Environmental Statement: Volume III

Appendix 11A: Phase 1 Environmental Assessment

VPI Immingham Phase I Geo-environmental Assessment

AECOM Environment & Infrastructure

VPI Immingham

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Quality information

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1. Introduction

AECOM Infrastructure & Environment UK Ltd (hereafter referred to as AECOM) was commissioned by Vitol Power International (VPI) Immingham to undertake a Phase 1 Geo-environmental Site Assessment of an area of land located to the north of the current power station, referred to hereafter as the 'site'. A site location plan is provided as Figure 1.

1.1 Project Background

The current VPI Immingham CHP plant has been operational since 2004. The CHP power plant is understood to produce steam which is supplied to nearby Humber and Lindsey Oil Refineries. It is understood that the proposed development includes the addition of a new CCGT plant to the VPI Immingham site, intended to increase export from 1320 MWe to 1800 MWe. It is understood by AECOM that Vitol have proposed an expansion of the CHP to the north of the current site. The land is partly occupied by both a car park and an area of open, hummocky land occupied by several vegetated mounds.

1.2 Objectives and Aims

The objective of this Phase 1 Environmental Desk Study was to determine the likely ground conditions beneath the proposed development site and the potential for ground contamination arising from historical or current on-site or off-site activities. This risk assessment also aimed to determine the presence of contamination sources and potential pathways to sensitive receptors located both on and offsite.

Based on the results of this assessment, AECOM has included recommendations for a future ground investigation to investigate potential pathways, and

1.3 Scope of Works

The scope of services for this study included:

- Commissioning and review of a Groundsure® report (including a regulatory database search, Coal Authority Report and historical Ordnance Survey (OS) maps);
- Review of publically available web-based sources, including the Environment Agency (EA) website and British Geological Survey (BGS);
- Review of relevant previous site investigation reports;
- Assessment of anticipated ground conditions and identification of potential development constraints; and
- Development of a preliminary Conceptual Site Model (CSM), identifying potential contaminants of concern, sources, pathways and receptors.

1.4 Information Sources

The following information sources were used in the completion of this geo-environmental assessment:

- Environment Agency (EA) website (www.environment-agency.gov.uk), including the 'What's in Your Back Yard' tool, accessed May 2017;
- Government Service website (https://flood-map-for-planning-service.gov.uk/), accessed June 2017;
- British Geological Survey (BGS) website (www.bgs.ac.uk) including the 'GeoIndex' tool, accessed May 2017;
- The Coal Authority Interactive Map Viewer (http://mapapps2.bgs.ac.uk/coalauthority/home.html), accessed May 2017;
- Groundsure® Reports; EnviroInsight (ref. GS-3982430), GeoInsight (ref. GS-3982431), UXO report and MapInsight (ref. GS- 3982432), dated 13th June 2017;
- The British Geological Survey (BGS) 1:50,000 solid and drift geology map No. 81;
- Highways Agency Geotechnical Data Management System Report (No 25153), A160 Improvements Ground Investigation Report, August 2010;
- Highways Agency Geotechnical Data Management System Report (No. 24109), A160/A180 Improvements – Immingham, Preliminary Sources Study Report, January 2010;
- Soil Mechanics (ref. A6032): Interpretive Report on Ground Investigation for Total Oil Limited, April 2006; and
- ABB (ref. PPC199): Total Lindsey Oil Refinery Site Landfarm, Completion Report- Surrender of Waste Management Licence, April 2006.

2. Site Description

2.1 Site Location

The site is located off Rosper Road, Immingham, North East Lincolnshire (see Figure 1), and is approximately 2 km east of South Killingholme. The site is centred on National Grid Reference (NGR) TA 516641 618468.

The site is surrounded by a mix of industrial and agricultural land use, namely the Lindsey Oil Refinery to the North West, which is operated by Total Ltd. To the South West is the Phillips 66 Humber refinery. Directly to the east is agricultural land and the River Humber is located approximately 1km from the site. The current VPI Immingham site is located directly to the south of the proposed development site.

2.2 Site Layout:

The site occupies a total area of approximately 5 ha. The northern area of the site is currently occupied by a car park and canteen building present in the northwest. The southern half of site is covered in shrubbery/grassland and contains various stockpiles of unknown origin. The site is bounded to the east by Rosper Road and to the south by the current VPI Immingham CHP plant. Immingham Port is located approximately 2.5km to the South East and the River Humber is located approximately 1.3km to the east.

With the exceptions of the various stockpiles on site the elevation of the site is <10m above ordnance datum (aOD).

2.3 Surrounding Land Use

Based on a review of maps, the land use immediately surrounding the site was assessed and is summarised below:

- North: Directly north of the site there is an access road which links the Lindsey Oil Refinery and Rosper Road. Beyond this, various utility buildings belonging to the Oil Refinery as well as unoccupied parcels of land are present.
- East: An unnamed drain and Rosper Road are directly east of the site, beyond which there are agricultural fields.
- West: To the west of the site mapping shows a settling tank, pond, electricity pylon as well as a railway track linking into the Lindsey Oil Refinery
- South: A utility line containing gas pipes is present to the south, separating the site and the current VPI Immingham CHP plant.

3. Environmental Setting

3.1 Geology

The Groundsure® reports (**Appendix A**), and data from publically available nearby BGS borehole records as well as historic reports associated with the site and nearby A160 improvements, have been reviewed to identify the likely geological sequence at the site. The anticipated sequence is detailed below:

3.1.1 Made Ground

The Groundsure® Geoinsight report records that the northwestern part of the site lays within an area of historic surface ground workings associated with the disposal of liquid sludge from the Lindsey Oil Refinery. Anecdotal information from discussions with TLOR site staff indicates that the area where the liquid waste was deposited was confined to the former field to the north of the site, and no liquid sludge was directly deposited on the site.

Made ground encountered in TP1, excavated as part of the 2006 Soil Mechanics ground investigation, was described as "*Soft to firm brown slightly sandy slightly gravelly clay with bands of soft black slightly sandy slightly gravelly clay. Gravel is subangular to subrounded fine to medium of various lithologies including chalk and potter. Very strong hydrocarbon odour"*.

Aerial imagery and topographical surveys show the eastern portion of the site to be occupied with stockpiles. Discussions with TLOR staff indicate that the stockpiles originated from topsoil and subsoil generated during reprofilingand construction of the car park in the northern portion of the site.

3.1.2 Glacial deposits

The Groundsure® Geoinsight report indicates that superficial drift deposits on the site are likely to comprise glacial deposits, comprising glacial till and glacial sands and gravels. More recent tidal flats alluvial deposits are shown to be present to the south of the site, but not extending onto the site.

The 2006 Soil Mechanics Interpretative Report describes the glacial deposits as comprising "*slightly sandy, slightly gravelly clay. The sand and gravel component comprises subangular to subrounded chalk, occasionally sandstone and shell fragments."*

Borehole logs from the 2006 Soil Mechanics Interpretative Report record glacial deposits are typically 16m to 20m thick near the northern area of site. This thickness is indicated by the 2006 ABB report to increase to 26m in BH7 (centre of the site). No data is available beyond the central area of site however considering that the bedrock surface was found to be lying as deep as 45m bgl in BGS borehole logs approximately 1km south of the site, it is possible that the thickness of these deposits increases further in the southern half of the site.

3.1.3 Bedrock

Published geological maps and memoirs indicate that the site is underlain by the Burnham Chalk Formation of the Upper Cretaceous period. The BGS Lexicon describes the Burnham Chalk Formation as *"White, thinly-bedded chalk with common tabular and discontinuous flint bands; sporadic marl seams"*. The upper 10m to 20m of the bedrock is frequently described as "soft chalk", overlying "hard chalk and flints", indicating that the upper part of the Chalk is extensively weathered.

3.2 Hydrology

A review of Ordnance Survey maps indicated that the site is located approximately 1.5km south west of the River Humber, which flows north west to south east. Drains run along the southern and western site boundaries, and a small water storage pond is located approximately 80m west of the site. The Humber River is a designated Ramsar site.

The site is located within an area whereby the Environment Agency issue flood warnings, and flood risk zone 3, meaning there is a high (greater than 1 in 100) annual probability of flooding. Flood defences are located along

the banks of the River Humber and the area falls under the jurisdiction of North East Lindsey Internal Drainage Board.

3.3 Hydrogeology

Consultation with the Environment Agency Aquifer Maps indicates that:

- The superficial glacial deposits are classified as a 'Secondary Aquifer (undifferentiated)', defined either as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers', or 'lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, tin permeable horizons and weathering'.
- The bedrock, Burnham Chalk Formation, is classified as a Principal Aquifer, defined as 'highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes.

The 2006 Soil Mechanics ground investigation showed water was encountered within the more granular horizons within the glacial deposits in BH5 (located north of the site). An initial water strike at 4.3m bgl subsequently rose slightly to give a resting water level of 3.9m bgl after 20 minutes, confirming shallow groundwater is expected to be sub-artesian in nature.

Additionally, during the 2009-2010 Highways England ground investigation , groundwater was encountered within the thicker granular glacial deposits, and in thin granular horizons within the glacial till, between depths of 2.4m and 15m bgl (-4.7 to -11.9m AOD). Again sub-artesian groundwater conditions were noted in several locations where groundwater was encountered, with borehole water level rises of up to 8.3m.

3.4 Radon

Public Health England's interactive Radon map indicates that the site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

4. Site History

4.1 Introduction

AECOM has reviewed historical Ordnance Survey (OS) maps dating from 1886 to present obtained as part of the Groundsure® report in order to assess potential historical uses of the site and the surrounding land. The summary provided below identifies key historical land uses and features which are considered to have the potential to have impacted the soil and groundwater beneath the subject site. The historical maps included within the Groundsure® report are provided in **Appendix B**.

4.2 History of the Site and Surrounding Land Use

AECOM has reviewed historical Ordnance Survey (OS) maps (**Appendix B**) and aerial imagery dating from 1886 to present obtained as part of the Groundsure® report in order to assess potential historical uses of the site and the surrounding land. Table 3 5 identifies the key historical land uses of the site and surrounding areas some of which are considered to have had the potential to impact the soil and groundwater beneath the site.

Table 1 - Summary of Site History

Year	On Site	Offsite
1886-1887	Marsh land; Rosper Road present; East Middle Mere Road present;	Cawber Farm – north east (450m); Marsh Farm – south east (750m);
1906-1910	No significant change;	No significant change;
1930-1947	No significant change;	Goxhill and Immingham Line/ Killingholme Station present – east (850m); School present – south (650m); Ulceby-Immingham railway line present (100m south west);
1951	Drainage system in place;	Municipal buildings present – south east (500m); Railway depot present – east (850m);
1968	No significant change;	No significant change;
1974	Railway sidings present (west);	Vast industrial expansion inc. oil refinery west and east of site;
1983	No significant change;	No significant change;
2002	Drainage ditches now shown (inferred to have been constructed in 1986 during the landfarm preparation); Pipe line on southern border of site.	Expansion of road system to south (A180/A160/A1173) (750m);
2007 aerial image (Google Earth)	A car park is now present in the northern half of site and the fields contain several stockpiles; Evidence of significant groundworks in the area;	Construction of various utility buildings in the north, as with the proposed development site, there is evidence of significant groundworks in the area;
2009 aerial image (Google Earth)	Construction laydown area present in area to the west of the recently built carpark; An additional stockpile below this construction laydown area is also present;	No significant change;
2010	No significant change;	Immingham West Fire Station approximately 750m south of site (date built is unknown);
2014	No significant change;	New road system throughout oil refinery, directly west of site.
2017 aerial image (Google Earth)	Construction of Canteen building adjacent to the carpark; Construction laydown area now mostly empty; Changes to stockpile layouts across the site.	No significant change;

5. Regulatory Database Search

5.1 Introduction

AECOM commissioned Groundsure® Limited to conduct a database search of available regulatory agency records to evaluate whether activities on or near the subject site have the potential to create a significant adverse impact. Groundsure® reviews databases compiled by national and local governmental agencies. The Groundsure® Report essentially relates to operational activities for which licences or authorisations are required and have been obtained pursuant to environmental laws. It is therefore possible that there are unauthorised activities being carried out in the vicinity of the subject site that are not detailed. It is noted that the database is not updated regularly and more recent unlisted or otherwise unregistered activities may therefore be present in the surrounding area.

It should be noted that this information is reported as AECOM received it from Groundsure®, which in turn reports information as it is provided in various government databases. It is not possible for either AECOM or Groundsure® to verify the accuracy or completeness of information contained in these databases. However, the use of this information is a generally accepted practice in the conduct of Phase 1 environmental assessments.

Sites identified within the study radius are evaluated to assess if they are likely to have had an adverse impact on the subject property or could be adversely affected by the subject property. The criteria used to evaluate sites within the study radius include distance from the subject property, expected depth and direction of groundwater and surface water flow, likely storm water flow direction and the presence / absence of documented contaminant releases at the identified sites.

The approximate distances to features described in this section have been estimated from the closest boundary of the site and may be subject to error.

5.2 Database Review

Key information from the Groundsure® Report that is considered pertinent to the subject site (within a radius of 500m), is summarised in **Table 2** below:

Table 2 – Summary of Database Review

CATEGORY	SUMMARY OF INFORMATION (<500m)
Part A(1) and IPPC Authorised Activities	1 effective: 270m south east; and 8 superseded: 270m south east all relating to Immingham CHP
List 1 Dangerous Substances Inventory Sites	1 inactive: 470m south east for Mercury and Cadmium relating to the Phillips 66 Humber Refinery site;
List 2 Dangerous Substance Inventory Sites	1 active: 470m south east for arsenic, chromium, copper, lead, nickel and zinc relating to the Phillips 66 Humber Refinery site;
Licensed Discharge Consents	3 revoked: one 51m south (relating to the Lindsey oil refinery oil interceptor) and two other unspecified trade discharges 470m south; and 1 effective: 50m north east; relating to sewage discharge from Lindsey oil refinery.
Planning Hazardous Substance Consents and Enforcements	1 approved active consents: 130m south relating to VPI Immingham – Consent to store 3050 tonnes of petroleum gas oil.
Dangerous or Hazardous Sites	1 on site current COMAH site (lower tier) relating to VPI Immingham CHP 2 off site current COMAH sites (both upper tier) relating to the Total Lindsey Oil Refinery (100m north east) and Phillips 66 Humber refinery (370m south) 1 off site historic NIHHS site (430m south relating to Conoco

CATEGORY	SUMMARY OF INFORMATION (<500m)
	Manufacturing Ltd) 1 off site historic COMAH site relating to Humber LPG terminal Ltd (450 m east)
EA Recorded Pollution Incidents List 2	2 recorded: 140m south east – minor impact to air (atmospheric pollutants and effects) 400m south – minor impact to land & air (Oils and Fuels).
EA Recorded Pollution Incidents List 1	1 recorded 400m south of site relating to major persistent and extensive impacts to water (East Halton Beck).
Environment Agency/Natural Resources Wales historic landfill sites	1 historic landfill licence relating to liquid sludge from the Lindsey Oil Refinery.
Environment Agency/Natural Resources Wales licensed waste sites	1 surrendered license 40m north west of the site relating to a biological treatment facility operated by the Lindsey Oil Refinery

No other database entries were identified within 500m of the site boundary. Database listings reviewed included: Historic IPC Authorisations, Red List Discharge Consent Register Part A(2) and Part B Activities and Enforcements, Category 3 or 4 Radioactive Substances Authorisations, Water Industry Referrals, Sites Determined as Contaminated land (Part 2a) or Petrol & fuel sites.

5.3 UXO

A Preliminary Unexploded Ordnance Risk Assessment (UXO) was conducted for the proposed development site and this is presented in **Appendix C**. Detailed findings are as follows:

- Indicative British/Allied UXO Risk: **Negligible**
- Indicative German UXO Risk: **Low**

According to the UXO report, the site in question does NOT require further research to clarify the unexploded ordnance (UXO) risk to future ground works.

6. Previous Reports

6.1 Introduction

AECOM reviewed previous environmental reports for the site by various others, as listed in Section 1.6. Pertinent information considered relevant to this assessment is summarised in the following sections.

6.2 Interpretive Report on Ground Investigation (Soil Mechanics, 2006)

Soil Mechanics were commissioned to undertake a ground investigation on the land east of Lindsey oil refinery, formerly used as a sludge landfarm. The investigation involved the advancement of 6 cable percussion boreholes (BH1 to 6) to a maximum depth of 25 m and 10 trial pits (TP1-3, CBR2, 3, 5, 7,9,10 &13) to a maximum depth of 2 m. Of the area assessed during this investigation a number of intrusive locations were observed as being close to site (TP1, BH5 and CBR7 &10). These locations are displayed in **Figure 2** and the summary of the strata depths encountered listed in Table 3 below

Table 3 – Summary of borehole log strata depths (m bgl)

Location	Topsoil	Made Ground	Glacial deposits (Clay)	Bedrock (Chalk)
TP1	-	0 – 0.70	0.70 – 2.00	-
CBR7	-	0 – 0.30	0.30 – 2.00	-
CBR10	-	0 – 0.90	0.90 – 2.00	-
BH5	0 – 0.40	0.40 – 1.00	1.00 – 16.20	16.20 – 16.30

From the investigation it is apparent that made ground is likely to extend to close to 1m with glacial deposits to at least 16 m, although evidence from the ABB report (see section 6.3) suggests these deposits to go down to at least 27m on site. Environmental testing was not undertaken in any of the aforementioned intrusive locations with the exception of BH5, which was done in conjunction with the ABB investigation, the data from this is summarised in section 6.3 below.

6.3 Surrender of Waste Management Licence (ABB, 2006)

Purpose of the report was to support the surrender of the waste management licence which covered activities associated with the disposal/treatment of refinery derived sludge. The application of this sludge extended into part of the north western area of the current proposed development site boundary (see **Figure 2**)

The report provided a summary of the site history stating that the sludge was applied to the land, over the course of 17 years (1986-2003), by tilling it into the top 0.3m of soil in order to encourage degradation.

The site investigation undertaken in the ABB report was undertaken in conjunction with the geotechnical work in the aforementioned Soil Mechanics report. The investigation involved the advancement of 13 trial pits (TP4-16) and drilling of 3 boreholes (done by Soil Mechanics; BH3-BH5). Groundwater sampling was also taken from existing monitoring wells (BH7 & BH8) installed in 1991. And surface water sampling was taken from the perimeter drains. Borehole logs for the investigation were not made available to AECOM.

In the context of the proposed development site a number of soil samples from intrusive locations (TP15, 16 & BH5) located near to the site (see **Figure 2**) were taken. Furthermore several surface and groundwater samples (SW3, 4 and BH7) were also taken near to the proposed development site. The results of which are displayed below:

Table 4 – Summary of chemicals within soil samples (all displayed in mg/kg)

Location	Depth (m)	Arsenic	Barium	Chromium	Copper	Lead	Vanadium	Zinc	Total TPH	PAH Total	Chloro-benzene
TP15*	0.3	5	126	32	35	39	67	235	15,573	130.8	-
TP15	1.2	5	110	29	13	18	36	63	2.6	3.5	-
TP16*	0.3	8	269	63	110	93	185	650	14,447	72.3	-
TP16	1.5	2	118	28	13	18	35	77	137.5	0.5	-
BH5*	0.1	13.5	-	50	107.4	98.9	-	751.2	20,700	5,360	-
BH5	3.0	9.3	-	17.5	12.1	12.1	-	53.3	270	33	-
BH5	4.0	9.6	-	13.8	12.2	12.7	-	53.4	130	16	-
BH5	8.0	6.2	-	13.7	9.1	9.9	-	39.4	24	14	0.034

*Samples noted as being 1 to 2% oil by weight

Table 5 – Summary of chemicals within water samples (all displayed in µg/l)

Location	Arsenic	Barium	Chromium	Copper	Lead	Selenium	Vanadium	Zinc	TPH Total	PAH Total
SW3	3	172	11	13	<1	2	4	28	20	0.146
SW4	4	195	11	13	<1	2	21	33	<10	<0.01
BH7**	<1	117	6	7	<1	2	<1	16	<10	<0.01

**Borehole drilled in 1991. No log was available for the borehole; however Figure 6 (ABB conceptual site model) shows the monitoring well installed into the Burnham formation chalk bedrock at 27 m bgl.

The report stated that following a comparison of soil sampling analytical results from trial pits at different depths the concentrations of hydrocarbons at the base of the trial pits in comparison to the samples collected at the surface were several orders of magnitudes lower. Moreover groundwater samples from BH7 indicated that the downward migration of contaminants has not taken place (owning to the low permeability of the glacial drift). On this basis it was considered that there were no current plausible source-pathway-receptor linkages.

7. Conceptual Site Model

7.1 Introduction

AECOM has developed a preliminary conceptual site model (CSM) based on a qualitative "Source → Pathway → Receptor" (SPR) risk assessment. The following sections consider the identified potential sources, pathways and receptors.

7.2 Assessment Framework

The site, in terms of potential land contamination, will be regulated by the local authority (Lincolnshire County Council) under the Town and Country Planning Act 1990 (as amended), taking account of the National Planning Policy Framework 2012, with the Environment Agency, Natural England and English Heritage acting as statutory consultees.

The 'suitable for use' approach is adopted for the assessment of contaminated land where remedial measures are only undertaken where unacceptable risks to human health or the environment are realised taking into account the use (or proposed use) of the land in question and the environmental setting. Additional environmental liabilities can arise through provisions contained within statutory legislation including Part 2A of the EPA 1990, the Water Resources Act 1991, the Groundwater Regulations 2009 and the Water Act 2003.

Current best practice recommends that the determination of health hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Statutory Guidance to Part 2A (2012) and CLR11.

The risk assessment process for environmental contaminants is based on a source-pathway-receptor analysis. These terms can be defined as follows:

- Source: hazardous substance that has the potential to cause adverse impacts;
- Pathway: route whereby a hazardous substance may come into contact with the receptor: examples include ingestion of contaminated soil and leaching of contaminants from soil into watercourses; and
- Receptor: target that may be affected by contamination: examples include human occupants / users of site, water resources (surface waters or groundwater), or structures.

For a risk to be present there must be a relevant pollutant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway resulting in potentially significant harm.

Further details on the risk assessment process and methodology are provided in **Appendix D**.

7.3 Potential Sources of Contamination

Based upon the available information, potential sources of contamination include:

7.3.1 On Site

- Made ground within infilled areas of land (e.g. the former sludge landfarm) as well as within stockpiles and mounds (thought to be associated with previous construction activities in the area)

7.3.2 Offsite

- Lindsey Crude Oil Refinery & Phillips 66 Humber Refinery (operations and spills/leaks);
- Made ground within infilled land associated with the former sludge landfarm and construction activities in the area
- Railway line and railway sidings; and,
- Surrounding agricultural land use.

7.4 Contaminants of Concern

Identified potential sources of contamination are summarised in **Table 6**, below.

Table 6 – Summary of Contaminants of Concern

Land use	Contaminant Grouping	Specific Contaminants
Made ground within landfarm and infilled land/ stockpiles (on site)	Organic	- Hydrocarbons e.g. diesel, lubricating oils, petrol - Polychlorinated Biphenyls (PCBs) - Polycyclic Aromatic Hydrocarbons (PAHs)
	Inorganic	- Metals including arsenic, zinc, lead, copper, manganese and cadmium
	Other	- Ground gases including carbon dioxide, methane and hydrogen sulphide. - Asbestos
Oil refinery operations and VPI power plant operations (off site)	Organic	- Hydrocarbons e.g. crude oil, motor oils, petrol, diesel, kerosene, lubricants, waxes, bitumen, aviation fuel - Other organics e.g. alcohols, PCBs, MTBE, TAME, solvents, aliphatic and aromatic compounds
	Inorganic	- Mineral acids, alkalis, cyanides, sulphur and sulphide - Metals e.g. aluminium, cobalt, copper, iron, lead, molybdenum, nickel and vanadium
	Other	- Asbestos
Railway line and former railway sidings (off site)	Organic	- Hydrocarbons e.g. diesel, lubricating oils, paraffin - Polychlorinated Biphenyls (PCBs) - Polycyclic Aromatic Hydrocarbons (PAHs) - Solvents - Ethylene glycol - Creosote (contains PAHs) - Herbicides (e.g. atrazine, simazine, sodium chlorate, dalapon, diuron, borax, paraquat, picloram)
	Inorganic	- Ferrous residues - Metal fines
	Other	- Asbestos - Ash and fill (possibly containing metals, phenols, sulphates and PAHs)
Agricultural land (on site)	Organic	- Insecticides/pesticides/ herbicides including organophosphates, Diazinon, Alphacypermethrin, Oxfendazole, Ivermectin, Glyphosate

Information included in the above table is based upon information from the Department of Environment (DoE) 1995 Industry Profiles for “Oil refineries and bulk storage of crude oil and petroleum products” and “Railway land”, the Health and Safety Executive database on pesticides, the Veterinary Medicines Directorate Defra website as well as industry experience

Whilst **Table 6** generally reflects contaminants that are associated with the specified land uses, it is not an exhaustive list, nor should it be interpreted as a list of chemicals that are present at site. It should also be noted that unrecorded land uses (which can significantly impact ground conditions on site) may have occurred; consequently uncertainty remains as to the exact nature and extent of potential contamination on site.

7.5 Potential Receptors

7.5.1 Human Health:

- On site construction workers;
- Future employees at the new development; and
- Off-site workers e.g. Lindsey Oil refinery.

7.5.2 Controlled Waters:

- Surface waters including the River Humber (RAMSAR site) and nearby drains;
- Shallow groundwater within the superficial deposits (Secondary A Aquifer); and,
- Groundwater within the bedrock (Principal Aquifer).

7.5.3 Infrastructure:

- Underground services e.g. buried pipes; and,
- Proposed future on site buildings.

7.5.4 Ecology:

- Flora and Fauna.

7.6 Potential Pathways

7.6.1 Human Health:

- Direct dermal contact with substances in shallow soil and/or groundwater during potential groundworks;
- Inhalation of substances from the partitioning of vapours from soil and / or shallow groundwater; and,
- Accidental ingestion and/or inhalation of substances in soil/dust and/or shallow groundwater during potential groundworks.

7.6.2 Controlled Waters:

- Vertical migration through unsurfaced areas, vegetated areas and hard-standing, and drains / pipework into Made Ground / shallow soils;
- Lateral and vertical migration within the made ground and superficial deposits (Secondary A Aquifer), e.g. leaching from made ground vertically into shallow soil layers, including into deeper groundwater;
- Preferential lateral and vertical migration along routes of underground services, pipelines and associated trenches;
- Lateral overland flow, including via drains, to nearby surface waters; and
- Lateral and vertical migration within deeper groundwater with the chalk aquifer.

7.6.3 Ecology:

- Plant uptake and subsequent ingestion by fauna.

7.6.4 Infrastructure:

- Migration of ground gases and accumulation in confined spaces associated with the future development of the site (e.g. basements, service ducts).
- Piling foundations associated with future development of the site.

7.7 Summary of Potential Pollutant Linkages (CSM)

A summary of the potential pollutant linkages and the related initial qualitative assessment of risk is summarised in **Table 7**, below. The risk rankings assume that the current ground and groundwater conditions prevail, prior to any mitigation measures such as further intrusive investigation, quantitative risk assessment or remediation. The risk rankings for each of the pollutant linkages are derived from a combination of the magnitude of the potential consequence (i.e. severity) of the exposure of the receptor to the contaminant; and the magnitude of probability (i.e. likelihood) that the pollutant linkage is present or will occur.

