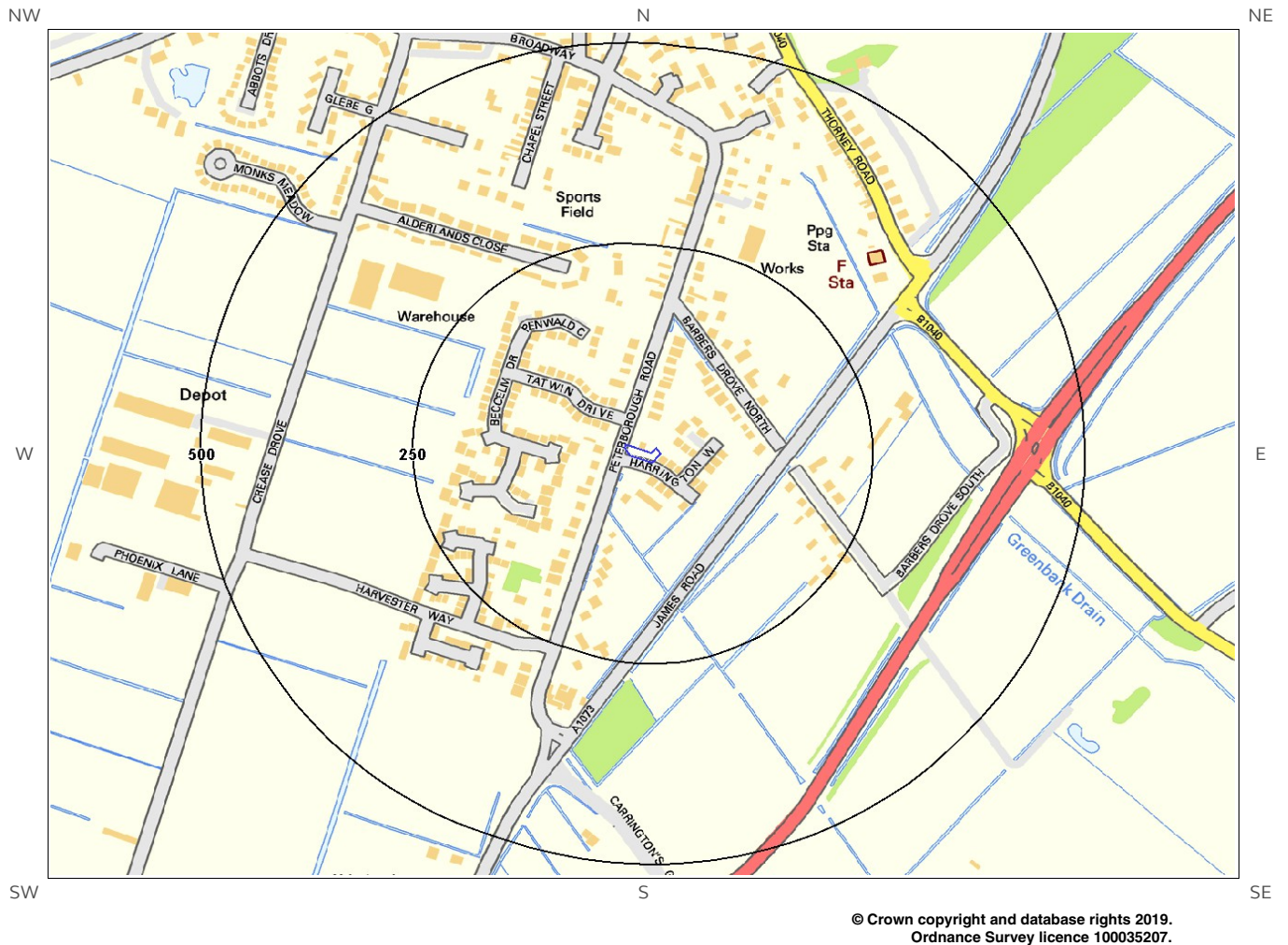
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

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.

3. Landfill and Other Waste Sites Map



- | | | | | | |
|---|--------------------|---|---------------------------|---|---|
|  | Site Outline |  | EA/NRW Active Landfill |  | Historic and Planned Waste Sites |
|  | Search Buffers (m) |  | EA/NRW Historic Landfill |  | EA/NRW Licensed Waste Site |
| | |  | BGS / DoE Survey Landfill |  | 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:

2

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	816	W		Site Address: Corporation Bank, Crowland Waste Licence: - Site Reference: SH-23-01/89, 2500/5070 Waste Type: Household Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1254	W		Site Address: Low Road, Crowland, Lincolnshire Waste Licence: - Site Reference: RD7-4-01/89, SH-4-01/89, 2500/5314 Waste Type: Commercial, Household, Liquid sludge Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Spalding Rural District Council Licence Holder: - First Recorded: 31-Dec-1952 Last Recorded: 31-Dec-1978

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

1

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

ID	Distance (m)	Direction	NGR	Details
Not shown	1329	W	522700.0 309600.0	Address: Long Drove, Crowland, Lincs BGS Number: 2680.0 Risk: No risk to aquifer Waste Type: N/A

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:

0

Database searched and no data found.

4. Current Land Use Map



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4. Current Land Uses

4.1 Current Industrial Data

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

2

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	0	On Site	Electricity Sub Station	524028 309462	Lincolnshire, PE6	Electrical Features	Infrastructure and Facilities
2	20	N	Pumping Station	524064 309480	Lincolnshire, PE6	Water Pumping Stations	Industrial Features

4.2 Petrol and Fuel Sites

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

2

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
3	310	S	523926 309158	TOTAL	64, Peterborough Road, Crowland, Lincolnshire, PE6 0BA	Not Applicable	Obsolete
4	480	N	523899 309929	OBSOLETE	59, Broadway, Crowland, Lincolnshire, PE6 0BH	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
PEAT-P	PEAT	PEAT

