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SITE INVESTIGATION REPORT AT COALBEACH LANE SOUTH SURFLEET SPALDING LINCOLNSHIRE

Report Reference No. C14949

On behalf of:

Seagate Homes (UK) Limited
Holbeach Manor
Fleet Road
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January 2020

CONTENTS

	Page
INTRODUCTION	1
LOCATION, TOPOGRAPHY & GEOLOGY OF THE SITE	2
SITE HISTORY	3
Summary of Historical Background	4
ENVIRONMENTAL DATABASE INFORMATION	5
PRELIMINARY RISK ASSESSMENT	8
Preliminary Conceptual Model	10
SITE WORK	11
LABORATORY WORK	12
GROUND CONDITIONS	14
Topsoil	14
Terrington Beds	14
Marine Sand	14
Groundwater & Excavation Side Stability	15
Evidence of Contamination	15
COMMENTS ON THE GROUND CONDITIONS IN RELATION TO FOUNDATION DESIGN & CONSTRUCTION	16
Traditional Foundations	16
Excavations	18
Floor Slabs	19
Buried Concrete	20
Hardstanding	20
COMMENTS ON THE CHEMICAL TEST RESULTS OF SOIL	21
Discussion of Soil Results	24
UPDATED CONCEPTUAL MODEL	25
COMMENTS ON GROUND CONTAMINATION IN RELATION TO PROPOSED DEVELOPMENT	26
Contaminated Soil	26
Drainage	26
Human Health – Construction Workers	26
Human Health – Users of Completed Development	27
Ground Gas	27
Water Environment	28
Effects on Building Materials & Services	28
Off-Site Disposal of Soil Arisings	28

TRIAL PIT LOCATION PLAN

TRIAL PIT RECORDS

GEOTECHNICAL LABORATORY TEST RESULTS

CHEMICAL LABORATORY TEST RESULTS

FIGURE 1 – Soil Profile

APPENDIX 1	Historical Map & Aerial Photograph Extracts
APPENDIX 2	Environmental Database Search
APPENDIX 3	Classification of Aggressive Chemical Environment for Concrete

SEAGATE HOMES (UK) LIMITED

REPORT ON A SITE INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT AT COALBEACH LANE SOUTH SURFLEET NEAR SPALDING LINCOLNSHIRE

Report Reference No. C14949 **January 2020**

INTRODUCTION

Seagate Homes (UK) Limited propose to develop a 2.3hectare site for residential purposes on land to the west of Coalbeach Lane South, Surfleet, near Spalding, Lincolnshire. The development is understood to comprise approximately sixty semi-detached and detached houses with between two and four bedrooms, associated parking areas and an access road. The proposed development also includes a pair of detention ponds at the southern end of the site.

A site investigation was undertaken by Ground Engineering Limited on behalf of Seagate Homes (UK) Limited. The purpose was to provide information on the underlying ground conditions in relation to foundation design and construction for the proposed development, including a contamination assessment. In addition, a desk study was conducted to detail the site history and search available information for any potential environmental issues.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

The site is located on the west side of Coalbeach Lane South in the eastern part of the village of Surfleet and to the west of the hamlet of Surfleet Seas End, about 420m north-west of the bridge carrying the A16 over the River Glen, some 6km north-north-east of Spalding. The site is centred at National Grid Reference TF 261 289. The site location is shown on page 1 of Appendix 2.

At the time of the investigation, the site comprised a large arable field bounded to the east partly by Coalbeach Road South and partly by the rear boundaries of residential properties fronting this road and Station Road to the south. The northern site boundary was delineated by a brick wall defining the boundary of No.22 Coalbeach Road South (The Orchards), a ditch and hedgerow; whilst the western limit of the site was defined by a hedgerow and track, beyond which were open fields.

A belt of Lombardy Poplar trees was present at the southern site margin. Two semi-mature trees, a London Plane and Lime stood close to the road in the north-eastern part of the site. Several other trees and hedgerows were present around the site perimeter and in neighbouring properties, these included Hawthorn; Walnut; Beech; and Lime.

The level site stands at an elevation of about 4mOD in an area of low-lying Fenland approximately 100m north-west of the north-east flowing River Glen. Coalbeach Road South to the east of the site runs along the former 'Roman Bank' which marked the limit of land reclamation by 1300AD.

The geological map for the area, sheet 144 (1992) at 1:50,000 scale, shows the site to be underlain by a thick succession of Terrington Beds and more recently identified as Tidal Flat Deposits. These silt and fine sand soils are indicated to rest on the solid geology of the Oxford Clay Formation. Previous work in the vicinity has found a surface layer of sandy silt, which merges below about 2.00m depth into silty fine sand. The medium dense to very dense sand has a 1.50m thick basal layer of sand and gravel at about 18.00m depth and is underlain by glacial Boulder Clay or 'Till' from about 19.50m depth.

SITE HISTORY

Historical maps, aerial photographs and historical information obtained on the internet, dating between 1888 and the most recent Ordnance Survey (OS) map have been reviewed as part of this desk study. Selected map and aerial photograph extracts are reproduced in Appendix 1 as Figures A to K with relevant descriptions given below.

Map Extracts Studied	*Description*
1888-89 OS Sheets: Lincs. CXXXIV.2 & CXXVI.14 Scale: 1:2500 **Figure A**	The site lies at the eastern end of a large field bounded by a drainage ditch to the north. The northern site boundary is undefined, whilst the eastern limit was formed by an adjacent road, Pinkthorn Villa and orchards to the south-east and south. The River Glen is shown contained within raised banks 90m to the south-east.
1904-05 OS Sheets: Lincs. CXXXIV.2 & CXXVI.14 Scale: 1:2500 **Figure B**	The site and surrounding area remained unchanged. A former orchard to the north-east had been cleared.
1947-50 OS Sheets: Lincs. CXXXIVNW & CXXVISW Scale: 1:10,560 **Figure C**	The site and remaining part of the large field to the west had been planted as an orchard. A ditch formed part of the northern site boundary and some buildings had been erected beyond the northern site boundary. A row of houses had been erected along the opposite eastern side of the adjacent road.
1971-72 OS Sheets: TF2628, TF2629, TF2528 & TF2529 Scale: 1:2500 **Figure D**	The site remained an orchard, with a track forming the western limit of the site. The field to the west was no longer denoted as an orchard, although the land to the north was. Several large glasshouses had been constructed immediately south of the site and to the south of Station Road. A sewage works is shown 90m north-east of the site. Residential properties had been erected along the south side of Station Road.
1975 OS Sheet: TF22NE Scale: 1:10,000 **Figure E**	The site and surrounding area remained unchanged. A haulage depot is denoted 220m to the east.
1989 OS Sheet: TF22NE Scale: 1:10,000 **Figure F**	The site and surrounding area remained unchanged. The former drainage ditch field boundary to the north-west was no longer shown.
1995 OS Sheets: TF2628, TF2629, TF2528 & TF2529 Scale: 1:2500 **Figure G**	The site and surrounding area were unchanged. An electricity sub-station was indicated 12m south of the site.

Map Extracts Studied	*Description*
1999 Aerial Photograph Not to Scale **Figure H**	The site was cultivated and being harvested for either vegetables or flowers at the time of this photograph. The far northern end of the site appeared to remain as an orchard. Trees and hedgerows are visible around the site margins, with two trees within the north-eastern part of the site.
2003 OS Sheets: TF2628NW & TF2629SW Original Scale: 1:1250 **Figure I**	The site and surrounding area remained unchanged.
2010 Aerial Photograph Not to Scale **Figure J**	The site and surrounding area remained largely unchanged. A dense tree belt is visible within the southern end of the site. The former glasshouses immediately south of the site had been removed and some houses or bungalows erected in their place.
2018 Aerial Photograph Not to Scale Page 1 of Appendix 2	The site and surrounding area remained unchanged. The site and adjacent fields appear to be covered by rows of polythene.
2019 OS Sheets: TF2628NW & TF2629SW Original Scale: 1:1250 **Figure K**	The site and surrounding area were unchanged. An electricity sub-station is denoted 80m to the north-east at Pinkthorn Close. This plan shows 150mm diameter sewers at about 2.3m depth beneath Station Road and Coalbeach Road South, draining and pumped to the north-east to the sewage works. The sub-station to the south of the site was no longer shown.

Summary of Historical Background

The site was reclaimed from an area of saltmarsh by 1300 and became the eastern part of a large field, which was planted as an orchard from around the 1940s until clearance of the trees in the late 1990s. The site has remained undeveloped and has been used for cultivation to the present day.

Glasshouses were erected immediately south of the site from around the 1950s, until their clearance prior to 2010. The neighbouring land to the south, east and north-east were developed as residential plots. Beyond the site, electricity sub-stations were located 12m to the south and 80m to the north-east; a sewage works 90m to the north-east; and a haulage depot 220m to the east.

ENVIRONMENTAL DATABASE INFORMATION

Appendix 2 contains information derived from Environmental Databases for a radius of up to 2,000m from the site. The information covers datasets held by Groundsure with contributors including the local authority, the Environment Agency (EA), British Geological Survey, Ordnance Survey and the Coal Authority and the results, within a radius of 250m, are summarised below:

1. Historical Industrial Sites	**On-Site**	**0 - 250m**
Potentially Contaminative Uses (1:10,000 mapping)	0	4
Historical Tank Database	0	4
Historical Energy Features Database	0	1
Historical Petrol & Fuel Site Database	0	0
Historical Garage & Motor Vehicle Repair Database	0	0
Historical Military Sites	0	0
Potentially Infilled Land	0	2
2. Environmental Permits, Incidents and Registers	**On-Site**	**0 - 250m**
Sites Holding Environmental Permits/Authorisations	0	3
Records of COMAH and NIHHS Sites	0	0
Environment Agency Recorded Pollution Incidents	0	0
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 Uses	**On-Site**	**0 - 250m**
Current Industrial Sites Data	0	4
Records of Petrol and Fuel Sites	0	0
Underground Electricity Cables 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 on the site	No	
Productive strata within solid geology beneath the site	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	0	0
Water Network Entries	2	24
Surface Water Features	Yes	Yes

7. Flooding		
Environment Agency indicative Zone 2 floodplains within 250m of site	Yes	
Environment Agency indicative Zone 3 floodplains within 250m of site	Yes	
Risk of flooding from rivers & the sea (RoFRaS) rating within 50m	Medium	
Flood defences within 250m of site	No	
Any areas benefitting from flood defences within 250m of site	No	
Flood storage areas within 250m of site	No	
Maximum BGS groundwater flooding susceptibility within 50m of site	Not Prone	
BGS confidence rating for groundwater susceptibility areas	N/A	
8. Designated Environmentally Sensitive Sites	**On Site**	**0 - 250m**
Environmentally sensitive sites	0	0

9. Natural Hazards (on site)

Hazard	Negligible	Very Low	Low	Moderate	High
Shrink Swell 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

There are no potentially contaminative uses on the site identified from historical mapping. The closest historical potentially contaminative use was the sewage works 12m north-east of the site. Unspecified depots, ground workings and potentially infilled land, tanks, and an electricity sub-station were identified between 9m south and 202m east of the site.

There are three licensed discharge consents, 107m to 207m north-east of the site, relating to sewage discharges into a drain. There are no pollution incidents recorded within 250m of the site. There are no landfill or other waste sites within 250m of the site.

The closest current industrial land uses are the electricity sub-station 42m to the north-east and the sewage works 85m to the north-east.

No artificial ground or made ground was identified on the site by the database, which indicates the site to be underlain by superficial Tidal Flat Deposits, designated as

‘Unproductive Strata. These deposits are underlain by the ‘Unproductive’ solid geology of the Oxford Clay Formation.

The site does not lie within a Source Protection Zone. The south-western corner of the site is bordered by the eastern end of a 2.1m wide inland river or watercourse. The River Glen is 82m to the south-east.

The site is within an area having a medium RoFRaS (Risk of Flooding from Rivers and the Sea) rating and is within both Zone 3 and Zone 2 floodplains.

The site is assessed as having a ‘negligible’ hazard for soluble rocks and collapsible rocks. The site is assessed as having a ‘very low’ hazard for landslides and a ‘low’ hazard for shrink-swell hazards. The site has a ‘moderate’ risk of hazards from compressible ground and running sand. The site is not within an environmentally sensitive area, identified mining area, or brine affected area. No radon protective measures are required for new properties on the site.

PRELIMINARY RISK ASSESSMENT

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 below in Table 1.

Table 1: Identified Potential Contaminant Sources

Contaminant Source	***Comments***
Drainage	Effluent from existing field drains could provide a contaminant source.
Soil Beneath Site	Contamination may be present within made ground across the site.
Soil Gas	Potential soil gas generated from made ground or underlying geology.
Ground Contamination Outside Site Boundary	Ground contamination migrating from adjacent or neighbouring sites.

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

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

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

Table 2: Human Receptors and Pathways

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

Table 3: Water Receptors and Pathways

Receptor-Water Environment	*Typical Exposure Pathway*
Groundwater The site is underlain by 'Unproductive' strata of Tidal Flat Deposits and the Oxford Clay Formation.	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 an open watercourse (field drain) at the south-western corner of the site. The River Glen flows 82m to the south-east of the site.	Surface infiltration of atmospheric waters into the soils beneath the site could wash or dissolve potential contaminants and laterally migrate. Contamination leads to a restriction/prevention of use: -as drinking water resource -for amenity use Effects on aquatic life

Preliminary Conceptual Model

Assessment of the potential linkage between ground contamination sources and human or environmental receptors have been assessed based on the desk study research documented in the preceding sections of this report. A generalised preliminary conceptual model relative to the construction phase and completed development is presented below in Table 4.

Table 4: Preliminary Conceptual Model Relative to Use as Residential Development

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

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

SITE WORK

The site work was undertaken on 12th December 2019 and consisted of excavation of eight machine excavated trial pits (TP1 to TP8). The trial pit positions are shown on the plan to the rear of this report text.

Public utility service drawings were obtained and consulted prior to determining the trial pit positions. These drawings are available from Ground Engineering Limited on request. A service scan was made at each position using a CAT (Cable Avoidance Tool) to check for the absence of detectable buried services.

The trial pits were excavated by a JCB Sitemaster excavator to depths of 2.50m or 3.00m below ground level. The exposed strata were sampled and recorded by a geo-environmental engineer.

Representative small and bulk disturbed samples of soil were taken at frequent intervals throughout the depth of each trial pit. A sample of groundwater was taken from TP1 when sufficient water had entered the pit.

An immediate assessment of the soil strength was given by a hand shear vane. The average of three readings is presented on the trial pit record.

A Mackintosh Probe was used to ascertain the in-situ relative density of granular soils. The 25mm diameter solid cone point of the probe was screwed onto the rods and driven into the ground by repeated blows of a 4.5kg slide hammer with a fall of 0.30m. The blow counts for each 0.30m driven or, alternatively the depth driven for 100 blows were recorded.

The trial pit records give the descriptions and depths of the various strata encountered, details of all samples taken, in-situ testing and the groundwater conditions observed during and on completion of excavation.

LABORATORY WORK

The samples were inspected in the laboratory and assessments of the soil characteristics have been taken into account during preparation of the trial pit records. The soil descriptions have been made in accordance with BS5930:2015. Geotechnical laboratory testing was scheduled in accordance with BS1377:1990 and 2016. The chemical test results follow the geotechnical results.

The moisture content 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.

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

The particle size distribution of selected samples of silt and sand were determined by sieve analysis. The particle size distribution passing the 63μm sieve was obtained by pipette sedimentation on selected samples. Results of these tests have been combined and are presented as particle size distribution curves at the end of this report.

California Bearing Ratio (CBR) tests were performed on selected recompacted near surface samples in accordance with Lincolnshire County Council's specification. The samples were recompacted using a 2.5kg rammer (BS light) or vibrating hammer, and the test consisted of jacking into the soil a cylindrical plunger with a cross sectional area of 1935mm^2. A force of 50N was applied initially to seat the plunger on the soil surface 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 2.5mm or 5.0mm penetration to standard forces expressed as a percentage.

Chemical analysis of selected soil samples was undertaken, by an independent laboratory, primarily for characterisation purposes. The samples were tested for a suite of tests 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 found by the investigation have been plotted as a soil profile in Figure 1. This shows a surface cultivated layer of topsoil resting on the anticipated superficial Tidal Flat Deposits consisting typically of firm and soft, sandy silt/clay of the Terrington Beds. The Terrington Beds became less clayey with depth and merged into Marine Sand at depths between 1.30m and 1.80m below ground level. The superficial deposits were found to at least the base of the deepest holes at 3.00m depth. Groundwater was found below 1.10m to 1.90m depth during the investigation.

Topsoil

The field had a surface 0.30m to 0.50m thick layer of topsoil. This was a soft, dark brown, slightly sandy, clay/silt.

Terrington Beds

Beneath the surface layer of topsoil, the trial pits entered a stiff or firm, light brown, orange brown and light grey mottled, slightly sandy silt/clay, which locally contained fine shell fragments. This deposit locally became soft below 0.70m to 1.10m depth in TP1, TP2 and TP8.

The Terrington Beds predominantly comprised slightly sandy, clay/silt soils, but locally varied to clayey, very sandy silt or slightly sandy, silty clay and typically became less clayey with depth. The sand fraction was fine grained. These clay/silt Tidal Flat Deposits were found to extend to depths between 1.30m and 1.80m.

Marine Sand

Beneath the Terrington Beds from between 1.30m and 1.80m depth, was a light brown, orange brown and grey mottled, silty fine sand, representing Marine Sand. The Marine Sand contained occasional black carbonaceous specks and was encountered to at least the base of the trial pits at depths between 2.50m and 3.00m.

Groundwater & Excavation Side Stability

Groundwater was met as seepages in each pit at depths between 1.10m and 1.90m. Groundwater ingress was accompanied by 'running sand' conditions and the trial pit sides were unstable and collapsed repeatedly when they reached depths of around 1.90m and 2.60m.

Evidence of Contamination

The topsoil was not noted to have any olfactory or visual evidence of contamination, including any hydrocarbon odours.

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

The investigation confirmed the site to be covered by a surface layer of topsoil resting on superficial Terrington Beds (clay/silt), with superficial Marine Sand from depths between 1.30m and 1.80m. The superficial deposits (clay, silt and sand) could offer support for lightly to modest loaded traditional foundations for the proposed housing development.

The clay/silt soils initially have a firm 'crust' at shallow depths, which could be capable of supporting lightly loaded structures, but these soils locally became soft with increasing depth. Localised deepening of traditional foundations will be required where proposed buildings are located close to the existing trees around the site margins, which include high and moderate water demand species. Foundations will need to penetrate the zones of root influence within the low volume change potential clay/silt. The underlying soft soils are poorly consolidated and should provide adequate support for the lightly loaded traditional strip or raft foundations. The underlying non-shrinkable Marine Sand could provide a suitable bearing stratum, providing that groundwater ingress and side instability could be controlled.

Floor slabs could be ground bearing in areas where they are well away from the influence of trees.

Traditional Foundations

The near-surface naturally deposited clays and silts of the Terrington Beds have modified plasticity indices ranging between 8% and 13% and are rated as being non-shrinkable to locally having a low volume change potential. Based on the National House Building Council (NHBC) Standards Chapter 4.2 'Building near trees' (2019), foundations in open ground, at least 13m from the nearest Hawthorn tree; at least 15m from the nearest Beech or Walnut tree; at least 17m from the nearest Lime tree; at least 20m from the nearest London Plane tree; and at least 31m from the nearest Lombardy Poplar tree; would require a minimum depth of 0.75m below either

existing or finished ground level, whichever is greater, in order to penetrate the zone of seasonal influence.

Based on the above NHBC Standards, the presence of several trees around the site margins, including several mature moderate water demand trees, will require increased foundation depths where foundations are to be positioned within their zones of root influence. For example, foundations at 7m to 8m distance from mature Lime, Walnut and London Plane trees in the north-eastern and northern parts of the site will require minimum foundation depths between 1.10m and 1.30m below ground level; with a minimum depth of 1.35m where foundations are 5m from the Beech tree at the south-eastern edge of the site; and a minimum depth of 2.25m where foundations are 2m from the Hawthorn hedge along the western side of the site. The foundation depths could be stepped up with increasing distance from trees, and depths should be assessed using the above NHBC Standards where both extant or recently removed trees are in the vicinity of proposed buildings. In areas close to trees, the underlying non-shrinkable Marine Sand, found by this investigation at depths of 1.30m to 1.80m, could be used as a bearing stratum without further need for deepening of foundations.

It is important therefore that foundations are extended below the proposed minimum 0.75m depth where roots from trees are present, both in areas where the trees remain and have been removed, in order to penetrate the zones of potential shrinkage or heave movements. In areas within the zones of root influence, it is recommended that raft foundations are adopted in accordance with NHBC Standard Chapter 4.2.9(c). This will require any underlying root affected clay soil to be removed and replaced with non-shrinkable compacted stone to a maximum of 1.25m below ground level. This solution would also avoid requirement for anti-heave precautions, such as void forming or compressible materials, which should be incorporated alongside strip foundations with root affected clay soils.

Foundations should extend through any topsoil, made ground or stiff, root affected clays. The firm and locally soft clay/silt soils found at the minimum foundation depth of 0.75m offer a maximum safe bearing capacity of 45kN/m^2 with a factor of 3.0 incorporated, for a 0.60m wide strip foundation, which is limited by the strength of the underlying soft clays. Similarly, the

Terrington Beds beneath a nominal 12m by 8m raft foundation would have a maximum safe bearing capacity of 30kN/m^2 with the same factor of safety of 3.0 incorporated.

The non-shrinkable, light brown and grey, silty fine Marine Sand offers a maximum safe bearing pressure of 100kN/m^2 for foundations up to 1.20m width, where present above the groundwater table.

The above bearing pressures should ensure that settlement beneath such foundations would be within 25mm. Settlement within the underlying sand should occur as the loads are applied. Some minor differential movements are likely to occur where differences in the thickness and composition of the Terrington Beds occurs.

Excavations

The near surface soils should be easily removed within foundation excavations for new buildings. The sides of excavations within the sandy silt or silty sand soils below about 1.50m depth are likely to be unstable and the sides of excavations should not be relied upon to stand unsupported.

Excavations could be expected to remain dry to 1.10m depth based on the findings of this investigation. Pumping from screened sumps may cope with groundwater ingress within the Terrington Beds that may occur within shallow excavations. However, any deep excavations extending below about 1.50m are likely to encounter groundwater within the Marine Sand with resulting 'running sand' conditions and ensuing side instability, side collapse and flooding of excavations resulting.

Whilst pumping from screened sumps may achieve sufficient draw-down of the groundwater locally, it is likely that it would be more effective to control the groundwater, particularly within deep excavations such as for sewers, by a dewatering scheme using well-points. Care should be taken not to allow removal of the clay/silt fraction from the sand in order to avoid loosening of this stratum. A specialist dewatering contractor should be consulted, but the latter well-pointing technique is likely to enable supported excavations to be completed dry.

Consideration should be given to the possibility of settlement of neighbouring existing foundations to the east of the site, which may be induced by dewatering.

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 sandy clay/silt soils as well as the silty, fine sand, are all 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.

Attention should be given where personnel are to enter any 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

Ground bearing floor slabs could be adopted for the new properties where they are remote from trees, and the naturally deposited clay/silt soils are present at shallow depth.

Ground bearing floor slabs should not be adopted for proposed buildings within influencing distance of neighbouring trees, particularly where buildings are proposed close to the site margins. Damaging differential heave movements could occur across such slabs, particularly where they cover any clay affected by recently severed tree roots.