Table 7 – Summary of Pollutant Linkages

SOURCE	PATHWAY	RECEPTOR	POTENTIAL SEVERITY	LIKELIHOOD OF OCCURRENCE	LEVEL OF RISK	DISCUSSION AND POSSIBLE MITIGATION
Made ground within areas of potentially infilled land/ stockpiles	Direct contact and/or ingestion of contaminated material	On site construction workers and future logistics site employees	Moderate	Possible	Medium	Direct contact and ingestion of contaminated particulates and dust is possible during site works, and as such there should be appropriate safety and mitigation measure (e.g. the use of PPE) put in place to minimise occupational risks to human health should areas of suspected contamination be encountered. Considering the proposed commercial use of the site it is unlikely that future employees would come in to any significant contact with site soils.
	Inhalation of particulates/dusts/ vapours / gases	On site construction workers/ employees	Moderate	Possible	Medium	As with the direction contact/ingestion pathway there is a possibility for vapours/gases/dusts and/or particulates to be inhaled as a consequence of disturbing the ground during site work. This can be mitigated with appropriate safety measures e.g. the presence of respirators and in the case of future site employees within proposed buildings, gas protection membranes.
	Migration of ground gases (e.g. methane and carbon dioxide) through permeable made ground strata	Newly constructed infrastructure	Minor	Possible	Low	Due to the proximity of the site to potentially in filled land an assessment of risks from ground gases may be required. Should ground gasses be considered a risk, this can be mitigated using gas protection membranes within newly constructed buildings.
	Leaching/l surface runoff of substances from any newly exposed/ excavated ground	Surface waters	Moderate	Unlikely	Low	Because site works might generate stockpiles of site won material and disturb soils there is the potential for leaching/surface run off and migration of substances from these newly exposed materials into surface waters (e.g. drains) and subsequently into contact with flora and fauna within said surface waters. Mitigation measures e.g. making sure any suspected contaminated material is contained and/ or appropriately disposed of, any plant machinery is thoroughly decontaminated and intrusive works minimised to reduce the disturbance of soils and fuel spills are rapidly dealt with is likely to be required for any construction works that take place.
		Flora and fauna	Moderate	Unlikely	Low	

Impacted shallow groundwater below site	Vertical migration of impacted groundwater from within the made ground superficial deposits	Deeper groundwater in the bedrock	Moderate	Unlikely	Low	Considering the low porosity of the superficial deposits it is unlikely that contaminants will be able to migrate to significant depths towards the bedrock. Despite this low risk it is still advised that good construction work practices are implemented.
Impacted shallow groundwater below site	Vertical migration of impacted groundwater from within the made ground and superficial deposits via enhanced pathways e.g. during foundation piling or drilling of boreholes	Deeper groundwater in the bedrock	Major	Possible	Considerable	The low permeable superficial deposits are likely acting as a protective layer above the Burnham formation chalk bedrock. Considering that this bedrock is listed as a principal aquifer any piling design or intrusive construction works which are likely to go beyond the superficial deposits may require preparation of a piling risk assessment, completed in accordance with the EA's 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention'.

8. Conclusions and Data Gaps

8.1 Conclusions

This Phase 1 Geo-environmental assessment comprises a review of available geo-environmental information for the VPI Immingham site in order to assess the likely ground conditions beneath the site and the potential for ground contamination arising from historical or current on-site or off-site activities.

Key findings of the assessment included:

- The geology underlying the site is anticipated to comprise variable depths of Made Ground, superficial deposits (Glacial till and Glacial sands and gravels) and weathered bedrock consisting of the Burnham Chalk Formation;
- The superficial deposits are classified as being of Secondary A (undifferentiated) Aquifer potential. The Burnham Chalk Formation is classified as a Principal Aquifer;
- The largest and most proximal surface water course is the River Humber, located ~1.5km directly to the east of the site. A number of other drains and tributaries of the River Humber are also present in close proximity to the site;
- Prior to its current use as a carpark and stockpile dumping area the site has been used primarily as agricultural land with the exception of the north west of site which was part of the sludge landfarm area. A limited number of other potential sources of contamination were identified from historical maps including a railway and oil refineries;
- There are significant data gaps relating to the contents of the stockpiles/mounds located on site, as well as the presence of potential contamination originating from the historic sludge landfarm located in the north west section of the site; and
- The main risks identified by the CSM pertained to the direct contact and inhalation of contaminants by construction workers as well as the potential for impacted shallow groundwater to migrate into the deeper groundwater via enhanced pathways e.g. piling foundations and boreholes. Thus it is advised that appropriate PPE is worn by those likely to come into contact with site soils and particular care is taken during the design and construction if works are required to go beyond the superficial deposits.

8.2 Data Gaps

Whilst the information from secondary datasets and previous ground investigation reports are able to provide a general idea of expected ground conditions, unrecorded land uses (which can significantly impact ground conditions on site) may have occurred. Furthermore coverage from previous ground investigations is poor for the proposed development site. Consequently large uncertainty remains as to the exact nature of the ground conditions present at the site, particularly in regards to the nature and contents of stockpiles as well as the potentially infilled land associated with the historic landfarm in the north western area of site.

8.3 Recommendations

Based upon the above data gaps, it is recommended that intrusive ground investigations, (potentially with further phases of additional ground investigation to delineate contamination hotspots, if identified), are undertaken in order to further assess potential risks posed to the proposed development (associated with ground conditions at the site) and establish an accurate environmental baseline of the site prior to the proposed development.

The ground investigations should include the installation of gas and groundwater monitoring wells across the site and around its perimeter to allow collection of soil and groundwater samples for laboratory analysis of contaminants based on the potential sources identified in Section 7.4. A programme of periodic gas and groundwater monitoring events may also need to be undertaken in order to identify changes in site conditions in response to weather and seasonal changes.

Filename: \\ukIds2pfpsw001\LE_Projects\Newproje\60_____ - VPI Immingham\Geo-Env\Updated Phase 1 Report\CAD\Figure 1- Site boundary.mxd

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Project Title:

VPI IMMINGHAM

Client:

VPI IMMINGHAM

Location Inset:

LEGEND

Site

Copyright:

AECOM Internal Project No:

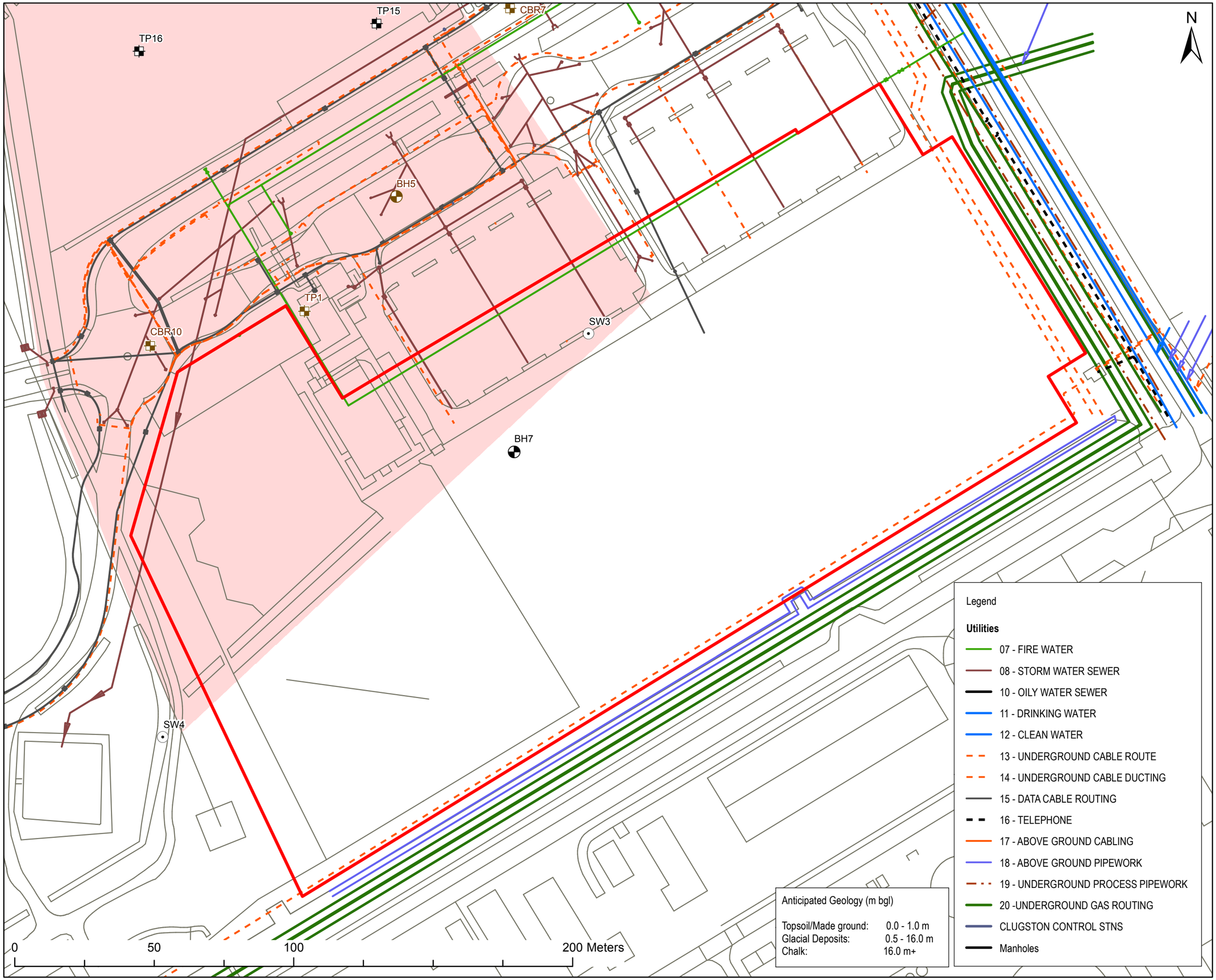
60547702

Drawing Title:

SITE LOCATION PLAN

Scale at A3: 1:1,250

Drawing No:			Rev:
FIGURE 1			01
Drawn:	**Chk'd:**	**App'd:**	**Date:**
JC	DM	AF	01/02/18



Filename: \\ukIds2pfpsw001\LE_Projects\Newproje\60_____ - VPI Immingham\Geo-Env\Updated Phase 1 Report\CAD\Figure 2- previous GI.mxd

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www.aecom.com

Project Title:

VPI IMMINGHAM

Client:

VPI IMMINGHAM

Location Inset:

LEGEND

Site Boundary

Approximate Former Sludge Landfarm Boundary

ABB Hole Locations 2006 (Approximate)

Borehole

Surface Water Sample

Trial Pit

Soil Mechanics Hole Locations 2006 (Approximate)

Borehole

Trial Pit

AECOM Internal Project No:

60547702

Drawing Title:

PREVIOUS GI & WATER SAMPLING LOCATIONS

Scale at A3: 1:1,250

Drawing No:			Rev:
FIGURE 2			01
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GB	DR	AF	05/02/18

Appendix A: Groundsure® Reports

AECOM

AECOM LTD,2, CITY WALK,
LEEDS, LS11 9AR

Groundsure Reference:	GS-3982430
Your Reference:	Oil_Refinery
Report Date	13 Jun 2017
Report Delivery Method:	Email - pdf

Enviro Insight

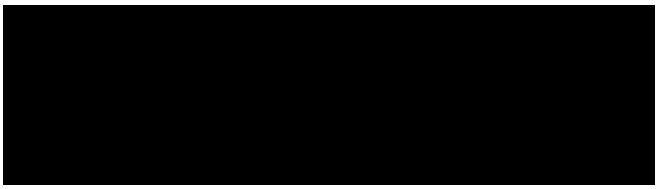
Address: TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW**
Date:	**13 Jun 2017**
Reference:	**GS-3982430**
Client:	**AECOM**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	27-Sep-2014
Grid Reference:	516613,417411
Site Size:	8.16ha

Report Reference: GS-3982430
Client Reference: Oil_Refinery

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Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	4	0	11	32
1.2 Additional Information – Historical Tank Database	0	0	8	30
1.3 Additional Information – Historical Energy Features Database	0	0	0	0
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Potentially Infilled Land	0	0	2	7

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	9
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	1
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	1
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	2	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	1	0
2.2 Records of COMAH and NIHHS sites	2	0	0	3
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	1
2.3.2 National Incidents Recording System, List 1	0	0	0	1
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	1	0	0	0	4	9
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	1	0	0	0	6

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	1	1	19	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 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	10	5
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
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)	1	0	0	1	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 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	No
6.10 Detailed River Network entries within 500m of the site	0	0	0	4	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	Yes
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Yes
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	High
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	6
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	1
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	3
8.5 Records of Ramsar sites	0	0	0	0	0	3
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	2	0	0	1	0	1
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

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

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	No
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

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

1. Historical Industrial Sites

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

2. Environmental Permits, Incidents and Registers

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

3. Landfills and Other Waste Sites

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

4. Current Land Uses

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

5. Geology

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

6. Hydrogeology and Hydrology

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

7. Flooding

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

8. Designated Environmentally Sensitive Sites

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

9. Natural Hazards

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

10. Mining

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

11. Contacts

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

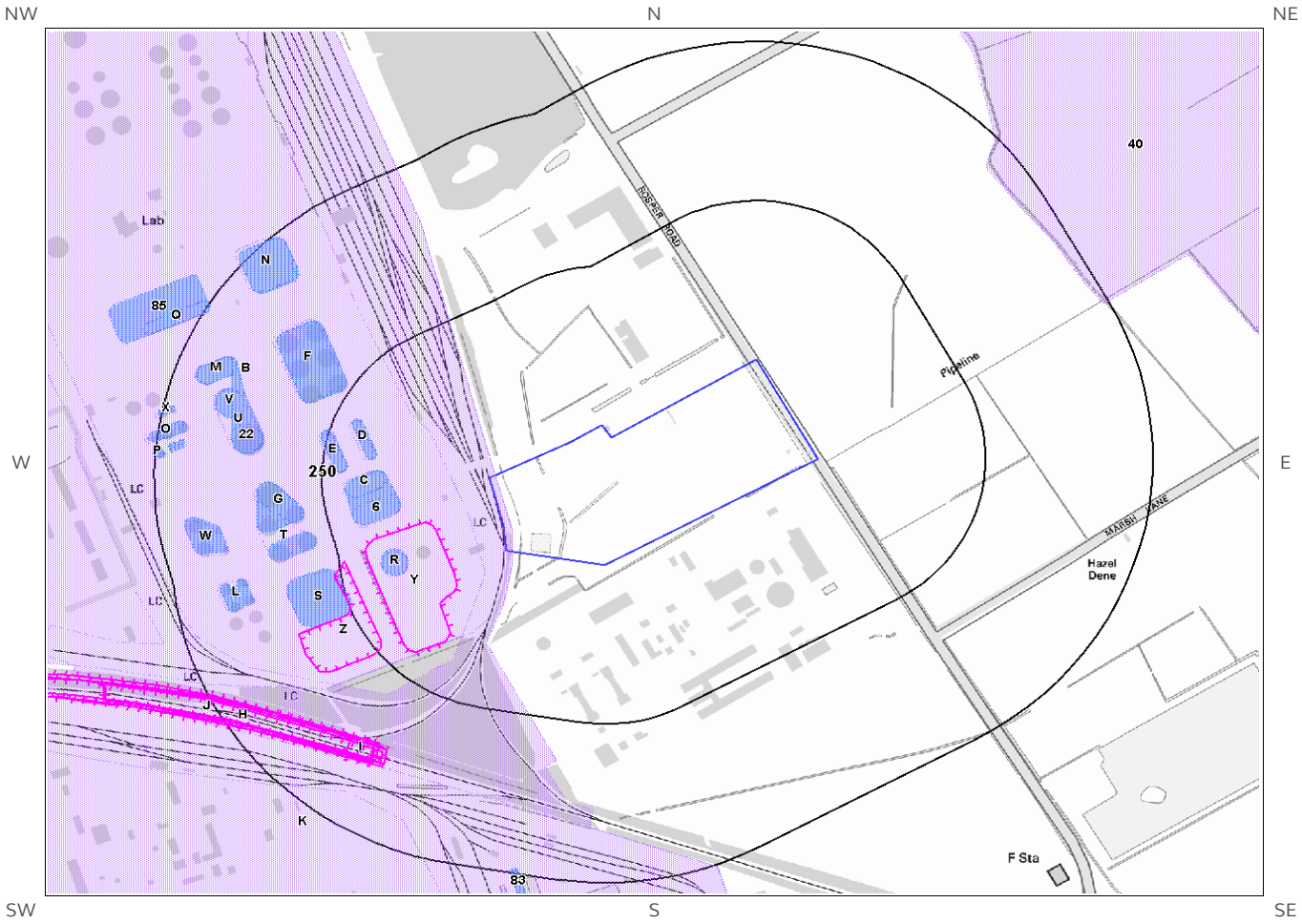
Note: Maps

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

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

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

1. Historical Land Use



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

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: 47

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Railway Sidings	1974
2A	0	On Site	Railway Sidings	1983
3B	0	On Site	Oil Refinery	1983
4B	0	On Site	Oil Refinery	1974
5Y	86	W	Unspecified Heap	1983
6	138	W	Unspecified Tanks	1983
7R	148	W	Unspecified Tank	1983
8C	156	W	Unspecified Tanks	1974
9C	156	W	Unspecified Tanks	1983
10D	176	W	Unspecified Tanks	1974
11D	176	W	Unspecified Tanks	1983
12E	215	W	Unspecified Tanks	1974
13E	215	W	Unspecified Tanks	1983
14Z	229	SW	Unspecified Heap	1983
15S	248	W	Unspecified Tanks	1983
16F	265	NW	Unspecified Tanks	1974
17F	265	NW	Unspecified Tanks	1983
18T	275	W	Unspecified Tanks	1983
19G	286	W	Unspecified Tanks	1983
20G	286	W	Unspecified Tanks	1974
21U	343	W	Unspecified Tanks	1983
22	345	W	Unspecified Tank	1974
23J	359	SW	Cuttings	1947
24H	360	SW	Cuttings	1930
25H	362	SW	Cuttings	1947
26I	364	SW	Cuttings	1983
27I	364	SW	Cuttings	1974
28J	364	SW	Cuttings	1968
29J	367	SW	Cuttings	1951
30K	381	S	Unspecified Commercial/Industrial	1983
31K	381	S	Unspecified Commercial/Industrial	1974
32V	384	W	Unspecified Tank	1974
33L	388	W	Unspecified Tanks	1983

34L	388	W	Unspecified Tanks	1974
35W	407	W	Unspecified Tanks	1983
36M	415	NW	Unspecified Tanks	1974
37M	415	NW	Unspecified Tanks	1983
38N	430	NW	Unspecified Tanks	1974
39N	430	NW	Unspecified Tanks	1983
40	457	NE	Marshes	1887
41O	462	W	Unspecified Tanks	1974
42O	462	W	Unspecified Tanks	1983
43X	481	W	Unspecified Tanks	1983
44P	490	W	Unspecified Tank	1974
45P	490	W	Unspecified Tank	1983
46Q	497	NW	Unspecified Tanks	1974
47Q	497	NW	Unspecified Tanks	1983

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: 38

ID	Distance (m)	Direction	Use	Date
48C	138	W	Tanks	1985
49R	148	W	Unspecified Tank	1985
50C	153	W	Tanks	1970
51D	172	W	Tanks	1985
52D	174	W	Tanks	1970
53E	212	W	Tanks	1985
54E	213	W	Tanks	1970
55S	245	W	Tanks	1985
56F	258	NW	Tanks	1985
57F	260	NW	Tanks	1970
58T	275	W	Tanks	1985
59G	282	W	Tanks	1985
60G	283	W	Tanks	1970
61U	342	W	Tanks	1985
62V	342	W	Tanks	1970
63L	385	W	Tanks	1985
64L	385	W	Tanks	1970
65L	392	W	Tanks	1970
66V	395	W	Tanks	1969
67V	396	W	Unspecified Tank	1983
68W	405	W	Tanks	1983

69L	409	W	Tanks	1970
70L	416	W	Tanks	1969
71M	417	NW	Tanks	1969
72L	417	W	Tanks	1983
73M	417	NW	Tanks	1983
74N	424	NW	Tanks	1985
75N	427	NW	Tanks	1970
76O	456	W	Tanks	1983
77O	458	W	Tanks	1969
78O	459	W	Tanks	1969
79O	459	W	Tanks	1983
80X	483	W	Tanks	1983
81P	487	W	Unspecified Tank	1969
82P	488	W	Unspecified Tank	1983
83	491	S	Tanks	1972
84Q	495	NW	Tanks	1969
85	495	NW	Tanks	1983

1.3 Additional Information – Historical Energy Features Database

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

Records of historical energy features within 500m of the search boundary: 0

Database searched and no data found.

1.4 Additional Information – Historical Petrol and Fuel Site Database

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

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

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

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

Database searched and no data found.

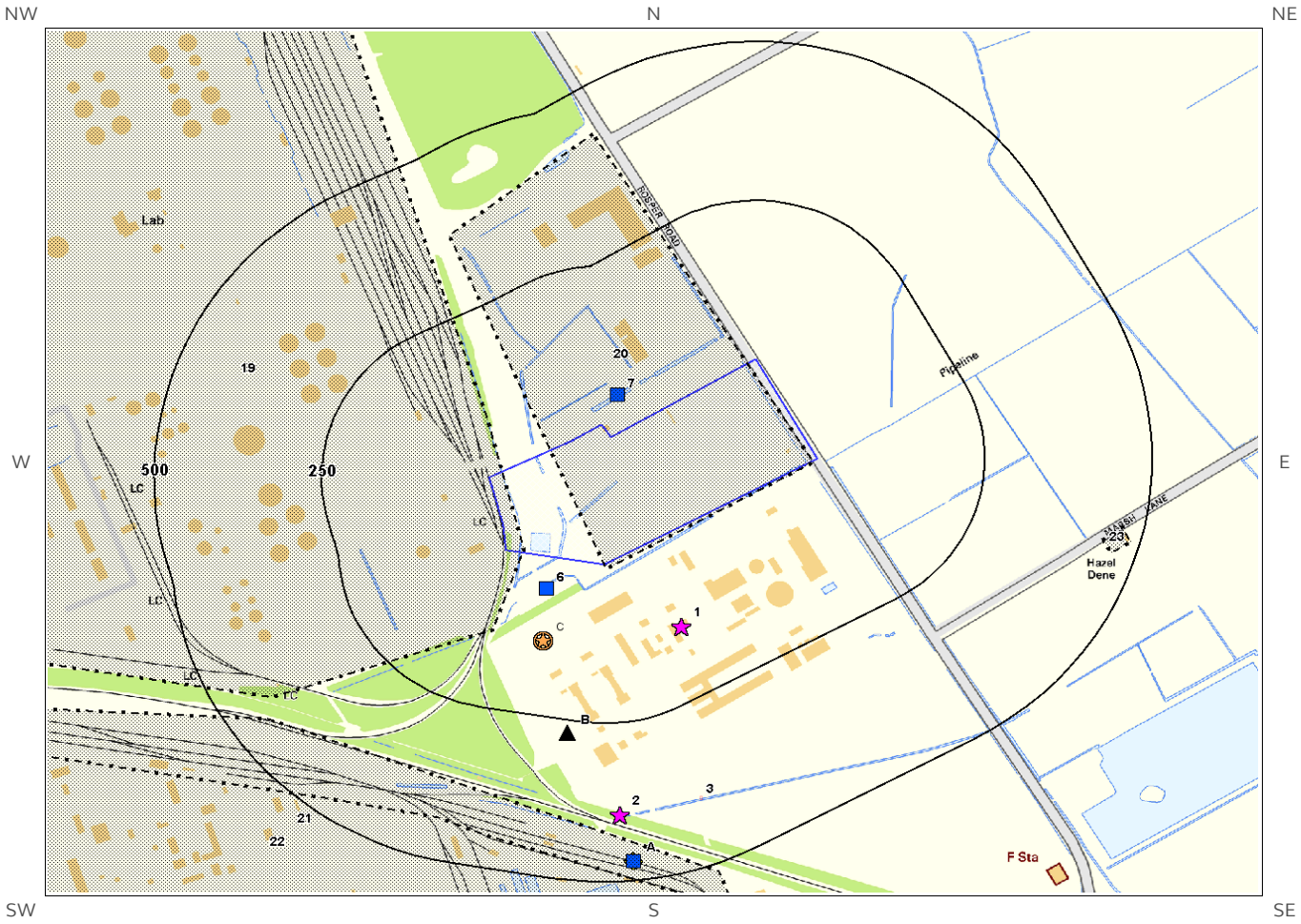
1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 9

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

ID	Distance(m)	Direction	Use	Date
86Y	86	W	Unspecified Heap	1983
87Z	229	SW	Unspecified Heap	1983
88J	359	SW	Cuttings	1947
89H	360	SW	Cuttings	1930
90H	362	SW	Cuttings	1947
91I	364	SW	Cuttings	1974
92I	364	SW	Cuttings	1983
93J	364	SW	Cuttings	1968
94J	367	SW	Cuttings	1951

2. Environmental Permits, Incidents and Registers Map



- 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:

9

The following Part A(1) and IPPC Authorised Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
25B	273	S	516500 417000	Operator: Immingham Chp Llp Installation Name: Immingham Chp Power Station Epr/bj8022iz Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: NP3130BP Original Permit Number: BJ8022IZ EPR Reference: - Issue Date: 28/10/2004 Effective Date: 28/10/2004 Last date noted as effective: 2017-04-01 Status: Superceded
26B	273	S	516500 417000	Operator: Immingham Chp Llp Installation Name: - Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: BJ8022 Original Permit Number: BJ8022 EPR Reference: - Issue Date: 16-8-2001 Effective Date: 16-8-2001 Last date noted as effective: 2005-10-03 Status: Superseded By Variation
27B	273	S	516500 417000	Operator: Immingham Chp Llp Installation Name: Immingham Chp Power Station Epr/bj8022iz Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: BU6140IT Original Permit Number: BJ8022IZ EPR Reference: - Issue Date: 1/5/2003 Effective Date: 1/5/2003 Last date noted as effective: 2017-04-01 Status: Superceded

ID	Distance (m)	Direction	NGR	Details	
28B	273	S	516500 417000	Operator: Vpi Immingham Llp Installation Name: Immingham Chp Power Station Epr/bj8022iz Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: YP3837GD Original Permit Number: BJ8022IZ EPR Reference: EA/EPR/BJ8022IZ/V002 Issue Date: 4/6/2009 Effective Date: 4/6/2009 Last date noted as effective: 2017-04-01 Status: Superceded
29B	273	S	516500 417000	Operator: Immingham Chp Llp Installation Name: Immingham Chp Power Station Epr/bj8022iz Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: BJ8022IZ Original Permit Number: BJ8022IZ EPR Reference: - Issue Date: 16/8/2001 Effective Date: 16/8/2001 Last date noted as effective: 2017-04-01 Status: Superceded
30B	273	S	516500 417000	Operator: Vpi Immingham Llp Installation Name: Immingham Chp Power Station Epr/bj8022iz Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: XP3732RA Original Permit Number: BJ8022IZ EPR Reference: - Issue Date: 29/12/2015 Effective Date: 1/1/2016 Last date noted as effective: 2017-04-01 Status: Effective
31B	273	S	516500 417000	Operator: Vpi Immingham Llp Installation Name: Immingham Chp Power Station Epr/bj8022iz Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: PP3432WT Original Permit Number: BJ8022IZ EPR Reference: - Issue Date: 14/11/2014 Effective Date: 14/11/2014 Last date noted as effective: 2017-04-01 Status: Superceded
32B	273	S	516500 417000	Operator: Immingham Chp Llp Installation Name: - Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: BU6140 Original Permit Number: BJ8022 EPR Reference: - Issue Date: 1-5-2003 Effective Date: 1-5-2003 Last date noted as effective: 2004-10-01 Status: Superseded By Pas
33B	273	S	516500 417000	Operator: Immingham Chp Llp Installation Name: Immingham Chp Power Station Epr/bj8022iz Process: COMBUSTION; ANY FUEL =>50MW	Permit Number: NP3339LK Original Permit Number: BJ8022IZ EPR Reference: - Issue Date: 30/4/2007 Effective Date: 30/4/2007 Last date noted as effective: 2017-04-01 Status: Superceded

