

GROUND ENGINEERING

Newark Road
Peterborough PE1 5UA
Tel: 01733 566566

SITE INVESTIGATION REPORT

ANGLIA (UK) LIMITED
MILL GREEN ROAD
PINCHBECK
SPALDING
LINCOLNSHIRE

Report Reference C14686

On behalf of:-

Anglia (UK) Limited
Mill Green Road
Pinchbeck
Spalding
Lincolnshire
PE11 3PU

April 2019

ANGLIA (UK) LIMITED

ROBERT DOUGHTY CONSULTANCY LIMITED

SITE INVESTIGATION REPORT

FOR

PROPOSED DWELLING

AT

ANGLIA (UK) LIMITED

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INTRODUCTION

The client, Anglia (UK) Limited, proposes to construct a new manager's house, at their site to the east of Mill Green Road, Pinchbeck, Spalding, Lincolnshire. The proposed layout is presented on a plan following this report text.

Ground Engineering Limited was commissioned by the client, under the direction of town planners Robert Doughty Consultancy Limited, to carry out a site investigation to determine the nature and geotechnical properties of the underlying soils, and provide information for the design and construction of the foundations. A desk study checking past uses and a contamination assessment were also included within the scope of this report.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

The site is located at Anglia (UK) Limited, to the east of Mill Green Road, Pinchbeck near Spalding, Lincolnshire. The site is on the south-western side of Pinchbeck and approximately 2km north-west of Spalding town centre. The National Grid Reference for the centre of the site is TF 2349 2466 and its location is shown on a plan following this report text.

At the time of the investigation in February 2019, the approximately 50m wide by 100m long investigation area comprised the eastern part of the Anglia (UK) Limited site, and was accessed from Mill Green Road to the west.

No trees were present on the site, however newly planted sapling trees were present to the west of the proposed dwelling, along the southern flank of the Anglia (UK) site.

The site boundaries were defined by Mill Green Road to the west; the rear gardens of houses fronting Mill Green Road to the north; and fields to the east and south. Drains were also present alongside the northern boundary and along a field boundary to the south.

The site stands at an elevation of approximately 3mOD on level ground within the Lincolnshire Fens. The site is approximately 800m north of Vernatt's Drain, and 2.5km west of the northward flowing River Welland.

The site is between drainage and reclamation features including; Old Fendyke 1.8km to the west (limit of reclamation of freshwater and peat marsh pre 1066AD to c.1300AD); the 'probable Saxon coastline' 1.5km to the north-east (c.1000AD); and the outer limit of reclamation by c.1300AD ('Roman Bank') 2.2km to the east.

The 1992 geological map for the area at 1:50,000 scale, Sheet 144 'Spalding' shows the site to be underlain by superficial Barroway Drove Beds (more recently named Tidal Flat Deposits), covering the solid geology of the Oxford Clay Formation at depth. Previous investigations by Ground Engineering Limited in this area found superficial deposits including Marine Sand to approximately 11m depth, covering Boulder Clay, and the expected Oxford Clay below 15.00m depth.

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>OS Map Extract</i>	<i>Description</i>
1887 Lincolnshire sheet 134SW Scale 1:10,560 Figure A	The site was within the north-western corner of a large parcel of land. A drain was present along the northern edge of the site, and drains were shown along field boundaries to the north and west. The Great Northern & Great Eastern railway was approximately 300m to the north-east of the site. The area around the site is generally fields.
1889 Lincolnshire sheet 134.10 Scale 1:2500 Figure B	The site and immediate surrounding area appear unchanged. Drains are shown within the northern part of the site, and along the northern boundary.
1904 Lincolnshire sheet 134.10 Scale 1:2500 Figure C	The site and immediate surrounding area appear unchanged. Mill Green Road is named to the west of the site.
1932 Lincolnshire sheet 134.10 Scale 1:2500 Figure D	The site remained undeveloped with a drain crossing the northern edge of the site. Allotment gardens are shown to the north of the site, with houses fronting Mill Green Road further to the north-west. A new building is shown 50m west of the site. Glasshouses are shown 130m west of the site, and an orchard is shown 150m south of the site.
1950 Lincolnshire sheet 134SW Scale 1:10,560 Figure E	The site area appears unchanged. New buildings are shown 50m west of the site fronting Mill Green Road.
1969 Sheet TF2324 Scale 1:2500 Figure F	The site area appears unchanged. A sewage works is shown 15m west of the site, to the west of the field boundary drain. The buildings 50m west of the site are denoted as an Abattoir. Additional glasshouses are shown 150m west of the site. The allotments are no longer denoted to the north of the site.
1988 Sheet TF2324 Scale 1:2500 Figure G	The site area appears unchanged. Long gardens of houses are shown to the north of the site, in the area of the former allotments. Most of the sewage works structures to the south-west have been removed, and the sewage works is no longer denoted. New houses are shown 100m west of the site, and fewer glasshouses are shown further west (beyond the map extract).

<i>OS Map Extract</i>	<i>Description</i>
1995 Sheet TF2324 Scale 1:2500 Figure H	The site and immediate surrounding area appear unchanged. Mill Green Nurseries is denoted to the west of the site.
2002 Raster Map Scale 1:10,000 Figure I	The drain within the northern part of the site has been infilled. A new field boundary is shown off-site to the north-east. The last of the former sewage works structures have been cleared to the south-west of the site, and the field in this area has been sub-divided.
2010 Sheet TF22SW Scale 1:10,000 Figure J	The site area remained undeveloped. A new building is shown 10m west of the site, on the other side of the boundary drain. New buildings (glasshouses?) are shown at Mill Green Nurseries to the west.
2014 Sheet TF22SW Scale 1:10,000 Figure K	Two buildings are shown in the western part of the site. A new building is also shown off-site to the north-east, adjacent a new section of drain.
2015 GroundSure Aerial Photograph of Site (Appendix 2)	Buildings including portable cabins are shown on the site, as well as many vehicles. The southernmost part of the site remained part of a field. The area west of the site has also been developed with new buildings, and is connected to the site by a roadway. An off-road motorbike track is shown to the east of the site within a field.
2018 Sheet TF2324 Not to Scale Figure L	The site and immediate surrounding area appear unchanged, however this extract may not be up to date.

Summary of Historical Information

The map of 1887 showed the site within a field, and the northern part crossed by a drain. The drain crossing the northern part of the site was infilled at the end of the Twentieth Century. Buildings had been constructed on the site by 2014.

The area around the site was mostly fields and orchards. A new building was shown 50m west of the site by 1932, with further buildings built by 1950. This area was subsequently denoted as an abattoir, which was cleared when the present day Anglia (UK) Limited site was developed. A sewage works was shown to the south-west of the site in 1969, which has been partly cleared by 1988 and fully cleared by 2002.

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)	0	4
Historical Tank Database	0	3
Historical Energy Features Database	0	0
Historical Petrol & Fuel Site Database	0	0
Historical Garage & Motor Vehicle Repair Database	0	0
Potentially Infilled Land	0	1
2. Environmental Permits, Incidents and Registers	On-Site	0 - 250m
Sites Holding Environmental Permits/Authorisations	0	1
Records of COMAH and NIHHS Sites	0	0
Environment Agency Recorded Pollution Incidents	0	1
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	0	2
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
Detailed River Network Entries	0	30
Surface Water Features	Yes	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 Zones)				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 potentially contaminative uses identified from 1:10,000 mapping are for the sewage works 1m west, and unspecified tanks at the sewage works 22m to 30m south-west of the site; an abattoir 34m to the west; and nurseries 123m to the west. There are no historical energy features, historical petrol or fuel sites, garages or motor vehicle repair premises on, or within 250m of the site. There are no areas of potentially infilled land on the site, the closest to the site was the sewage works to the west. There was an unspecified licensed discharge consent 99m west of the site, which was revoked in 1997. There are no pollution incidents recorded on the site, however there was one 165m south-west of the site in 2002, involving vegetable cuttings, with a minor impact on water. There are no registered or historical landfills registered on, or within 250m of the site. The current industrial use of the site as Anglia (UK) Limited, a windows

company, is not recorded. Current industrial sites within 250m of the site relate to Houghton Produce Limited 108m west, and a silo 143m west. There are no current petrol or fuel sites within 250m of the site.

Superficial Tidal Flat Deposits are indicated to cover the site, which are designated by the EA as an 'Unproductive' stratum. The site is underlain by the solid geology of the Oxford Clay Formation, which is also designated by the EA as an 'Unproductive' stratum. There are no groundwater abstractions on, or within 250m of the site. The closest surface water features recorded are the drains along the northern and western site boundaries. The site is within a Zone 2 and Zone 3 floodplain, and is not within an area benefiting from flood defences. The site has a 'medium' risk of flooding by rivers and the sea (RoFRaS) rating.

The site is assessed as having a 'moderate' hazard from compressible ground and running sand. The site is assessed as having a 'low' hazard from shrinking or swelling clay; a 'very low' hazard from landslides; and a 'negligible' hazard from soluble rocks and collapsible rocks. The site is within a nitrate vulnerable zone, a designated environmentally sensitive area. The site is not within an identified mining area, or brine affected area. No radon protection measures are required for new residential properties or extensions.

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 – pathway – 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>
Drainage/Buildings	Effluent from leaking drains would provide a contaminant source. Buildings and outbuildings may contain asbestos.
Soil Beneath Site	Contamination may be present within any made ground materials on the site.
Soil Gas	Potential soil gas generated from made ground or underlying geology.
Ground Contamination Outside Site Boundary	Ground contamination migrating from adjoining sites.

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

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

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

Table 2: Human Receptors and Pathways

<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 Tidal Flat Deposits are indicated to be an 'Unproductive' stratum. The solid geology Oxford Clay is also indicated by the EA to be an 'Unproductive' stratum. The site is not within any Source Protection Zones.	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 There are surface water features, drains, along some boundaries of the site.	Surface infiltration of atmospheric waters into the soils beneath the site could wash or dissolve potential contaminants and laterally migrate. Contamination leads to a restriction/prevention of use: -as drinking water resource -for amenity use Effects on aquatic life.

Preliminary Conceptual Model

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

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

Table 4: Preliminary Conceptual Model Relative to Proposed Industrial/Residential Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage/ Buildings	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/ Likely (asbestos-buildings)	Low likelihood	Low likelihood	Low likelihood
Human Health i end users	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Unlikely	Low likelihood	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
<u>Key to Table 4</u> 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 1st February 2019 comprised two window sampled boreholes (WS1 and WS2), and one hand excavated trial pit including a soakaway test (TP1). The positions are shown on the exploratory hole location plan following this report text.

Public utility service drawings were sourced and consulted prior to determining the exploratory hole positions. The service drawings sourced by Ground Engineering Limited are available on request. 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 exploratory hole location plan, 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 boring and excavation.

Window Sampled Boreholes

The window sampled boreholes, WS1 and WS2, were sunk to a depth of 4.00m, and subsequently extended by dynamic probing to depths of 11.00m and 11.70m respectively where they were completed. Prior to the start of boring, an inspection pit was dug to 1.20m below ground level using hand tools to ensure the absence of buried services.

Representative small disturbed samples of soil were taken from the starter pits at regular intervals throughout their depth. Samples of made ground and topsoil were taken within polycarbonate pots and amber glass jars pending possible contamination testing. A water sample was taken once sufficient water has entered borehole WS1.

The boreholes were formed by a small track mounted window sampling and super heavy dynamic probing rig. The window sampling equipment consisted of drive-in sample tubes of specially constructed and strengthened steel, lined with a plastic core-liner. The barrels were initially of 87mm internal diameter and were reduced in diameter with successive barrels with

increasing depth. Upon extraction, a continuous 'undisturbed' profile of the soil was obtained within the plastic liners. The plastic liners were subsequently split by a geotechnical engineer who sub-sampled them, with the remaining samples re-sealed within the plastic liners. An immediate assessment of the apparent shear strength of clay was made within the liners (WS1) using a hand shear vane, the average of three readings for each test depth have been recorded and presented on the borehole record in kilopascals (kPa).

Standard penetration tests (SPTs) were undertaken in the window sample boreholes at regular intervals in order to give an indication of the in-situ relative density of the material. The test was made by driving a 50mm diameter split spoon attachment (S) into the soil at the base of the borehole by means of an automatic trip hammer weighing 63.50kg falling freely through 750mm. The penetration resistance ('N' value) was determined as the number of blows required to drive the tool the final 300mm of a total penetration of 450mm into the soil ahead of the borehole. The SPT test is fully described in BS EN22476:3:2005 and the results of these tests are presented on the borehole records.

The boreholes were extended to depths of 11.00m (WS1) and 11.70m (WS2) by dynamic probing. The probe was driven using the super heavy dynamic probing rig. The test comprised driving a 90° cone, 150mm² in area, on 35mm diameter rods using a 63.5kg hammer falling through 750mm. The blow count was recorded for every 100mm of penetration (N100). The results are presented as a plot of hammer blow counts against depth and accompany the borehole records.

On completion the exploratory holes were backfilled with arisings.

Hand Excavated Trial Pit

A hand excavated trial pit TP1 was undertaken to the east of the proposed dwelling. The exposed strata were logged and sampled by a Geoenvironmental Engineer, and samples collected for subsequent laboratory tests.

Representative small disturbed samples of soil were taken from the trial pit at regular intervals throughout its depth.

A soakaway test was carried out within the trial pit, in broad accordance with BRE Digest 365 (2016) in order to allow the assessment of the soil infiltration rates. The general method of the test was to excavate the trial pit with vertical sides trimmed square to the base. The dimensions were accurately measured and recorded, and the pits were then filled with clean water. The rate of water dissipation from the pit was measured by recording the depth of water relative to a datum at frequent time intervals. Time constraints within the day allocated only allowed for a single fill in the pit. The results are presented and follow the trial pit record.

On completion, the trial pit was emptied of any remaining water, backfilled with arisings, and the surface 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 borehole and trial pit records. The soil descriptions have been made in accordance with BS5930:2015. The geotechnical test results, undertaken in accordance with BS1377:1990 and other industry standards, are presented following the exploratory hole records. The chemical test results follow the geotechnical test results.

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

The particle size distributions of selected samples were obtained by sieve analysis. The particle size distribution passing the 63µm sieve was obtained by pipette sedimentation. The results of these tests are given as particle size distribution curves at the end of this report.

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

Chemical analysis of two 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'

GROUND CONDITIONS

The ground conditions comprised a surface layer of made ground/topsoil, underlain by the expected firm or stiff clay, and Tidal Flat Deposits, which were proved to at least the base of the boreholes at a maximum depth of 4.00m. Probing indicated very loose soils, becoming medium dense below 8.60m/8.70m depth. Groundwater was recorded at 1.85m depth on completion of WS1.

Made ground/Topsoil

In TP1, a 0.25m thick surface layer of made ground comprising firm, brown, slightly sandy, slightly gravelly, silty clay fill was met. The gravel fraction comprised angular to sub-rounded, brick, flint, occasional mortar and ash. Topsoil was encountered from surface in WS1 and WS2 to depths of 0.40m and 0.30m respectively, and comprised light brown/brown, fine sandy silt.

Tidal Flat Deposits

Tidal Flat Deposits were encountered beneath the made ground/topsoil at between 0.25m and 0.40m depth, extending to between 1.00m and 4.00m below ground level, and interpreted from the probing to extend to depths of 7.70m (WS2) and 8.00m (WS1). This deposit had an interpreted thickness of between 7.40m and 7.60m.

The Tidal Flat Deposits initially consisted of firm or stiff (WS1), becoming soft below 1.35m depth, slightly fine sandy, silty clays with occasional black carbonaceous specks. Below 2.00m to 2.50m depth the Tidal Flat Deposits comprised very loose, brown, clayey, very silty fine grained sand. The shallow trial pit was completed within Tidal Flat Deposits.

The probing indicated very loose and loose soils to 7.70m (WS2) and 8.00m (WS1) depth, which were interpreted as probable Tidal Flat Deposits.

Probable Marine Sand

The probing indicated loose, becoming medium dense conditions below 8.60m to 8.70m depth, to at least the base of the probes at 11.00m and 11.70m depth, a thickness of between at least 3.00m and at least 4.00m. These soils were interpreted to represent the expected superficial Marine Sand.

Groundwater

Groundwater was encountered at 3.00m depth in WS1, within silty sand. On completion of the boreholes and removal of the casing, groundwater was recorded at depths of 1.85m (WS1) and 3.20m (WS2). The shallow trial pit was dry during excavation and on completion.

Observations

Live roots were observed in all of the boreholes and trial pits, and to a maximum depth of 1.90m in WS1 in the western part of the site close to the newly planted trees further west.

The trial pit sides were stable during excavation and on completion.

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, mortar and ash, and the topsoil did not contain any artefacts.

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

The proposed development is understood to comprise constructing a new two-storey house for manager's accommodation. The investigation confirmed the site to be underlain by a thin layer of made ground/topsoil resting on the expected superficial Tidal Flat Deposits. The made ground/topsoil had variable bearing properties, was found to a maximum depth of 0.40m, 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 underlying superficial deposits would only be capable of supporting lightly loaded traditional foundations for new buildings, locally deepened in clay soils due to the presence of trees. However deepened foundations may be unsuitable due to the presence of soft soils below about 1.35m depth. The anticipated underlying Boulder Clay and 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 1.50m are likely to encounter groundwater, and be unstable, with running sand conditions. Ground bearing floor slabs could be adopted, but would need to be suspended in clay soils affected by tree roots.

Traditional Foundations

Foundations should be extended through any made ground/topsoil, which was found to a maximum 0.40m depth. The naturally deposited Tidal Flat Deposit clays, could offer a founding stratum where encountered at shallow depth for lightly loaded traditional foundations. Deepened foundations extending into the soft potentially organic Tidal Flat Deposits may be unsuitable for locally deepened footings due to their poor bearing properties and high compressibility.

Samples of the Tidal Flat Deposits (clay) had modified plasticity indices of between 30% and 41%. The results indicate the clays range from medium to high 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 1.00m 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.

No trees were present on the site, however it is likely that the proposed dwelling will be within influencing distances of newly planted trees (as clay soils are present at shallow depth). These will dictate deepened foundations both where trees remain and where removed.

Based on an assumed high water demand English Oak tree, and moderate water demand Beech trees, minimum foundation depths of between 1.00m and 2.00m would be required in such clay soils based on NHBC Standards and a 15m distance from foundations to trees. Foundations would need to be at least 25m from the position of a mature English Oak tree, and 15m from a mature Beech tree, for the adoption of the minimum foundation depth of 1.00m on this site. Within these distances foundation depths will depend on the proximity of trees to new foundations and depths should be determined using the NHBC Standards where clay forms the base of foundation excavations. Tree species outside the site boundaries and distances to the proposed dwelling should be verified before final design of foundation depths based on NHBC Standards.

Foundations should be taken at least 0.50m below the last vestiges of live roots in clay soils. Live roots were encountered to a maximum depth of 1.90m within WS1 in clay soils, closest to the newly planted trees beyond the western site boundary. The depth of roots is likely to vary across the site, and is likely to be deeper closer to the trees. Strip footings could be stepped up along the length of wall runs where foundation depths vary due to the influence of trees. Steps should not exceed 0.50m and further guidance is provided in the aforementioned NHBC document.

Evenly loaded raft foundations in accordance with NHBC Standards could be used if at least 10m from English Oak trees, and 1m from Beech trees in clay soils.

Recommendations for foundation depths related to proposed tree planting are also provided in the NHBC Standards and the volume change potential should be considered for any proposed landscaping within the proposed scheme on the site.

In summary, foundations for the new building will need to be a minimum of 1.00m deep and may need locally to be taken to below 2.00m below ground level, in order to penetrate the depths of potential root-induced desiccation within this site.

A cable percussive borehole would be required to provide information for the design of piled foundations.

Bearing Capacity

The firm clay soils found at the minimum foundation depth of 1.00m offer a maximum safe bearing capacity of 40kN/m² with a factor of 3.0 incorporated for a 0.60m wide strip foundation, which is limited by the strength of the underlying soft clays and very loose silts/sands. Similarly the Tidal Flat Deposits beneath a nominal 12m by 6m raft foundation cast at 1.00m depth would have a maximum safe bearing capacity of 20kN/m² with the same factor of safety of 3.0 incorporated.

These bearing capacities should also ensure that settlement beneath narrow strip foundations would be within 25mm, and the anticipated settlement beneath a 6m wide raft is approximately 40mm. Settlement within the underlying sand should occur as the loads are applied.

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 are likely to 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 Tidal Flat Deposits with resulting side instability, although groundwater seepages were encountered below about 1.50m 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 clay/silt soils are prone to softening and deterioration, in the presence of

either surface water or groundwater, with loss of their already limited bearing properties. Care should be taken to keep the excavations dry.