Raft foundations should avoid problems associated with shallow root affected clays, since they will require a minimum depth of 0.75m and in areas close to trees they will need to be placed on a compacted stone blanket extending up to 1.25m below ground level.

Sulphate Conditions

Sulphate analysis of selected samples of soil and water yielded soluble sulphate concentrations within Design Sulphate Class DS-1 of the BRE Special Digest 1, Table C1 (2005), presented in Appendix 3. The pH results of samples ranged between 7.8 and 8.6, 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.

Hardstanding

Naturally deposited soils comprising silt/clay or sandy silt, was generally encountered at sub-grade level across this site.

Based on IAN 73/06, Table 5.1 recommends a design CBR value of 1% for silt, and 3% for sandy clay with a plasticity index of 10%.

Laboratory CBR tests yielded CBR values ranging between 0.5% and 9.3%. A conservative design CBR value of 1.0% for the naturally deposited sandy silt should be adopted for hardstanding design on this site, although the pavement construction will need to be at least 450mm thick since the silty soils are considered to be potentially frost susceptible in accordance with Road Note 29, Appendix 1.

The sub-grade should be suitably compacted and inspected, with any topsoil, very soft, organic or desiccated clays, being removed and replaced with suitable well-graded coarse-grained fill. Care should be taken not to allow exposed silt/clay soils at sub-grade level to become exposed to inclement weather conditions, since they are prone to rapid softening and deterioration. A permeable geotextile should be incorporated in order to prevent both loss of any sub-base material into the sub-grade and migration of sub-grade soils into the overlying sub-base.

COMMENTS ON THE CHEMICAL TEST RESULTS OF SOIL

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

Reference has also been given to ATRISKsoil soil screening values produced by Atkins Limited and provided under licence to Ground Engineering Limited. Atkins SSVs have been derived in line with the Environment Agency 2009 guidance using the CLEA 1.071 software. With the absence of a S4UL for cyanide the ATRISKsoil SSV has been used as the soil screening criteria within this report.

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

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

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

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

Table 1 compares the test results for the made ground with the SSVs in relation to the specified uses. The number of test results, which exceed these values, are also provided.

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

Determinand	Number of Samples	Min Value mg/kg	Max Value mg/kg	Number of Samples Exceeding SSV for			Measured 95th Percentile mg/kg	Assessment Method	Soil Screening Values (SSVs) 1.0% 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	7	1.0%	2.9%	-	-	-	-	-	-	-	-
Arsenic	7	11	19	0	0	0	16.32	S4UL	37	40	640
Cadmium	7	<0.10	0.23	0	0	0	0.21	S4UL	11	85	190
Chromium (III)*	7	13	31	0	0	0	25.12	S4UL	910	910	8600
Chromium (VI)	7	<0.50	<0.50	0	0	0	<0.50	S4UL	6	6	33
Lead	7	6.5	50	0	0	0	43.82	C4SL	200	310	2330
Mercury	7	<0.10	0.16	0	0	0	0.14	S4UL	11	15	320
Selenium	7	<0.20	0.26	0	0	0	0.23	S4UL	250	430	12,000
Nickel	7	12	19	0	0	0	17.48	S4UL	130	180	980
Phenols	7	<0.30	<0.30	0	0	0	<0.30	S4UL	120	440	440
Benzo[a]pyrene	7	<0.10	<0.10	0	0	0	<0.10	S4UL	0.79	1.2	15
Copper	7	10	48	0	0	0	40.80	S4UL	2400	7100	68,000
Zinc	7	33	65	0	0	0	55.27	S4UL	3700	40,000	730,000
Free Cyanide	7	<0.50	<0.50	0	0	0	<0.50	ATRISK	34	34	34

Notes

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

LQM/CIEH S4ULs 'Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3608. All rights reserved'
ATRISKsoil SSVs produced by Atkins Limited and provided under licence to Ground Engineering Limited

Discussion of Soil Results

The results of the laboratory analysis from this investigation indicate that the surface topsoil contains no elevated concentrations of contaminants. Concentrations of all elements and compound determinants were within all associated soil screening criteria for the most sensitive residential end use with home grown produce, as well as within criteria for residential without home grown produce or a commercial/industrial end use.

Based on the chemical analyses, the near surface soils would not be considered to present a significant possibility of significant harm to human health in the context of re-use of these soils within a residential setting.

The made ground was not noted to have olfactory or visual evidence of fuel contamination or to contain asbestos containing materials (ACM).

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 intrusive ground investigation documented in the preceding sections of this report.

A generalised conceptual model, updated following the intrusive works, monitoring and testing, and targeted to provide coverage across the site, relative to the construction phase and completed development, is presented below in Table 6.

Table 6: Updated Conceptual Model Relative to Construction and Future Residential Use

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage	Soil Beneath Site	Soil Gas	Ground Contamination Outside Site Boundary
Human Health – ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Very Low	Low	Very Low	Very Low
Human Health – users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Very Low	Low	Very Low	Very Low
Water Environment	Migration through ground into surface water or groundwater	Very 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

Key to Table 6 Risk	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 site having a residential end use is discussed as follows.

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

Contaminated Soil

The site is underlain by up to 0.50m of topsoil, which does not contain any elevated concentrations of contaminants. All concentrations of elements and compounds were within the applicable screening values for the proposed residential end uses. The surface soils are suitable for re-use within residential garden areas of the proposed development.

Drainage

The integrity of the drainage ditches at the south-western end and northern edge of the site should be checked to ensure that they are free-flowing, and a plan implemented to ensure that it remains unblocked and well maintained. Any sediment within the drainage ditches should not be spread across the site and should be disposed off-site. This should remove any future risk to human health and the water environment.

Human Health - Construction Workers

No elevated levels of contaminants were identified by this investigation. There is therefore a low risk that a pathway could develop affecting groundworkers during the construction phase of development.

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 that 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, to minimise the potential for inadvertent ingestion of soil.

c) Generation of dust should be limited by damping-down.

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

Human Health - Users of Completed Development

The risk of ground contamination affecting the end users of the completed development, where a pathway is present in a residential setting would be considered to be low.

The results of the chemical analyses suggest that the topsoil is considered suitable for re-use at the surface within new garden and landscaped areas. No scheme of remediation would be considered necessary for the proposed development.

Ground Gas

There are no potential sources of ground gas and no precautions are likely to be required to protect the proposed building from ingress of soil gases. No precautionary measures are required to protect the residents from radon.

Consideration should be given to gas monitoring within deep or confined spaces to ensure safety of personnel entering them, since carbon dioxide could be generated from the soils and could accumulate within excavations, service or inspection chambers.

Water Environment

The site is underlain by Tidal Flat Deposits (Terrington Beds) which are designated by the E.A. as 'Unproductive'. The River Glen flows north-east about 90m to the south-east at a higher elevation. The northern and south-western site boundaries are defined by a drainage ditch intercepting surface water.

The silt/clay soils of the Terrington Beds are low permeability soils, whilst the underlying Marine Sand present below about 1.80m depth would be expected to have slightly better drainage potential. The groundwater is present at around 1.10m below site level. The risk to groundwater from any near-surface soil contaminants is considered to be very low. It is therefore unlikely that the proposed development, including the installation of foundations, would impact the quality of the water environment.

Effects on Building Materials and Services

No precautionary measures are considered necessary for buried concrete or services, where they are to be in contact with the near-surface soils.

Off-Site Disposal of Soil Arisings

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

Excavated material and excess spoil should always be classified prior to removal from site as required by 'Duty of Care' (Environmental Protection Act, 1990) legislation. This means that material has to be given a proper description and waste classification prior to

removal. Basic characterisation is the responsibility of the waste producer and compliance checking and on-site verification are generally the responsibility of the landfill operator. The landfill operator will need to liaise with the waste producer as the approach relies on the information from basic characterisation.

It is expected that clean arisings from the naturally derived soils 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.

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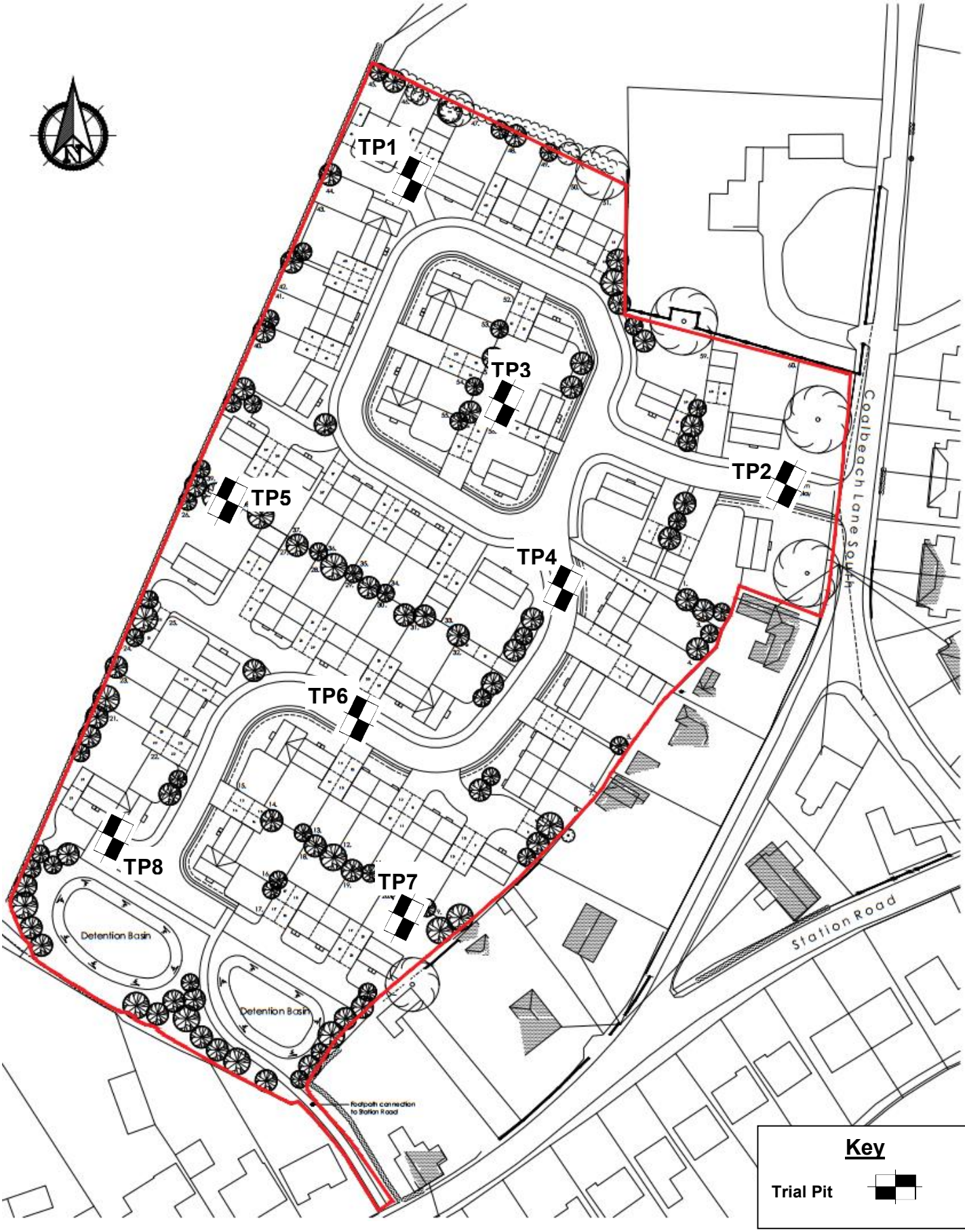
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Trial Pit Location Plan

Based on Studio 11 Architecture Drawing No. 415.PL.01
Not to Scale



Project: Coalbeach Lane South, Surfleet **Client: Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

GROUND ENGINEERING LIMITED

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

Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP1

Date: 12/12/19

Pit Size: 2.10m L x 0.70m W x 2.50m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT.			
0.15-0.45	MP1	30					
0.30-0.70	CBR1					0.30	
0.40	D2			Firm, becoming soft below 0.70m, light brown/orange brown mottled, slightly sandy SILT/CLAY.			
0.45-0.75	MP2	78					
0.50-0.70	B1						
				(TERRINGTON BEDS)			
0.80	D3						
0.80-1.10	CBR2						
0.75-1.05	MP3	81					
1.10	D4		1 ▽			1.10	
1.25-1.55	MP4	31		Soft, light brown/orange brown/light grey mottled, sandy, clayey SILT.			
1.55-1.85	MP5	51		(TERRINGTON BEDS)			
						1.80	
1.85-2.15	MP6	72		Light brown/brown/grey mottled, silty fine SAND.			
2.00-2.50	B2		▼c				
2.00	W1						
2.10	D5						
2.15-2.45	MP7	85		(MARINE SAND)			
2.30	D6						
2.45-2.75	MP8	89				2.50	
2.50	D7			Pit completed at 2.50m depth			
2.75-3.05	MP9	107					

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Water seepage at 1.10m depth
2. Pit sides collapsed when pit reached 2.30m depth
3. Water stood at 2.00m on completion

Project No	
14949	
Scale	Page
1:25	1/1

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Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP2

Date: 12/12/19

Pit Size: 2.20m L x 0.70m W x 2.50m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT.			
0.30-0.70	CBR1					0.30	
0.40-1.10	B1			Stiff, becoming firm, light brown/orange brown/light grey mottled, clayey, very sandy SILT.			
0.40	D2						
0.40	V1	(105)					
0.80	D3			(TERRINGTON BEDS)			
1.10	D4					1.10	
1.25-1.55	MP1	22		Soft, orange brown/brown/light grey mottled, slightly sandy, clayey SILT. (TERRINGTON BEDS)			
						1.40	
1.45	D5			Grey/brown mottled, silty fine SAND with occasional black carbonaceous specks.			
1.55-1.85	MP2	57					
1.60-2.40	B2						
1.80	D6						
1.85-2.15	MP3	68	▽ 1				
				(MARINE SAND)			
2.15-2.45	MP4	79					
2.30	D7						
2.45-2.75	MP5	86					
2.50	D8					2.50	
				Pit completed at 2.50m depth			
2.75-3.05	MP6	101					

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Water seepage at 1.90m depth
2. Pit sides collsped when pit reached 2.40m depth
3. Pit dry on completion

Project No	
14949	
Scale	Page
1:25	1/1

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Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP3

Date: 12/12/19

Pit Size: 2.20m L x 0.70m W x 3.00m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT with occasional roots.			
0.30-0.70	B1						
0.40	D2					0.50	
				Firm, light brown/orange brown mottled, slightly sandy CLAY/ SILT.			
0.80	D3						
1.10	D4			(TERRINGTON BEDS)		1.65	
1.70	D5						
1.75-2.05	MP1	31	1 ▽	Brown/grey mottled, silty fine SAND with occasional black carbonaceous specks.			
1.80-2.50	B2						
2.00	D6						
2.05-2.35	MP2	43					
2.30	D7						
2.35-2.65	MP3	45					
				(MARINE SAND)			
2.65-2.95	MP4	57					
2.70	D8						
2.95-3.25	MP5	69				3.00	
3.00	D9			Pit completed at 3.00m depth			
3.25-3.55	MP6	87					

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Water seepage at 1.80m depth
2. Pit sides collapsed when pit reached 1.90m depth
3. Pit dry on completion

Project No 14949

Scale 1:25

Page 1/1

GROUND ENGINEERING LIMITED

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Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP4

Date: 12/12/19

Pit Size: 2.20m L x 0.20m W x 2.50m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT.		0.30	
0.40	D2			Stiff, becoming firm, friable, brown/light brown mottled, slightly clayey, very sandy SILT with rare finely comminuted shell fragments.			
0.40	V1	(96)					
0.50-1.10	B1						
0.70	D3						
				(TERRINGTON BEDS)			
1.10	D4						
1.25-1.55	MP1	35					
1.55-1.85	MP2	54				1.60	
1.70-2.50	B2			Brown/light brown/orange brown/grey mottled, very silty fine SAND.			
1.70	D5		▽ 1				
1.85-2.15	MP3	76					
2.00	D6						
2.15-2.45	MP4	88		(MARINE SAND)			
2.40	D7						
2.45-2.75	MP5	92				2.50	
2.50	D8						
				Pit completed at 2.50m depth			
2.75-3.05	MP6	95					

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Water seepage at 1.80m depth
2. Pit sides collapsed when pit reached 2.50m depth
3. Pit dry on completion

Project No 14949

Scale 1:25

Page 1/1

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Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP5

Date: 12/12/19

Pit Size: 2.70m L x 0.70m W x 3.00m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT with roots.		0.30	
0.40	D2			Stiff, becoming firm, friable, brown/light brown mottled, slightly sandy CLAY/SILT with rare gastropod shell.			
0.40	V1	(118)					
0.50-0.80	B1						
0.90	D3			(TERRINGTON BEDS)		1.30	
1.25-1.55	MP1	37					
1.35-1.50	B2			Light brown/orange brown/light grey mottled silty fine SAND.			
1.35	D4						
1.55-1.85	MP2	56					
1.70	D5						
1.85-2.15	MP3	68	▽1				
2.00	D6			(MARINE SAND)			
2.15-2.45	MP4	80					
2.40-3.00	B3						
2.45-2.75	MP5	87					
2.50	D7						
2.75-3.05	MP6	95					
3.00	D8					3.00	
				Pit completed at 3.00m depth			

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Water seepage at 1.85m depth
2. Pit sides collapsed when pit reached 2.00m depth
3. Pit dry on completion

Project No	
14949	
Scale	Page
1:25	1/1

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Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP6

Date: 12/12/19

Pit Size: 2.20m L x 0.70m W x 3.00m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT.			
0.15-0.45	MP1	21				0.30	
0.30-0.70	B1			Stiff, becoming firm below 0.70m, orange brown/light brown, slightly sandy, clayey SILT. Becoming very sandy.			
0.40	D2						
0.40	V1	(90)					
0.45-0.75	MP2	74					
0.80-1.20	B2						
0.80	D3						
0.95-1.25	MP3	32					
				(TERRINGTON BEDS)			
1.20	D4						
1.25-1.55	MP4	45					
1.55-1.85	MP5	62				1.60	
1.70	D5		1 ▽	Light brown/grey mottled, silty fine SAND with occasional black carbonaceous specks.			
1.85-2.15	MP6	82					
2.15-2.45	MP7	88					
2.20	D6						
				(MARINE SAND)			
2.45-2.75	MP8	101					
2.50-3.00	B3						
2.50	D7						
2.80	D8						
3.00	D9					3.00	
				Pit completed at 3.00m depth			

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼C Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Water seepage at 1.80m depth
2. Pit sides collapsed when pit reached 2.10m depth
3. Pit dry on completion

Project No	
14949	
Scale	Page
1:25	1/1

GROUND ENGINEERING LIMITED

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

Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP7

Date: 12/12/19

Pit Size: 2.20m L x 0.70m W x 2.50m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT.		0.30	
0.40	D2			Stiff, becoming firm below 0.75m, light brown/brown mottled, sandy CLAY/SILT.			
0.40	V1	(88)					
0.50-0.90	B1						
0.70	D3						
0.90	D4			(TERRINGTON BEDS)			
1.15-1.45	MP1	60					
1.40	D5						
1.45-1.75	MP2	65					
1.75-2.05	MP3	72	▽			1.80	
1.85	D6			Light brown/orange brown mottled, silty fine SAND.			
1.90-2.30	B2						
2.05-2.35	MP4	88					
2.20	D7			(MARINE SAND)			
2.35-2.65	MP5	83					
2.50	D8					2.50	
2.65-2.95	MP6	99		Pit completed at 2.50m depth			

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Water seepage at 1.80m depth
2. Pit sides collapsed when pit reached 2.50m depth
3. Pit dry on completion

Project No 14949

Scale 1:25

Page 1/1

GROUND ENGINEERING LIMITED

Tel: 01733-566566
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Site: LAND OFF COALBEACH LANE SOUTH, SURFLEET

TRIAL PIT
TP8

Date: 12/12/19

Pit Size: 2.20m L x 0.70m W x 3.00m D.

Ground Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			TOPSOIL - Soft, dark brown, slightly sandy CLAY/SILT.			
0.15-0.45	MP1	41					
						0.40	
0.40-0.70	CBR1			Firm, becoming soft below 0.75m, light brown/orange brown mottled, slightly sandy SILT/CLAY.			
0.45	D2						
0.45-0.75	MP2	75					
0.50-0.80	B1						
0.70	D3						
0.75-1.05	MP3	85		(TERRINGTON BEDS)			
1.00-1.30	MP4	42		Becoming sandy below 1.00m depth.			
1.20	D4						
1.30-1.60	MP5	45					
1.50	D5		▽1			1.50	
1.60-2.40	B2			Brown/orange brown/grey mottled, very silty fine SAND with occasional black carbonaceous specks.			
1.60-1.90	MP6	83					
1.90	D6						
1.90-2.10	MP7	88					
2.10-2.40	MP8	92					
2.30	D7						
2.40-2.70	MP9	89		(MARINE SAND)			
2.60-3.00	B3						
2.80	D8						
3.00	D9					3.00	
				Pit completed at 3.00m depth			

KEY

- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS
1. Water seepage at 1.50m depth
2. Pit sides collapsed when pit reached 2.60m depth
3. Pit dry on completion

Project No 14949

Scale 1:25

Page 1/1

LABORATORY TEST RESULTS

CONTRACT LAND OFF COALBEACH LANE SOUTH, SURFLEET

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	Soil Total % Dry Wt.	Soil Aqueous Extract mg/l	Water mg/l	pH	Top %	Base %	
TP1	CBR1	0.30 - 0.70				29	1.88	1.47										4.5	3.2	0% retained on 20mm sieve
	B1	0.50 - 0.70	33	24	9	30														SOIL CLASSIFICATION = CL/ML 0% retained on 425µm sieve
	W1	2.00														296	7.8			
TP2	B1	0.40 - 1.10				26	1.90	1.48							148		8.1	1.8	1.3	0% retained on 20mm sieve
TP3	B1	0.30 - 0.70				23	1.93	1.56										9.3	4.1	0% retained on 20mm sieve
TP4	B1	0.50 - 1.10													107		7.9			
	D3	0.70	34	26	8	28														SOIL CLASSIFICATION = ML 0% retained on 425µm sieve
TP5	B1	0.50 - 0.80	37	24	13	32									82		8.0			SOIL CLASSIFICATION = CI/MI 0% retained on 425µm sieve
TP6	B1	0.30 - 0.70				25	1.88	1.47										6.8	4.1	0% retained on a 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

14949

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LABORATORY TEST RESULTS

CONTRACT LAND OFF COALBEACH LANE SOUTH, SURFLEET

Trial-pit	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)			pH	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	Soil Total % Dry Wt.	Soil Aqueous Extract mg/l	Water mg/l		Top %	Base %	
TP6	B2	0.80 - 1.20													181		8.0			
TP7	B1	0.50 - 0.90													148		8.2			
	D3	0.70	31	22	9	25														SOIL CLASSIFICATION = CL 0% retained on 425μm sieve
TP8	CBR1	0.40 - 0.70				25	1.91	1.54										0.8	0.5	0% retained on 20mm sieve
	D4	1.20													66		8.0			

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

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

Aqueous Extract 2:1 Water:Soil

C.B.R. - CALIFORNIA BEARING RATIO

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TEST CERTIFICATE

Determination of Particle Size Distribution

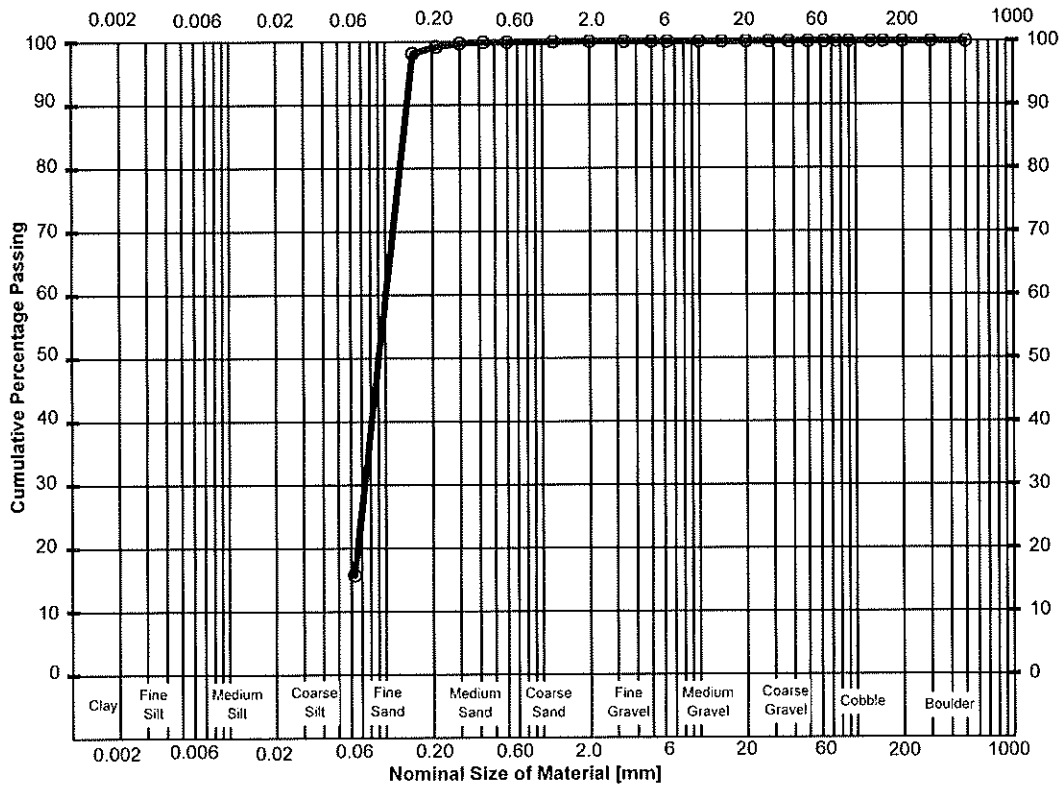
Tested in Accordance with BS 1377-2: 1990: Clause 9.2
Sieved Grading

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/2/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/2 **Pre-treatment for organic material:** N/A
Client Reference: B2

Sample Description: Brown silty SAND.