5.3 Bedrock and Solid Geology

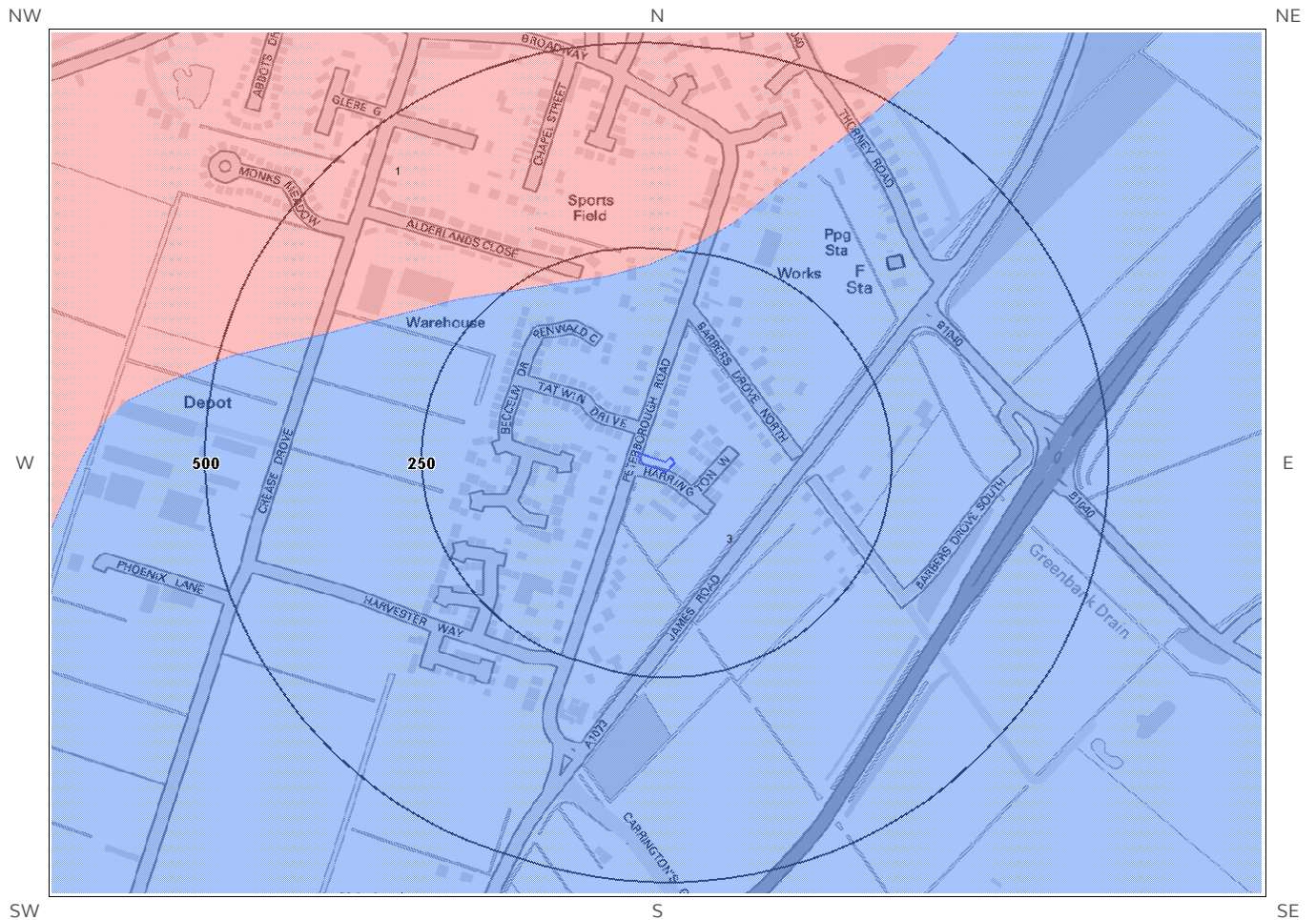
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
OXF-MDST	OXFORD CLAY FORMATION	MUDSTONE

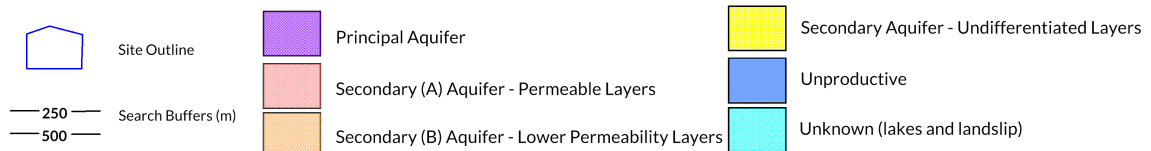
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