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 clay 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 Slabs

In open areas, well away from any trees, the proposed building could have a ground bearing floor slab, providing the sub-grade soils are well prepared. The proposed house may be in an area close to newly planted trees in clay soils, where the floor slab should be suspended on the foundations in order to avoid any differential movements between them. A suspended floor slab would avoid any volume change movements within root affected clays, providing that the sub-floor gaps recommended in NHBC Standards Chapter 4.2, Table 7, are adopted.

The site has a 'medium' risk of flooding by rivers and the sea (RoFRaS) rating, and the site levels may have to be raised. If ground levels are raised the floor slabs would still need to comply with NHBC recommendations.

Sulphate Conditions

Sulphate analysis of selected samples of soil and water yielded soluble sulphate concentrations within Design Sulphate Classes DS-1 and DS-2 of the BRE Special Digest 1, Table C1 (2005), presented in Appendix 3. The pH results of samples ranged between 7.2 and 8.0 indicating alkaline conditions.

These results indicate an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-2 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.

Drainage

The soakaway test (TP1) gave a soil infiltration rate (f) of 5.62×10^{-7} m/s, for the fine sandy, silty clay Tidal Flat Deposit soils. These results rate the Tidal Flat Deposits as having a 'poor' drainage potential according to BS8004:1986, and reflect the poor drainage properties of the Tidal Flat Deposit clays and silts.

Groundwater was met at between 1.50m and 3.20m depth in the exploratory holes, within the superficial Tidal Flat Deposits. Soakaway drainage on this site may deteriorate over time as the chambers could become blocked with silt. Provision should be made for regular cleaning. There would be no advantage in excavating soakaway chambers below the groundwater level, which reduces the effective volume of soakaway strata.

Hardstanding

Naturally deposited firm or stiff, slightly fine sandy, silty clays were encountered at sub-grade level across this site.

Based on Interim Advice Note (IAN) 73/06 (2009) 'Design Guidance for Road Pavement Foundations (Draft HD25)', Table 5.1 recommends a design CBR value of 3.0% for a clay with a plasticity index of 30%, and a design CBR value of 2.5% for a clay with a plasticity index of 40%, both with a thin pavement construction. A conservative design CBR value of

2.5%, could be adopted for hardstanding design on this site. This assumes that any inferior soils at sub-grade level will be removed and replaced.

The sub-grade should be suitably compacted and inspected with any soft spots or root infested clays being removed and replaced with more suitable well-graded coarse-grained fill. Care should be taken not to allow the exposed soil at sub-grade level to become exposed to inclement weather conditions, as the condition of the very silty soils will rapidly deteriorate in the presence of water.

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. The number of test results, which exceed these values, are also provided.

Table 5: Comparison of Chemical Test Results with SSVs for Near Surface Soils

Determinand	Number of Samples	Min Value mg/kg	Max Value mg/kg	Number of Samples Exceeding SSV for			Assessment Method	Soil Screening Criteria 1% 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	2	1.4%	1.9%	-	-	-	-	-	-	-
Arsenic	2	10	11	0	0	0	S4UL	37	40	640
Cadmium	2	<0.10	0.10	0	0	0	S4UL	11	85	190
Chromium (III)*	2	19	21	0	0	0	S4UL	910	910	8600
Chromium (VI)	2	<0.50	<0.50	0	0	0	S4UL	6	6	33
Lead	2	18	22	0	0	0	C4SL	200	310	2330
Mercury	2	0.10	0.11	0	0	0	S4UL	11	15	320
Selenium	2	<0.20	<0.20	0	0	0	S4UL	250	430	12,000
Nickel	2	17	18	0	0	0	S4UL	130	180	980
Phenols	2	<0.30	<0.30	0	0	0	S4UL	120	440	440
Benzo[a]pyrene	2	<0.10	<0.10	0	0	0	S4UL	0.79	1.2	15
Copper	2	11	11	0	0	0	S4UL	2400	7100	68,000
Zinc	2	45	47	0	0	0	S4UL	3700	40,000	730,000
Free Cyanide	2	<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.

LQM/CIEH S4ULs ©Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3608. All rights reserved

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

Discussion of Soil Results

Levels of all elements and compounds were within the associated soil screening values for both residential and commercial/industrial end uses.

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.

The results indicate that the near surface soils would be suitable for retention at the surface in the proposed residential setting.

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 proposed new industrial/residential development use of the site is presented in Table 6 below.

Table 6: General Conceptual Model Relative to Future Industrial/Residential Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage/ Buildings	Soil	Soil Gas	Off-Site Sources
Human Health i ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low/ High (asbestos)	Very Low	Very 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 6</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 Anglia (UK) Limited industrial site, the site history and proposed additional residential use of the site, in the context of the conceptual model, are discussed as follows.

The proposed development is understood to comprise building a new manager's dwelling, including gardens, landscaping and areas of 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 up to 0.40m of made ground/topsoil. The limited chemical testing has identified no elevated concentrations in respect to the proposed residential with home grown produce end use.

Existing Drainage & Buildings

Redundant 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.

The existing buildings may have asbestos containing materials within them. It is recommended that an asbestos survey be conducted in order to determine the presence, type and nature of such materials prior to any demolition. Suitable precautions, in line with current best practice, should be put in place to protect workers from the effects of asbestos material, during the demolition and site excavation phases.

Soil Gas

According to the environmental database there are no landfills within 250m of the site. The site is underlain by a thin layer of made ground/topsoil, covering superficial Tidal Flat Deposits.

There is a very low risk that hazardous gas 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.

Human Health - Users of Completed Development

The results of the chemical analysis undertaken would indicate that the topsoil should be considered suitable for re-use at the surface in any new garden, landscaped or planted areas.

The test results indicate that no scheme of remediation would be considered necessary for areas covered by buildings or hard surfaced areas, which would effectively provide a barrier from end users to the made ground.

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

Water Environment

The site is underlain by 'Unproductive' superficial strata, covering an 'Unproductive' solid geology stratum. There are surface water features, drains, along the boundaries of the site. The site does not lie within a source protection zone. The site has a 'medium' risk of flooding by rivers and the sea (RoFRaS) rating, and the site/floor levels may have to be raised to comply with Environment Agency requirements.

The risk to the water environment is considered as very low as it is unlikely that the proposed development and contaminants within the made ground soils would impact the quality of the water environment.

Effects on Building Materials and Buried Services

The sulphate requirements for buried concrete have been discussed in the previous section of this report.

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.

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 OF CONTAMINATION ASSESSMENT

The proposed development is understood to comprise building a new manager's dwelling.

Remediation Strategy

The following points will constitute a plan for any 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. 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.
- Where garden and landscaped areas are proposed the near surface soils on-site should be considered suitable for retention.
- A photographic record should be undertaken by the contractor during the construction phase.
- 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.

Appropriate records should be kept so that a Validation Report can be compiled and subsequently submitted to the local authority if required.

GROUND ENGINEERING LIMITED



S. WEATHERLEY

B.Eng.(Hons.),

C.Geol., F.G.S.

Senior Geo-Environmental Engineer



S. J. FLEMING

M.Sc., M.C.S.M.,

C.Geol., F.G.S.

Director

Site Location Plan

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Not To Scale



Project : Anglia (UK) Limited, Mill Green Road, Pinchbeck,
Spalding, Lincolnshire

Client : Anglia (UK) Limited

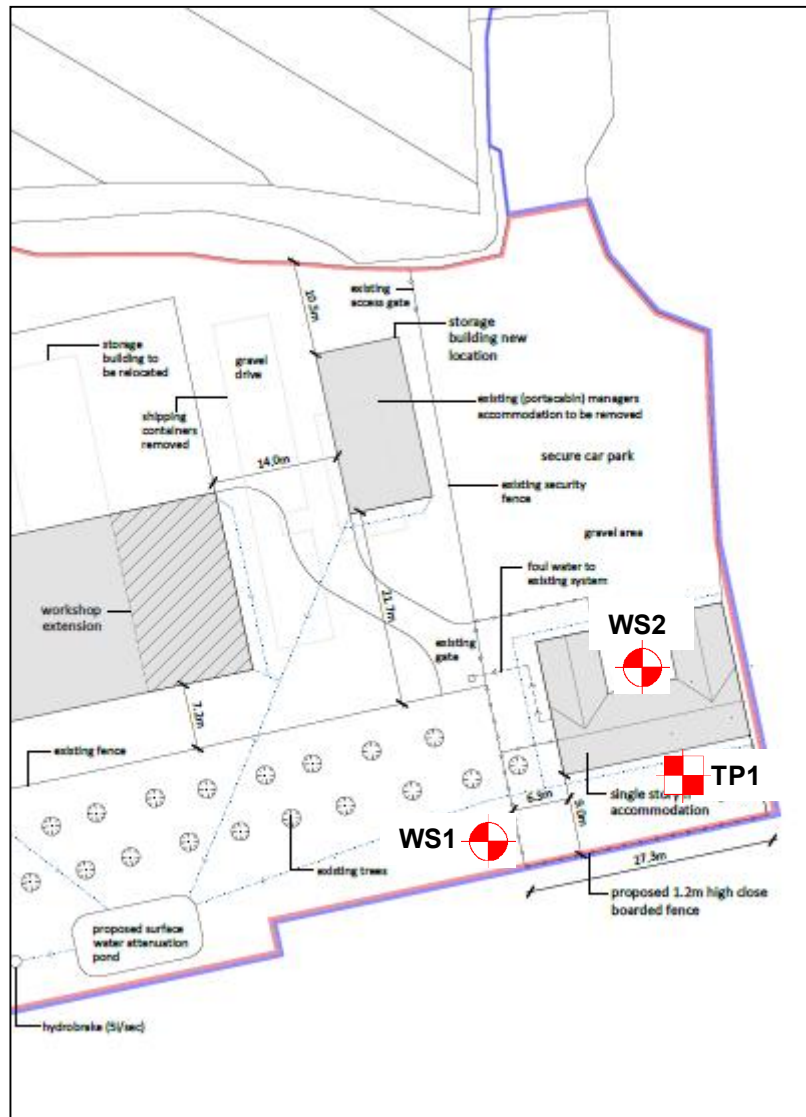
**GROUND
ENGINEERING
LIMITED**
Peterborough

Tel : 01733 566566

Project No.
C14686

Exploratory Hole Location Plan

Based on plan provided by the client



Not To Scale



Project : Anglia (UK) Limited, Mill Green Road,
Pinchbeck, Spalding, Lincolnshire

Client : Anglia (UK) Limited

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

Project No.
C14686

L I M I T E D
Tel: 01733-566566
www.groundengineering.co.uk

Date: 01/02/19

Hole Size:	87mm dia to 2.00m
	77mm dia to 4.00m
	50mm dia to 11.00m

Ground
Level:

REMARKS	1. Starter pit excavated from 0.00m to 1.20m depth 2. Live roots observed to 1.90m depth 3. Borehole cased to 3.00m depth	Project No 14686	
		Scale 1:50	Page 1/2

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GROUND ENGINEERING

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DYNAMIC PROBE PENETRATION TEST

Date 01/02/19

PROBE No
WS1

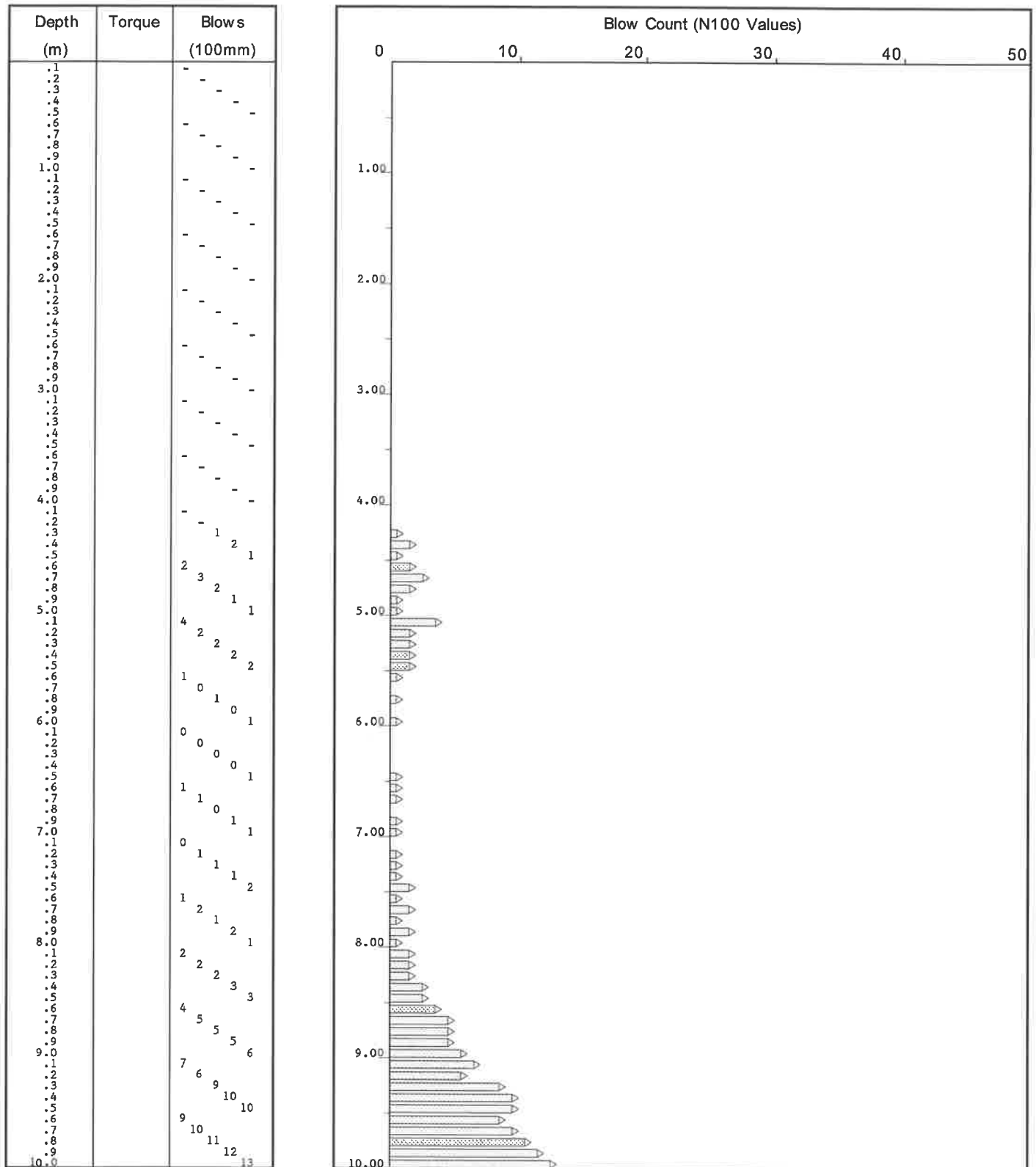
Project
Number 14686

Sheet 1 of 2

Method
BS 1377 : Part 9 : Clause 3.2 (DPSH)

Client
ANGLIA (UK) LTD

Site
MILL GREEN ROAD, PINCHBECK



Remarks :

Hammer 63.5 kg
Standard Drop 750 mm
Cone 50 mm dia
Rod 8kg / 35 mm

14686

GROUND ENGINEERING

L I M I T E D
Tel: 01733-566566 www.groundengineering.co.uk

DYNAMIC PROBE PENETRATION TEST

Date 01/02/19

PROBE No
WS1

Project
Number 14686

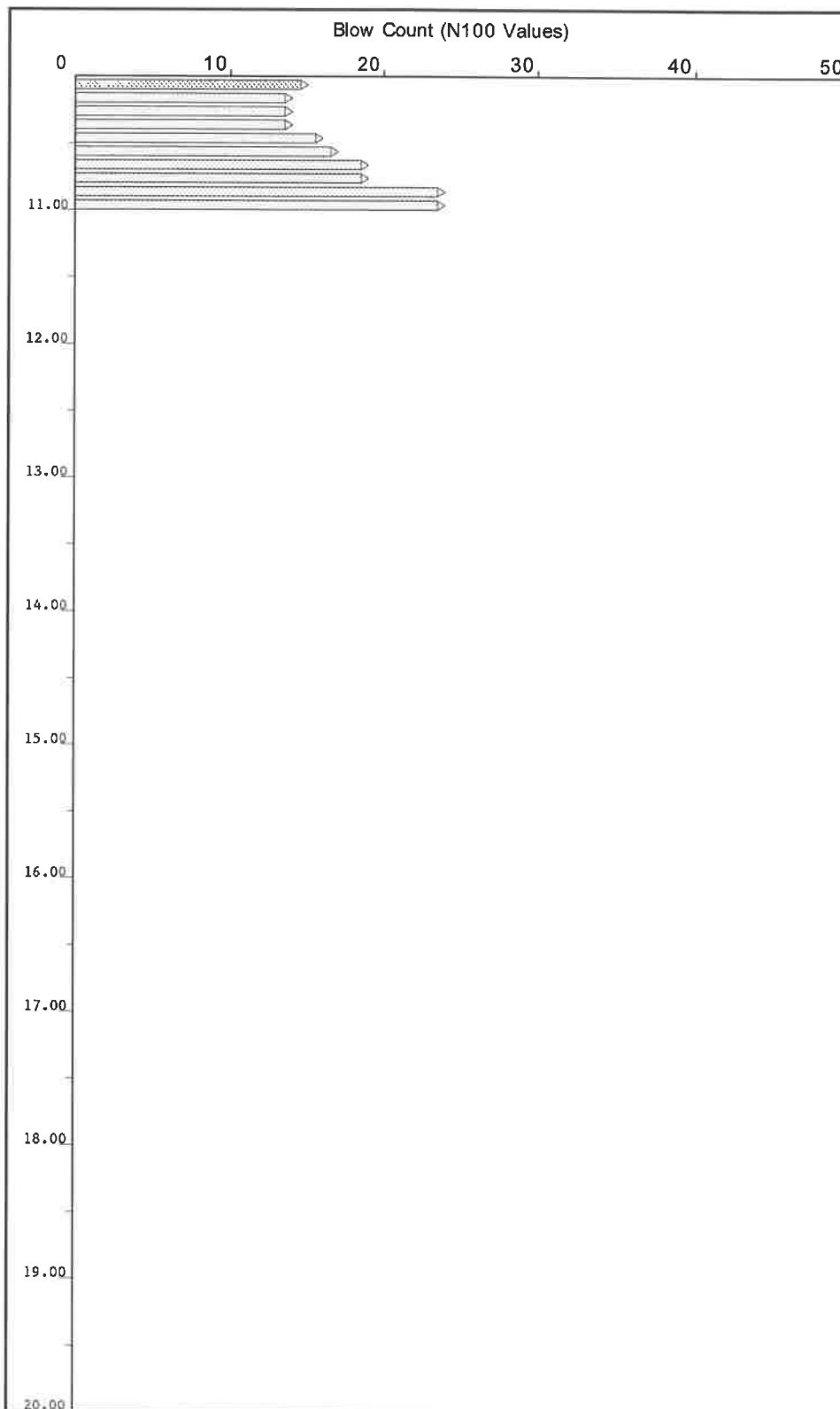
Sheet 2 of 2

Method
BS 1377 : Part 9 : Clause 3.2 (DPSH)

Client
ANGLIA (UK) LTD

Site
MILL GREEN ROAD, PINCHBECK

Depth (m)	Torque	Blows (100mm)
.1		15
.2		14
.3		14
.4		14
.5		16
.6		17
.7		19
.8		19
.9		24
11.0		24



Remarks :

Hammer 63.5 kg
Standard Drop 750 mm
Cone 50 mm dia
Rod 8kg / 35 mm

14686

L I M I T E D
Tel: 01733-566566
www.groundengineering.co.uk

Date: 01/02/19

Hole Size: 87mm dia to 2.00m
67mm dia to 4.00m
50mm dia to 11.70m

Ground
Level:

REMARKS	1. Starter pit excavated from 0.00m to 1.20m depth 2. Live roots observed to 0.30m depth 3. Borehole cased to 3.00m depth	Project No 14686	
		Scale 1:50	Page 1/2

KEY		Groundwater Strikes					Groundwater Observations				
		Depth m					Date	Depth m			
		No	Struck	Rose to	Rate	Cased		Sealed	Hole	Casing	Water
D - Disturbed Sample	J - Jar Sample							01/02/19	4.00	3.00	3.00
B - Bulk Sample	M - Mackintosh Probe							01/02/19	4.00	0.00	3.20
U - Undisturbed Sample	V - Vane Shear Test										
W - Water Sample	Cohesion () kPa										
W Water Strike	P () - Hand Penetrometer										
Wc Depth to Water on completion	Cohesion () kPa										
	Standpipe Level										

[illegible]

GROUND ENGINEERING

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DYNAMIC PROBE PENETRATION TEST

