

GROUND ENGINEERING

Newark Road
Peterborough PE1 5UA
Tel: 01733 566566
Fax: 01733 315280

SITE INVESTIGATION REPORT

NEW HOUSING DEVELOPMENT
LAND OFF PARK LANE
DONINGTON
LINCOLNSHIRE

Report Reference C13751A

On behalf of:-

Calderdale Homes (Eastern) Limited
c/o Salway & Wright
32 The Crescent
Spalding
Lincolnshire
PE11 1AF

April 2016

CALDERDALE HOMES (EASTERN) LIMITED

ROBERT DOUGHTY CONSULTANCY LIMITED

TOWN PLANNERS & LANDSCAPE ARCHITECTS

SITE INVESTIGATION REPORT

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INTRODUCTION

The client, Calderdale Homes (Eastern) Limited, proposes to construct a residential development at their site off Park Lane, Donington, Lincolnshire. The proposed layout and building loads were not known at the time of report writing but the proposed houses were anticipated to be 'lightly loaded'.

Ground Engineering Limited was commissioned by the client, under the direction of town planners Robert Doughty Consultancy, 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 of the proposed new housing is on the southern side of Park Lane, at its junction with Gleed Avenue, and immediately to the west of Millson's Close, Donington, Lincolnshire. The National Grid Reference for the centre of the site is TF 2065 3569 and its location is shown on a plan following this report text.

At the time of the investigation in January 2016 the site comprised an asphalt surfaced yard, with single-storey workshop and office buildings in the south-eastern corner and along the western side of the site. To the south of the building in the south-east of the site was an undeveloped parcel of land with wood, plaster coving and black plastic bags littering the area. The site was approximately 35m wide fronting Park Lane by 27m deep. The site was bound by Millson's Close to the east; the gardens of houses off Station Street (A152) to the south; a private track providing access to the rear of houses fronting Gleed Avenue to the west; and Park Lane to the north. Trees were present on the southern part of the site which included a Fir and an unidentified deciduous tree. A privet hedge and two coniferous trees were also present in the north-western corner of the site fronting Park Lane. Trees including Silver Birch were also present in the communal grassed area in Millson's Close to the east.

The site stands at about 4mOD in the flat lying Lincolnshire Fens.

The geological map, sheet 128 (1995), shows superficial Terrington Beds (Tidal Flat Deposits) covering the site, overlying the solid geology of the Oxford Clay at depth. A borehole record close to the northern edge of the site found 7.60m of superficial Alluvium, covering gravel to 7.75m depth, and in turn Boulder Clay and solid geology Oxford Clay at 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 sheets 116SE & 125NE Scale 1:10,560 Figure A	The site is within the western part of Donington. A building is shown in the eastern part of the site, seemingly associated with the property of Park Lane House to the north. The western part of the site has trees within an enclosure. A brewery is shown 100m south-east of the site. A pond is shown 130m south of the site. A malthouse is shown 150m south-west of the site. A gas works with a gasometer is shown 260m south-east of the site.
1889 Lincolnshire Sheet 116.16 Scale 1:2500 Figure B	The building on the site is denoted as a smithy. Market Place is shown 120m east of the site. Drains are shown along the edges of Park Lane 20m to the north, and along a field boundary 50m to the west. Drains are also shown 120m south-east and 140m south-west of the site.
1903 Lincolnshire sheets 116SE & 125NE Scale 1:10,560 Figure C	The site and immediate surrounding area appear generally unchanged, however a new building is shown 15m north of the site.
1904-05 Lincolnshire Sheet 116.16 Scale 1:2500 Figure D	The site and immediate surrounding area appear unchanged.
1938 & 1946-48 Lincolnshire sheets 116SE & 125NE Scale 1:10,560 Figure E	The site and immediate surrounding area appear unchanged.
1956 Sheets TF23NW & TF23SW Scale 1:10,560 Figure F	The site area appears unchanged. New houses are shown 20m west of the site.

<i>OS Map Extract</i>	<i>Description</i>
1972 Sheet TF2035 Scale 1:2500 Figure G	New buildings are shown in the eastern part of the site, replacing the former smithy. The site comprised two parcels of land, fronting a new road Gleed Avenue/Park Lane immediately north of the site. New houses and The Queen public house are shown 80m west of the site. An electricity sub-station is shown 100m west-south-west of the site. A large irregular shaped glasshouse is shown 40m north of the site. A silo is shown 125m north-east of the site, on the western side of a store. Public Conveniences are shown 90m east of the site. A new building is shown at an engineering works 120m south-east of the site, on the site of the former brewery. The pond is no longer shown 130m south of the site, and a new drain crosses this area. A garage with a canopy is shown 150m south-west on the site of the former malthouse. The gas works has been cleared to the south-east (beyond the map extract).
1977 Sheets TF23NW & TF23SW Scale 1:10,000 Figure H	The site area appears unchanged. New housing is shown 100m south of the site off Chestnut Avenue, and the drain crossing this area is no longer shown. New housing is shown 220m south-west of the site fronting Malting Lane. New housing is also shown 250m south-east of the site off Coxhill Avenue, on the site of the former gas works.
1978 Sheet TF2035 Scale 1:2500 Figure I	The site area appears unchanged. Additional new roads and houses are shown 200m south of the site off Laurel Close, Ash Court and Maple Way.
1981 Sheet TF2035 Scale 1:2500 Figure J	One of the buildings in the east of the site has been cleared. Millson's Close and new housing has been built on land adjacent the east of the site, replacing former buildings. Two new houses have been built 100m south-west of the site. The engineering works 140m south-east has been extended southwards.
1987 Sheet TF2035 Scale 1:2500 Figure K	The building in the east of the site has been extended westwards. The irregular shaped glasshouse to the north has been replaced with a smaller glasshouse. New houses off Church View are shown further north. The works building to the south-west has been further extended southwards. Additional new houses have been built 150m south-east of the site off an extended Ash Court and Maple Way.
1988 Sheet TF2035 Scale 1:2500 Figure L	The site area appears unchanged. Additional new houses have been built off Ash Court to the south-east.
1995 Sheet TF2035 Scale 1:2500 Figure M	The site is no longer divided in two. The building in the east of the site has been extended westwards, and a new rectangular building is shown in the western part of the site. Buildings have been cleared 140m south-east of the site.
2002 Raster Map Scale 1:10,000 Figure N	The site and immediate surrounding area appear unchanged.

<i>OS Map Extract</i>	<i>Description</i>
2010 GroundSure Aerial Photograph of Site (Appendix 2)	The site appears to be generally hard-surfaced with rectangular buildings in the west and south-east of the site. The southern-most part of the site is vegetated, and with mature trees along the southern boundary and along the north-western boundary. New houses are shown along Station Street 20m to the south of the site. A new road, a cul-de-sac off Park Lane, with housing is shown 50m north of the site, replacing the former glasshouse. A new road and houses are shown 100m south-east of the site in the area of the former works.
2014 Sheets TF23NW & TF23SW Scale 1:10,000 Figure O	The site and immediate surrounding area appear unchanged.
2016 Sheet TF2035 Not to scale Figure P	The site and immediate surrounding area appear unchanged.

Summary of Historical Information

The map of 1887 showed the site contained a building, a smithy, which was present on-site until at least the 1950s. New buildings were shown in the eastern part of the site in the 1970s, and a large rectangular building had been built in the western part of the site by 1995. Two buildings were present at the time of this investigation in 2016, which were being used by tenants.

The area around the site was generally residential. A brewery was present 100m south-east of the site, which was being used as an engineering works by the 1970s, and has been subsequently been redeveloped for housing by 2010. A malthouse was present 150m south-west of the site, which was redeveloped with a garage by the 1970s.

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)	4	25
Historical Tank Database	0	4
Historical Energy Features Database	0	12
Historical Petrol & Fuel Site Database	0	0
Historical Garage & Motor Vehicle Repair Database	0	5
Potentially Infilled Land	0	1
2. Environmental Permits, Incidents and Registers	On-Site	0 - 250m
Sites Holding Environmental Permits/Authorisations	0	2
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	1	7
Records of Petrol and Fuel Sites	0	1
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	0
Surface Water Features	No	Yes

7. Flooding					
Environment Agency indicative Zone 2 floodplains within 250m of site				Yes	
Environment Agency indicative Zone 3 floodplains within 250m of site				Yes	
Risk of flooding from rivers & the sea (RoFRaS) rating				Very Low	
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)				2	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 on-site from 1:10,000 mapping relate to the smithy. Potentially contaminative uses around the site include; the brewery 93m to the south-east; malthouse 142m to the south-west of the site; police station 177m to the south-west; windmills 204m and 237m south-west; unspecified commercial/industrial 233m east; gasworks and gasometers 233m to the south-east; unspecified works 237m south-west; and graveyard 241m east. There are no tanks recorded on the site, and duplicate records for tanks and gasometer at the gasworks to the east. There are electricity sub-stations 97m west of the site and 231m south-west of the site. There are no historical petrol or fuel sites on, or within 250m of the site. There are no historical garages or motor vehicle repair premises on the site, and one 150m south-west of the site. There are no areas of potentially infilled land on the site, and one record

for a graveyard to the north-east. There are no environmental permits on the site; although there is a Part B permit for unloading of petrol at the garage 150m to the south-west. There are no pollution incidents recorded on the site, and one within 250m of the site, for smoke 230m north-east in 2002 with a minor impact on air. There are no registered or historic landfills registered on, or within 250m of the site. There is one current industrial use recorded on the site, for Bridge Greenhouses Limited. Current industrial uses within 250m of the site relate to; electricity substations; Donington Service Station, MOT & repair centre; Paul Watkins Publishing; Unspecified works; and B&A Alexander (vehicle repair, testing & servicing). There are no current petrol or fuel sites on-site, and one 150m south-west of the site at Donington Service Station.

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, nor surface water abstraction licences on site, or within 250m of the site. There are no river network entries on, or within 250m of the site. The site is not within a source protection zone. There are no surface water features recorded on the site, the closest is a drain 116m south-west of the site. The site is not within a floodplain, however 109m south of the site is within a Zone 2 and a Zone 3 floodplain. The site is not within an area benefiting from flood defences. The site has a 'very low' risk of flooding for 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. The site is assessed as having a 'very low' hazard from landslides. The site is assessed as having 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	Drains could provide a contaminant source.
Soil Beneath Site	Contamination may be present within any made ground materials on the site, associated with the former site use as a smithy.
Soil Gas	Potential soil gas generated from made ground or natural soils.
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 a Source Protection Zone.	Surface infiltration of atmospheric waters into the soils beneath the site could wash or dissolve potential contaminants and migrate to underlying groundwater. Contamination leads to restriction/prevention of use as a resource, for example, drinking water, and can have secondary impacts on other resources, which depend on it.
Surface Water There is a surface water feature, a drain, 116m south-west of the site. There are no rivers within 250m 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 Residential Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage	Soil Beneath Site	Soil Gas	Ground Contamination Outside Site Boundary
Human Health – ground or construction workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Likely	Low likelihood	Low likelihood	Low likelihood
Human Health – end users	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Unlikely	Likely	Low likelihood	Low likelihood
Water Environment	Migration through ground into surface water or surrounding groundwater	Low likelihood	Low likelihood	Unlikely	Unlikely
Flora	Vegetation on site growing on contaminated soil	Low likelihood	Low likelihood	Low likelihood	Unlikely
Building Materials	Contact with contaminated soil	Low likelihood	Low likelihood	Low likelihood	Low likelihood

Key to Table 4 Estimated Potential for Linkage with Contaminant Source	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.
N/A	Not Applicable.

SITE WORK

The site work conducted on 22nd January 2016 comprised four machine excavated trial pits (TP1 to TP4). The trial pit positions are shown on the exploratory hole location plan following this report text.

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

The exploratory hole records, presented following the exploratory hole location plan, give the descriptions and depths of the various strata encountered, details of all samples taken and the groundwater conditions observed during and on completion of excavation.

Machine Excavated Trial Pits

Trial pits TP1 to TP4 were excavated using a JCB 3CX machine to depths of between 0.50m and 2.50m. Trial pit TP4 was limited to 0.50m depth due to very restricted access to that area. The exposed strata were sampled and recorded by a Geoenvironmental Engineer. Representative small and bulk disturbed samples of soil were taken at regular intervals throughout the depth of each trial pit.

A soakaway test was carried out within trial pit TP1 in broad accordance with BRE Digest 365 in order to allow the assessment of the soil infiltration rate. 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 pit was 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. The test was monitored for 142 minutes, and as the water had not drained away sufficiently the water was not topped up and the test was not repeated a second time. The results are presented and follow the respective trial pit record.

The trial pits were emptied of any remaining water and backfilled with compacted arisings upon completion.

LABORATORY WORK

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

The moisture contents and 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 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.

California Bearing Ratio (C.B.R.) tests were performed on selected recompacted samples. The samples were recompacted using a 2.5kg rammer within a CBR mould. The tests consisted of jacking into the remoulded soil a cylindrical plunger with a cross sectional area of 1935mm². A force of 50N was applied initially to seat the plunger on the soil surface during each test and then the plunger was made to penetrate the soil at a uniform rate of 1mm/min. Readings of force were taken at intervals of penetration of 0.25mm to a penetration not exceeding 7.50mm. The CBR value is the ratio of the force required to achieve 2.50mm or 5.00mm penetration to standard forces expressed as a percentage.

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

Chemical analysis of four 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 made ground to depths of between at least 0.50m and at least 2.00m, which rested on the expected superficial Tidal Flat Deposits and underlying Marine Sand. The superficial deposits were found to at least the base of the exploratory holes at 2.50m depth. The solid geology of the Oxford Clay was not encountered within 2.50m depth by this investigation.

Made Ground

Asphalt hardstanding was found at surface in TP1, TP2 and TP3, to between 0.05m and 0.15m depth. Made ground was encountered beneath the asphalt, and from surface in TP4, to depths of between at least 0.50m (TP4) and at least 2.00m (TP3), which beneath the asphalt was initially a light brown gravel sub-base fill of angular and sub-angular limestone. The gravel sub-base fill was encountered to depths of between 0.20m and 0.30m below ground level.

Beneath the hardstanding and sub-base where present, and from surface in TP4, dark brown and brown, slightly sandy, slightly gravelly to gravelly, clayey silt fill, varying to silty clay fill, with occasional cobbles of brick and metal rods encountered. Trial pit TP3 was completed in silt fill at 2.00m depth when a suspected brick culvert was encountered, and trial pit TP4 was completed in made ground at 0.50m due to extremely limited access to the area behind the building. The gravel fraction comprised angular to rounded flint, coal, ash, concrete, brick and a rare suspected cement-bound asbestos sheet fragment (TP3).

Tidal Flat Deposits

The anticipated superficial Tidal Flat Deposits were met in TP1 and TP2, beneath the made ground, at depths of 1.00m and 0.80m respectively, and found to at least the base of TP1 at 2.00m depth and 1.00m depth in TP2, a thickness of between 0.20m and at least 1.00m.

The Tidal Flat Deposits comprised brown, sandy, clay/silt. The sand fraction was generally fine grained. Trial pit TP1 was completed within Tidal Flat Deposits.

Marine Sand

Beneath the Tidal Flat Deposits in TP2 at 1.00m depth, to at least the base of the trial pit at 2.50m depth, Marine Sand was encountered. The Marine Sand generally comprised light brown and orange brown, very silty sand, which was dark brown and slightly organic at 1.50m to 1.70m depth. The sand fraction was generally fine grained.

Groundwater

No groundwater was met in TP1, TP2 and TP4. Groundwater was met at 1.80m in TP3, and standing at 2.00m depth on completion.

Observations

Live roots were observed to at least 2.00m depth in TP3, which was excavated close to a mature deciduous tree by the southern boundary.

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 coal, ash, concrete and brick. A rare suspected cement-bound asbestos sheet fragment was also found at 0.50m to 0.80m depth in TP3.

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

The investigation confirmed the site to be underlain by a variable thickness of made ground resting on the expected superficial Tidal Flat Deposits and underlying Marine Sand. The proposed building loads were not known at the time of report writing, however the houses were anticipated to be 'lightly' loaded. The underlying superficial silts have adequate bearing properties and may provide a suitable founding stratum. Foundations may need to be locally deepened due to the presence of a suspected brick culvert beneath the south-western part of the site. The underlying silty Marine Sand would also offer support for traditional foundations for the proposed new houses. Foundation excavations may encounter shallow groundwater. Ground bearing floor slabs could be used locally but would need to be suspended where the made ground is thicker over the suspected culvert.

Traditional Foundations

Foundations should be extended through any made ground, which was found to extend to about 1.00m generally, and to at least 2.00m depth in the south-western part of the site above the suspected culvert.

The naturally deposited Tidal Flat Deposits may provide suitable founding strata for traditional foundations, where encountered at shallow depth. The sandy silt Tidal Flat Deposits would be considered non-shrinkable, but are potentially frost susceptible and a minimum footing depth in this stratum of 0.60m should be adopted in order to avoid the potentially damaging effects of frost action.

Samples of the Tidal Flat Deposits clay/silt had modified plasticity indices of 9% and 10%. These are considered non-shrinkable to having a low volume change potential, based on NHBC Standards Chapter 4.2 'Building near trees' (2014). On an open site, away from the influence of trees, a minimum foundation depth of 0.75m 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.

It is likely that some of the proposed houses will be within influencing distance of high water demand trees where clay soils are present at shallow depth. Trees were present on the site and included Cypress, Fir and an unidentified deciduous tree.

Based on high water demand English Oak and Cypress trees, and moderate water demand Fir trees, a minimum foundation depth between 0.75m and 1.00m would locally be required in these clay soils based on the current tree positions and NHBC Standards at 5m distance. The foundations would need to be at least 25m from mature English Oak trees, 15m from mature Fir trees and 12m from mature Cypress trees, for the adoption of the minimum foundation depth of 0.75m in clay soils. Within these distances foundation depths will depend on the proximity of trees to new foundations, which should be determined using the NHBC Standards where clay forms the base of foundation excavations. Tree species along the site boundaries and distances to proposed dwellings 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 at least 2.00m depth within TP3 in made ground soils. The depth of roots is likely to vary across the site, and is likely to be deeper closer to the trees adjacent the site boundaries. Foundations would not need to be deepened within the underlying sand once it is reached. 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.

It is assumed that new trees will be planted within the vicinity of proposed houses. 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 a housing scheme on the site.

In summary, it would be prudent to adopt a minimum depth of 0.75m for foundations for the new buildings, and will need locally to be taken to 1.00m below ground level, in order to penetrate the depths of potential root-induced desiccation within this site.

Bearing Capacity

The non-shrinkable, silty sand of the Marine Sand would provide a suitable founding stratum for the proposed buildings. The naturally deposited silty sand, where present from a depth of 0.75m, has an allowable bearing pressure of 115kN/m² for foundations up to 1.20m wide, which should be sufficient for the proposed houses and limit immediate settlement to within 25mm.

The naturally deposited Tidal Flat Deposit clay/silt, at a depth of 0.75m has a net safe bearing capacity of 80kN/m², increasing to 95kN/m² at 1.50m depth, beneath a 0.60m wide strip footing. These bearing capacities incorporate a factor of safety of 3.0 against shear failure and should be sufficient to support the proposed houses. Settlements are likely to be less than 25mm, although some differential settlements will occur where foundations straddle different soil types. Care should be taken where foundations cross from sand to clay and precautionary measures adopted to minimise differential movements.

Excavations

The made ground together with the underlying soils should be easily removed within excavations for the proposed buildings. 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 or Marine Sand with resulting side instability, although groundwater was encountered below 1.80m depth in the trial pits. Care should be taken not to excavate below the water table in the absence of suitable side support and groundwater control, such as dewatering via screened sumps or even well-points. The silt/clay soils are prone to softening and deterioration, in the

presence of either surface water or groundwater, with loss of their modest 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. The excavated surfaces should be protected from deterioration using a blinding layer of concrete, since the silt/clay soils are prone to rapid deterioration if exposed to water, with resulting loss of their modest bearing properties. Care should therefore be exercised to ensure that neither surface water nor groundwater is allowed to collect in the base of excavations.

Excavations should either avoid or bridge over the suspected culvert crossing the southern part of the site at a depth of 2.00m, and further investigation will be required to determine the details of this feature.

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

Where the proposed houses are in an area close to extant or former trees, 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 any root affected clays, providing that the sub-floor gaps recommended in NHBC Standards Chapter 4.2, Tables 9 and 10, are adopted. Similarly, the floor slabs should be suspended if the suspected culvert is to remain.

Ground bearing floor slabs could be adopted for new buildings where the naturally deposited silty sand is present at shallow depths and where they are remote from trees in clay soils. It may be possible to proof-roll soils present at sub-grade level, although supporting floor

slabs across the variable Tidal Flat and Marine Sand deposits are likely to result in some long term minor differential movements beneath them. Settlement of a floor slab bearing on the non-shrinkable silty sand would be negligible.

Drainage

The soakaway test (TP1) gave a soil infiltration rate (f) of $4.88 \times 10^{-7} \text{m/s}$ for the sandy silt Tidal Flat Deposits soils. This result rates Tidal Flat Deposits as having a 'poor' drainage potential according to BS8004:1986.

Perched groundwater was met in trial pit TP3 at 1.80m below ground level, within made ground soils and associated with the suspected culvert in the southern part of the site. Soakaway drainage on this site may deteriorate over time as the chambers could become blocked with silt. Provision should be made for regular cleaning.