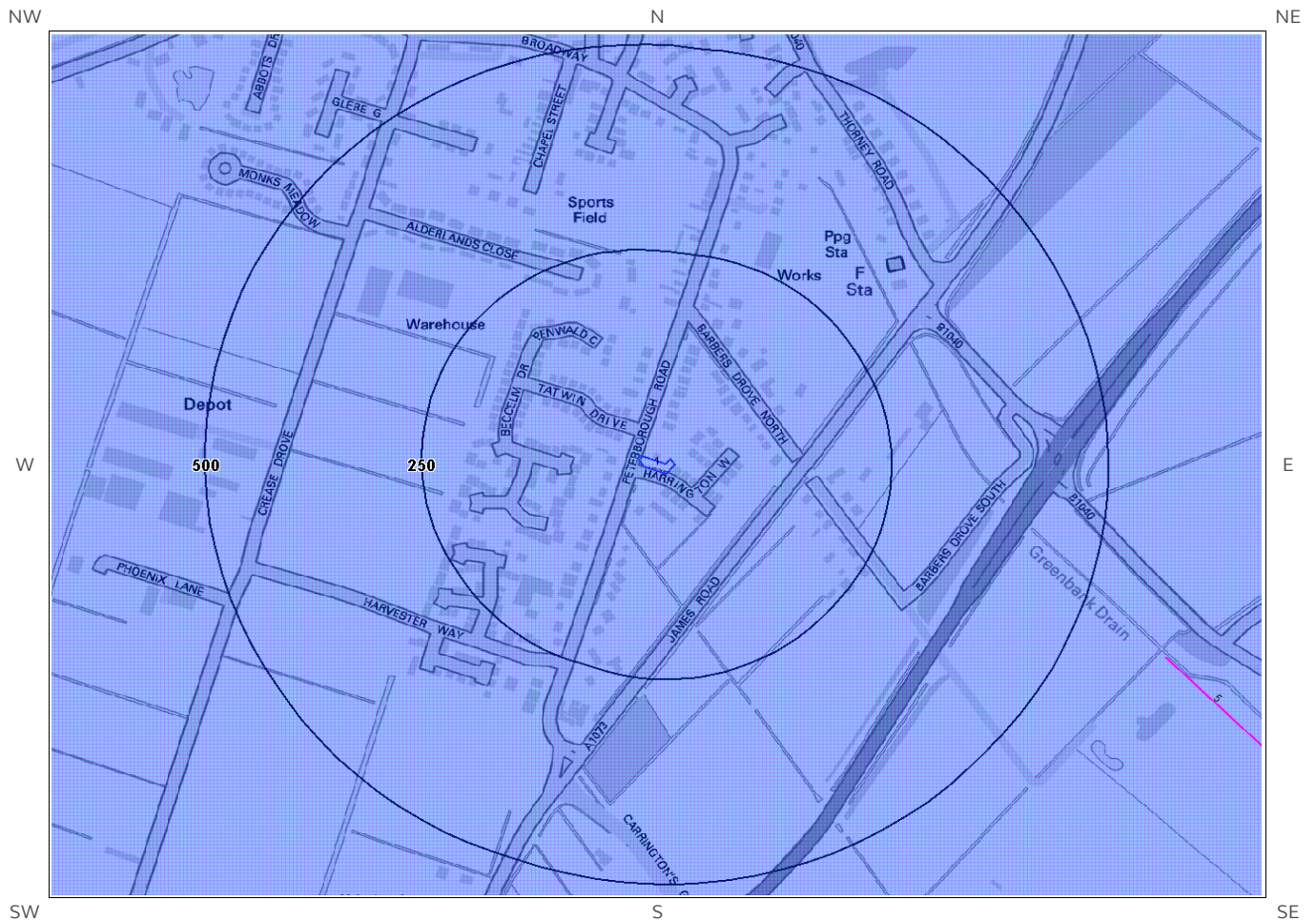
6a. Aquifer Within Superficial Geology



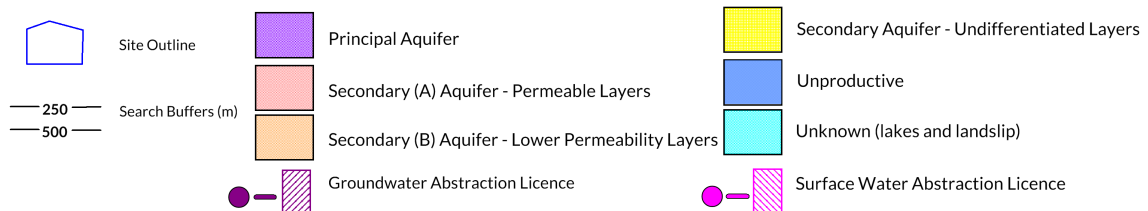
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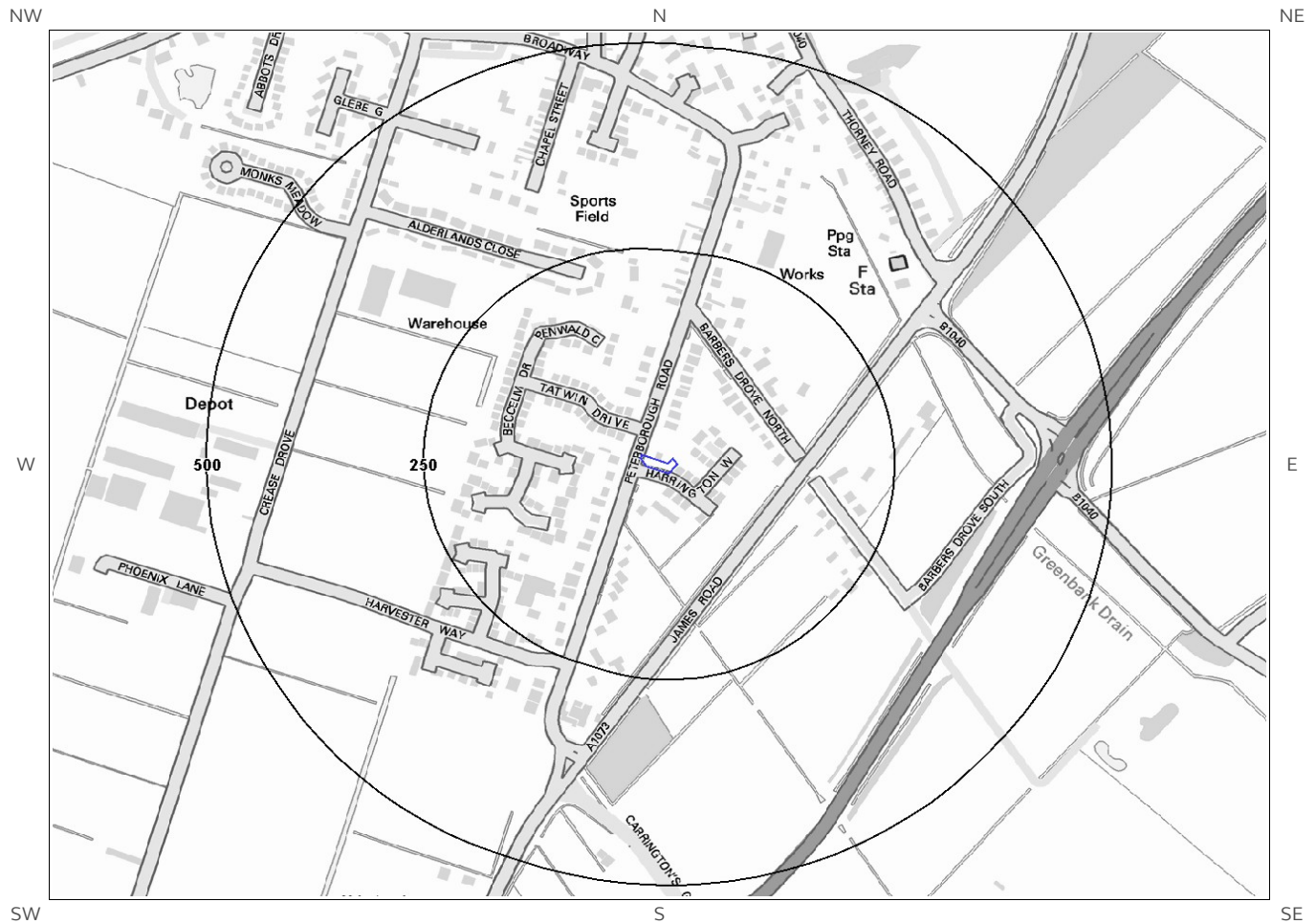
6b. Aquifer Within Bedrock Geology and Abstraction Licences



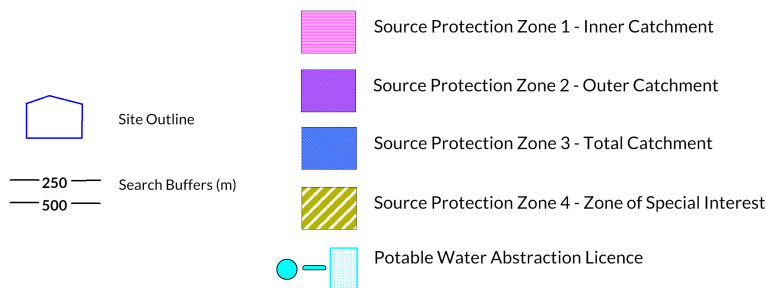
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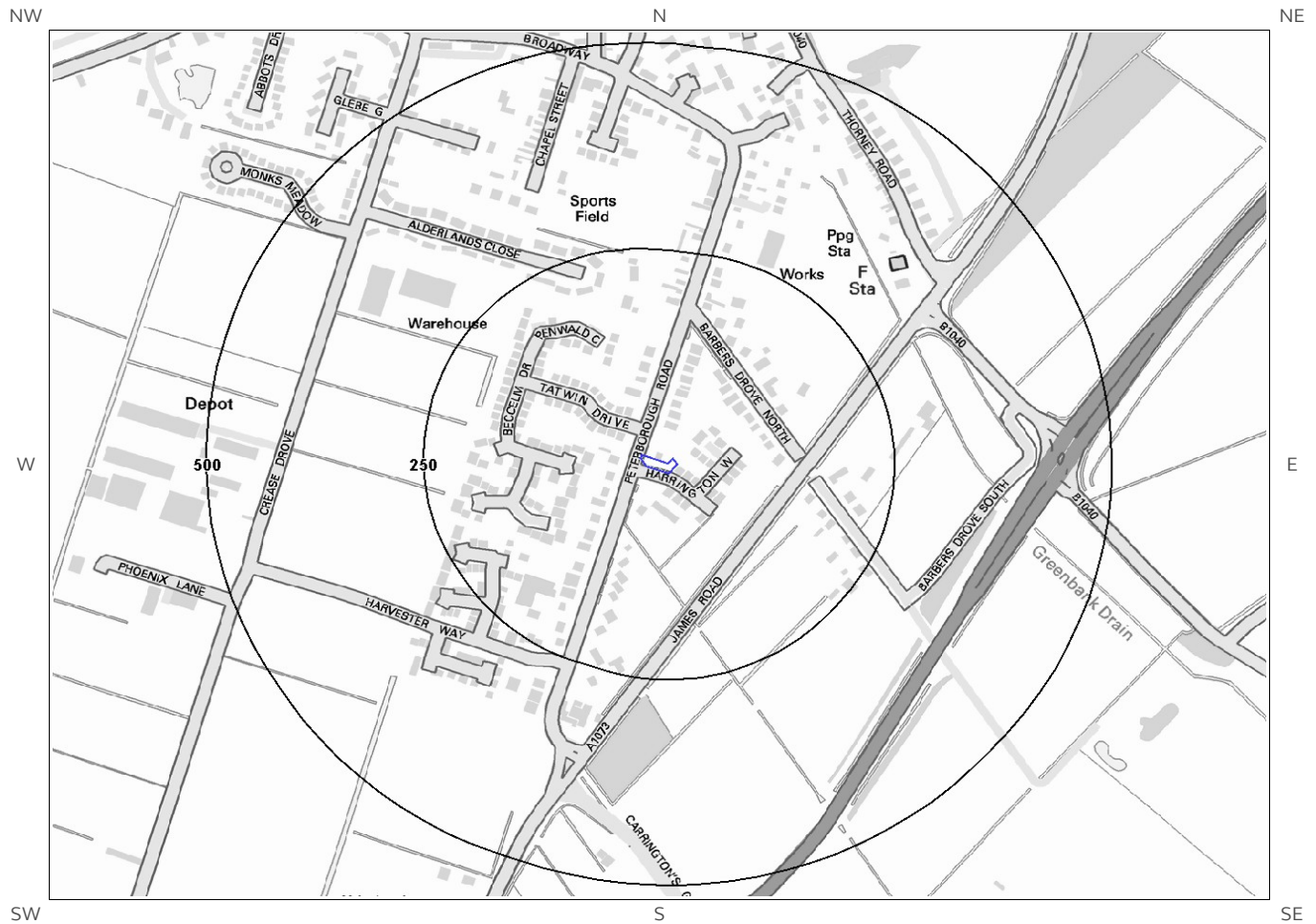
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences



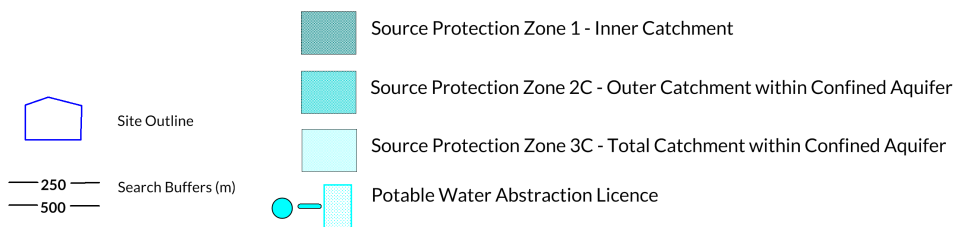
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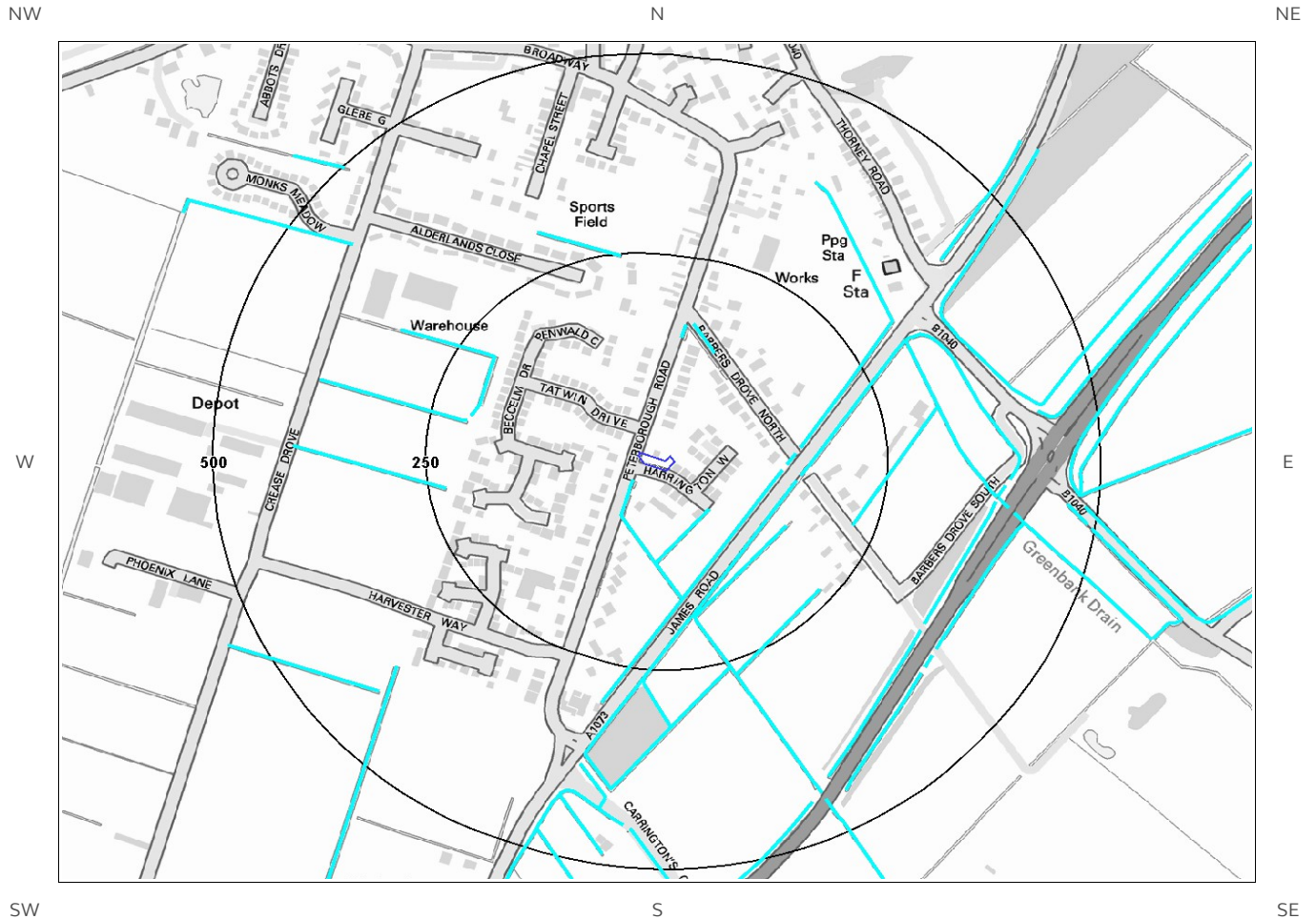
6d. Hydrogeology – Source Protection Zones within confined aquifer



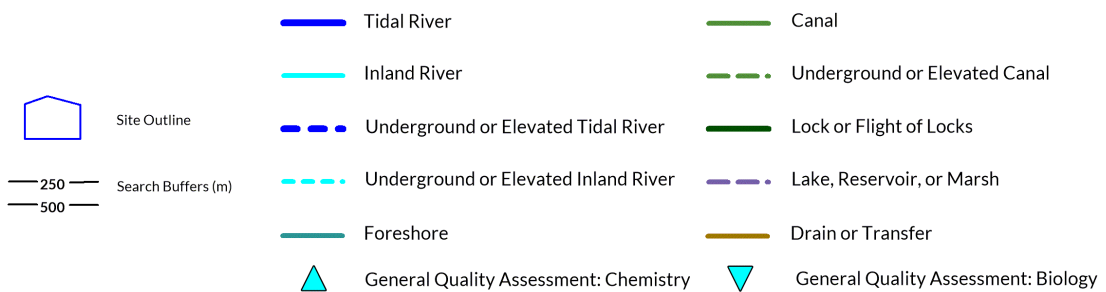
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6e. Hydrology – Watercourse Network and River Quality