Material Specification: Not Required **Depth Top:** 2.00m
Location: TP1 **Depth Base:** 2.50m
Source: **Supplier:**



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	100
0.300	100
0.212	99
0.150	98
0.063	16
0.020	
0.006	
0.002	

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 09.01.2020 Page 1 of 1
Form Number: GELab/C/709-2 Version 52

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TEST CERTIFICATE

Determination of Particle Size Distribution

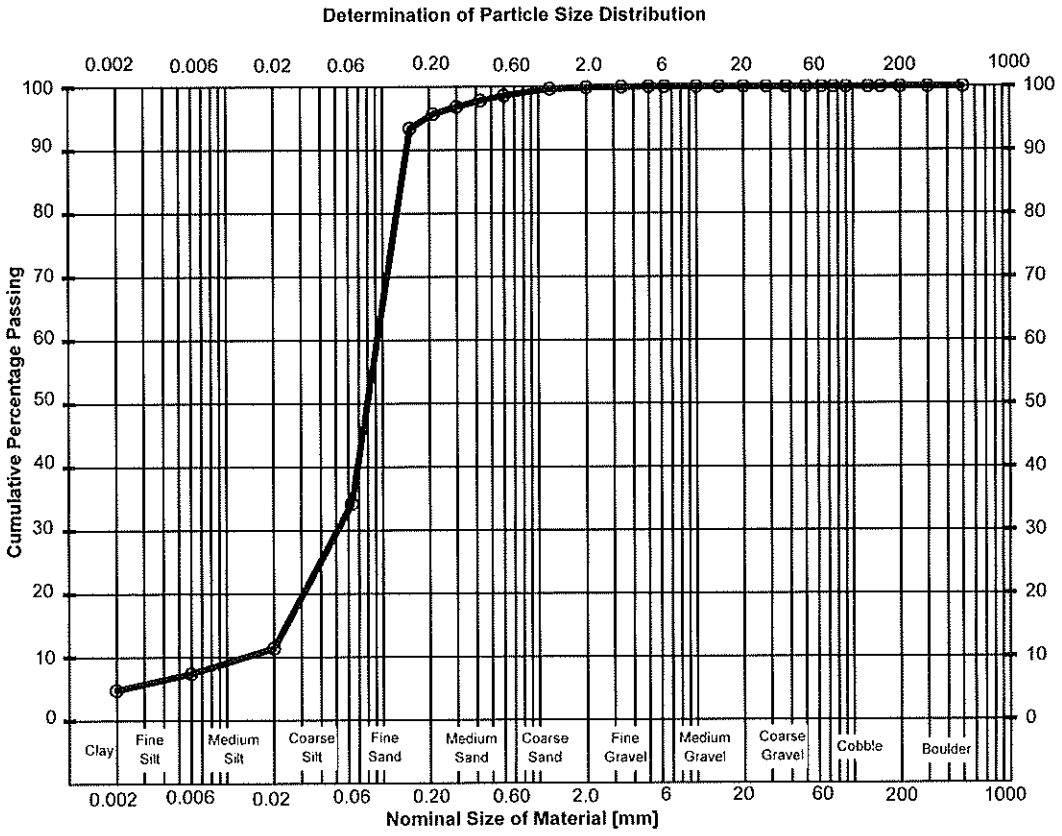
Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/4/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/4 **Pre-treatment for organic material:** No
Client Reference: B1

Sample Description: Soft and Firm friable brown orange-brown dark brown slightly clayey SILT/SAND.

Material Specification: Not Required **Depth Top:** 0.40m
Location: TP2 **Depth Base:** 1.10m
Source: **Supplier:**



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	99
0.425	98
0.300	97
0.212	96
0.150	93
0.063	34
0.020	**11**
0.006	**7**
0.002	**5**

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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Determination of Particle Size Distribution

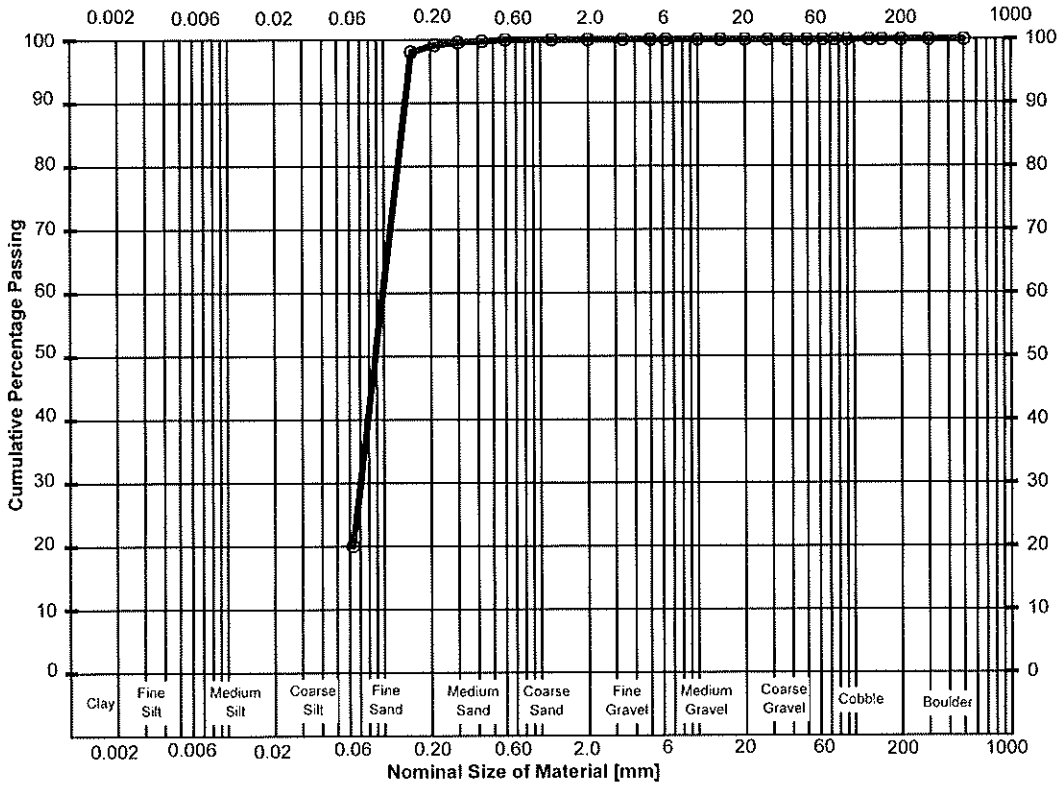
Tested in Accordance with BS 1377-2: 1990: Clause 9.2
Sieved Grading

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/7/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/7 **Pre-treatment for organic material:** N/A
Client Reference: B2

Sample Description: Brown silty SAND.

Material Specification: Not Required **Depth Top:** 1.80m
Location: TP3 **Depth Base:** 2.50m
Source: **Supplier:**



Sieve Analysis

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

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

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Determination of Particle Size Distribution

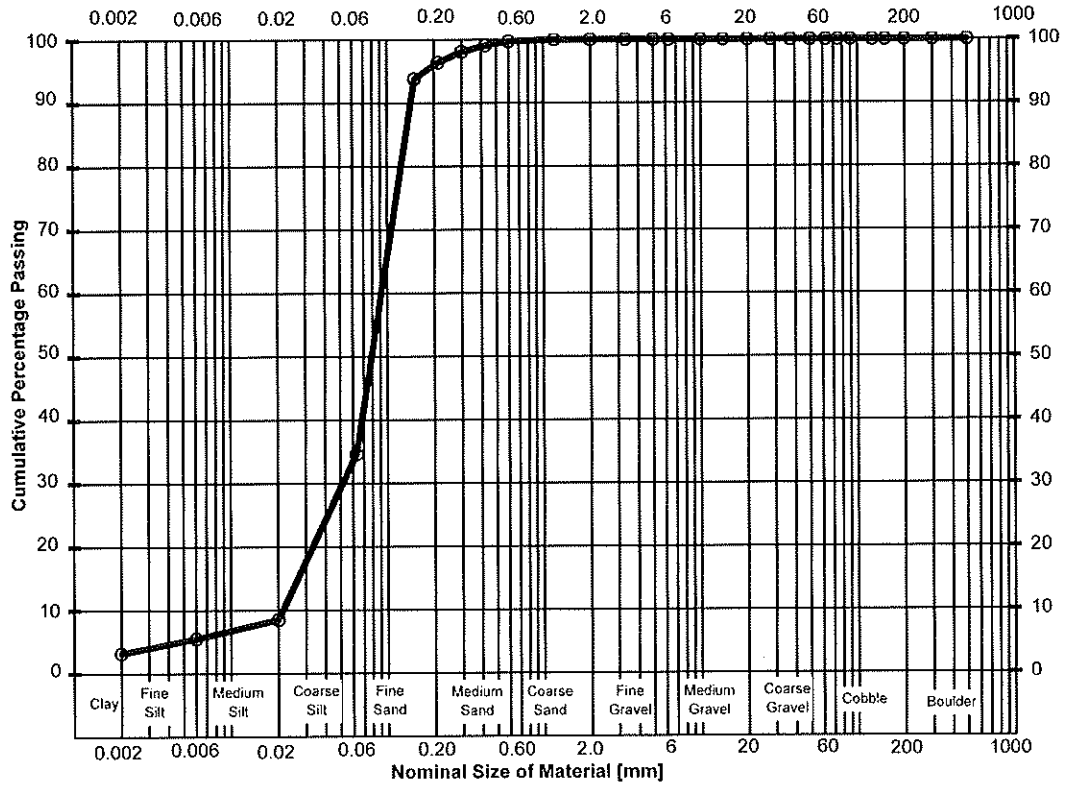
Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/8/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2019
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/8 **Pre-treatment for organic material:** No
Client Reference: B1

Sample Description: Brown slightly clayey very silty SAND.

Material Specification: Not Required **Depth Top:** 0.50m
Location: TP4 **Depth Base:** 1.10m
Source: **Supplier:**



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	99
0.300	98
0.212	96
0.150	94
0.063	35
0.020	**9**
0.006	**6**
0.002	**3**

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

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Date Reported: 09.01.2020 Page 1 of 1
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Determination of Particle Size Distribution

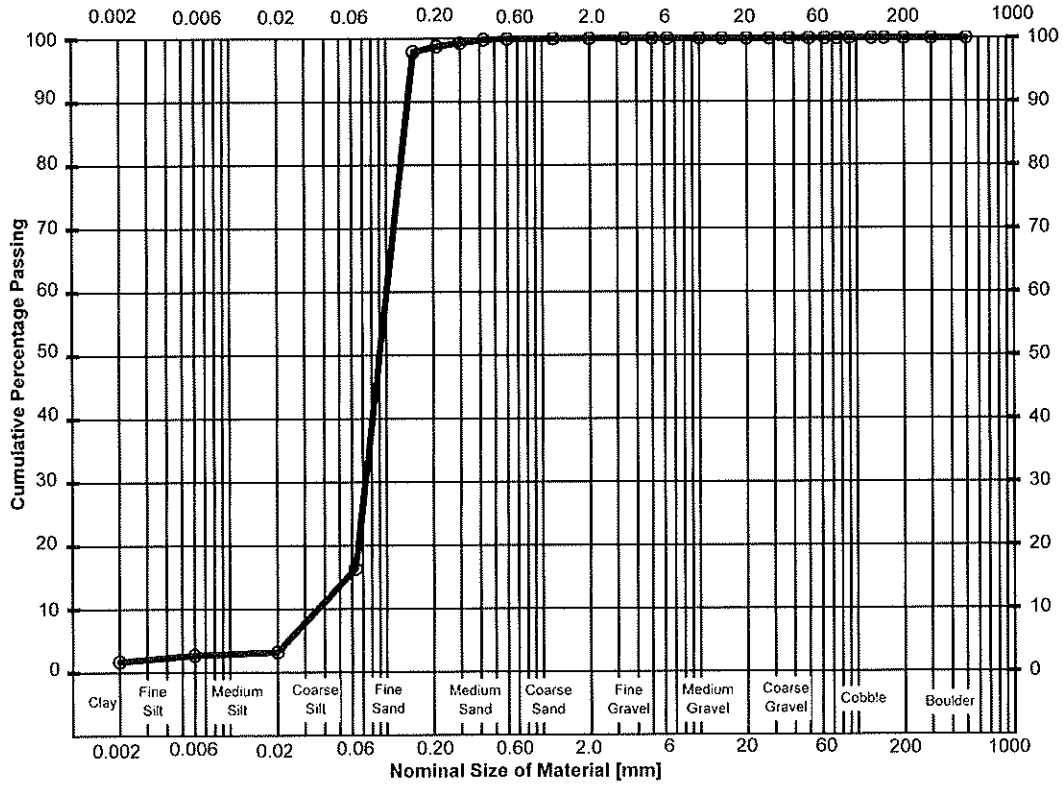
Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/11/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/11 **Pre-treatment for organic material:** No
Client Reference: B2

Sample Description: Orange-brown slightly clayey silty SAND.

Material Specification: Not Required **Depth Top:** 1.35m
Location: TP5 **Depth Base:** 1.50m
Source: **Supplier:**



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	100
0.300	99
0.212	99
0.150	98
0.063	16
0.020	**3**
0.006	**3**
0.002	**2**

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: 09.01.2020 Page 1 of 1
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Determination of Particle Size Distribution

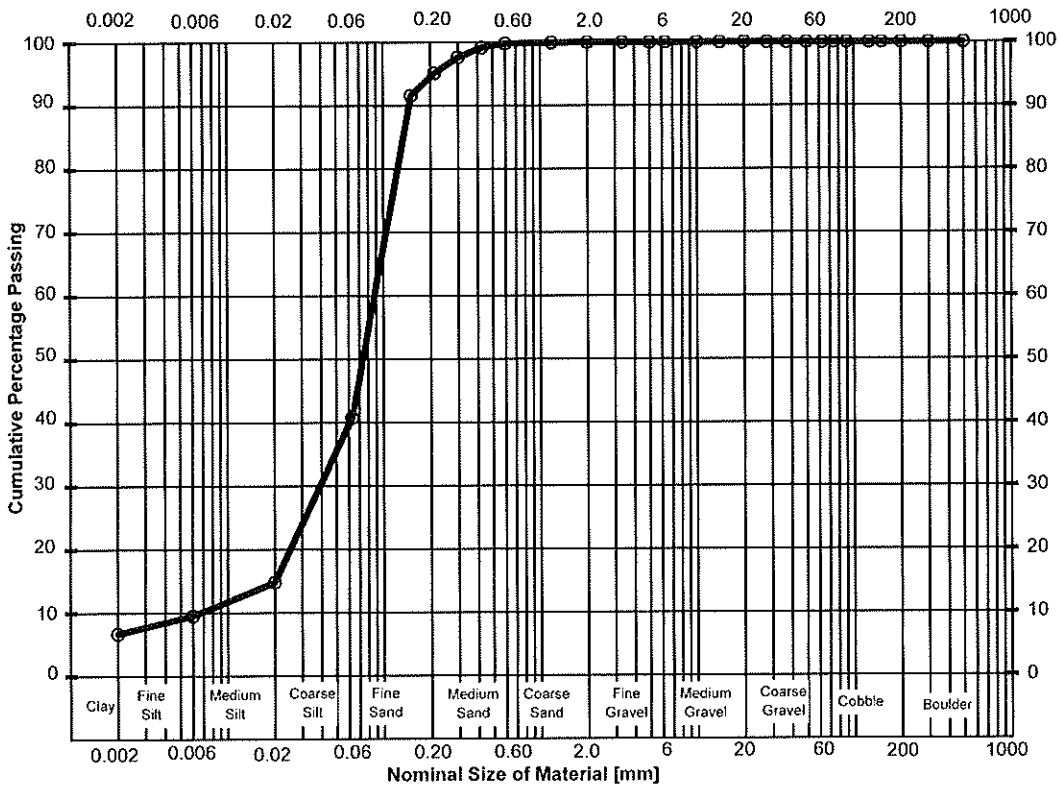
Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/13/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/13 **Pre-treatment for organic material:** No
Client Reference: B2

Sample Description: Brown clayey SILT/SAND.

Material Specification: Not Required **Depth Top:** 0.80m
Location: TP6 **Depth Base:** 1.20m
Source: **Supplier:**



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	99
0.300	98
0.212	95
0.150	92
0.063	41
0.020	15
0.006	10
0.002	7

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: 09.01.2020 Page 1 of 1
Form Number: GELab/C/709-2 Version 52

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TEST CERTIFICATE

Determination of Particle Size Distribution

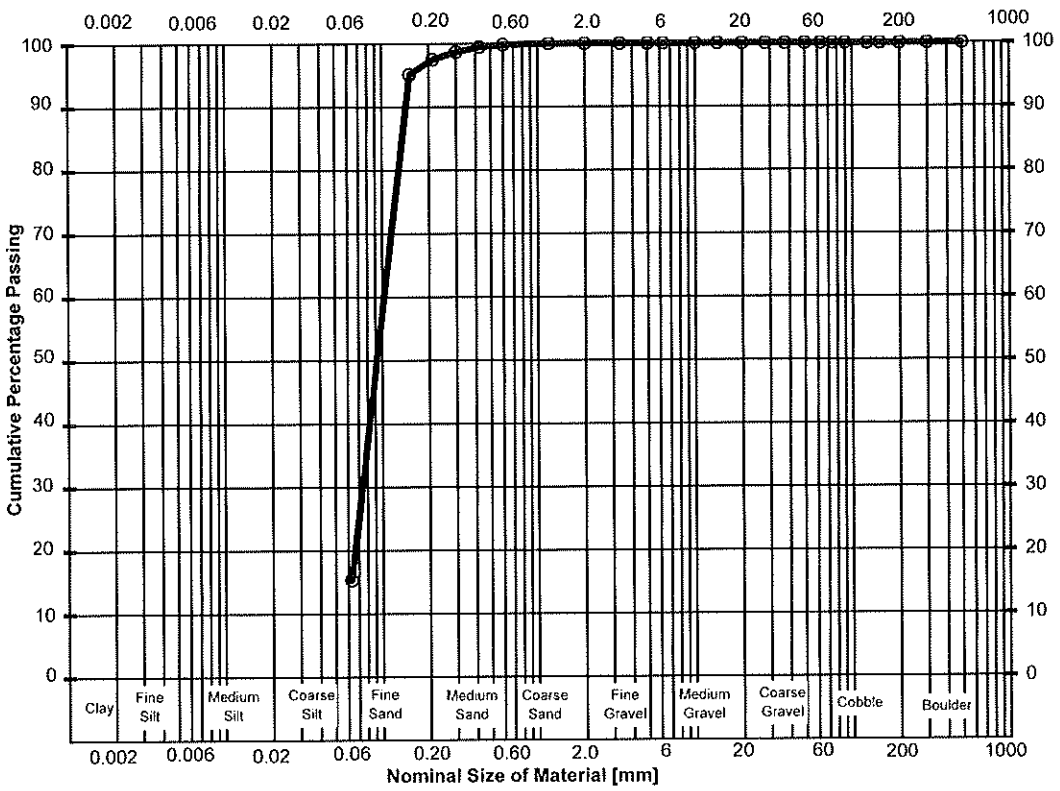
Tested in Accordance with BS 1377-2: 1990: Clause 9.2
Sieved Grading

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/14/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/14 **Pre-treatment for organic material:** N/A
Client Reference: B3

Sample Description: Brown slightly clayey slightly silty SAND.