Hardstanding

Made ground and Tidal Flat Deposits (clay/silt) 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 design CBR values of 1% for silt, 3% for clay with a plasticity index of 10%, with a thin pavement construction, and a design CBR value of 20% for a poorly graded sand. Laboratory determined CBR values were between 2.5% and 3.4% for slightly sandy, gravelly, clayey silt fill soils. Therefore a conservative design CBR value of 2.5% could be adopted for hardstanding design on this site. The soils have a high silt content and would be considered to be frost susceptible, requiring a minimum pavement thickness of 450mm.

The sub-grade should be suitably compacted and inspected with any made ground, topsoil, loose, very soft or organic soils being removed and replaced with 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 silty soils will rapidly deteriorate in the presence of water.

Sulphate Conditions

Sulphate analysis of selected samples of soil yielded soluble sulphate concentrations within Design Sulphate Class DS-1 of the BRE Special Digest 1, Table C2 (2005), presented in Appendix 3. The pH results of samples ranged between 7.3 and 9.2, indicating alkaline conditions.

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

COMMENTS ON THE SOIL CHEMICAL TEST RESULTS

The results of the laboratory chemical testing on near surface soil samples have been compared to CLEA Soil Screening Values (SSVs) and Category 4 Screening Levels (C4SLs), which have been used as screening tools for use in the assessment of land affected by contamination.

Atkins Limited has derived ATRISKsoil SSVs based on the default assumptions provided in SR3, which have been used in the development of the Soil Guideline Values (SGVs) published by the Environment Agency in 2009. Atkins SSVs have been derived in line with the Environment Agency 2009 guidance (SR2, SR3, SR4, SR7) using the CLEA v1.04 and CLEA v1.06 software. These are provided under licence to Ground Engineering Limited, and respective toxicology reports and technical details on the derivation of the SSVs can be provided on request.

Following revised statutory guidance to support Part 2A of the Environment Protection Act (2012), Final Category 4 Screening Levels have been published (for arsenic, benzene, benzo[a]pyrene, cadmium, chromium VI and lead) by the Department for Environment Food and Rural Affairs in their document SP1010:2014. With the exception of lead the C4SLs are higher than the SSVs.

The following standard land uses form the basis of the assessment in relation to soils:

- Residential usage with home grown produce
- Residential usage 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, and C4SLs for lead and chromium (VI), in relation to the specified uses. The number of test results, which exceed these values, is also provided.

Table 5: Comparison of Chemical Test Results with SSVs and C4SLs for Made Ground

Determinand	Number of Samples	Min Value mg/kg	Max Value mg/kg	Number of Samples Exceeding SSV/C4SL for			Assessment Method	Soil Screening Criteria 6% SOM [#]		
				Residential with home grown produce	Residential without home grown produce	Commercial/Industrial		Residential with home grown produce mg/kg	Residential without home grown produce mg/kg	Commercial/Industrial mg/kg
Organic Matter	4	3.6%	7.6%	-	-	-	-	-	-	-
Arsenic	4	17	26	0	0	0	SSV	32	35	640
Cadmium	4	0.14	0.28	0	0	0	SSV	10	83	230
Chromium (III)*	4	17	26	0	0	0	SSV	12,900	15,500	213,000
Chromium (VI)	4	<0.50	<0.50	0	0	0	C4SL	21 [#]	21 [#]	49 [#]
Lead	4	110	570	2	1	0	C4SL	200 [#]	310 [#]	2330 [#]
Mercury	4	0.29	0.72	0	0	0	SSV	11	14	410
Selenium	4	<0.20	0.28	0	0	0	SSV	350	595	13,000
Nickel	4	21	24	0	0	0	SSV	130	130	1800
Phenols	4	<0.30	<0.30	0	0	0	SSV	420	519	3200
Benzo[a]pyrene	4	0.44	3.1	1	1	0	SSV	1	1	14
Copper	4	22	69	0	0	0	SSV	4020	8370	109,000
Zinc	4	100	180	0	0	0	SSV	17,200	46,800	917,000
Free Cyanide	4	<0.50	<0.50	0	0	0	SSV	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.

[#] Category 4 Screening Levels for lead and chromium VI are based on 6% SOM.

Discussion of Soil Results

The results of the laboratory analysis indicate that the made ground contains elevated concentrations of benzo[a]pyrene and lead, which exceeded the residential with home grown produce and residential without home grown produce soil screening values. The highest concentrations of benzo[a]pyrene and lead did not exceed the associated soil screening values for a commercial/industrial end use.

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

Due to the limited number of samples tested, statistical analysis is not considered to be meaningful.

Other Contaminants

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

Apart from a rare suspected cement-bound asbestos sheet fragment (TP3, 0.50m-0.80m depth), no asbestos containing materials were observed in any of the samples.

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 residential development use of the site is presented in Table 6 below.

Table 6: General Conceptual Model Relative to Future Residential Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage	Soil	Soil Gas	Off-Site Sources
Human Health – ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low	Low	Low	Very Low
Human Health – users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	N/A	Moderate	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 Risk</u>	Definition
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 commercial/industrial plot, the site history and proposed residential use of the site, in the context of the conceptual model, are discussed as follows.

The client proposes to construct a residential development, although the proposed layout was not known at the time of report writing.

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

Contaminated Soil

On the basis of the ground investigation, the site is underlain by between 0.80m and at least 2.00m of made ground. The chemical testing has identified elevated concentrations of benzo[a]pyrene and lead in respect to the proposed residential with home grown produce end use.

The results indicate that the near surface soils encountered beneath the site would generally be suitable beneath buildings, or areas of adjacent hardstanding. It would be unlikely that the site users or workers would normally be able to penetrate building floors or surface hardstanding layers necessary in order to uncover any contaminated soils beneath the site.

Existing Drainage

Redundant drain runs, where encountered, should be removed from beneath the site and precautions should ensure that any remaining effluent is directly disposed off-site. The integrity of existing drainage should be checked, and if they are to be retained any damaged

sections replaced prior to development. The latter measures should minimise any future risk to human health and the water environment.

Soil Gas

According to the environmental database there are no landfills on, or within 250m the site. The site is underlain by a layer of made ground, covering superficial Tidal Flat Deposits and Marine Sand. The solid geology Oxford Clay is expected to underlie the site at depth.

There is a 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.
- d) Consideration should be given to gas monitoring within deep or confined spaces, particularly where made ground thickens, to ensure safety of personnel entering them,

since carbon dioxide could accumulate within any excavations, service chambers or sub-structures.

Human Health - Users of Completed Development

The risk of the identified ground contamination (benzo[a]pyrene and lead) affecting the site users where a pathway is present, in a residential setting with private gardens, would generally be considered to be moderate.

For garden and patio areas it is recommended that the made ground with elevated concentrations of contaminants should either be completely removed, or removed to a minimum depth of 1.00m below finished ground level, and replaced with an equivalent thickness of clean inert topsoil or clean granular fill. No excavation of naturally deposited soil is considered necessary unless it is contaminated. Made ground was found to at least 2.00m depth (TP3) above a suspected culvert during this investigation.

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

Water Environment

The site is underlain by superficial Tidal Flat Deposits, an 'Unproductive' stratum, covering Oxford Clay, also an 'Unproductive' solid geology stratum. There is a surface water feature, a drain, 116m south-west of the site. The site does not lie within a source protection zone.

The risk to the water environment is considered 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

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

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 WM2 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.

GROUND ENGINEERING LIMITED



S. WEATHERLEY

B.Eng.(Hons.),

C.Geol., F.G.S.,

Senior Geo-Environmental Engineer



C. M. J. EBELING

M.Sc.(Eng.), M.A.E.G.

C.Geol., F.G.S.,

Director

Site Location Plan

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Not To Scale



Project : Land off Park Lane, Donington, Lincolnshire

Client : Calderdale Homes (Eastern) Limited

**GROUND
ENGINEERING
LIMITED**

Peterborough

Tel : 01733 566566

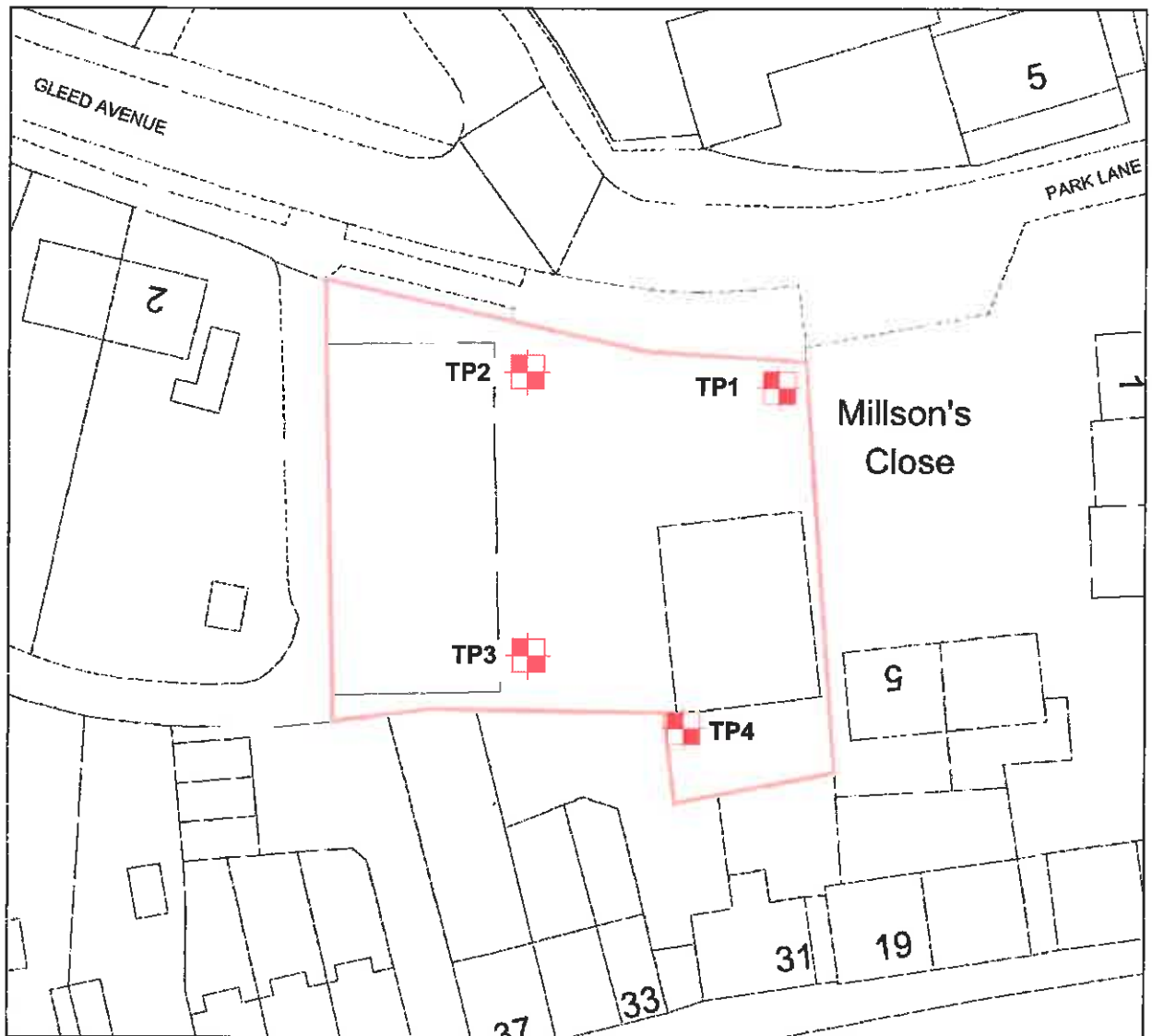
Project No.

C13751A

Exploratory Hole Location Plan

Plan based on Robert Doughty Consultancy existing layout drawing 1179-02-EL01

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Not To Scale



Project : Land off Park Lane, Donington, Lincolnshire

Client : Calderdale Homes (Eastern) Limited

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

**Project No.
C13751A**

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND OFF PARK LANE, DONINGTON		TRIAL PIT TP1	
Date: 22/01/16			Pit Size: 2.40m L x 0.60m W x 2.00m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m
Depth m	Type	Result				
				MADE GROUND - ASPHALT.		0.15
0.30	D1			MADE GROUND - Light brown GRAVEL of angular and sub-angular limestone.		0.20
0.30	J1			MADE GROUND - Firm, brown and dark brown, slightly sandy, slightly gravelly, silty CLAY with occasional cobbles of brick and metal rods. Gravel is angular to sub-rounded brick fragments, concrete, ash and coal.		0.60
0.60	D2			MADE GROUND - Dark brown, slightly sandy, slightly gravelly SILT. Gravel is angular to sub-rounded coal, ash and brick fragments.		0.60
0.60	J2					
0.90	D3					1.00
0.90	J3					
1.20	D4			Brown, sandy SILT. Sand is fine grained.		
1.20	J4					
1.50	D5			(TIDAL FLAT DEPOSIT)		
1.50	J5					
1.80	D6					
2.00	D7					2.00
				Pit completed at 2.00m depth		
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample  Water Strike  Water Rise  Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. No live roots observed 2. Pit dry 3. Pit sides stable 4. Soakaway test undertaken at 2.00m depth			
Project No 13751						Scale 1:25
Page 1/1						

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land off Park Lane, Donington, Lincolnshire
 Client: Calderdale Homes (Eastern) Ltd

Project No: C13751
 Sheet No: 1/1

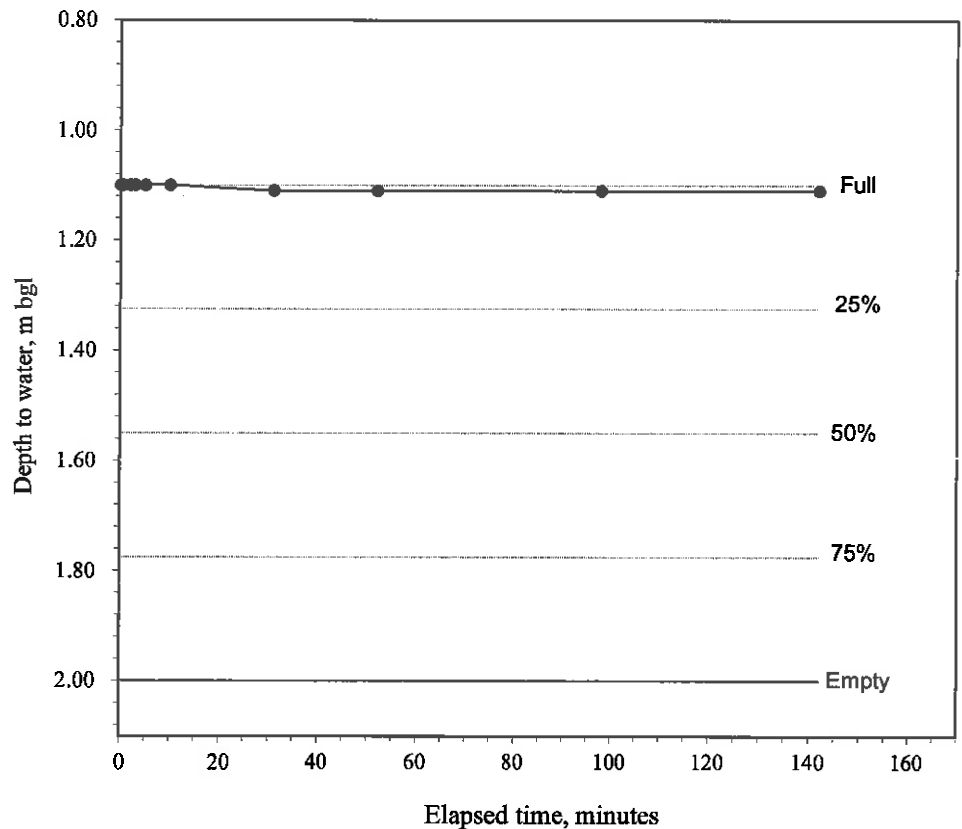
Trial Pit: TP1 FIRST FILLING
 Depth: 2.00
 Length: 2.40
 Width: 0.60

Description of Stratum under test: Brown light brown sandy SILT

Depth to water prior to test: 2m
 (below ground level)

Elapsed Time min	Depth to Water m
0	1.10
1	1.10
2	1.10
3	1.10
5	1.10
10	1.10
31	1.11
52	1.11
98	1.11
142	1.11

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

$$f = (V_{75} - V_{25}) / A_{50} (T_{75} - T_{25})$$

$V_{75} - V_{25} = 0.648$
 $A_{50} = 4.140$
 $T_{75} - T_{25} = 5350$
 Soil Infiltration Rate $f = \underline{4.88E-07} \text{ m/s}$

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND OFF PARK LANE, DONINGTON		TRIAL PIT TP2	
Date: 22/01/16			Pit Size: 2.70m L x 0.60m W x 2.50m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m
Depth m	Type	Result				
				MADE GROUND - ASPHALT. MADE GROUND - Light brown GRAVEL of angular and sub-angular limestone.		0.05
0.40	D1			MADE GROUND - Dark brown, slightly gravelly SILT. Gravel is angular to sub-rounded brick fragments, coal and ash.		0.30
0.40	J1			MADE GROUND - Dark brown, slightly sandy, gravelly, clayey SILT. Gravel is fine and medium, angular to sub-rounded brick fragments and ash.		0.50
0.60	D2					
0.60	J2					
0.50-0.80	CBR1					
0.90	D3			Brown, sandy CLAY/SILT. Sand is fine grained. (TIDAL FLAT DEPOSIT)		0.80
				Light brown and orange brown, very silty SAND. Sand is fine grained.		1.00
1.20-1.40	B1			(MARINE SAND)		1.50
1.20	D4					
1.60	D5			Dark brown, slightly organic, silty SAND. Sand is fine grained. (MARINE SAND)		1.70
1.80	D6			Light brown and orange brown, very silty SAND. Sand is fine grained.		
1.90-2.10	B2			(MARINE SAND)		
2.10	D7					
2.30-2.50	B3					
				Pit completed at 2.50m depth		2.50
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample  Water Strike  Water Rise  Level on completion MP - Mackintosh Probe P () - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. Live roots observed to 0.80m depth 2. Pit dry 3. Pit sides unstable below 0.40m depth on completion			
Project No 13751						
Scale 1:25 Page 1/1						

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND OFF PARK LANE, DONINGTON		TRIAL PIT TP3	
Date: 22/01/16			Pit Size: 2.20m L x 0.60m W x 2.00m D.		Ground Level:	
Samples and in-situ Tests			(Date)	Description of Strata	Legend	Depth m
Depth m	Type	Result	Water			O.D. Level m
0.40	D1			MADE GROUND - ASPHALT.		0.05
0.40	J1			MADE GROUND - Light brown GRAVEL of angular and sub-angular limestone.		0.30
0.50-0.80	CBR1			MADE GROUND - Brown, slightly sandy, slightly gravelly SILT with occasional cobbles of brick. Gravel is angular to sub-rounded brick fragments, concrete, ash and rare cement-bound asbestos sheet fragment.		
0.70	D2					
0.70	J2					
1.00	D3					
1.00	J3					
1.40	D4					
1.80	D5		1 √			
2.00	B1		√c			2.00
				Pit abandoned on brickwork at 2.00m depth		

KEY	REMARKS
D - Disturbed Sample	1. Live roots observed to 2.00m depth
B - Bulk Sample	2. Groundwater met at 1.80m depth, and stood at 2.00m depth on completion
U - Undisturbed Sample	3. Pit sides stable
R - Root Sample	4. Pit abandoned at 2.00m depth due to brickwork obstruction
W - Water Sample	
J - Jar Sample	
√ - Water Strike	
√ - Water Rise	
√c - Level on completion	
MP - Mackintosh Probe	
P() - Hand Penetrometer	
Cohesion () kPa	
V - Vane Shear Test	
Cohesion () kPa	

Project No 13751	
Scale 1:25	Page 1/1

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND OFF PARK LANE, DONINGTON		TRIAL PIT TP4			
			Date: 22/01/16	Pit Size: 1.60m L x 0.80m W x 0.50m D.		Ground Level:		
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m	
Depth m	Type	Result						
0.30	D1			MADE GROUND - Brown, slightly sandy, slightly gravelly SILT. Gravel is sub-angular to rounded flint, concrete and brick fragments.		0.50		
				Pit completed at 0.50m depth				
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample Water Strike Water Rise Level on completion MP - Mackintosh Probe P () - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. Live roots observed to 0.50m depth 2. Pit dry 3. Pit sides stable				Project No 13751	
				Scale		Page		
				1:25		1/1		

LABORATORY TEST RESULTS

CONTRACT LAND OFF PARK LANE, DONNINGTON

Trial-pit	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO ₄)				C.B.R.		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	Top %		Base %
TP1	D4/J4	1.20	37	28	9	32								230				7.3			SOIL CLASSIFICATION = MI 9% retained on 425µm sieve
	D5/J5	1.50												206				7.6			
	CBR1	0.50 - 0.80				22	1.87	1.51											2.7	3.2	
TP2	D3	0.90	34	24	10	31															SOIL CLASSIFICATION = CL/ ML 1% retained on 425µm sieve
	D4	1.20																7.9			
	D5	1.60																7.5			
TP3	CBR1	0.50 - 0.80				24	1.86	1.50											2.5	3.4	2% retained on 20mm 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