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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
3	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
1	218	N	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	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	1262	N	524300 310700	Status: Historical Licence No: 5/32/11/*G/0024 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: WELL AT 38 POSTLAND ROAD Data Type: Point Name: SMEDLEY Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/03/1966 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
5	612	E	524630 309220	Status: Active Licence No: 5/32/11/*S/0112 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: GREEN BANK DRAIN, CROWLAND Data Type: Line Name: BOOR Annual Volume (m³): 15000 Max Daily Volume (m³): 2000 Application No: - Original Start Date: 01/06/1986 Expiry Date: - Issue No: 101 Version Start Date: 30/09/2002 Version End Date:
Not shown	940	NW	523250 310000	Status: Active Licence No: 5/31/14/*S/0254 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW RIVER - CROWLAND Data Type: Line Name: F G TANSLEY & SON Annual Volume (m³): 22000 Max Daily Volume (m³): 4000 Application No: - Original Start Date: 01/07/2001 Expiry Date: - Issue No: 1 Version Start Date: 01/07/2001 Version End Date:
Not shown	981	NW	523200 310000	Status: Historical Licence No: 5/31/14/*S/0178B Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW RIVER AT CROWLAND Data Type: Line Name: F ADAMS & SON Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 01/12/1984 Expiry Date: - Issue No: 100 Version Start Date: 01/11/1993 Version End Date:
Not shown	1003	SE	524530 308560	Status: Active Licence No: 5/32/11/*S/0112 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FIELD DRAINS, CROWLAND Data Type: Line Name: BOOR Annual Volume (m³): 15000 Max Daily Volume (m³): 2000 Application No: - Original Start Date: 01/06/1986 Expiry Date: - Issue No: 101 Version Start Date: 30/09/2002 Version End Date:
Not	1462	SE	525250	Status: Active Annual Volume (m³): 15000

ID	Distance (m)	Direction	NGR	Details
shown			308570	Licence No: 5/32/11/*S/0112 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN, CROWLAND Data Type: Line Name: BOOR Max Daily Volume (m³): 2000 Application No: - Original Start Date: 01/06/1986 Expiry Date: - Issue No: 101 Version Start Date: 30/09/2002 Version End Date:
Not shown	1463	SE	523927 307228	Status: Active Licence No: 5/32/11/*S/0144/R01 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 01/11/2017 Expiry Date: 31/03/2029 Issue No: 1 Version Start Date: 01/11/2017 Version End Date:
Not shown	1463	SE	523927 307228	Status: Active Licence No: 5/32/11/*S/0144/R01 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 01/11/2017 Expiry Date: 31/03/2029 Issue No: 1 Version Start Date: 01/11/2017 Version End Date:
Not shown	1463	SE	523927 307228	Status: Historical Licence No: 5/32/11/*S/0144 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1463	SE	523927 307228	Status: Historical Licence No: 5/32/11/*S/0144 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1466	SE	523900 307210	Status: Historical Licence No: 5/32/11/*S/0144 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1466	SE	523900 307210	Status: Historical Licence No: 5/32/11/*S/0144 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1473	SE	525264 308599	Status: Active Licence No: 5/32/11/*S/0144/R01 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW SOUTH EAU DRAIN AT THORNEY Data Type: Line Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 01/11/2017 Expiry Date: 31/03/2029 Issue No: 1 Version Start Date: 01/11/2017 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Name: N WOODROFFE & SONS					
Not shown	1473	SE	525264 308599	Status: Active Licence No: 5/32/11/*S/0144/R01 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW SOUTH EAU DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 01/11/2017 Expiry Date: 31/03/2029 Issue No: 1 Version Start Date: 01/11/2017 Version End Date:
Not shown	1473	SE	525264 308599	Status: Historical Licence No: 5/32/11/*S/0144 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW SOUTH EAU DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1473	SE	525264 308599	Status: Historical Licence No: 5/32/11/*S/0144 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW SOUTH EAU DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1483	SE	525270 308590	Status: Historical Licence No: 5/32/11/*S/0144 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW SOUTH EAU DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1483	SE	525270 308590	Status: Historical Licence No: 5/32/11/*S/0144 Details: Transfer Between Sources (Pre Water Act 2003) Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEW SOUTH EAU DRAIN AT THORNEY Data Type: Line Name: N WOODROFFE & SONS	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1619	NW	522930 310660	Status: Active Licence No: 5/31/14/*S/0254 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: RIVER WELLAND - CROWLAND Data Type: Line Name: F G TANSLEY & SON	Annual Volume (m³): 22000 Max Daily Volume (m³): 4000 Application No: - Original Start Date: 01/07/2001 Expiry Date: - Issue No: 1 Version Start Date: 01/07/2001 Version End Date:
Not shown	1669	NW	522900 310700	Status: Historical Licence No: 5/31/14/*S/0178B Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: RIVER WELLAND AT CROWLAND Data Type: Line Name: F ADAMS & SON	Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 01/12/1984 Expiry Date: - Issue No: 100 Version Start Date: 01/11/1993 Version End Date:
Not shown	1764	S	524391 307711	Status: Active Licence No: 5/32/11/*S/0144/R01 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 01/11/2017 Expiry Date: 31/03/2029 Issue No: 1

ID	Distance (m)	Direction	NGR	Details	
Not shown	1765	S	524391 307710	Data Type: Point Name: N WOODROFFE & SONS	Version Start Date: 01/11/2017 Version End Date:
				Status: Historical Licence No: 5/32/11/*S/0144 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Point Name: N WOODROFFE & SONS	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
Not shown	1767	S	524400 307710	Status: Historical Licence No: 5/32/11/*S/0144 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Point Name: N WOODROFFE & SONS	Annual Volume (m³): 55000 Max Daily Volume (m³): 3000 Application No: - Original Start Date: 23/09/1997 Expiry Date: 31/10/2017 Issue No: 102 Version Start Date: 16/07/2008 Version End Date:
				Status: Historical Licence No: 5/32/11/*S/0144 Details: Transfer between sources Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: HUNDREDS DRAIN AT THORNEY Data Type: Point Name: N WOODROFFE & SONS	Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 01/09/1997 Expiry Date: 31-Oct-17 Issue No: 100 Version Start Date: 01/06/1998 Version End Date:
Not shown	1804	NW	521919 312031	Status: Active Licence No: 5/31/14/*S/0160 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: COMMON DRAIN, CROWLAND Data Type: Line Name: WHEAT	Annual Volume (m³): 30000 Max Daily Volume (m³): 2000 Application No: - Original Start Date: 01/09/1983 Expiry Date: - Issue No: 101 Version Start Date: 18/10/2013 Version End Date:
				Status: Active Licence No: 5/32/11/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEWBOROUGH MAIN DRAIN AT CROWLAND Data Type: Line Name: WOODROFFE	Annual Volume (m³): 18000 Max Daily Volume (m³): 700 Application No: - Original Start Date: 18/08/2008 Expiry Date: 31/03/2020 Issue No: 1 Version Start Date: 01/04/2009 Version End Date:
Not shown	1883	W	522230 308880	Status: Historical Licence No: 5/32/11/*S/0133 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEWBOROUGH MAIN DRAIN- CROWLAND Data Type: Line Name: WOODROFFE	Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 01/03/1993 Expiry Date: 31/10/2002 Issue No: 100 Version Start Date: 01/06/1998 Version End Date:
				Status: Historical Licence No: 5/32/11/*S/0156 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEWBOROUGH MAIN DRAIN AT CROWLAND Data Type: Line Name: WOODROFFE	Annual Volume (m³): 18000 Max Daily Volume (m³): 700 Application No: - Original Start Date: 21/06/2004 Expiry Date: 31/10/2008 Issue No: 1 Version Start Date: 21/06/2004 Version End Date:
Not shown	1915	SE	525570 308270	Status: Active Licence No: 5/32/11/*S/0112 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF	Annual Volume (m³): 15000 Max Daily Volume (m³): 2000 Application No: - Original Start Date: 01/06/1986