Date 01/02/19

PROBE No
WS2

Project
Number 14686

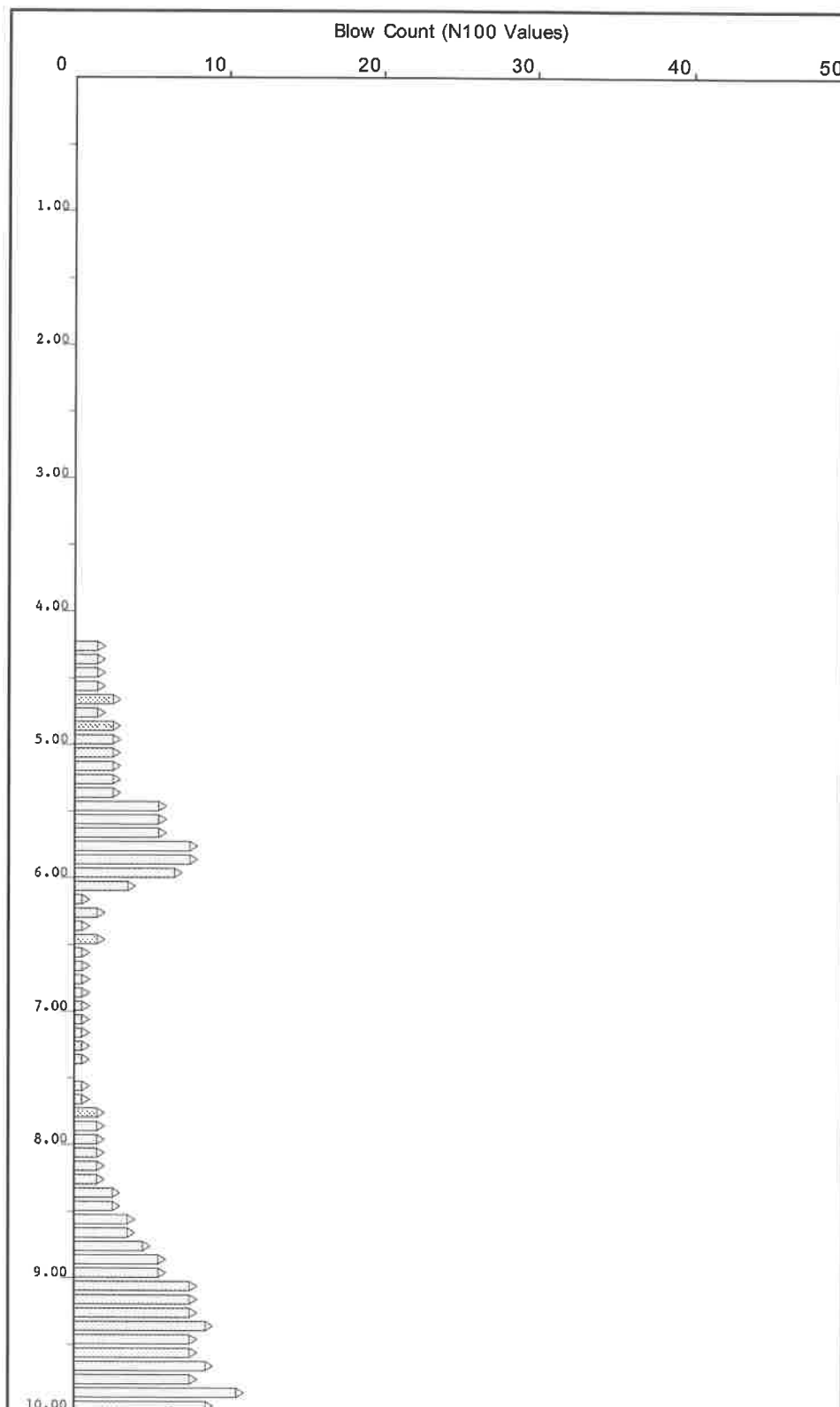
Sheet 1 of 2

Method
BS 1377 : Part 9 : Clause 3.2 (DPSH)

Client
ANGLIA (UK) LTD

Site
MILL GREEN ROAD, PINCHBECK

Depth (m)	Torque	Blows (100mm)
.1		-
.2		-
.3		-
.4		-
.5		-
.6		-
.7		-
.8		-
.9		-
1.0		-
.1		-
.2		-
.3		-
.4		-
.5		-
.6		-
.7		-
.8		-
.9		-
2.0		-
.1		-
.2		-
.3		-
.4		-
.5		-
.6		-
.7		-
.8		-
.9		-
3.0		-
.1		-
.2		-
.3		-
.4		-
.5		-
.6		-
.7		-
.8		-
.9		-
4.0		-
.1		-
.2		-
.3		2
.4		2
.5		2
.6	2	2
.7	2	3
.8	3	2
.9	3	3
5.0	3	3
.1	3	3
.2	3	3
.3	3	3
.4	3	6
.5	6	6
.6	6	6
.7	6	8
.8	6	8
.9	6	7
6.0	4	1
.1	1	2
.2	1	1
.3	1	2
.4	1	1
.5	1	1
.6	1	1
.7	1	1
.8	1	1
.9	1	1
7.0	1	1
.1	1	1
.2	1	1
.3	1	1
.4	1	0
.5	1	1
.6	1	1
.7	1	2
.8	1	2
.9	2	2
8.0	2	2
.1	2	2
.2	2	2
.3	2	3
.4	4	3
.5	4	3
.6	4	5
.7	4	6
.8	4	6
.9	8	6
9.0	8	8
.1	8	8
.2	8	8
.3	8	9
.4	8	8
.5	8	8
.6	8	9
.7	8	8
.8	8	8
.9	8	11
10.0		9



Remarks :

Hammer 63.5 kg

14686

Standard Drop 750 mm

Cone 50 mm dia

Rod 8kg / 35 mm

GROUND ENGINEERING

L I M I T E D
Tel: 01733-566566 www.groundengineering.co.uk

DYNAMIC PROBE PENETRATION TEST

Date 01/02/19

PROBE No
WS2

Project
Number 14686

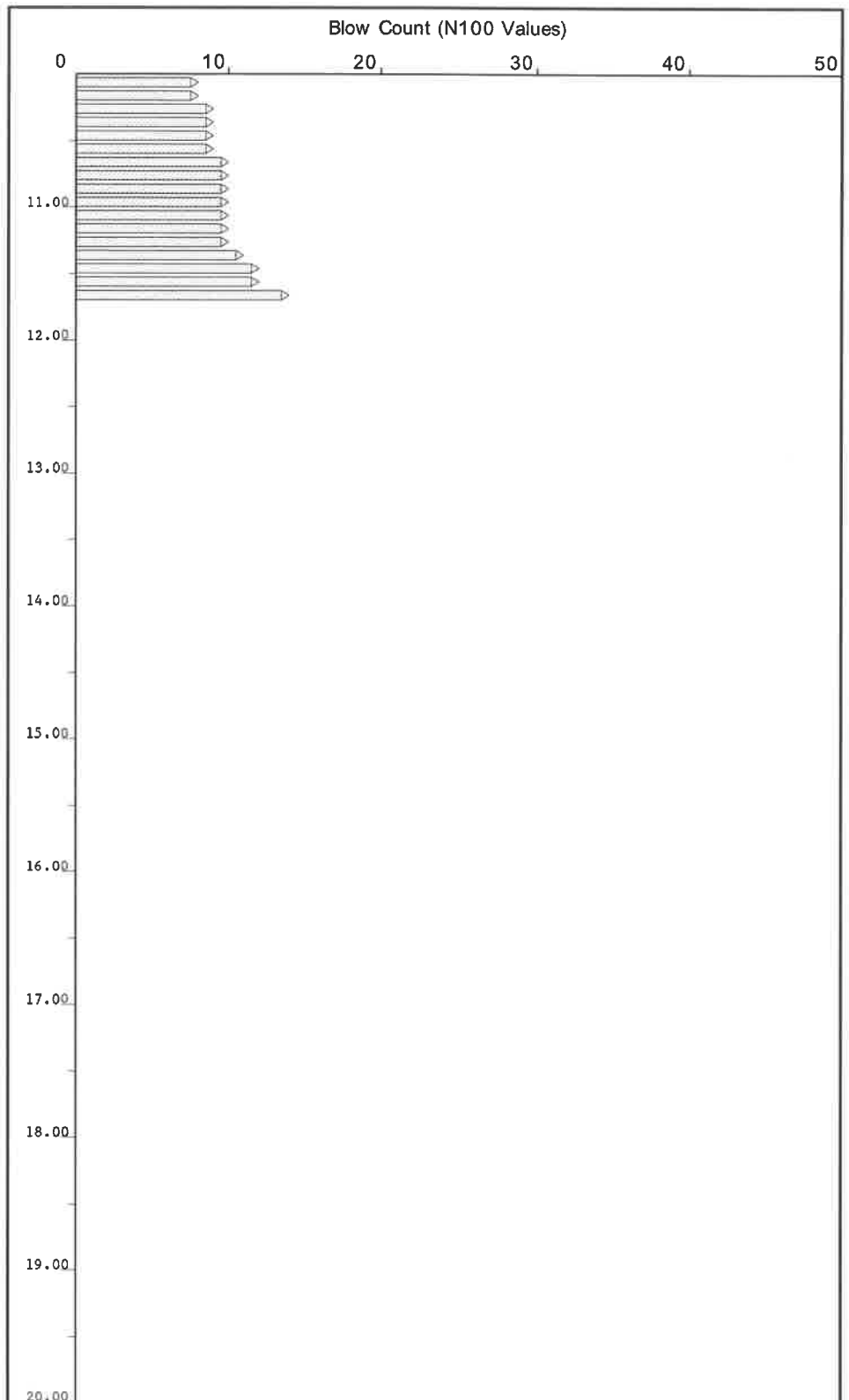
Sheet 2 of 2

Method
BS 1377 : Part 9 : Clause 3.2 (DPSH)

Client
ANGLIA (UK) LTD

Site
MILL GREEN ROAD, PINCHBECK

Depth (m)	Torque	Blows (100mm)
.1		8
.2		8
.3		9
.4		9
.5		9
.6		9
.7		10
.8		10
.9		10
11.0		10
.1		10
.2		10
.3		10
.4		11
.5		12
.6		12
.7		14



Remarks :

Hammer 63.5 kg
Standard Drop 750 mm
Cone 50 mm dia
Rod 8kg / 35 mm

14686

GROUND ENGINEERING L I M I T E D Tel: 01733-566566 www.groundengineering.co.uk			Site: MILL GREEN ROAD, PINCHBECK		TRIAL PIT TP1	
			Date: 01/02/19	Pit Size: 1.00m L x 0.30m W x 1.00m D.		Ground Level:
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m
Depth m	Type	Result				O.D. Level m
0.10	D1			MADE GROUND - Firm, brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is angular to sub-rounded brick, flint, occasional mortar and ash.		0.25
0.40	D2			Firm, friable, brown, slightly fine sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.60
0.70	D3			Firm, brown, orange brown and light grey mottled, slightly fine sandy, silty CLAY with black carbonaceous specks. (TIDAL FLAT DEPOSIT)		1.00
1.00	D4			Pit completed at 1.00m depth		
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental Sample ∇ - Water Strike ∇ - Water Rise ∇c - Level on completion MP - Mackintosh Probe P () - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. Live roots observed to at least 1.00m depth 2. Pit dry 3. Pit sides stable			
			Project No 14686 Scale 1:25 Page 1/1			

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Anglia (UK) Limited, Mill Green Road, Pinchbeck
 Client: Anglia (UK) Limited

Project No: C14686
 Sheet No: 1/1

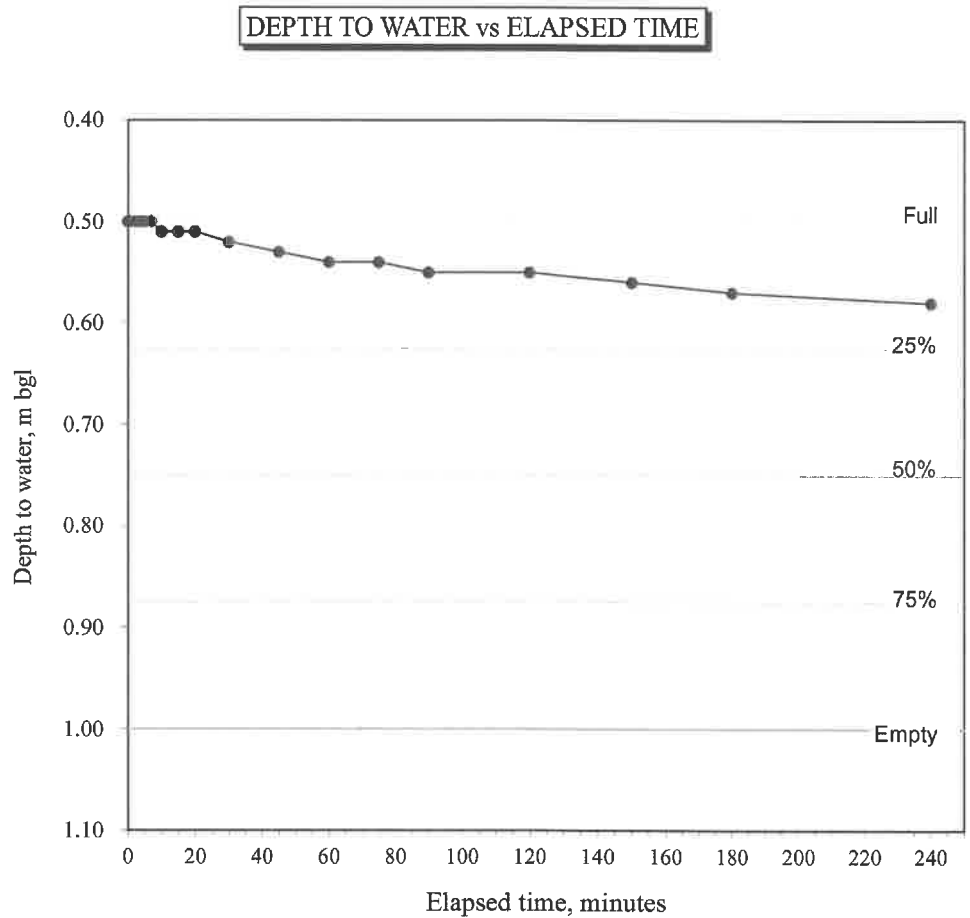
Trial Pit: TP1 FIRST FILLING
 Depth: 1.00
 Length: 1.00
 Width: 0.30

Description of Stratum under test: Firm, brown and orange brown, slightly sandy, silty CLAY

Depth to water prior to test: dry
 (below ground level)

Elapsed Time min	Depth to Water m
0	0.50
1	0.50
2	0.50
3	0.50
4	0.50
5	0.50
7	0.50
10	0.51
15	0.51
20	0.51
30	0.52
45	0.53
60	0.54
75	0.54
90	0.55
120	0.55
150	0.56
180	0.57
240	0.58

All dimensions given in metres



$$f = (V75 - V25) / A50(T75 - T25)$$

$$V75 - V25 = 0.075$$

$$A50 = 0.950$$

$$T75 - T25 = 2340 \quad (\text{extrapolated})$$

Extrapolated Soil Infiltration Rate $f = \underline{\underline{5.62E-07}} \text{ m/s}$

LABORATORY TEST RESULTS

CONTRACT MILL GREEN ROAD, PINCHBECK

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	
WS1	D3	0.90	62	25	37	29												SOIL CLASSIFICATION = CH 0% retained on 425µm sieve
	D4	1.10												412			7.9	
	W1	1.50													716		7.2	
	U1A	1.70	50	20	30	26								346			7.8	
WS2	D5	1.20																SOIL CLASSIFICATION = CI/CH 0% retained on 425µm sieve

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

LABORATORY TEST RESULTS

CONTRACT MILL GREEN ROAD, PINCHBECK

Trial-pit	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	
TP1	D4	1.00	66	25	41	30												SOIL CLASSIFICATION = CH 0% retained on 425µm sieve
Aqueous Extract 2:1 Water:Soil																		

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



8180

GROUND ENGINEERINGNewark Road Peterborough
t: 01733 566566

e: admin@groundengineering.co.uk

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4

Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd

Client Address: Newark Road
Peterborough
PE1 5UA

Certificate Number: PL6574-1/5/710-2

Client Reference: C14686

Lab Job Number: PL6574-1

Date Sampled: Unknown

Date Received: 06.02.2019

Date Tested: 07.03.2019

Contact: Simon Weatherley

Site Name: Mill Green Road

Site Address: Pinchbeck

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

TEST RESULTS

Laboratory Reference: PL6574-1/5

Client Reference: U2A

Pre-treatment for
organic material:

No

Sample Description: Brown slightly clayey silty SAND.

Material Specification: Not Required

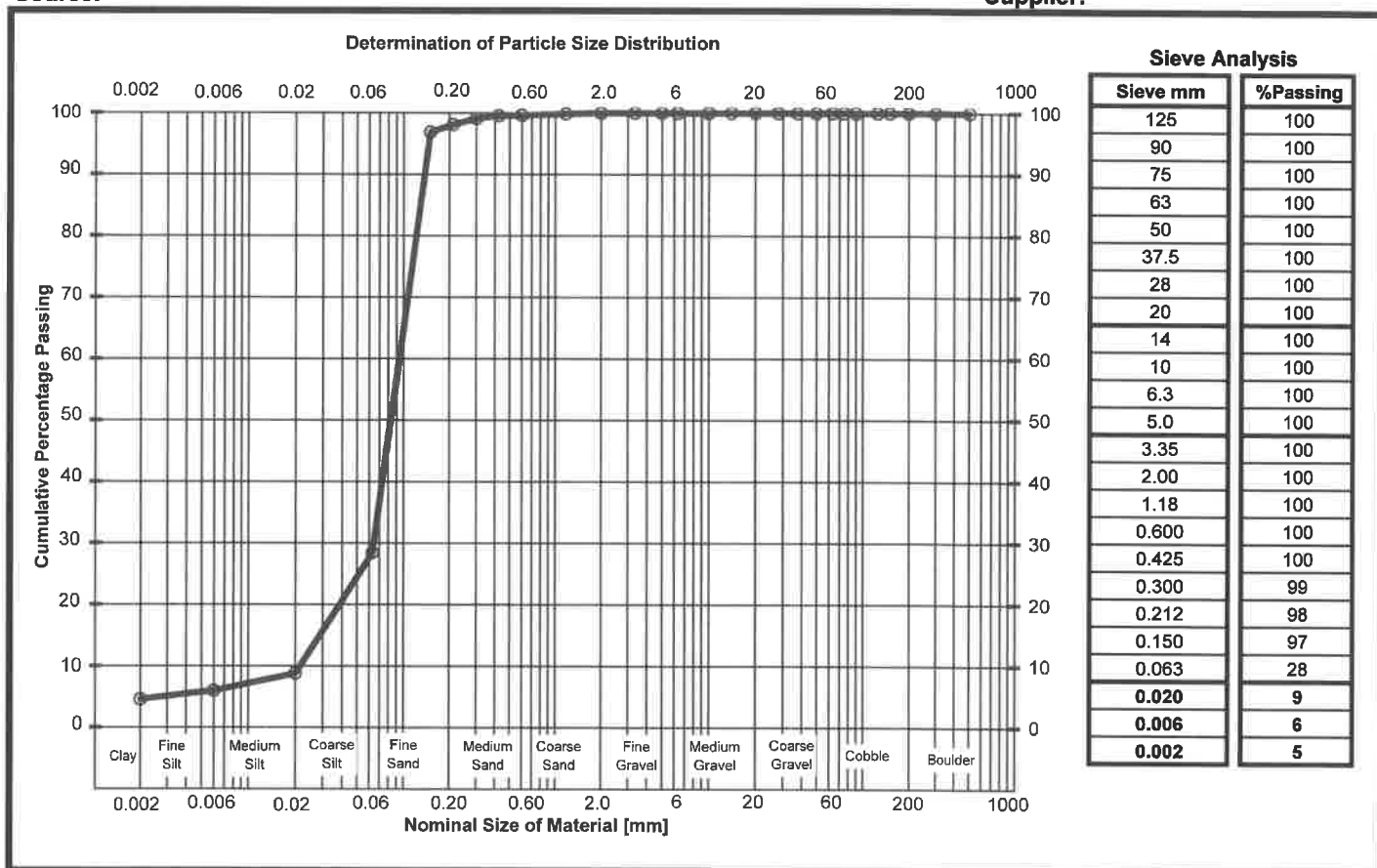
Location: WS1

Source:

Depth Top: 2.50m

Depth Base: 3.00m

Supplier:



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

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

Date Reported:

11.03.2019

Page 1 of 1

Form Number:

GELab/C/709-2 Version 51

for and on behalf of Ground Engineering Ltd

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Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA



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GROUND ENGINEERING**TEST CERTIFICATE**

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: PL6574-1/7/710-2
Client Reference: C14686
Lab Job Number: PL6574-1
Date Sampled: Unknown
Date Received: 06.02.2019
Date Tested: 07.03.2019
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