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:

1

The following List 1 Dangerous Substance Inventory Site records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
4A	470	S	516600 416800	Name: Conoco Main O/f Killingholme Status: Not Active Receiving Water: River Humber, South Killingholme Drain, R. Humber	Authorised Substances: Mercury (other), Cadmium

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

1

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

ID	Distance (m)	Direction	NGR	Details	
5A	470	S	516600 416800	Name: Conoco Main O/f Killingholme Status: Active Receiving Water: S Kill.drn.rosper Road	Authorised Substances: Arsenic, Chromium, Copper, Lead, Nickel, Zinc

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	
6	51	S	516470 417230	Address: THE INTERCEPTOR, LINDSEY OIL REFINERY, KILLINGHOLME, GRIMSBY. Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: PR3NFF1242 Permit Version: 1	Receiving Water: South Killingholme Main Drain Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 06/11/1979 Effective Date: 06-Nov-1979 Revocation Date: 10/01/1994
7	52	NE	516576 417535	Address: LINDSEY OIL REFINERY, LINDSEY OIL REFINERY, NORTH KILLINGHOLME, IMMINGHAM, NORTH LINCOLNSHIRE, DN40 3LW Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: EPRVP3424XR Permit Version: 1	Receiving Water: TRIB OF RIVER HUMBER Status: NEW ISSUED UNDER EPR 2010 Issue date: 05/09/2012 Effective Date: 05-Sep-2012 Revocation Date: -
8A	470	S	516600 416800	Address: AT HUMBER REFINERY, SOUTH KILLINGHOLME, SOUTH HUMBERSIDE Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: PR3NFF855B Permit Version: 1	Receiving Water: Trib South Killingholme Drain Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 16/11/1983 Effective Date: 16-Nov-1983 Revocation Date: 07/05/1991
9A	470	S	516600 416800	Address: AT HUMBER REFINERY, SOUTH KILLINGHOLME, SOUTH HUMBERSIDE Effluent Type: TRADE DISCHARGES - UNSPECIFIED Permit Number: PR3NFF855B Permit Version: 2	Receiving Water: South Killingholme Main Drain Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 08/05/1991 Effective Date: 08-May-1991 Revocation Date: 24/03/1994

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:

1

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

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
34C	134	S	PA/2008/1704	516464 417147	Approved	02/03/2009	VPI Immingham LLP (PKA Immingham CHP Plant) Combined Heat & Power Plant, Rosper Road, South Killingholme, DN40 3DZ	Hazardous Substances Consent to store 3050 tonnes of petroleum gas oil.	Enforcement: No Enforcement Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 5

The following COMAH & NIHHS Authorisation records provided by the Health and Safety Executive are represented as polygons or buffered points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Company	Address	Operational Status	Tier
19	0	On Site	Total Lindsey Oil Refinery Limited	Total Lindsey Oil Refinery Limited, Lindsey Oil Refinery, HQ/Total Lindsey, Eastfield Road, Immingham, North East Lincolnshire, DN40 3LW	Current COMAH Site	COMAH Upper Tier Operator
20	0	On Site	VPA Immingham LLP	VPI Immingham LLP, Immingham CHP LLP, Rosper Road, Immingham, Grimsby, North East Lincolnshire, DN40 3DZ	Current COMAH Site	COMAH Lower Tier Operator
21	370	S	Phillips 66 Limited	Phillips 66 Limited, Humber Refinery, Humber Refinery, Eastfield Road, Grimsby, North Lincolnshire, DN40 3DW	Current COMAH Site	COMAH Upper Tier Operator
22	433	S	Conoco Manufacturing Ltd	Conoco Manufacturing Ltd, South Tank Farm, South Killingholme, Immingham	Historical NIHHS Site	-
23	445	E	Humber Lpg Terminal Ltd	Humber Lpg Terminal Ltd, Marsh Lane, South Killingholme, DN40 3ED	Historical COMAH Site	-

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:

2

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

ID	Distance (m)	Direction	NGR	Details	
1	139	SE	516670 417170	Incident Date: 03-Oct-2002 Incident Identification: 112451 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
2	396	S	516579 416873	Incident Date: 13-Dec-2004 Incident Identification: 282826 Pollutant: Oils and Fuel Pollutant Description: Crude Oil	Water Impact: Category 2 (Significant) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)

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

1

The following NIRS List 1 records are represented as points on the Environmental Permits, Incidents and Registers Map:

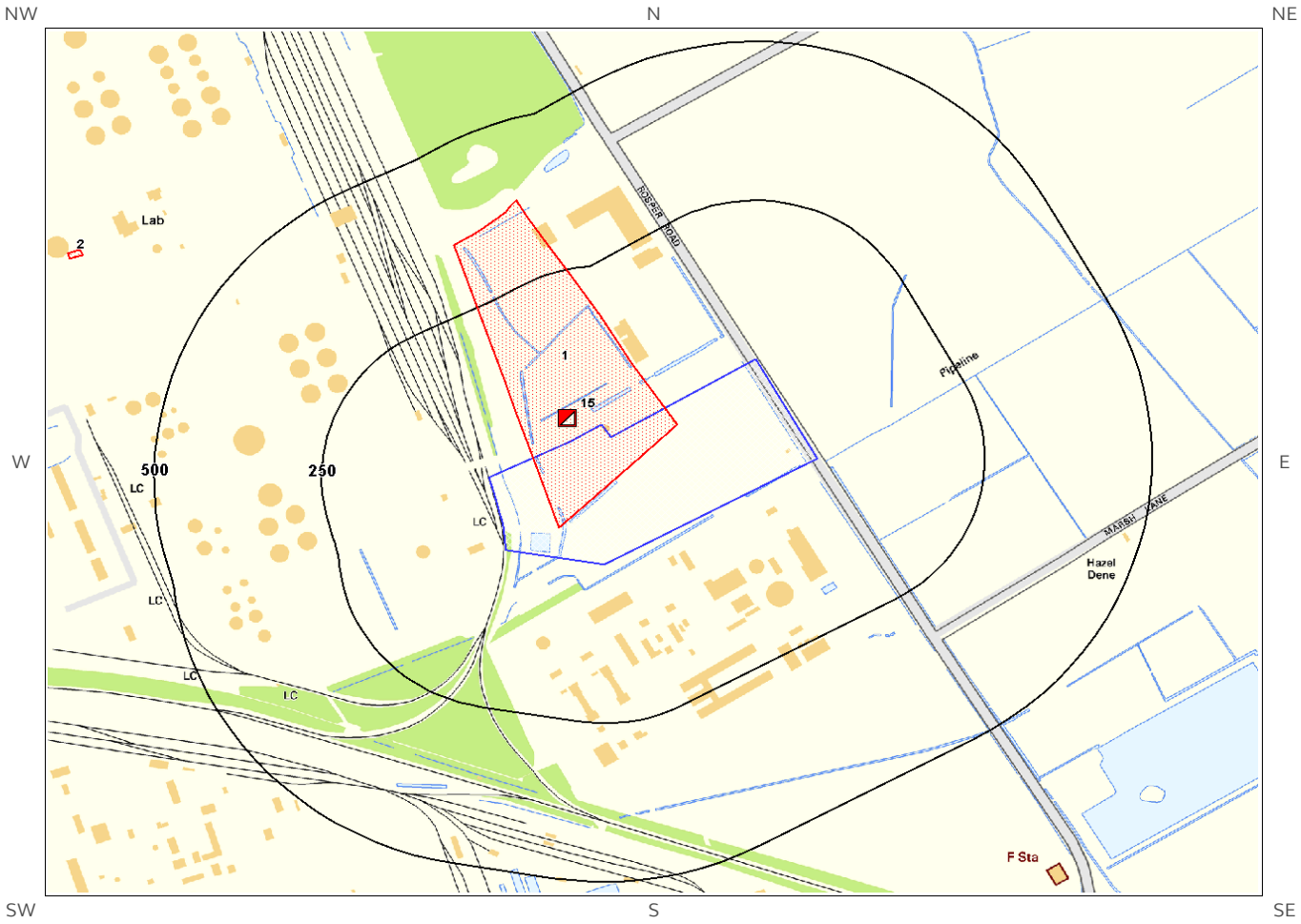
ID	Distance(m)	Direction	NGR	Details	
3	395	S		Incident Date: 29-Jul-2000 Incident Identification: 7235.0 Catchments Name: SKITTER BECK (IMMINGHAM) Water Description: RIVER STRETCH (FRESHWATER) Water Course: EAST HALTON BECK Incident Substantiated: Yes	Priority Description: Immediate (2 Hours) Waste Description: Not Available Water Impact: Major (Persistent, Extensive) Impact Land Impact: Minor Impact Air Impact: No Impact Action Taken: Prosecution

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

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

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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:

14

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

ID	Distance (m)	Direction	NGR	Details	
1	0	On Site	516400 417500	Site Address: Lindsey Oil Refinery, Rosper Road Waste Licence: Yes Site Reference: 55/19/0767, 2000/5298 Waste Type: Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 06-Nov-1985 Licence Surrendered: Licence Holder Address: - Operator: Lindsey Oils Licence Holder: - First Recorded: 31-Dec-1986 Last Recorded: -
2	701	NW	515700 417700	Site Address: Lindsey Oils Site C, North Killingholme, North Lincolnshire Waste Licence: - Site Reference: 55/26/790 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Lindsey Oils Licence Holder: - First Recorded: - Last Recorded: -
Not shown	903	E	517900 417200	Site Address: Marsh Lane, South Killingholme Waste Licence: Yes Site Reference: A553, 55/19/0553 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 23-Oct-1984 Licence Surrendered: 31-Dec-1987 Licence Holder Address: Arundel Howe, Stakesby Road, Whitby Operator: Geostore Limited Licence Holder: Geostore Limited First Recorded: 31-Dec-1985 Last Recorded: 31-Dec-1987

ID	Distance (m)	Direction	NGR	Details	
Not shown	927	SE	517600 416500	Site Address: Landfill Site - South Killingholme, Humber Road, Grimsby, Lincolnshire Waste Licence: Yes Site Reference: - Waste Type: Industrial Environmental Permitting Regulations (Waste) Reference: YP2/L/POR001	Licence Issue: 08-Oct-1991 Licence Surrendered: 06-Nov-2007 Licence Holder Address: Moody Lane, Grimsby, Lincolnshire Operator: Landfill Site - South Killingholme Licence Holder: Landfill Site - South Killingholme First Recorded: - Last Recorded: -
Not shown	955	SW	515700 416500	Site Address: South Killingholme Conoco, South Killingholme, North Lincolnshire Waste Licence: - Site Reference: 55/26/809 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Conoco Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1011	SE	516900 416200	Site Address: Conoco, Killingholme Waste Licence: Yes Site Reference: 55/19/0148, 1480, 2000/5296 Waste Type: Industrial, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 10-Dec-1987 Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 31-Jul-1975 Last Recorded: -
Not shown	1077	W	515100 416800	Site Address: Eastfield Road Landfill Site, Eastfield Road, South Killingholme Waste Licence: Yes Site Reference: A023, 55/17/0023 Waste Type: Inert, Industrial, Commercial, Household, Special, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 01-Dec-1980 Licence Surrendered: 19-Oct-1989 Licence Holder Address: - Operator: Humberside County Council Licence Holder: J W Stanley First Recorded: 01-Dec-1975 Last Recorded: 01-Mar-1988
Not shown	1123	NW	515200 418000	Site Address: Lindsey Oil Refinery Site A and C, Station Road, Thurlby, Bourne Waste Licence: Yes Site Reference: A147, 55/19/0147 Waste Type: Inert, Industrial, Household, Special, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: AY1/L/LIN014	Licence Issue: 14-Jun-1977 Licence Surrendered: 15-Jul-1990 Licence Holder Address: - Operator: Lindsey Oil Refinery Licence Holder: Lindsey Oil Refinery Limited First Recorded: 31-Dec-1960 Last Recorded: 31-Dec-1989
Not shown	1151	E	518100 417600	Site Address: Killigholme Haven, Immingham, South Humberside Waste Licence: Yes Site Reference: A553, 55/19/0553 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 23-Oct-1984 Licence Surrendered: 31-Dec-1987 Licence Holder Address: Arundel Howe, Stakesby Road, Whitby Operator: Geostore Limited Licence Holder: Geostore Limited First Recorded: 31-Dec-1985 Last Recorded: 31-Dec-1987
Not shown	1215	NW	515500 418400	Site Address: Lindsey Oil Site C, Killingholme Waste Licence: - Site Reference: 55/16/0424 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1261	SE	517000 416000	Site Address: Conoco, Killingholme Waste Licence: Yes Site Reference: 55/19/0148, 1480, 2000/5295 Waste Type: Industrial, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 18-Dec-1987 Licence Surrendered: Licence Holder Address: - Operator: Conoco Licence Holder: - First Recorded: 30-Jun-1975 Last Recorded: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1313	E	518200 417400	Site Address: Marsh Lane, Killingholme Waste Licence: - Site Reference: 55/19/0553 Waste Type: Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Geostore Limited Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1361	E	518200 417600	Site Address: Tioxide, South Killingholme Waste Licence: Yes Site Reference: A105, 55/19/0105 Waste Type: Inert, Industrial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 29-Jun-1977 Licence Surrendered: 24-Feb-1992 Licence Holder Address: Billingham, Cleveland Operator: BTP Tioxide Limited Licence Holder: BTP Tioxide Limited First Recorded: 31-Dec-1961 Last Recorded: 24-Feb-1992
Not shown	1443	E	518400 417300	Site Address: Immingham Dock, West Of South Killingholme Haven Waste Licence: Yes Site Reference: A646, 55/19/0646 Waste Type: Inert, Industrial, Commercial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 20-Jan-1978 Licence Surrendered: 26-Jan-1990 Licence Holder Address: - Operator: British Transport Docks Board Licence Holder: ABP First Recorded: 01-Feb-1978 Last Recorded: 31-Dec-1990

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:

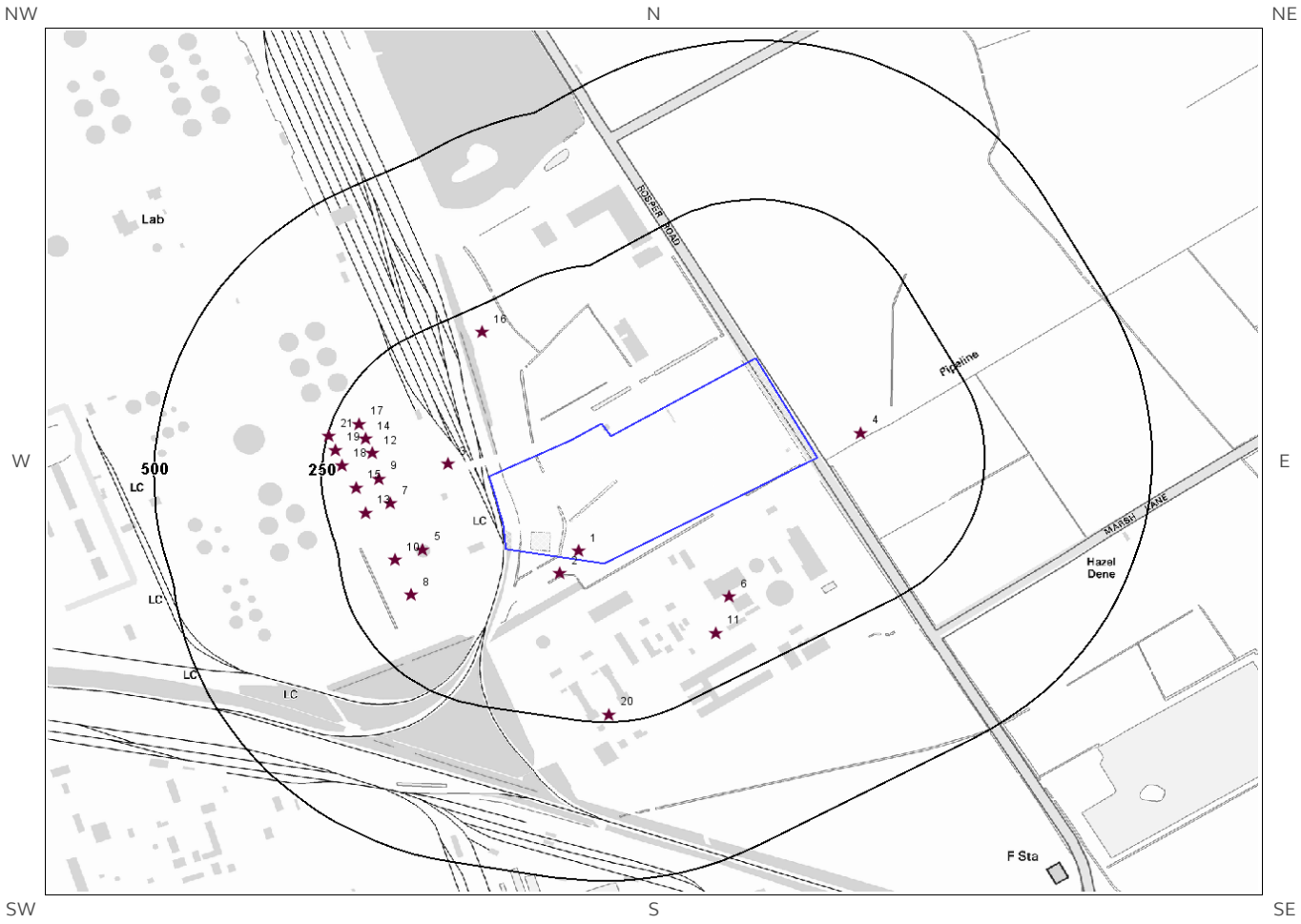
7

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
15	36	NW	516500 417500	Site Address: Lindsey Oil Refinery Ltd, Lindsey Oil Refinery, South Killingholme, Grimsby, N E Lincs, DN40 3LW Type: Biological Treatment Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: LIN013 EPR reference: EA/EPR/YP3695NB/S002 Operator: Lindsey Oil Refinery Ltd Waste Management licence No: 70828 Annual Tonnage: 3000.0	Issue Date: 06/11/1985 Effective Date: - Modified: - Surrendered Date: 18/10/2006 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Licensed Facility At Lindsey Oil Refinery Correspondence Address: -
Not shown	1066	NW	515500 418000	Site Address: Lindsey Oil Refinery, North Killingholme, Immingham, N E Lincs, DN40 3LW Type: Industrial Waste Landfill (Factory curtilage) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: LIN014 EPR reference: EA/EPR/YP3095NZ/A001 Operator: Lindsey Oil Refinery Ltd Waste Management licence No: 70817 Annual Tonnage: 25000.0	Issue Date: 14/06/1977 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Total Lindsey Oil Refinery Correspondence Address: -
Not shown	1066	NW	515500 418000	Site Address: Lindsey Oil Refinery, North Killingholme, Immingham, N E Lincs, DN40 3LW Type: Industrial Waste Landfill (Factory curtilage) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: LIN014 EPR reference: EA/EPR/YP3095NZ/V004 Operator: Total Lindsey Oil Refinery Ltd Waste Management licence No: 70817 Annual Tonnage: 24999.0	Issue Date: 14/06/1977 Effective Date: - Modified: 03/11/2015 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Total Lindsey Oil Refinery Correspondence Address: -
Not shown	1066	NW	515500 418000	Site Address: Lindsey Oil Refinery, North Killingholme, N Lincolnshire, DN40 3LW Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: IPC024 EPR reference: EA/EPR/CP3892NB/A001 Operator: Lindsey Oil Refinery Ltd Waste Management licence No: 73223 Annual Tonnage: 250000.0	Issue Date: 14/06/1977 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: To PPC Site Name: Lindsey Oil Refinery Site A & C (bw2994in) Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1147	W	515300 417000	Site Address: Wastewise Waste Man. Svcs. Ltd, Eastfield Road, South Killingholme, Grimsby, N E Lincs, DN40 3NB Type: Household Waste Amenity Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WAS004 EPR reference: EA/EPR/RP3394NH/S002 Operator: Wastewise Waste Management Services Ltd Waste Management licence No: 72061 Annual Tonnage: 20000.0	Issue Date: 07/12/1992 Effective Date: - Modified: - Surrendered Date: 20/03/2000 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: South Killingholme C A Site Correspondence Address: -
Not shown	1183	SE	517600 416500	Site Address: Tioxide Europe Ltd, Humber Road, Grimsby, N E Lincs Type: Industrial Waste Landfill (Factory curtilage) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: TIO003 EPR reference: EA/EPR/JP3095NJ/A001 Operator: Tioxide Europe Ltd Waste Management licence No: 70833 Annual Tonnage: 475000.0	Issue Date: 08/10/1991 Effective Date: - Modified: - Surrendered Date: 06/11/2007 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Landfill Site - South Killingholme Correspondence Address: -
Not shown	1183	SE	517600 416500	Site Address: Tioxide Europe Ltd, Humber Road, Grimsby, N E Lincs, DN31 2SW Type: Industrial Waste Landfill (Factory curtilage) Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: TIO003 EPR reference: - Operator: Tioxide Europe Ltd Waste Management licence No: 70833 Annual Tonnage: 25000.0	Issue Date: 08/10/1991 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Landfill Site - South Killingholme Correspondence Address: Tioxide Europe Ltd, Moody Lane, Grimsby, N E Lincs, DN31 2SW

4. Current Land Use Map



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: 21

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	0	On Site	Pylon	516517 417289	Pylon, DN40	Electrical Features	Infrastructure and Facilities
2	24	S	Settling Tank	516489 417254	Settling Tank, DN40	Waste Storage, Processing and Disposal	Infrastructure and Facilities
3	64	W	Oil Refinery	516323 417426	Oil Refinery, DN40	Oil and Gas Extraction, Refinery and Product Manufacture	Extractive Industries
4	76	NE	Pipeline	516939 417475	Pipeline, DN40	Pipelines	Industrial Features
5	124	W	Tank	516285 417291	Tank, DN40	Tanks (Generic)	Industrial Features
6	132	SE	Pipeline	516743 417217	Pipeline, DN40	Pipelines	Industrial Features
7	154	W	Tank	516236 417364	Tank, DN40	Tanks (Generic)	Industrial Features
8	160	SW	Tank	516267 417220	Tank, DN40	Tanks (Generic)	Industrial Features
9	164	W	Tank	516220 417403	Tank, DN40	Tanks (Generic)	Industrial Features
10	168	W	Tank	516243 417275	Tank, DN40	Tanks (Generic)	Industrial Features
11	173	SE	Chimney	516723 417160	Chimney, DN40	Chimneys	Industrial Features
12	179	W	Tank	516209 417443	Tank, DN40	Tanks (Generic)	Industrial Features
13	193	W	Tank	516199 417349	Tank, DN40	Tanks (Generic)	Industrial Features
14	195	W	Tank	516199 417466	Tank, DN40	Tanks (Generic)	Industrial Features
15	200	W	Tank	516185 417389	Tank, DN40	Tanks (Generic)	Industrial Features
16	212	NW	Pylon	516374 417634	Pylon, DN40	Electrical Features	Infrastructure and Facilities
17	212	NW	Tank	516189 417489	Tank, DN40	Tanks (Generic)	Industrial Features
18	221	W	Tank	516164 417423	Tank, DN40	Tanks (Generic)	Industrial Features
19	233	W	Tank	516155 417448	Tank, DN40	Tanks (Generic)	Industrial Features

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
20	237	S	Chimney	516563 417031	Chimney, DN40	Chimneys	Industrial Features
21	249	W	Tank	516144 417470	Tank, DN40	Tanks (Generic)	Industrial Features

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
TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
TFD-XCZ	TIDAL FLAT DEPOSITS	CLAY AND SILT

5.3 Bedrock and Solid Geology

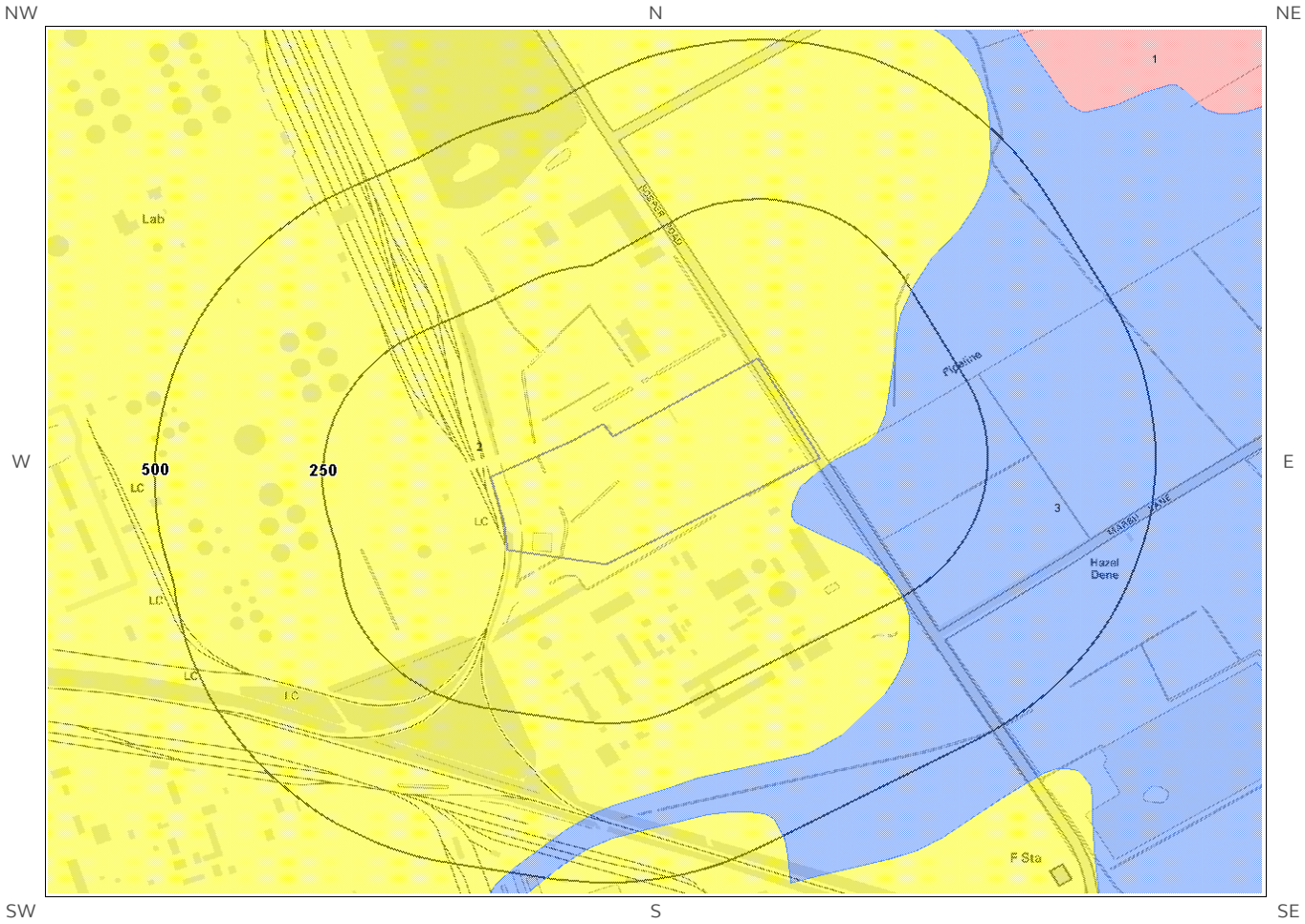
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
BCK-CHLK	BURNHAM CHALK FORMATION	CHALK