ID	Distance (m)	Direction	NGR	Details
Not shown	1952	NW	522700 310900	SUPPLY Point: GREEN BANK DRAIN, CROWLAND Data Type: Point Name: BOOR Expiry Date: - Issue No: 101 Version Start Date: 30/09/2002 Version End Date:
				Status: Historical Licence No: 5/31/14/*S/0178A Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: COMMON DRAIN CROWLAND Data Type: Line Name: F ADAMS & SON Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 01/12/1984 Expiry Date: - Issue No: 100 Version Start Date: 01/12/1992 Version End Date:
				Status: Active Licence No: 5/31/14/*S/0253 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: COMMON DRAIN - CROWLAND COMMON Data Type: Line Name: F G TANSLEY & SON Annual Volume (m³): 28000 Max Daily Volume (m³): 4000 Application No: - Original Start Date: 01/07/2001 Expiry Date: - Issue No: 1 Version Start Date: 01/07/2001 Version End Date:

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site

None identified

Database searched and no data found.

6.6 Source Protection Zones

Source Protection Zones within 500m of the study site

None identified

Database searched and no data found.

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
253	N	Minor Aquifer/Intermediate Leaching Potential	12	Soils which can possibly transmit non – or weakly adsorbed pollutants and liquid discharges but are unlikely to transmit adsorbed pollutants.

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	23 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.6
7	23	Not Specified	Inland river not influenced	Catchment Area: Welland

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	SW		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): 1.6
2	33 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
8	33 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
3	41 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
9	41 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
4	69 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
10	69 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
5	107 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
11	107 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
6	117 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
12	117 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
7	118 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
13	118 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				conditions) Average Width in Watercourse Section (m): Not Provided
8	129 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.3
14	129 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.3
9	139 N	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
15	139 N	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
10	145 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
16	145 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	149 N	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.2
17	149 N	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.2
12	150 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.3
13	150 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
18	150 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.3
19	150 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
14	159 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.6
20	159 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.6
15	160 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
21	160 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
16	184 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
17	184 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
22	184 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
23	184 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
18	186 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.9
24	186 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.9
19	193 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
25	193 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
20	197	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	W			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
21	197 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.8
26	197 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
27	197 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.8
22	206 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
28	206 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
23	223 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
29	223 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
24	230 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
30	230 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
25	233 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
31	233 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
26	248 N	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 2.5
32	248 N	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
27	257 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
28	257 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
33	257 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
34	257 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
29	260 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
30	260 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
31	260 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
35	260 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
Not shown	260 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	260 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
32	268 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene 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
33	268 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
Not shown	268 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
39	268 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
34	273 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
Not shown	273 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
35	294 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	294 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
36	304 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
Not shown	304 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
37	310 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
38	310 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.7
43	310 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
44	310	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	NE			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.7
39	316 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
45	316 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
40	317 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
46	317 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
41	319 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
47	319 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
42	354 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.2
48	354 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.2
43	356 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
49	356 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
44	360 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
50	360 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 2.5
45	363 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
51	363 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
46	365 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	365 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
47	368 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
53	368 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
48	372 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
49	372 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.5
Not shown	372 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
Not shown	372 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.5
50	375 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	375 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground 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
51	381 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
52	381 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
53	381 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	381 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
Not shown	381 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	381 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
54	384 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
60	384 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
55	385 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
56	385 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.9
61	385 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
62	385 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.9
57	392	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	SE			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
63	392 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
58	401 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.2
64	401 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.2
59	410 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	410 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
60	417 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
61	417 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	417 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
Not shown	417 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
62	418 E	Greenbank Drain	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.5
Not shown	418 E	Greenbank Drain	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.5
63	422 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 1.9
Not shown	422 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
64	425 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
65	425 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
Not shown	425 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
Not shown	425 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
66	426 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
Not shown	426 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
67	431 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
68	431 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
Not shown	431 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.0
Not shown	431 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
69	433 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground 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	433 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
70	440 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	440 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
71	449 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
Not shown	449 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
72	451 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
Not shown	451 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
73	463 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	463 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
74	464 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
Not shown	464 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
75	465 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
Not shown	465	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	E			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
76	469 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
77	469 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	469 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
Not shown	469 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
78	473 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
79	473 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	473 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	473 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
80	475 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
Not shown	475 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
81	476 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.5
Not shown	476 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 2.5
82	477 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
83	477 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
Not shown	477 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	477 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
84	478 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	478 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
85	479 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
Not shown	479 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
86	484 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
Not shown	484 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
87	487 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
Not shown	487 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
88	496 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
Not shown	496 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Nene Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
89	497 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9
Not shown	497 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.9