Contact: Simon Weatherley

Site Name: Mill Green Road
Site Address: Pinchbeck

TEST RESULTS

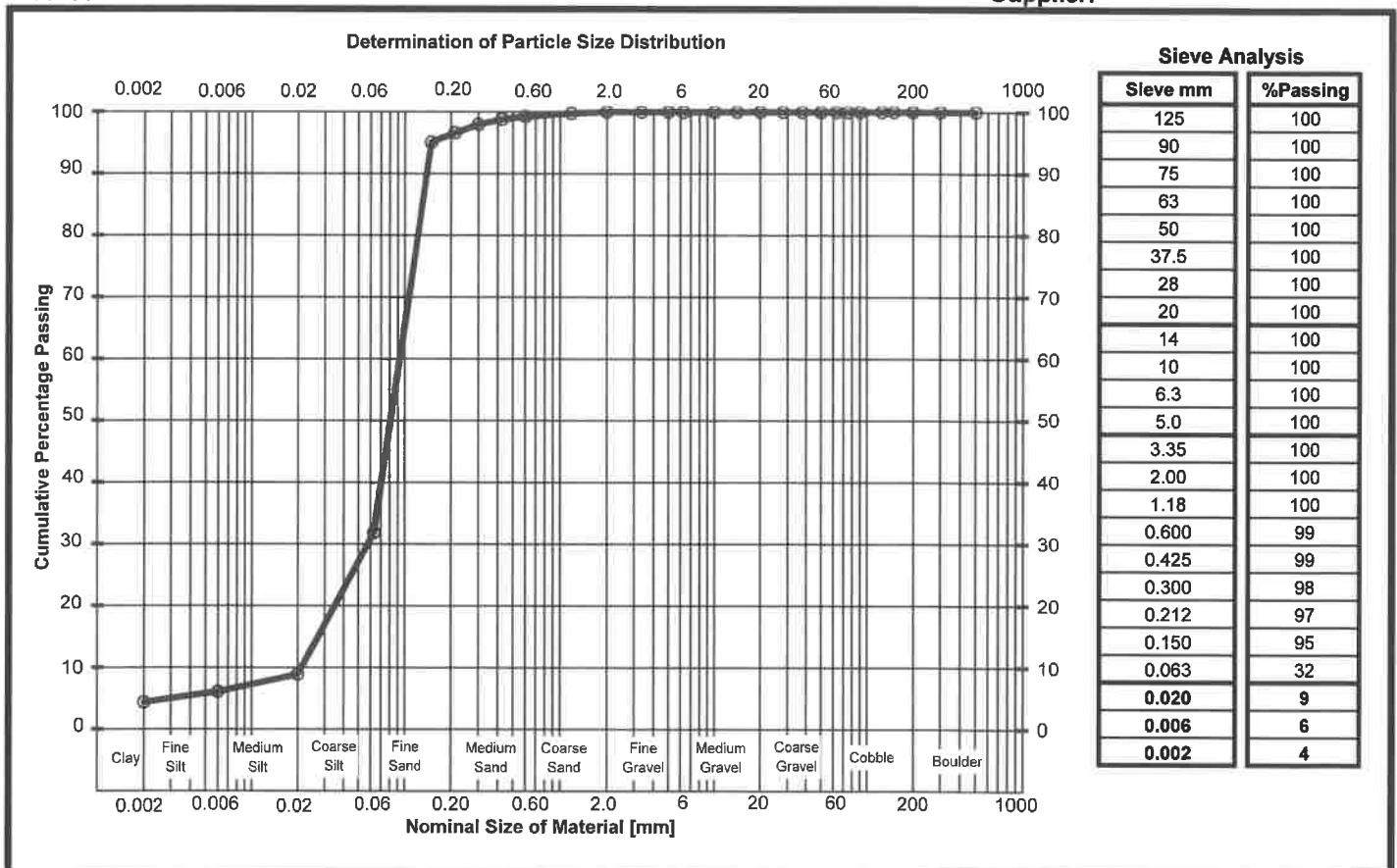
Laboratory Reference: PL6574-1/7
Client Reference: U3

Pre-treatment for organic material: No

Sample Description: Brown slightly clayey silty SAND.

Material Specification: Not Required
Location: WS2
Source:

Depth Top: 3.00m
Depth Base: 4.00m
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: 11.03.2019 Page 1 of 1
Form Number: GELab/C/709-2 Version 51

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Registration Number: 6929574
Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA



Final Report

Report No.: 19-04157-1

Initial Date of Issue: 13-Feb-2019

Client Ground Engineering Limited

Client Address: Newark Road
Peterborough
Cambridgeshire
PE1 5UA

Contact(s): Simon Weatherley

Project SW/C14686 Anglia (uk) Ltd, Mill Green
Road, Spalding

Quotation No.: **Date Received:** 05-Feb-2019

Order No.: SW/C14686 **Date Instructed:** 05-Feb-2019

No. of Samples: 2

Turnaround (Wkdays): 5 **Results Due:** 11-Feb-2019

Date Approved: 13-Feb-2019

Approved By:



Details: Martin Dyer, Laboratory Manager

Project: SW/C14686 Anglia (uk) Ltd. Mill Green Road, Spalding

Client: Ground Engineering Limited		Chemtest Job No.:		19-04157
Quotation No.:		Chemtest Sample ID.:		767707
		Client Sample ID.:		D1
		Sample Location:		WS1
		Sample Type:		SOIL
		Top Depth (m):		0.30
		Date Sampled:		01-Feb-2019
Determinand	Accred.	SOP	Units	LOD
pH	U	2010		N/A
Moisture	N	2030	%	0.020
Stones and Removed Materials	N	2030	%	0.020
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010
Cyanide (Free)	U	2300	mg/kg	0.50
Cyanide (Total)	U	2300	mg/kg	0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50
Arsenic	U	2450	mg/kg	1.0
Cadmium	U	2450	mg/kg	0.10
Chromium	U	2450	mg/kg	1.0
Copper	U	2450	mg/kg	0.50
Mercury	U	2450	mg/kg	0.10
Nickel	U	2450	mg/kg	0.50
Lead	U	2450	mg/kg	0.50
Selenium	U	2450	mg/kg	0.20
Zinc	U	2450	mg/kg	0.50
Chromium (Hexavalent)	N	2490	mg/kg	0.50
Organic Matter	U	2625	%	0.40
Acenaphthene	U	2700	mg/kg	0.10
Acenaphthylene	U	2700	mg/kg	0.10
Anthracene	U	2700	mg/kg	0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10
Chrysene	U	2700	mg/kg	0.10
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.10
Fluoranthene	U	2700	mg/kg	0.10
Fluorene	U	2700	mg/kg	0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10
Naphthalene	U	2700	mg/kg	0.10
Phenanthrene	U	2700	mg/kg	0.10
Pyrene	U	2700	mg/kg	0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0
Total Phenols	U	2920	mg/kg	0.30

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-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; 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)
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

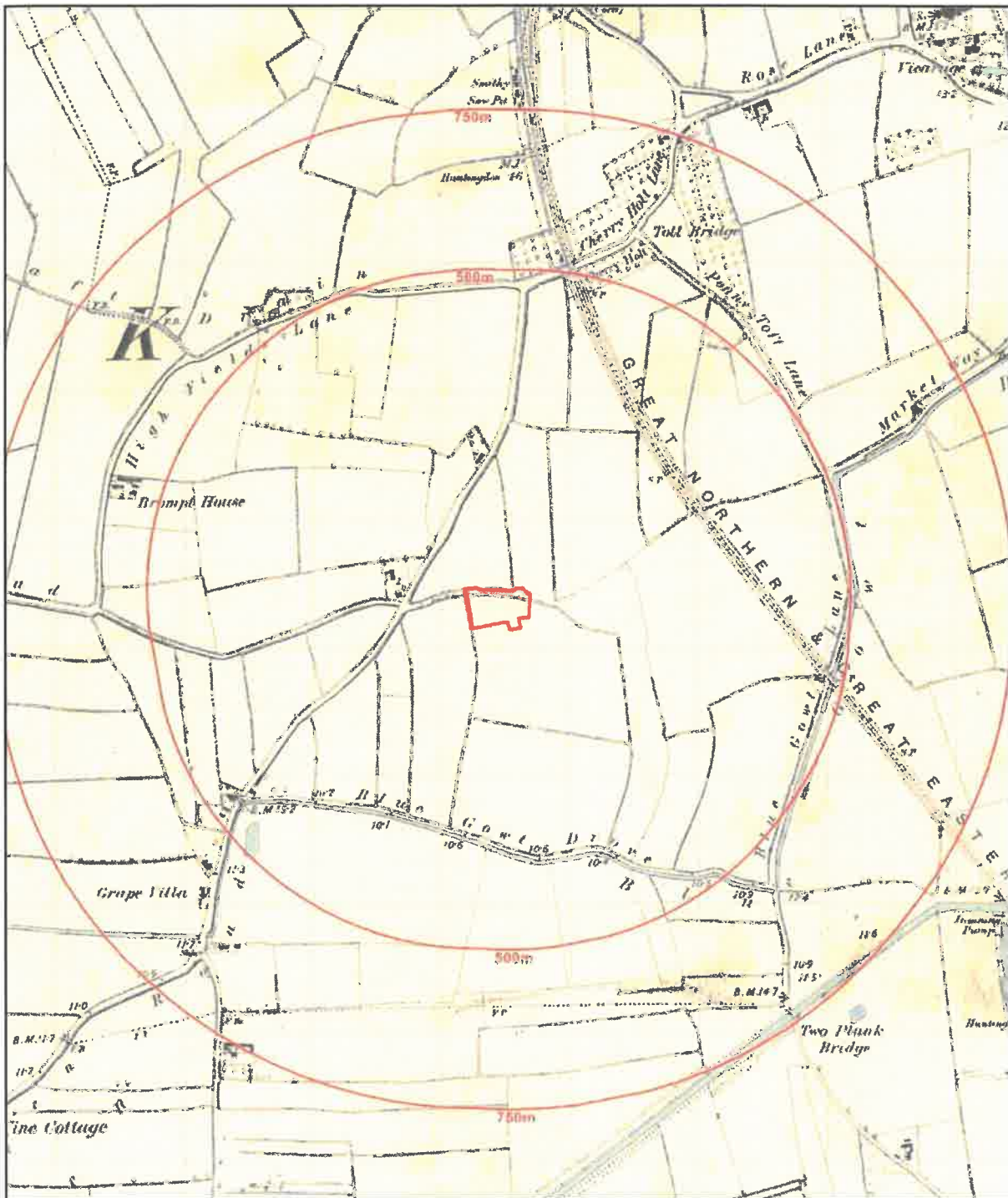
APPENDIX 1

HISTORICAL MAP EXTRACTS

Site History

Figure A

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Client : Anglia (UK) Limited

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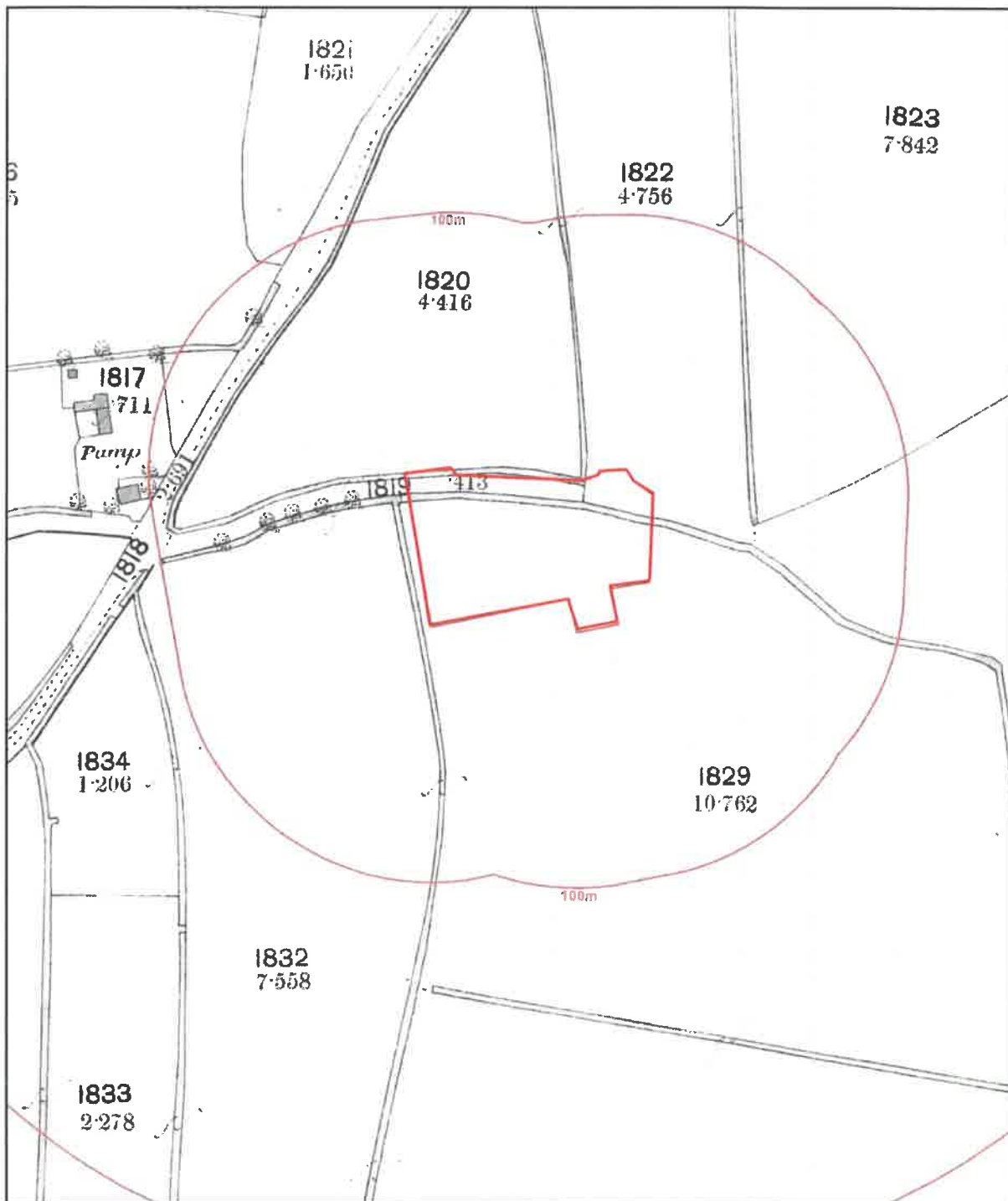
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Site History

Figure B

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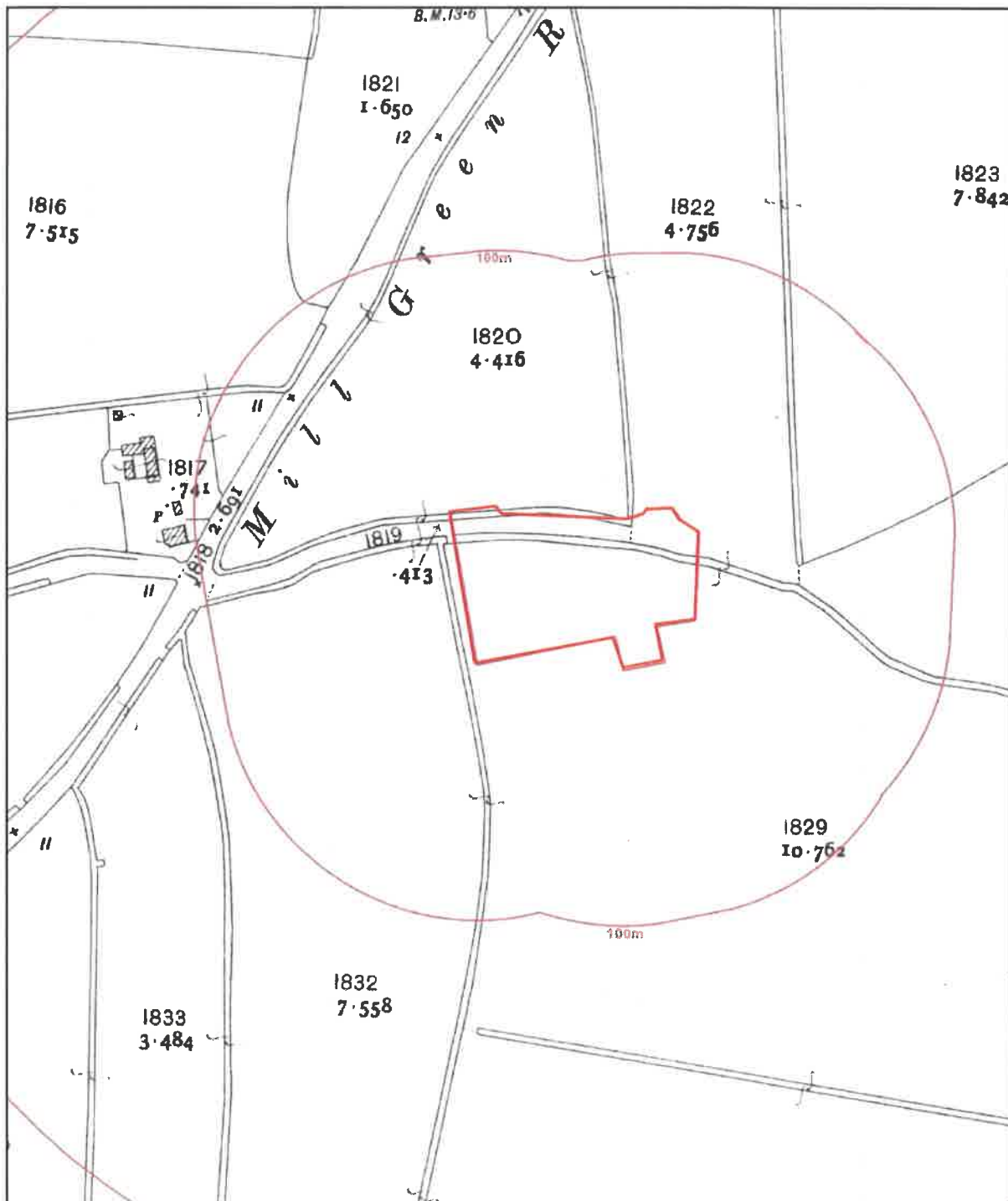
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Figure C

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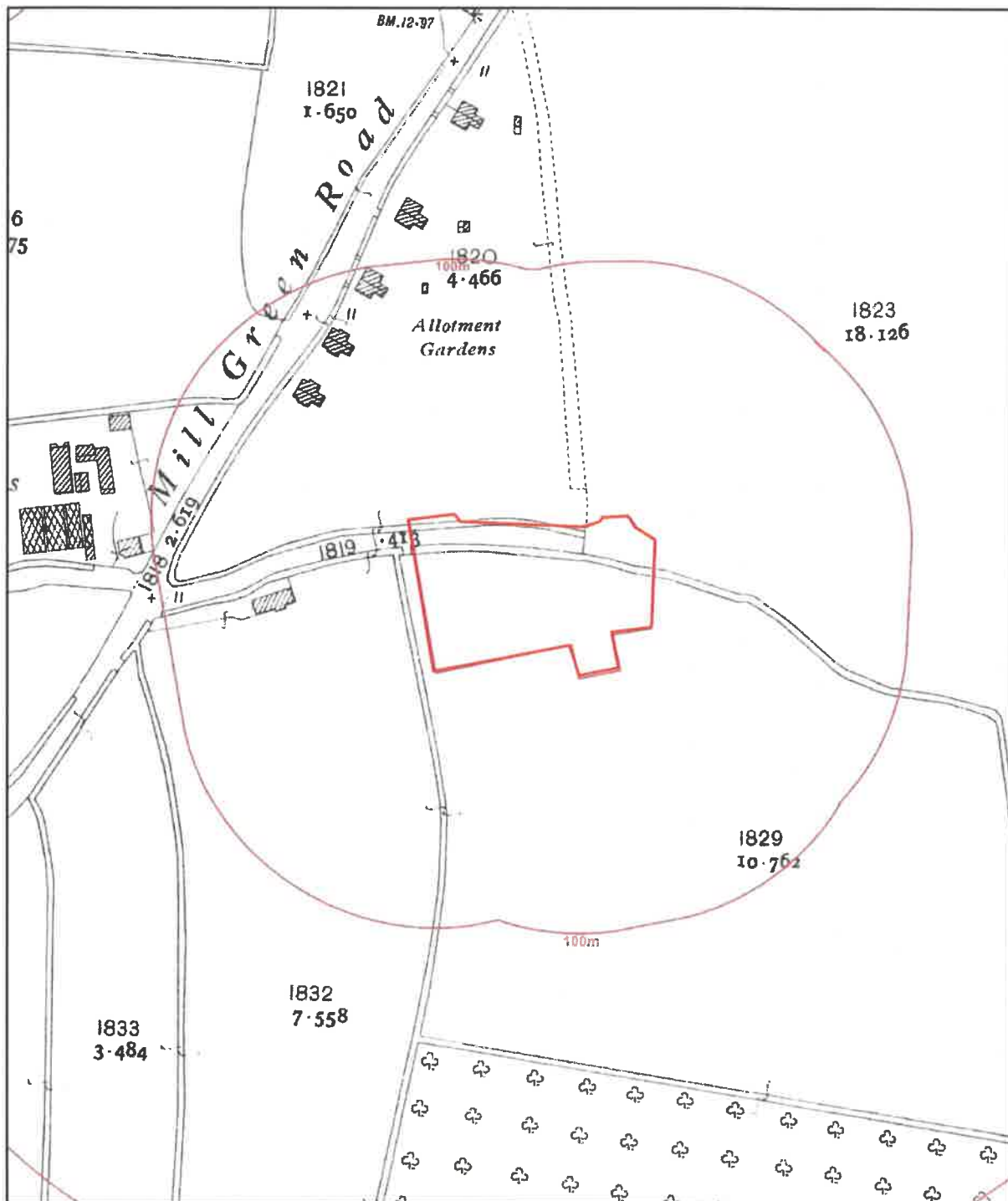
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Figure D