C.B.R. - CALIFORNIA BEARING RATIO



8180

GROUND ENGINEERING

Newark Road Peterborough
t: 01733 566566 f: 01733 315280
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

Contact: Simon Weatherley

Site Name: Land off Park Lane
Site Address: Donington

Certificate Number: PL5295-1/2/710-2

Client Reference: C13751

Lab Job Number: PL5295-1

Date Sampled: Unknown

Date Received: 05.02.2016

Date Tested: 17.02.2016

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

TEST RESULTS

Laboratory Reference: PL5295-1/2

Client Reference: D5 / J5

Pre-treatment for organic material:

No

Sample Description: Brown slightly clayey very sandy SILT

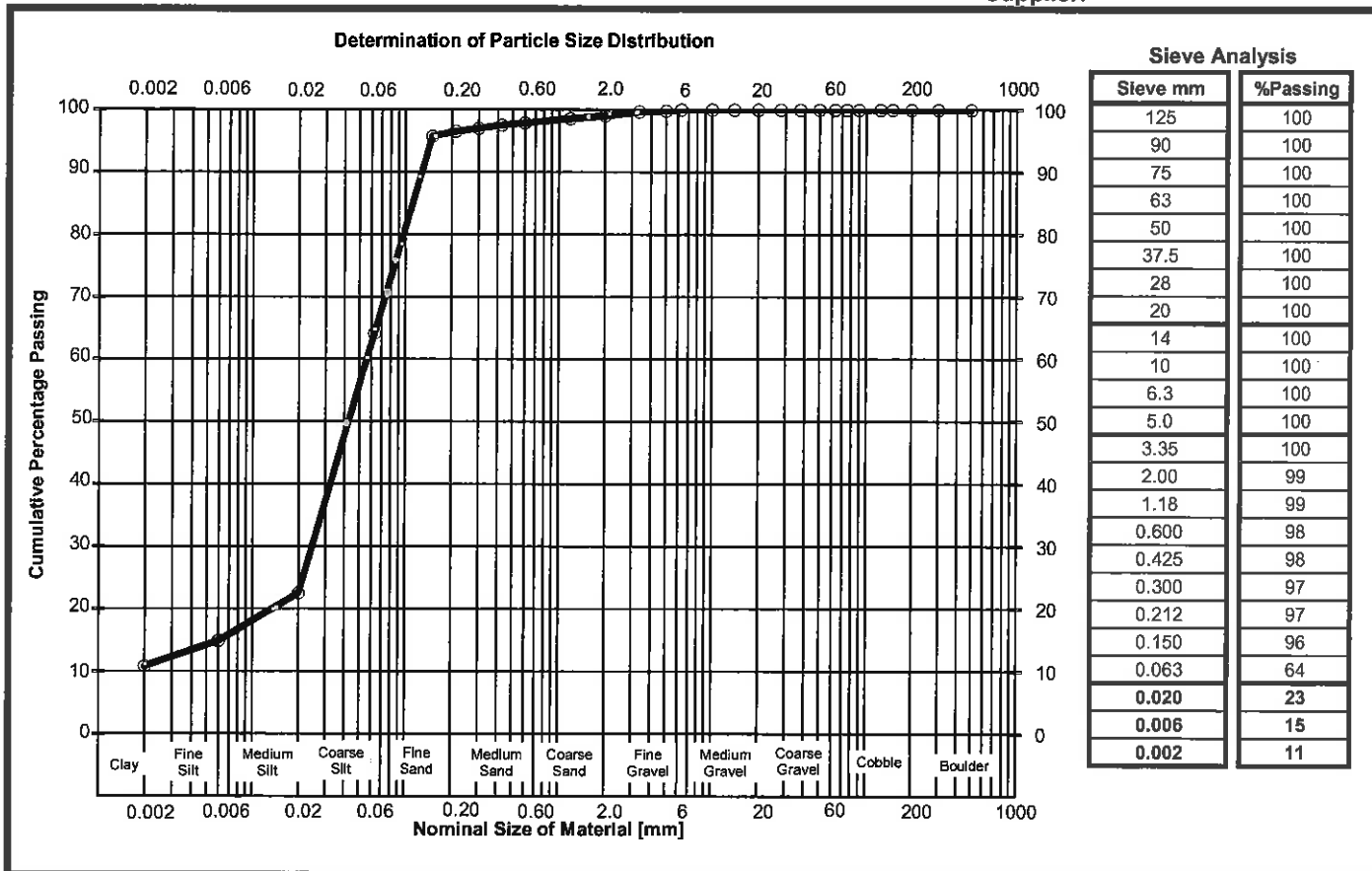
Material Specification: Not Required

Depth: 1.50m

Location: TP1

Source:

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: 22.02.2016 Page 1 of 1
Form Number: GELab/C/709-2 Version 46

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



8180

GROUND ENGINEERING

Newark Road Peterborough
t: 01733 566566 f: 01733 315280
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: PL5295-1/5/710-2

Client Reference: C13751

Lab Job Number: PL5295-1

Date Sampled: Unknown

Date Received: 05.02.2016

Date Tested: 18.02.2016

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

Contact: Simon Weatherley

Site Name: Land off Park Lane
Site Address: Donington

TEST RESULTS

Laboratory Reference: PL5295-1/5

Client Reference: B1

Pre-treatment for organic material:

No

Sample Description: Brown grey red brown very sandy SILT

Material Specification: Not Required

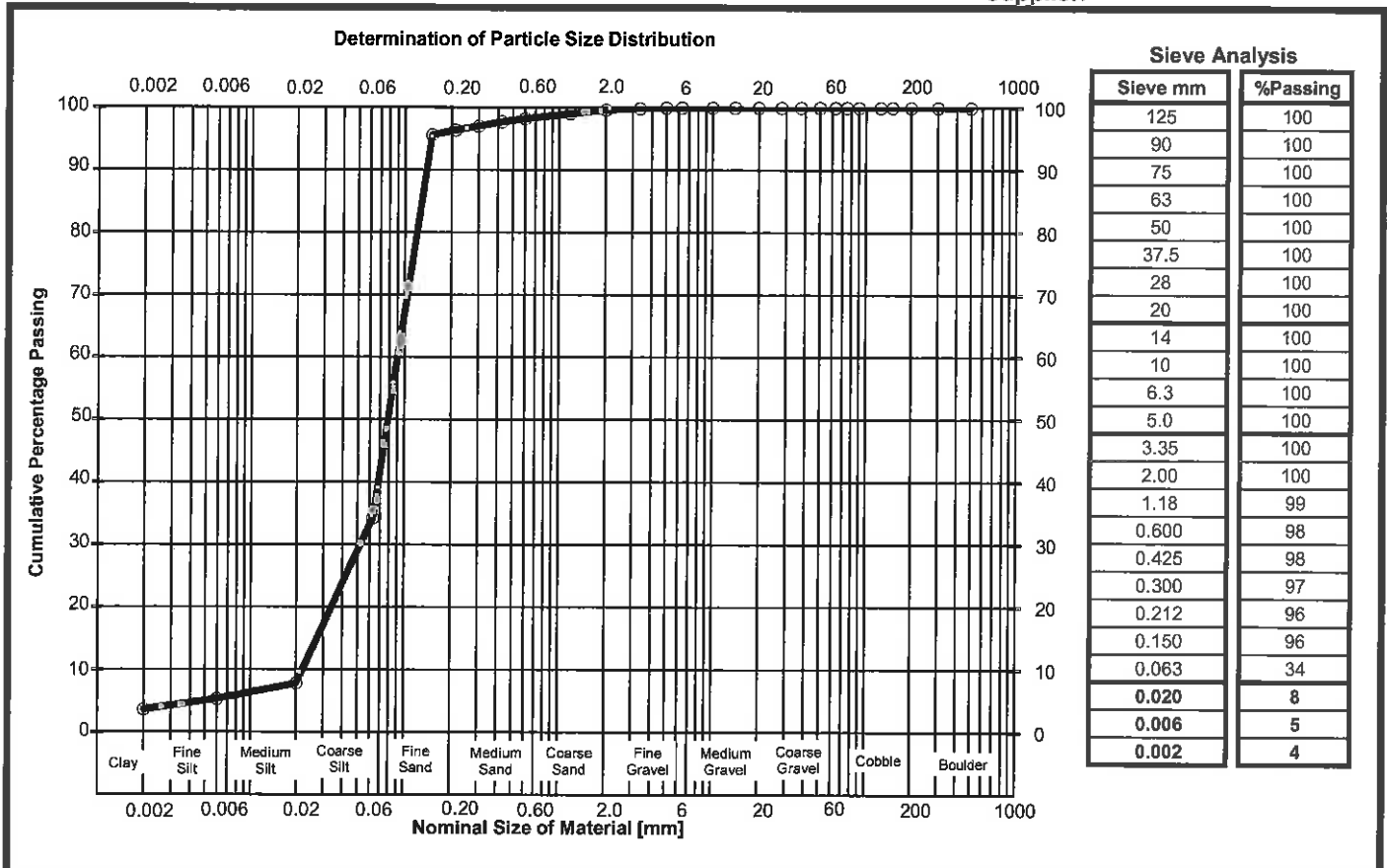
Location: TP2

Source:

Depth Top: 1.20m

Depth Base: 1.40m

Supplier:



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Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

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 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: PL5295-1/8/710-2

Client Reference: C13751

Lab Job Number: PL5295-1

Date Sampled: Unknown

Date Received: 05.02.2016

Date Tested: 18.02.2016

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

Contact: Simon Weatherley

Site Name: Land off Park Lane
 Site Address: Donington

TEST RESULTS

Laboratory Reference: PL5295-1/8

Client Reference: B2

Pre-treatment for organic material:

N/A

Sample Description: Brown grey red brown very sandy SILT

Material Specification: Not Required

Location: TP2

Source:

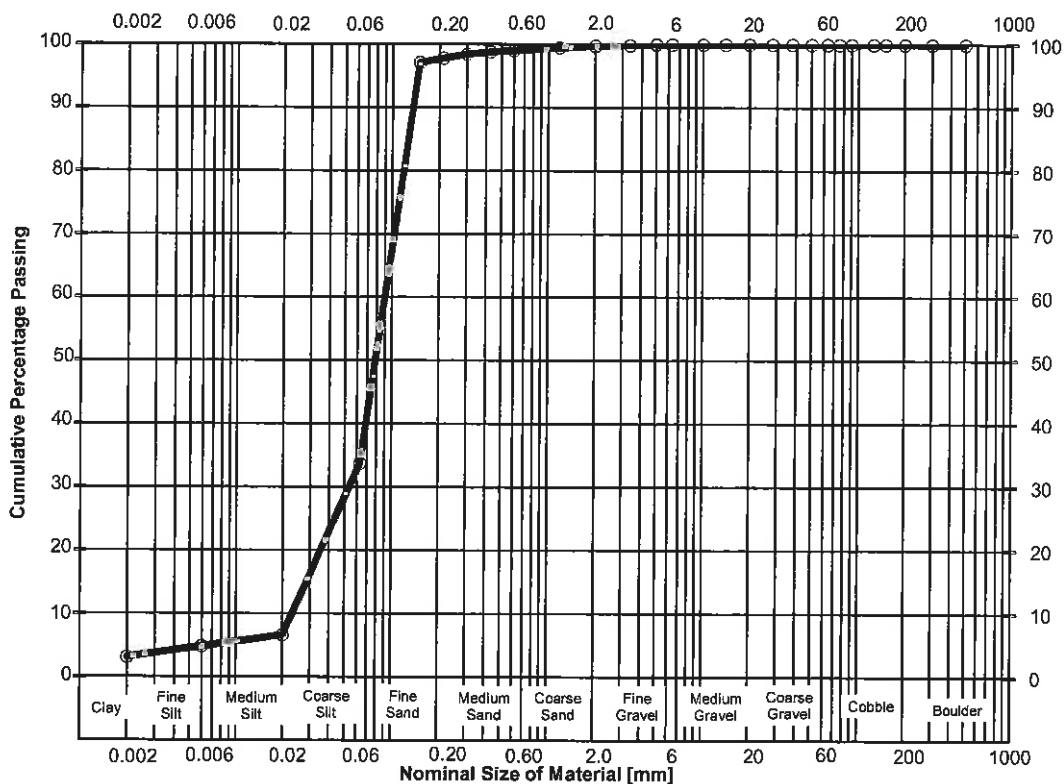
Depth Top: 1.90m

Depth Base: 2.10m

Supplier:

Determination of Particle Size Distribution

Sieve Analysis



Sieve mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	99
0.600	99
0.425	99
0.300	98
0.212	98
0.150	97
0.063	34
0.020	7
0.006	5
0.002	3

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

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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: PL5295-1/9/710-2

Client Reference: C13751

Lab Job Number: PL5295-1

Date Sampled: Unknown

Date Received: 05.02.2016

Date Tested: 18.02.2016

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

Contact: Simon Weatherley

Site Name: Land off Park Lane
Site Address: Donington

TEST RESULTS

Laboratory Reference: PL5295-1/9

Client Reference: B3

Pre-treatment for organic material:

No

Sample Description: Brown very sandy SILT

Material Specification: Not Required

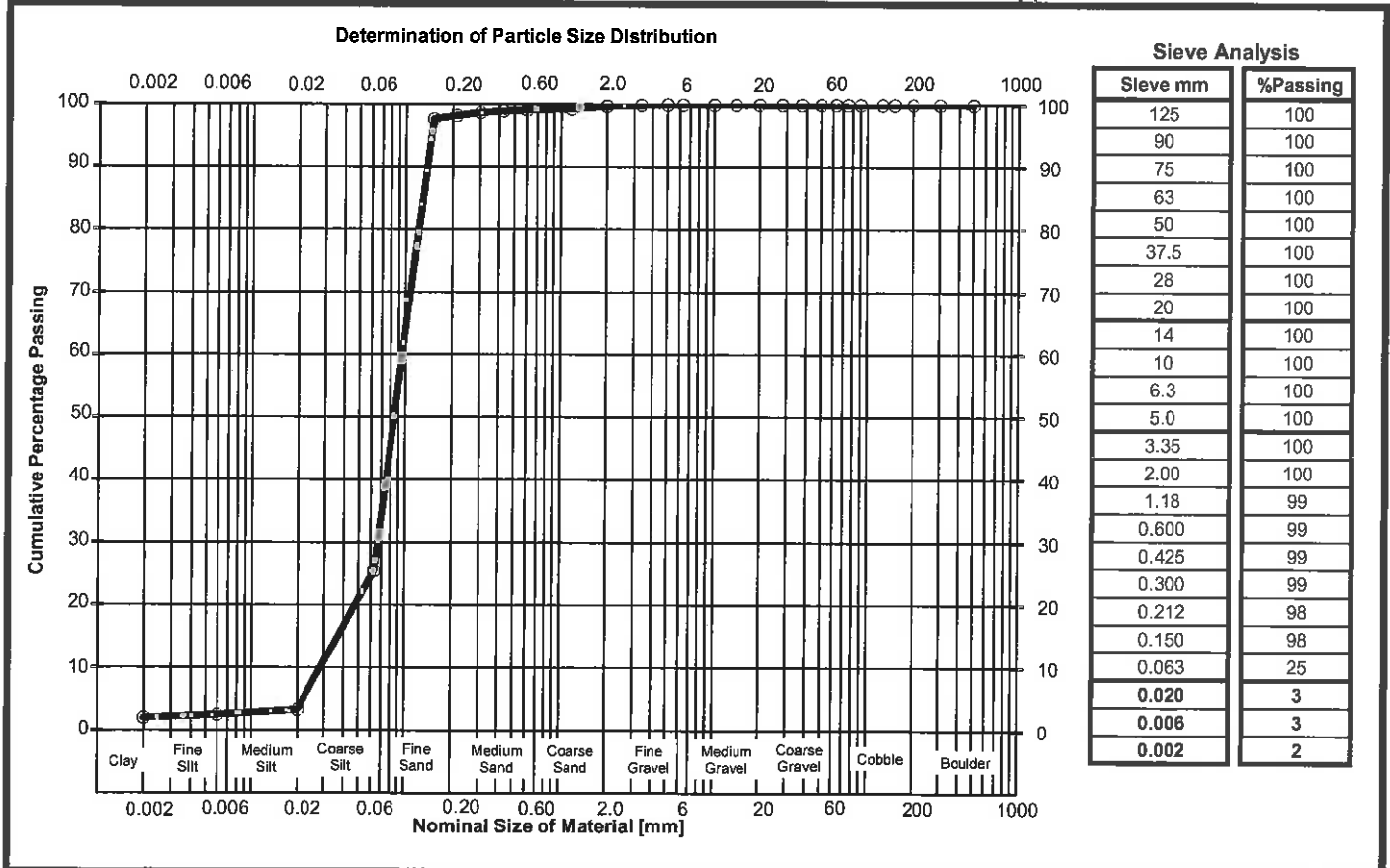
Location: TP2

Source:

Depth Top: 2.30m

Depth Base: 2.50m

Supplier:



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

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

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Date Reported: 22.02.2016 Page 1 of 1

Form Number: GELab/C/709-2 Version 46

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Final Report

Report No.: 16-06260-1
Initial Date of Issue: 21-Mar-2016
Client Ground Engineering Limited
Client Address: Newark Road
Peterborough
Cambridgeshire
PE1 5UA
Contact(s): Simon Weatherley
Project SW/C13751A-Land off Park lane,
Donington

Quotation No.:		Date Received:	16-Mar-2016
Order No.:	SW/C13751A	Date Instructed:	16-Mar-2016
No. of Samples:	4	Target Date:	18-Mar-2016
Turnaround (Wkdays):	5	Results Due:	22-Mar-2016
Date Approved:	21-Mar-2016		

Approved By:

Details: Keith Jones, Technical Manager

Results - Soil

Client: Ground Engineering Limited		Chemtest Job No.:		18-02-2016	19-02-2016	20-02-2016	21-02-2016
Quotation No.:		Chemtest Sample ID.:		268140	268141	268142	268143
Order No.: SW/C13751A		Client Sample Ref.:		TP1	TP2	TP3	TP4
		Client Sample ID.:		D1	D2	D1	D1
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.30	0.40	0.40	0.30
		Date Sampled:		22-Jan-2016	22-Jan-2016	22-Jan-2016	22-Jan-2016
Parameter		Assayed	SOP	Units	LOO		
pH		U	2010		N/A	7.9	8.5
Moisture		N	2030	%		21	13
Stones		N	2030	%		< 0.020	< 0.020
Boron (Hot Water Soluble)		U	2120	mg/kg	0.40	0.40	0.86
Sulphate (2:1 Water Soluble) as SO4		U	2120	g/l	0.010	0.88	0.015
Cyanide (Free)		U	2300	mg/kg	0.50	< 0.50	< 0.50
Cyanide (Total)		U	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)		U	2325	mg/kg	0.50	2.9	4.3
Arsenic		U	2450	mg/kg	1.0	23	26
Cadmium		U	2450	mg/kg	0.10	0.14	0.20
Chromium		U	2450	mg/kg	1.0	17	17
Copper		U	2450	mg/kg	0.50	69	22
Mercury		U	2450	mg/kg	0.10	0.38	0.29
Nickel		U	2450	mg/kg	0.50	24	21
Lead		U	2450	mg/kg	0.50	570	110
Selenium		U	2450	mg/kg	0.20	< 0.20	< 0.20
Zinc		U	2450	mg/kg	0.50	180	100
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter		U	2625	%	0.40	4.0	4.5
Acenaphthene		U	2700	mg/kg	0.10	< 0.10	0.47
Acenaphthylene		U	2700	mg/kg	0.10	< 0.10	0.99
Anthracene		U	2700	mg/kg	0.10	0.13	< 0.10
Benzo[a]anthracene		U	2700	mg/kg	0.10	0.44	0.54
Benzo[a]pyrene		U	2700	mg/kg	0.10	0.44	0.53
Benzo[b]fluoranthene		U	2700	mg/kg	0.10	0.42	0.75
Benzo[g,h,i]perylene		U	2700	mg/kg	0.10	< 0.10	0.67
Benzo[k]fluoranthene		U	2700	mg/kg	0.10	0.11	0.35
Chrysene		U	2700	mg/kg	0.10	0.79	0.82
Dibenz[a,h]anthracene		U	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene		U	2700	mg/kg	0.10	0.88	0.80
Fluorene		U	2700	mg/kg	0.10	0.37	0.15
Indeno(1,2,3-c,d)Pyrene		U	2700	mg/kg	0.10	< 0.10	0.29
Naphthalene		U	2700	mg/kg	0.10	< 0.10	0.32
Phenanthrene		U	2700	mg/kg	0.10	0.50	0.35
Pyrene		U	2700	mg/kg	0.10	0.81	0.81
Total Of 16 PAH's		U	2700	mg/kg	2.0	4.9	7.8
Total Phenols		U	2920	mg/kg	0.30	< 0.30	< 0.30

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 our Coventry 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

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.co.uk

APPENDIX 1

HISTORICAL MAP EXTRACTS

Site History

Figure A

Reproduced from the 1887 edition Ordnance Survey sheets Lincolnshire 116SE & 125NE at 1:10,560 scale with the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright. All rights reserved. Licence number AL100005523