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

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

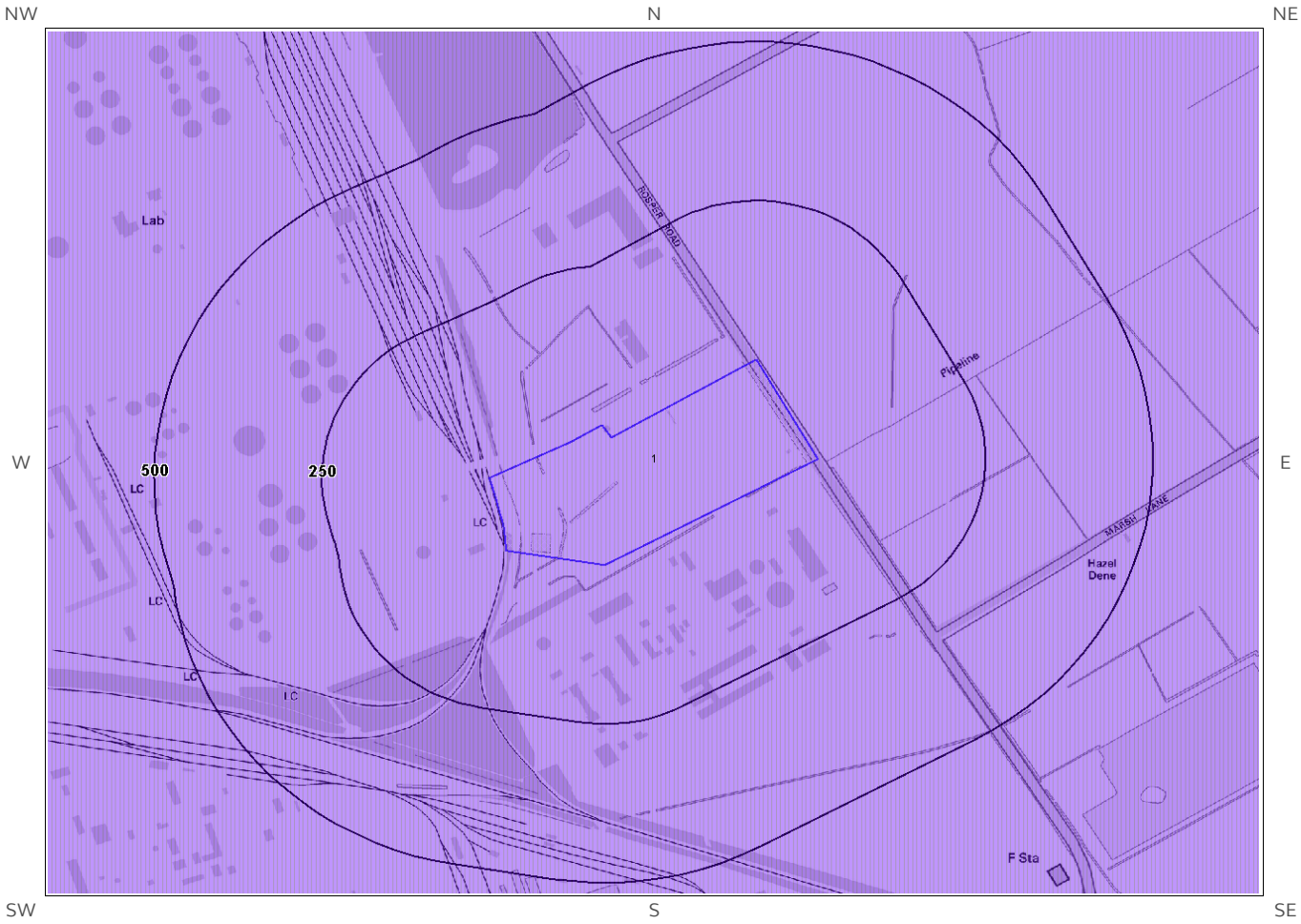
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licenses



Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

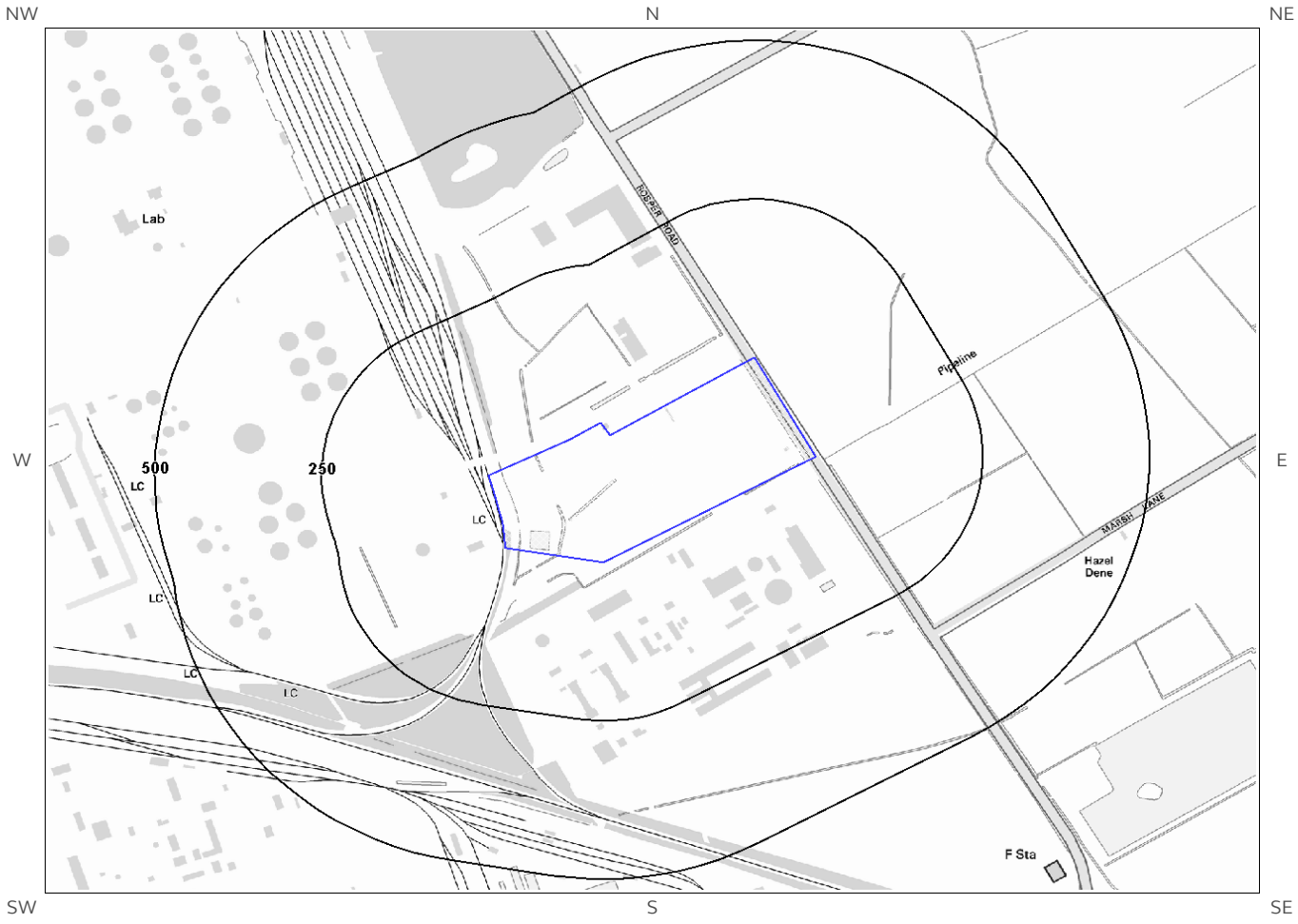
Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

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



Site Outline

250
500
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

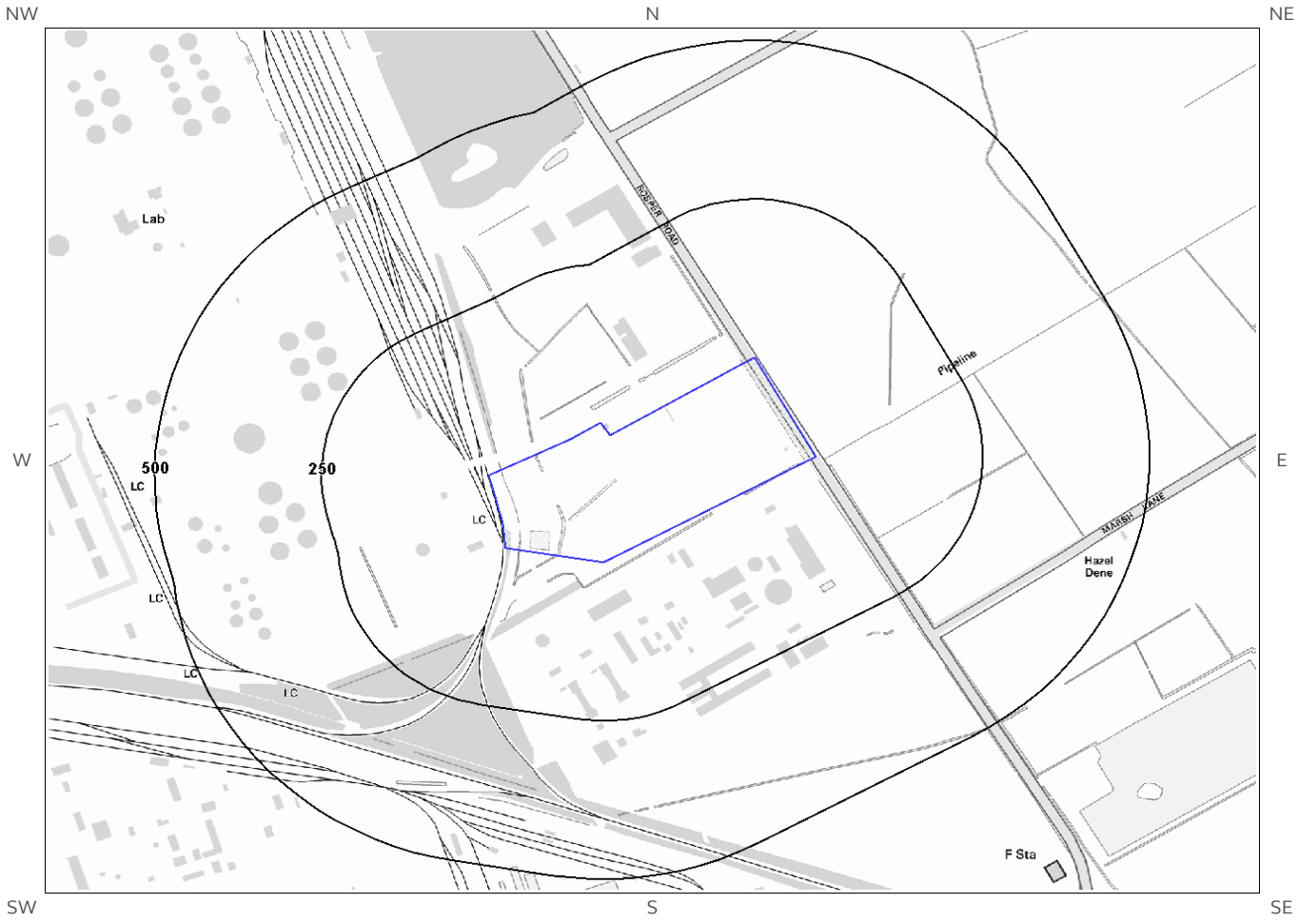
Source Protection Zone 2 - Outer Catchment

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



Site Outline

250
500
Search Buffers (m)

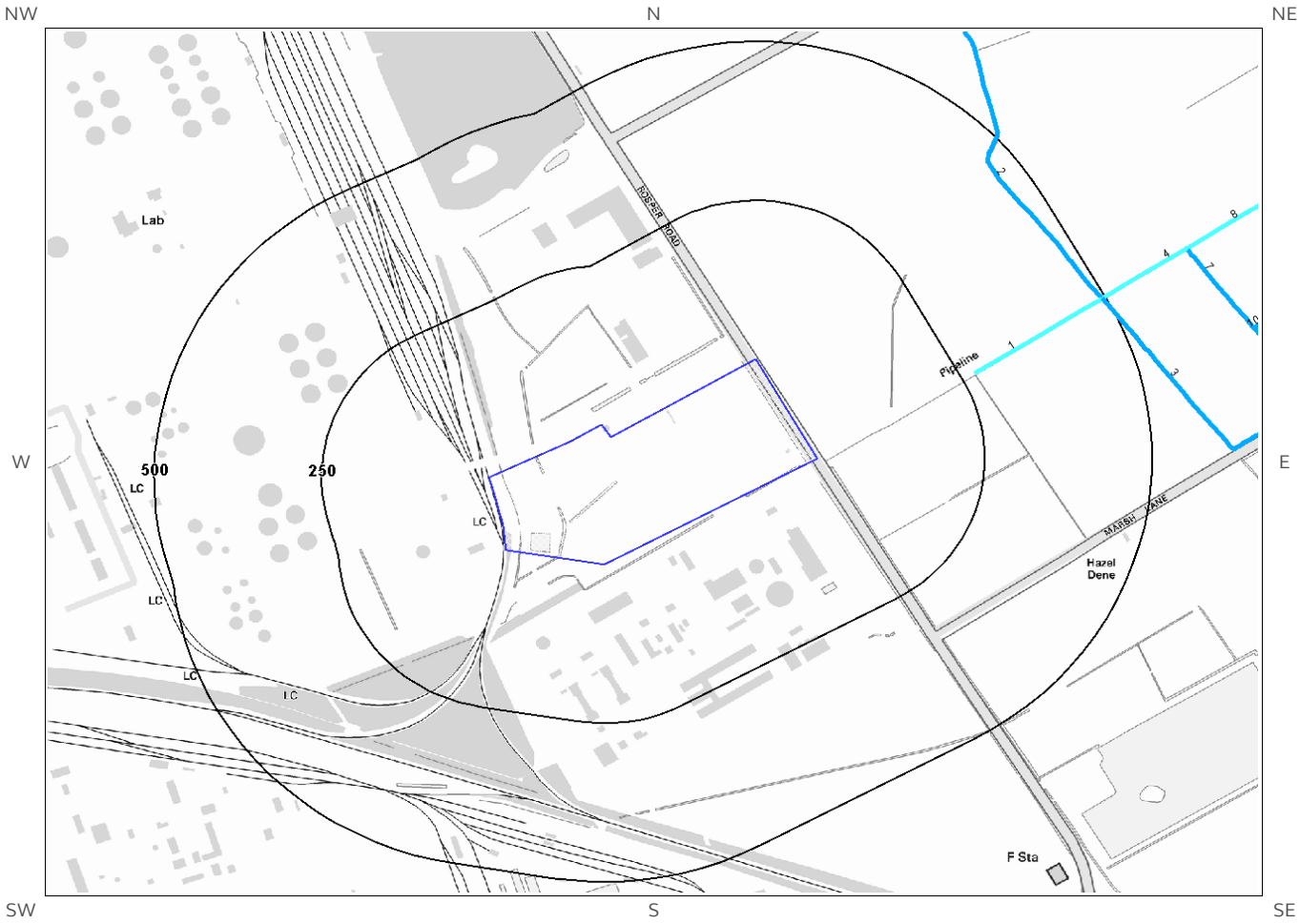
Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

6e. Hydrology – Detailed River Network and River Quality



Site Outline

250
500
Search Buffers (m)

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

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

From 1 April 2010, the Environment Agency/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
2	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
3	15	SE	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.2 Aquifer within Bedrock Deposits

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

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	860	SW	515620 416950	Status: Historical Licence No: 4/29/09/*G/0124 Details: Process water Direct Source: Ground Water Source Of Supply Point: Conoco Bore2 S.killingholme Data Type: Point Name: CONOCO LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 1/6/1980 Expiry Date: 31/07/2002 Issue No: 100 Version Start Date: 1/7/1997 Version End Date:
Not shown	860	SW	515620 416950	Status: Historical Licence No: 4/29/09/*G/0145 Details: Process Water Direct Source: Ground Water Source Of Supply Point: Conoco Bore2 S.killingholme Data Type: Point Name: CONOCOPHILLIPS LTD	Annual Volume (m^3): 619000 Max Daily Volume (m^3): 1700 Original Application No: NA363 Original Start Date: 2/7/2002 Expiry Date: 31/3/2010 Issue No: 2 Version Start Date: 15/7/2003 Version End Date:
Not shown	860	SW	515620 416950	Status: Historical Licence No: AN/029/0009/001 Details: Process Water Direct Source: Ground Water Source Of Supply Point: Conoco Bore2 S.killingholme Data Type: Point Name: Phillips 66 Ltd	Annual Volume (m^3): 619000 Max Daily Volume (m^3): 1700 Original Application No: NPS/WR/002956 Original Start Date: 1/4/2010 Expiry Date: 31/3/2018 Issue No: 1 Version Start Date: 1/4/2010 Version End Date:
Not shown	860	SW	515620 416950	Status: Active Licence No: AN/029/0009/001 Details: Process Water Direct Source: Ground Water Source Of Supply Point: Borehole 2 S.killingholme Data Type: Point Name: Phillips 66 Limited	Annual Volume (m^3): 619000 Max Daily Volume (m^3): 1700 Original Application No: NPS/WR/011064 Original Start Date: 1/4/2010 Expiry Date: 31/3/2018 Issue No: 2 Version Start Date: 13/7/2012 Version End Date:
Not shown	885	E	517760 417440	Status: Active Licence No: 4/29/09/*G/0129 Details: General Use Relating To Secondary Category (Low Loss) Direct Source: Ground Water Source Of Supply Point: Inland Cavern Bore 1 Data Type: Point Name: Phillips 66 Limited	Annual Volume (m^3): 14000 Max Daily Volume (m^3): 1056 Original Application No: NPS/WR/011065 Original Start Date: 8/5/1985 Expiry Date: - Issue No: 102 Version Start Date: 13/7/2012 Version End Date:
Not shown	895	E	517770 417440	Status: Active Licence No: 4/29/09/*G/0129 Details: General Use Relating To Secondary Category (Low Loss) Direct Source: Ground Water Source Of Supply Point: Inland Cavern Bore 2 Data Type: Point Name: Phillips 66 Limited	Annual Volume (m^3): 14000 Max Daily Volume (m^3): 1056 Original Application No: NPS/WR/011065 Original Start Date: 8/5/1985 Expiry Date: - Issue No: 102 Version Start Date: 13/7/2012 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	921	SW	515730 416670	Status: Historical Licence No: AN/029/0009/001 Details: Process Water Direct Source: Ground Water Source Of Supply Point: Conoco Bore1 S.killingholme Data Type: Point Name: Phillips 66 Ltd	Annual Volume (m^3): 619000 Max Daily Volume (m^3): 1700 Original Application No: NPS/WR/002956 Original Start Date: 1/4/2010 Expiry Date: 31/3/2018 Issue No: 1 Version Start Date: 1/4/2010 Version End Date:
Not shown	921	SW	515730 416670	Status: Historical Licence No: 4/29/09/*G/0145 Details: Process Water Direct Source: Ground Water Source Of Supply Point: Conoco Bore1 S.killingholme Data Type: Point Name: CONOCOPHILLIPS LTD	Annual Volume (m^3): 619000 Max Daily Volume (m^3): 1700 Original Application No: NA363 Original Start Date: 2/7/2002 Expiry Date: 31/3/2010 Issue No: 2 Version Start Date: 15/7/2003 Version End Date:
Not shown	921	SW	515730 416670	Status: Historical Licence No: 4/29/09/*G/0124 Details: Process water Direct Source: Ground Water Source Of Supply Point: Conoco Bore1 S.killingholme Data Type: Point Name: CONOCO LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 1/6/1980 Expiry Date: 31/07/2002 Issue No: 100 Version Start Date: 1/7/1997 Version End Date:
Not shown	921	SW	515730 416670	Status: Active Licence No: AN/029/0009/001 Details: Process Water Direct Source: Ground Water Source Of Supply Point: Borehole 1 S.killingholme Data Type: Point Name: Phillips 66 Limited	Annual Volume (m^3): 619000 Max Daily Volume (m^3): 1700 Original Application No: NPS/WR/011064 Original Start Date: 1/4/2010 Expiry Date: 31/3/2018 Issue No: 2 Version Start Date: 13/7/2012 Version End Date:
Not shown	1346	E	518170 417800	Status: Active Licence No: 4/29/09/*G/0129 Details: General Use Relating To Secondary Category (Low Loss) Direct Source: Ground Water Source Of Supply Point: Riverside Cavern Bore 1 Data Type: Point Name: Phillips 66 Limited	Annual Volume (m^3): 14000 Max Daily Volume (m^3): 1056 Original Application No: NPS/WR/011065 Original Start Date: 8/5/1985 Expiry Date: - Issue No: 102 Version Start Date: 13/7/2012 Version End Date:
Not shown	1355	E	518180 417800	Status: Active Licence No: 4/29/09/*G/0129 Details: General Use Relating To Secondary Category (Low Loss) Direct Source: Ground Water Source Of Supply Point: Riverside Cavern Bore 2 Data Type: Point Name: Phillips 66 Limited	Annual Volume (m^3): 14000 Max Daily Volume (m^3): 1056 Original Application No: NPS/WR/011065 Original Start Date: 8/5/1985 Expiry Date: - Issue No: 102 Version Start Date: 13/7/2012 Version End Date:
Not shown	1875	SE	518578 416651	Status: Active Licence No: 4/29/09/*G/0045 Details: Raw Water Supply Direct Source: Ground Water Source Of Supply Point: Timber Yard Bore Data Type: Point Name: ASSOCIATED BRITISH PORTS	Annual Volume (m^3): 1400000 Max Daily Volume (m^3): 5480 Original Application No: NPS/WR/002800 Original Start Date: 1/6/1966 Expiry Date: - Issue No: 101 Version Start Date: 7/12/2010 Version End Date:
Not shown	1917	SE	518600 416600	Status: Historical Licence No: 4/29/09/*G/0045 Details: Raw Water Supply Direct Source: Ground Water Source Of Supply Point: Timber Yard Bore Data Type: Point Name: ASSOCIATED BRITISH PORTS	Annual Volume (m^3): 945588 Max Daily Volume (m^3): 2619 Original Application No: - Original Start Date: 1/6/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/4/1997 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1968	SE	518197 415977	Status: Active Licence No: 4/29/09/*G/0045 Details: Raw Water Supply Direct Source: Ground Water Source Of Supply Point: Reception Bore Data Type: Point Name: ASSOCIATED BRITISH PORTS	Annual Volume (m^3): 1400000 Max Daily Volume (m^3): 5480 Original Application No: NPS/WR/002800 Original Start Date: 1/6/1966 Expiry Date: - Issue No: 101 Version Start Date: 7/12/2010 Version End Date:

6.4 Surface Water Abstraction Licences

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

Database searched and no data found.

6.5 Potable Water Abstraction Licences

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

Database searched and no data found.