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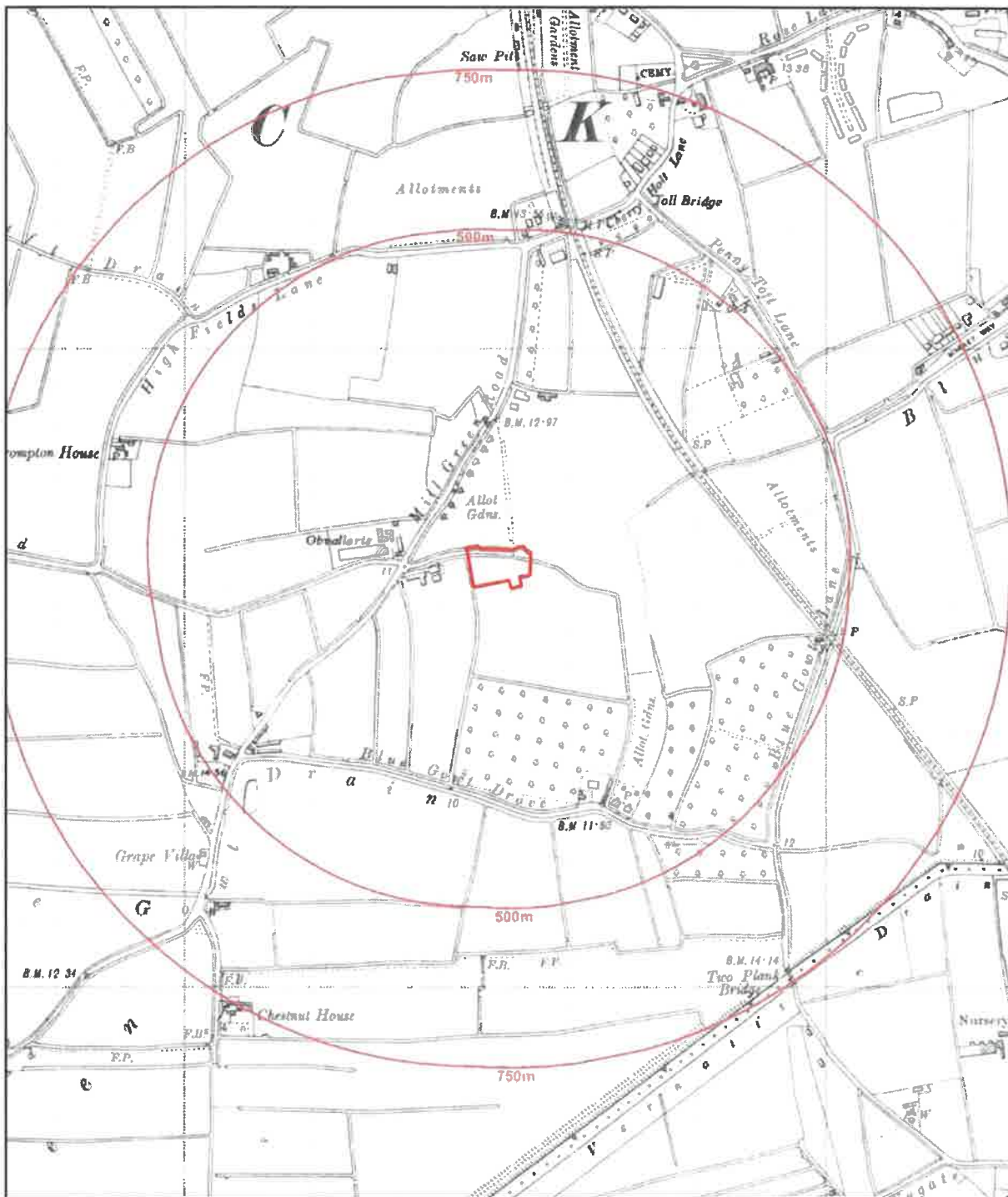
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Site History

Figure E

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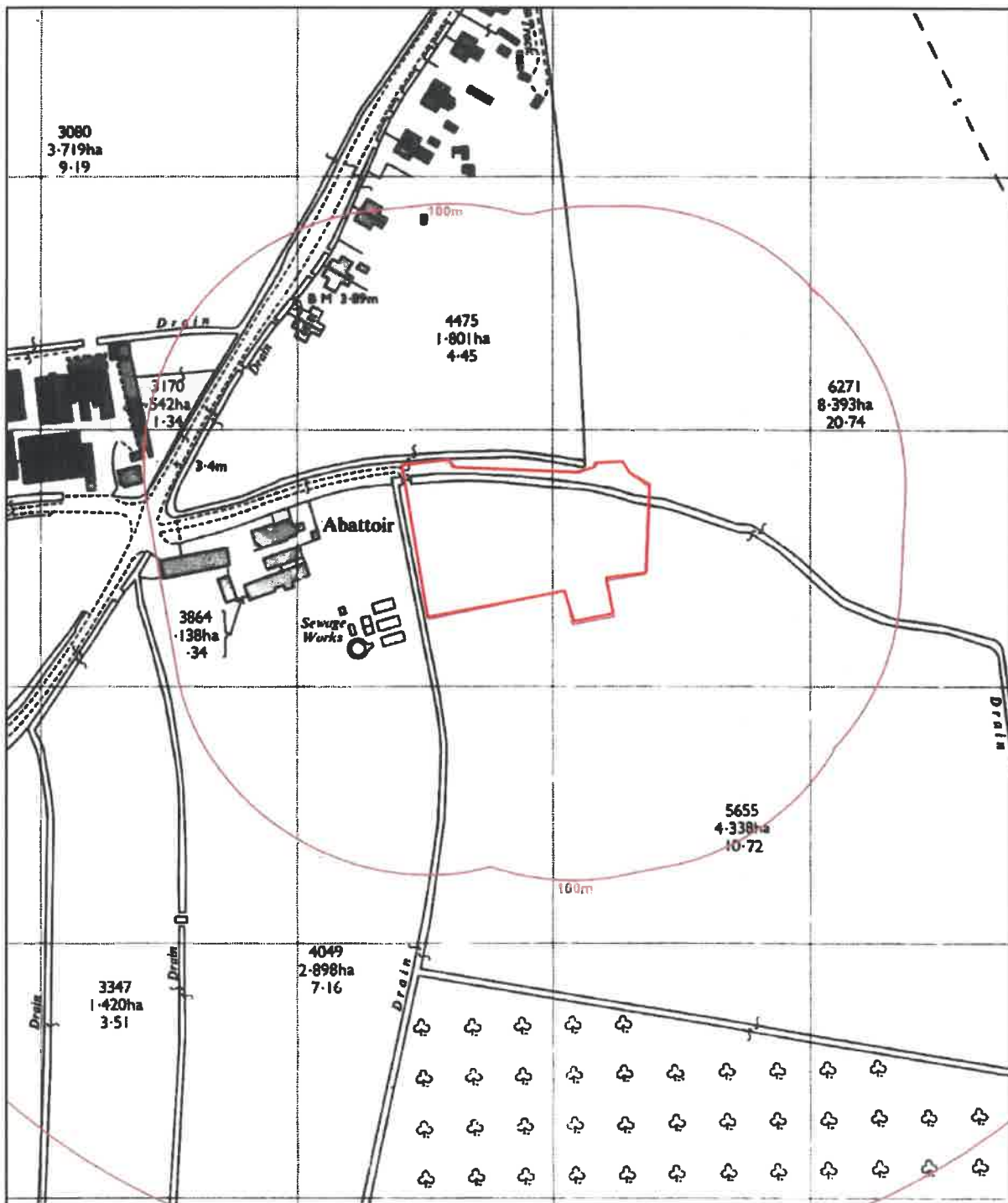
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Site History

Figure F

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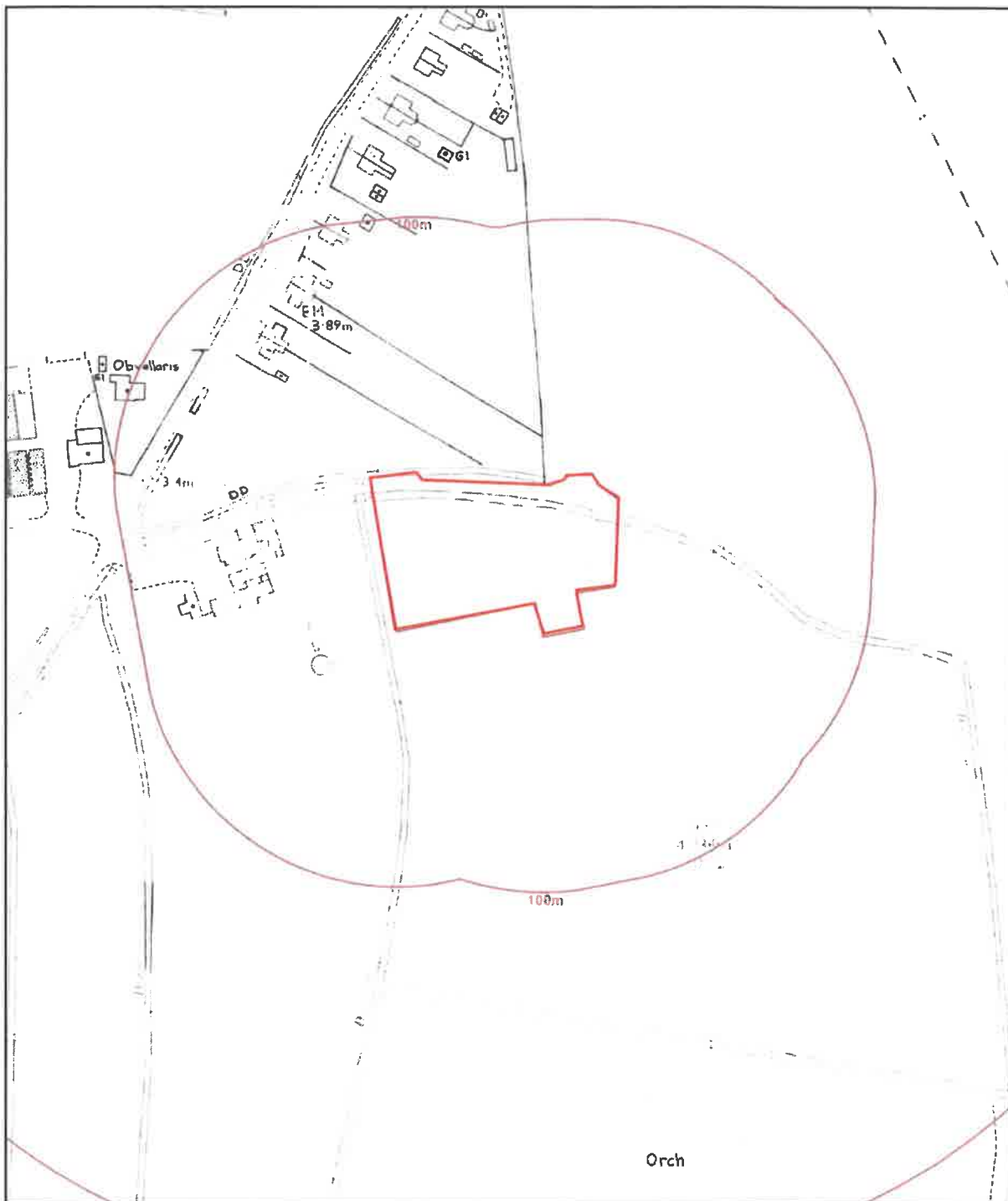
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Site History

Figure G

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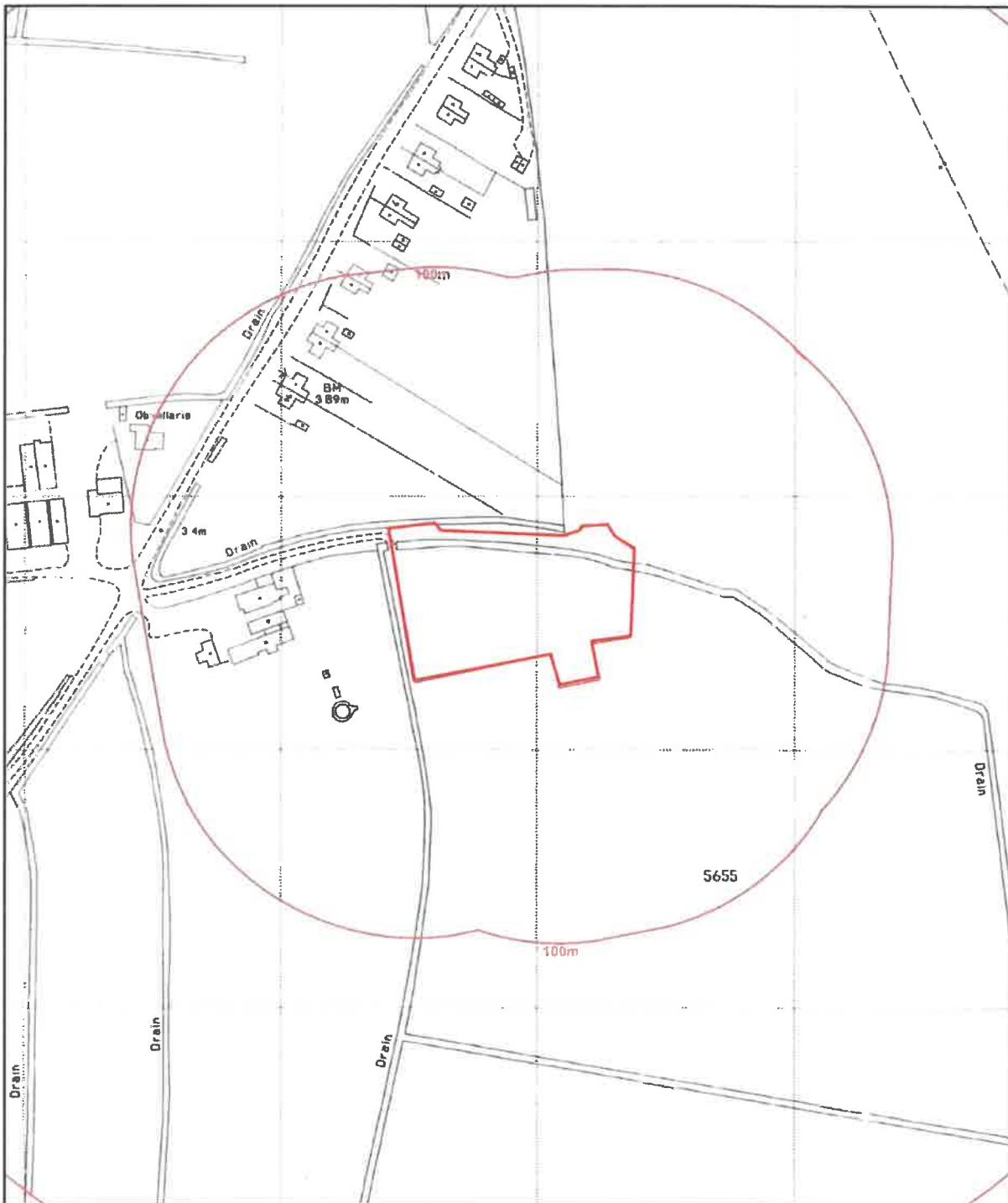
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Site History

Figure H

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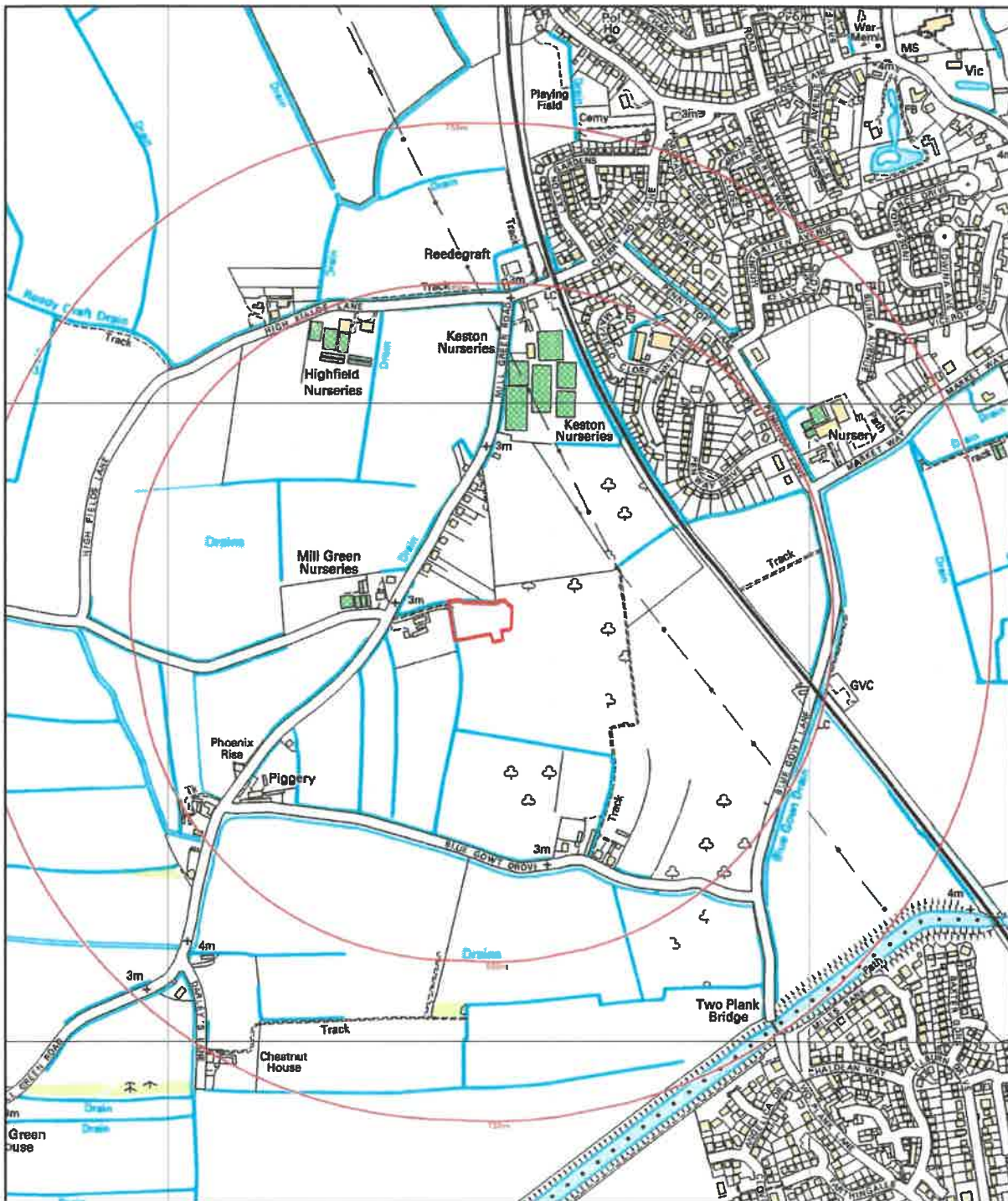
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Site History