Project : Land off Park Lane, Donington,
Lincolnshire

Client : Calderdale Homes (Eastern) Limited

GROUND
ENGINEERING
LIMITED

Peterborough Tel : 01733 566566

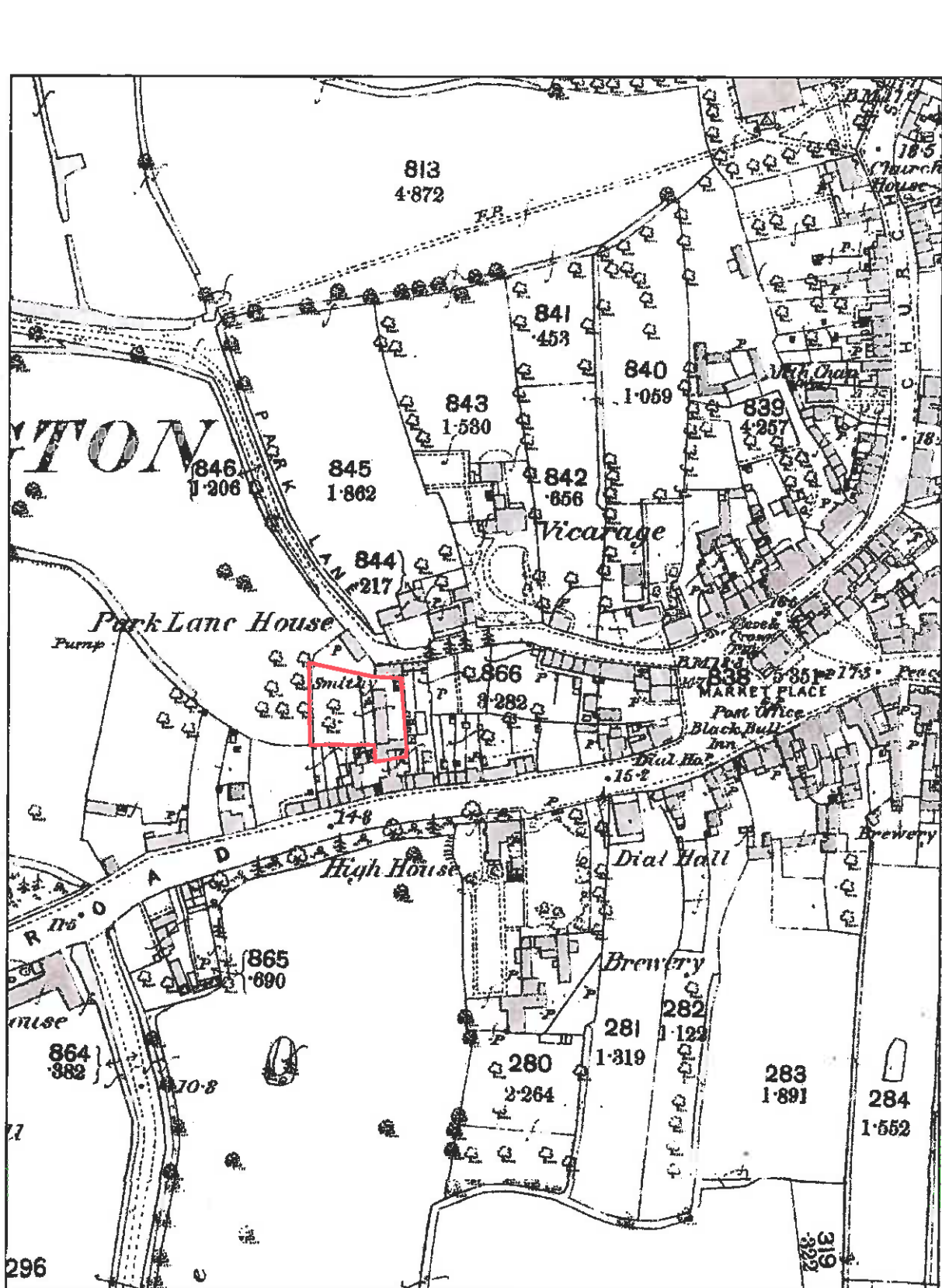
Project No.

C13751

Site History

Figure B

Reproduced from the 1889 edition Ordnance Survey sheets Lincolnshire 116.16 & 125.4 at 1:2500 scale with the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright. All rights reserved. Licence number AL100005523



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Figure C

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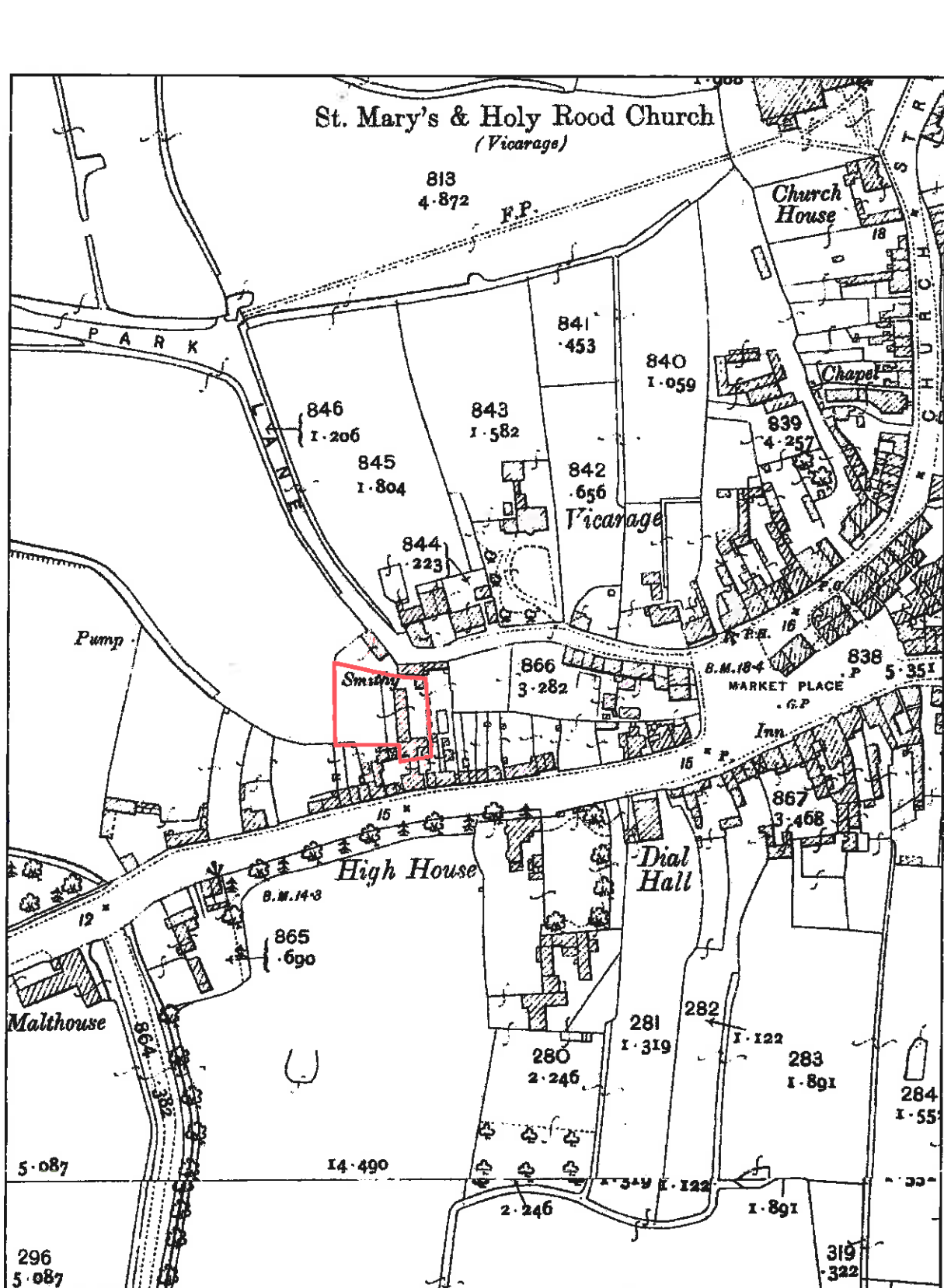
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Site History

Figure D

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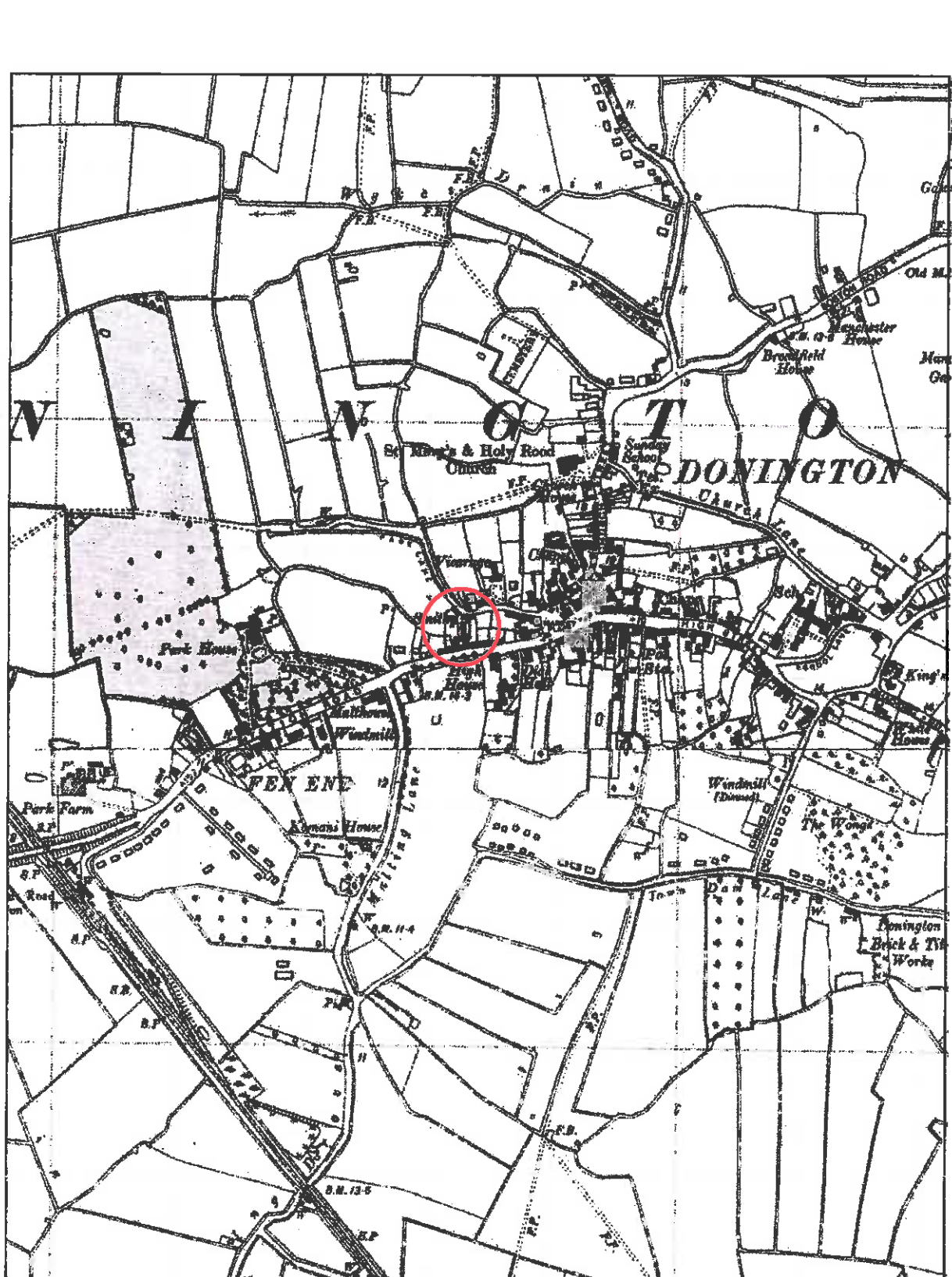
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Site History

Figure E

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Site History

Figure F

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Client : Calderdale Homes (Eastern) Limited

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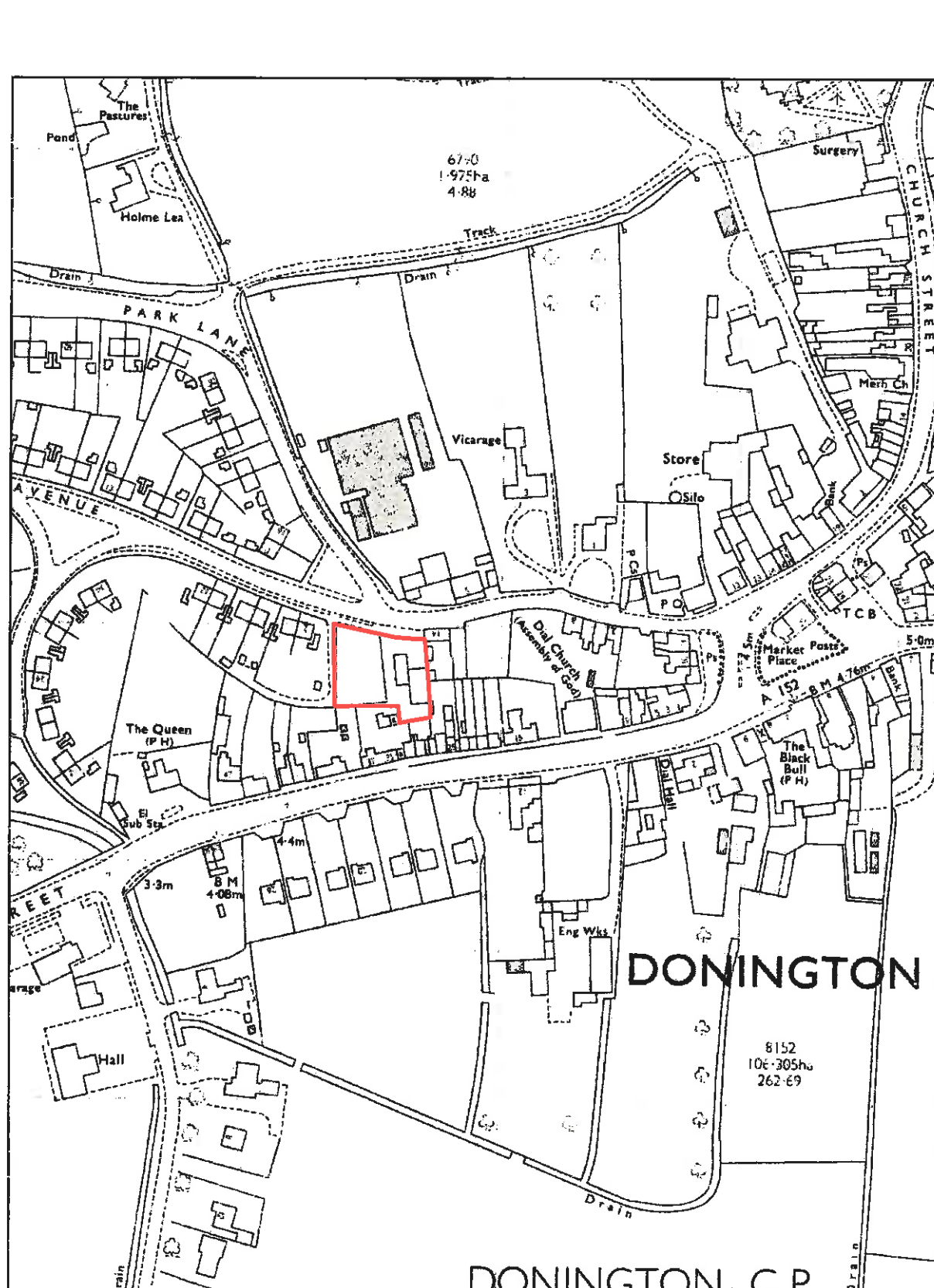
Project No.

C13751

Site History

Figure G

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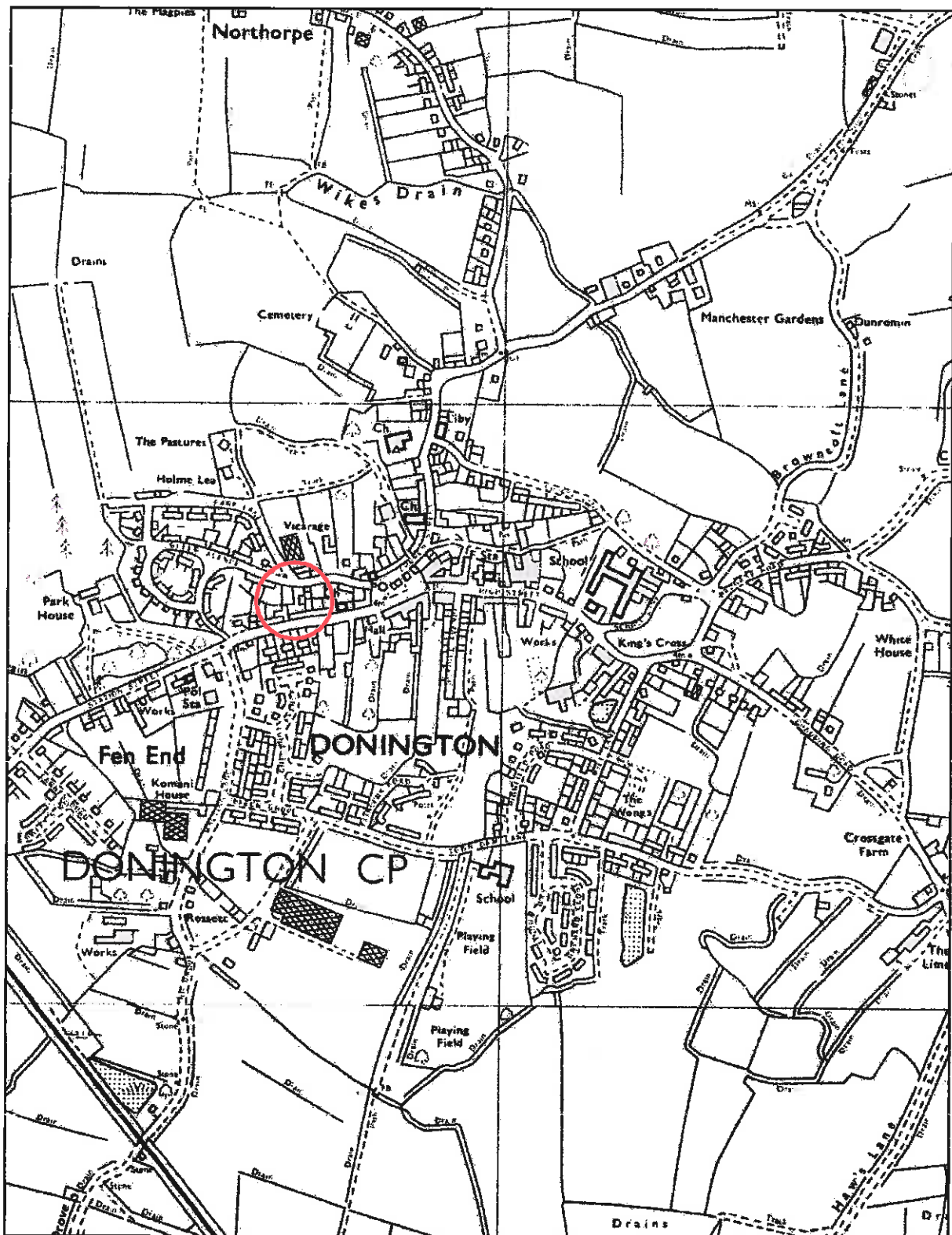
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Site History

Figure H

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Client : Calderdale Homes (Eastern) Limited

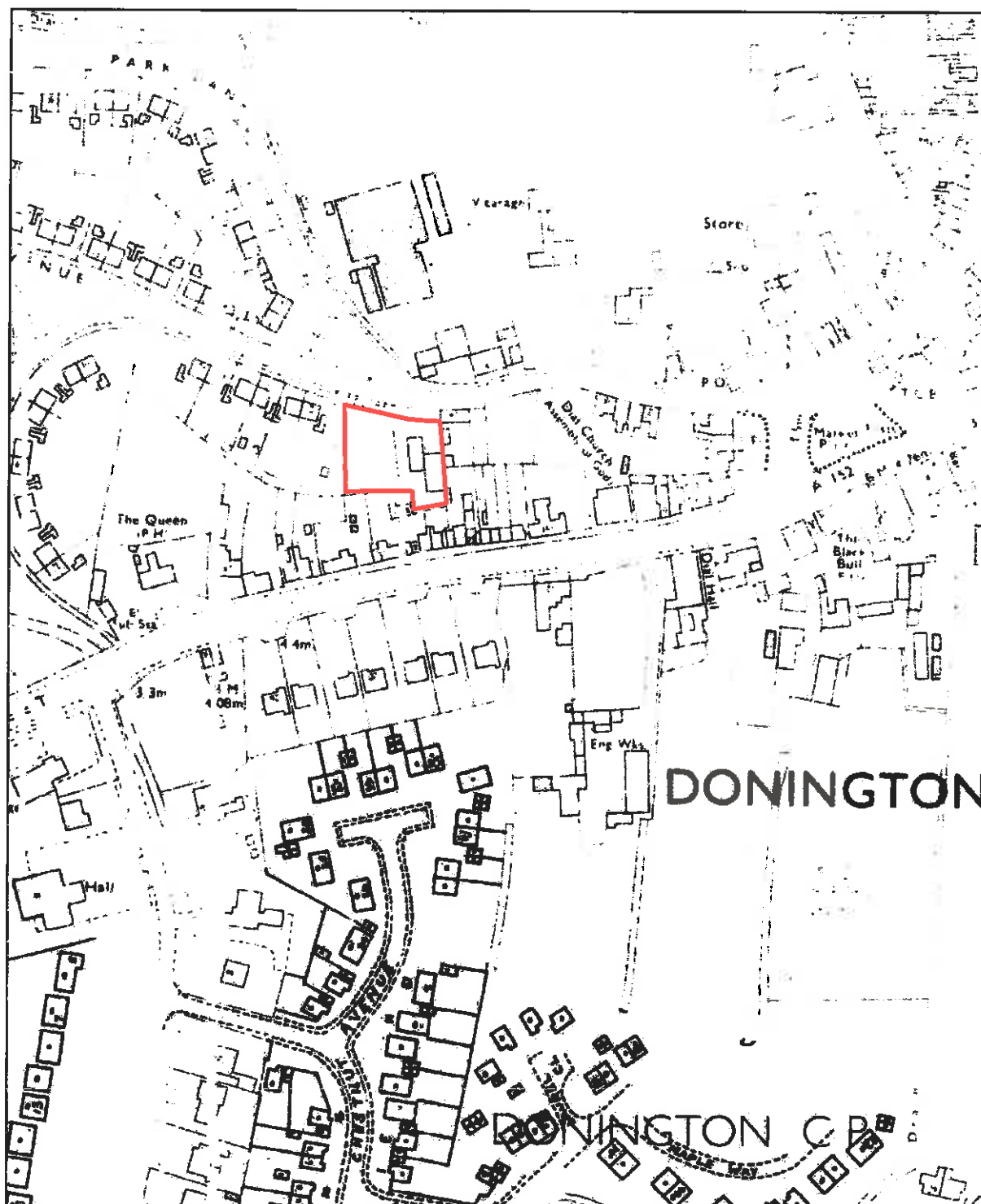
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Project No.