6.6 Source Protection Zones

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

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.
338	E	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? No

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Detailed River Network

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

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

ID	Distance (m)	Direction	Details	
1	271	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	461	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
3	495	NE	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
4	495	NE	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined

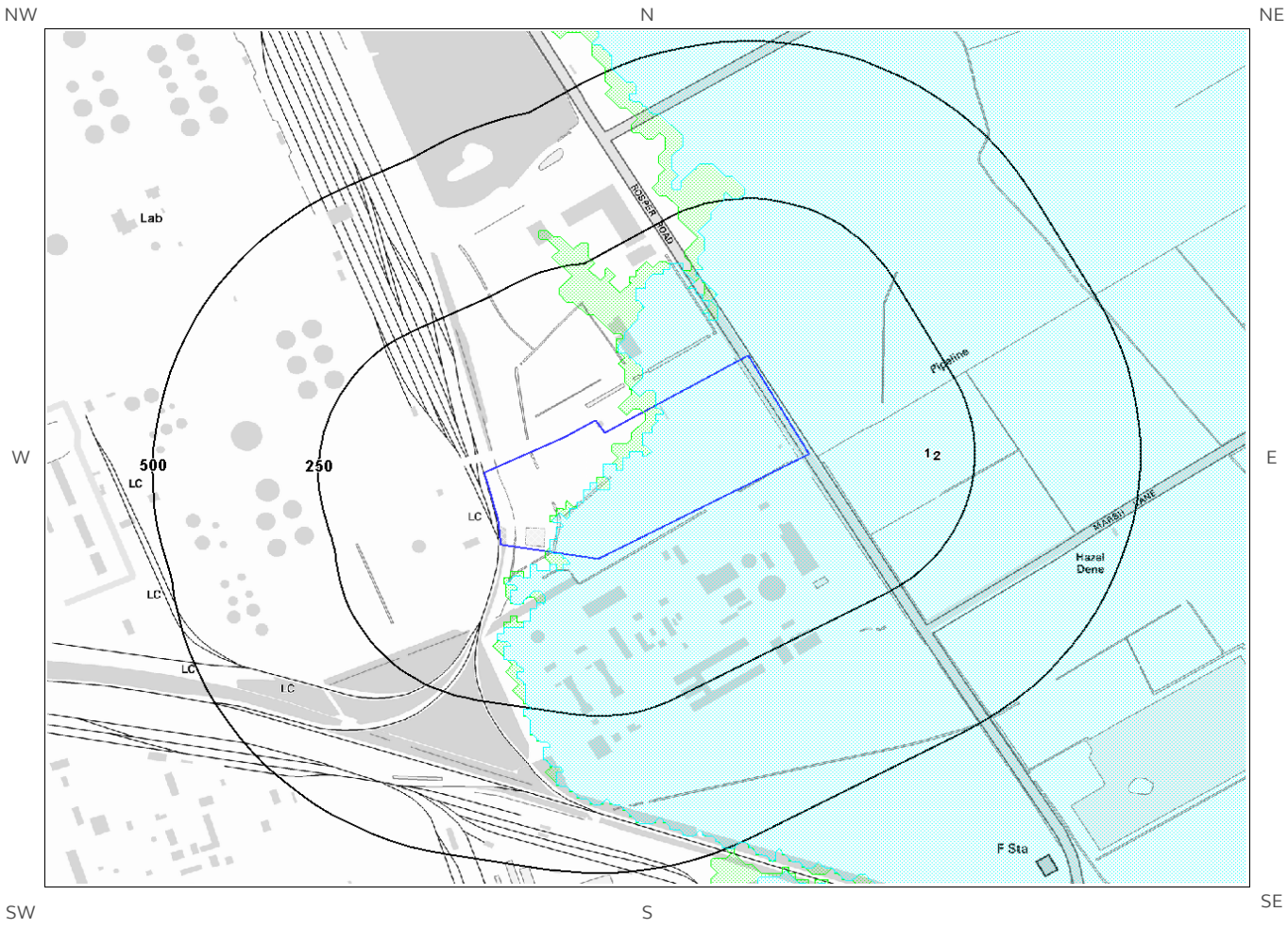
6.11 Surface Water Features

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

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
9	SE
21	SE
22	NW
25	NW
26	SW
29	NW
32	SE
45	W
50	NW
52	NW
55	NW
56	NW
65	W
68	W
77	S
82	NW
94	NW
142	S
156	SE
208	E
235	SW

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



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

Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? Yes

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

ID	Distance (m)	Direction	Update	Type
1	0	On Site	12-May-2017	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? Yes

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

ID	Distance (m)	Direction	Update	Type
1	0	On Site	15-May-2017	Zone 3 - (Fluvial Models)

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

What is the highest risk of flooding onsite? High

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 High (1 in 30 or greater) 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	Very Low
2	0.0	On Site	Very Low

3	0.0	On Site	High

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

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

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Clearwater Flooding

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

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

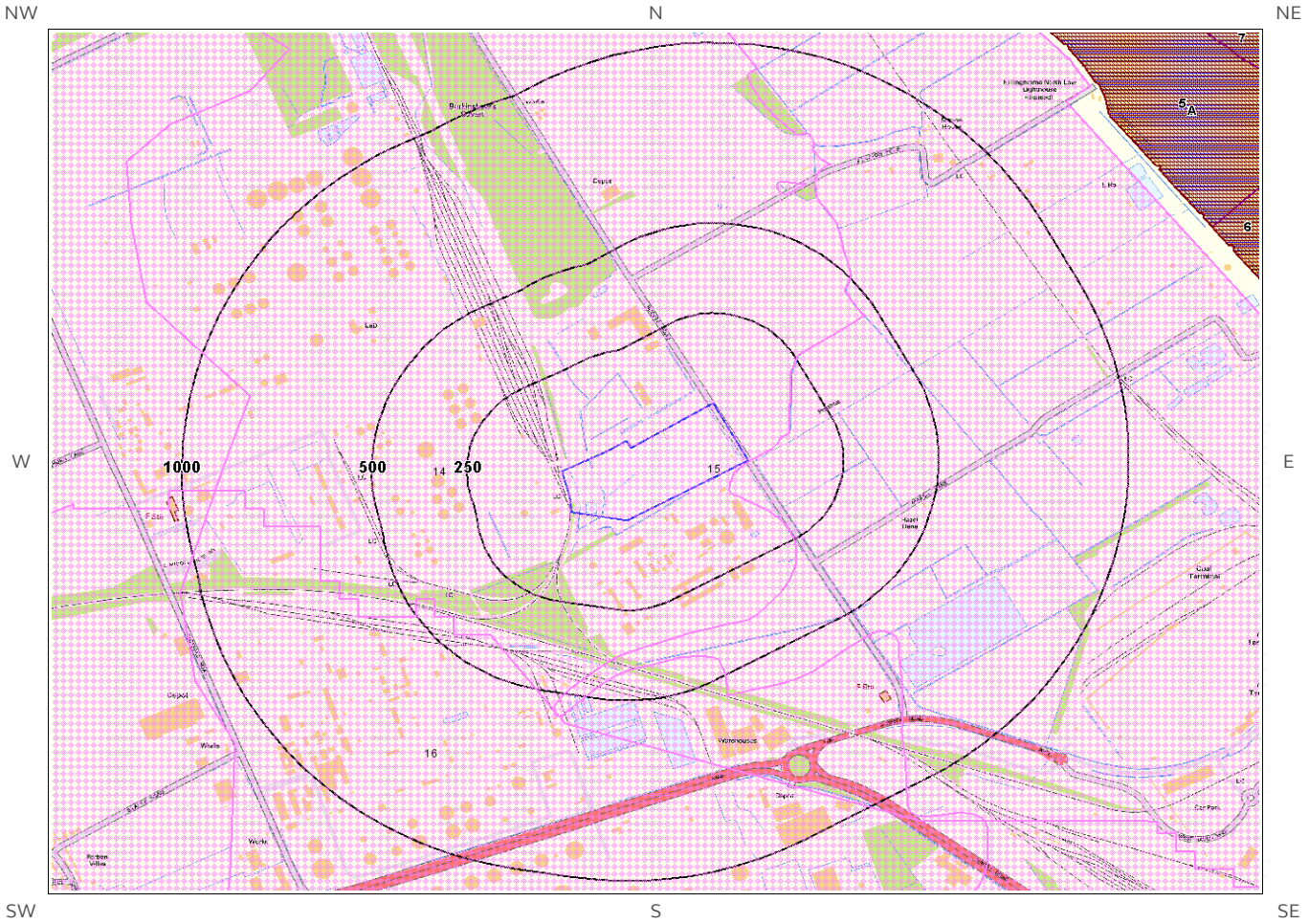
7.8 Groundwater Flooding Confidence Areas

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

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

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

8. Designated Environmentally Sensitive Sites Map



Site Outline

100
250
Search Buffers (m)

AONB
National Park
SSSI
Special Protection Areas
Nitrate Vulnerable Zones
Green Belt
Environmentally Sensitive Areas
Special Areas of Conservation
World Heritage Sites
Nitrate Sensitive Areas
Ancient Woodland
National Nature Reserve
Local Nature Reserves
Ramsar Sites

8. Designated Environmentally Sensitive Sites

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

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

6

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
5	1313	NE	Humber Estuary	Natural England
6	1380	NE	Humber Estuary	Natural England
7	1544	NE	Humber Estuary	Natural England
Not shown	1851	E	Humber Estuary	Natural England
Not shown	1917	N	North Killingholme Haven Pits	Natural England
Not shown	1945	N	North Killingholme Haven Pits	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:

1

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

ID	Distance (m)	Direction	SAC Name	Data Source
1	1313	NE	Humber Estuary	Natural England

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

3

The following Special Protection Area (SPA) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SPA Name	Data Source
2A	1313	NE	Humber Estuary	Natural England
Not shown	1917	N	Humber Estuary	Natural England
Not shown	1945	N	Humber Estuary	Natural England

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

3

The following Ramsar records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ramsar Site Name	Ramsar Site Status	Data Source
11A	1313	NE	Humber Estuary	Listed	Natural England
Not shown	1917	N	Humber Estuary	Listed	Natural England
Not shown	1945	N	Humber Estuary	Listed	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

4

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

ID	Distance (m)	Direction	NVZ Name	Data Source
14	0	On Site	Existing	DEFRA
15	0	On Site	New	DEFRA
16	402	SW	Existing	DEFRA
Not shown	1507	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

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Low

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

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

9.1.2 Landslides

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

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

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

9.1.3 Soluble Rocks

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

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

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

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

9.1.4 Compressible Ground

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

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

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build 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

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

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

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

9.1.6 Running Sand

What is the maximum Running Sand*[*] hazard rating identified on the study site? Moderate

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

Hazard
Significant potential for running sand problems with relatively small changes in ground conditions. Avoid large amounts of water entering the ground (for example through pipe leakage or soak-aways). Do not dig (deep) holes into saturated ground near the property without technical advice. For new build 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.

9.2 Radon

9.2.1 Radon Affected Areas

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

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

9.2.2 Radon Protection

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

10. Mining

10.1 Coal Mining

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

Database searched and no data found.

10.2 Non-Coal Mining

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

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

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

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

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

Public Health England
Public information access office
Public Health England, Wellington House
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www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
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Mansfield
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Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
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SO16 0AS
Tel: 08456 050505

Local Authority
Authority: North Lincolnshire Council
Phone: 01724 296 296
Web: http://www.northlincs.gov.uk/
Address: Civic Centre, Ashby Road, Scunthorpe, North Lincolns, DN16

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

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016

Groundsure
LOCATION INTELLIGENCE

AECOM

AECOM LTD,2, CITY WALK,
LEEDS, LS11 9AR

Groundsure Reference:	GS-3982431
Your Reference:	Oil_Refinery
Report Date	13 Jun 2017
Report Delivery Method:	Email - pdf

Geo Insight

Address: TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,

[redacted]

Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW**
Date:	**13 Jun 2017**
Reference:	**GS-3982431**
Client:	**AECOM**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	27-Sep-2014
Grid Reference:	516613,417411
Site Size:	8.16ha

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the 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: Geology 1:10,000 Scale		
1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	No
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of faults within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	No

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	2	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	0	0	0	0	0
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

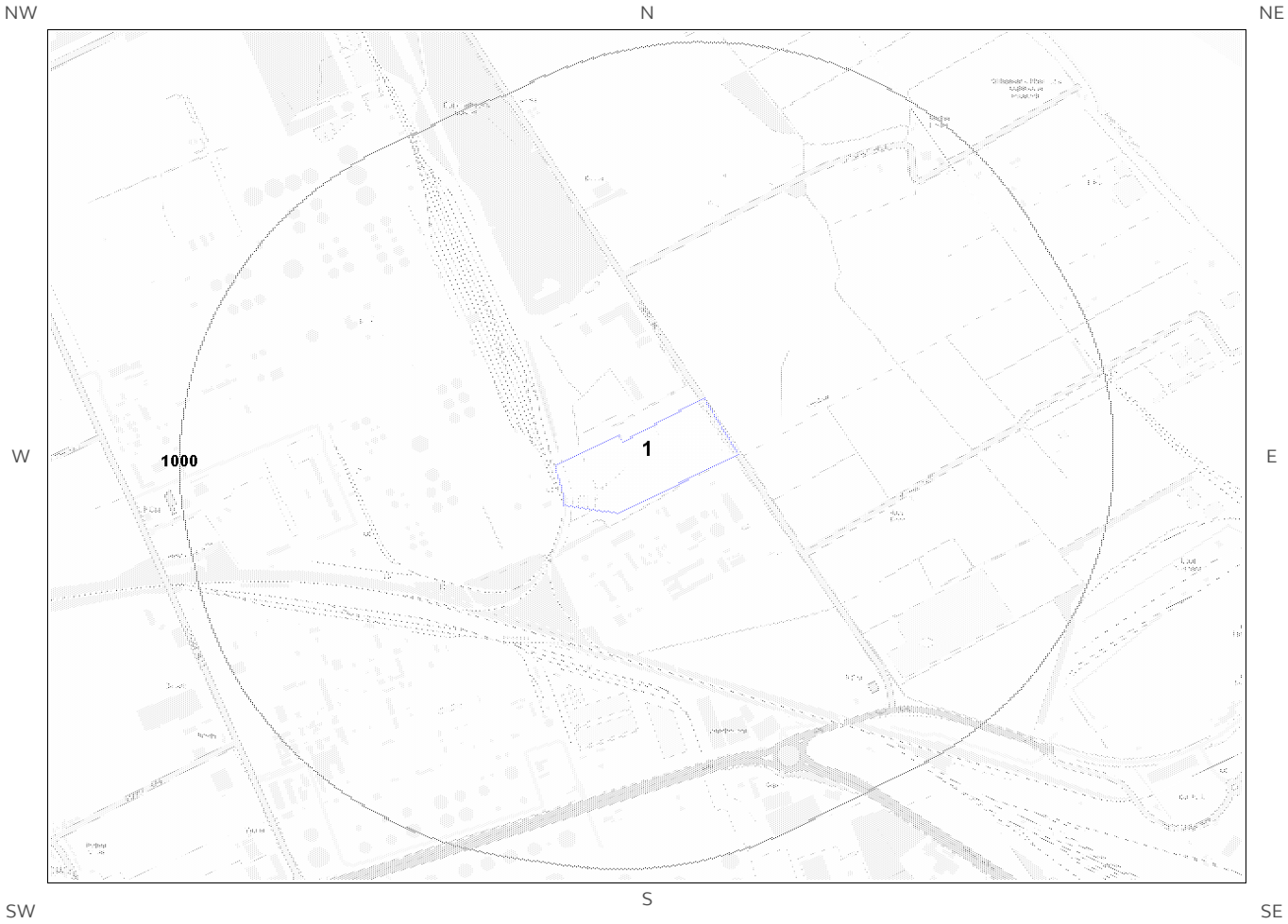
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Low
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Moderate
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Moderate

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	0	0

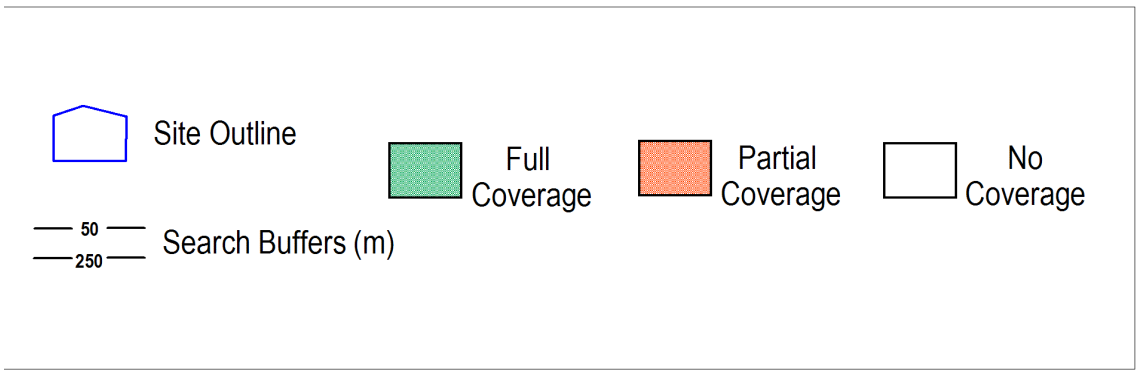
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	3	2	0

Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	3	1	1	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	24	40	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend



Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage

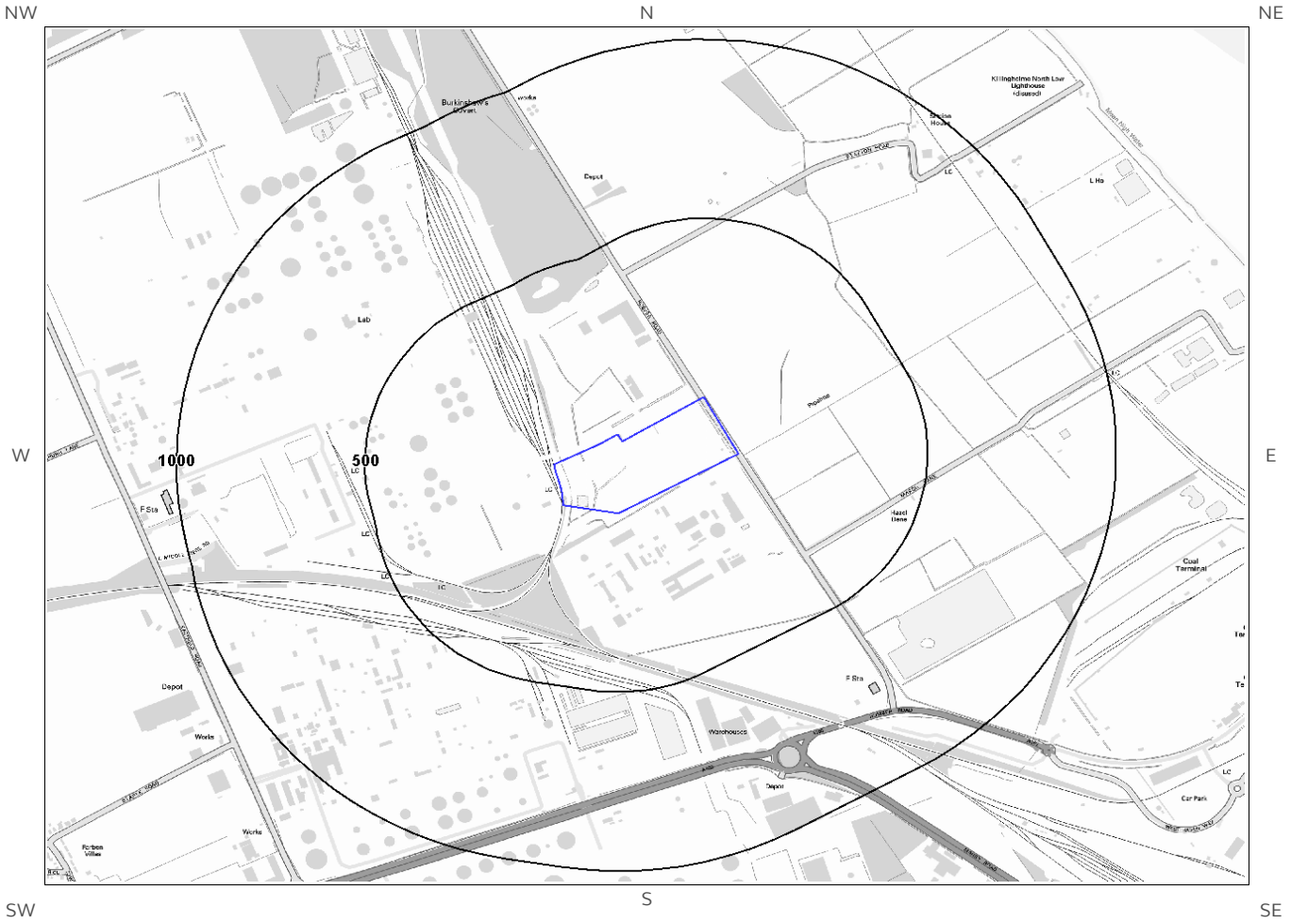
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

1 Geology (1:10,000 scale).

1.1 Artificial Ground Map (1:10,000 scale)



Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Disturbed Ground (undivided)

Worked Ground (undivided)

Landscaped Ground (undivided)

Infilled Ground

Reclaimed Ground

1. Geology 1:10,000 scale

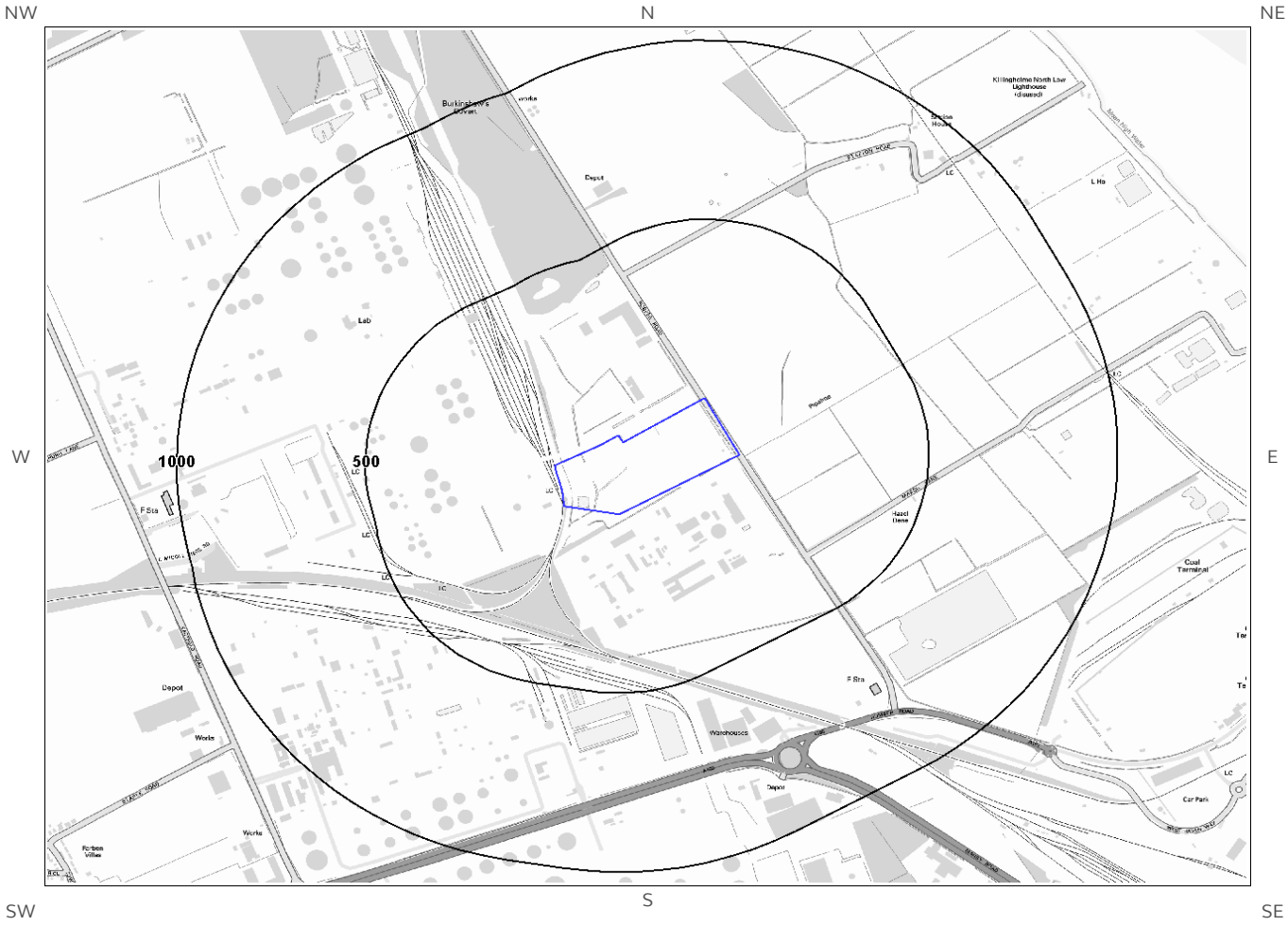
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2 Superficial Deposits and Landslips Map (1:10,000 scale)



Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

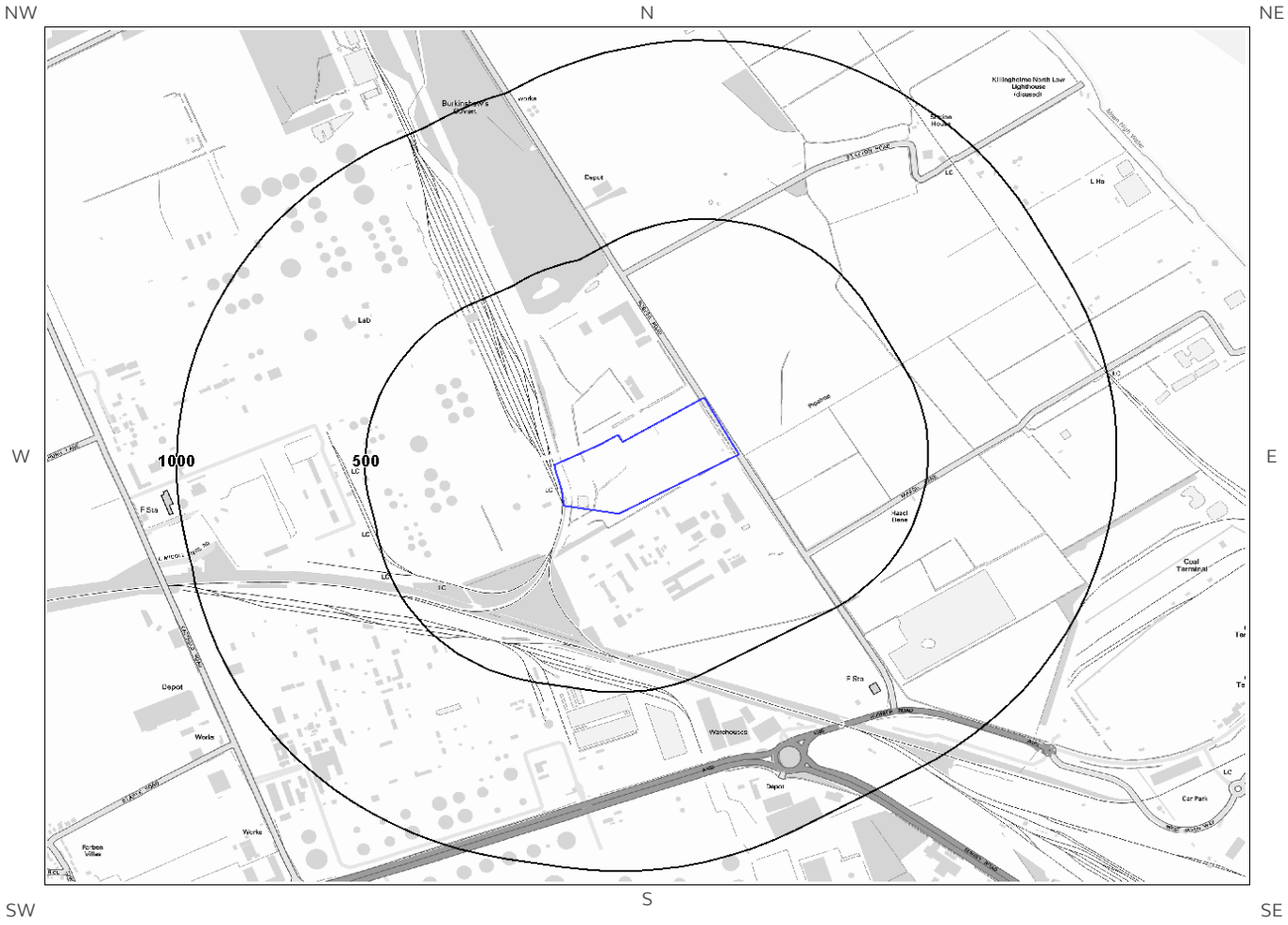
No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and Faults Map (1:10,000 scale)



Bedrock and Faults Legend

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

Database searched and no data found at this scale.

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found at this scale.