Material Specification: Not Required **Depth Top:** 2.50m
Location: TP6 **Depth Base:** 3.00m
Source: **Supplier:**



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	99
0.300	99
0.212	98
0.150	95
0.063	15
0.020	
0.006	
0.002	

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 09.01.2020 Page 1 of 1
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TEST CERTIFICATE

Determination of Particle Size Distribution

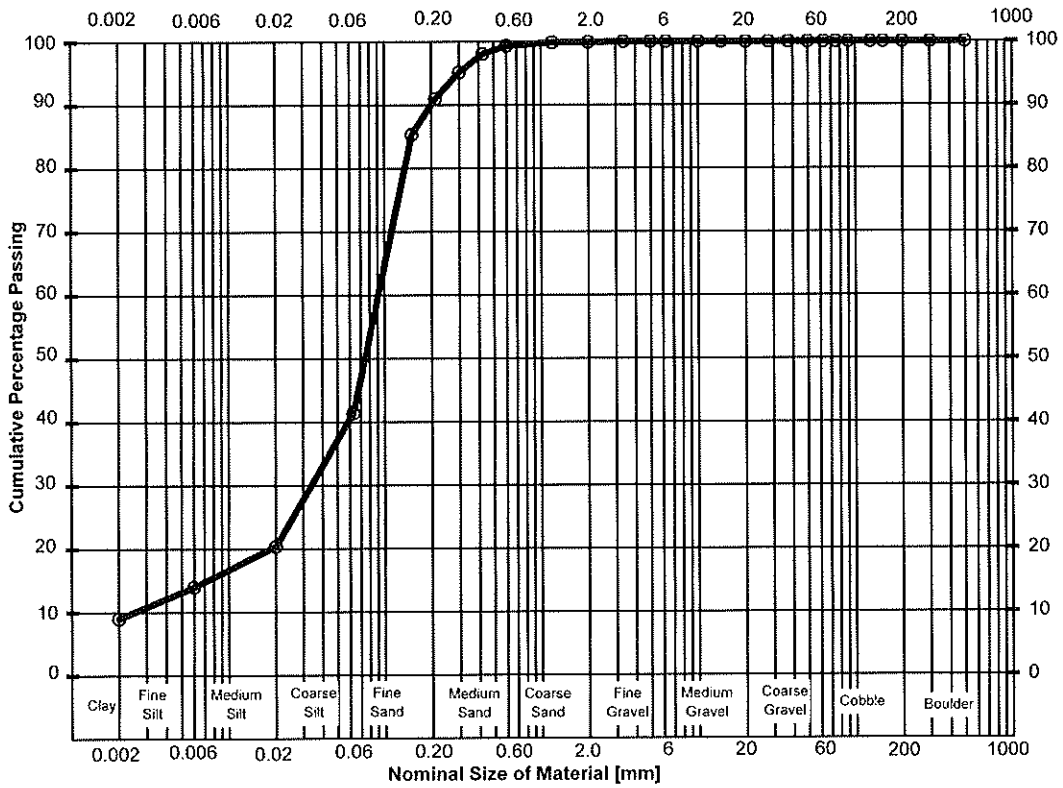
Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/15/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/15 **Pre-treatment for organic material:** No
Client Reference: B1

Sample Description: Brown clayey SILT/SAND.

Material Specification: Not Required **Depth Top:** 0.50m
Location: TP7 **Depth Base:** 0.90m
Source: **Supplier:**



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	99
0.425	98
0.300	95
0.212	91
0.150	85
0.063	41
0.020	**20**
0.006	**14**
0.002	**9**

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: 09.01.2020 Page 1 of 1
Form Number: GELab/C/709-2 Version 52

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

8180

GROUND ENGINEERING

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

TEST CERTIFICATE

Determination of Particle Size Distribution

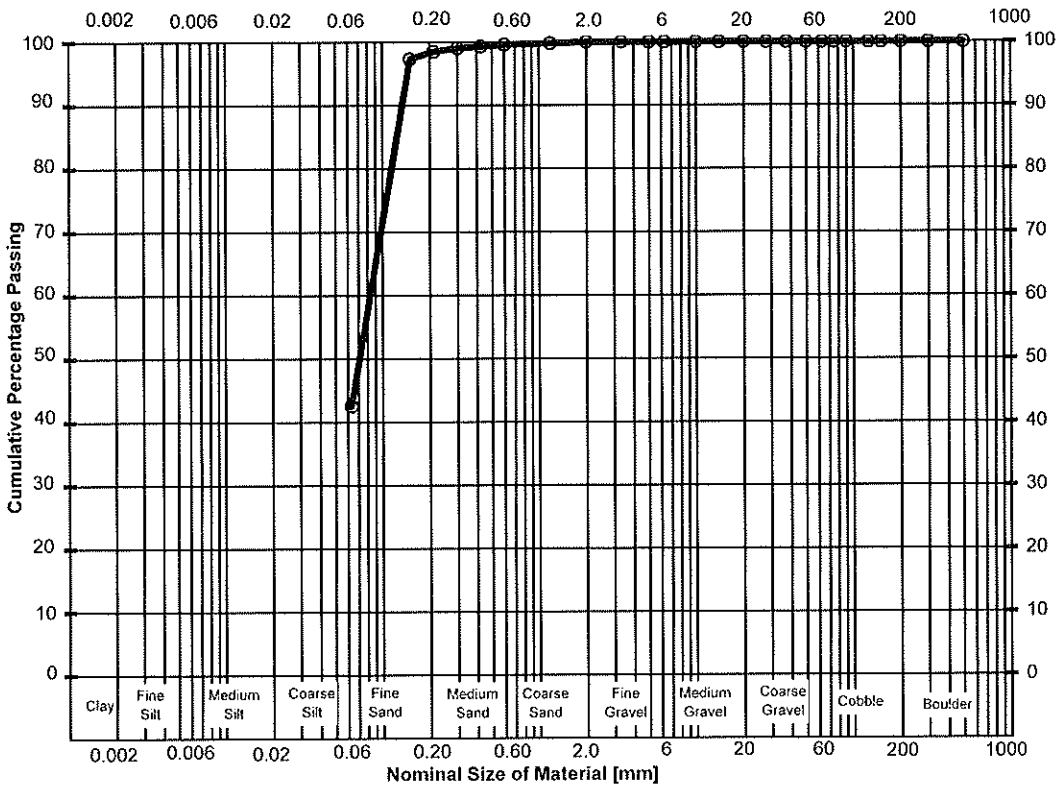
Tested in Accordance with BS 1377-2: 1990: Clause 9.2
Sieved Grading

Client:	Ground Engineering Ltd	Certificate Number:	PL6927-1/18/710-2
Client Address:	Newark Road	Client Reference:	C14949
	Peterborough	Lab Job Number:	PL6927-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	17.12.2019
Contact:	Chris Ebeling	Date Tested:	07.01.2020
		Certificate of Sampling:	N/A
Site Name:	Land off Coalbeach Lane South	Sampling Certificate No.:	N/A
Site Address:	Surfleet	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL6927-1/18 **Pre-treatment for organic material:** N/A
Client Reference: B2

Sample Description: Brown slightly clayey SILT/SAND.

Material Specification: Not Required **Depth Top:** 1.60m
Location: TP8 **Depth Base:** 2.40m
Source: **Supplier:**



Sieve Analysis

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

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 09.01.2020 Page 1 of 1
Form Number: GELab/C/709-2 Version 52

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

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

UKAS TESTING 2183

mCERTS

Final Report

Report No.:	19-42033-1
Initial Date of Issue:	23-Dec-2019
Client	Ground Engineering Limited
Client Address:	Newark Road Peterborough Cambridgeshire PE1 5UA
Contact(s):	Chris Ebeling
Project	C14949 Land off Coalbeach Lane South, Surfleet

Quotation No.:		**Date Received:**	17-Dec-2019
Order No.:	C14949	**Date Instructed:**	17-Dec-2019
No. of Samples:	7		
Turnaround (Wkdays):	5	**Results Due:**	23-Dec-2019
Date Approved:	23-Dec-2019		

Approved By:

Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: C14949 Land off Coalbeach Lane South, Surfleet

Client: Ground Engineering Limited					Chemtest Job No.:	19-42033	19-42033	19-42033	19-42033	19-42033	19-42033	19-42033
Quotation No.:					Chemtest Sample ID.:	944424	944425	944426	944427	944428	944429	944430
					Client Sample ID.:	D1	D1	D2	D1	D1	D1	D1
					Sample Location:	TP1	TP2	TP3	TP5	TP6	TP7	TP8
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.10	0.10	0.40	0.10	0.10	0.10	0.10
					Date Sampled:	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
pH	M	2010		4.0		8.3	8.3	8.6	8.2	8.4	8.4	8.5
Moisture	N	2030	%	0.020		17	14	14	15	18	15	18
Stones and Removed Materials	N	2030	%	0.020		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.035	< 0.020
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40		1.2	1.0	0.49	0.86	1.2	1.0	1.4
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		0.66	0.056	0.019	< 0.010	0.022	< 0.010	0.020
Cyanide (Free)	M	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50		0.83	0.63	0.74	< 0.50	0.61	0.52	0.66
Arsenic	M	2450	mg/kg	1.0		18	19	13	11	13	12	12
Cadmium	M	2450	mg/kg	0.10		0.23	0.23	< 0.10	< 0.10	0.16	0.16	0.18
Chromium	M	2450	mg/kg	1.0		27	31	18	13	19	18	18
Copper	M	2450	mg/kg	0.50		42	48	11	10	33	33	34
Mercury	M	2450	mg/kg	0.10		0.15	0.16	< 0.10	< 0.10	0.10	0.11	0.15
Nickel	M	2450	mg/kg	0.50		17	19	19	13	14	13	12
Lead	M	2450	mg/kg	0.50		40	50	6.5	8.7	27	34	44
Selenium	M	2450	mg/kg	0.20		0.26	0.24	< 0.20	0.20	< 0.20	< 0.20	< 0.20
Zinc	M	2450	mg/kg	0.50		56	65	34	33	45	45	50
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40		2.8	2.8	1.0	1.9	2.4	2.6	2.9
Acenaphthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10		< 0.10	0.23	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10		< 0.10	0.30	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Soil Colour	N	2040		N/A		Brown,	Brown	Brown	Brown,	Brown	Brown	Brown
Other Material	N	2040		N/A		NONE	NONE	NONE	NONE,	NONE	NONE	NONE

Chemtest
The right chemistry to deliver results

Results - Soil

Project: C14949 Land off Coalbeach Lane South, Surfleet

Client: Ground Engineering Limited				**Chemtest Job No.:**	19-42033	19-42033	19-42033	19-42033	19-42033	19-42033	19-42033
Quotation No.:				**Chemtest Sample ID.:**	944424	944425	944426	944427	944428	944429	944430
				Client Sample ID.:	D1	D1	D2	D1	D1	D1	D1
				Sample Location:	TP1	TP2	TP3	TP5	TP6	TP7	TP8
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m)	0.10	0.10	0.40	0.10	0.10	0.10	0.10
				Date Sampled	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
Soil Texture	N	2040		N/A	Clay,	Clay	Sand	Sand	Clay	Sand	Clay

Chemtest
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Test Methods

SOP	Title	Parameters Included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
$	This information has been supplied by the client and can affect the integrity of test data.

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

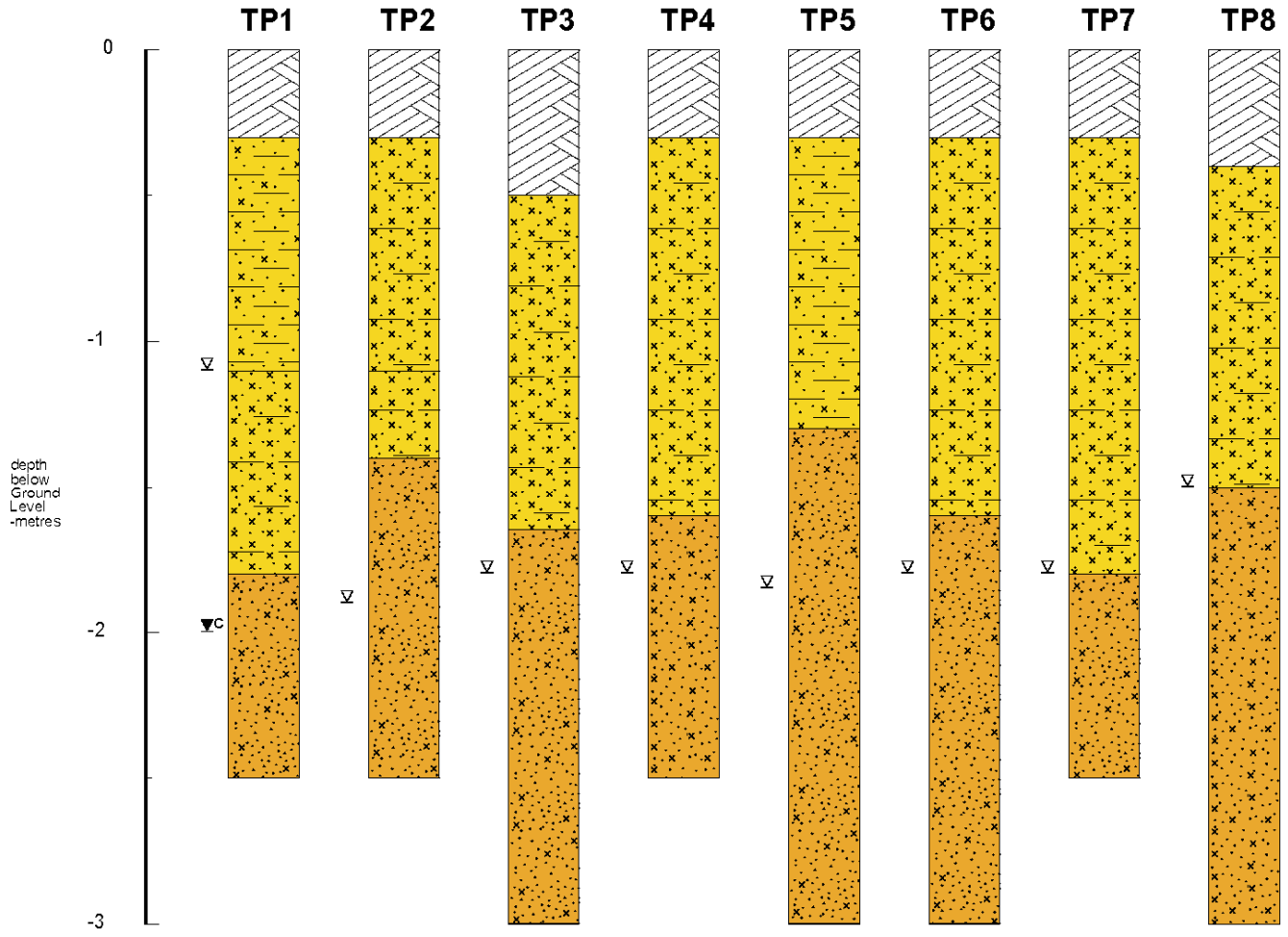
Sample Deviation Codes

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

Sample Retention and Disposal

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

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



KEY TO LEGENDS

- TOPSOIL
- Firm or stiff, slightly sandy SILT/CLAY TERRINGTON BEDS
- Firm or soft, sandy, clayey SILT TERRINGTON BEDS
- Silty, fine SAND MARINE SAND
- Groundwater Encountered
- Groundwater Rise
- C Level on Completion

SITE	LAND OFF COALBEACH LANE SOUTH, SURFLEET		Contract No. 14949
CLIENT	SEAGATE HOMES LIMITED	Soil Profile	Vertical Scale 1:25
© GROUND ENGINEERING, NEWARK ROAD, PETERBOROUGH. Tel (01733) 566566		Date 09/01/20	Fig. No 1

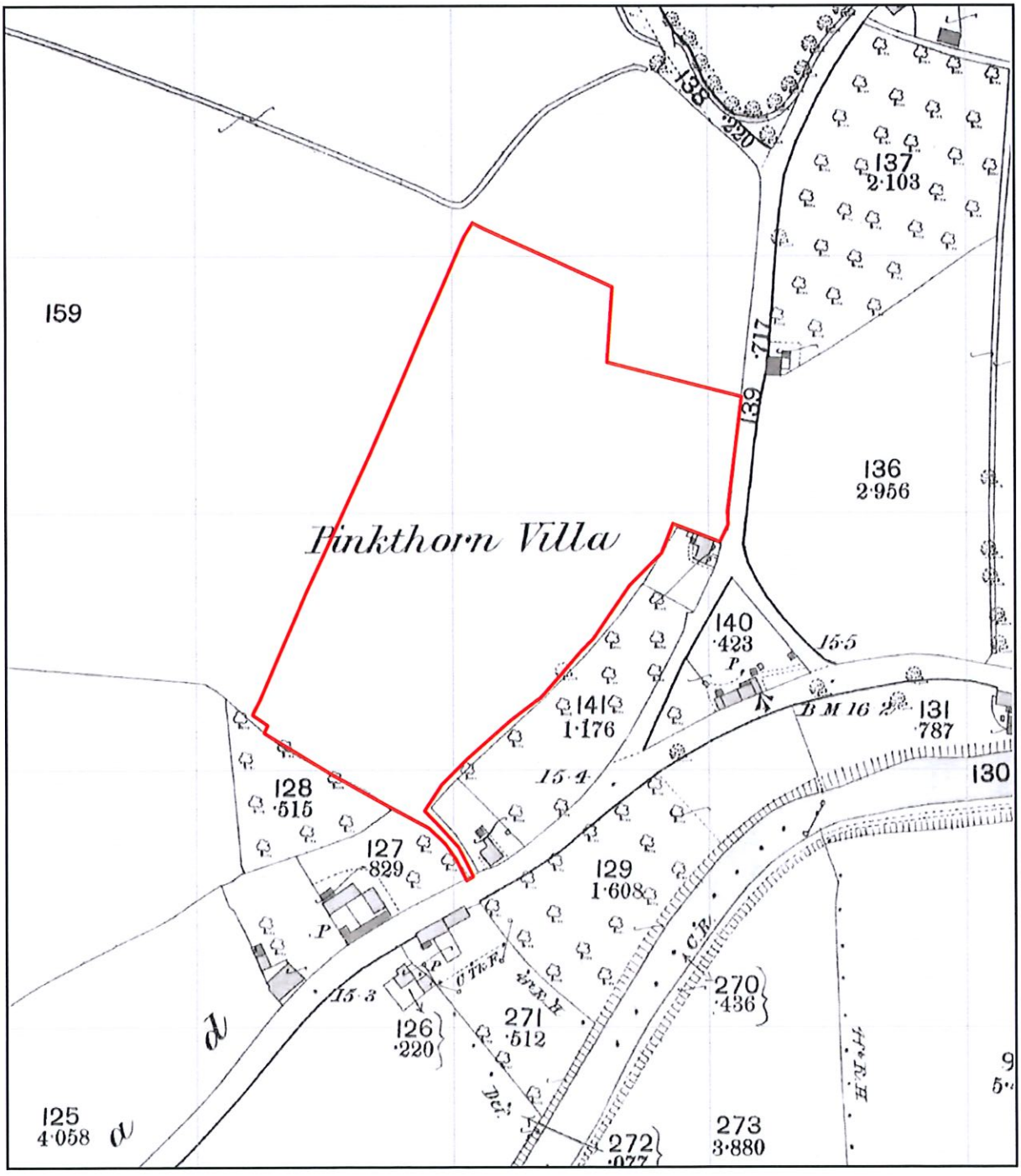
APPENDIX 1

HISTORICAL MAP & PHOTOGRAPH EXTRACTS

Site History

Figure A

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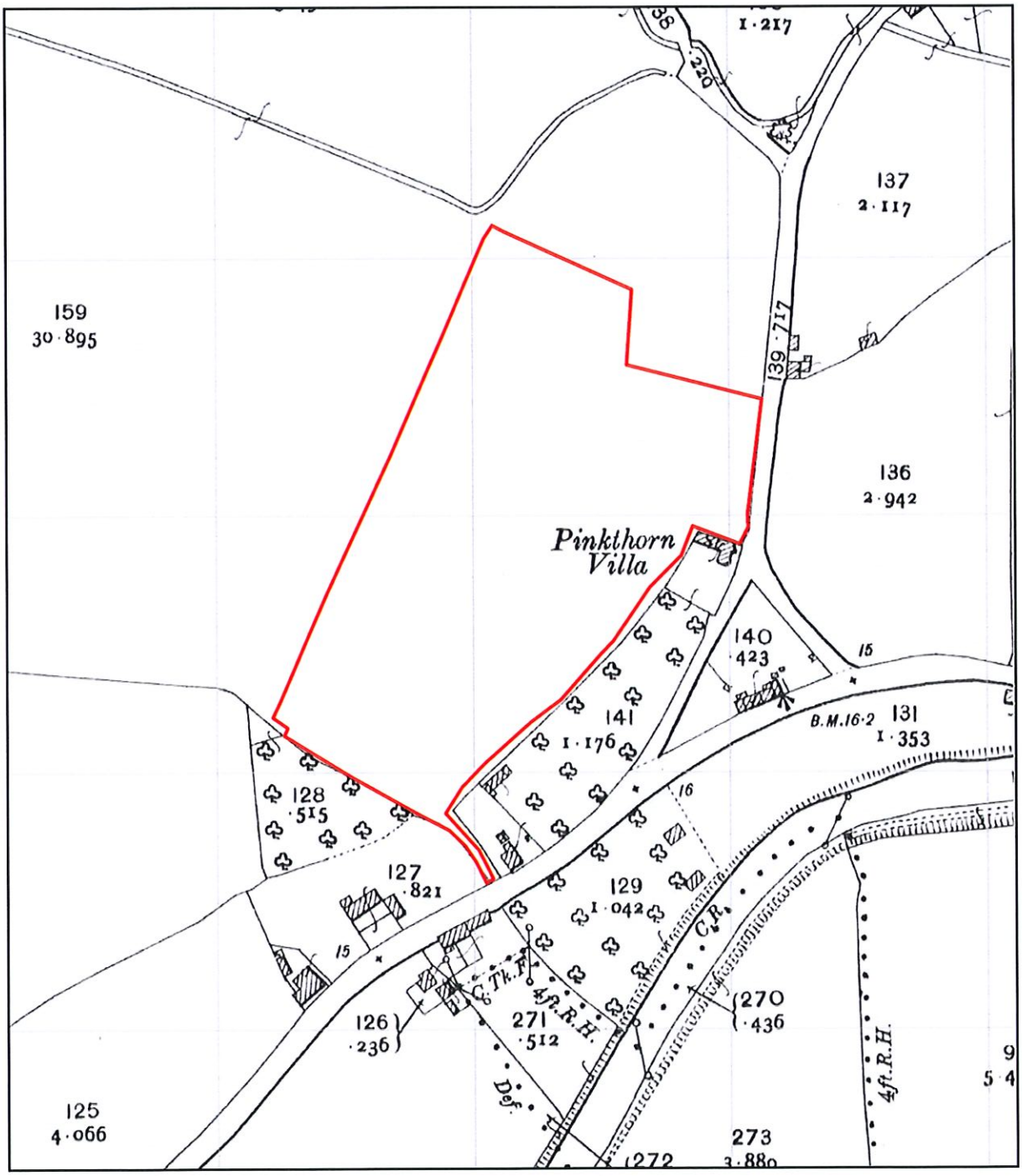