C13751

Figure I



C13751

Figure J

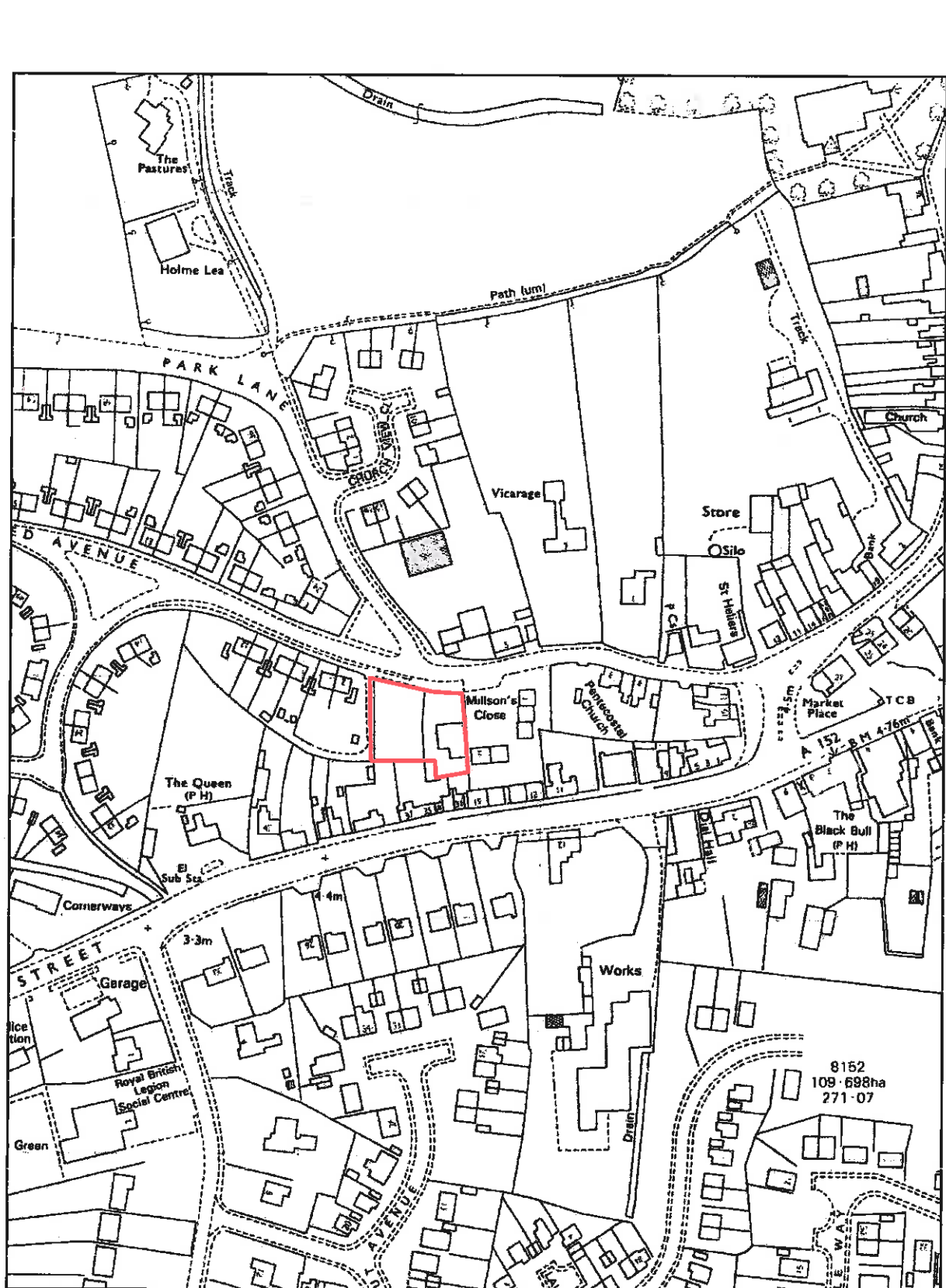
The map shows a residential area with several streets and landmarks. A red rectangle highlights a specific area in the center of the map. The map includes labels for streets like Park Lane, Vicarage, and Donington, as well as landmarks like The Queen's Hall and The Black Bull. The word 'DONINGTON' is printed in large letters across the bottom right.

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Site History

Figure K

Reproduced from the 1987 edition Ordnance Survey sheet TF2035 at 1:2500 scale with the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright. All rights reserved. Licence number AL10005523



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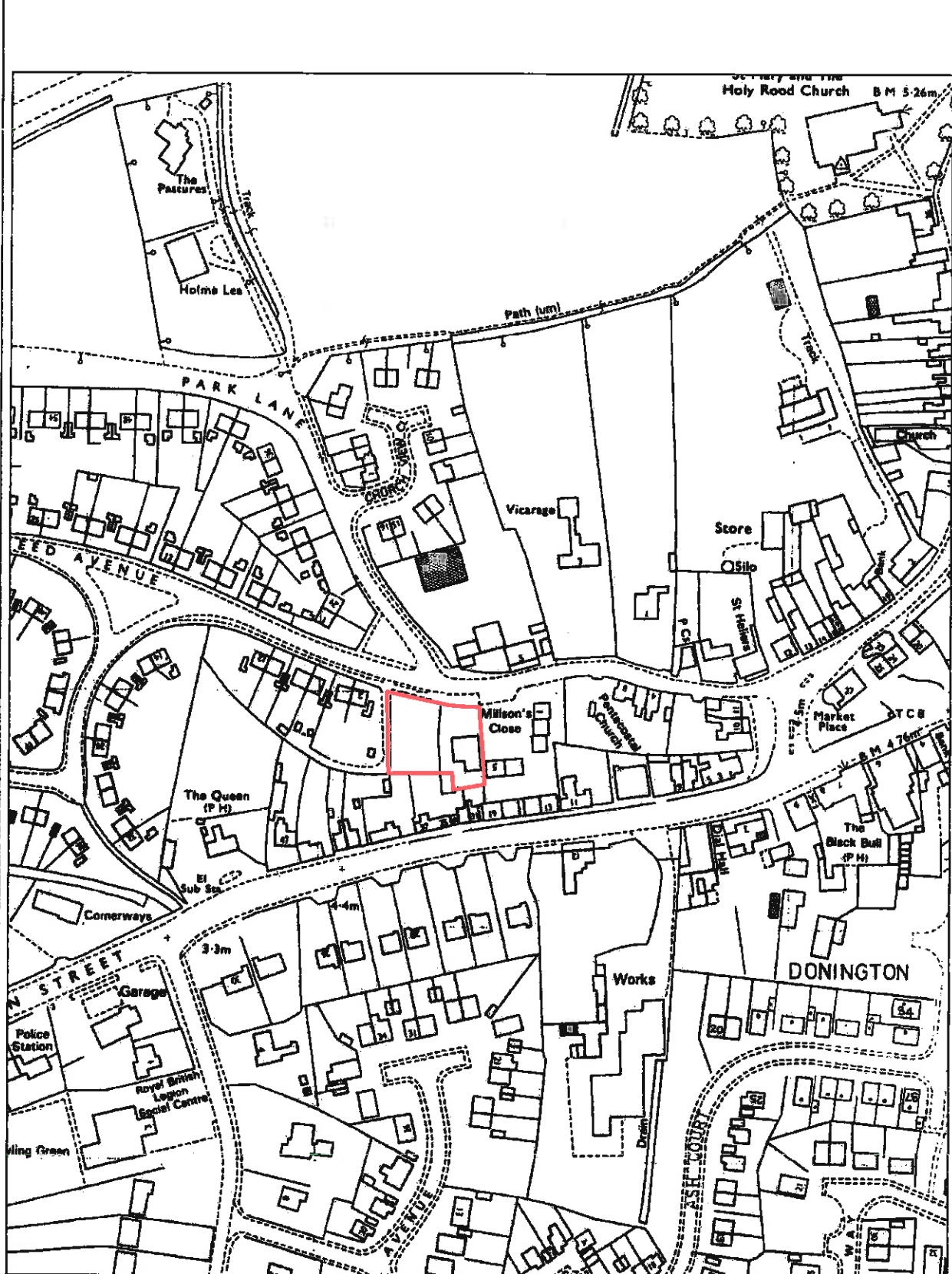
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Site History

Figure L

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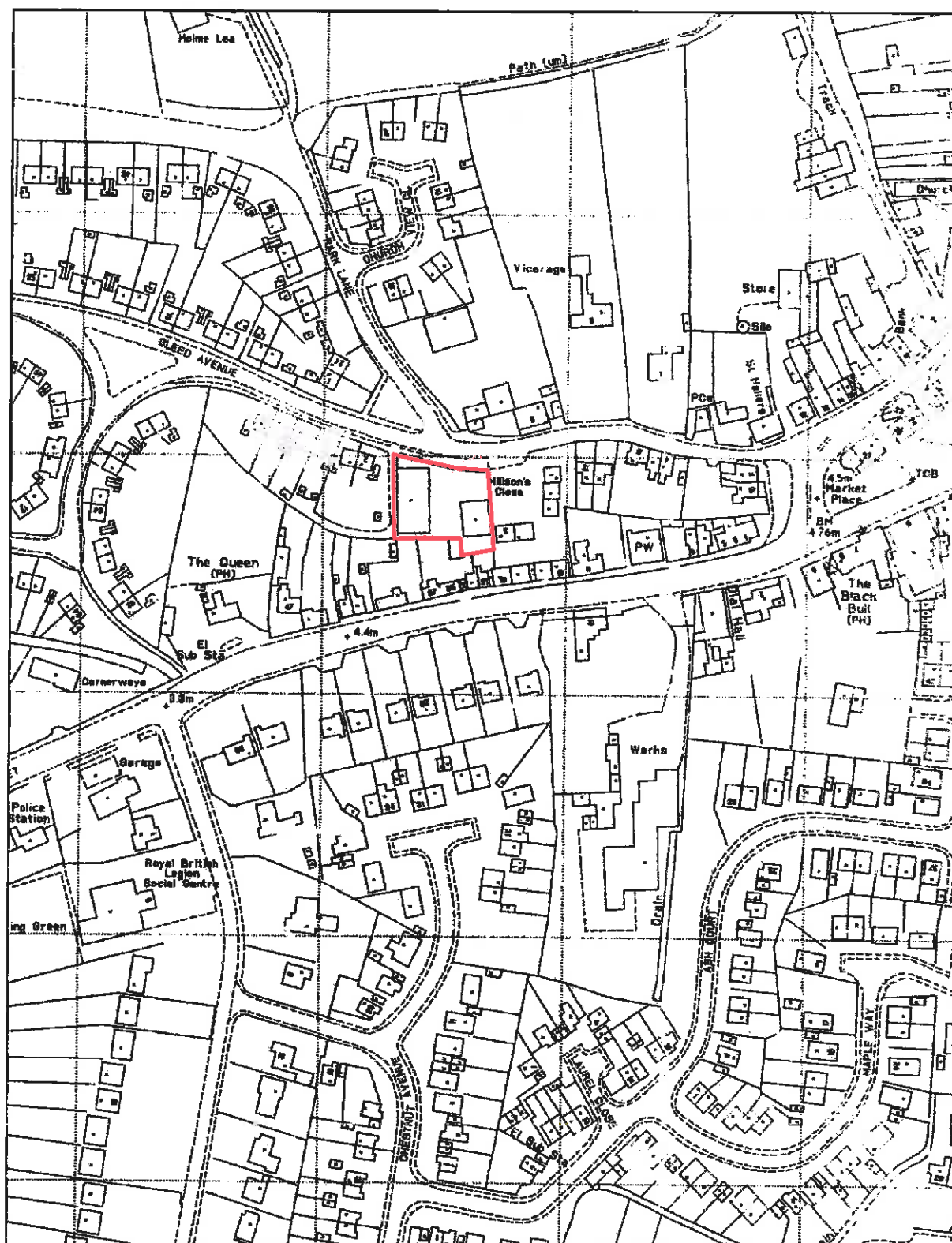
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Site History

Figure M

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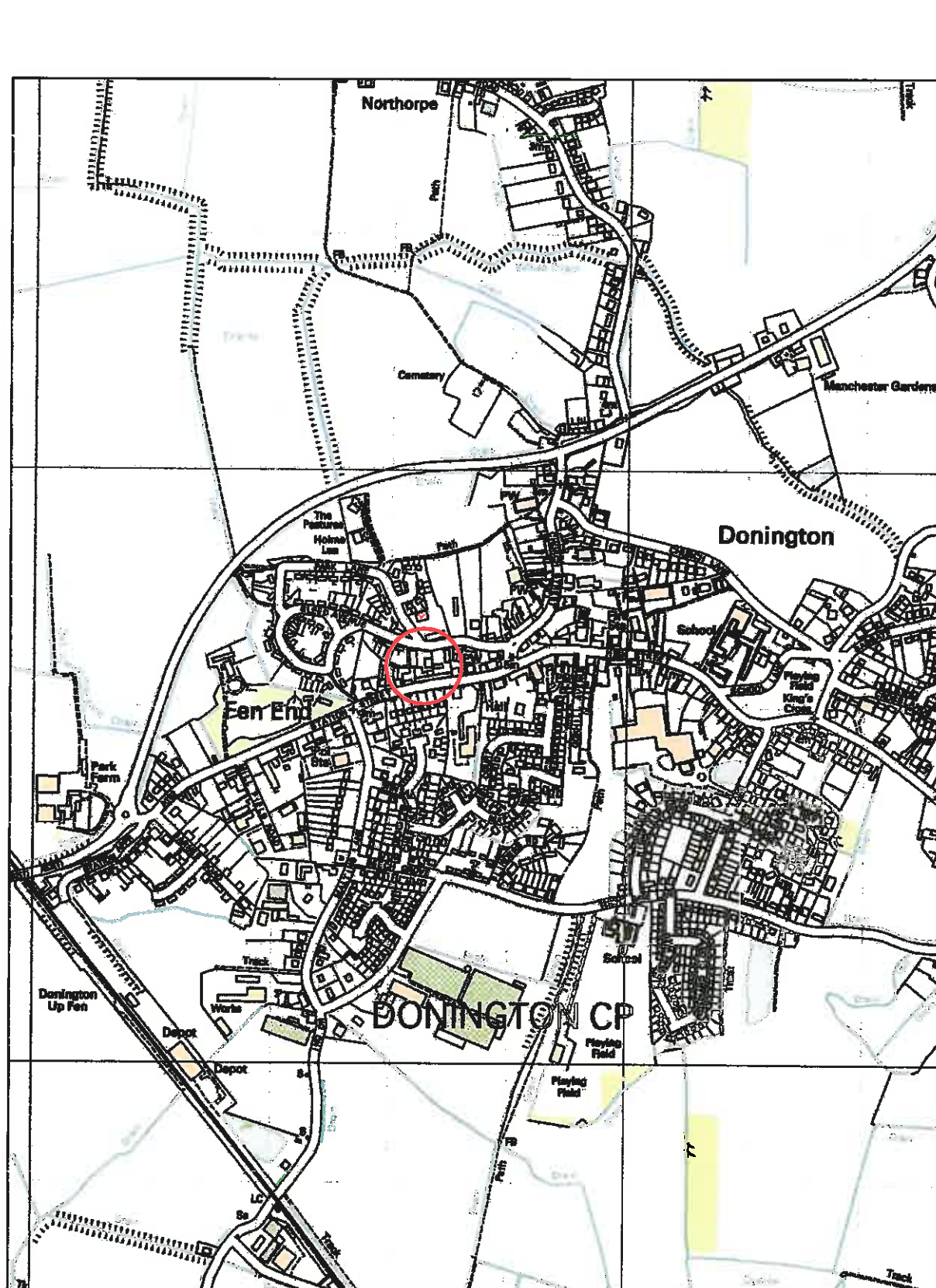
Project No.

C13751

Site History

Figure N

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Client : Calderdale Homes (Eastern) Limited

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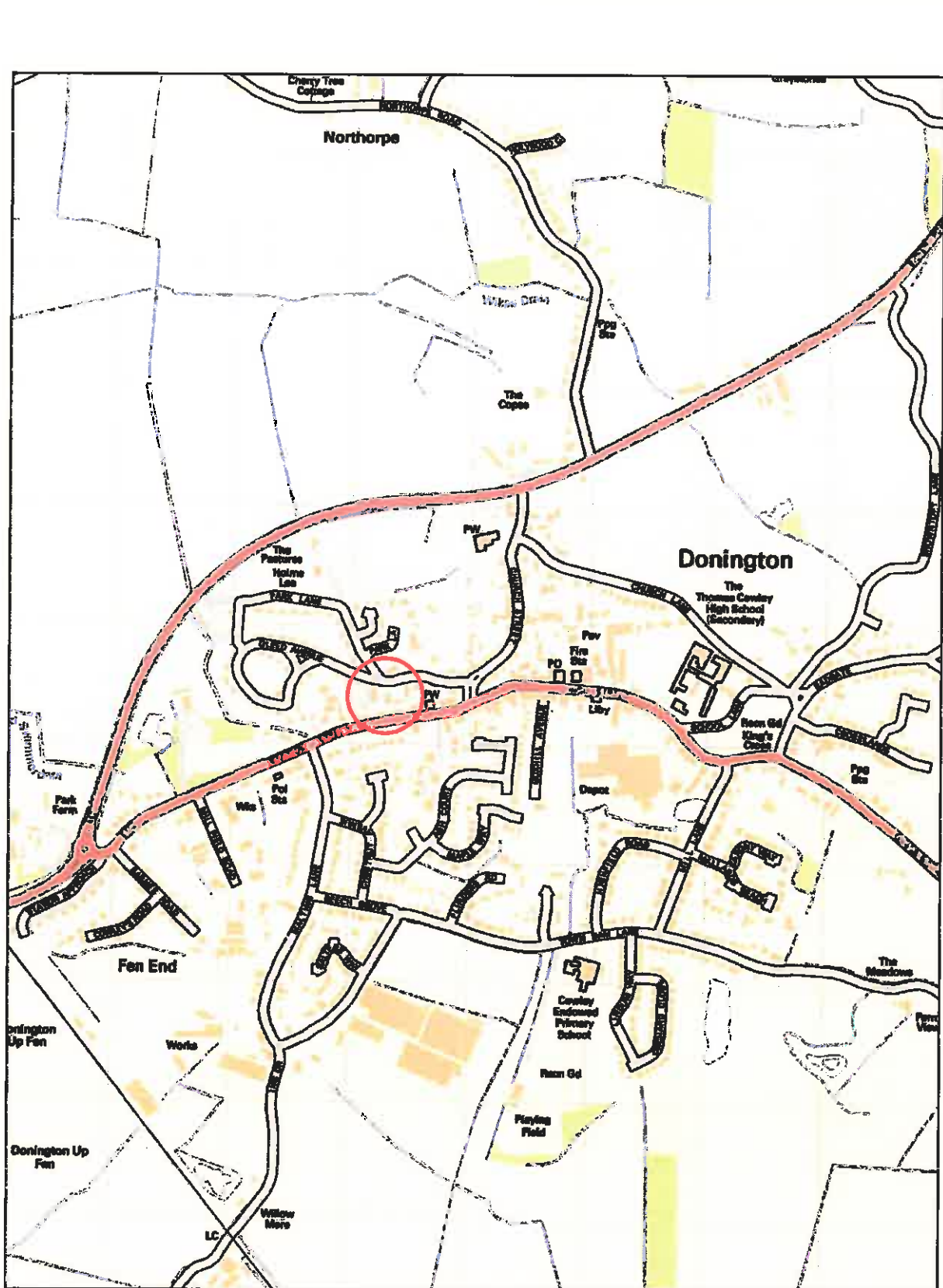
Project No.