Figure I

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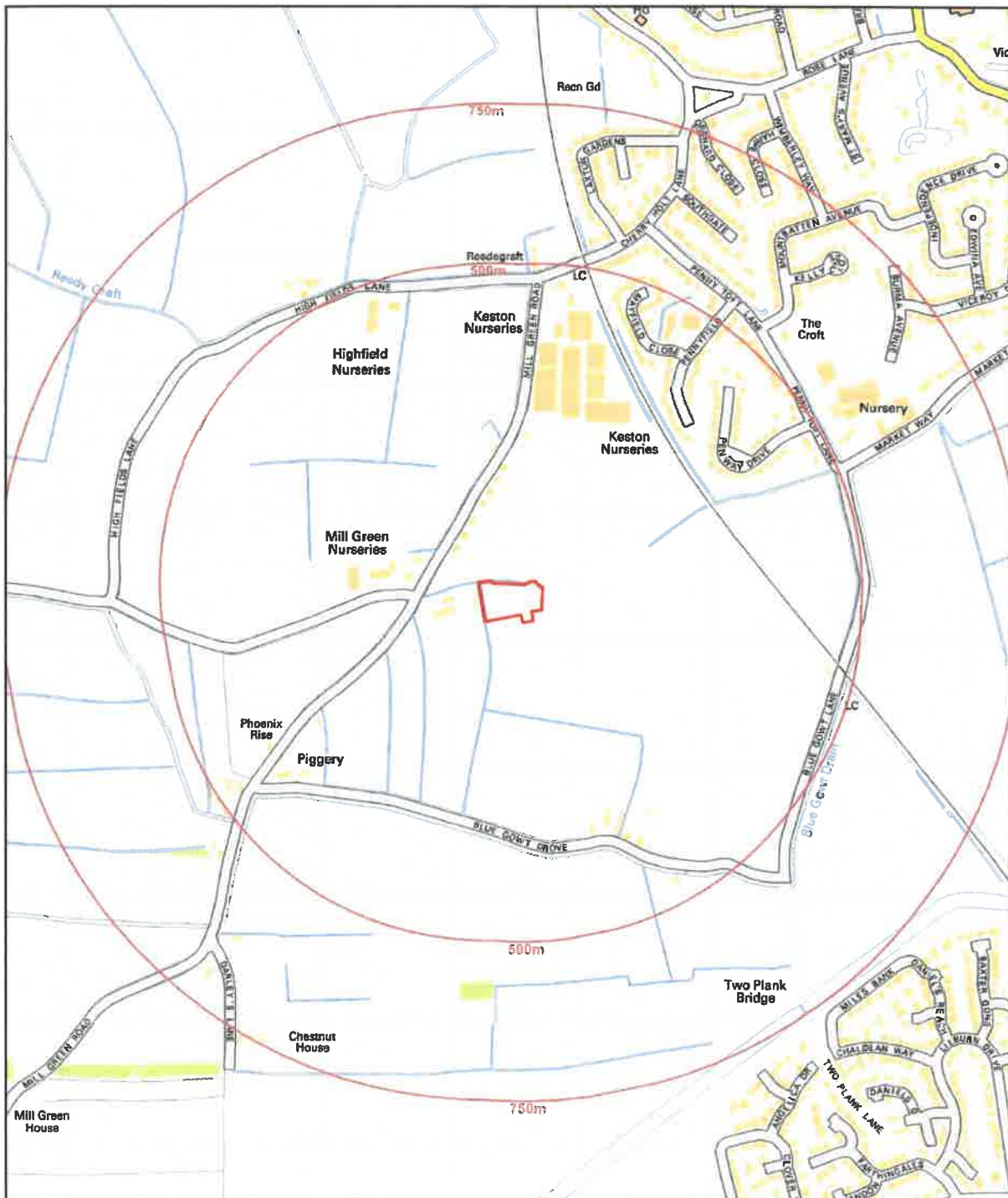
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Site History

Figure J

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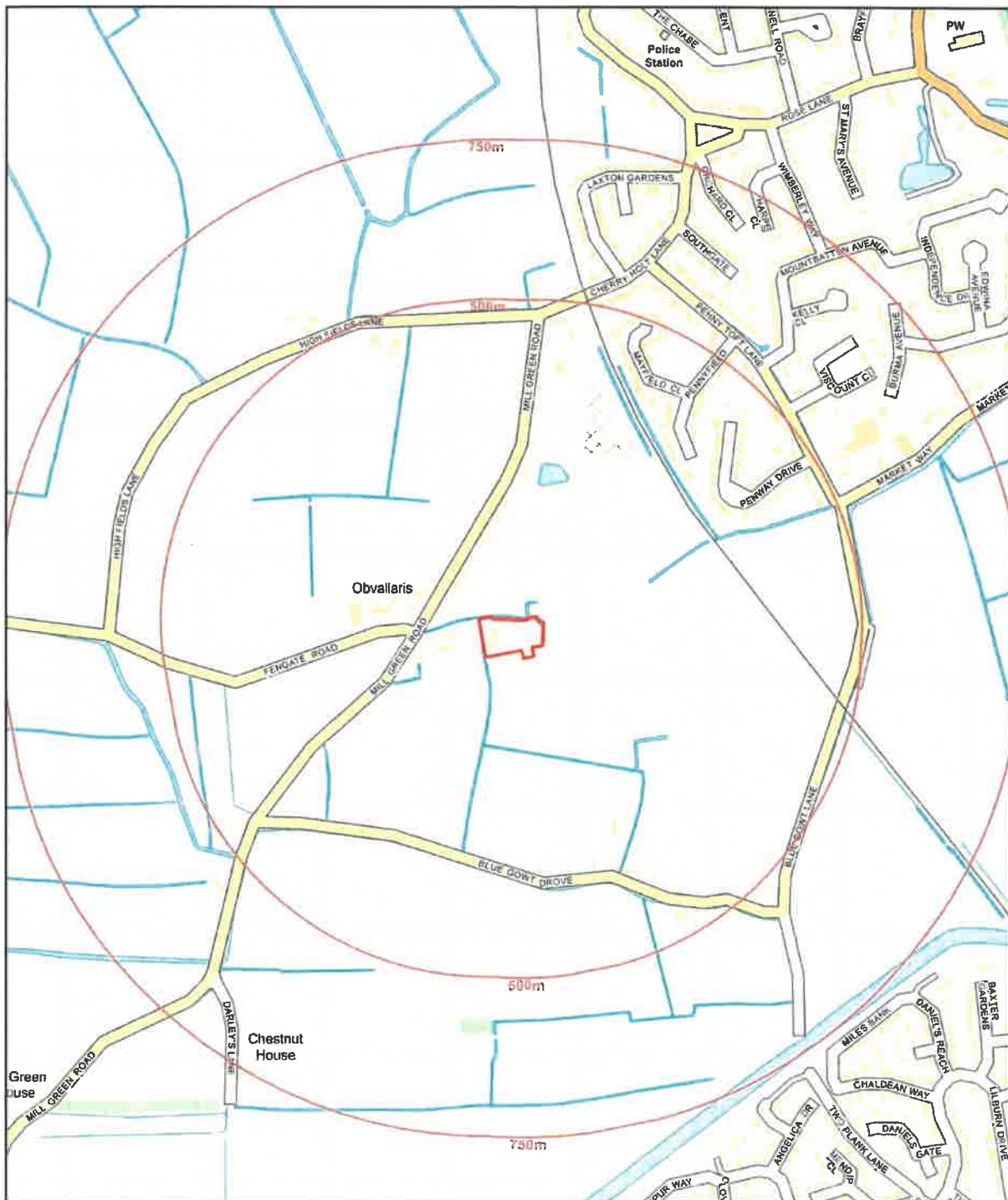
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Site History

Figure K

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Site History

Figure L

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Project No.

C14686

APPENDIX 2

ENVIRONMENTAL DATABASE SEARCH

Address: ANGLIA UK, THE ANGLIAN BUSINESS CENTRE, MILL GREEN ROAD, PINCHBECK, SPALDING, PE11 3PU

Date: 21 Jan 2019

Reference: GS-5762749

Client: Ground Engineering Limited



Aerial Photograph Capture date: 06-Apr-2015

Grid Reference: 523488,324661

Site Size: 0.48ha

Report Reference: GS-5762749

Client Reference: SWC14686

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Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	3	1	8
1.2 Additional Information – Historical Tank Database	0	3	0	6
1.3 Additional Information – Historical Energy Features Database	0	0	0	0
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	0
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	1	0	7

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	0
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	1	0
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	1	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	2
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use

	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	2	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
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

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site						
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site						
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	2
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	7
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	2	28	84	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	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	1
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	1	0	0
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

Moderate

9.1.1 Maximum Shrink-Swell hazard rating identified on the study site

Low

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

Moderate

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

Moderate

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.

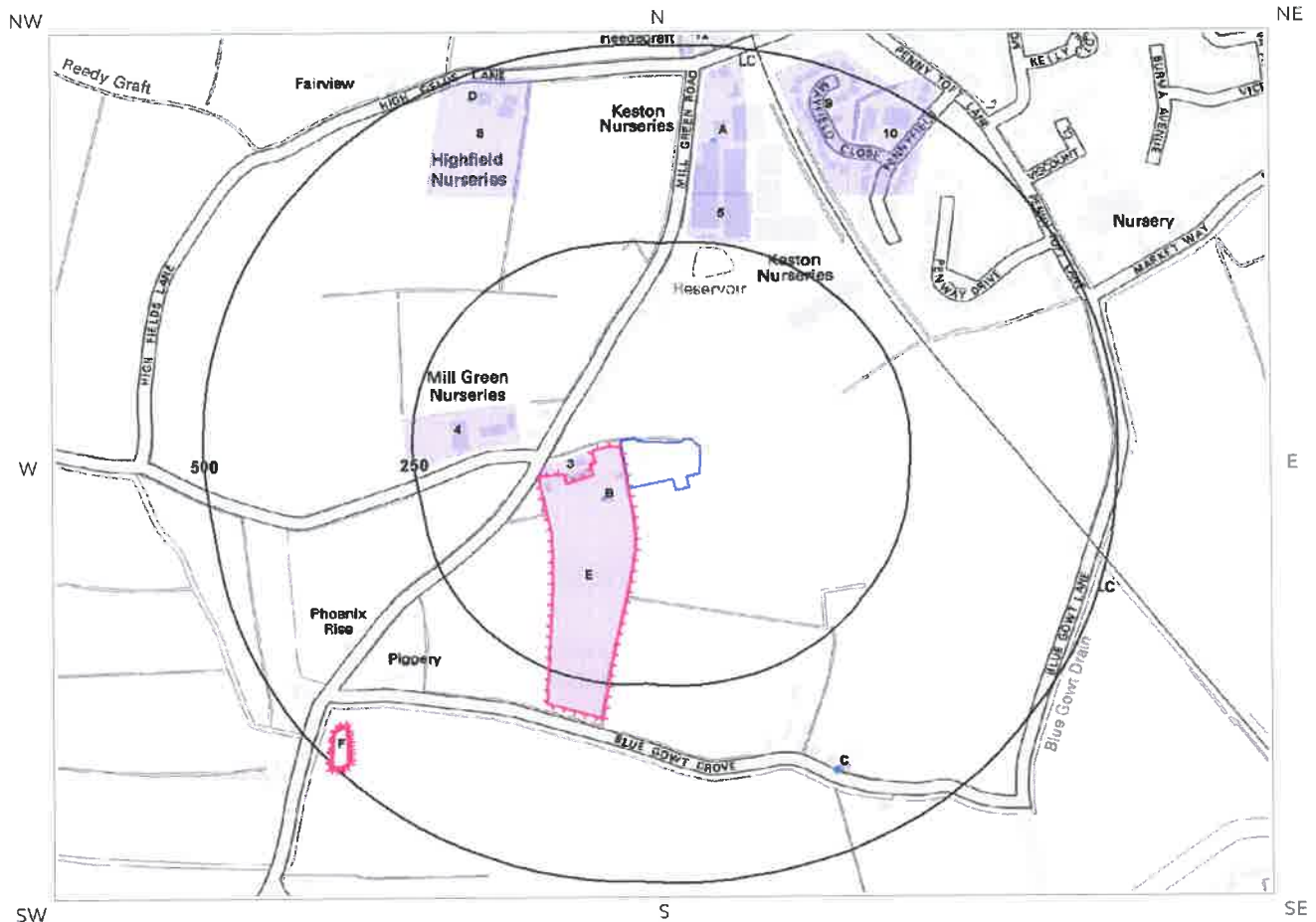
Note: Maps

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).

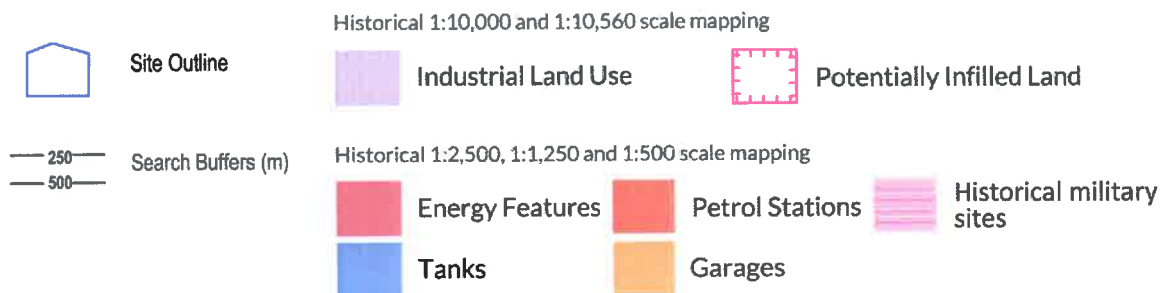
Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

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: 12

ID	Distance [m]	Direction	Use	Date
1E	1	W	Sewage Works	1980
2B	22	SW	Unspecified Tank	1980
3	34	W	Abattoir	1980
4	123	W	Nurseries	1990
5	254	N	Nurseries	1990
6A	311	N	Nurseries	1989
7A	311	N	Nursery	1973
8	335	N	Nurseries	1989
9	356	NE	Nursery	1973
10	363	NE	Dairy	1973
11C	392	SE	Unspecified Tank	1990
12	485	N	Nursery	1973

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: 9

ID	Distance (m)	Direction	Use	Date
13B	27	SW	Unspecified Tank	1967
14B	28	W	Unspecified Tank	1995
15B	30	SW	Unspecified Tank	1988
16A	378	N	Unspecified Tank	1984
17A	378	N	Unspecified Tank	1986
18C	395	SE	Unspecified Tank	1995
19C	396	SE	Unspecified Tank	1988
20D	465	N	Unspecified Tank	1984
21D	467	N	Unspecified Tank	1986

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: 0

Database searched and no data found.

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: 0

Database searched and no data found.

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

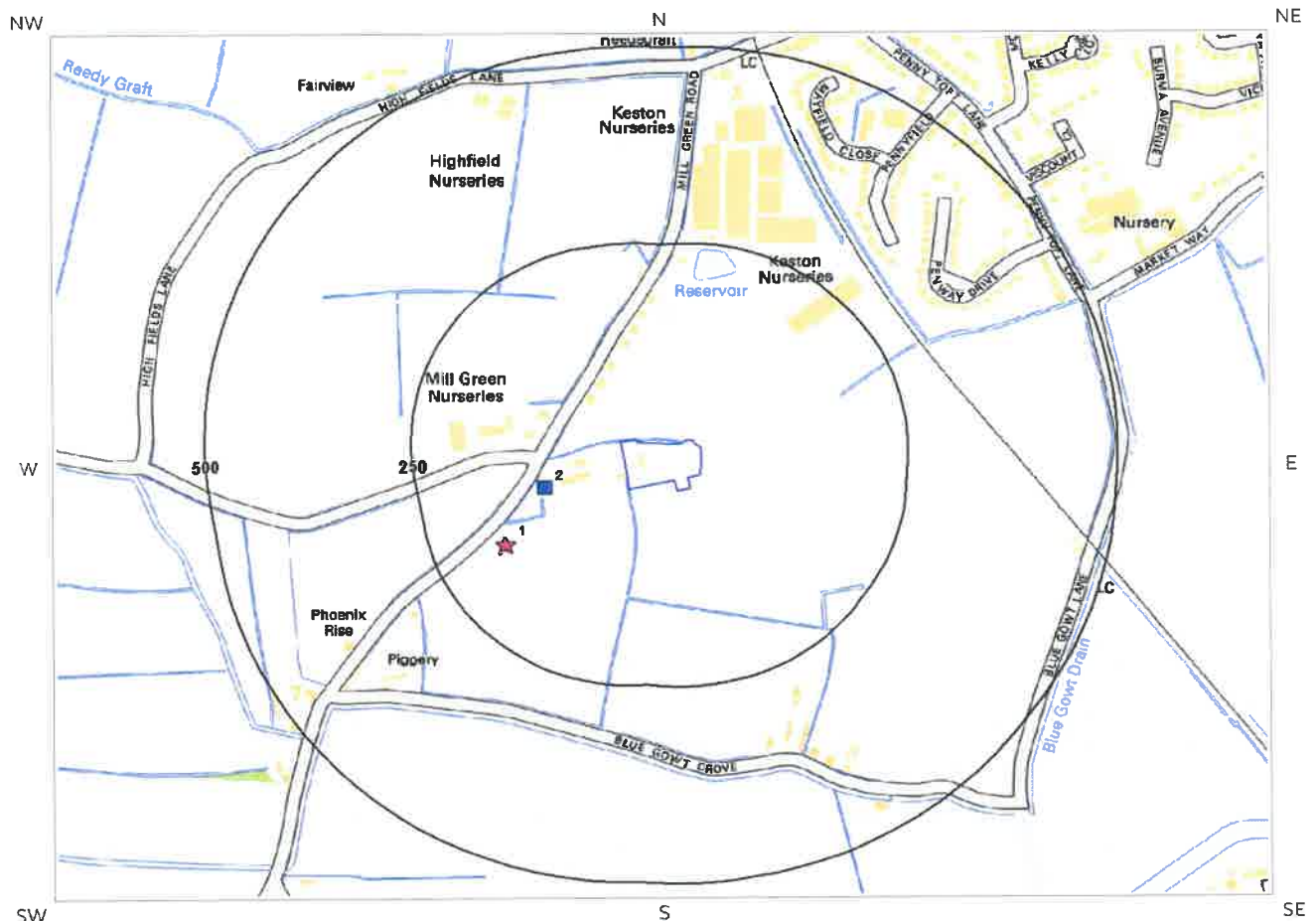
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 8

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

ID	Distance(m)	Direction	Use	Date
----	-------------	-----------	-----	------

22E	1	W	Sewage Works	1980
23F	453	SW	Pond	1929
24F	453	SW	Pond	1929
25F	454	SW	Pond	1938
26F	457	SW	Pond	1950
27F	457	SW	Pond	1903
28F	457	SW	Pond	1887
29F	457	SW	Pond	1950

2. Environmental Permits, Incidents and Registers Map



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- | | | |
|--------------------|-------------------------------|--|
| 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:

0

Database searched and no data found.