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure B

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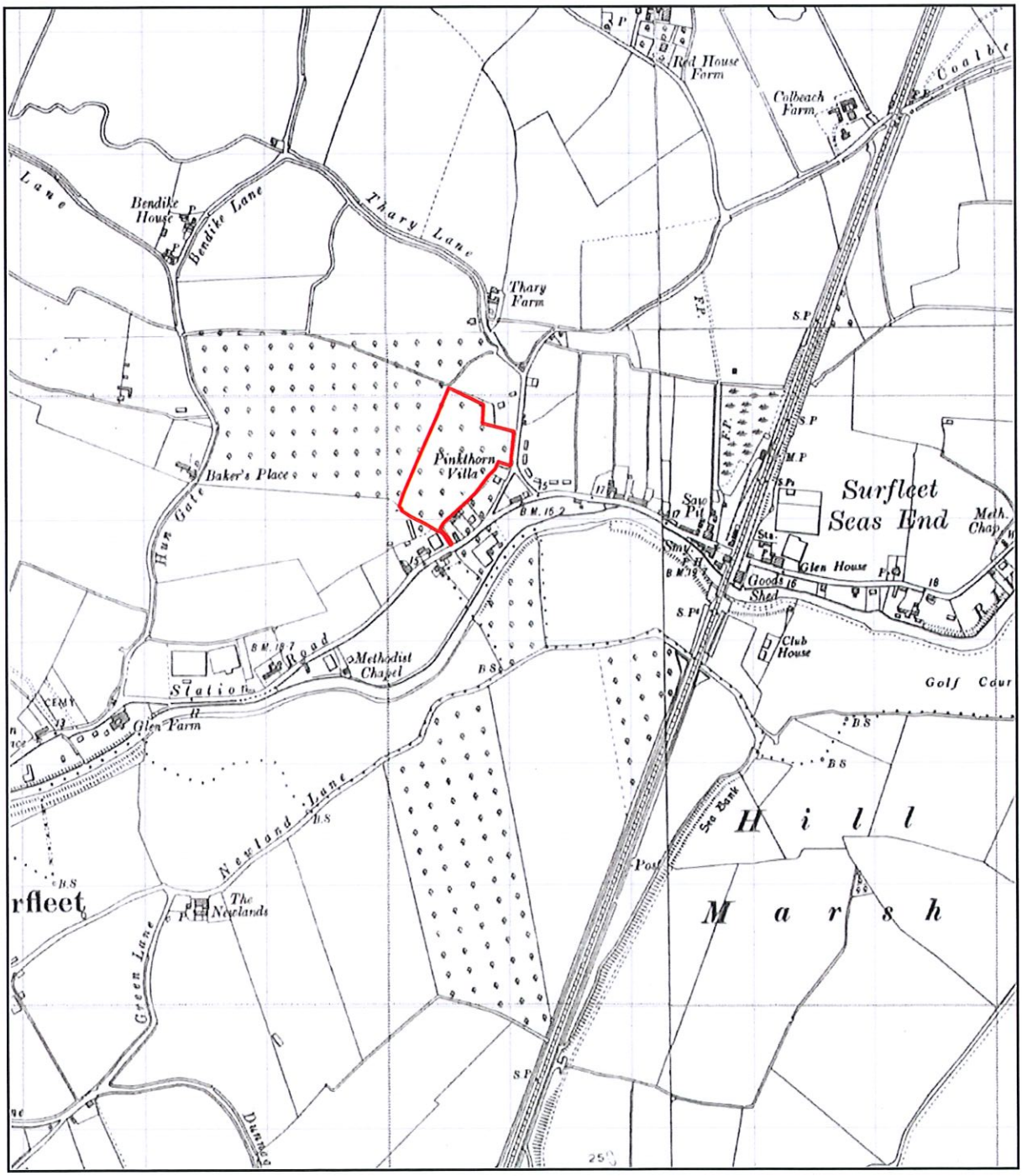


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure C

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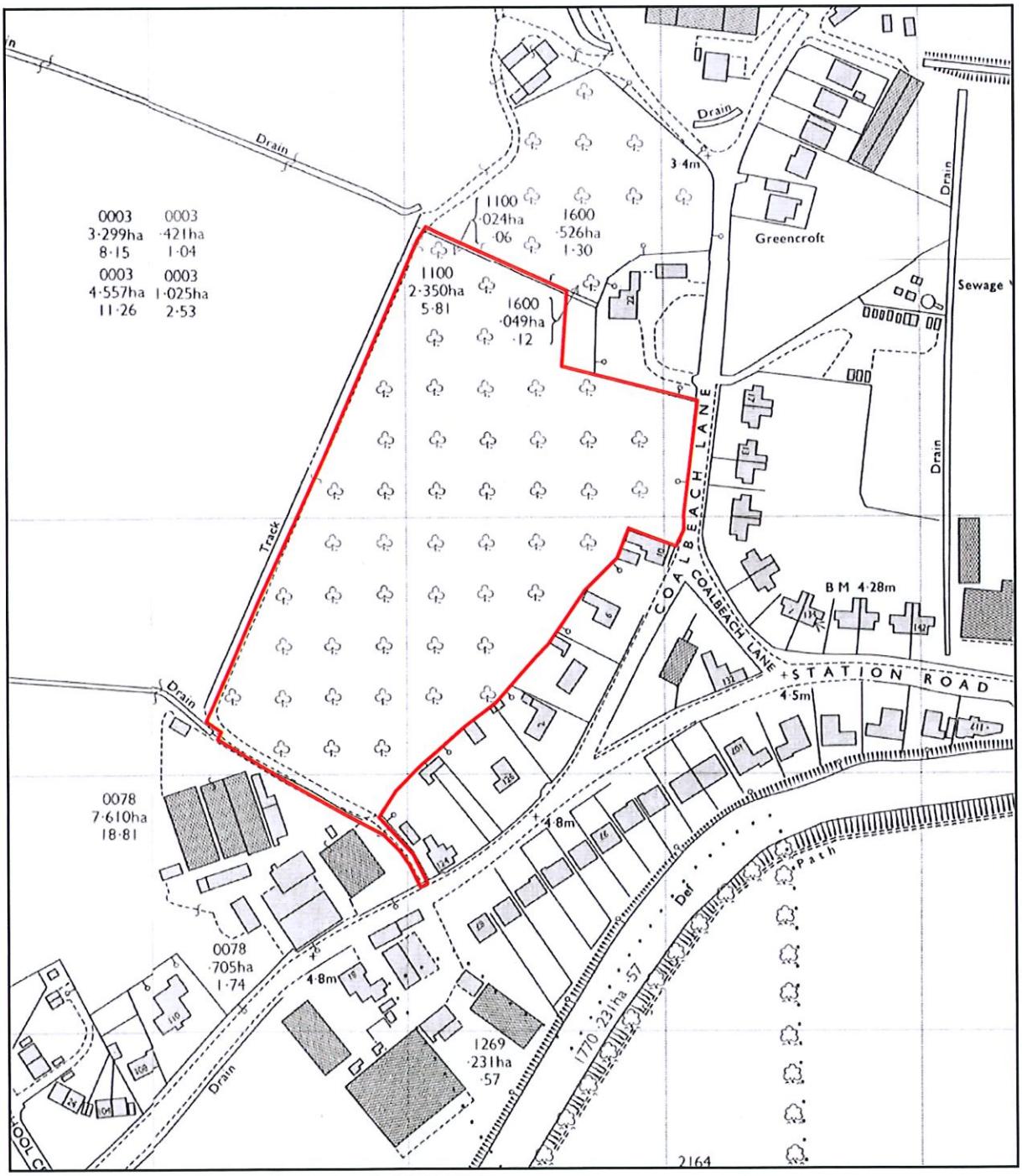


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure D

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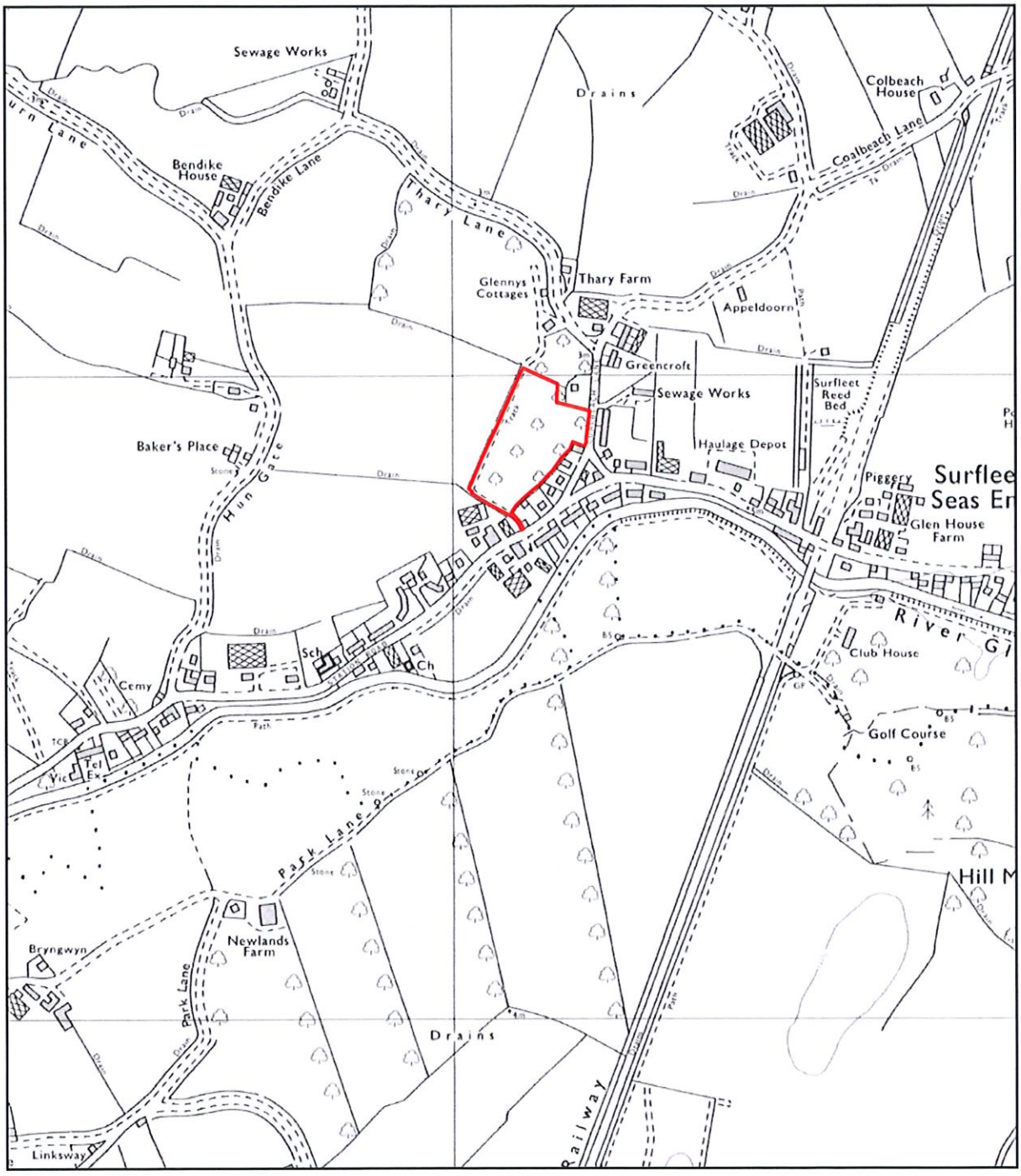


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure E

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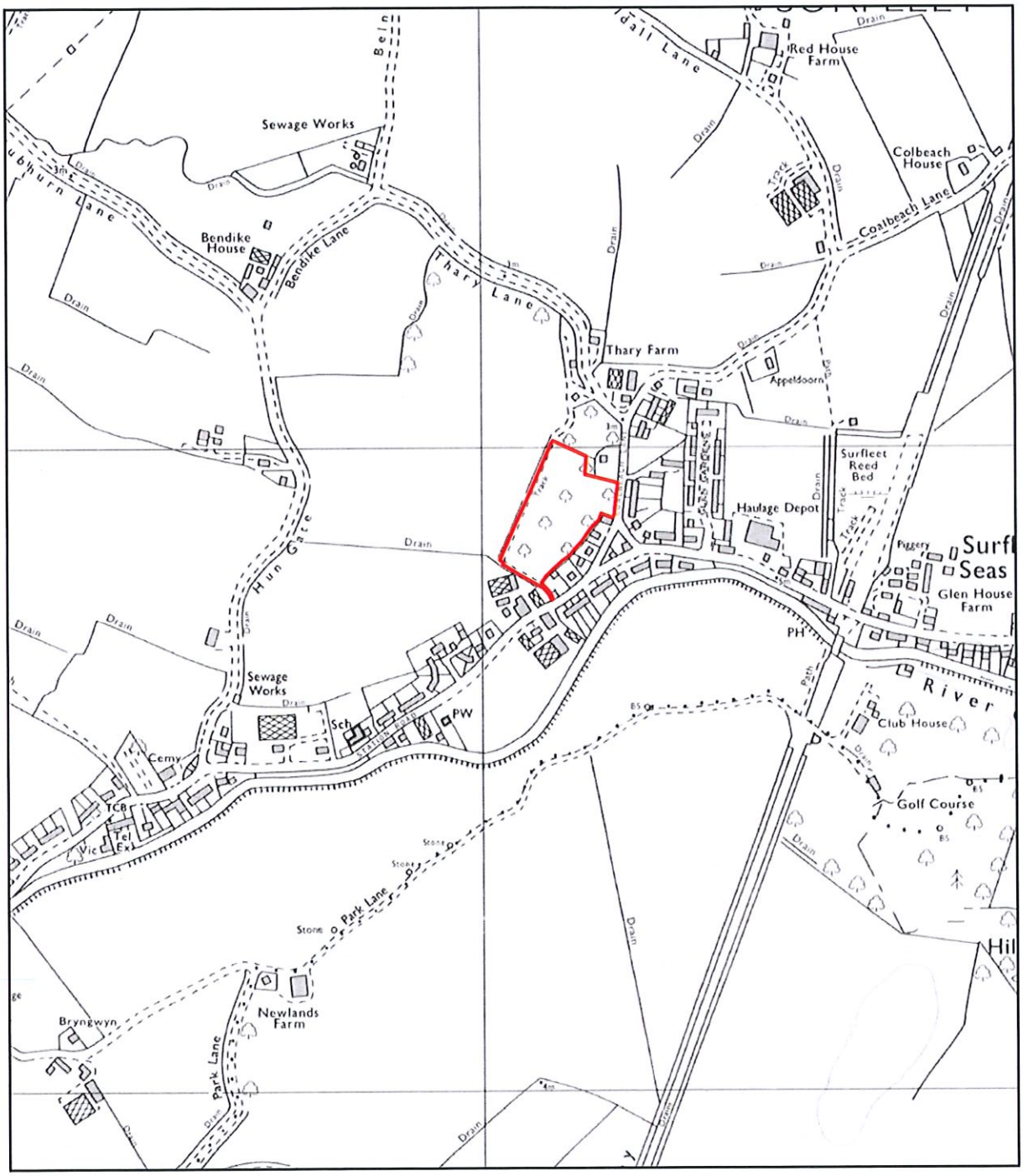


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure F

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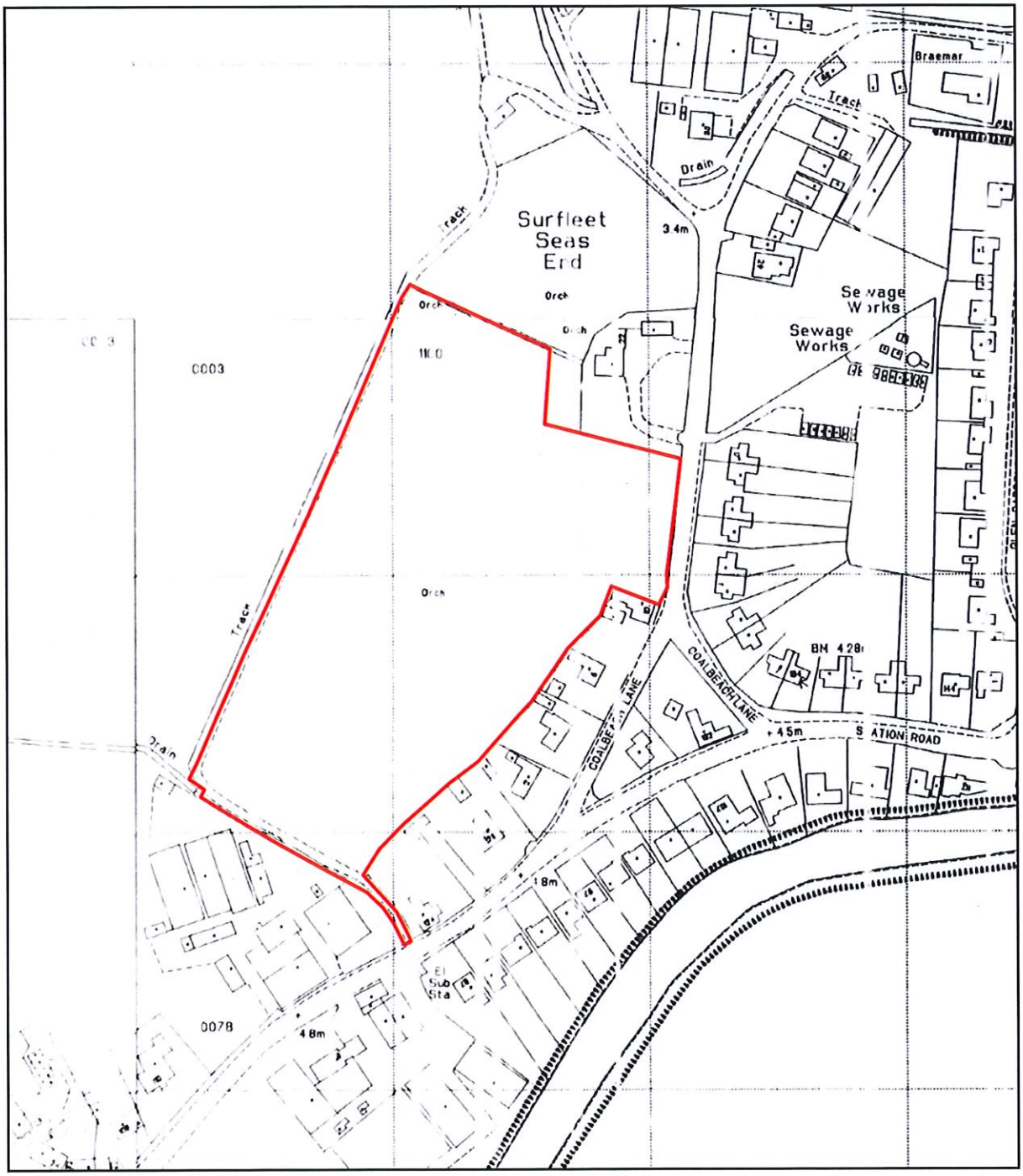


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure G

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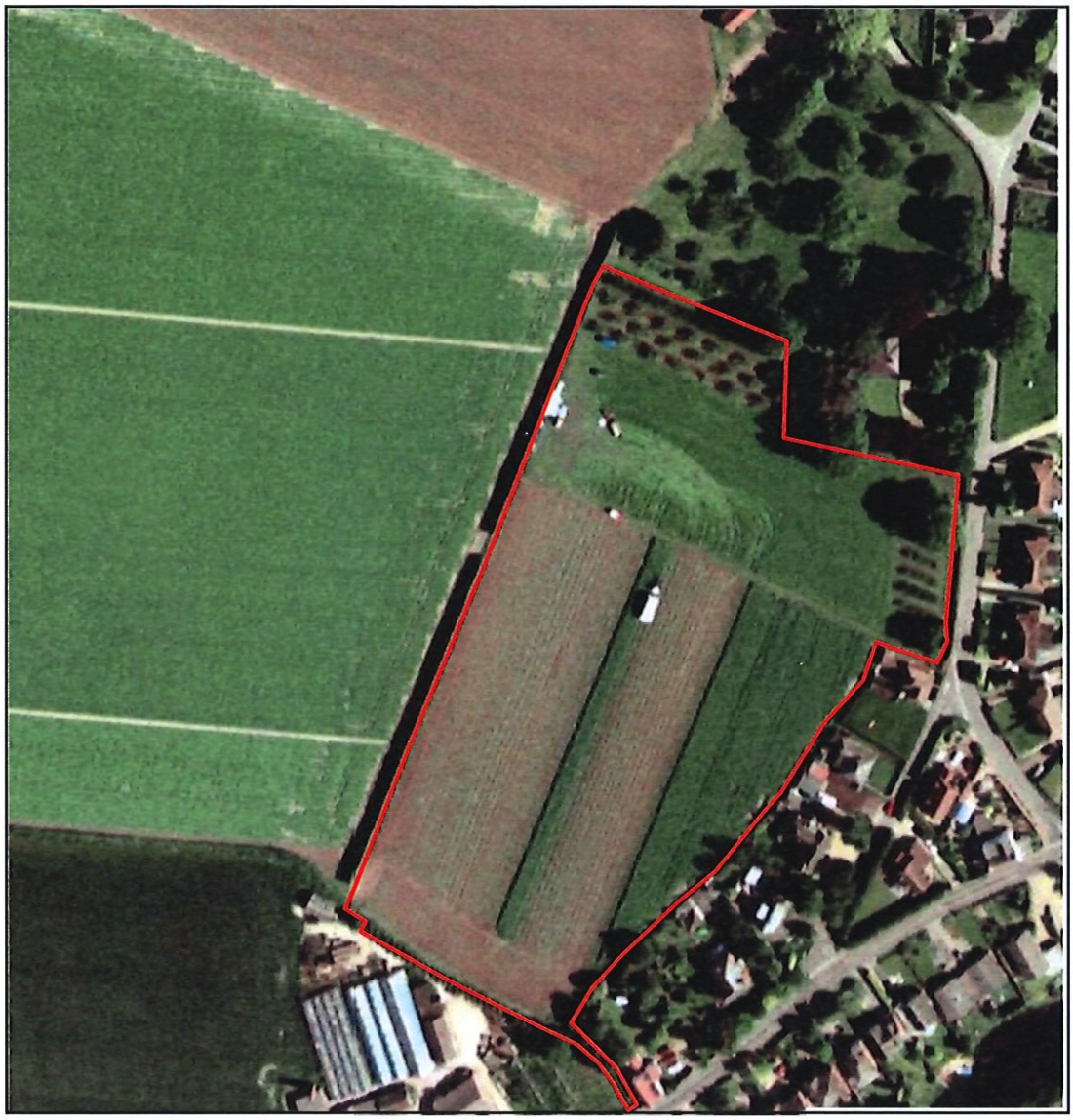


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure H

Reproduced from a **1999 Aerial Photograph**
Not to scale

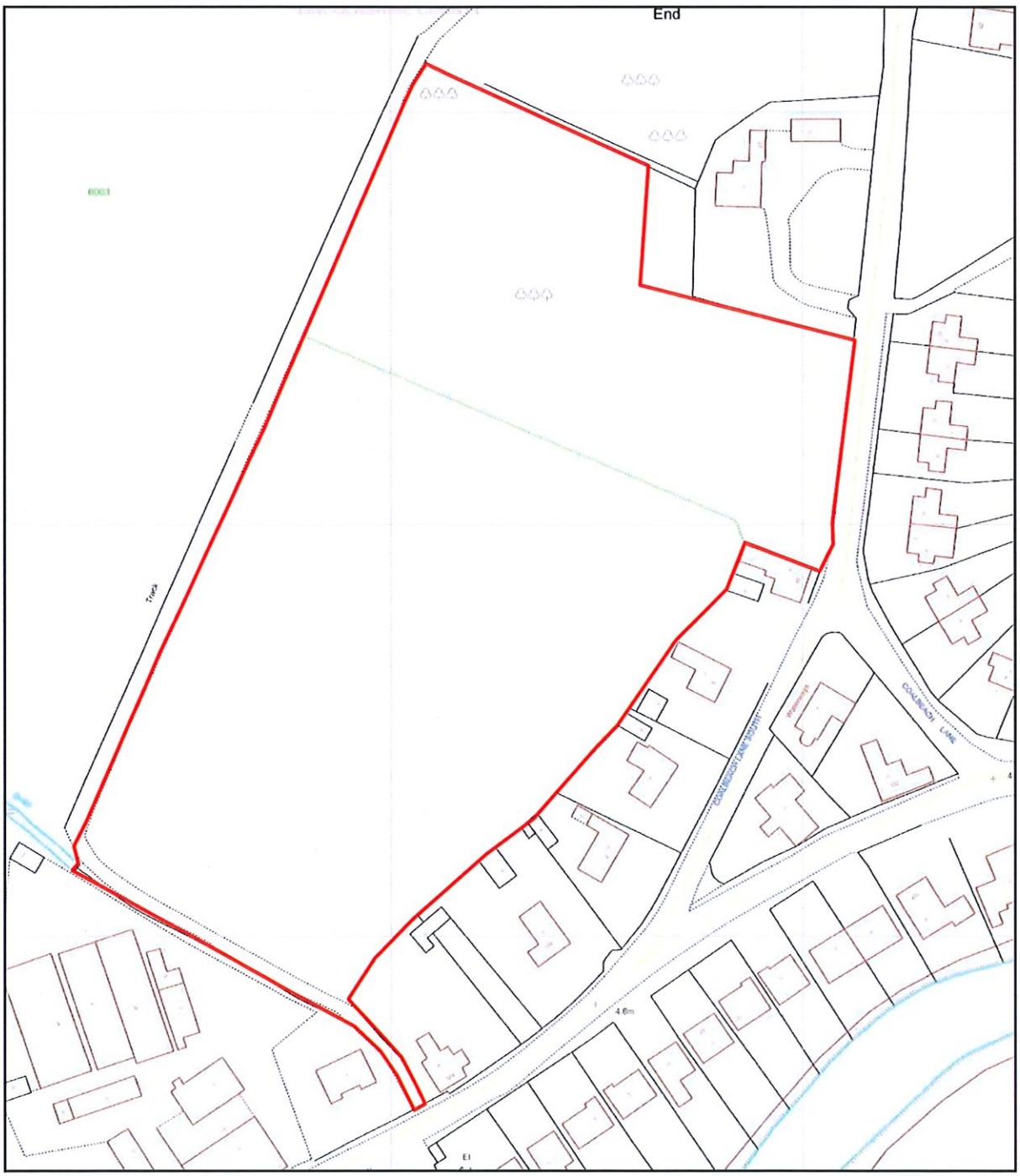


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure I

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Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure J