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Site History

Figure O

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Client : Calderdale Homes (Eastern) Limited

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Project No.

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Site History

Figure P

Reproduced from the 2016 edition Ordnance Survey TF2035 (BT Plan) Not to scale with the permission of the Controller of Her Majesty's Stationary Office, © Crown Copyright. All rights reserved. Licence number AL100005523



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Client : Calderdale Homes (Eastern) Limited

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Peterborough Tel : 01733 566566

Project No.

C13751

APPENDIX 2

ENVIRONMENTAL DATABASE SEARCH

Groundsure Enviroinsight

Address: LAND OFF PARK LANE, DONINGTON,
Date: 22 Mar 2016
Reference: GS-2864234
Client: Ground Engineering Limited



Aerial Photograph Capture date: 23-May-2010
Grid Reference: 520650,335684
Site Size: 0.12ha

Report Reference: GS-2864234
Client Reference: SWC13751

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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.

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1.1 Potentially Contaminative Uses Identified from 1:10,000 scale mapping	4	0	25	18
1.2 Additional Information – Historical Tank Database	0	0	4	7
1.3 Additional Information – Historical Energy Features Database	0	0	12	10
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	5	5
1.6 Potentially Infilled Land	0	0	1	14

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	2	1
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	2
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 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 Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency Historic Landfill Sites	0	0	0	0	0	0
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 Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use

On-site 0-50m 51-250 251-500

4.1 Current Industrial Sites Data	1	0	7	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	1	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 Are there any records of Artificial Ground and Made Ground present beneath the study site?

No

5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?

Yes

5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.

Section 6: Hydrogeology and Hydrology

0-500m

6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?

Yes

6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?

Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	3
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	0	0	Not searched	Not searched

On-site 0-50m 51-250 251-500 501-1000 1000-1500

Section 6: Hydrogeology and Hydrology

0-500m

6.9 Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	No	No
6.10 Detailed River Network entries within 500m of the site	0	0	0	1	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Environment Agency Zone 2 floodplains within 250m of the study site?	Yes
7.2 Are there any Environment Agency Zone 3 floodplains within 250m of the study site?	Yes
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Not Prone
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Not Applicable

Section 8: Designated Environmentally Sensitive Sites

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

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	2	0	0	0	2	2
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?

Moderate

9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?

Low

9.1.2 What is the maximum Landslides hazard rating identified on the study site?

Very Low

9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?

Negligible

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

Moderate

9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?

Negligible

9.1.6 What is the 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 property 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 Are there any coal mining areas within 75m of the study site?

No

10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?

No

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

No

Using this report

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

1. 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 licenses, 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.

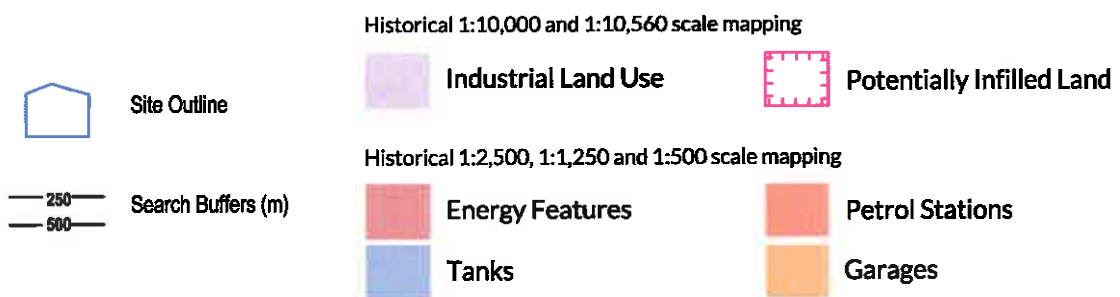
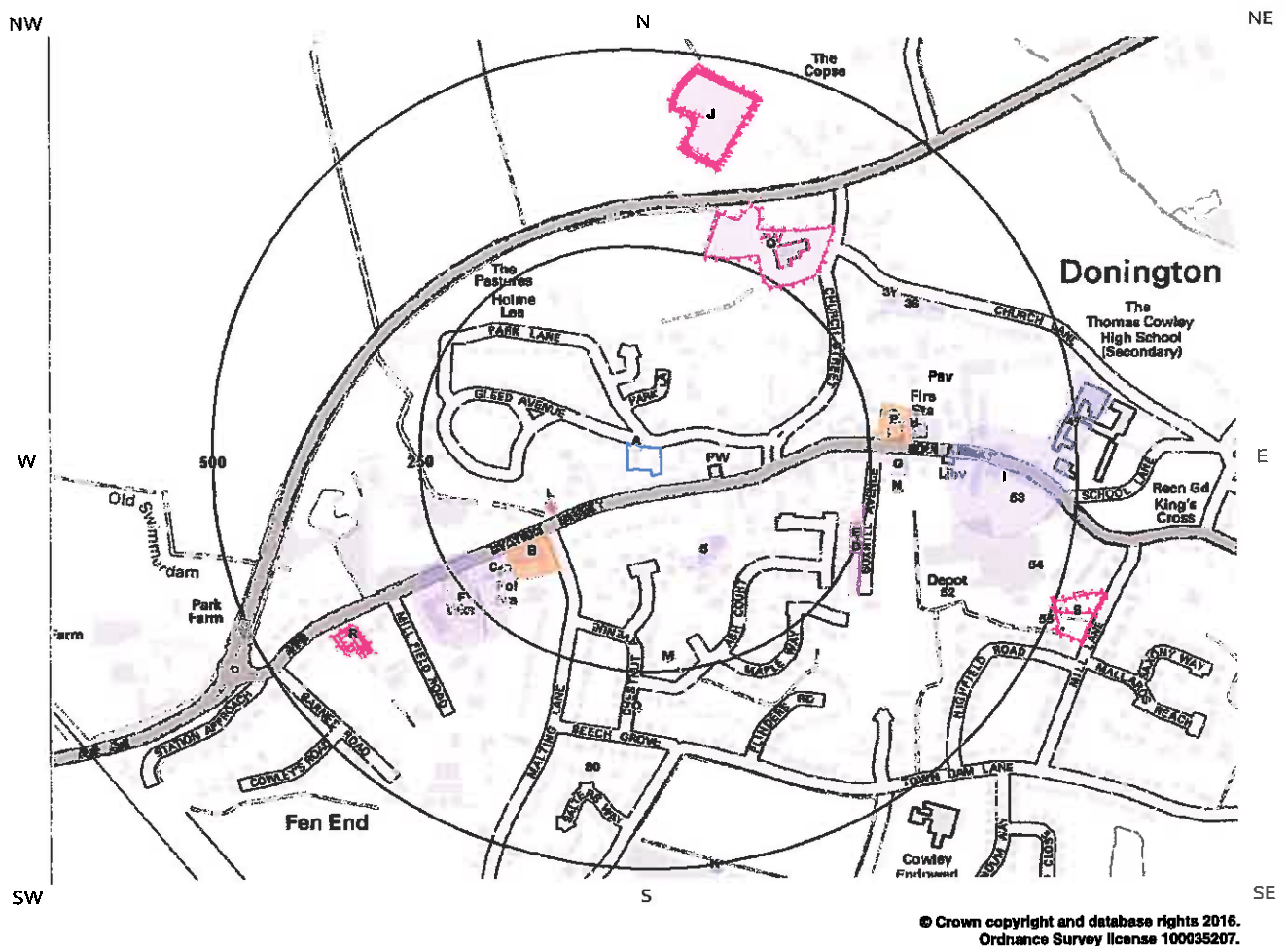
Note: Maps

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



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: 47

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Smithy	1887
2A	0	On Site	Smithy	1903
3A	0	On Site	Smithy	1922
4A	0	On Site	Smithy	1887
5	93	SE	Brewery	1887
6B	142	SW	Malthouse	1887
7B	142	SW	Malthouse	1903
8B	142	SW	Malthouse	1887
9B	142	SW	Malthouse	1887
10B	144	SW	Malthouse	1922
11B	144	SW	Malthouse	1950
12C	177	SW	Police Station	1988
13C	177	SW	Police Station	1975
14F	204	SW	Windmill	1950
15D	233	E	Unspecified Commercial/Industrial	1887
16D	233	E	Gas Works	1903
17E	235	E	Gasworks	1887
18E	235	E	Gasworks	1887
19F	237	SW	Unspecified Windmill	1887
20F	237	SW	Corn Windmill	1887
21F	237	SW	Unspecified Works	1975
22F	237	SW	Unspecified Works	1988
23F	237	SW	Windmill	1903
24F	237	SW	Windmill	1887
25E	241	E	Gasometer	1887
26E	241	E	Gasometer	1887
27E	241	E	Unspecified Tank	1887
28E	241	E	Gasometer	1903
29Q	242	NE	Grave Yard	1887
30F	253	SW	Windmill	1922
31G	274	E	Police Station	1922
32G	276	E	Police Station	1887
33H	297	E	Smithy	1903

34H	298	E	Fire Station	1988
35H	299	E	Fire Station	1975
36	315	NE	Telephone Exchange	1887
37	329	NE	Telephone Exchange	1922
38I	340	E	Unspecified Works	1975
39I	340	E	Unspecified Works	1988
40J	361	N	Cemetery	1950
41J	363	N	Cemetery	1922
42J	364	N	Cemetery	1887
43J	367	N	Cemetery	1903
44J	367	N	Cemetery	1887
45J	368	N	Cemetery	1988
46J	368	N	Cemetery	1975
47	445	E	Nursery	1887

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:

11

ID	Distance (m)	Direction	Use	Date
48E	236	E	Gas Works	1889
49E	236	E	Gas Works	1905
50E	244	E	Gasometer	1905
51E	244	E	Gasometer	1889
52	375	SE	Unspecified Tank	1966
53	426	E	Unspecified Tank	1889
54	461	E	Unspecified Tank	1972
55	497	SE	Unspecified Tank	1972
56K	499	S	Unspecified Tank	1995
57K	499	S	Unspecified Tank	1981
58K	499	S	Unspecified Tank	1988

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:

22

ID	Distance (m)	Direction	Use	Date
59L	97	W	Electricity Substation	1995
60L	97	SW	Electricity Substation	1981
61L	99	SW	Electricity Substation	1972
62L	103	SW	Electricity Substation	1987
63L	106	SW	Electricity Substation	1988
64M	231	S	Electricity Substation	1987
65E	236	E	Gas Works	1889
66E	236	E	Gas Works	1905
67E	244	E	Gasometer	1889
68E	244	E	Gasometer	1905
69M	246	S	Electricity Substation	1988
70M	248	S	Electricity Substation	1995
71N	278	E	Electricity Substation	1995
72N	278	E	Electricity Substation	1981
73N	278	E	Electricity Substation	1988
74N	279	E	Electricity Substation	1987
75N	279	E	Electricity Substation	1972
76O	296	S	Electricity Substation	1987
77O	296	S	Electricity Substation	1988
78O	296	S	Electricity Substation	1981
79O	296	S	Electricity Substation	1995
80	379	S	Electricity Substation	1995

1.4 Additional Information – Historical Petrol and Fuel Site Database

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

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

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 10

ID	Distance (m)	Direction	Use	Date
81B	127	SW	Garage	1981
82B	127	SW	Garage	1988

83B	128	SW	Garage	1995
84B	129	SW	Garage	1987
85B	130	SW	Garage	1972
86P	257	E	Garage	1972
87P	257	E	Garage	1987
88P	267	E	Garage	1981
89P	267	E	Garage	1988
90P	267	E	Garage	1995

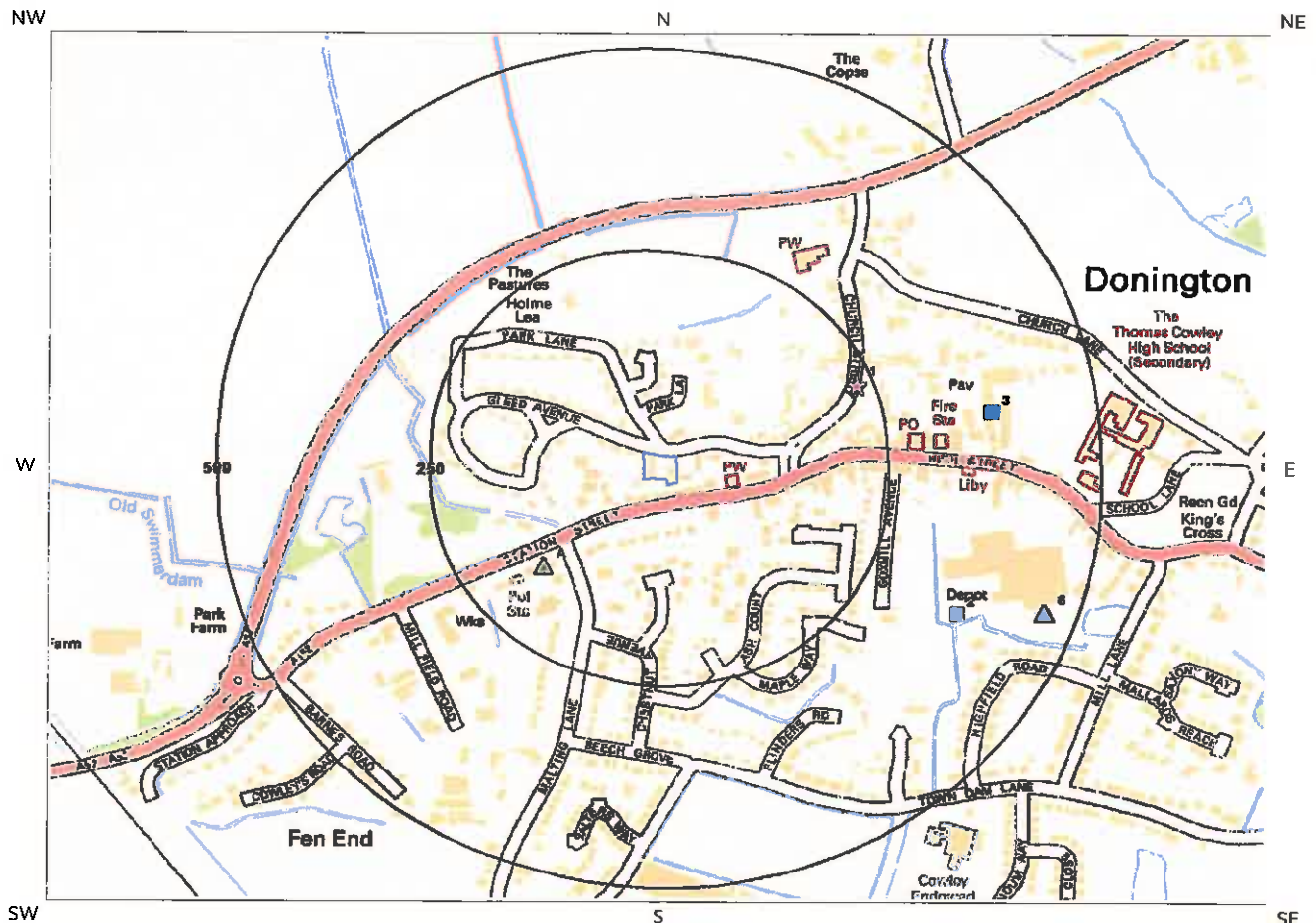
1.6 Potentially Infilled Land

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

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

ID	Distance(m)	Direction	Use	Date
91Q	242	NE	Grave Yard	1887
92J	361	N	Cemetery	1950
93J	363	N	Cemetery	1922
94J	364	N	Cemetery	1887
95J	367	N	Cemetery	1887
96J	367	N	Cemetery	1903
97J	368	N	Cemetery	1975
98J	368	N	Cemetery	1988
99R	384	SW	Ponds	1948
100R	384	SW	Ponds	1903
101R	384	SW	Ponds	1887
102R	388	SW	Ponds	1950
103S	497	E	Pond	1950
104S	500	E	Pond	1903
105S	500	E	Pond	1887

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 / NIHS 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 and Local Authorities reveal the following information:

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

3

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

ID	Distance (m)	Direction	NGR	Details
4A	162	SW	520512 335556	Address: Donington Service Station, 38 Station Street, Donington, Spalding, Lincs, PE11 4UL Process: Unloading of Petrol into Storage at Service Stations Status: Historical Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
5A	162	SW	520512 335556	Address: W A Burdall, Donington Service Station, 38 Station Street, Donington, Spalding, Lincs, PE11 4UL Process: Unloading of Petrol into Storage at Service Stations Status: Historical Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
6	462	E	521102 335499	Address: Select Timber Products, Mill Lane, Donington, Spalding, Lincs, PE11 4ST Process: Timber Process Status: Current Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

2

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	368	SE	521000 335500	Address: MILL LANE FACTORY, DONINGTON, SPALDING, PE11 Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: PR3NFF1076 Permit Version: 1 Receiving Water: Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 24/01/1974 Effective Date: 24-Jan-1974 Revocation Date: 20/02/1992

ID	Distance (m)	Direction	NGR	Details
3	376	E	521040 335750	Address: 24-26 HIGH STREET, DONINGTON, LINCOLNSHIRE, PE11 4TA Effluent Type: MISCELLANEOUS DISCHARGES - SURFACE WATER Permit Number: PRNNF02638 Permit Version: 1 Receiving Water: Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 14/05/1990 Effective Date: 14-May-1990 Revocation Date: 18/08/1992

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 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	230	NE	520880 335782	Incident Date: 03-Apr-2002 Incident Identification: 68598 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

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

0

Database searched and no data found.

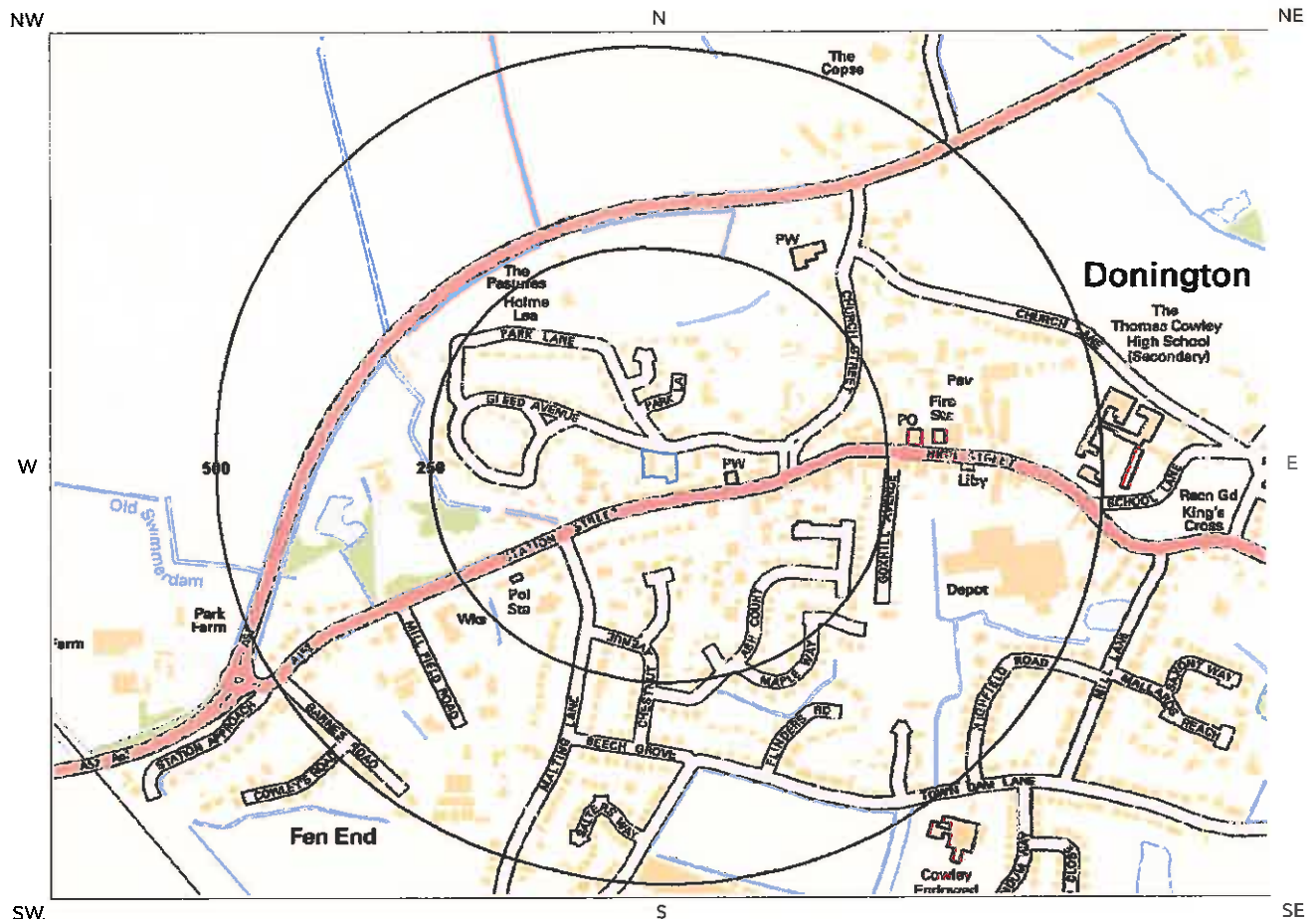
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