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:

1

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

ID	Distance (m)	Direction	NGR	Details
2	99	W	523350 324630	Address: PREMISES OF DAVID PARKER HOMES LTD, MILL GREEN ROAD, SPALDING Effluent Type: UNSPECIFIED Permit Number: PR5LF5120 Permit Version: 1 Receiving Water: land Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 20/01/1986 Effective Date: 20-Jan-1986 Revocation Date: 16/09/1997

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:

1

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

ID	Distance (m)	Direction	NGR	Details	
1	165	SW	523302 324558	Incident Date: 06-Feb-2002 Incident Identification: 57059 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Vegetable Cuttings and Deposits	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

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

0

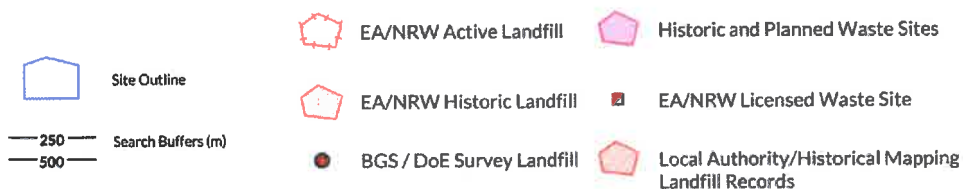
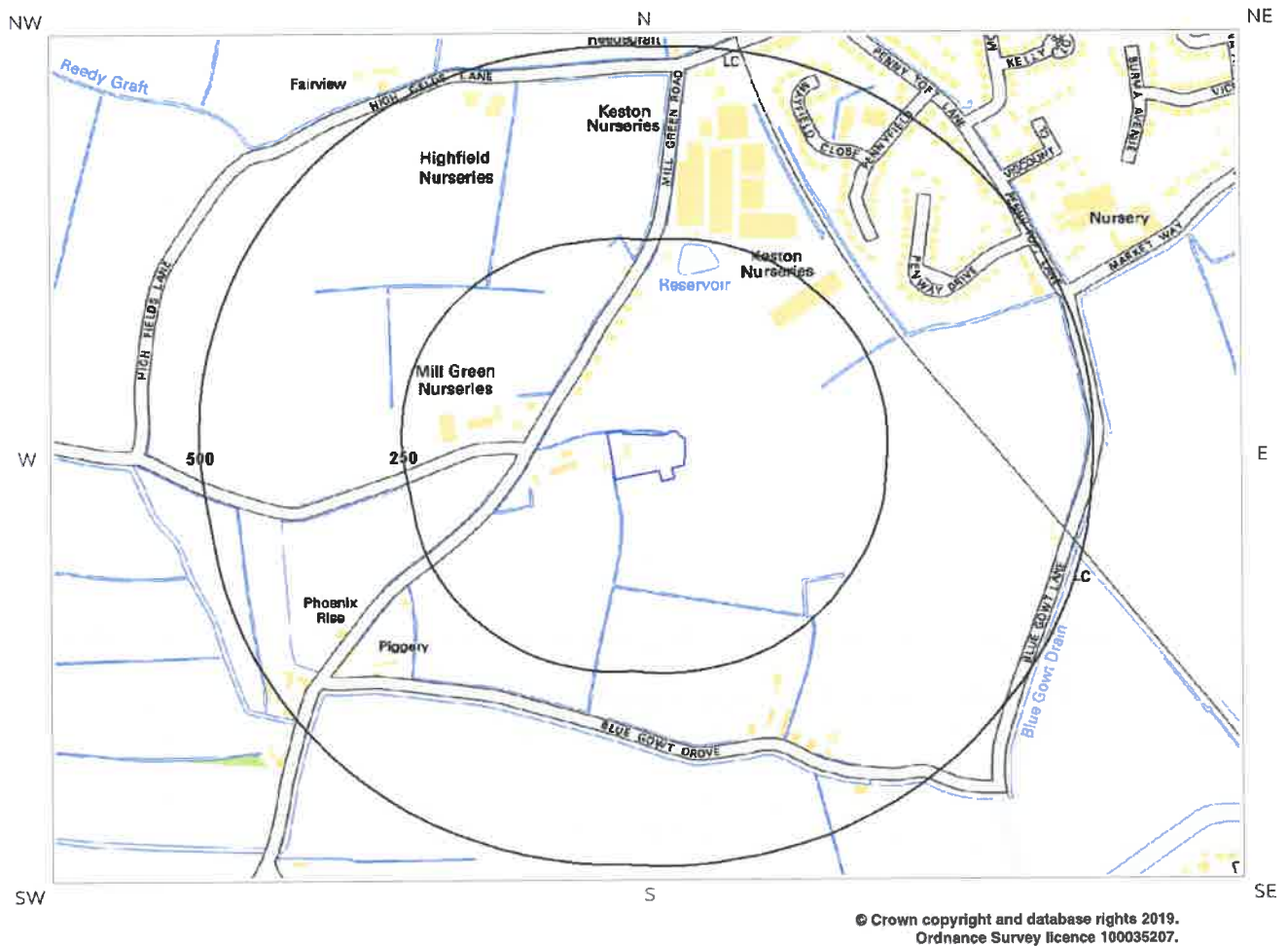
Database searched and no data found.

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

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

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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:

3

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	867	SE		Site Address: Woolram Wygate, Spalding, Lincolnshire Waste Licence: - Site Reference: RD7-71-01/89, SH-71-01/89, 2500/5041 Waste Type: - Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1087	SE		Site Address: Woolram Wygate, Spalding, Lincolnshire Waste Licence: - Site Reference: RD7-71-01/89, SH-71-01/89, 2500/5041 Waste Type: - Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1155	SE		Site Address: Woolram Wygate, Spalding, Lincolnshire Waste Licence: - Site Reference: RD7-71-01/89, SH-71-01/89, 2500/5041 Waste Type: - Environmental Permitting Regulations (Waste) Reference: - Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -

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

0

Database searched and no data found.

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

0

Database searched and no data found.

3.2 Other Waste Sites

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

0

Database searched and no data found.

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

0

Database searched and no data found.



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	108	W	Houghton Produce Ltd	523333 324697	Fengate Road, Pinchbeck, Spalding, Lincolnshire, PE11 3PS	Fruit, Flower and Vegetable Growers	Farming
2	143	W	Silo	523301 324717	Lincolnshire, PE11	Hoppers and Silos	Farming

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 0

Database searched and no data found.

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
TFD-XCZ	TIDAL FLAT DEPOSITS	CLAY AND SILT

5.3 Bedrock and Solid Geology

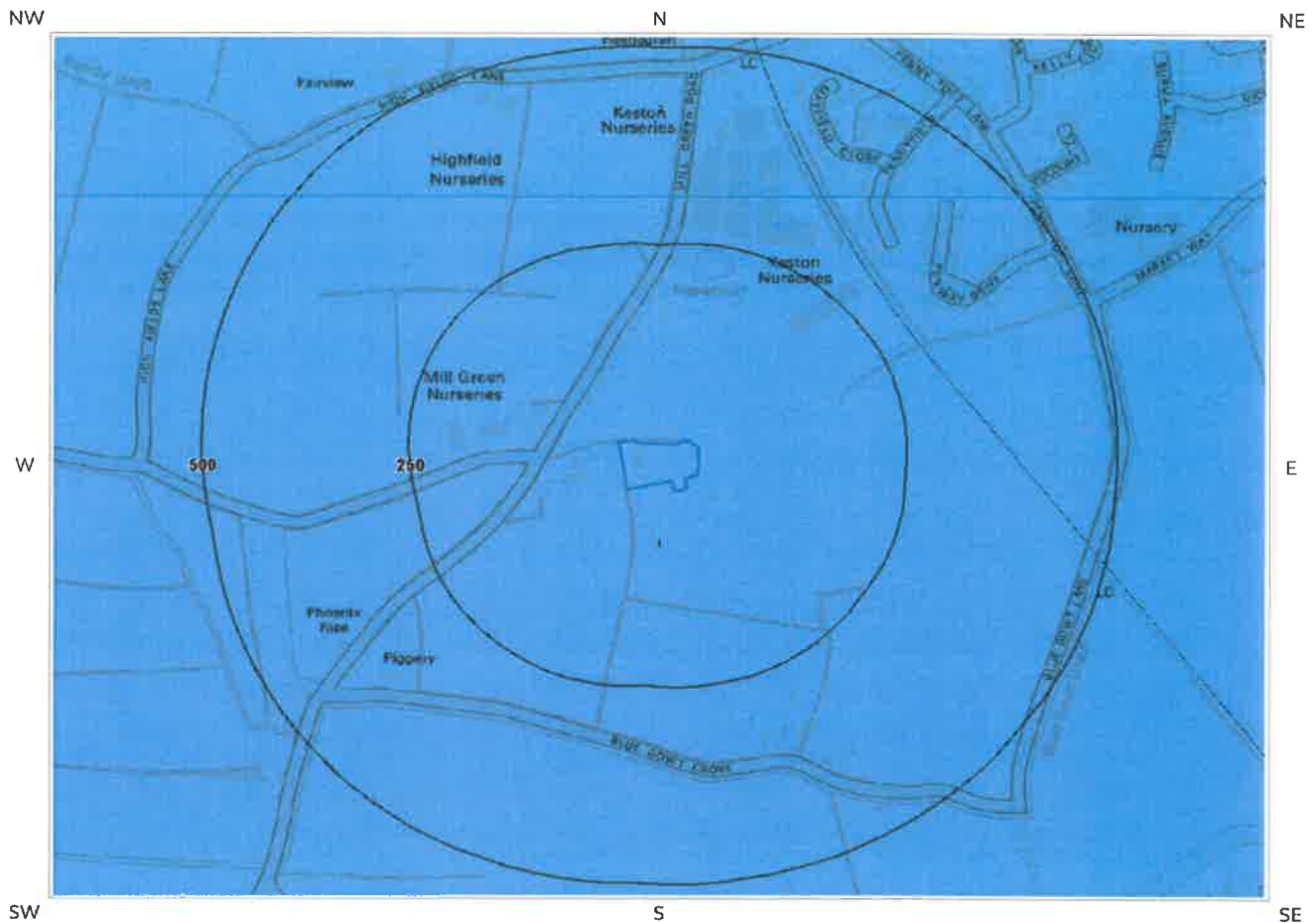
The database has been searched on site, including a 50m buffer.

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

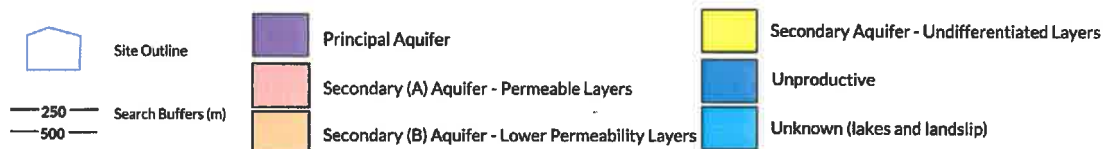
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

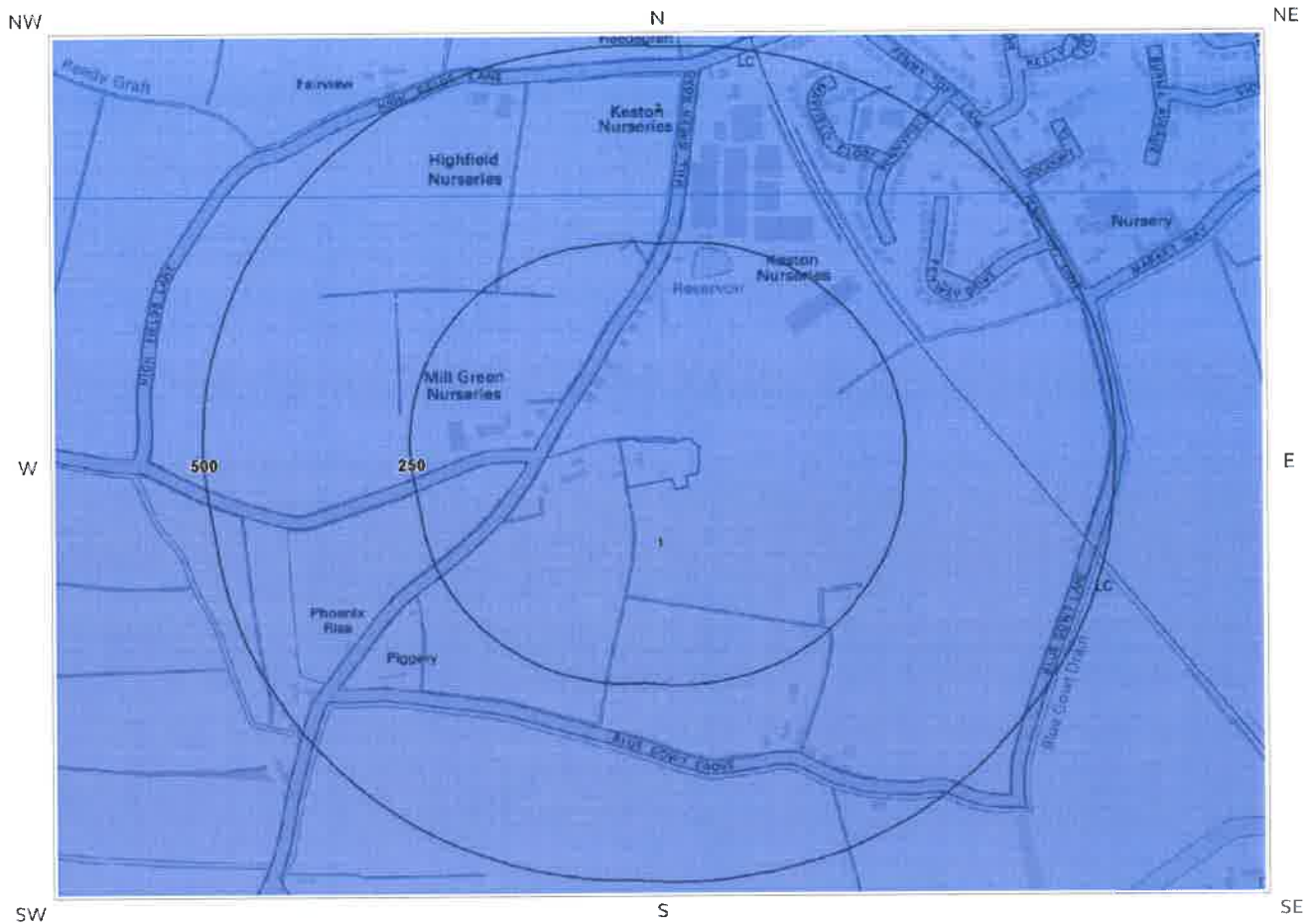
6a. Aquifer Within Superficial Geology



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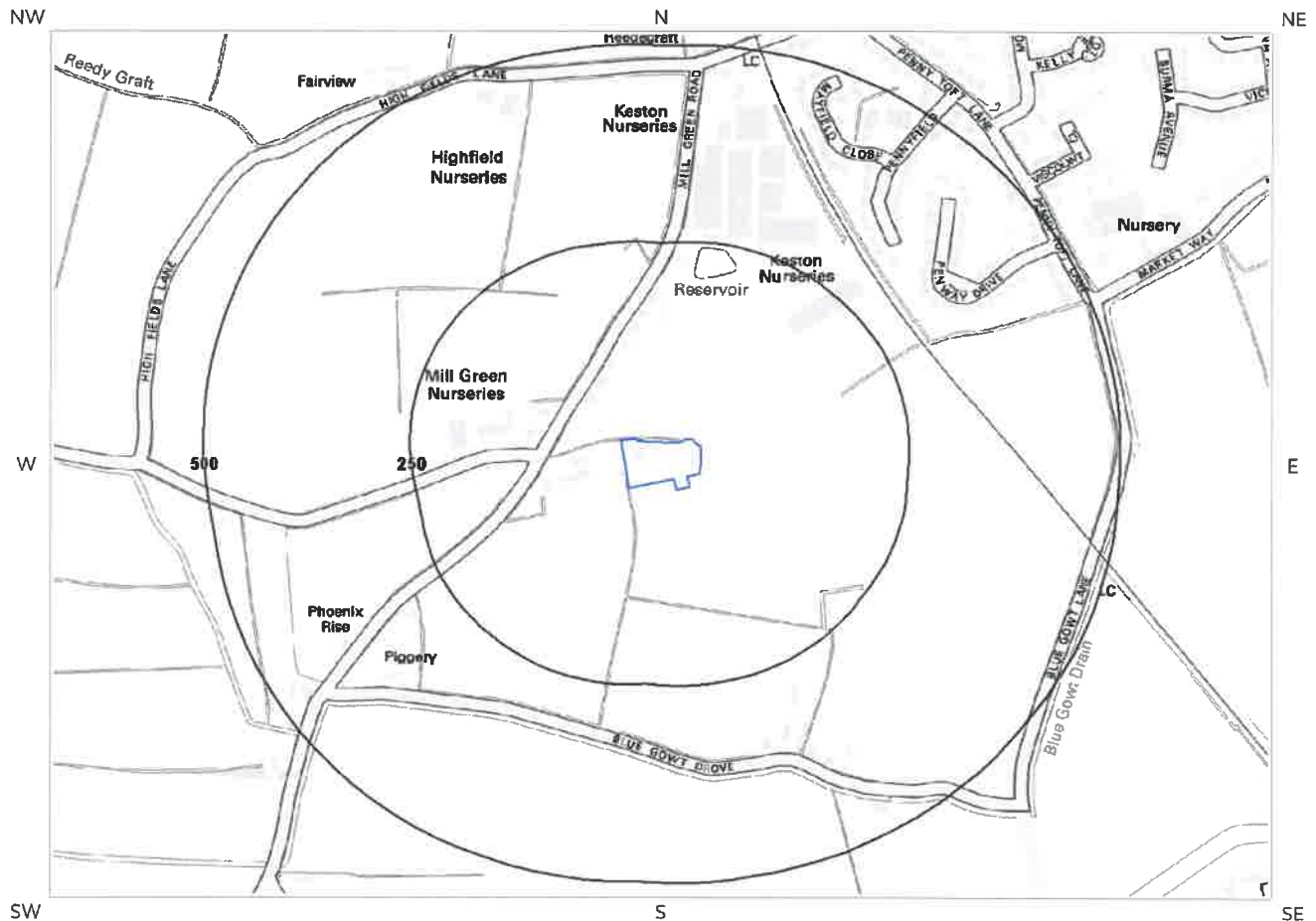


6b. Aquifer Within Bedrock Geology and Abstraction Licences

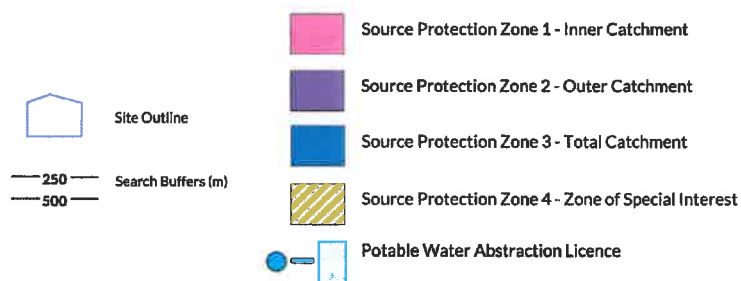


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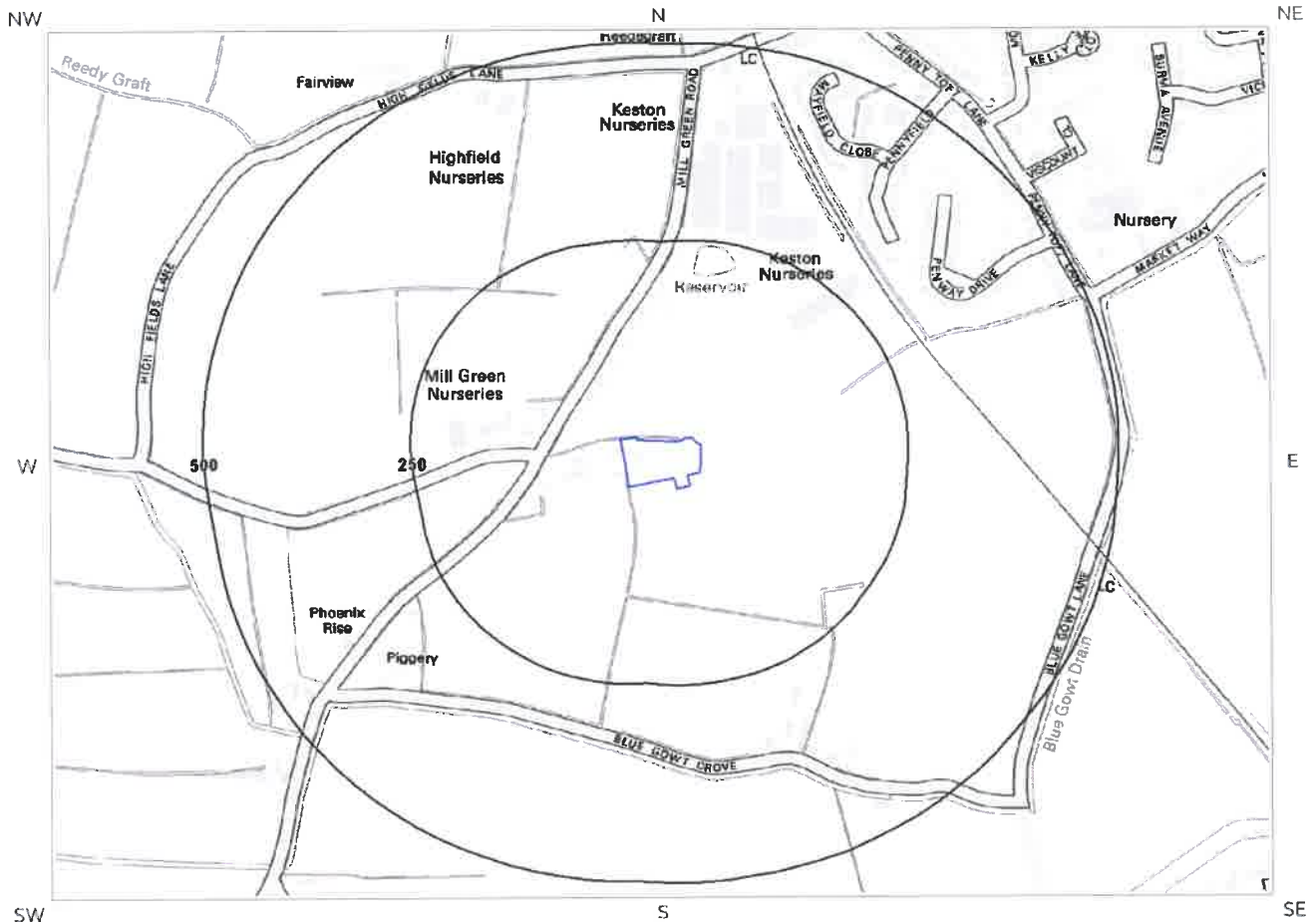
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences



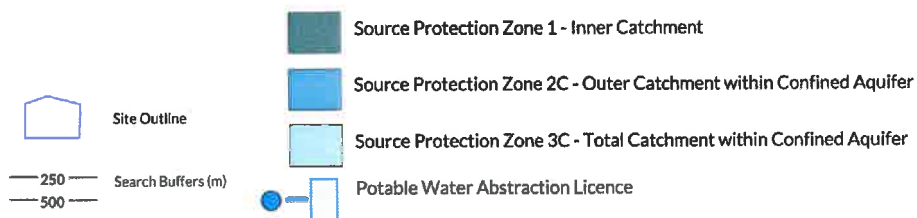
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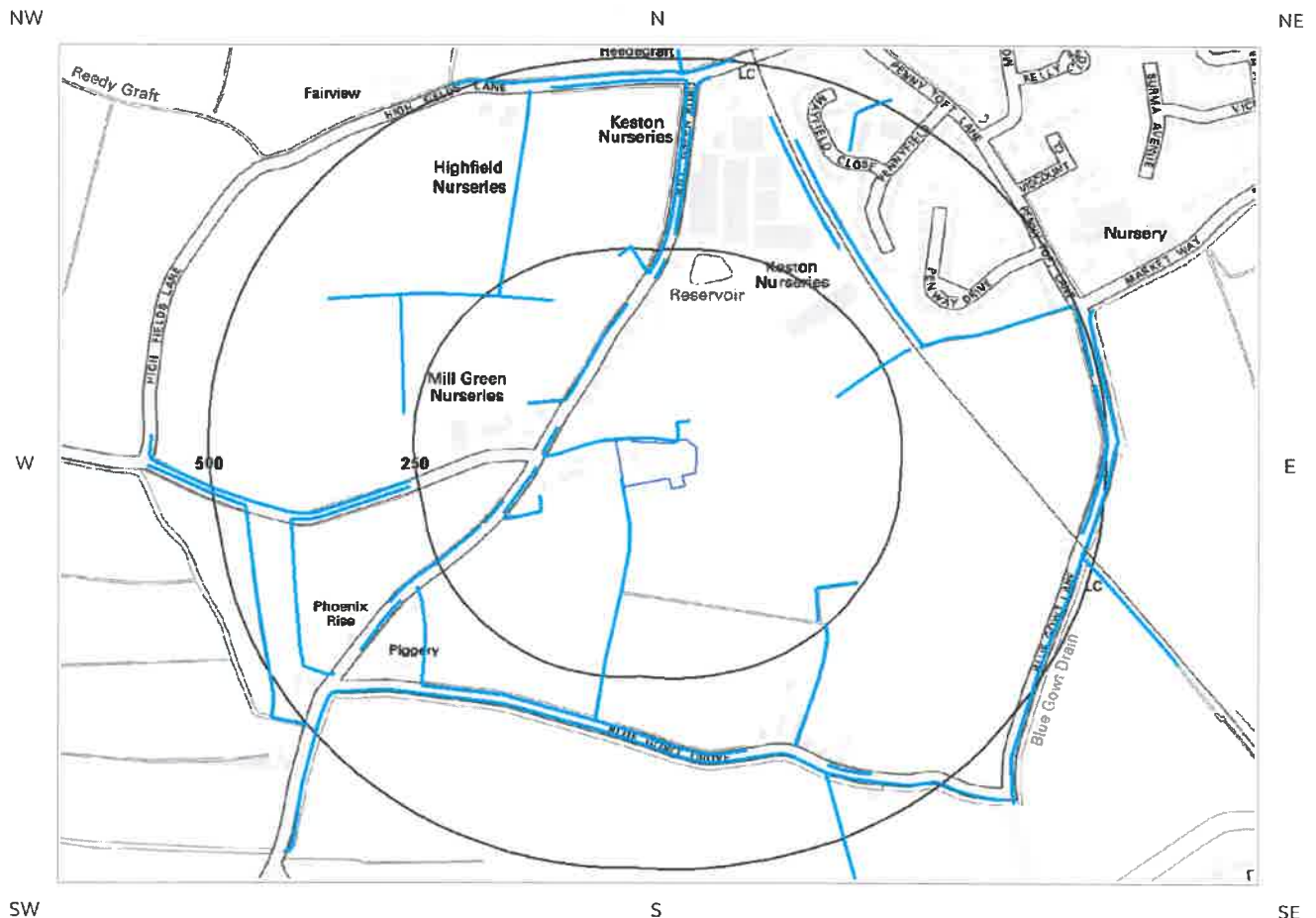
6d. Hydrogeology – Source Protection Zones within confined aquifer



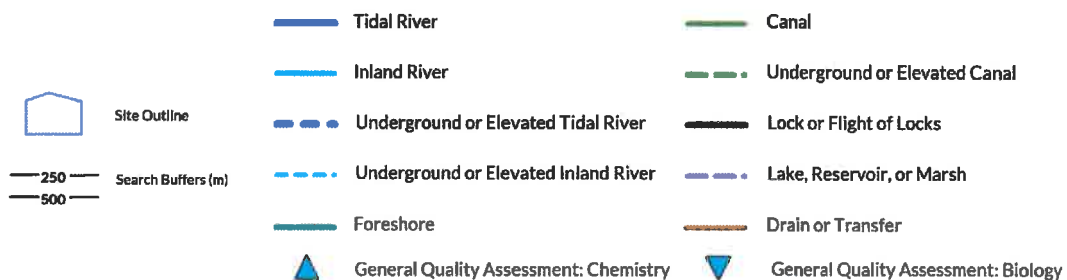
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6e. Hydrology – Watercourse Network and River Quality



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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
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
2	310	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

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
2	310	N	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	1424	W	522070 324280	Status: Historical Licence No: 5/31/14/*G/0007 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BORE CHASE FARM PINCHBECK Data Type: Point Name: MOLSON Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/02/1979 Version End Date:
Not shown	1432	W	522070 324250	Status: Historical Licence No: 5/31/14/*G/0007 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE - CHASE FARM Data Type: Point Name: MOLSON Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/02/1966 Expiry Date: - Issue No: 101 Version Start Date: 23/08/1999 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
Not shown	733	SE	523900 324000	Status: Active Licence No: 5/31/14/*S/0117 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: VERNATTS DRAINS - SOUTH HOLLAND Data Type: Line Name: C W DOBBS & SON LTD Annual Volume (m³): 5455 Max Daily Volume (m³): 1027.4 Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 101 Version Start Date: 29/11/2001 Version End Date:
Not shown	1318	N	524550 325970	Status: Historical Licence No: 5/31/14/*S/0247 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: CAPTAINS DRAIN "E - F" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD Annual Volume (m³): 135000 Max Daily Volume (m³): 8000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:
Not shown	1319	N	524550 325970	Status: Active Licence No: 5/31/14/*S/0247 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: CAPTAINS DRAIN "E - F" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD Annual Volume (m³): 135000 Max Daily Volume (m³): 8000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:
Not	1678	NW	522600	Status: Active Annual Volume (m³): 22730

ID	Distance (m)	Direction	NGR	Details	
shown			326140	Licence No: 4/30/12/*S/0179 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: UNNAMED FARM DYKE PINCHBECK Data Type: Point Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Max Daily Volume (m³): 1455 Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 101 Version Start Date: 12/01/2006 Version End Date:
Not shown	1687	NW	522600 326150	Status: Historical Licence No: 4/30/12/*S/0179 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: UNNAMED FARM DYKE PINCHBECK Data Type: Point Name: GRANGE FARM PINCHBECK	Annual Volume (m³): 22730 Max Daily Volume (m³): 1454.75 Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/05/1986 Version End Date:
Not shown	1781	N	522950 326400	Status: Active Licence No: 4/30/12/*S/0179 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: UNNAMED FARM DYKE PINCHBECK Data Type: Point Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Annual Volume (m³): 22730 Max Daily Volume (m³): 1455 Application No: - Original Start Date: 01/03/1966 Expiry Date: - Issue No: 101 Version Start Date: 12/01/2006 Version End Date:
Not shown	1833	E	525340 324320	Status: Historical Licence No: 5/31/14/*S/0014 Details: Non-Evaporative Cooling Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: VERNATTS DRAIN Data Type: Line Name: SPALDING ENERGY CO LTD	Annual Volume (m³): 2.72766e+006 Max Daily Volume (m³): 22912 Application No: - Original Start Date: 01/01/1966 Expiry Date: - Issue No: 101 Version Start Date: 02/02/2002 Version End Date:
Not shown	1877	NW	521000 325300	Status: Active Licence No: 5/31/14/*S/0116A Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: RIVER GLEN, WEST PINCHBECK Data Type: Line Name: SNEATH	Annual Volume (m³): 32000 Max Daily Volume (m³): 1900 Application No: - Original Start Date: 01/02/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/05/1996 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 None identified

Database searched and no data found.

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	1 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
4	1 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
2	2 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): 2.6
5	2 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): 2.6
3	81 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): 2.0
6	81 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): 2.0
4	102 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): 2.2
7	102 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): 2.2
5	104 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
8	104 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
6	150 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
9	150 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)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 2.5
7	182 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): 2.8
10	182 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): 2.8
8	184 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): 2.0
11	184 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): 2.0
9	200 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): 2.6
12	200 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): 2.6
10	208 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): Not Provided
13	208 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): Not Provided
11	213 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): 3.1
14	213 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): 3.1
12	219 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): Not Provided
13	219 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

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
15	219 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): Not Provided
16	219 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
14	239 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): 2.7
15	239 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): 2.8
17	239 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): 2.7
18	239 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): 2.8
16	249 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): 2.1
19	249 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): 2.1
17	259 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): 2.4
20	259 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): 2.4
18	260 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): 2.3
21	260 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): 2.3
19	264	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface

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): 2.2
22	264 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): 2.2
20	269 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
Not shown	269 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
21	288 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
24	288 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
22	295 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): Not Provided
25	295 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): Not Provided
23	297 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): 1.6
26	297 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): 1.6
24	302 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): 3.1
27	302 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): 3.1
25	303 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)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 3.5
28	303 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): 3.5
26	307 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): 3.9
29	307 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): 3.9
27	308 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): 3.9
30	308 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): 3.9
28	309 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): 2.3
Not shown	309 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): 2.3
29	311 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): 3.0
32	311 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): 3.0
30	313 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): 3.0
31	313 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): 1.5
33	313 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): 3.0

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
34	313 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): 1.5
32	315 S	Blue Gowt Drain	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): 7.0
Not shown	315 S	Blue Gowt Drain	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): 7.0
33	328 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): 2.6
36	328 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): 2.6
34	334 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): 2.5
Not shown	334 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): 2.5
35	338 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): 2.9
Not shown	338 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): 2.9
36	403 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): 1.9
Not shown	403 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): 1.9
37	411 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): Not Provided
Not shown	411	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface

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
38	414 SE	Blue Gowt Drain	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): 7.0
39	414 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): 1.7
Not shown	414 SE	Blue Gowt Drain	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): 7.0
Not shown	414 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): 1.7
40	425 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): 2.6
Not shown	425 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): 2.6
41	427 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): 2.7
Not shown	427 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): 2.7
42	463 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): 2.1
Not shown	463 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): 2.1
43	479 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): 2.2
44	479 N	Reedy Graft Drain	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): 4.8
Not shown	479 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): 2.2
Not shown	479 N	Reedy Graft Drain	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): 4.8
45	481 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): 2.8
46	481 N	Reedy Graft Drain	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): 3.7
47	481 N	Reedy Graft Drain	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): 3.7
Not shown	481 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): 2.8
Not shown	481 N	Reedy Graft Drain	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): 3.7
Not shown	481 N	Reedy Graft Drain	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): 3.7
48	483 E	Blue Gowt Drain	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): 6.5
49	483 N	Reedy Graft Drain	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
50	483 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): 2.8
Not shown	483 E	Blue Gowt Drain	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): 6.5

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
Not shown	483 N	Reedy Graft Drain	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
Not shown	483 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): 2.8
51	484 E	Blue Gowt Drain	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): 6.5
Not shown	484 E	Blue Gowt Drain	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): 6.5
52	485 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): 4.7
53	485 N	Reedy Graft Drain	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
Not shown	485 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): 4.7
Not shown	485 N	Reedy Graft Drain	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
54	486 N	Reedy Graft Drain	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): 3.3
Not shown	486 N	Reedy Graft Drain	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): 3.3
55	489 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): Not Provided
Not shown	489 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): Not Provided
56	493	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Welland 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): 3.0
Not shown	493 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): 3.0
57	498 SW	Fengate Drain	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): 6.2
Not shown	498 SW	Fengate Drain	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): 6.2
58	499 N	Reedy Graft Drain	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
Not shown	499 N	Reedy Graft Drain	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

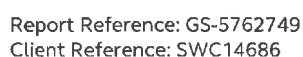
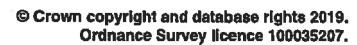
6.11 Surface Water Features

Surface water features within 250m of the study site

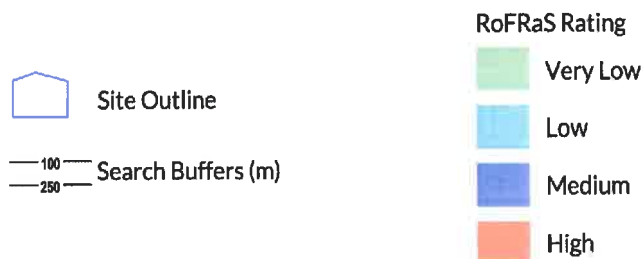
Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
1	W
101	W
103	W
148	W
182	E
183	W
198	NW
206	N
219	N
245	SE



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



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)

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

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.

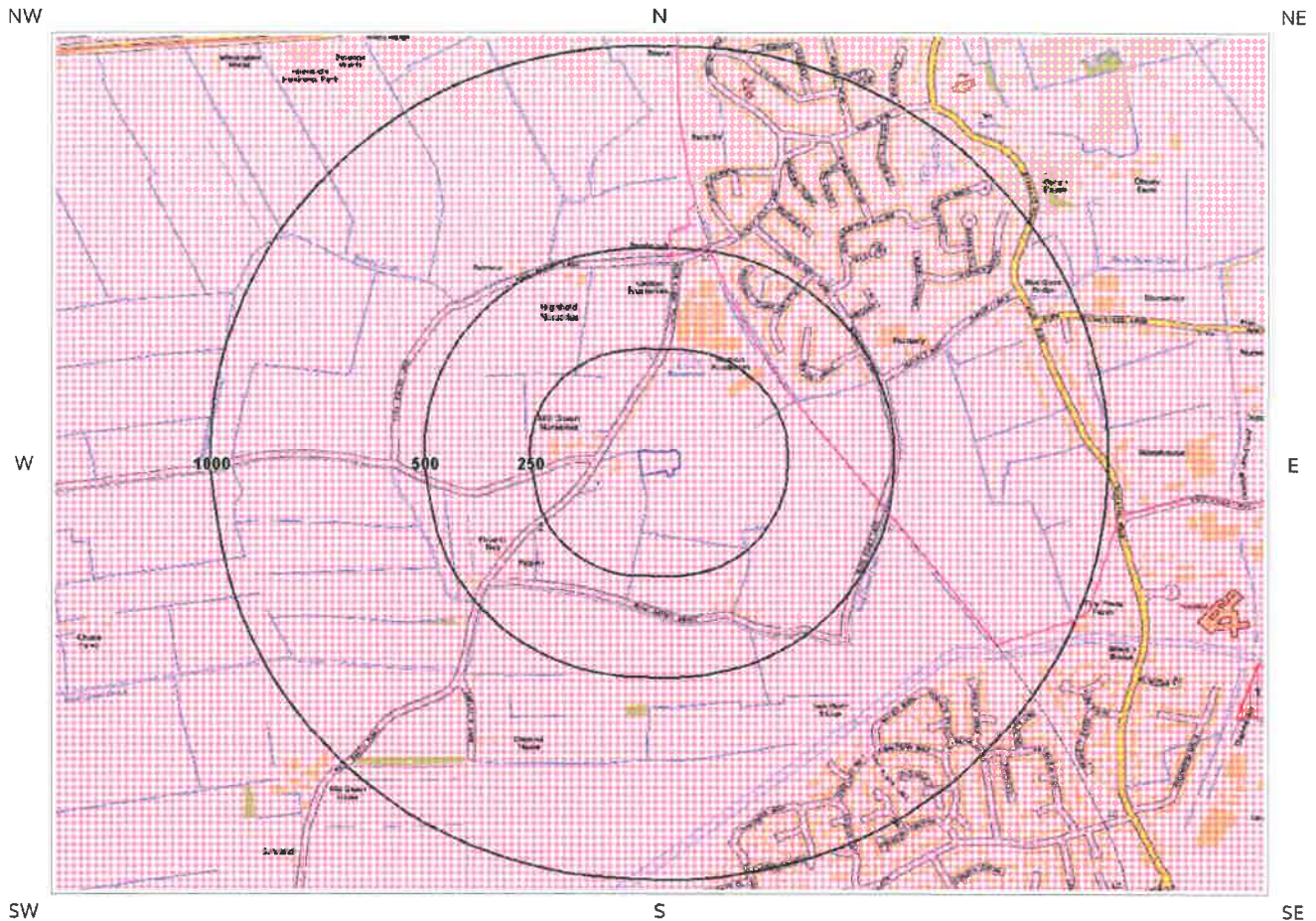
7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result Not Applicable

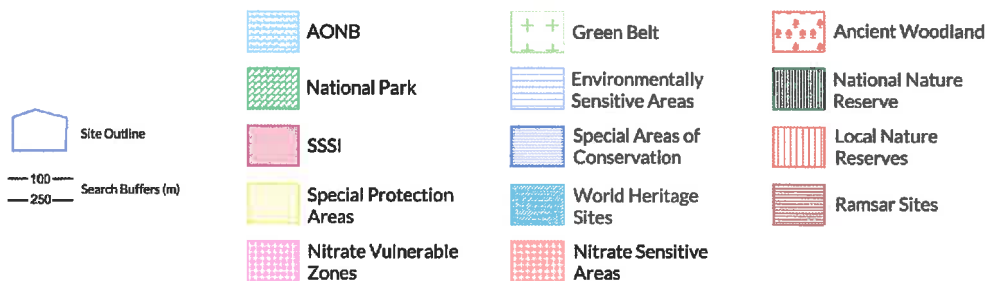
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

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:

1

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

ID	Distance (m)	Direction	LNR Name	Data Source
1	1432	E	Vernatts	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

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:

2

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
2	0	On Site	Existing	DEFRA
3	295	NE	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 Low

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

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. 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 possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially 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

Moderate

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

Hazard
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. Extra construction costs are likely. For existing property possible 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

Moderate

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

Hazard
Significant potential for running sand problems with relatively small changes in ground conditions. Avoid large amounts of water entering the ground (for example through pipe leakage or soak-aways). Do not dig (deep) holes into saturated ground near the property without technical advice. For new build consider the consequences of soil and groundwater conditions during and after construction. For existing property possible increase in insurance risk from running sand, for example, due to water leakage, high rainfall events or flooding.

* 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



Public Health England



The Coal Authority



APPENDIX 3

CLASSIFICATION OF AGGRESSIVE CHEMICAL ENVIRONMENT FOR BURIED CONCRETE

TABLE C1 – AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE
(ACEC) CLASSIFICATION FOR NATURAL GROUND LOCATIONS^a

Table C1 Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground locations ^a						
Sulfate				Groundwater		ACEC
Design Sulfate Class for location	2:1 water/soil extract ^b	Groundwater	Total potential sulfate ^c	Static water	Mobile water	Class for location
1	2 (SO ₄ mg/l)	3 (SO ₄ mg/l)	4 (SO ₄ %)	5 (pH)	6 (pH)	7
DS-1	< 500	< 400	< 0.24	≥ 2.5		AC-1s
					> 5.5 ^d	AC-1 ^d
					2.5–5.5	AC-2z
DS-2	500–1500	400–1400	0.24–0.6	> 3.5		AC-1s
					> 5.5	AC-2
					2.5–3.5	AC-2s
					2.5–5.5	AC-3z
DS-3	1600–3000	1500–3000	0.7–1.2	> 3.5		AC-2s
					> 5.5	AC-3
					2.5–3.5	AC-3s
					2.5–5.5	AC-4
DS-4	3100–6000	3100–6000	1.3–2.4	> 3.5		AC-3s
					> 5.5	AC-4
					2.5–3.5	AC-4s
					2.5–5.5	AC-5
DS-5	> 6000	> 6000	> 2.4	> 3.5		AC-4s
					≥ 2.5	AC-5

Notes

- a** Applies to locations on sites that comprise either undisturbed ground that is in its natural state (ie is not brownfield – Table C2) or clean fill derived from such ground.
b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to 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 (eg pyrite) following ground disturbance (Appendix A1 and Box C8).
d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15 mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

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' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.