Reproduced from a **2010 Aerial Photograph**
Not to scale

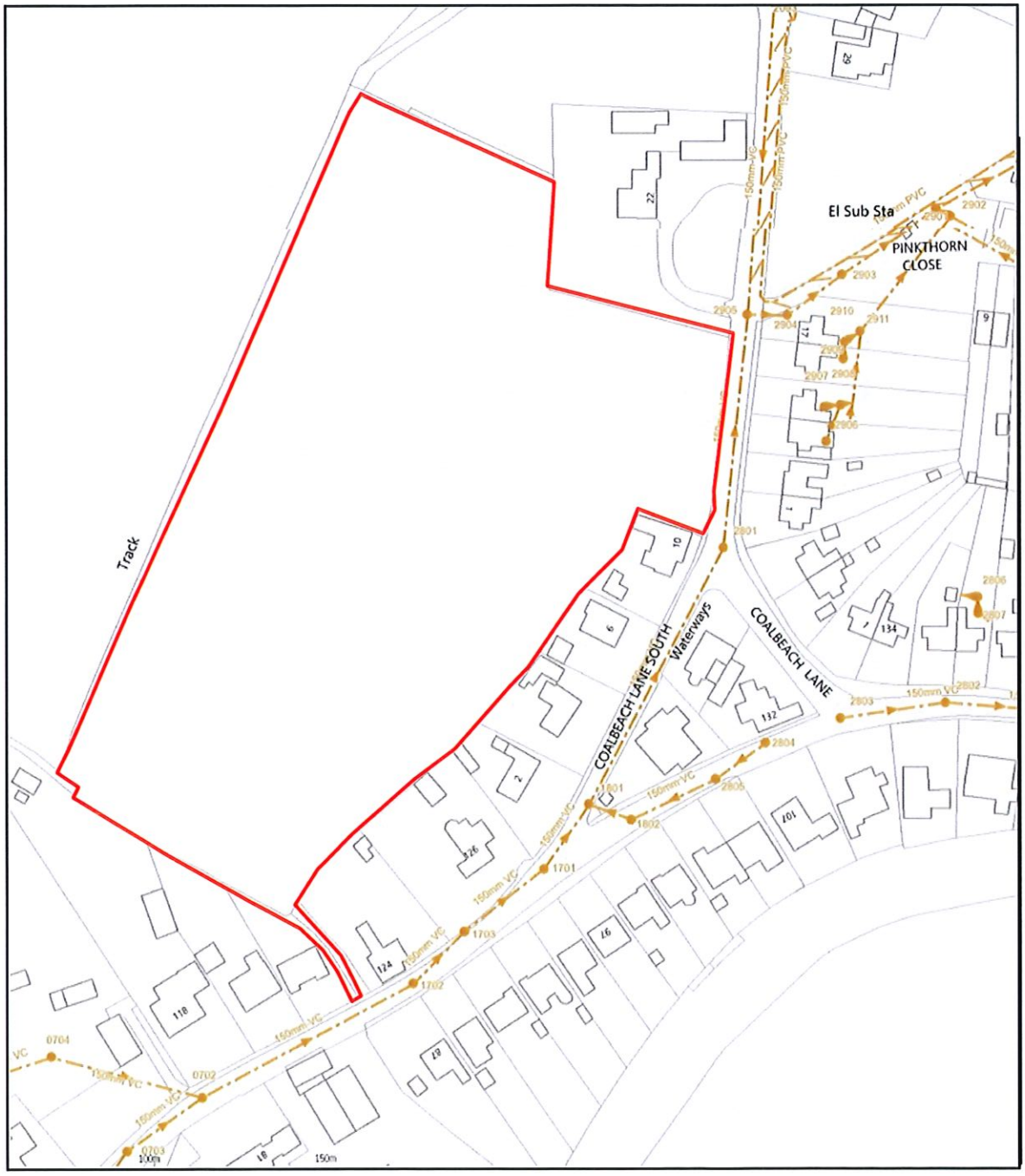


Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

Site History

Figure K

Reproduced from the **2019** Anglian Water sewage plan based on sheets **TF2628NW & TF2629SW** originally at **1:1250** scale with the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright. All rights reserved. Licence number AL100005523



Project : Coalbeach Lane, Surfleet **Client : Seagate Homes (UK) Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C14949**

APPENDIX 2

ENVIRONMENTAL DATABASE SEARCH

Enviro Insight

Address:	**COALBEACH LANE SOUTH, SURFLEET, SPALDING, PE11 4BL**
Date:	**6 Dec 2019**
Reference:	**GS-6506314**
Client:	**Ground Engineering Limited**

NW N NE

W E

SW S SE



Aerial Photograph Capture date:	20-Apr-2018
Grid Reference:	526117,328898
Site Size:	2.3107ha

Report Reference: GS-6506314
Client Reference: SWC14949

Contents Page

Contents Page 3
Overview of Findings 6
Using this report 10
1. Historical Land Use 11
1. Historical Industrial Sites 12
1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping....12
1.2 Additional Information – Historical Tank Database....13
1.3 Additional Information – Historical Energy Features Database....14
1.4 Additional Information – Historical Petrol and Fuel Site Database....14
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database....14
1.6 Historical military sites....14
1.7 Potentially Infilled Land....14
2. Environmental Permits, Incidents and Registers Map 16
2. Environmental Permits, Incidents and Registers 17
2.1 Industrial Sites Holding Licences and/or Authorisations....17
2.1.1 Records of historic IPC Authorisations within 500m of the study site:....17
2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:....17
2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:....17
2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:....17
2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:....17
2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: 18
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:....18
2.1.8 Records of Licensed Discharge Consents within 500m of the study site:....18
2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: 19
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:....19
2.2 Dangerous or Hazardous Sites....19
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents....19
2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:....19
2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:....19
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990....20
3. Landfill and Other Waste Sites Map 21
3. Landfill and Other Waste Sites 22
3.1 Landfill Sites....22
3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site: 22
3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site: 22
3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:....22
3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:....22
3.2 Other Waste Sites....22
3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site: 22
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site: 23
4. Current Land Use Map 24
4. Current Land Uses 25
4.1 Current Industrial Data....25
4.2 Petrol and Fuel Sites....25
4.3 National Grid High Voltage Underground Electricity Transmission Cables....25
4.4 National Grid High Pressure Gas Transmission Pipelines....26

5. Geology 27
5.1 Artificial Ground and Made Ground 27
5.2 Superficial Ground and Drift Geology 27
5.3 Bedrock and Solid Geology 27
6 Hydrogeology and Hydrology 28
6a. Aquifer Within Superficial Geology 28
6b. Aquifer Within Bedrock Geology and Abstraction Licences 29
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences 30
6d. Hydrogeology – Source Protection Zones within confined aquifer 31
6e. Hydrology – Watercourse Network and River Quality 32
6.Hydrogeology and Hydrology 33
6.1 Aquifer within Superficial Deposits 33
6.2 Aquifer within Bedrock Deposits 33
6.3 Groundwater Abstraction Licences 33
6.4 Surface Water Abstraction Licences 34
6.5 Potable Water Abstraction Licences 37
6.6 Source Protection Zones 37
6.7 Source Protection Zones within Confined Aquifer 37
6.8 Groundwater Vulnerability and Soil Leaching Potential 38
6.9 River Quality 38
6.9.1 Biological Quality: 38
6.9.2 Chemical Quality: 39
6.10 Ordnance Survey MasterMap Water Network 39
6.11 Surface Water Features 48
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea) 49
7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map 50
7 Flooding 51
7.1 River and Coastal Zone 2 Flooding 51
7.2 River and Coastal Zone 3 Flooding 51
7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating 52
7.4 Flood Defences 52
7.5 Areas benefiting from Flood Defences 52
7.6 Areas benefiting from Flood Storage 52
7.7 Groundwater Flooding Susceptibility Areas 52
7.8 Groundwater Flooding Confidence Areas 53
8. Designated Environmentally Sensitive Sites Map 54
8. Designated Environmentally Sensitive Sites 55
8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site: 55
8.2 Records of National Nature Reserves (NNR) within 2000m of the study site: 55
8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site: 55
8.4 Records of Special Protection Areas (SPA) within 2000m of the study site: 55
8.5 Records of Ramsar sites within 2000m of the study site: 55
8.6 Records of Ancient Woodland within 2000m of the study site: 56
8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site: 56
8.8 Records of World Heritage Sites within 2000m of the study site: 56
8.9 Records of Environmentally Sensitive Areas within 2000m of the study site: 56
8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site: 56
8.11 Records of National Parks (NP) within 2000m of the study site: 56
8.12 Records of Nitrate Sensitive Areas within 2000m of the study site: 56
8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site: 57

8.14 Records of Green Belt land within 2000m of the study site: 57
9. Natural Hazards Findings 58
9.1 Detailed BGS GeoSure Data 58
9.1.1 Shrink Swell 58
9.1.2 Landslides 58
9.1.3 Soluble Rocks 58
9.1.4 Compressible Ground 59
9.1.5 Collapsible Rocks 59
9.1.6 Running Sand 59
9.2 Radon 60
9.2.1 Radon Affected Areas 60
9.2.2 Radon Protection 60
10. Mining 61
10.1 Coal Mining 61
10.2 Non-Coal Mining 61
10.3 Brine Affected Areas 61
Contact Details 62
Standard Terms and Conditions 64

Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	1	3	56
1.2 Additional Information – Historical Tank Database	0	0	4	0
1.3 Additional Information – Historical Energy Features Database	0	1	0	0
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	1	1	11

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

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	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/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	1	3	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Records of Artificial Ground and Made Ground present beneath the study site	None identified
5.2 Records of Superficial Ground and Drift Geology present beneath the study site	Identified
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site	Identified
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site	Identified

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	1	1	22
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

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site	No	No	No	No	No	Yes
6.10 Ordnance Survey MasterMap Water Network entries within 500m of the site	2	0	24	74	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Enviroment Agency Zone 2 floodplains within 250m of the study site	Identified
7.2 Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Identified
7.3 Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site	Medium
7.4 Flood Defences within 250m of the study site	None identified
7.5 Areas benefiting from Flood Defences within 250m of the study site	None identified
7.6 Areas used for Flood Storage within 250m of the study site	None identified
7.7 Maximum BGS Groundwater Flooding susceptibility within 50m of the study site	Not Prone
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	Not Applicable

Section 8: Designated Environmentally Sensitive Sites

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

Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	3
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 Maximum risk of natural ground subsidence	Moderate
9.1.1 Maximum Shrink-Swell hazard rating identified on the study site	Low
9.1.2 Maximum Landslides hazard rating identified on the study site	Very Low
9.1.3 Maximum Soluble Rocks hazard rating identified on the study site	Negligible
9.1.4 Maximum Compressible Ground hazard rating identified on the study site	Moderate
9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site	Negligible
9.1.6 Maximum Running Sand hazard rating identified on the study site	Moderate
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

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

Using this report

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

1. Historical Industrial Sites

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

2. Environmental Permits, Incidents and Registers

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

3. Landfills and Other Waste Sites

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

4. Current Land Uses

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

5. Geology

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

6. Hydrogeology and Hydrology

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

7. Flooding

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

8. Designated Environmentally Sensitive Sites

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

9. Natural Hazards

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

10. Mining

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

11. Contacts

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

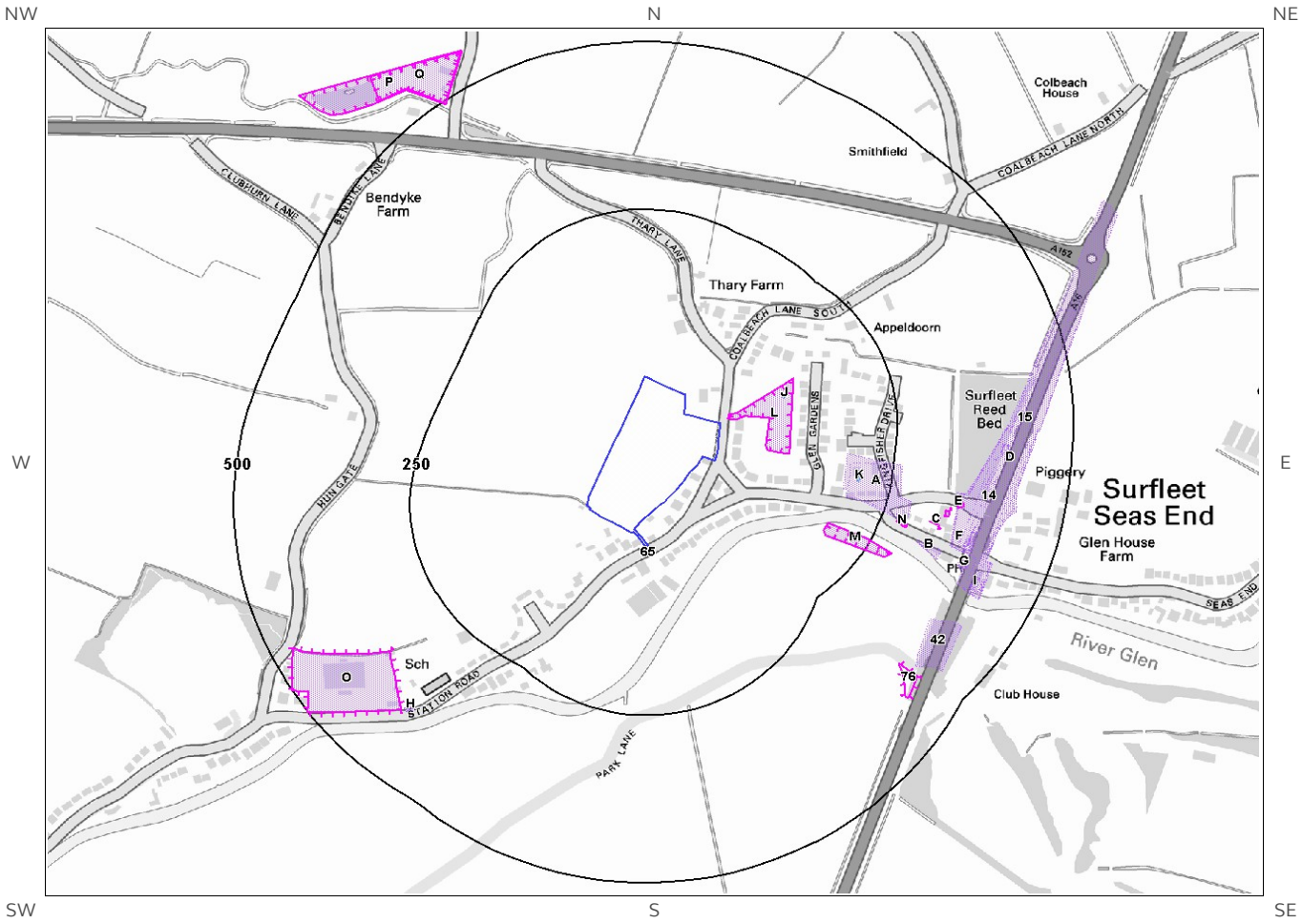
Note: Maps

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

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

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

1. Historical Land Use



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Site Outline

250
500
Search Buffers (m)

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

Industrial Land Use

Potentially Infilled Land

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

Energy Features

Petrol Stations

Historical military sites

Tanks

Garages

1. Historical Industrial Sites

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

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

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 60

ID	Distance [m]	Direction	Use	Date
1L	12	NE	Sewage Works	1973
2A	182	E	Unspecified Depot	1989
3M	185	SE	Unspecified Ground Workings	1950
4A	189	E	Unspecified Depot	1973
5N	273	E	Saw Pit	1950
6B	310	SE	Smithy	1906
7B	310	SE	Smithy	1950
8B	318	SE	Smithy	1903
9B	318	SE	Smithy	1903
10C	322	E	Saw Pit	1903
11C	322	E	Saw Pit	1903
12C	334	E	Saw Pit	1955
13C	340	E	Saw Pit	1887
14	344	E	Railway Sidings	1887
15	347	E	Railway Sidings	1955
16E	348	E	Railway Building	1887
17D	348	E	Railway Sidings	1950
18D	349	E	Railway Sidings	1906
19E	349	E	Saw Pit	1906
20E	349	E	Saw Pit	1906
21E	349	E	Railway Building	1950
22E	350	E	Railway Building	1955
23O	353	SW	Sewage Works	1989
24F	364	E	Railway Building	1887
25D	368	E	Railway Sidings	1903
26D	368	E	Railway Sidings	1903
27F	373	E	Railway Station	1887
28F	375	E	Railway Building	1955
29F	376	E	Railway Building	1950
30F	376	E	Railway Building	1906
31G	377	SE	Railway Building	1955
32F	377	E	Railway Station	1903
33F	377	E	Railway Station	1903

34G	378	SE	Railway Building	1950
35G	378	SE	Railway Building	1903
36G	378	SE	Railway Building	1903
37F	379	E	Railway Station	1950
38F	379	E	Railway Station	1955
39F	380	E	Railway Station	1906
40G	381	SE	Railway Building	1887
41H	383	SW	Unspecified Station	1906
42	386	SE	Railway Sidings	1887
43H	388	SW	Unspecified Station	1955
44D	391	E	Railway Building	1887
45D	399	E	Railway Buildings	1887
46D	399	E	Railway Building	1955
47D	399	E	Railway Building	1950
48D	400	E	Railway Building	1903
49D	400	E	Railway Building	1903
50D	400	E	Railway Building	1906
51D	404	E	Railway Sidings	1903
52D	404	E	Railway Sidings	1903
53I	404	SE	Railway Building	1887
54I	406	SE	Goods Shed	1906
55I	406	SE	Goods Shed	1955
56I	406	SE	Goods Shed	1950
57I	408	SE	Goods Shed	1903
58I	408	SE	Goods Shed	1903
59P	495	NW	Sewage Works	1973
60Q	496	NW	Sewage Works	1989

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: 4

ID	Distance (m)	Direction	Use	Date
61J	96	NE	Unspecified Tank	1972
62J	96	NE	Unspecified Tank	1997
63K	202	E	Tanks	1997
64K	202	E	Tanks	1972

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: 1

ID	Distance (m)	Direction	Use	Date
65	9	S	Electricity Substation	1997

1.4 Additional Information – Historical Petrol and Fuel Site Database

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

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

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 0

Database searched and no data found.

1.6 Historical military sites

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

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

Database searched and no data found.

1.7 Potentially Infilled Land

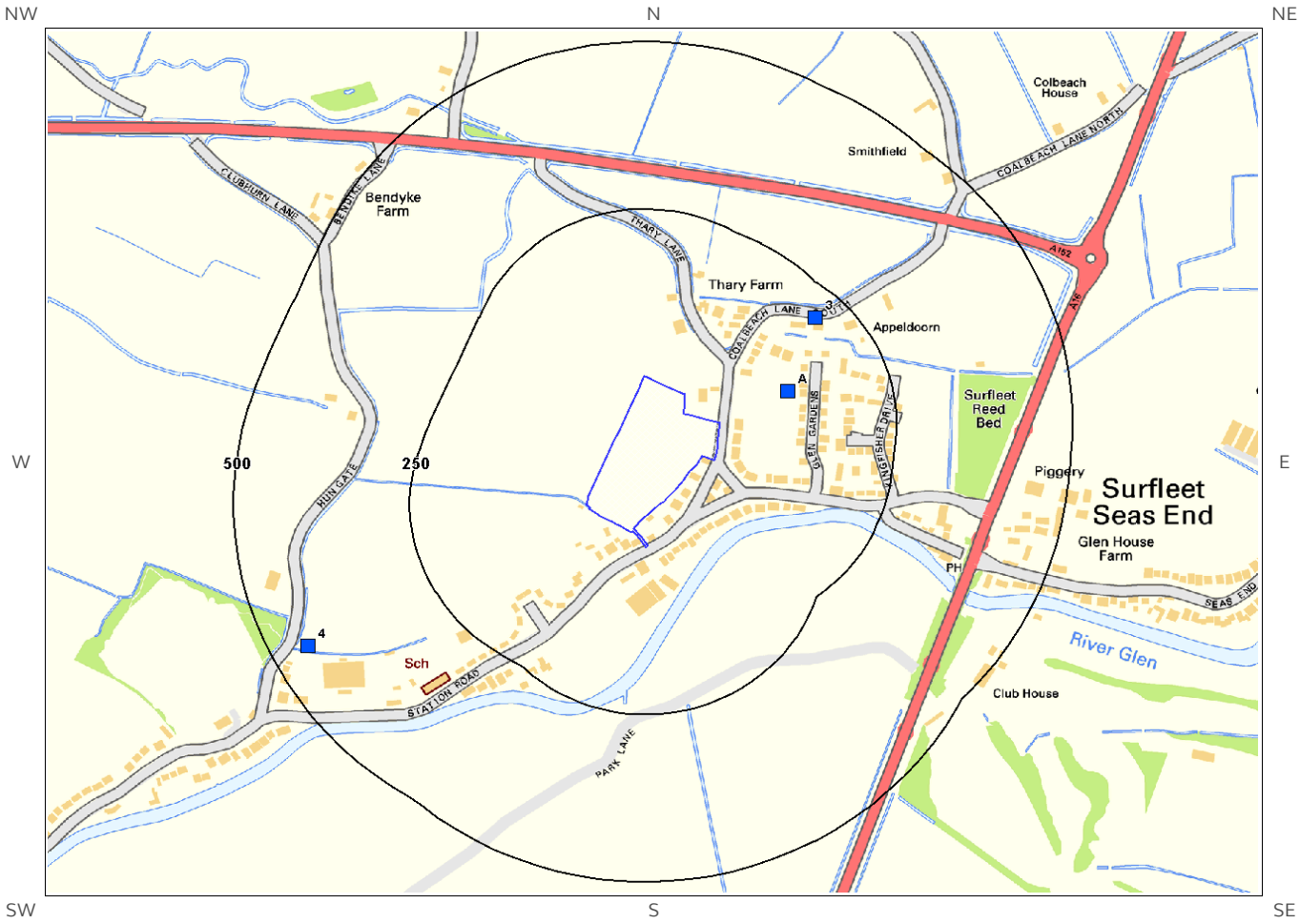
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 13

The following Historical Potentially Infilled Features derived from the Historical Mapping information is

provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
66L	12	NE	Sewage Works	1973
67M	185	SE	Unspecified Ground Workings	1950
68N	273	E	Saw Pit	1950
69C	322	E	Saw Pit	1903
70C	322	E	Saw Pit	1903
71E	334	E	Saw Pit	1955
72E	340	E	Saw Pit	1887
73E	349	E	Saw Pit	1906
74E	349	E	Saw Pit	1906
75O	353	SW	Sewage Works	1989
76	395	SE	Pond	1887
77P	495	NW	Sewage Works	1973
78Q	496	NW	Sewage Works	1989

2. Environmental Permits, Incidents and Registers Map



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

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

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

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

4

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

ID	Distance (m)	Direction	NGR	Details	
1A	107	NE	526310 328990	Address: WOODS LANE, SURFLEET, SPALDING Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AW5NF560 Permit Version: 1	Receiving Water: Fen Drain Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 10/08/1971 Effective Date: 10-Aug-1971 Revocation Date: 05/03/2019
2A	107	NE	526310 328990	Address: WOODS LANE, SURFLEET, SPALDING Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AW5NF560 Permit Version: 2	Receiving Water: Fen Drain Status: VARIED UNDER EPR 2010 Issue date: 06/03/2019 Effective Date: 06-Mar-2019 Revocation Date: -
3	207	NE	526349 329100	Address: CAMELOT, COALBEACH LANE, SURFLEET, LINCOLNSHIRE Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PRNNF12062 Permit Version: 1	Receiving Water: unnamed Fen Drain Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 30/04/1997 Effective Date: 30-Apr-1997 Revocation Date: -
4	448	SW	525630 328610	Address: WOODS LANE, SURFLEET, SPALDING Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: AW5NF560 Permit Version: 1	Receiving Water: Fen Drain Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 10/08/1971 Effective Date: 10-Aug-1971 Revocation Date: 05/03/2019

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

0

Database searched and no data found.