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

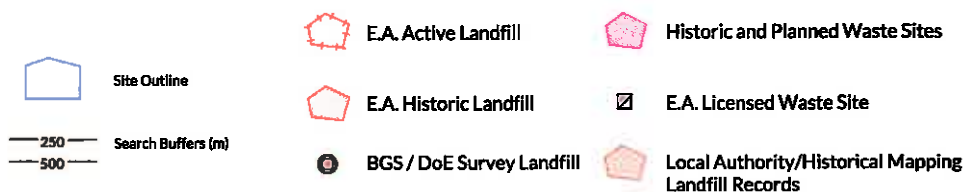
0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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3. Landfill and Other Waste Sites

3.1 Landfill Sites

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

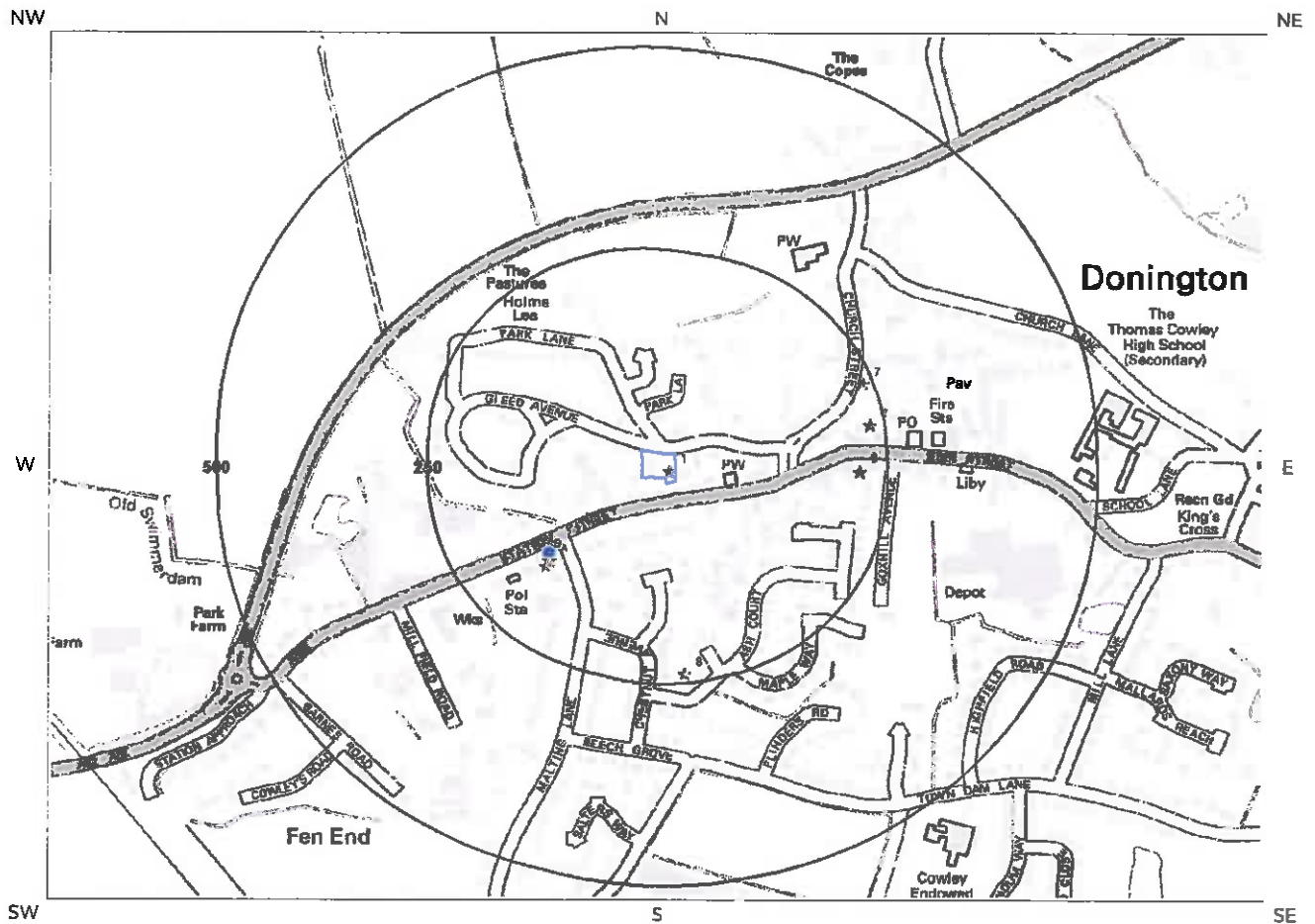
Database searched and no data found.

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

0

Database searched and no data found.

4. Current Land Use Map



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4. Current Land Uses

4.1 Current Industrial Data

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

8

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	0	On Site	Bridge Greenhouses Ltd	520662 335673	Bridge Greenhouses, Park Lane, Donington, Spalding, PE11 4UE	Horticultural Equipment	Industrial Products
2	105	SW	Electricity Sub Station	520549 335601	PE11	Electrical Features	Infrastructure and Facilities
3A	151	SW	Donington Service Station	520521 335562	38 Station Street, Donington, Spalding, Lincolnshire, PE11 4UL	Petrol and Fuel Stations	Road and Rail
4A	158	SW	Donington MOT & Repair Centre	520518 335556	38 Station Street, Donington, Spalding, PE11 4UQ	Vehicle Repair, Testing and Servicing	Repair and Servicing
5	216	E	Paul Watkins Publishing	520885 335673	1, High Street, Donington, Spalding, PE11 4TA	Published Goods	Industrial Products
6	233	E	Works	520898 335731	PE11	Unspecified Works Or Factories	Industrial Features
7	238	E	B & A Alexander	520888 335781	11, Church Street, Donington, Spalding, PE11 4UA	Vehicle Repair, Testing and Servicing	Repair and Servicing
8	238	S	Electricity Sub Station	520681 335422	PE11	Electrical Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

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

1

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

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
9	145	SW	520520 335572	Murco	Donington Service Station, 38, Station Street, Station Street, Donington, Spalding, Lincolnshire, PE11 4UL	Not Applicable	Obsolete

4.3 National Grid High Voltage Underground Electricity Transmission Cables

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

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

0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

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

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

0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

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

5.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
TFD	TIDAL FLAT DEPOSITS	CLAY AND SILT [UNLITHIFIED DEPOSITS CODING SCHEME]

5.3 Bedrock and Solid Geology

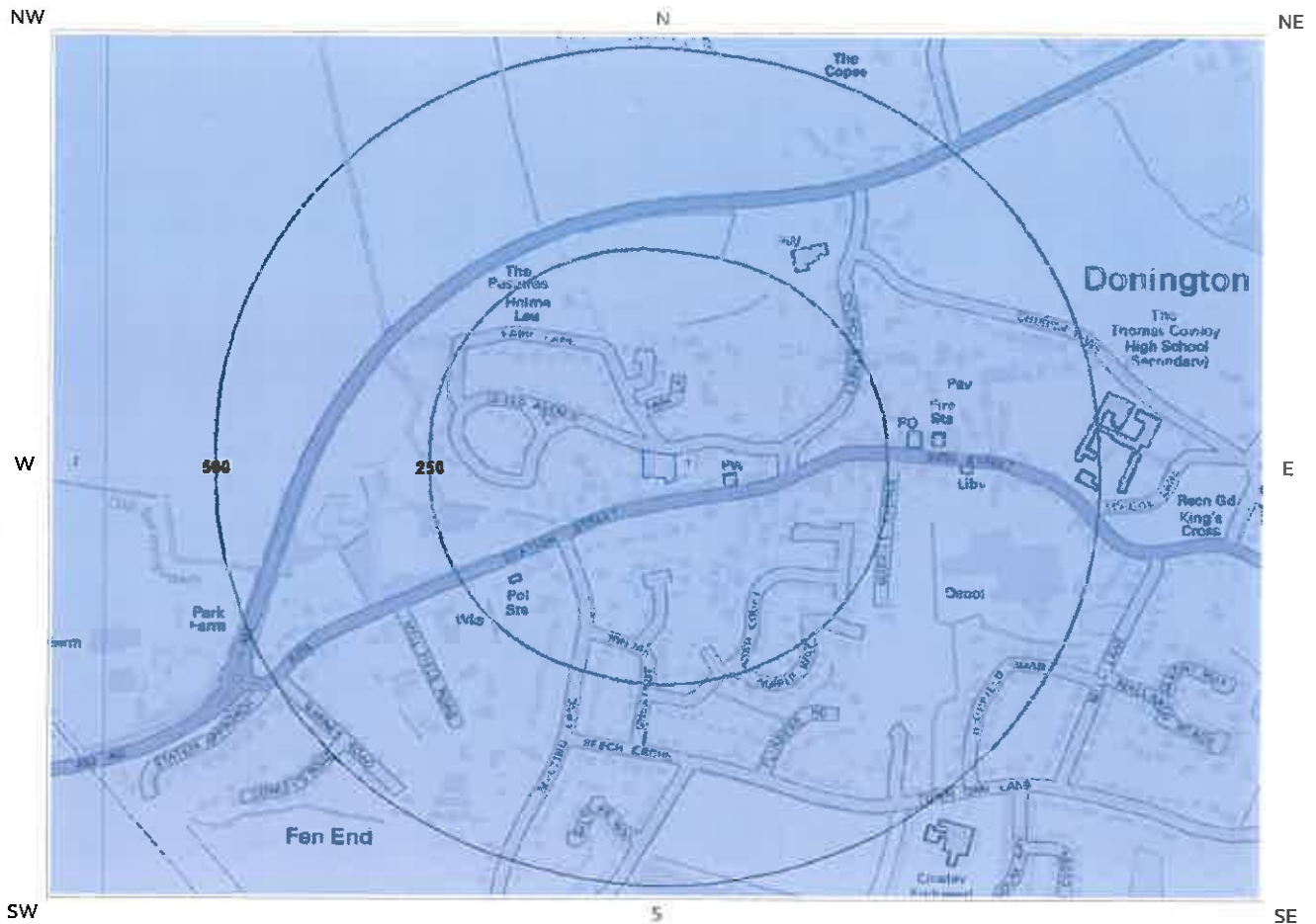
The database has been searched on site, including a 50m buffer.

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

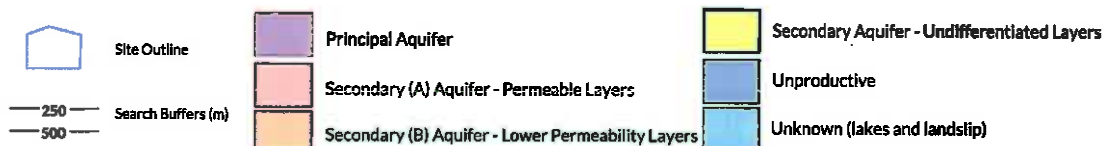
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

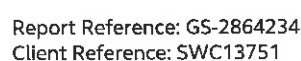
6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology

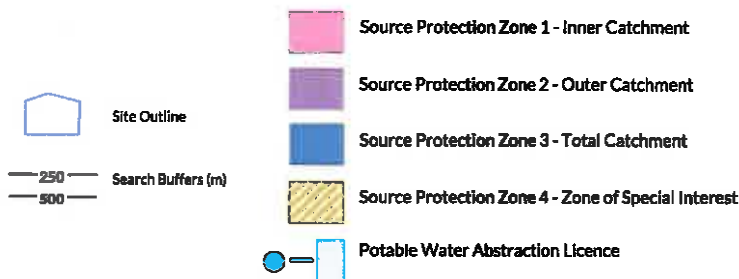
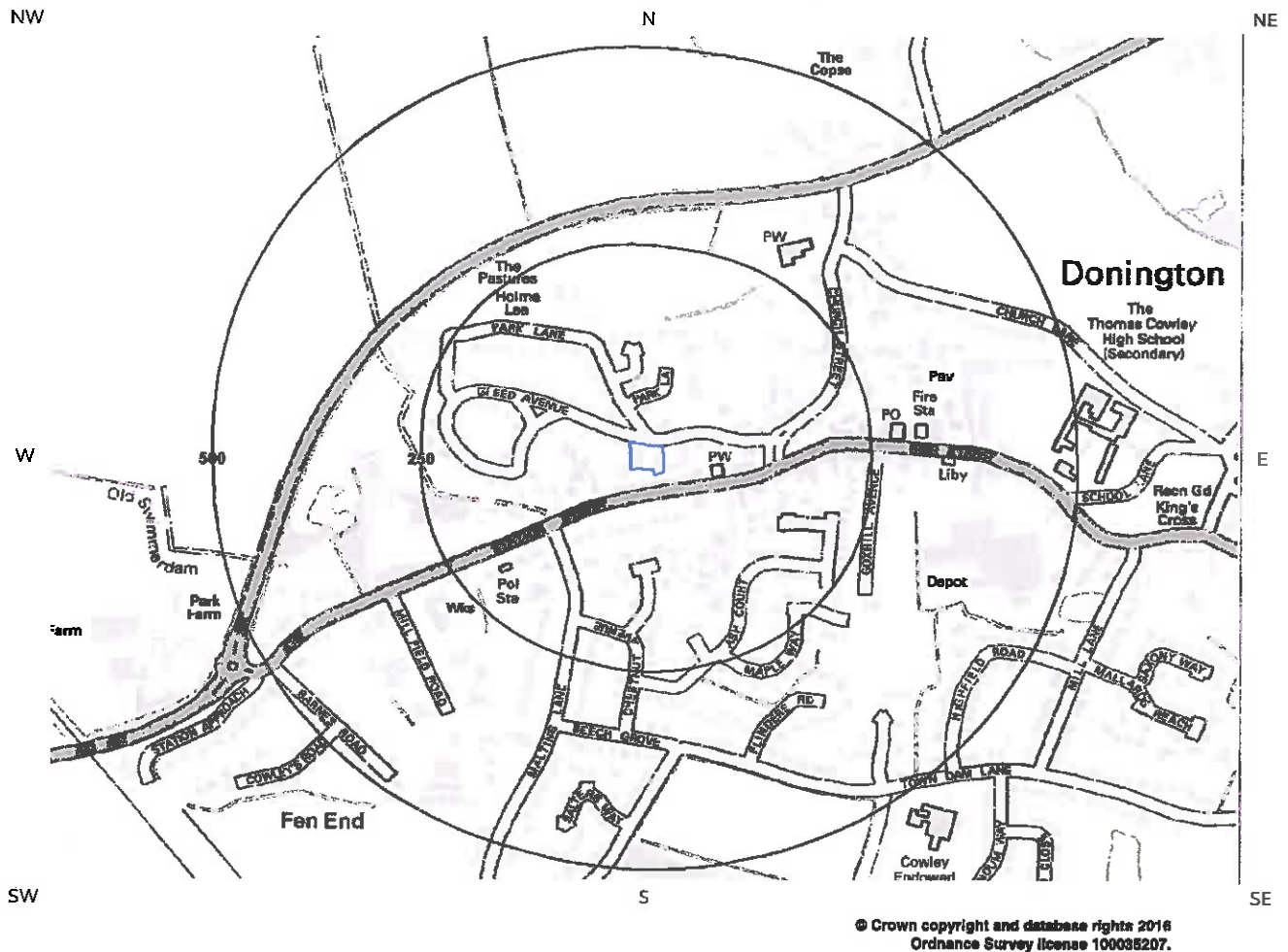


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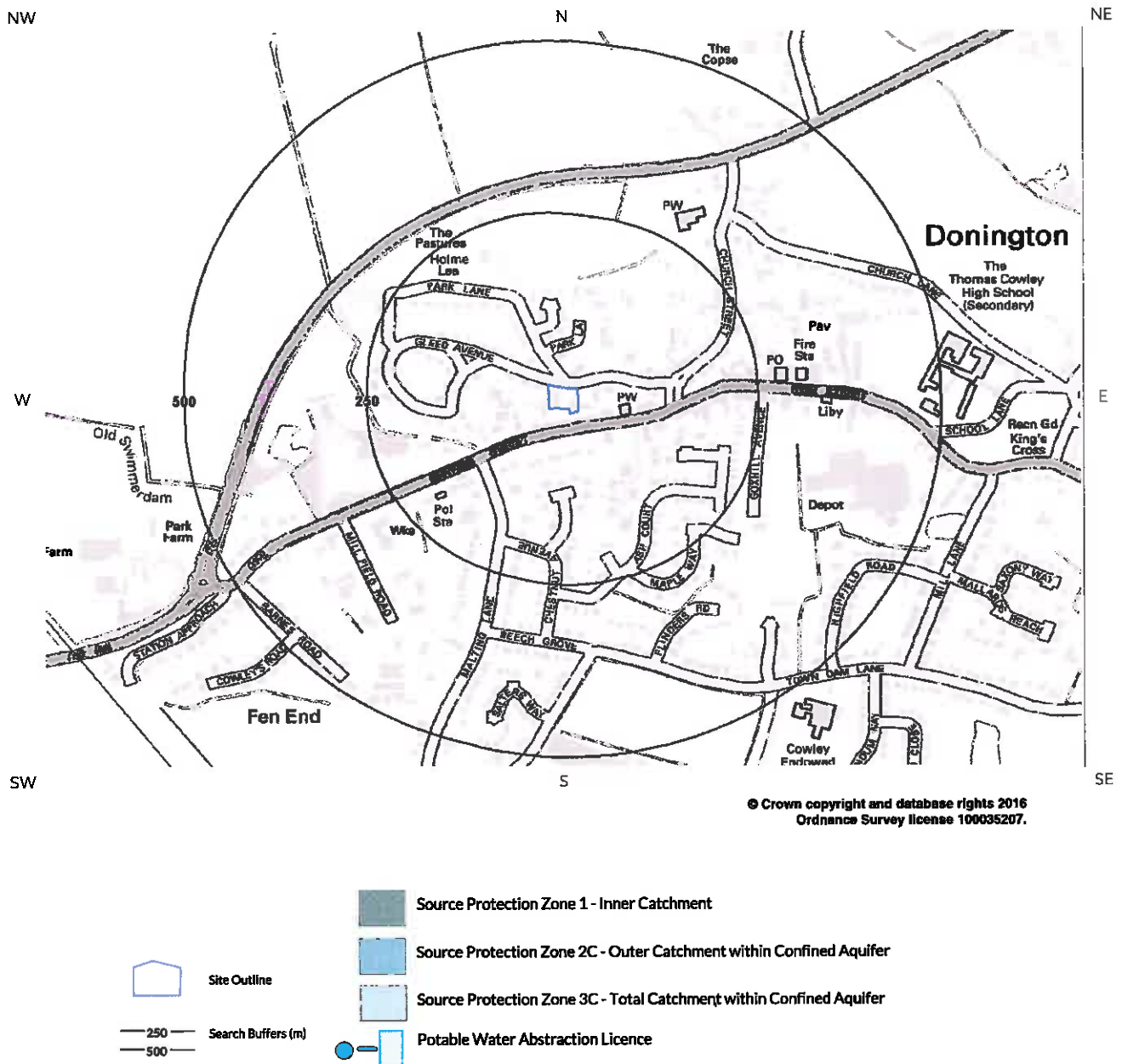




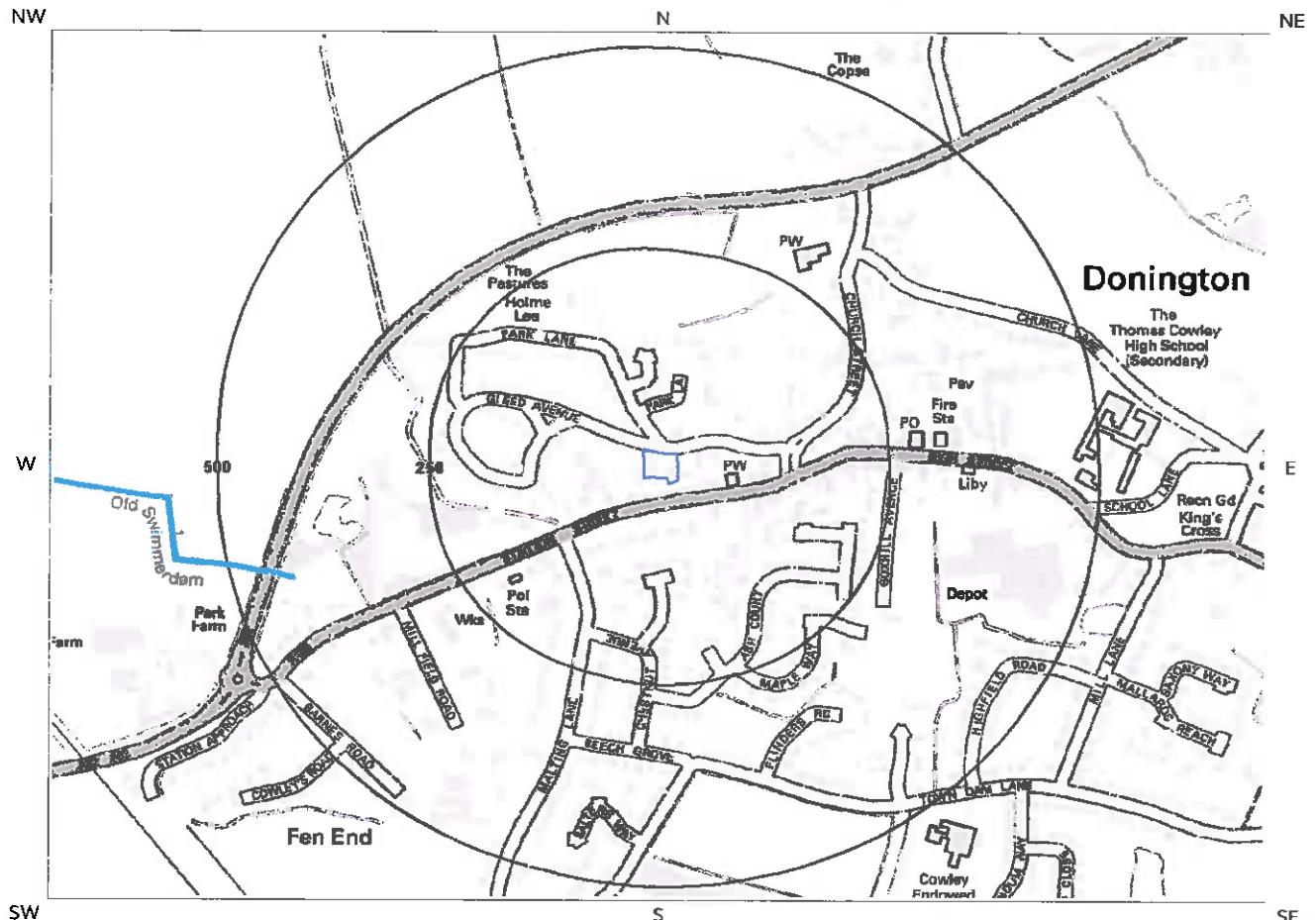
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



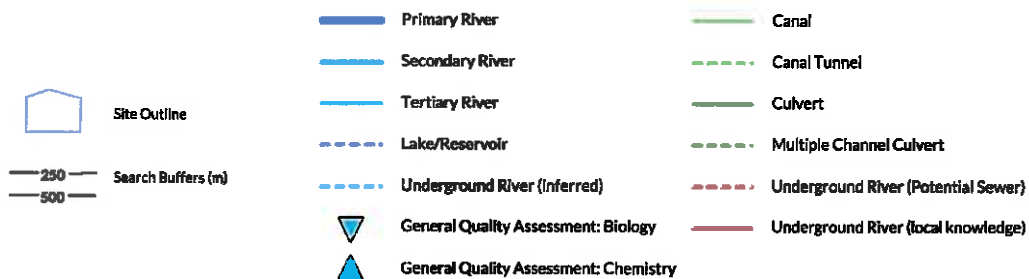
6d. Hydrogeology – Source Protection Zones within confined aquifer



6e. Hydrology – Detailed River Network and River Quality



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6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

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

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

The following aquifer records are shown on the Aquifer within Superficial Geology Map (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

6.2 Aquifer within Bedrock Deposits

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

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

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

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

6.3 Groundwater Abstraction Licences

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

Database searched and no data found.