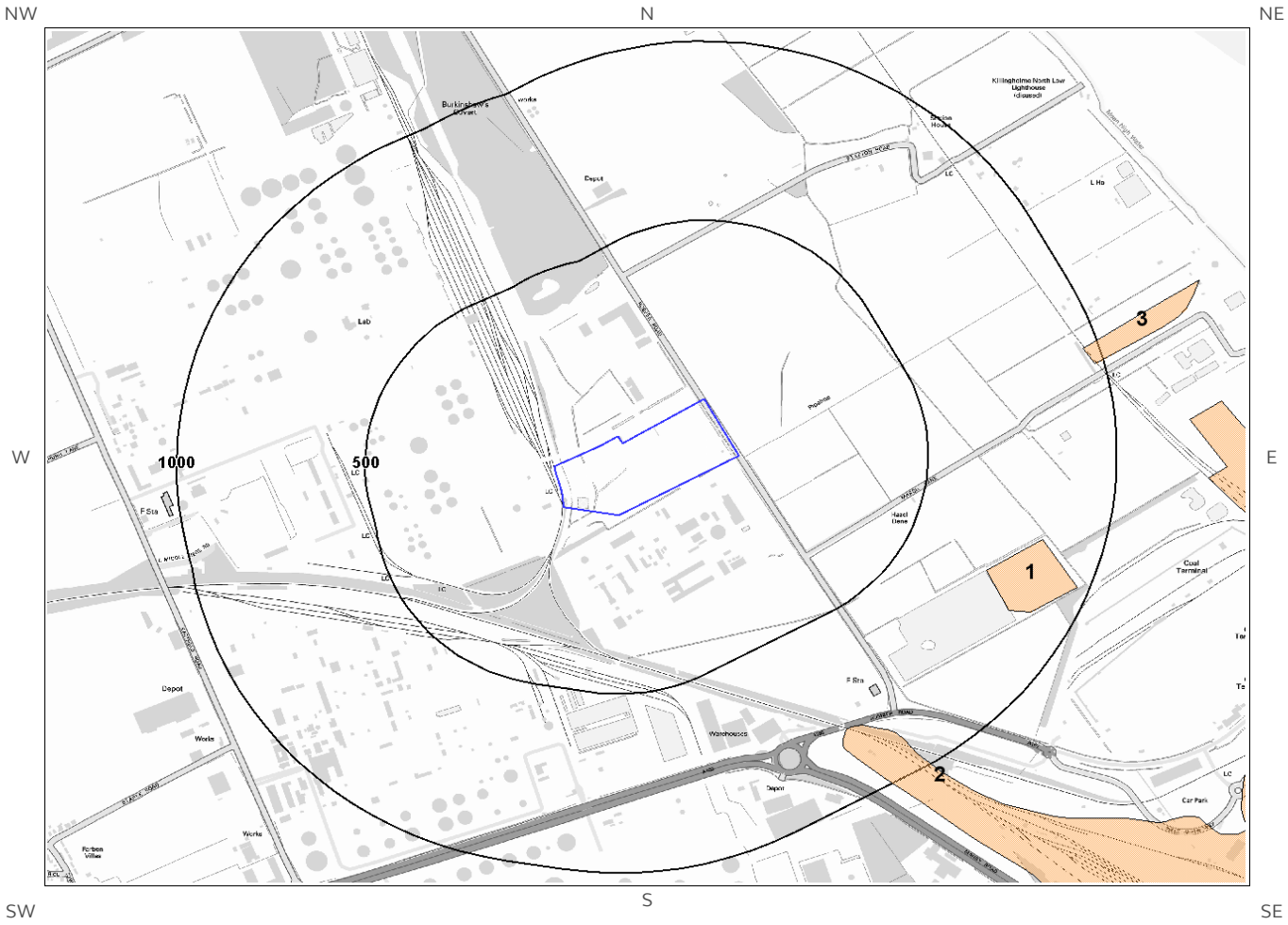
The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

---

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 081

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? No

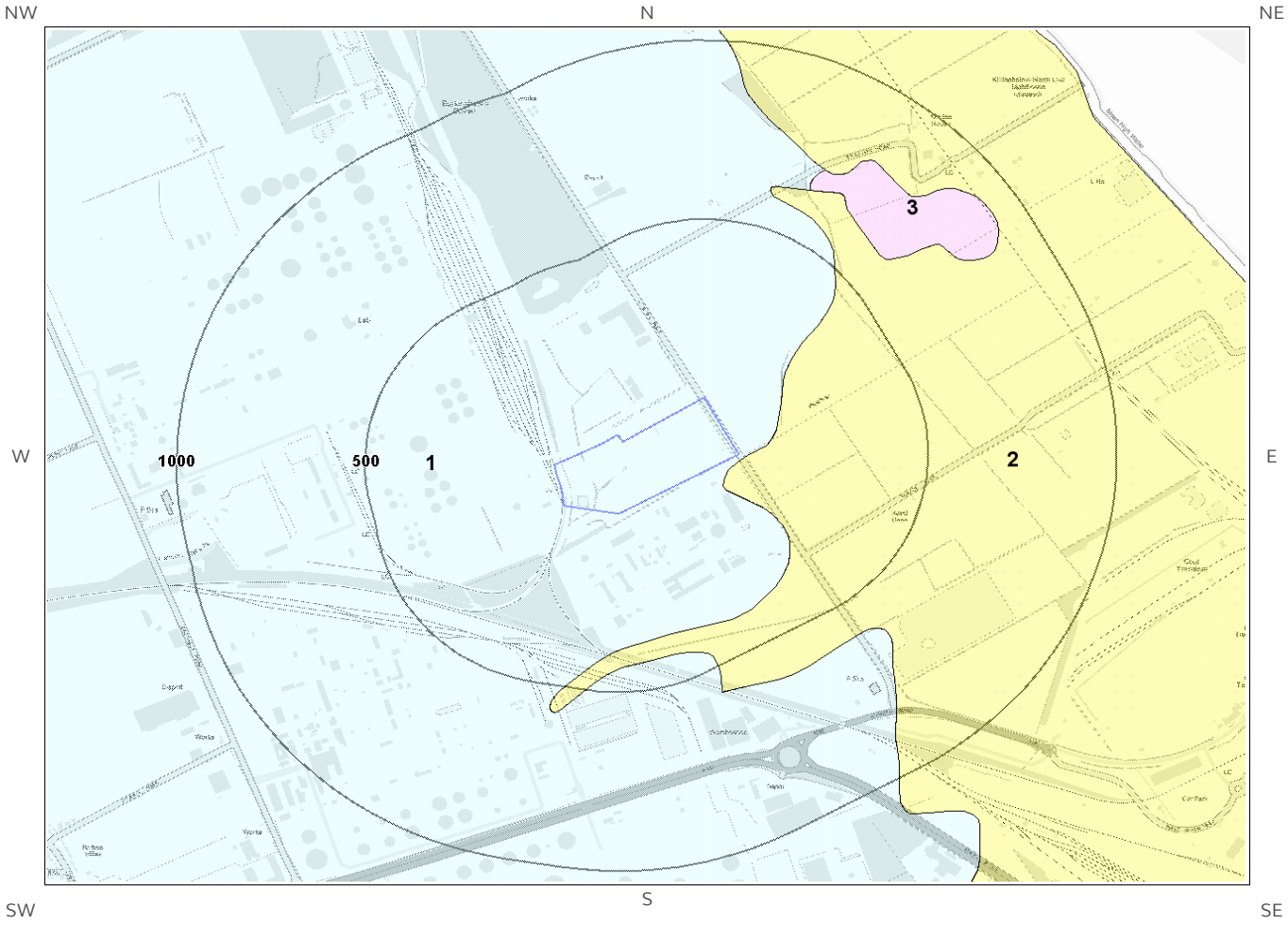
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

2.2 Superficial Deposits and Landslips Map (1:50,000 scale)



Ground Workings Legend

Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
2	15.0	SE	TFD-XCZ	TIDAL FLAT DEPOSITS	CLAY AND SILT

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Low
15.0	SE	Intergranular	Low	Very Low

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

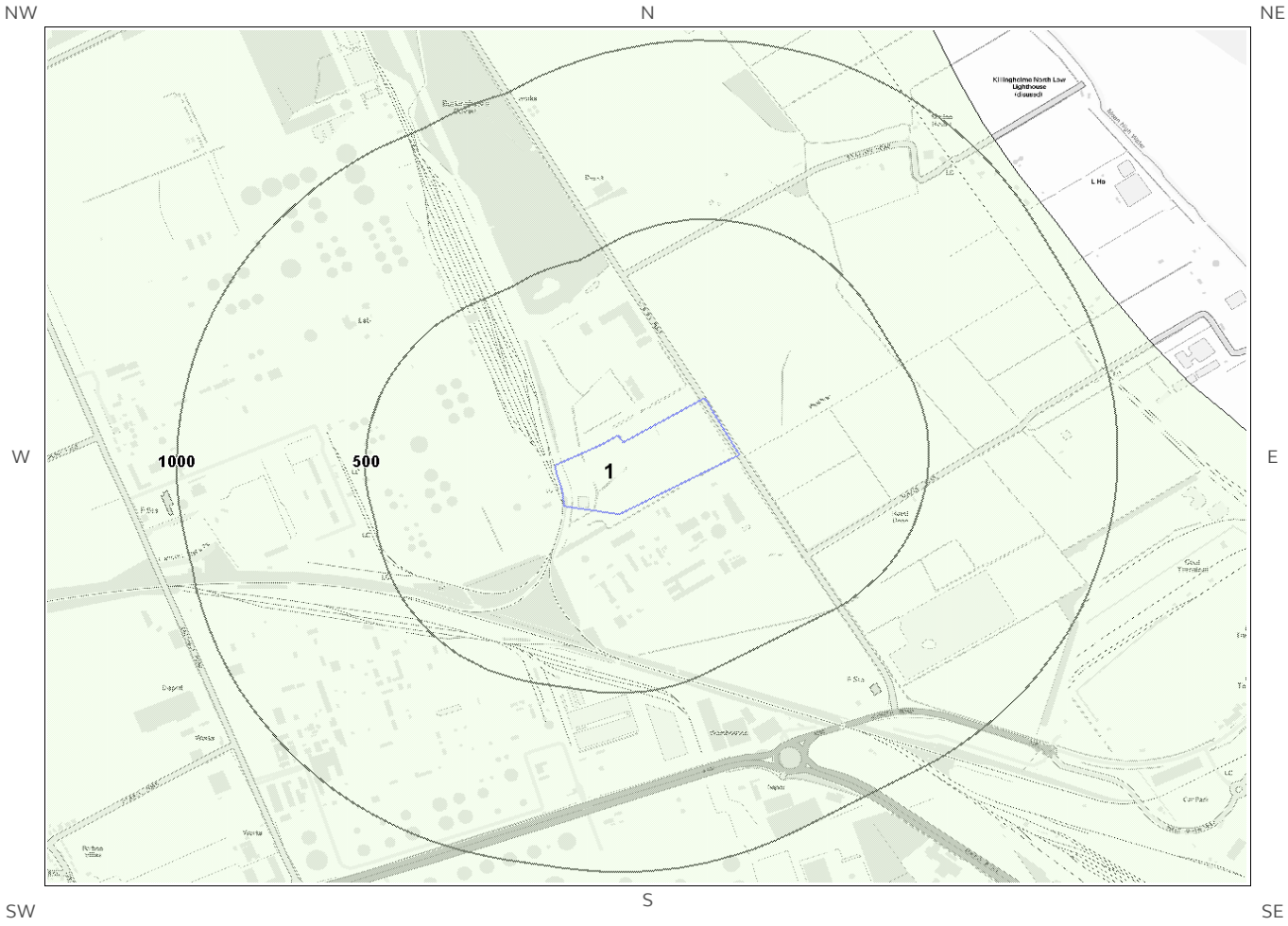
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and Faults Map (1:50,000 scale)



Ground Workings Legend

Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 081

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	BCK-CHLK	BURNHAM CHALK FORMATION - CHALK	TURONIAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Very High	Very High

2.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

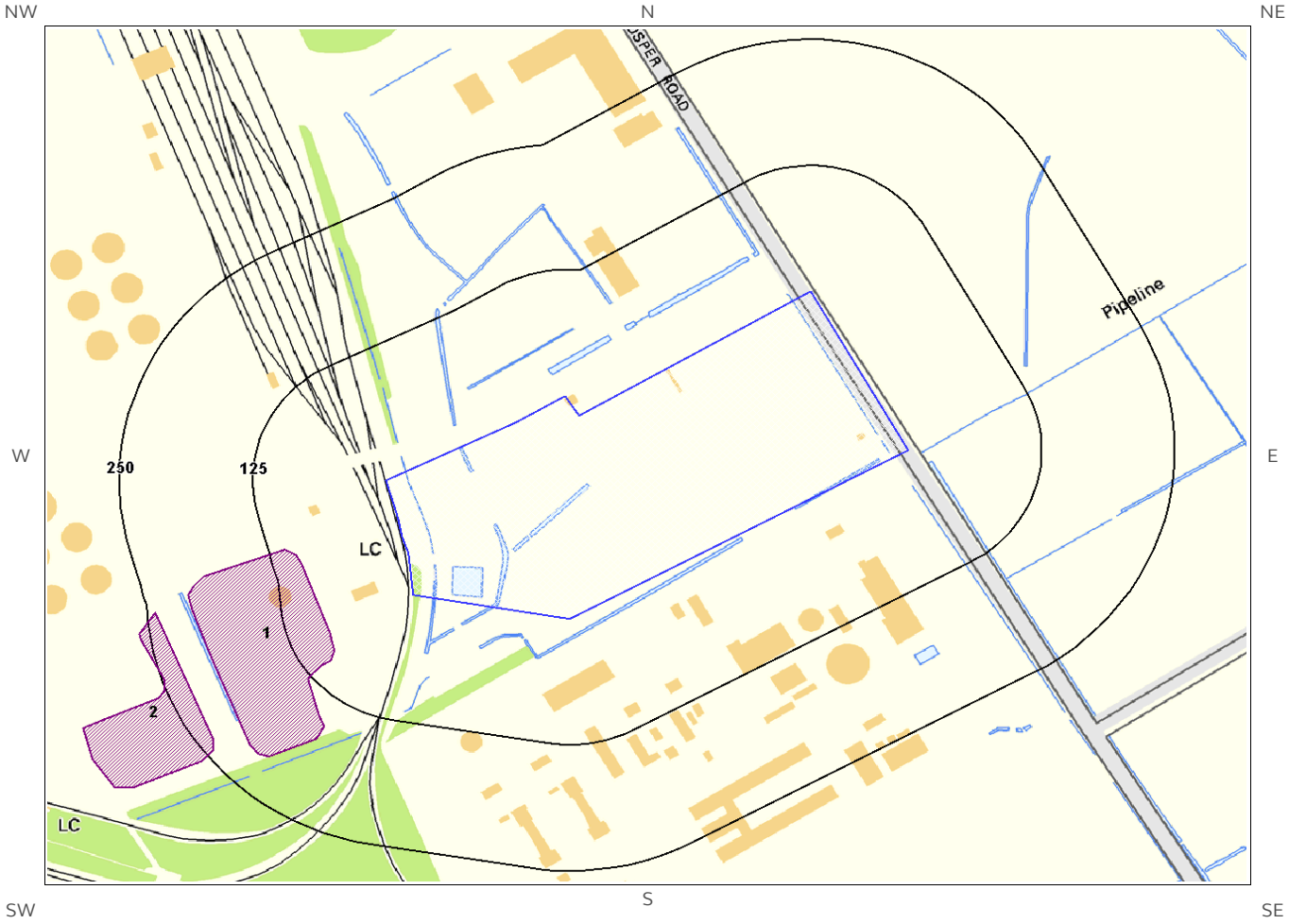
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

3.2 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.

---

4 Ground Workings Map



Ground Workings Legend

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1	86.0	W	516267 417234	Unspecified Heap	1983
2	229.0	SW	516186 417187	Unspecified Heap	1983

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

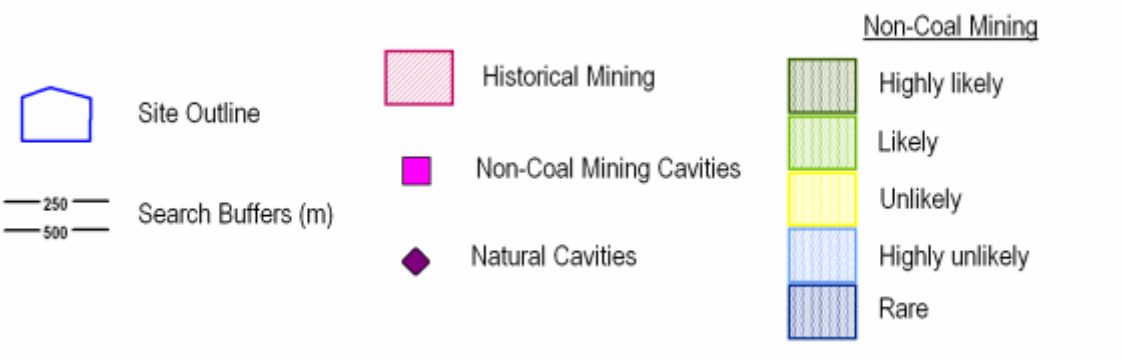
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? No

Database searched and no data found.

5 Mining, Extraction & Natural Cavities Map

Mining, Extraction and Natural Cavities Legend



5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

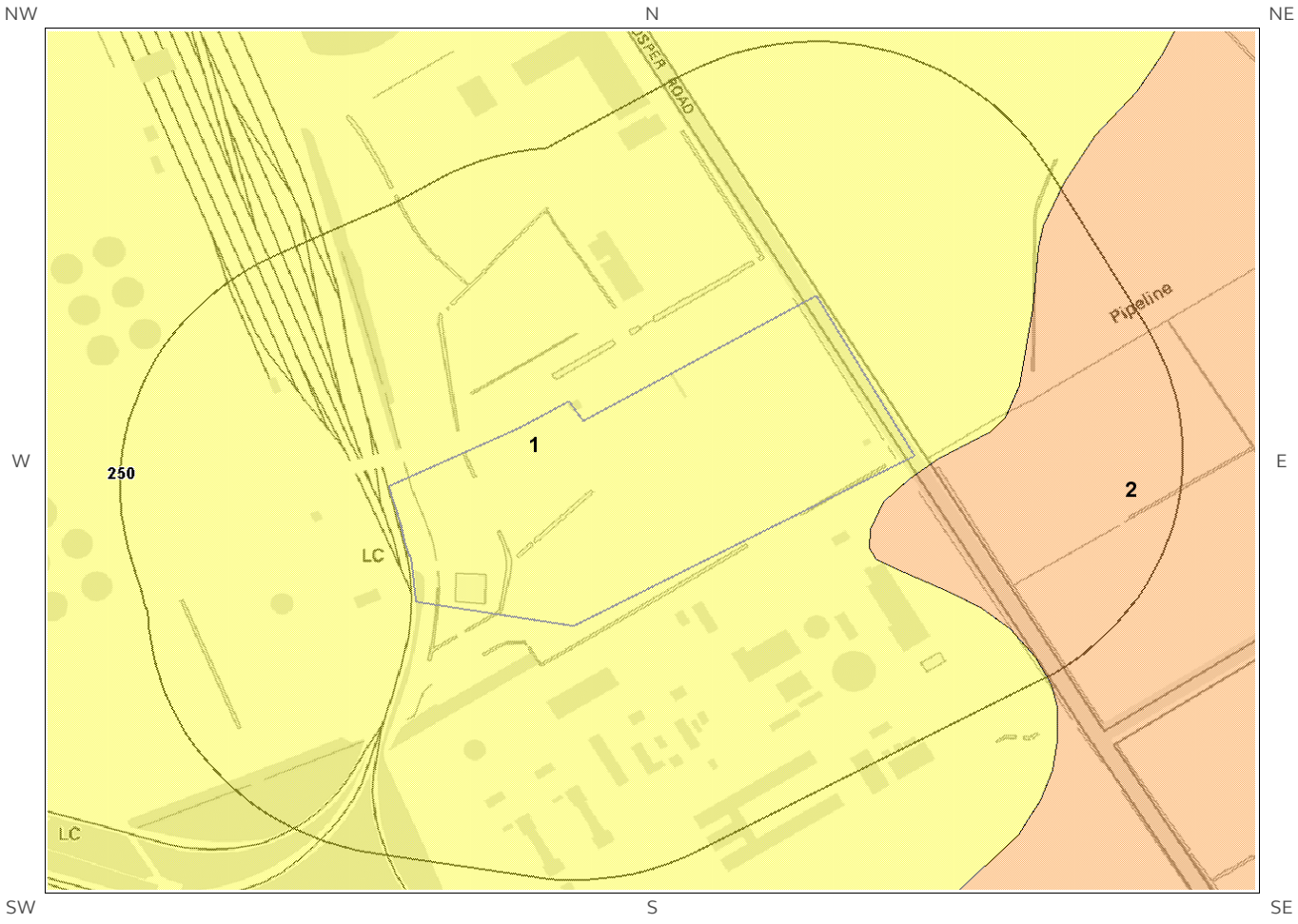
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

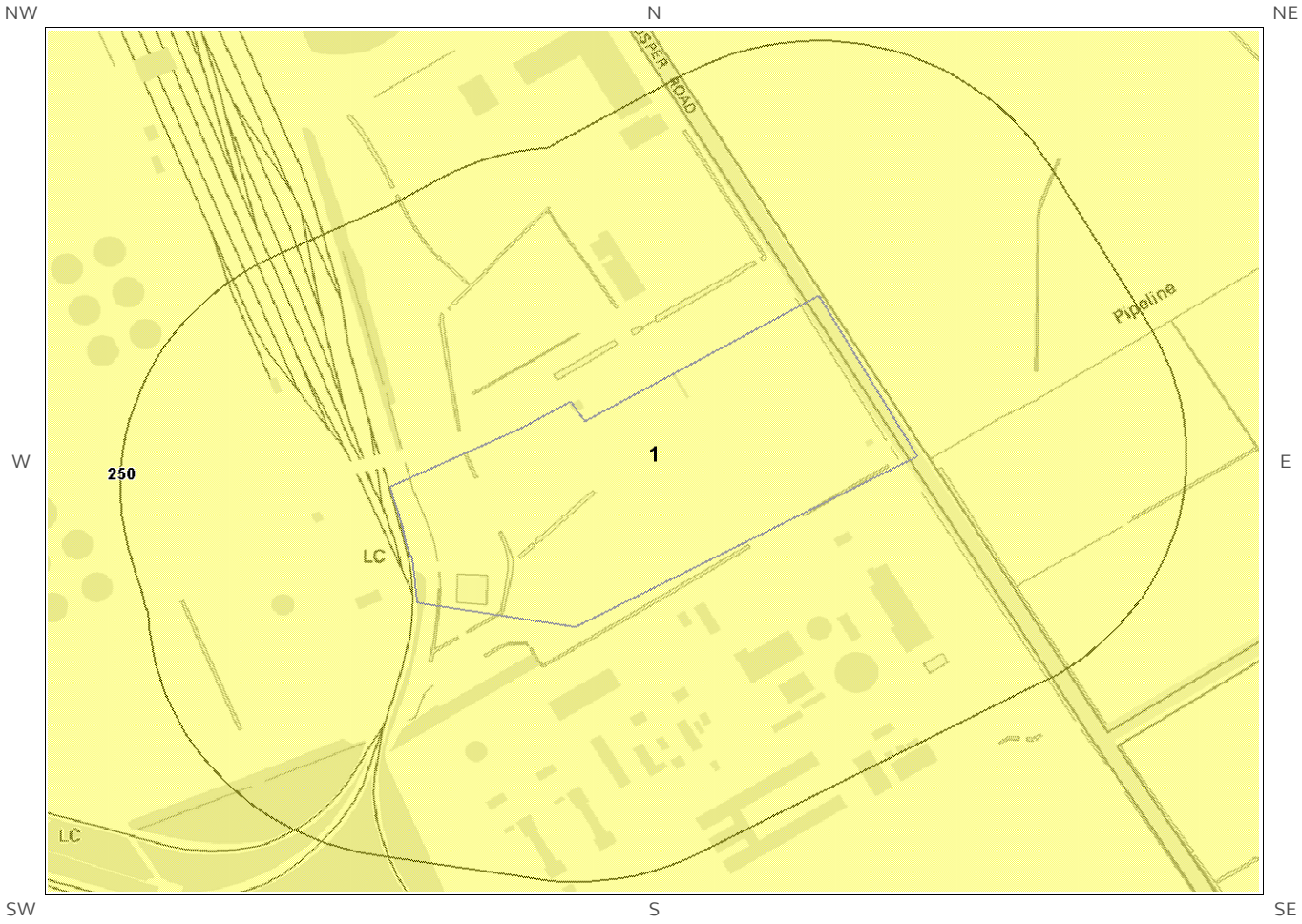
6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map



Shrink Swell Clay Legend

6.2 Landslides Map

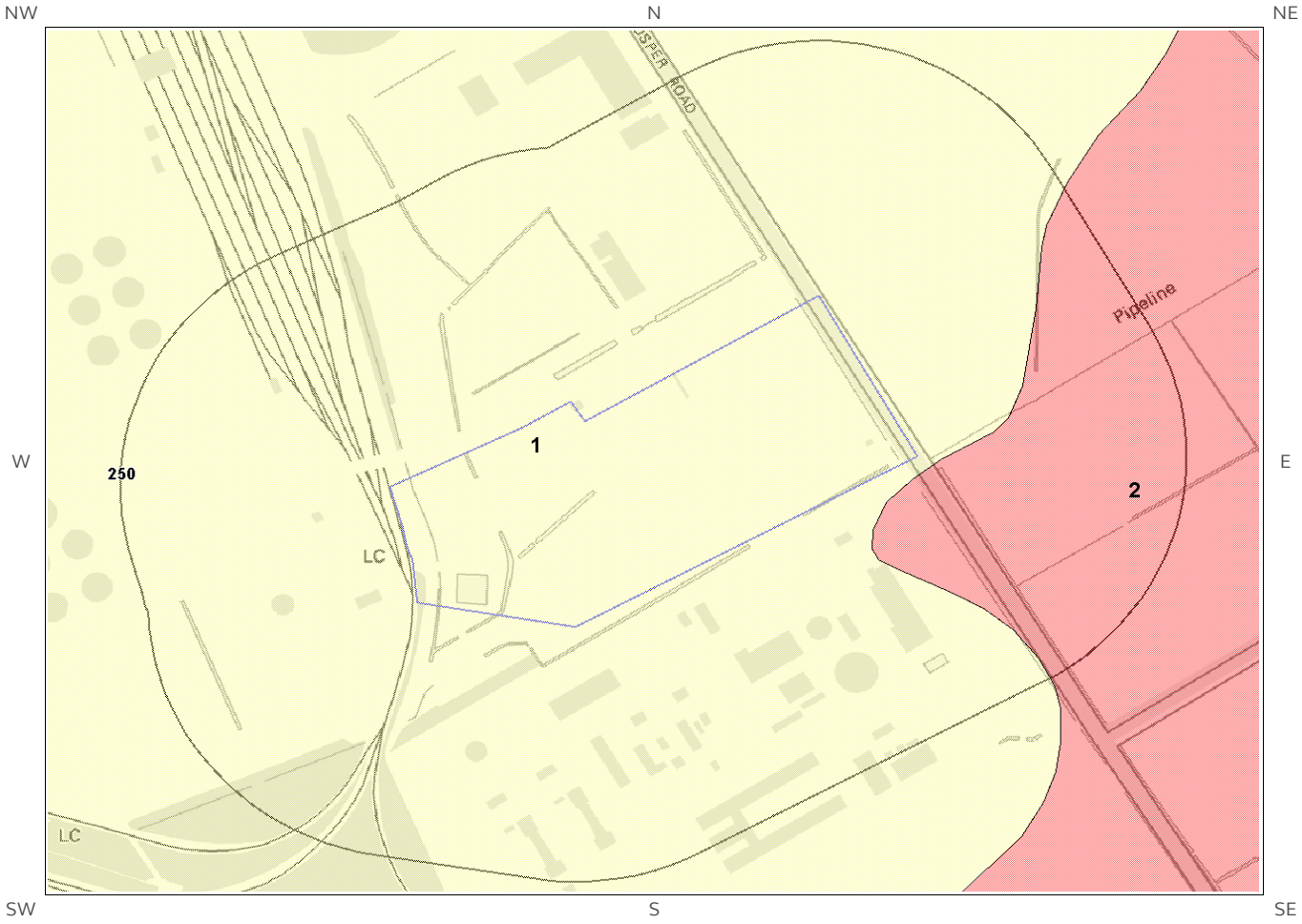


Landslides Legend

6.3 Ground Dissolution of Soluble Rocks Map

Ground Dissolution Soluble Rocks Legend

6.4 Compressible Deposits Map

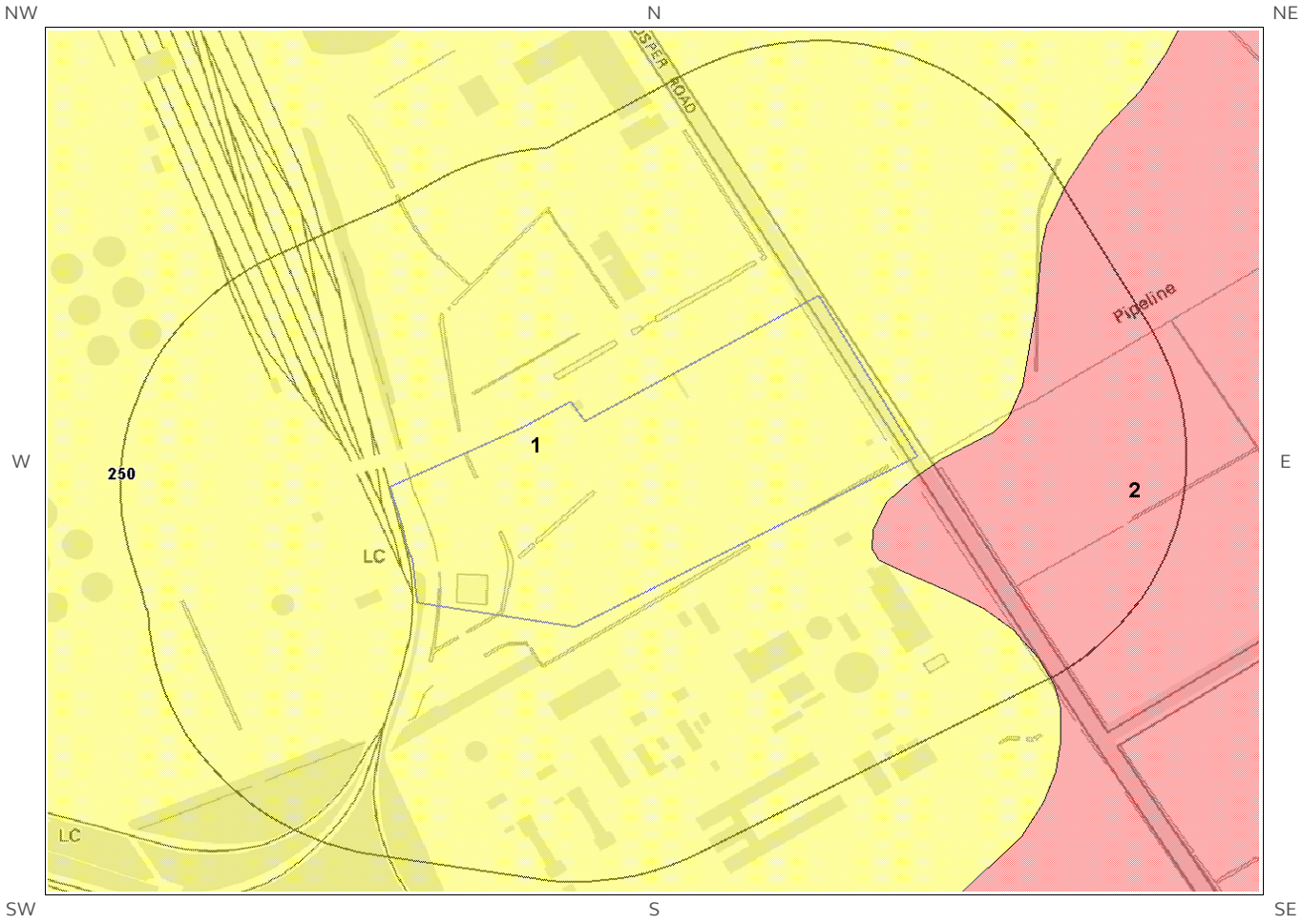


Compressible Deposits Legend

6.5 Collapsible Deposits Map

Collapsible Deposits Legend

6.6 Running Sand Map



Running Sand Legend

6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Moderate

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
2	15.0	SE	Low	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.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	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.