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

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

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

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

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

0

Database searched and no data found.

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

0

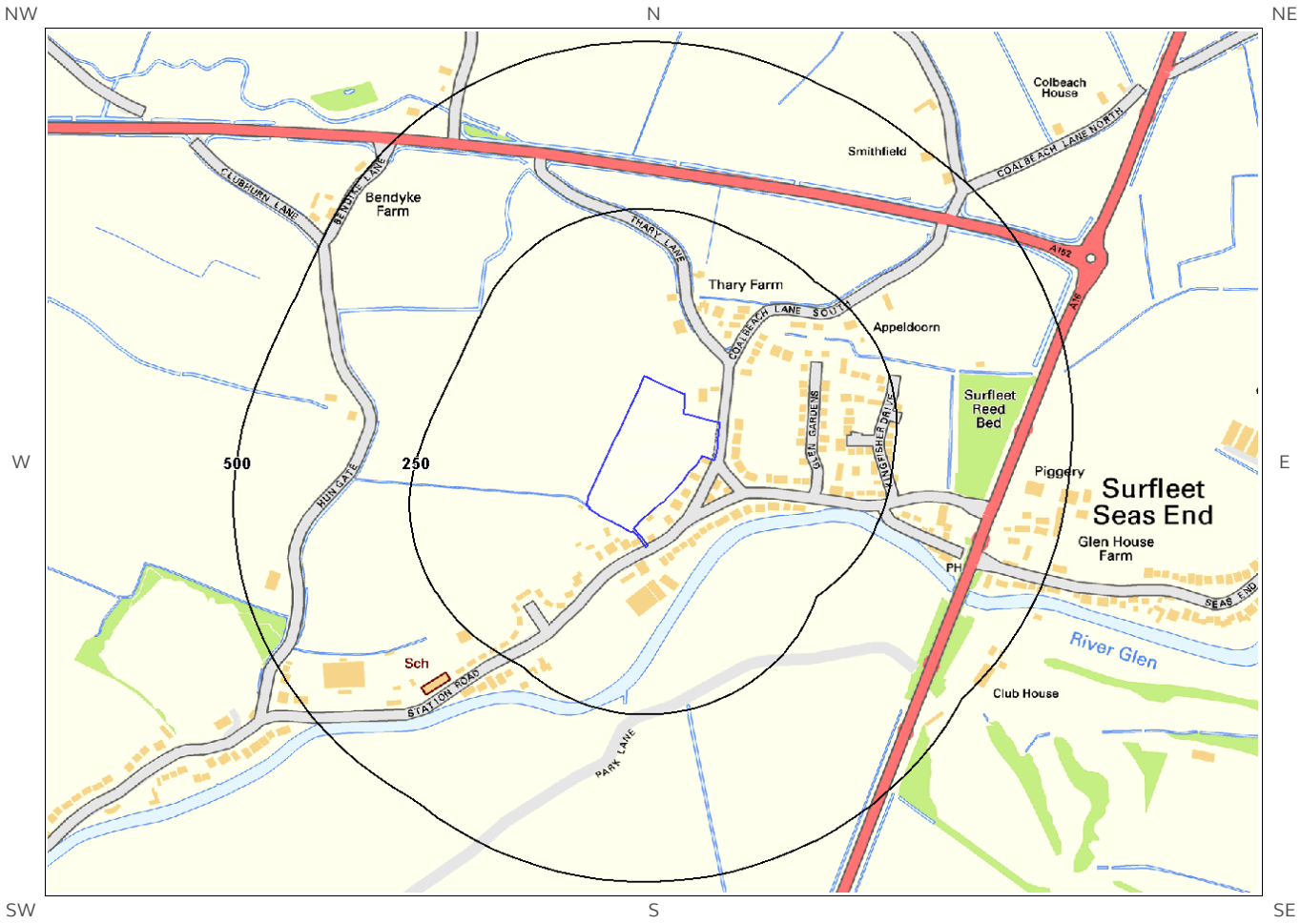
Database searched and no data found.

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

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

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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Site Outline

250
500
Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

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

0

Database searched and no data found.

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

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

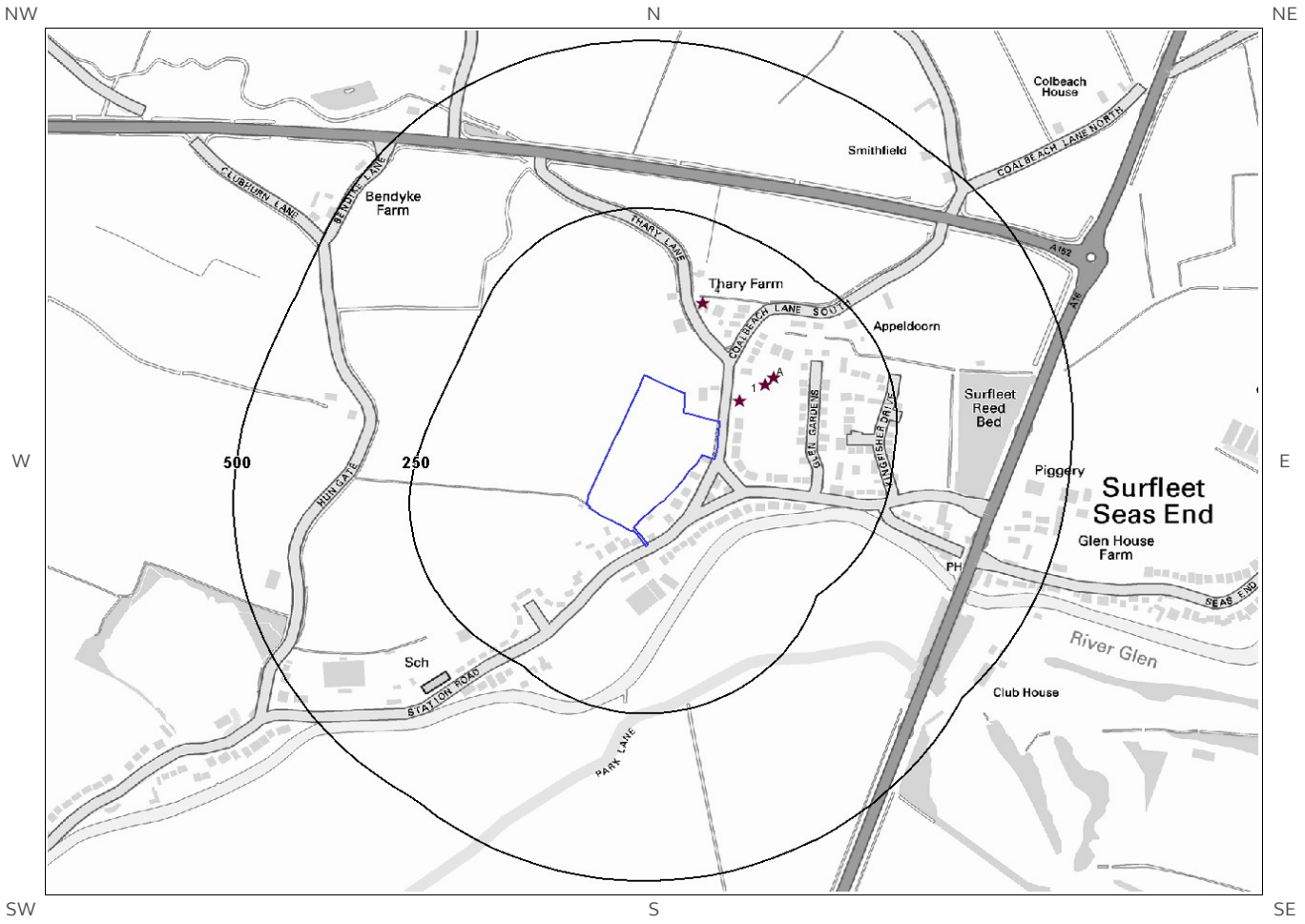
Database searched and no data found.

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

0

Database searched and no data found.

4. Current Land Use Map



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Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 4

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	42	NE	Electricity Sub Station	526241 328975	Lincolnshire, PE11	Electrical Features	Infrastructure and Facilities
2A	85	NE	Sewage Works	526278 328999	Lincolnshire, PE11	Waste Storage, Processing and Disposal	Infrastructure and Facilities
3A	100	NE	Works	526289 329010	Lincolnshire, PE11	Unspecified Works Or Factories	Industrial Features
4	134	NE	Graphix Design & Print	526189 329121	Tudor Gables, Thary Lane, Surfleet, Spalding, Lincolnshire, PE11 4BN	Published Goods	Industrial Products

4.2 Petrol and Fuel Sites

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

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

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

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

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

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

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

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

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

5.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
TFD-XCZ	TIDAL FLAT DEPOSITS	CLAY AND SILT

5.3 Bedrock and Solid Geology

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

Lex Code	Description	Rock Type
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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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licences



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Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

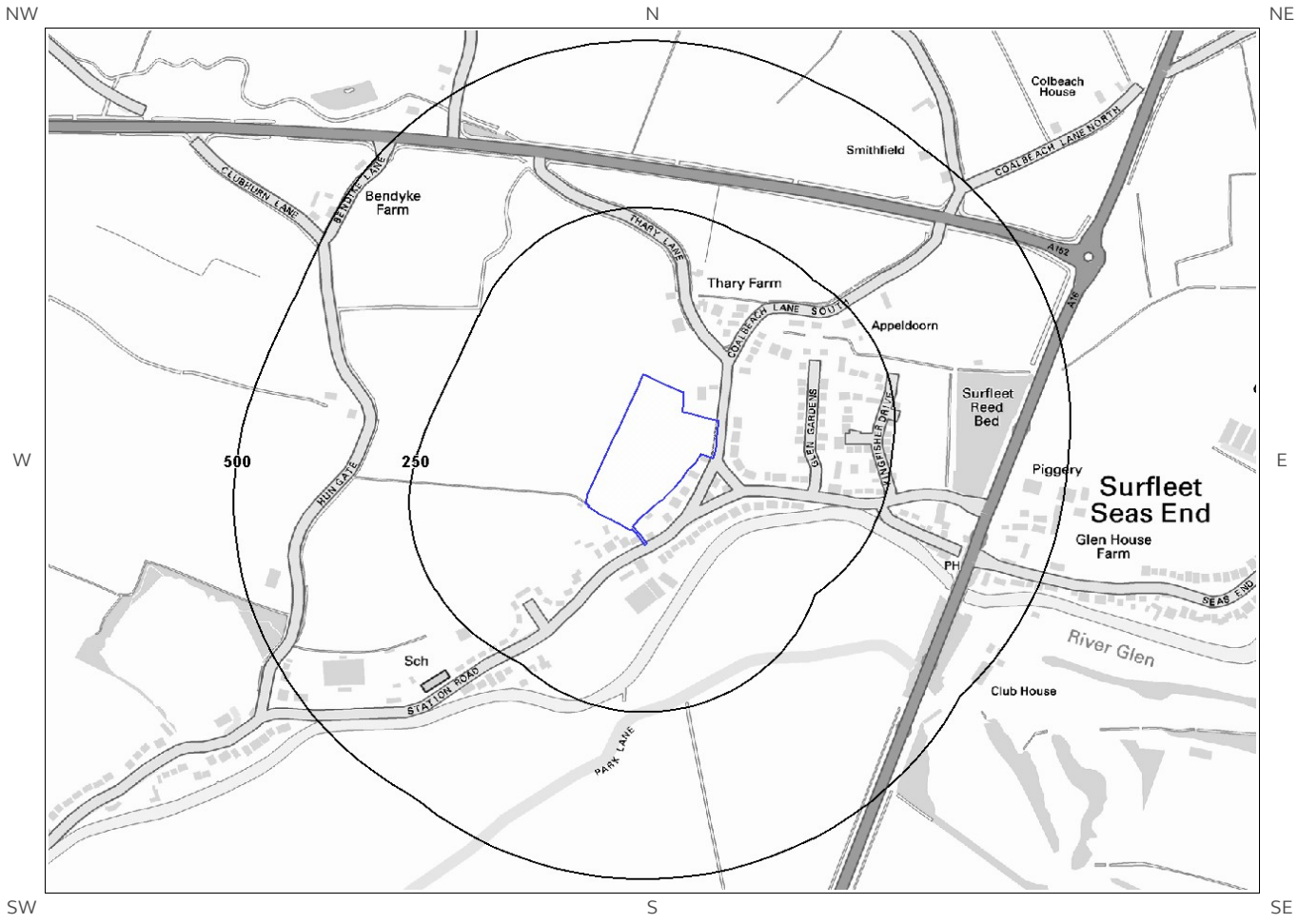
Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

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



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Site Outline

250
500
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

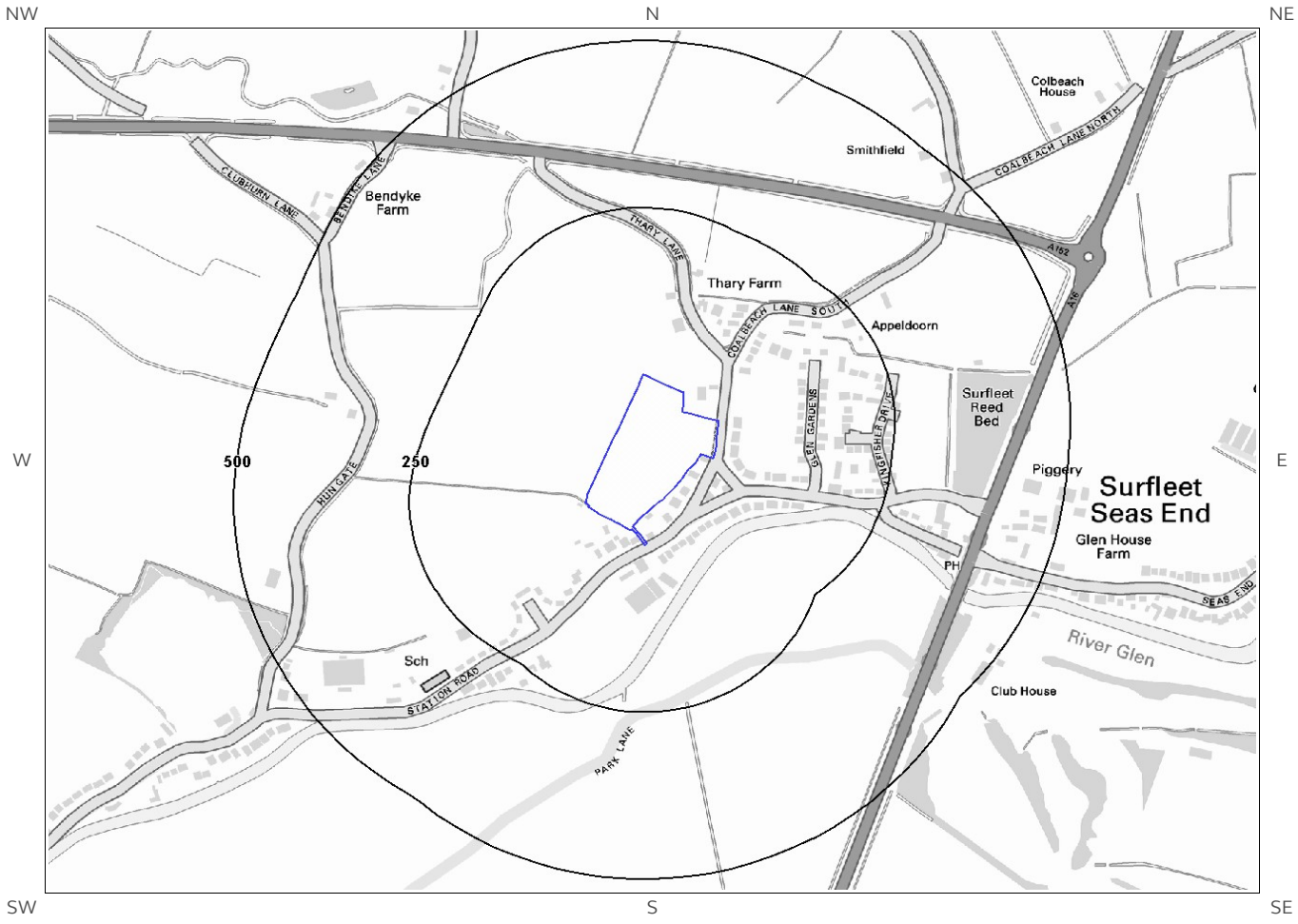
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

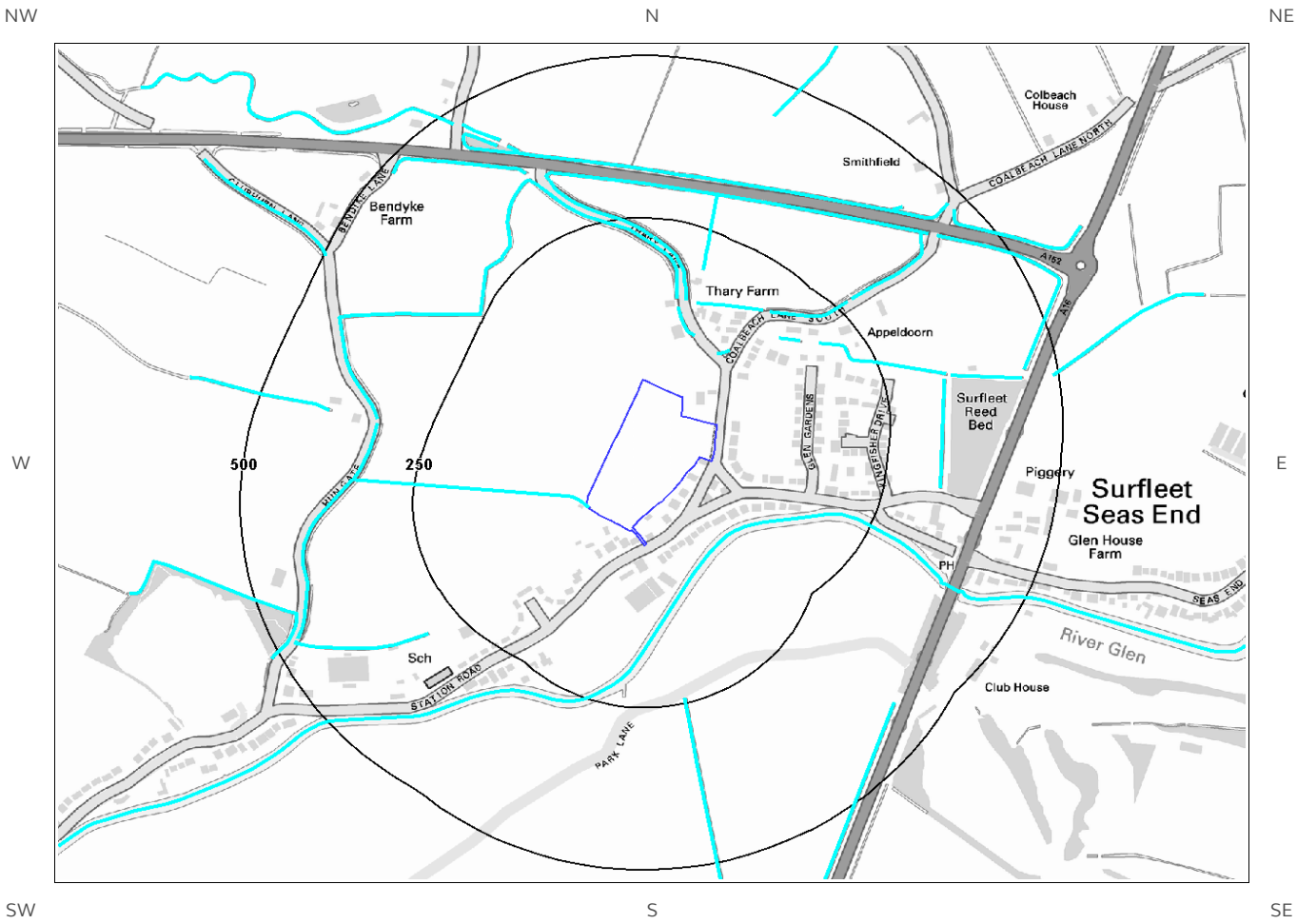
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

Site Outline

250
500
Search Buffers (m)

6e. Hydrology – Watercourse Network and River Quality



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Site Outline

250
500
Search Buffers (m)

Watercourse type

- Tidal River
- Inland River
- Canal
- Lock or Flight of Locks
- Lake, Reservoir, or Marsh
- Foreshore
- Drain or Transfer

Watercourse level

- On ground surface
- Underground or Elevated
- Level unknown

- General Quality Assessment: Biology
- General Quality Assessment: Chemistry

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

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

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

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

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

6.2 Aquifer within Bedrock Deposits

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

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

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

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

6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site None identified

Database searched and no data found.