6.11 Surface Water Features

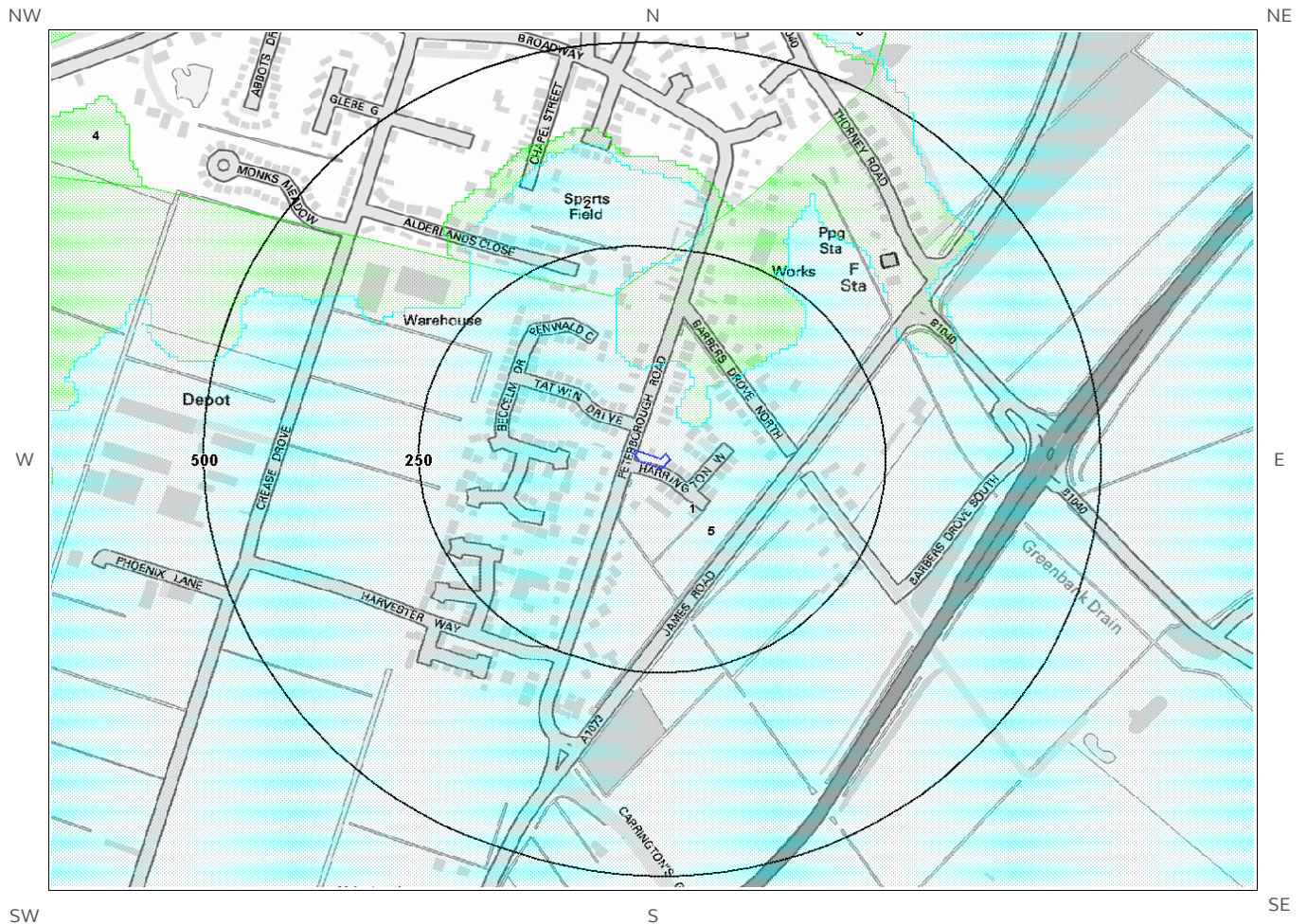
Surface water features within 250m of the study site

Identified

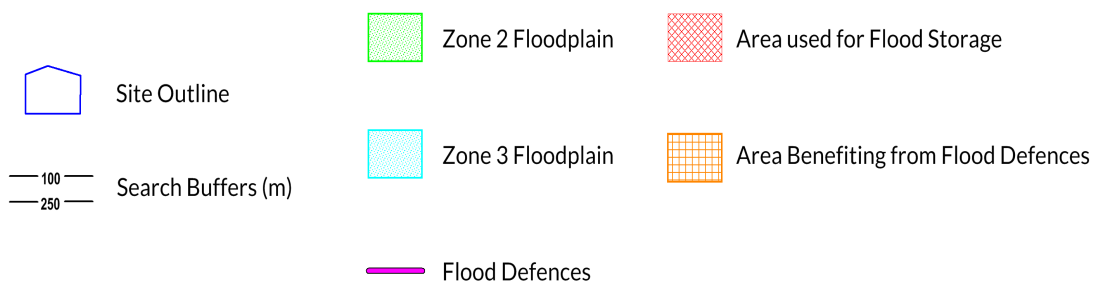
The following surface water records are not represented on mapping:

Distance (m)	Direction
41	SW
127	SE
148	E
157	E
184	S
193	S
194	W
206	W
223	E

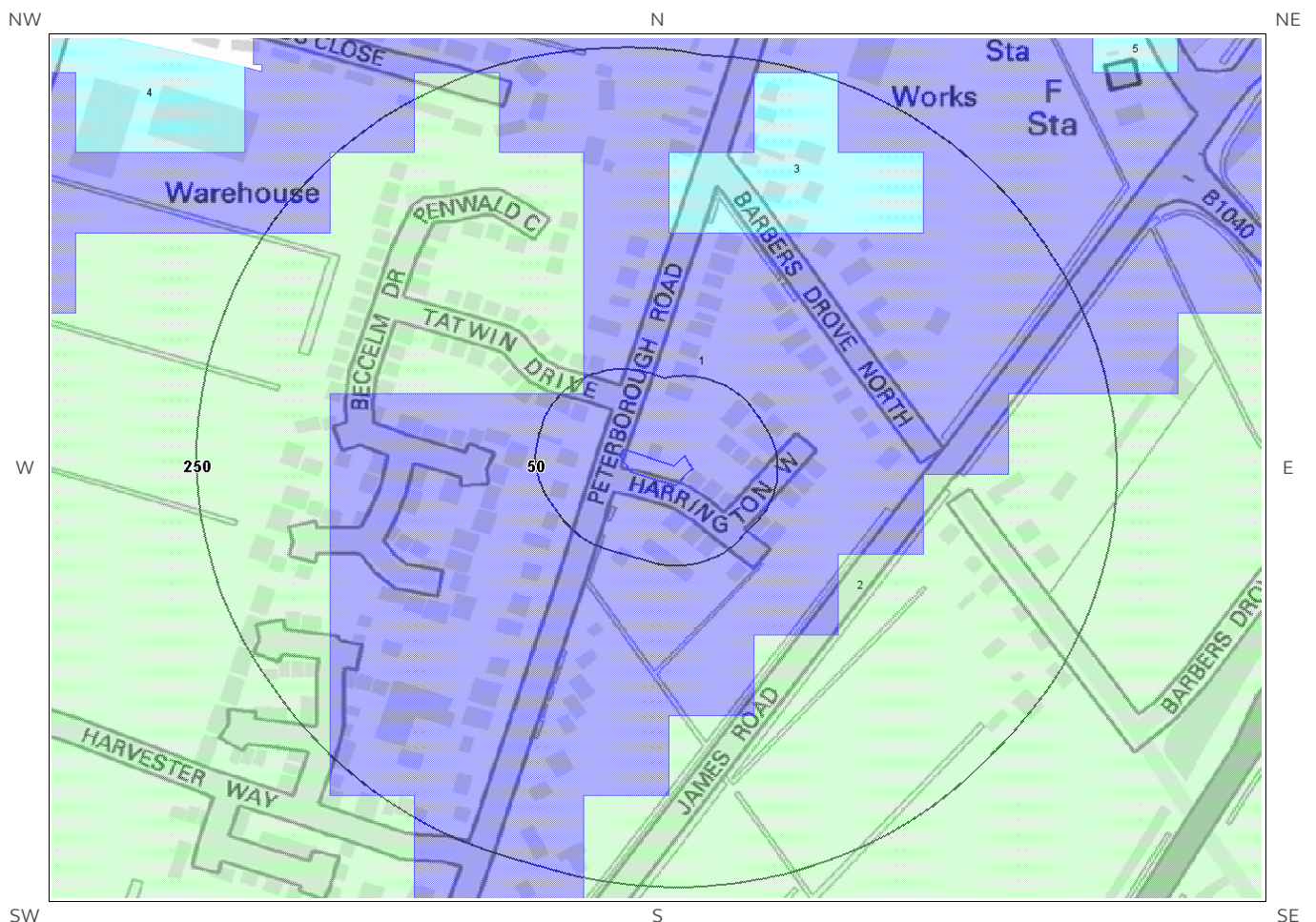
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



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



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 Site Outline
 Search Buffers (m)
100
250

RoFRaS Rating
 Very Low
 Low
 Medium
 High

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
1	0	On Site	12-Oct-2018	Zone 2 - (Fluvial /Tidal Models)
2	191	N	12-Oct-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
1	0	On Site	12-Oct-2018	Zone 3 - (Fluvial Models)

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

Highest risk of flooding onsite

Medium

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 Medium (greater than 1 in 100 but less than 1 in 30) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRaS flood Risk
----	--------------	-----------	-------------------

1	0.0	On Site	Medium
2	42.0	NW	Very Low

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 None identified

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

Not Prone

The area is not considered to be prone to groundwater flooding based on rock type.