* This includes an automatically generated 50m buffer zone around the site

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	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.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	15.0	SE	Moderate	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.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

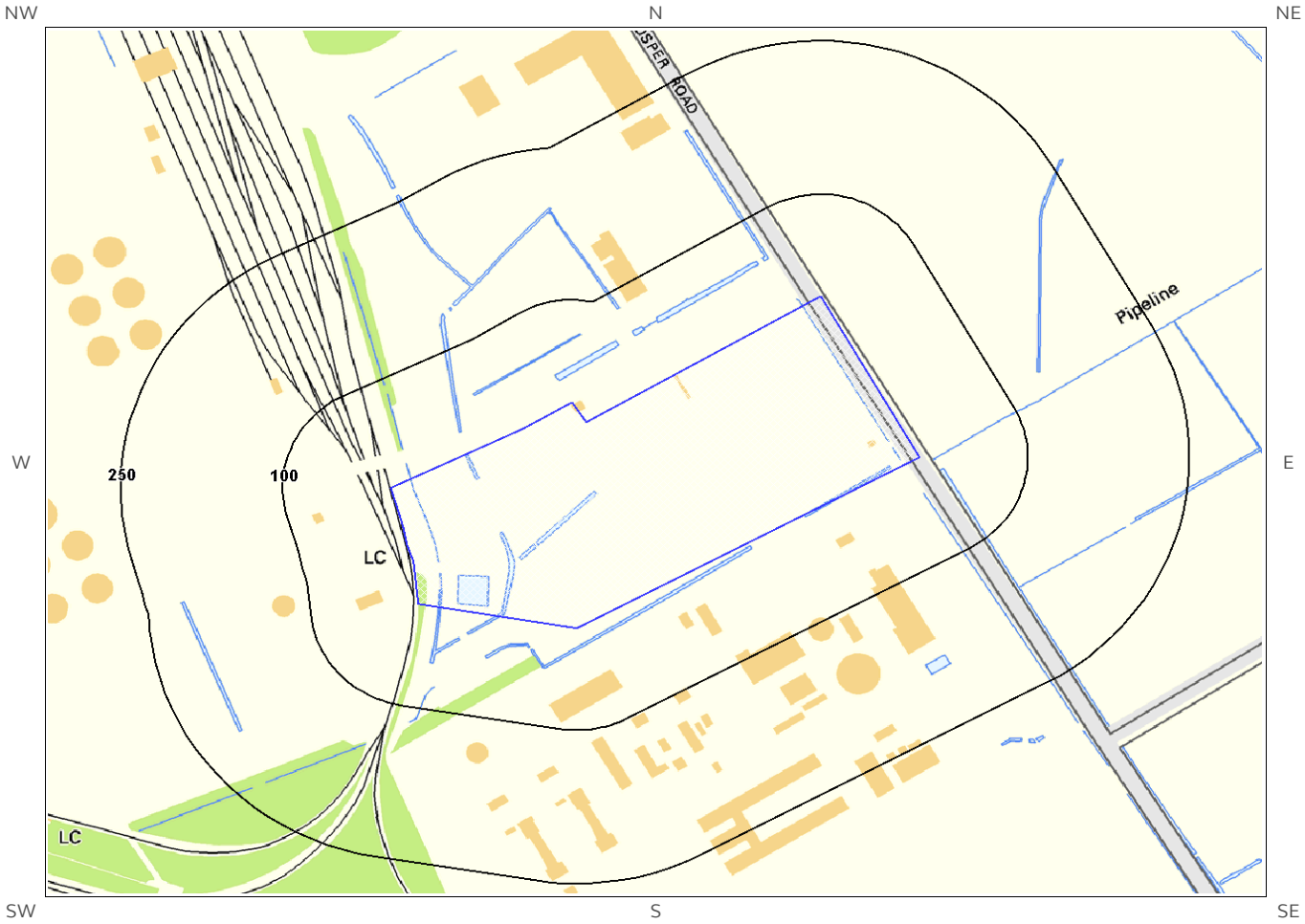
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	15.0	SE	Negligible	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.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	15.0	SE	Moderate	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.

7 Borehole Records Map



Borehole Records Legend

Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 0

Database searched and no data found.

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary: 5

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
4.0	SE	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg
36.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	30 - 45 mg/kg	<100 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels Map

Railways and Tunnels Legend

- Site Outline
- Search Buffers (m) — 250 — 500
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary?	No
Have any underground railway lines been identified within 250m of the study site boundary?	No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary?	No
Have any other railway tunnels been identified within 250m of the site boundary?	No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? Yes

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1A	0	On Site	515726 417603	Railway Sidings	1983
2A	0	On Site	515726 417603	Railway Sidings	1974
3B	0	On Site	516238 417664	Railway Sidings	1985
4B	8	W	516229 417676	Railway Sidings	1970
5	246	S	516046 417031	Railway Sidings	1985

Any records that have been identified are represented on the Railways and Tunnels Map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Name	Type
2	W	Not given	Rail
2	W	Not given	Rail
11	W	Not given	Rail
11	W	Not given	Rail
12	W	Not given	Rail
12	W	Not given	Rail
13	W	Not given	Rail
13	W	Not given	Rail
13	W	Not given	Rail
13	W	Not given	Rail
15	W	Not given	Rail
15	W	Not given	Rail
16	W	Not given	Rail
16	W	Not given	Rail
17	NW	Not given	Rail
17	NW	Not given	Rail
33	NW	Not given	Multi Track
33	NW	Not given	Multi Track
39	NW	Not given	Multi Track
39	NW	Not given	Multi Track
49	NW	Not given	Rail
49	NW	Not given	Rail
50	S	Not given	Rail
50	S	Not given	Rail
55	NW	Not given	Multi Track
55	NW	Not given	Multi Track
70	NW	Not given	Rail
70	NW	Not given	Rail
72	NW	Not given	Rail
72	NW	Not given	Rail
77	NW	Not given	Rail

Distance (m)	Direction	Name	Type
77	NW	Not given	Rail
106	NW	Not given	Rail
106	NW	Not given	Rail
110	NW	Not given	Rail
110	NW	Not given	Rail
122	S	Not given	Multi Track
122	S	Not given	Multi Track
125	S	Not given	Multi Track
125	S	Not given	Multi Track
125	S	Not given	Multi Track
125	S	Not given	Multi Track
133	NW	Not given	Rail
133	NW	Not given	Rail
134	S	Not given	Rail
134	S	Not given	Rail
136	NW	Not given	Rail
136	NW	Not given	Rail
137	NW	Not given	Rail
137	NW	Not given	Rail
144	NW	Not given	Rail
144	NW	Not given	Rail
150	NW	Not given	Rail
150	NW	Not given	Rail
164	NW	Not given	Rail
164	NW	Not given	Rail
190	NW	Not given	Rail
190	NW	Not given	Rail
214	NW	Not given	Rail
214	NW	Not given	Rail
216	NW	Not given	Rail
216	NW	Not given	Rail
248	NW	Not given	Rail
248	NW	Not given	Rail

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

Contact Details

Groundsure Helpline

Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries

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

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

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

Public Health England

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

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Website: **www.jpb.co.uk**

Ordnance Survey

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Website: http://www.ordnancesurvey.co.uk/

Getmapping PLC

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Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**

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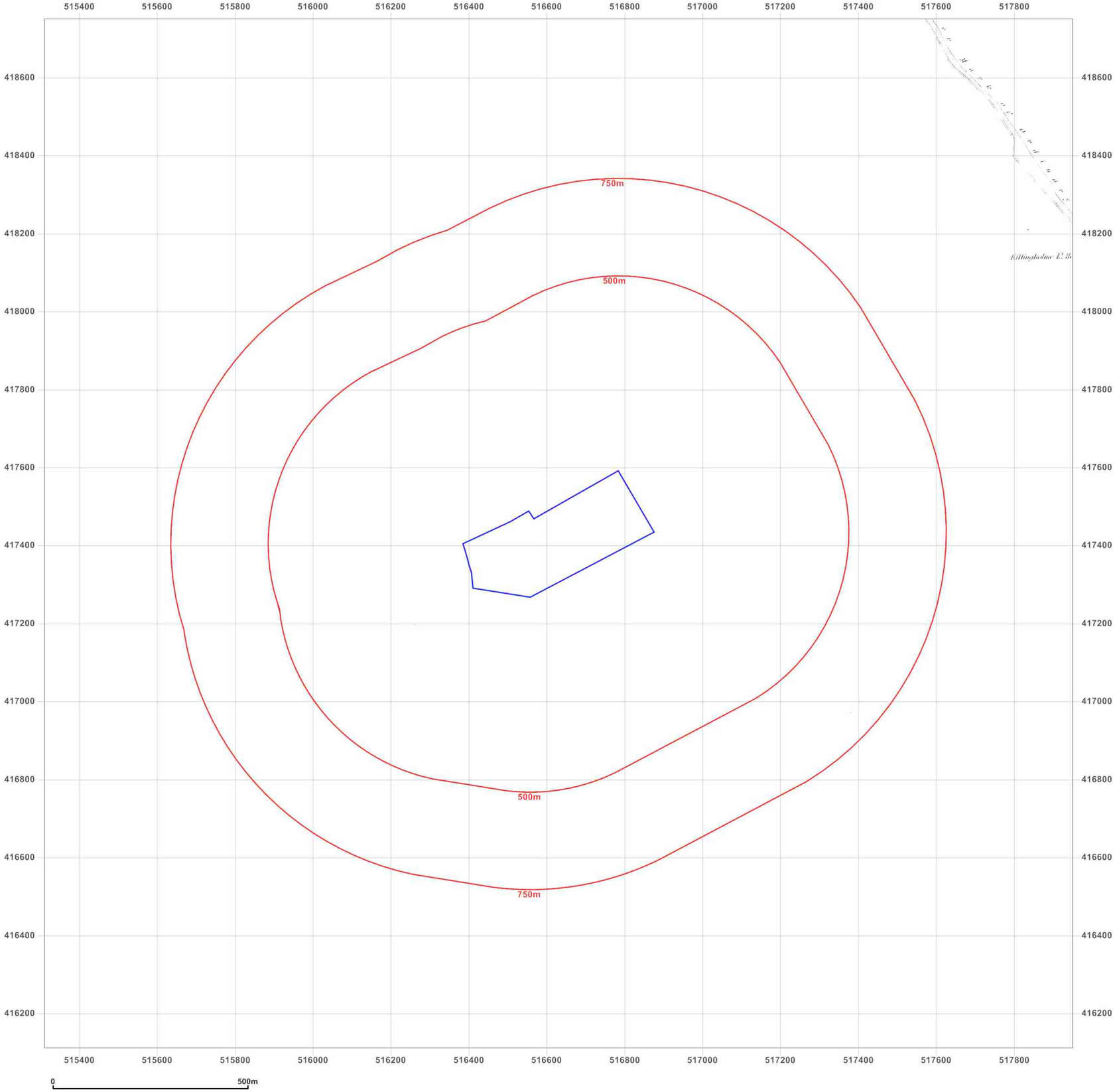
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016/

Appendix B: Historic Maps



Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

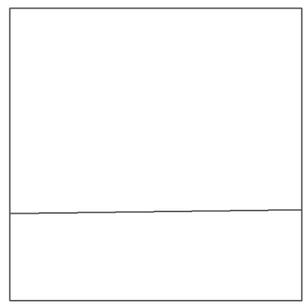
Map date: **1854**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



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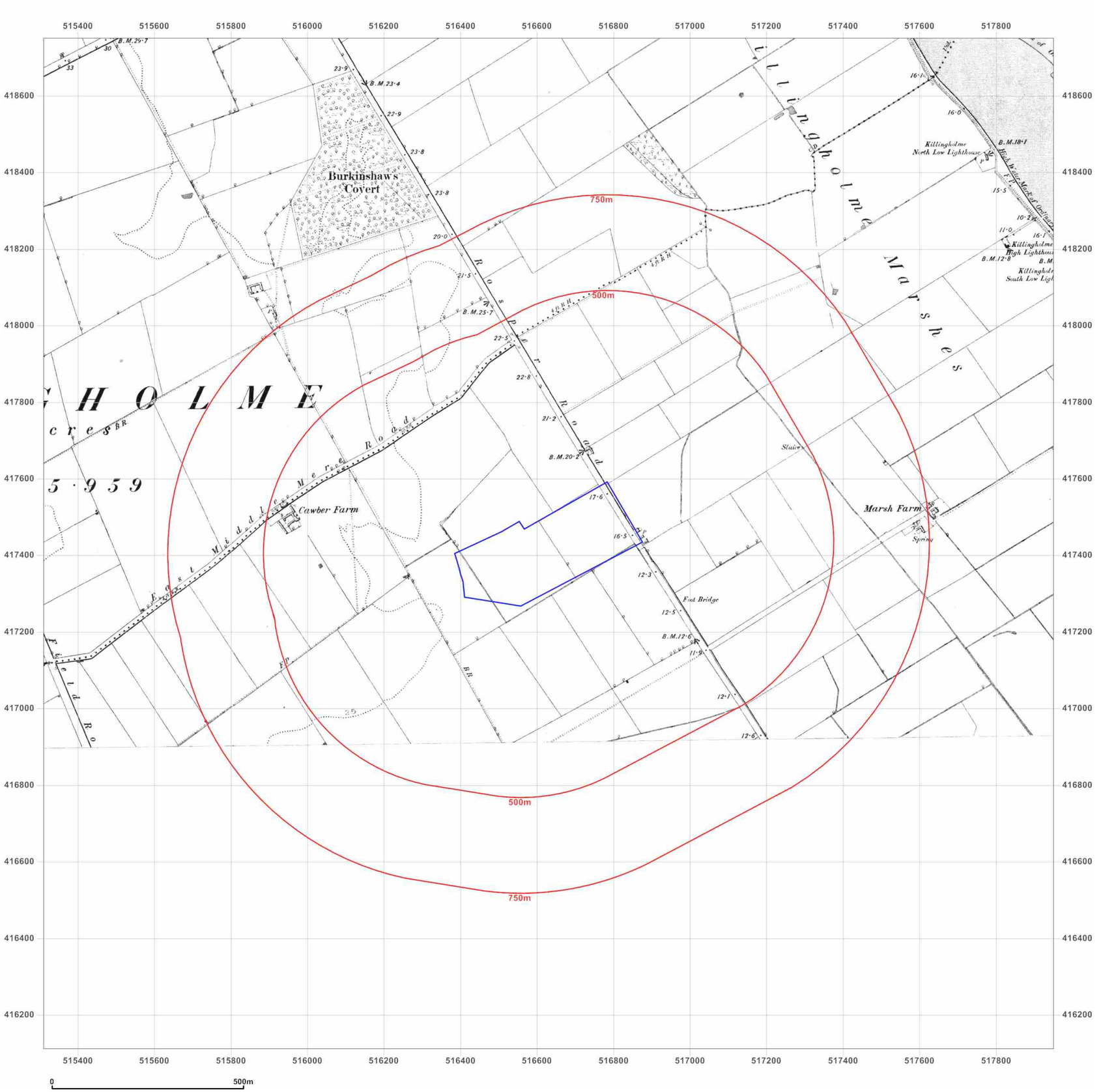

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1886**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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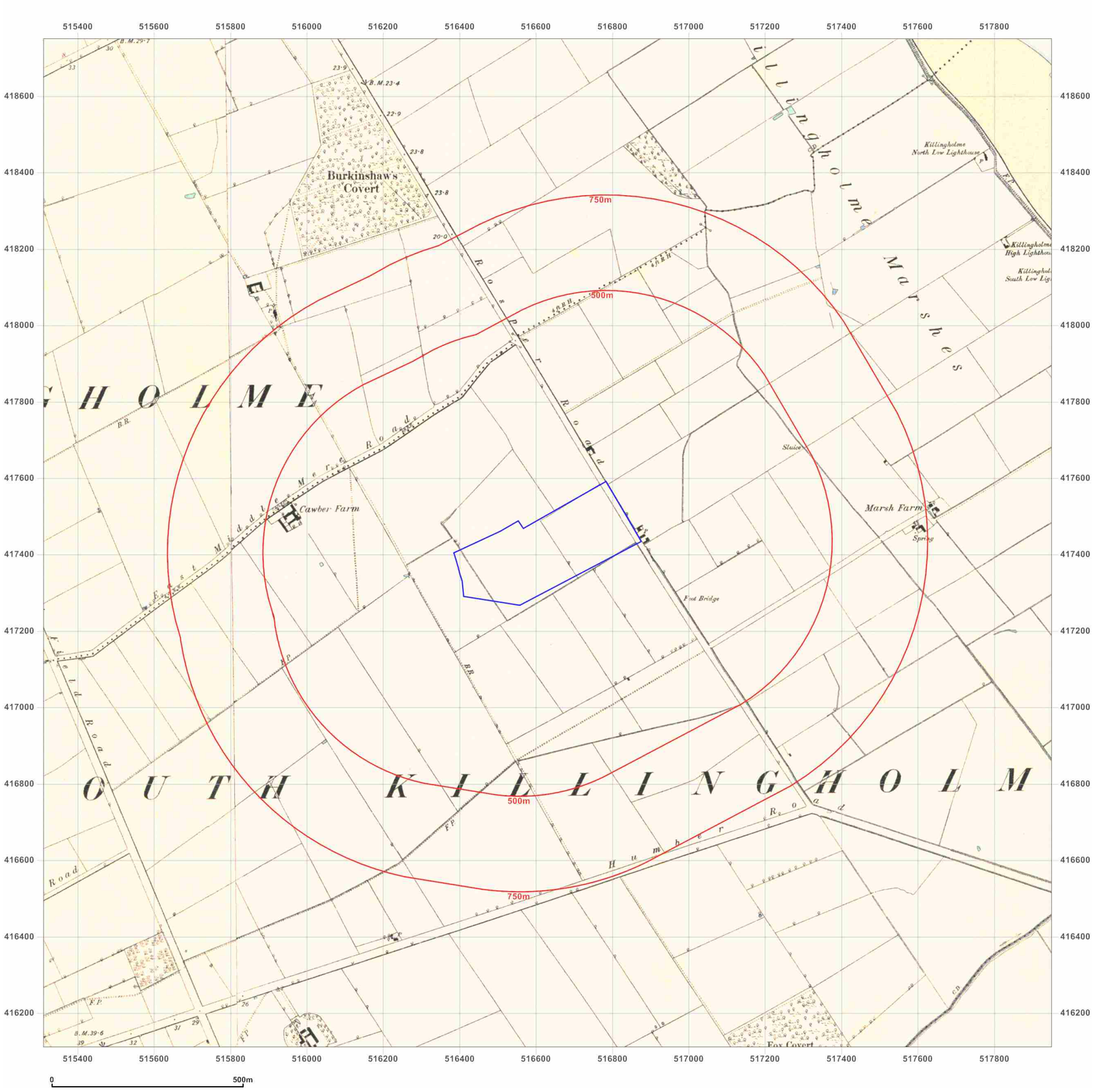

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1886-1887**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1886
Revised 1886
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1886
Revised N/A
Edition N/A
Copyright N/A
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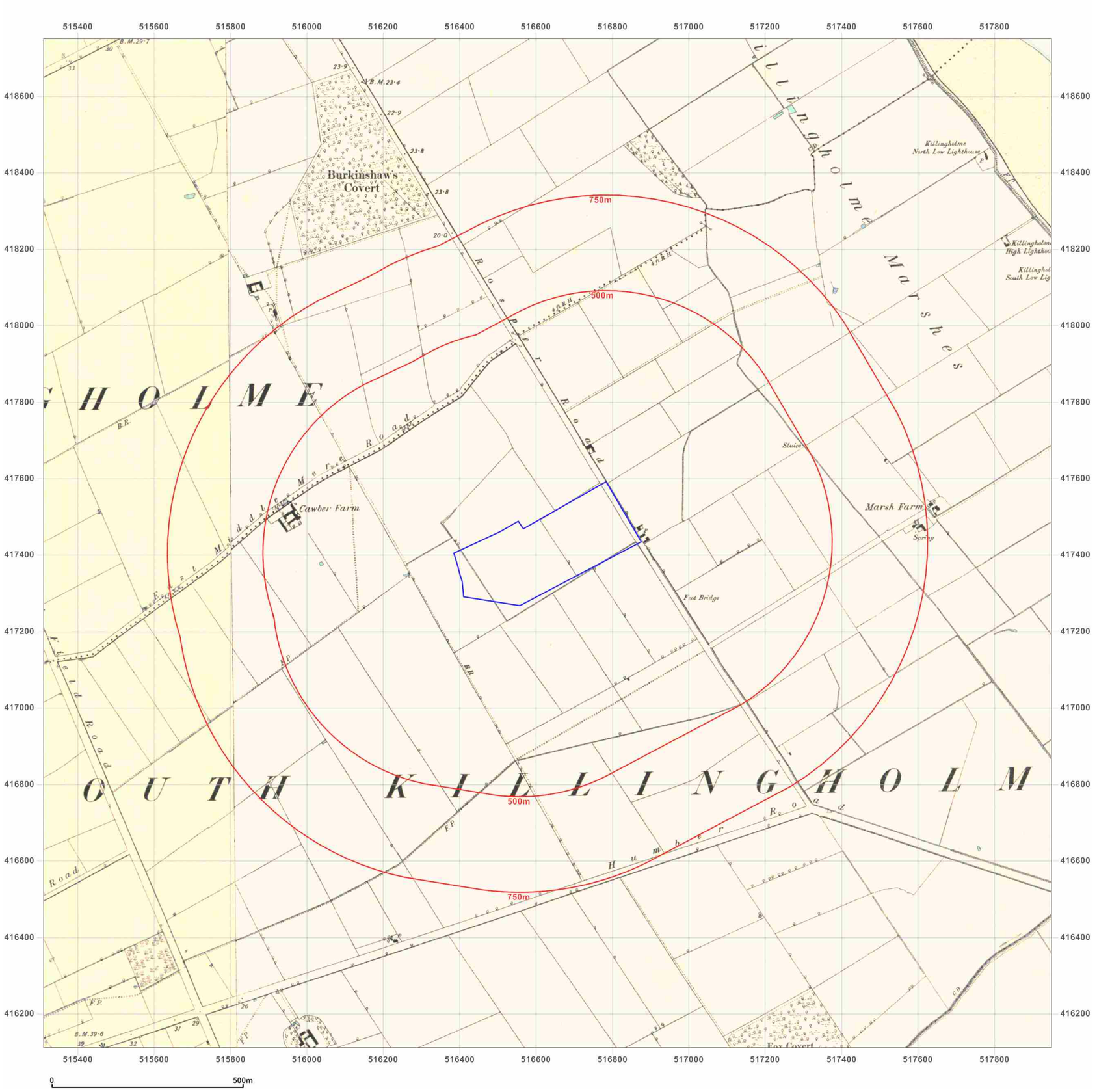

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1886-1887**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1886
Revised N/A
Edition N/A
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Surveyed 1886
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Edition N/A
Copyright N/A
Levelled N/A

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Production date: 13 June 2017