6.4 Surface Water Abstraction Licences

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

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

ID	Distance (m)	Direction	NGR	Details	
3	485	SE	526640 328670	Status: Active Licence No: 5/31/14/*S/0249 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: RIVER GLEN - SURFLEET Data Type: Point Name: SPALDING GOLF CLUB	Annual Volume (m³): 12,800 Max Daily Volume (m³): 302 Application No: - Original Start Date: 09/01/2002 Expiry Date: 31/03/2022 Issue No: 1 Version Start Date: 01/04/2004 Version End Date:
4	528	E	526700 328700	Status: Active Licence No: 5/31/14/*S/0123 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: R GLEN AT SURFLEET Data Type: Point Name: SPALDING GOLF CLUB	Annual Volume (m³): 3,410 Max Daily Volume (m³): 250 Application No: - Original Start Date: 01/01/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2004 Version End Date:
Not shown	1178	SE	525810 325600	Status: Active Licence No: 5/31/14/*S/0247 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: BLUE GOWT "C - D" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Annual Volume (m³): 135,000 Max Daily Volume (m³): 8,000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:
Not shown	1476	W	524609 329238	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT P Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1476	W	524609 329238	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT P Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1550	W	524594 329420	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT Q Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1550	W	524594 329420	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT Q Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1658	SE	526190 325300	Status: Active Licence No: 5/31/14/*S/0247 Details: General Farming & Domestic Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: VERNATTS DRAIN "A - B" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Annual Volume (m³): 135,000 Max Daily Volume (m³): 8,000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:
Not shown	1658	SE	526190 325300	Status: Active Licence No: 5/31/14/*S/0247 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: VERNATTS DRAIN "A - B" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Annual Volume (m³): 135,000 Max Daily Volume (m³): 8,000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:
Not shown	1715	W	524202 327574	Status: Historical Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS, PINCHBECK-POINT A Data Type: Line Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 101 Version Start Date: 28/09/2011 Version End Date:
Not shown	1749	SW	524200 327600	Status: Historical Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS, PINCHBECK Data Type: Line Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 100 Version Start Date: 01/01/2011 Version End Date:
Not shown	1752	SW	524500 327700	Status: Historical Licence No: 5/31/14/*S/0036 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: R GLEN AT PINCHBECK Data Type: Line Name: DANIELS	Annual Volume (m³): 3,296 Max Daily Volume (m³): 614 Application No: - Original Start Date: 01/01/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2004 Version End Date:
Not shown	1756	SW	524202 327574	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS, PINCHBECK-POINT A Data Type: Line Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1756	SW	524202 327574	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS, PINCHBECK-POINT A Data Type: Line Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1795	NW	523828 329680	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEWBERRY DRAIN, GOSBERTON-POINT B Data Type: Line Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1795	NW	523828 329680	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEWBERRY DRAIN, GOSBERTON-POINT B Data Type: Line Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1837	W	524188 328842	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT N Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1837	W	524188 328842	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT N Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1839	W	524227 329206	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT O Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1839	W	524227 329206	Status: Active Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: FARM DRAINS-GOSBERTON-POINT O Data Type: Point Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 102 Version Start Date: 01/04/2019 Version End Date:
Not shown	1839	NW	524400 329700	Status: Historical Licence No: 5/31/14/*S/0169 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: NEWBERRY DRAIN, GOSBERTON Data Type: Line Name: PROCTOR BROS (GOSBERTON) LTD	Annual Volume (m³): 100,000 Max Daily Volume (m³): 6,000 Application No: - Original Start Date: 01/04/1992 Expiry Date: - Issue No: 100 Version Start Date: 01/01/2011 Version End Date:
Not shown	1895	SE	527010 327090	Status: Active Licence No: 5/31/14/*S/0247 Details: General Farming & Domestic Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: VERNATTS DRAIN "G - H" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Annual Volume (m³): 135,000 Max Daily Volume (m³): 8,000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:
Not shown	1895	SE	527010 327090	Status: Active Licence No: 5/31/14/*S/0247 Details: Spray Irrigation - Direct Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: VERNATTS DRAIN "G - H" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Annual Volume (m³): 135,000 Max Daily Volume (m³): 8,000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1895	SE	527010 327090	Status: Active Licence No: 5/31/14/*S/0247 Details: Spray Irrigation - Storage Direct Source: SURFACE WATER SOURCE OF SUPPLY Point: VERNATTS DRAIN "G - H" Data Type: Line Name: LINCOLNSHIRE FIELD PRODUCTS LTD	Annual Volume (m^3): 135,000 Max Daily Volume (m^3): 8,000 Application No: - Original Start Date: 27/11/1998 Expiry Date: - Issue No: 1 Version Start Date: 27/11/1998 Version End Date:

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site — None identified

Database searched and no data found.

6.6 Source Protection Zones

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

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site — None identified

Database searched and no data found.

6.9 River Quality

Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site — Identified

6.9.1 Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
Not shown	1172	SW	525100 328100	River Name: Glen Reach: Surfleet...blue Gowt Drain End/Start of Stretch: Start of Stretch NGR	B	B	B	B	B
Not shown	1172	SW	525100 328100	River Name: Glen Reach: Bourne Eau...surfleet End/Start of Stretch: End of Stretch NGR	B	B	B	B	B
Not shown	1395	E	527600 329100	River Name: Glen Reach: Blue Gowt Drain...surfleet Seas End Slui End/Start of Stretch: Start of Stretch NGR	B	B	B	B	B
Not shown	1395	E	527600 329100	River Name: Glen Reach: Surfleet...blue Gowt Drain End/Start of Stretch: End of Stretch NGR	B	B	B	B	B

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
Not shown	1156	SW	525098 328129	River Name: Glen Reach: Blue Gowt Drain Surfleet Seas End Slui End/Start of Stretch: Sample Point NGR	D	C	C	B	B
Not shown	1156	SW	525098 328129	River Name: Glen Reach: Surfleet Blue Gowt Drain End/Start of Stretch: Sample Point NGR	D	C	C	B	B
Not shown	1156	SW	525098 328129	River Name: Glen Reach: Bourne Eau Surfleet End/Start of Stretch: Sample Point NGR	D	C	C	B	B
Not shown	1172	SW	525100 328100	River Name: Glen Reach: Surfleet Blue Gowt Drain End/Start of Stretch: Start of Stretch NGR	D	C	C	B	B
Not shown	1172	SW	525100 328100	River Name: Glen Reach: Bourne Eau Surfleet End/Start of Stretch: End of Stretch NGR	D	C	C	B	B
Not shown	1395	E	527600 329100	River Name: Glen Reach: Blue Gowt Drain Surfleet Seas End Slui End/Start of Stretch: Start of Stretch NGR	D	C	C	B	B
Not shown	1395	E	527600 329100	River Name: Glen Reach: Surfleet Blue Gowt Drain End/Start of Stretch: End of Stretch NGR	D	C	C	B	B

6.10 Ordnance Survey MasterMap Water Network

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

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

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

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	0 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
18	0 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
2	82 SE	River Glen Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 19.0
19	82 SE	River Glen Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 19.0
3	84 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
20	84 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
4	94 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
21	94 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.6
5	135 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
22	135 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
6	136 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
23	136 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 2.3
7	140 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.0
24	140 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.0
8	161 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
25	161 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
9	183 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
26	183 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
10	189 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
27	189 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	194 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
28	194 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
12	221 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
29	221 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
13	242 S	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.4
30	242 S	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.4
14	257 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.3
31	257 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.3
15	275 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.2
32	275 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.2
16	299 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
Not shown	299 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
17	302 SW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
34	302 SW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
18	305 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
35	305 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
19	321	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	N			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
20	321 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.1
21	321 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.7
Not shown	321 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	321 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.1
Not shown	321 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.7
22	323 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
39	323 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
23	325 E	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
40	325 E	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
24	332 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	332 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
25	335 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): Not Provided
Not shown	335 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
26	338 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
43	338 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
27	347 E	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
44	347 E	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.8
28	353 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	353 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
29	355 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.4
Not shown	355 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.4
30	360 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.0
Not shown	360 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.0
31	394 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.7

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
32	394 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.7
Not shown	394 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.7
Not shown	394 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.7
33	397 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.7
50	397 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.7
34	408 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
51	408 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
35	417 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
36	417 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.2
Not shown	417 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
53	417 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.2
37	419 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
54	419	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	NE			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.8
38	420 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
39	420 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
55	420 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
56	420 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.4
40	424 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
Not shown	424 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.1
41	431 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.9
58	431 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.9
42	433 SE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
59	433 SE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
43	448 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.5
Not shown	448 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): 1.5
44	451 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
61	451 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.3
45	465 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.2
62	465 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 5.2
46	468 SW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.0
63	468 SW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.0
47	471 SW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
64	471 SW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.7
48	480 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.9
Not shown	480 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 3.9
49	492 E	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1
Not shown	492 E	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.1

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
50	497 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
67	497 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Welland Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

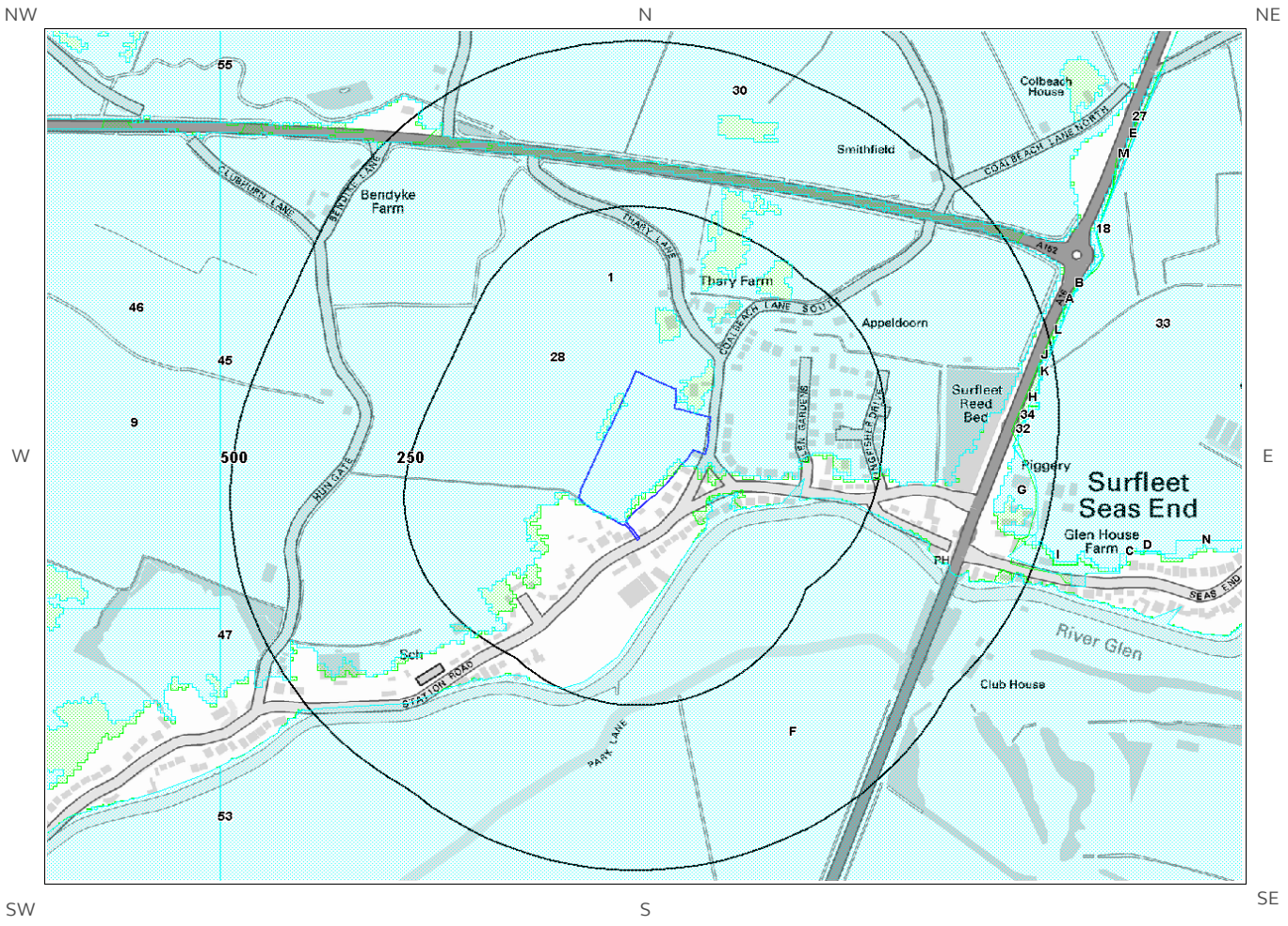
6.11 Surface Water Features

Surface water features within 250m of the study site Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
73	SE
93	NE
134	N
135	NE
139	NE
181	NE
193	NE
220	N
242	S

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



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

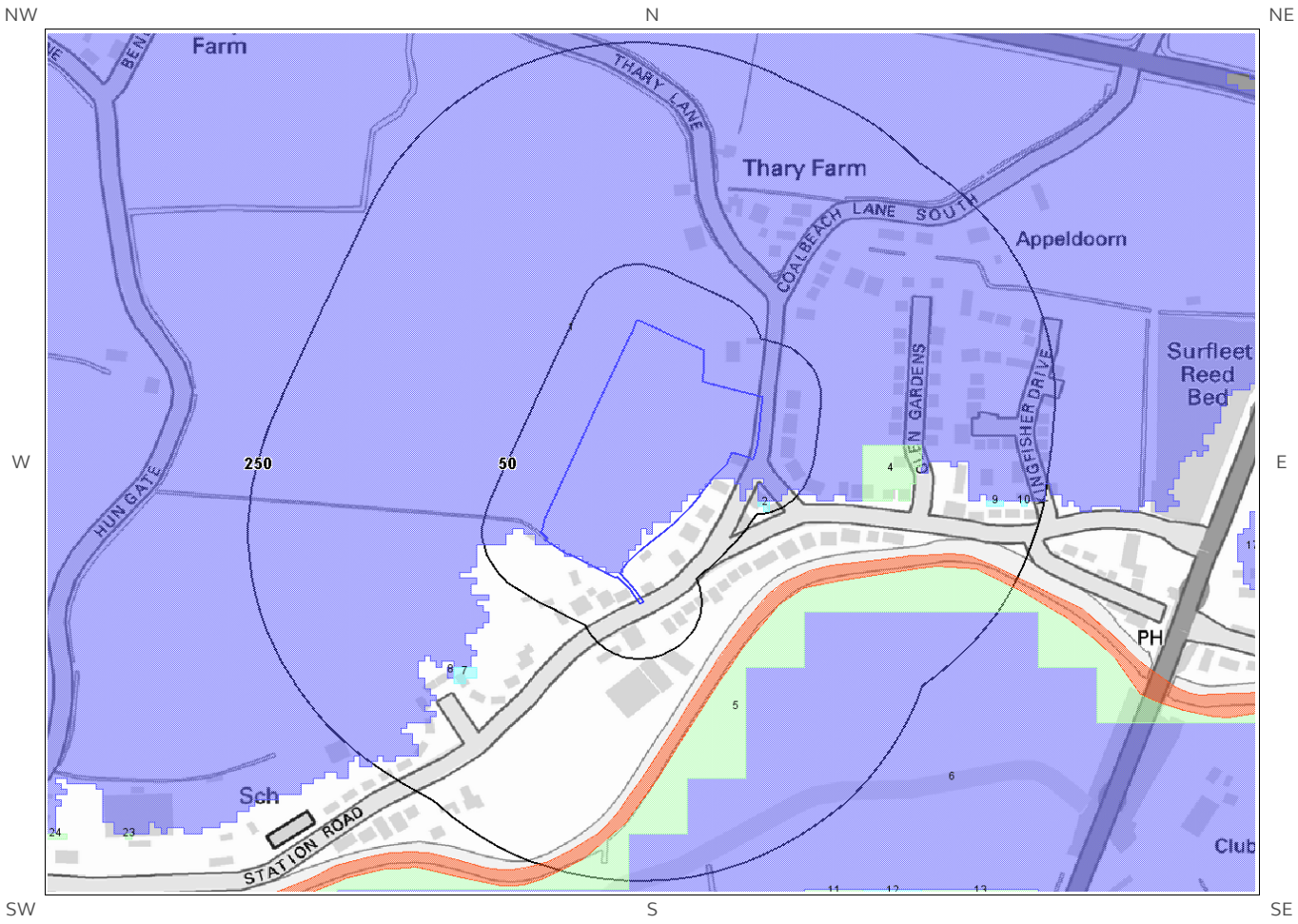
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



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Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

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

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

ID	Distance (m)	Direction	Update	Type
1	0	On Site	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)
2F	56	SE	19-Nov-2019	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

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

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

ID	Distance (m)	Direction	Update	Type
1	0	On Site	19-Nov-2019	Zone 3 - (Fluvial Models)
2F	62	SE	19-Nov-2019	Zone 3 - (Fluvial Models)

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

Highest risk of flooding onsite — Medium

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

RoFRaS data for the study site indicates the property is in an area with a Medium (greater than 1 in 100 but less than 1 in 30) chance of flooding in any given year.

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

ID	Distance (m)	Direction	RoFRas flood Risk
1	0.0	On Site	Medium
2	37.0	S	Low

7.4 Flood Defences

Flood Defences within 250m of the study site — None identified

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

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

7.6 Areas benefiting from Flood Storage

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

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site — None identified

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

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

Not Prone

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

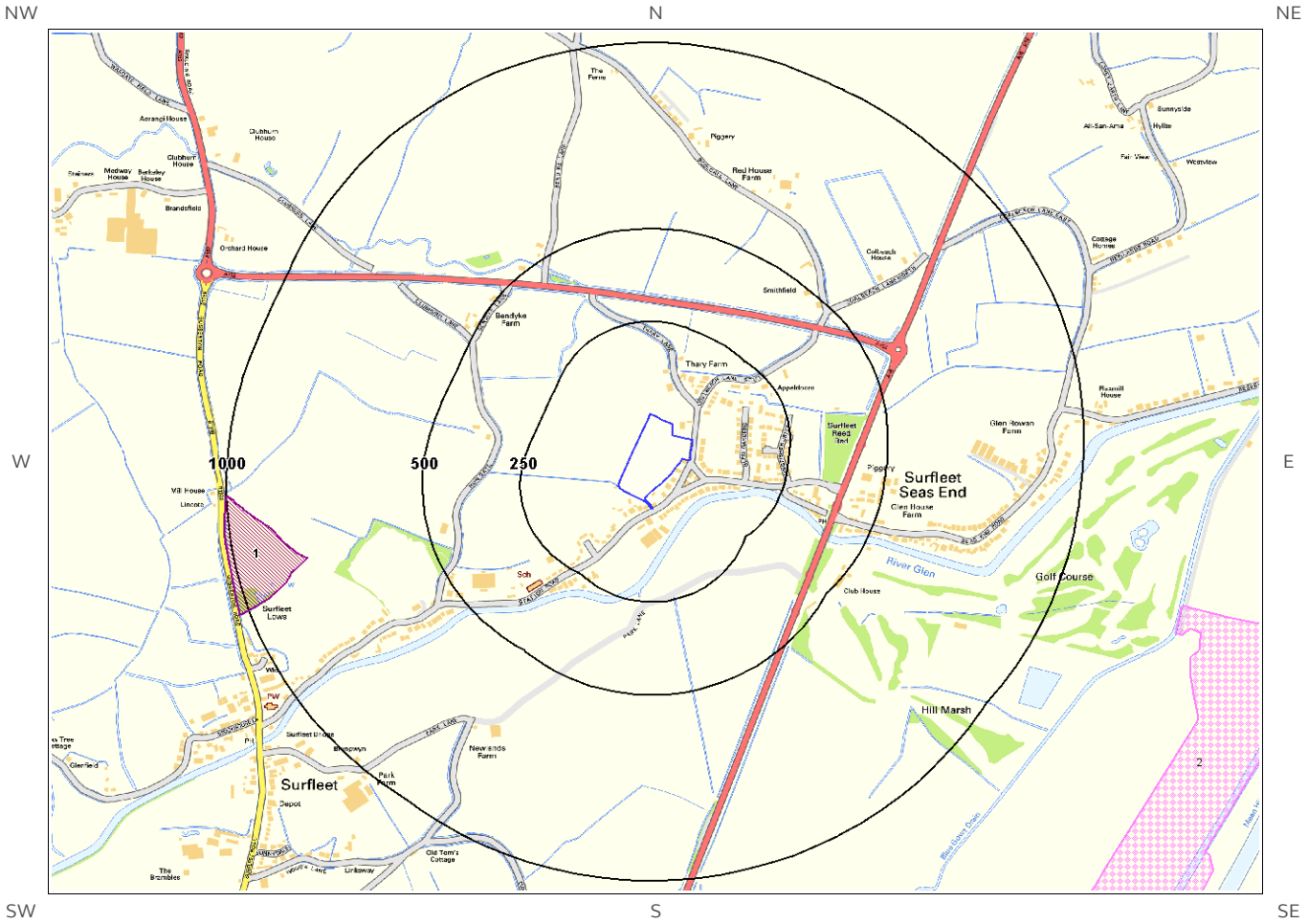
7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result	Not Applicable

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

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

8. Designated Environmentally Sensitive Sites Map



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8. Designated Environmentally Sensitive Sites

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

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

1

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

ID	Distance (m)	Direction	SSSI Name	Data Source
1	817	W	Surfleet Lows	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

3

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

ID	Distance (m)	Direction	NVZ Name	Data Source
2	1317	E	Existing	DEFRA
Not shown	1933	W	Existing	DEFRA
Not shown	1971	W	Existing	DEFRA

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

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

Maximum Shrink-Swell* hazard rating identified on the study site — Low

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

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

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

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

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

9.1.3 Soluble Rocks

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

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

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

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

9.1.4 Compressible Ground

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

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

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

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

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

Hazard
No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

Maximum Running Sand*[*] hazard rating identified on the study site — Moderate

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

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

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

9.2 Radon

9.2.1 Radon Affected Areas

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

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

9.2.2 Radon Protection

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

10. Mining

10.1 Coal Mining

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

Database searched and no data found.

10.2 Non-Coal Mining

Non-Coal Mining areas within 50m of the study site boundary — None identified

Database searched and no data found.

10.3 Brine Affected Areas

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

Contact Details

Groundsure Helpline
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info@groundsure.com

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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
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Rotherham, S60 1BY
Tel: 03708 506 506
Web: **www.environment-agency.gov.uk**
Email: enquiries@environment-agency.gov.uk

Public Health England
Public information access office
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Local Authority
Authority: South Holland District Council
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APPENDIX 3

CLASSIFICATION OF AGGRESSIVE CHEMICAL ENVIRONMENT FOR BURIED CONCRETE

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

Table C1 Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground locations[a]

Sulfate				Groundwater		ACEC
Design Sulfate Class for location	2:1 water/soil extract[b]	Groundwater	Total potential sulfate[c]	Static water	Mobile water	Class for location
1	2 (SO_4 mg/l)	3 (SO_4 mg/l)	4 (SO_4 %)	5 (pH)	6 (pH)	7
DS-1	< 500	< 400	< 0.24	≥ 2.5		AC-1s
					> 5.5[d]	AC-1[d]
					2.5–5.5	AC-2z
DS-2	500–1500	400–1400	0.24–0.6	> 3.5		AC-1s
					> 5.5	AC-2
				2.5–3.5		AC-2s
					2.5–5.5	AC-3z
DS-3	1600–3000	1500–3000	0.7–1.2	> 3.5		AC-2s
					> 5.5	AC-3
				2.5–3.5		AC-3s
					2.5–5.5	AC-4
DS-4	3100–6000	3100–6000	1.3–2.4	> 3.5		AC-3s
					> 5.5	AC-4
				2.5–3.5		AC-4s
					2.5–5.5	AC-5
DS-5	> 6000	> 6000	> 2.4	> 3.5		AC-4s
				2.5–3.5	≥ 2.5	AC-5

Notes

a Applies to locations on sites that comprise either undisturbed ground that is in its natural state (ie is not brownfield – Table C2) or clean fill derived from such ground.

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

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

d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15 mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that include the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.

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