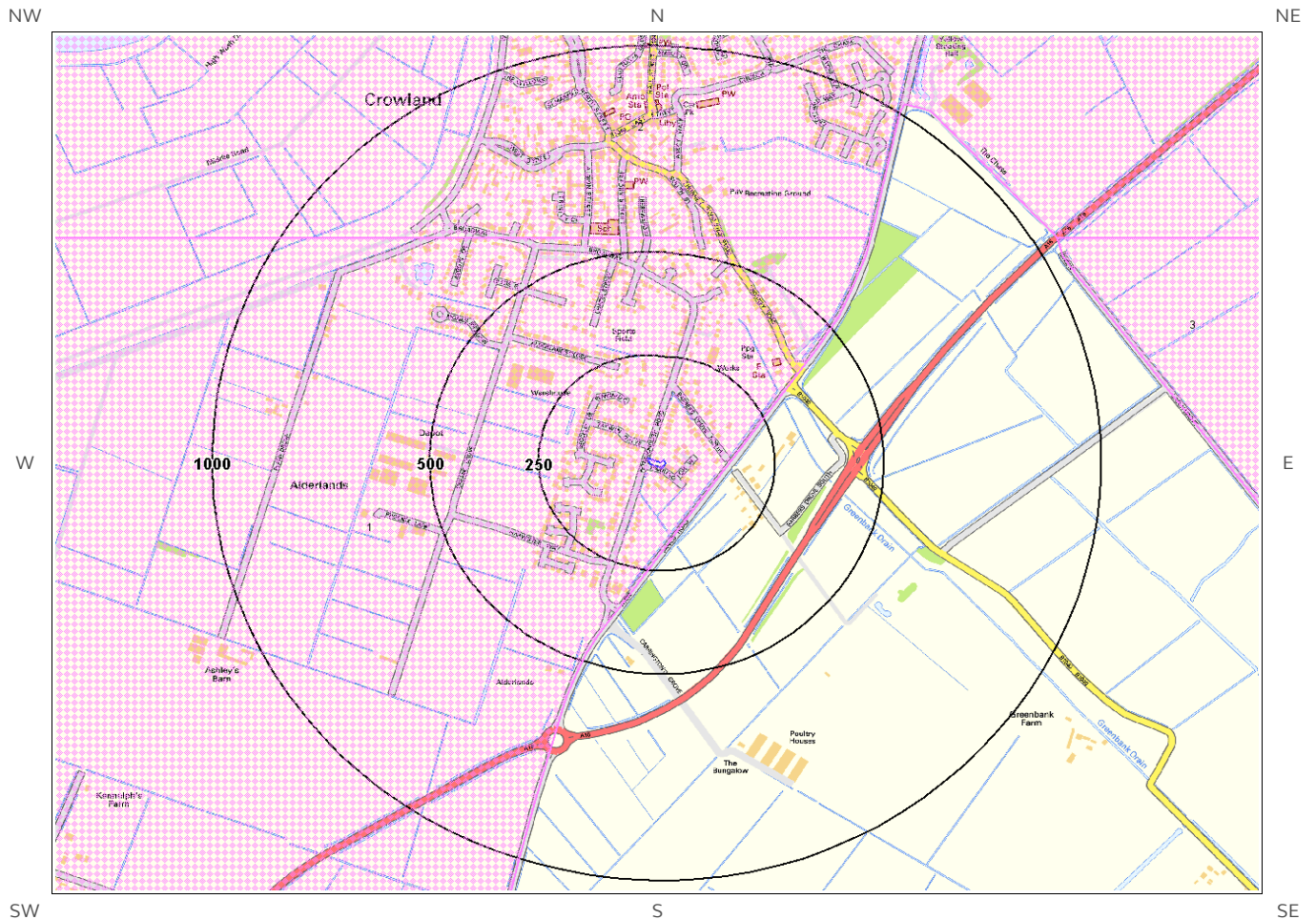
7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result Not Applicable

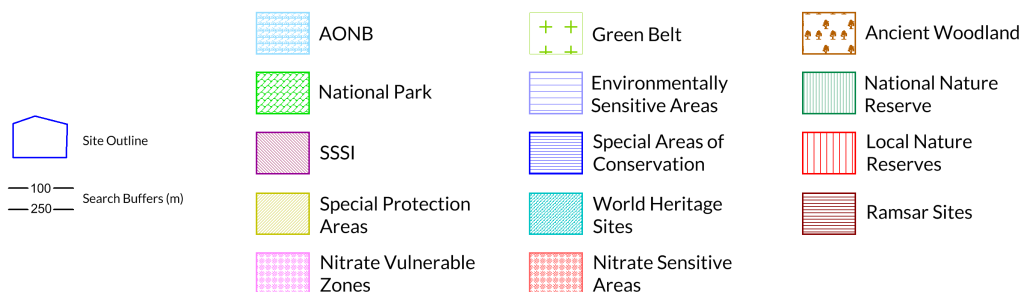
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

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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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:

0

Database searched and no data found.

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:

0

Database searched and no data found.

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:

0

Database searched and no data found.

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:

4

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
1	0	On Site	Existing	DEFRA
2	535	N	Existing	DEFRA
3	1039	NE	Existing	DEFRA
Not shown	1593	NW	Existing	DEFRA

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

0

Database searched and no data found.

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 Moderate

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

Hazard
Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

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

High

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

Hazard
Very significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Construction may not be possible at economic cost. For existing property probable increase in insurance risk from compressibility especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

Maximum Collapsible 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
No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. 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

None identified

Database searched and no data found.

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: South Holland District Council
Phone: 01775 761 161

Web: <http://www.sholland.gov.uk/>

Address: Council Offices, Priory Road, Spalding, Lincolnshire, PE11

Gemapping PLC

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



APPENDIX 3

CLASSIFICATION OF AGGRESSIVE CHEMICAL ENVIRONMENT FOR BURIED CONCRETE

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 Class for location
Design Sulfate Class for location	2:1 water/soil extract ^b		Groundwater		Total potential sulfate ^c	Static water	Mobile water	
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	AC-5
DS-5m	> 6000 > 1200 ^e		> 6000 > 1000 ^e		> 2.4	> 5.5		AC-4ms
							≥ 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 (SO₄), 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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