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site?

Yes

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	1160	S	520600 334500	Status: Historical Licence No: 4/30/12/*S/0228 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: Unnamed Drain Donington Data Type: Point Name: MLEGGATE & SON Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 1/6/1977 Expiry Date: - Issue No: 100 Version Start Date: 1/6/1977 Version End Date:
Not shown	1458	SE	521400 334400	Status: Historical Licence No: 4/30/12/*S/0228 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: Unnamed Drain Donington Data Type: Line Name: MLEGGATE & SON Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 1/6/1977 Expiry Date: - Issue No: 100 Version Start Date: 1/6/1977 Version End Date:
Not shown	1940	W	518700 335900	Status: Active Licence No: 4/30/12/*S/0129 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: Hammond Beck Donington Data Type: Point Name: BROCKLEHURST Annual Volume (m³): 2273 Max Daily Volume (m³): 681.9 Application No: - Original Start Date: 1/1/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2004 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site?

No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site?

No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Is there any Environment Agency information on groundwater vulnerability and soil leaching potential within 500m of the study site? **No**

Database searched and no data found.

6.9 River Quality

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

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? **Yes**

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details
1	428	W	River Name: Old Swimmerdam Drain Welsh River Name: - Alternative Name: - River Type: Secondary River Main River Status: Currently Undefined

6.11 Surface Water Features

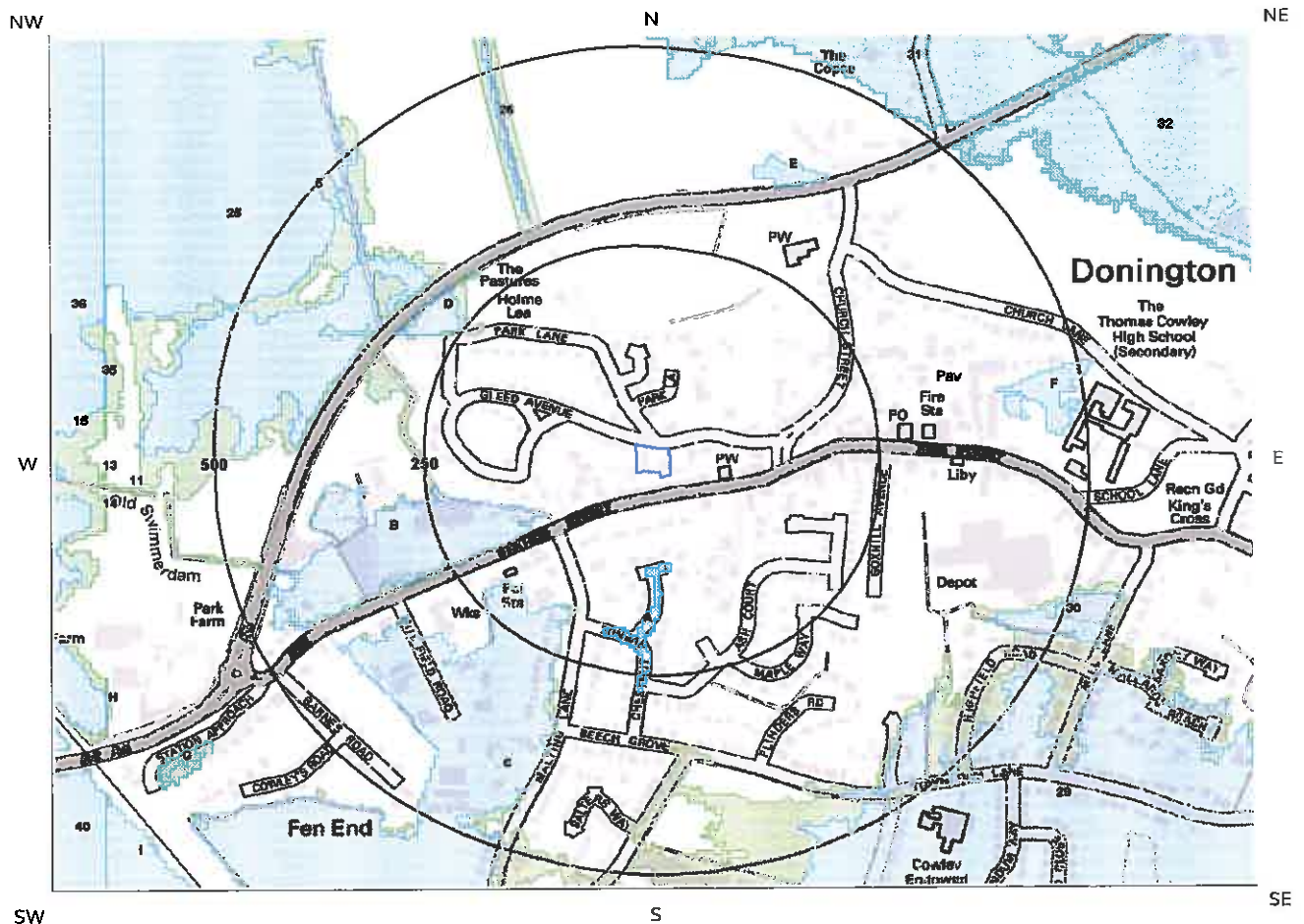
Are there any surface water features within 250m of the study site?

Yes

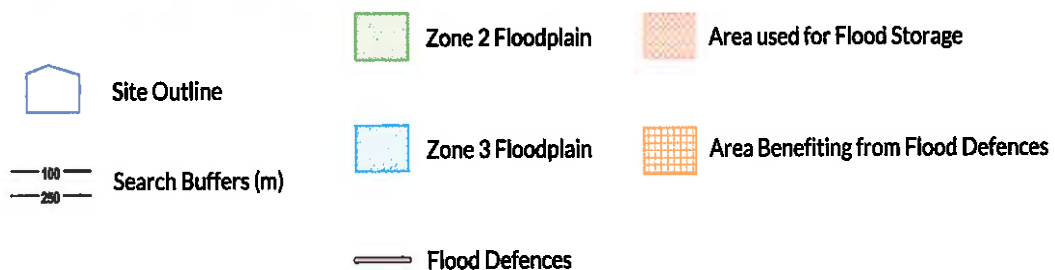
The following surface water records are not represented on mapping:

Distance (m)	Direction
116	SW
187	W
200	SW

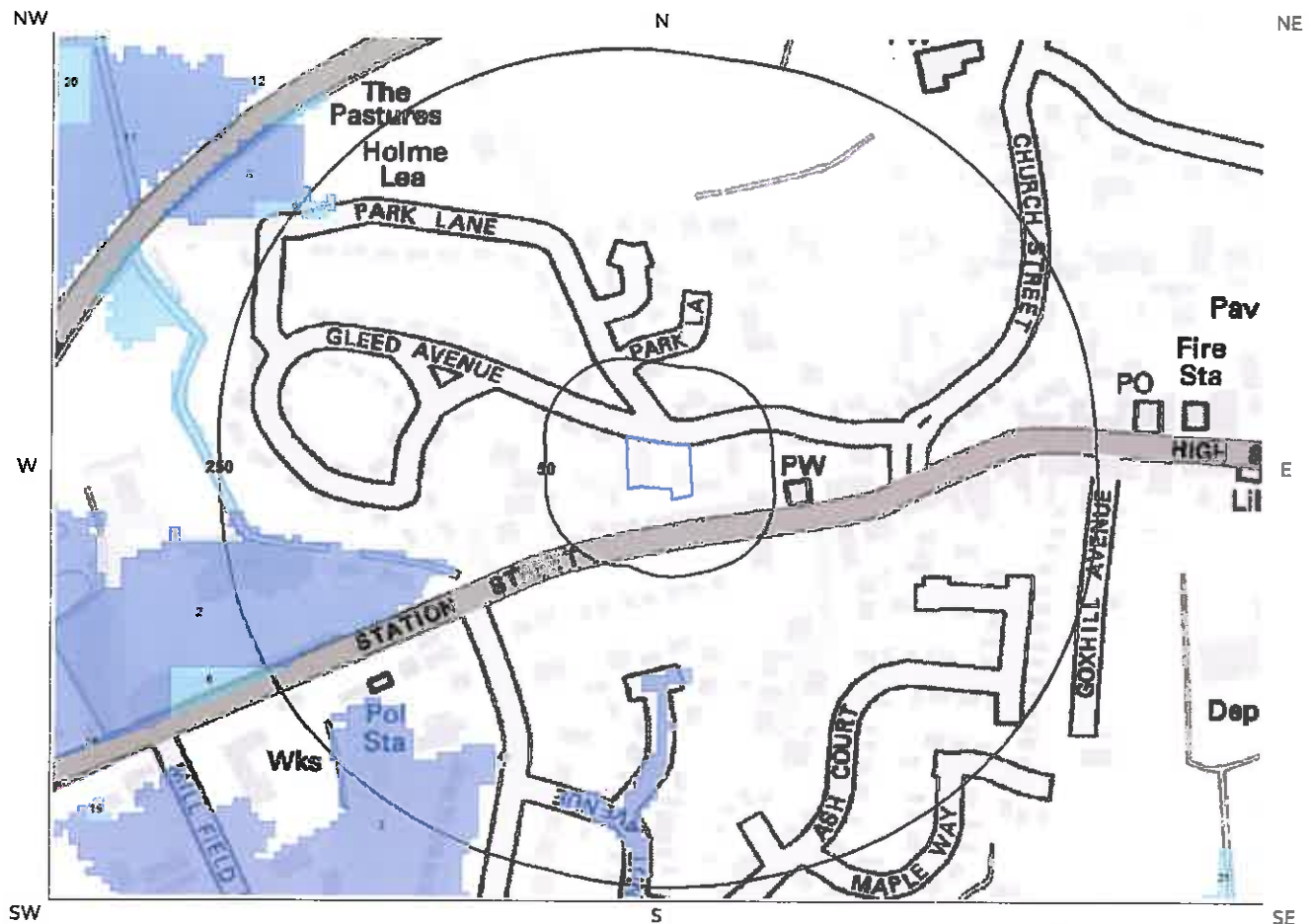
7a. Environment Agency Flood Map for Planning (from rivers and the sea)



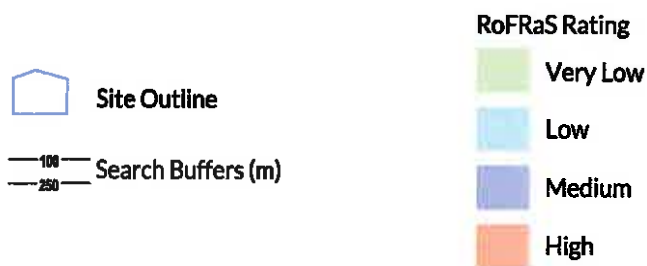
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7b. Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency Zone 2 floodplain? Yes

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

ID	Distance (m)	Direction	Update	Type
1A	109	S	08-Feb-2016	Zone 2 - (Fluvial /Tidal Models)
2B	118	SW	08-Feb-2016	Zone 2 - (Fluvial /Tidal Models)
3C	185	SW	08-Feb-2016	Zone 2 - (Fluvial /Tidal Models)
4D	231	NW	08-Feb-2016	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency Zone 3 floodplain? Yes

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
1A	109	S	23-Feb-2016	Zone 3 - (Fluvial Models)
2B	118	SW	23-Feb-2016	Zone 3 - (Fluvial Models)
3C	189	SW	23-Feb-2016	Zone 3 - (Fluvial Models)

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

What is the highest risk of flooding onsite?

Very Low

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

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

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site?

No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site?

No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site?

No

7.7 Groundwater Flooding Susceptibility Areas

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

No

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 What is the 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

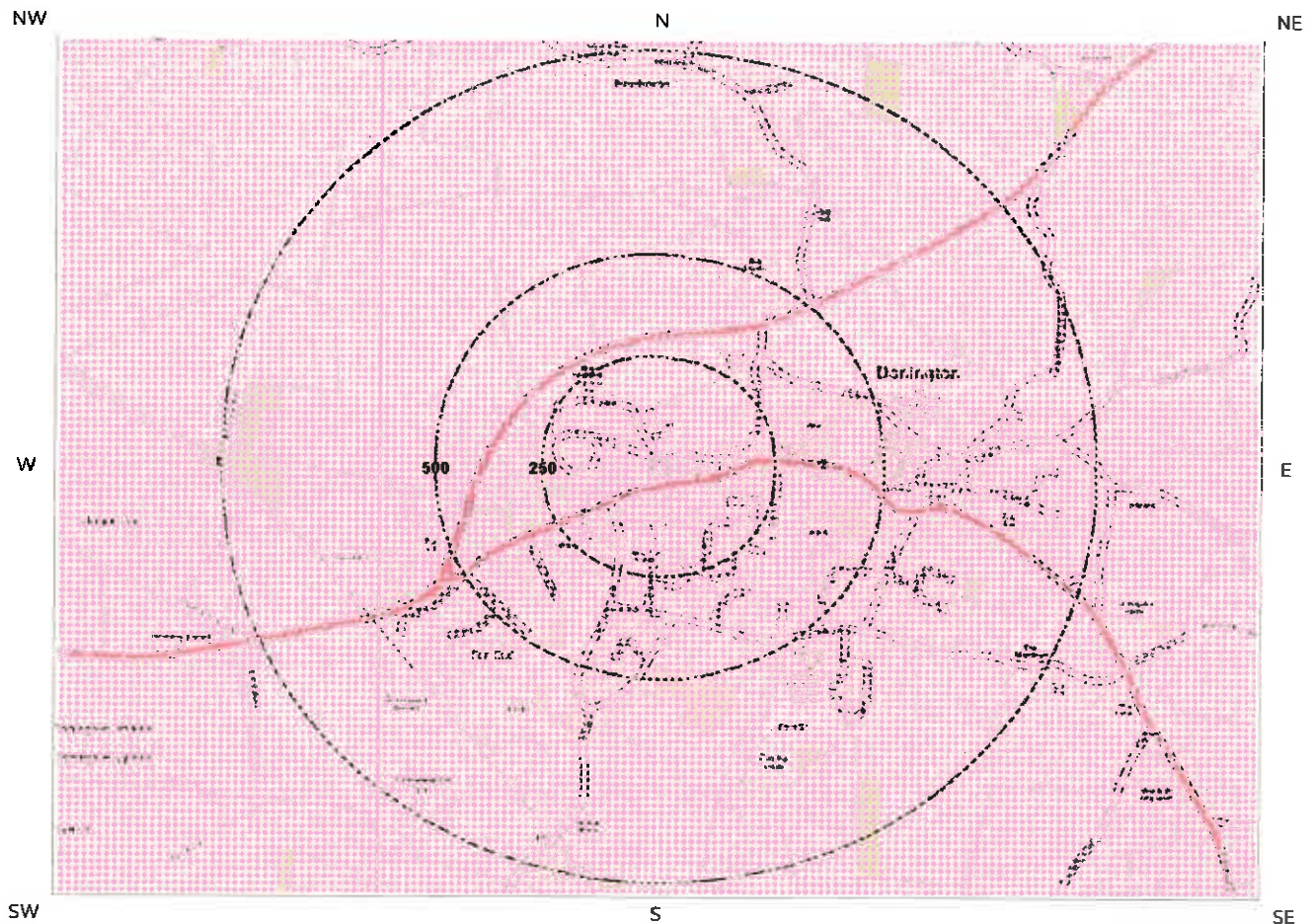
What is the British Geological Survey confidence rating in this result?

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

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

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:

Database searched and no data found.

0

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

Database searched and no data found.

0

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

Database searched and no data found.

0

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

Database searched and no data found.

0

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

Database searched and no data found.

0

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

Database searched and no data found.

0

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

Database searched and no data found.

0

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

6

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

ID	Distance (m)	Direction	NVZ Name	Data Source
1	0	On Site	Existing	DEFRA
2	0	On Site	New	DEFRA
3	630	W	Existing	DEFRA
4	630	W	New	DEFRA
Not shown	1843	NE	New	DEFRA
Not shown	1901	SE	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 GeoInsight, available from our [website](#). The following information has been found:

9.1.1 Shrink Swell

What is the 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

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

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

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

9.1.3 Soluble Rocks

What is the 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

What is the 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 $\bar{O}$ 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 $\times$ possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

What is the 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

What is the 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 $\bar{O}$ consider the consequences of soil and groundwater conditions during and after construction. For existing property $\bar{O}$ possible increase in insurance risk from running sand, for example, due to water leakage, high rainfall events or flooding.

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 property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.**

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

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

Are there any coal mining areas within 75m of the study site? No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? No

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
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: 08708 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 C2 – AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE
(ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS^a

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations ^a								
Sulfate and magnesium					Groundwater		ACEC	
Design Sulfate	2:1 water/soil extract ^b		Groundwater		Total potential sulfate ^c	Static water	Mobile water	Class for location
Class for location								
1	2	3	4	5	6	7	8	9
	(SO ₄ mg/l)	(Mg mg/l)	(SO ₄ mg/l)	(Mg mg/l)	(SO ₄ %)	(pH) ^d	(pH) ^d	
DS-1	< 500		< 400		< 0.24	≥ 2.5	> 6.5 ^d 5.5–6.5 4.5–5.5 2.5–4.5	AC-1s AC-1 AC-2z AC-3z AC-4z
DS-2	500–1500		400–1400		0.24–0.6	> 5.5 2.5–5.5	> 6.5 5.5–6.5 4.5–5.5 2.5–5.5	AC-1s AC-2 AC-2s AC-3z AC-4z AC-5z
DS-3	1600–3000		1500–3000		0.7–1.2	> 5.5 2.5–5.5	> 6.5 5.5–6.5 2.5–5.5	AC-2s AC-3 AC-3s AC-4 AC-5
DS-4	3100–6000	≤ 1200	3100–6000	≤ 1000	1.3–2.4	> 5.5 2.5–5.5	> 6.5 2.5–6.5	AC-3s AC-4 AC-4s AC-5
DS-4m	3100–6000	> 1200 ^e	3100–6000	> 1000 ^e	1.3–2.4	> 5.5 2.5–5.5	> 6.5 2.5–6.5	AC-3s AC-4m AC-4ms AC-5m
DS-5	> 6000	≤ 1200	> 6000	≤ 1000	> 2.4	> 5.5 2.5–5.5	≥ 2.5	AC-4s AC-5
DS-5m	> 6000	> 1200 ^e	> 6000	> 1000 ^e	> 2.4	> 5.5 2.5–5.5	≥ 2.5	AC-4ms AC-5m

Notes

- a** Brownfield locations are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).
- b** The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered from previous Digests (Box C7).
- c** Applies only to locations where concrete will be exposed to sulfate ions (SO₄), which may result from the oxidation of sulfides such as pyrite, following ground disturbance (Appendix A1 and Box C8).
- d** An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).
- e** The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

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

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