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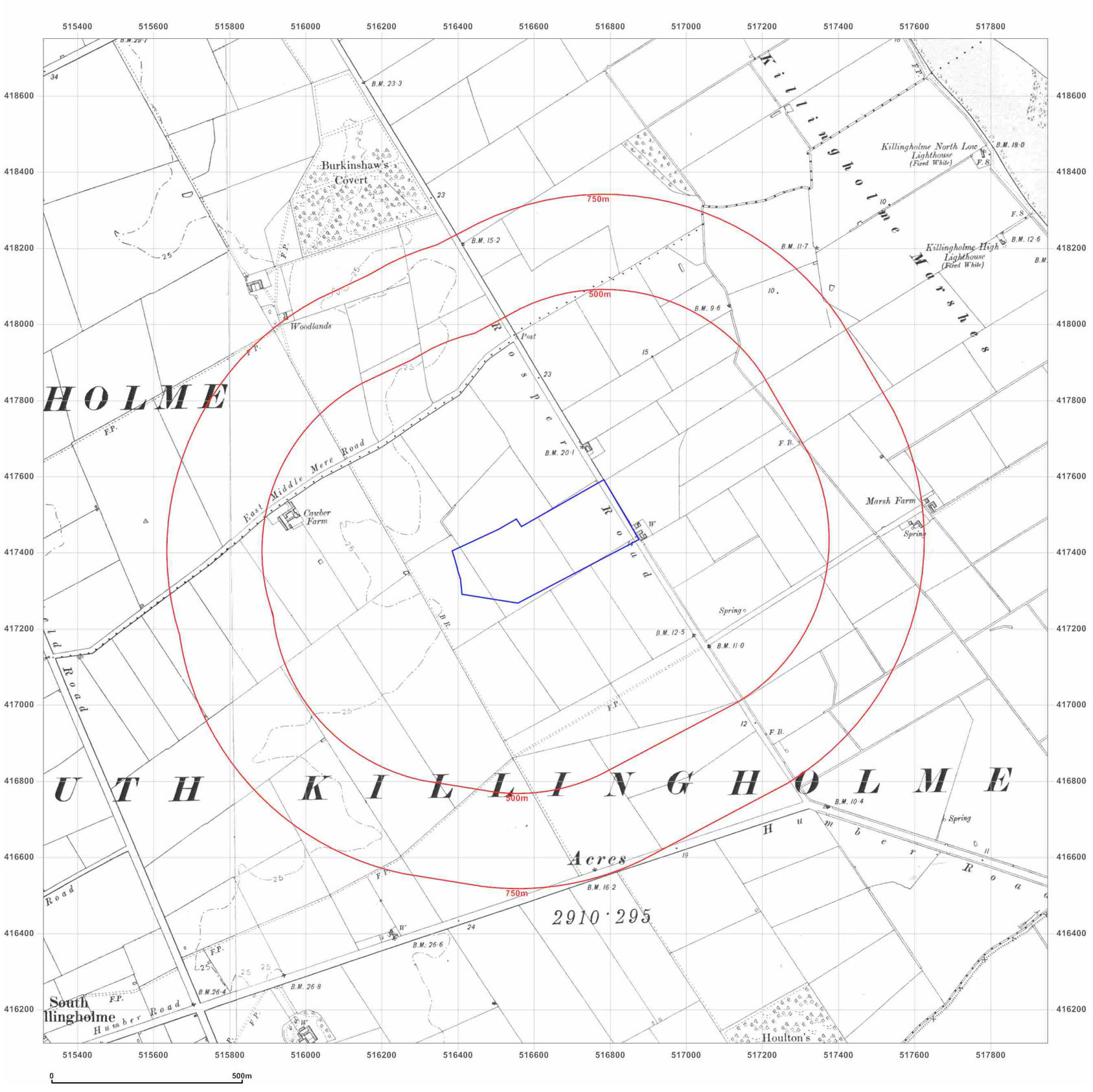

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1906**

Scale: 1:10,560

Printed at: 1:10,560

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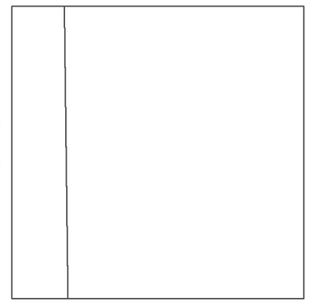
Surveyed 1886
Revised 1906
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1886
Revised 1906
Edition N/A
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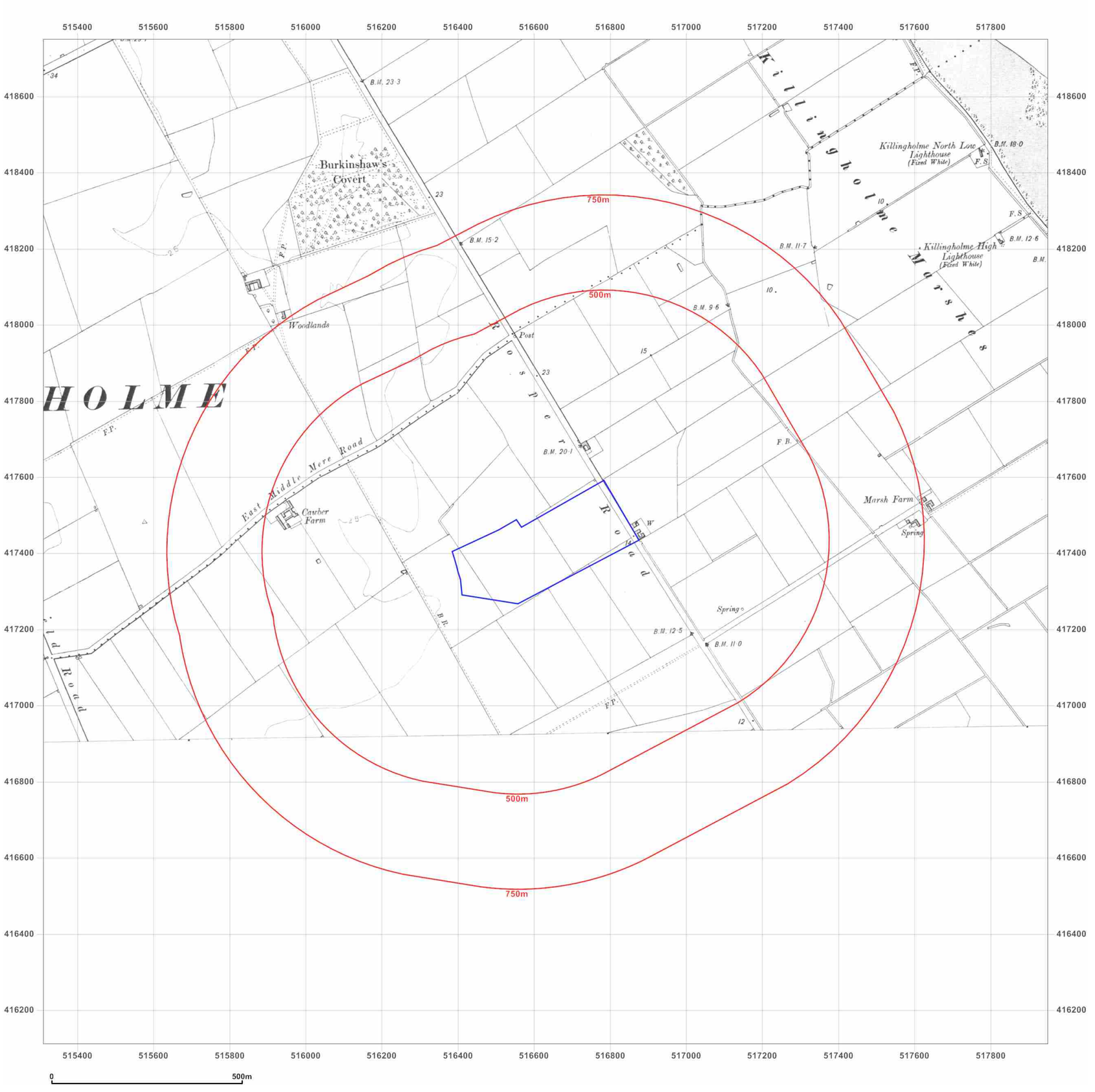

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1910**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1853
Revised 1910
Edition 1910
Copyright N/A
Levelled N/A

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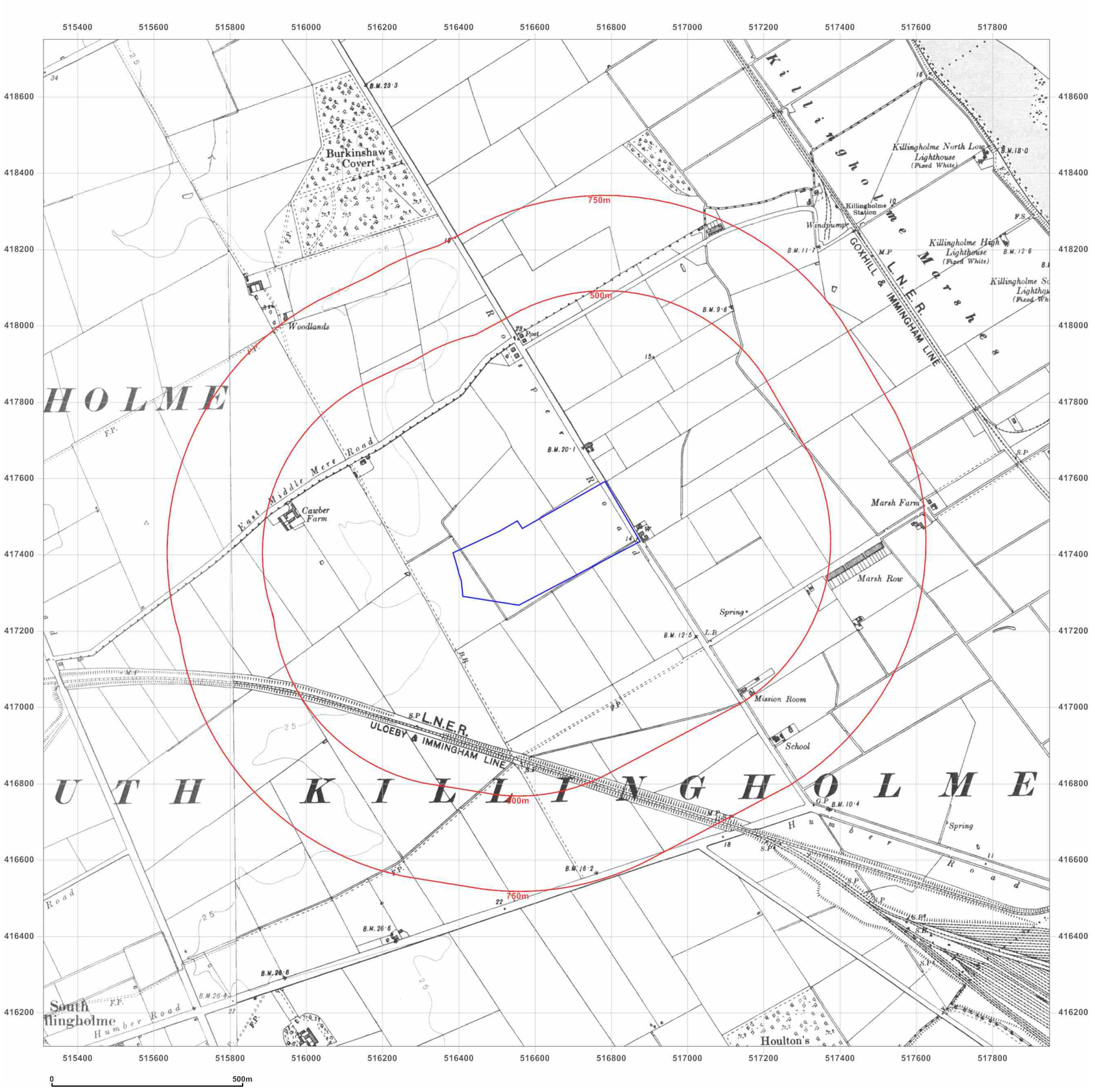

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1929-1930**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1886
Revised 1929
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1886
Revised 1930
Edition N/A
Copyright N/A
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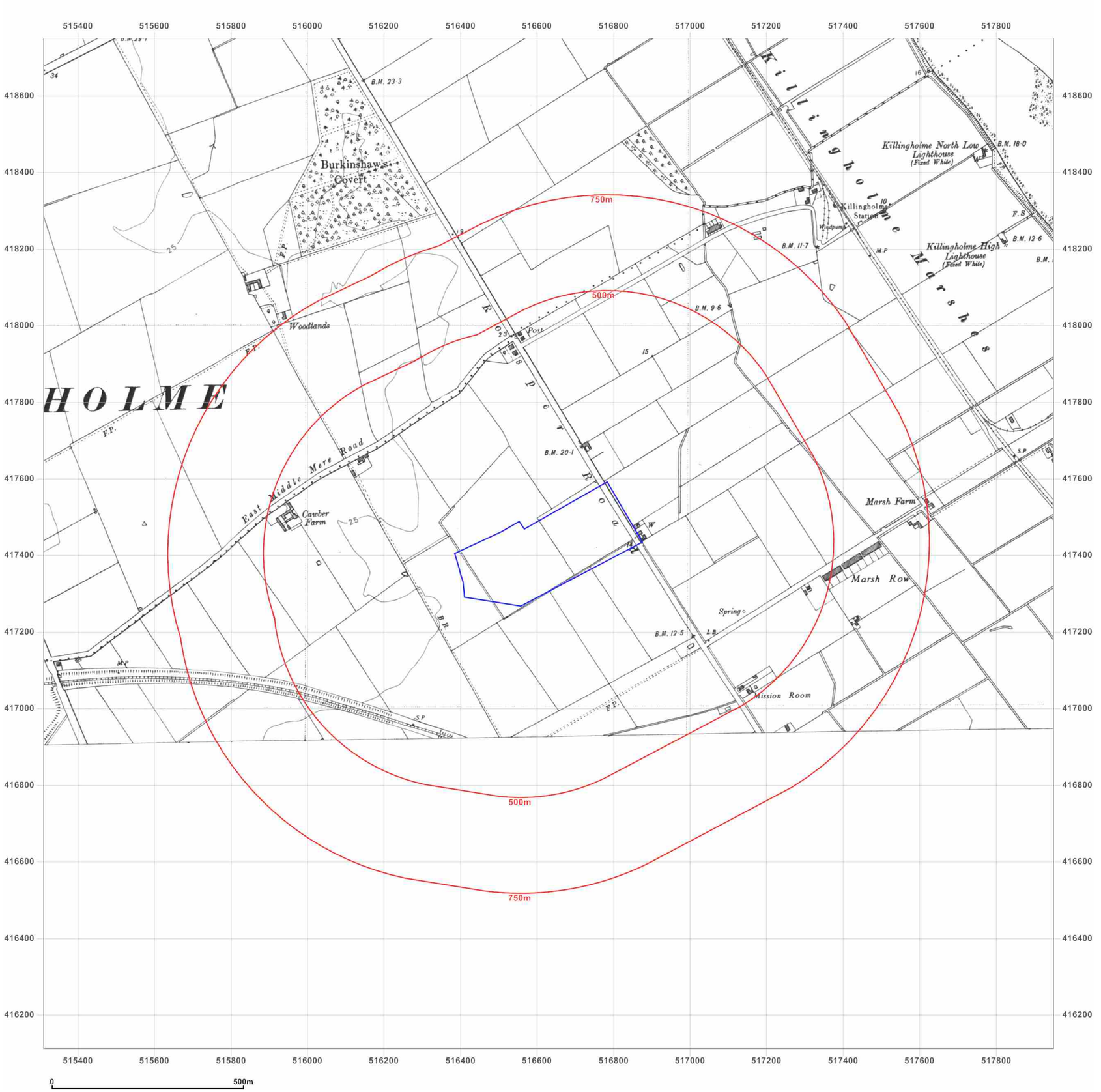

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1947**

Scale: 1:10,560

Printed at: 1:10,560

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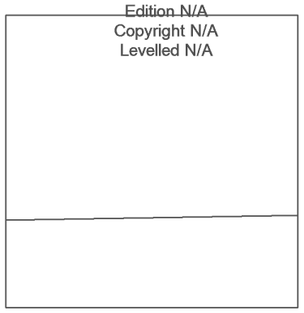
Surveyed 1853
Revised 1947
Edition N/A
Copyright N/A
Levelled N/A



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W: www.groundsure.com

Production date: 13 June 2017

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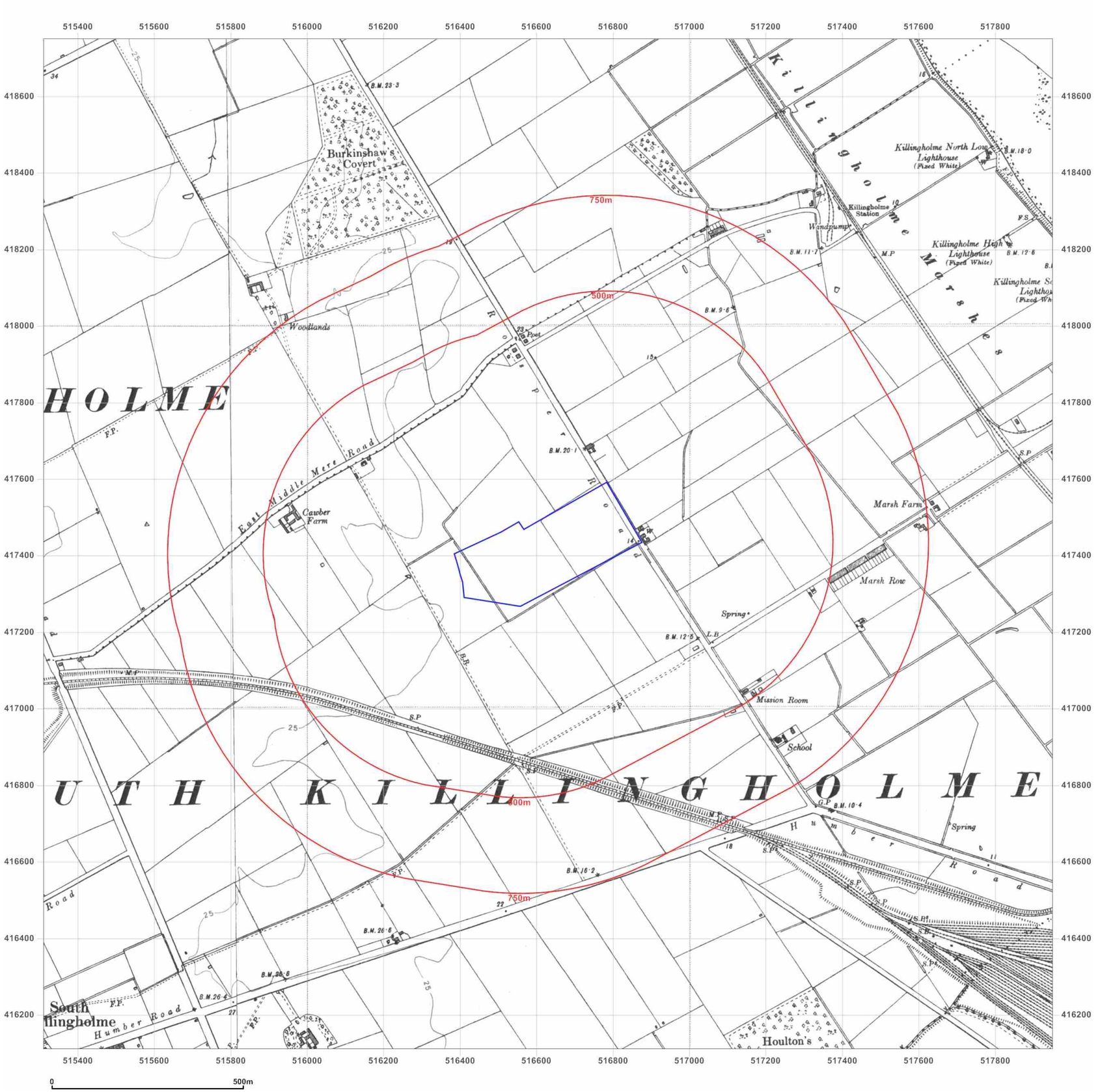

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: County Series

Map date: **1947**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1886
Revised 1947
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1886
Revised 1947
Edition 1947
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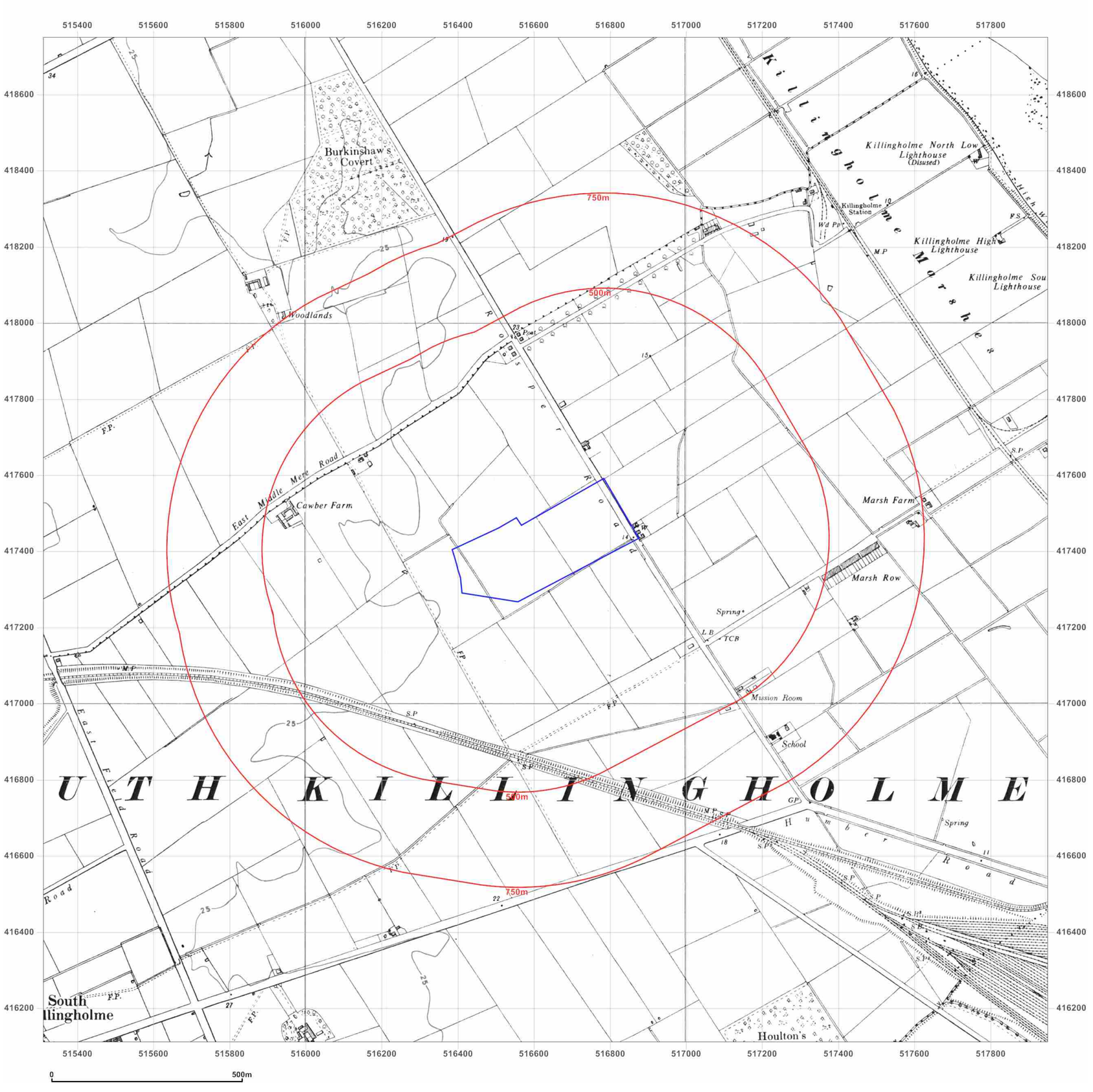

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: Provisional
Map date: **1951**
Scale: 1:10,560
Printed at: 1:10,560

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Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

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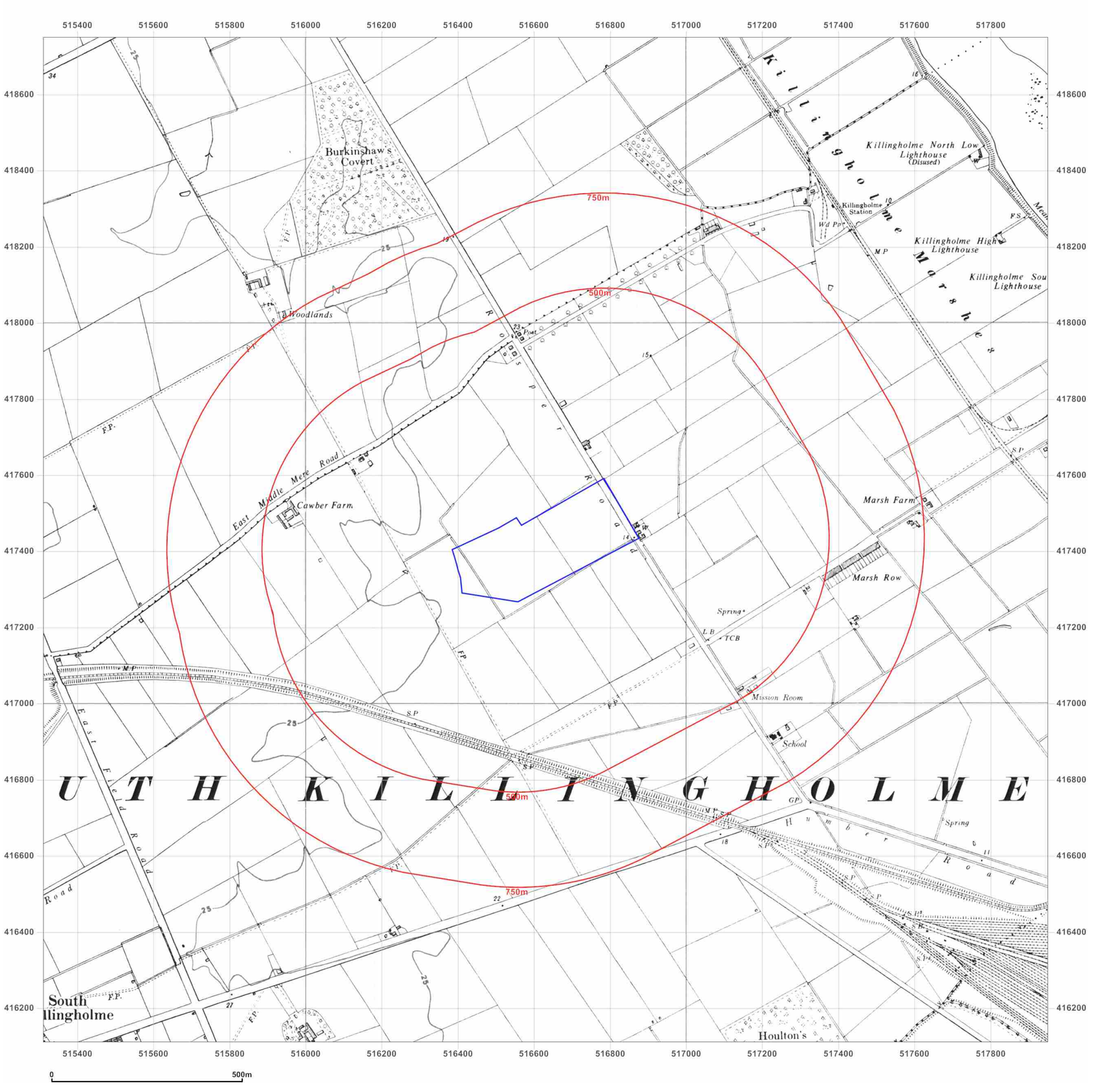
Production date: 13 June 2017

To view map legend click here *Legend*



Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: Provisional

Map date: **1951**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

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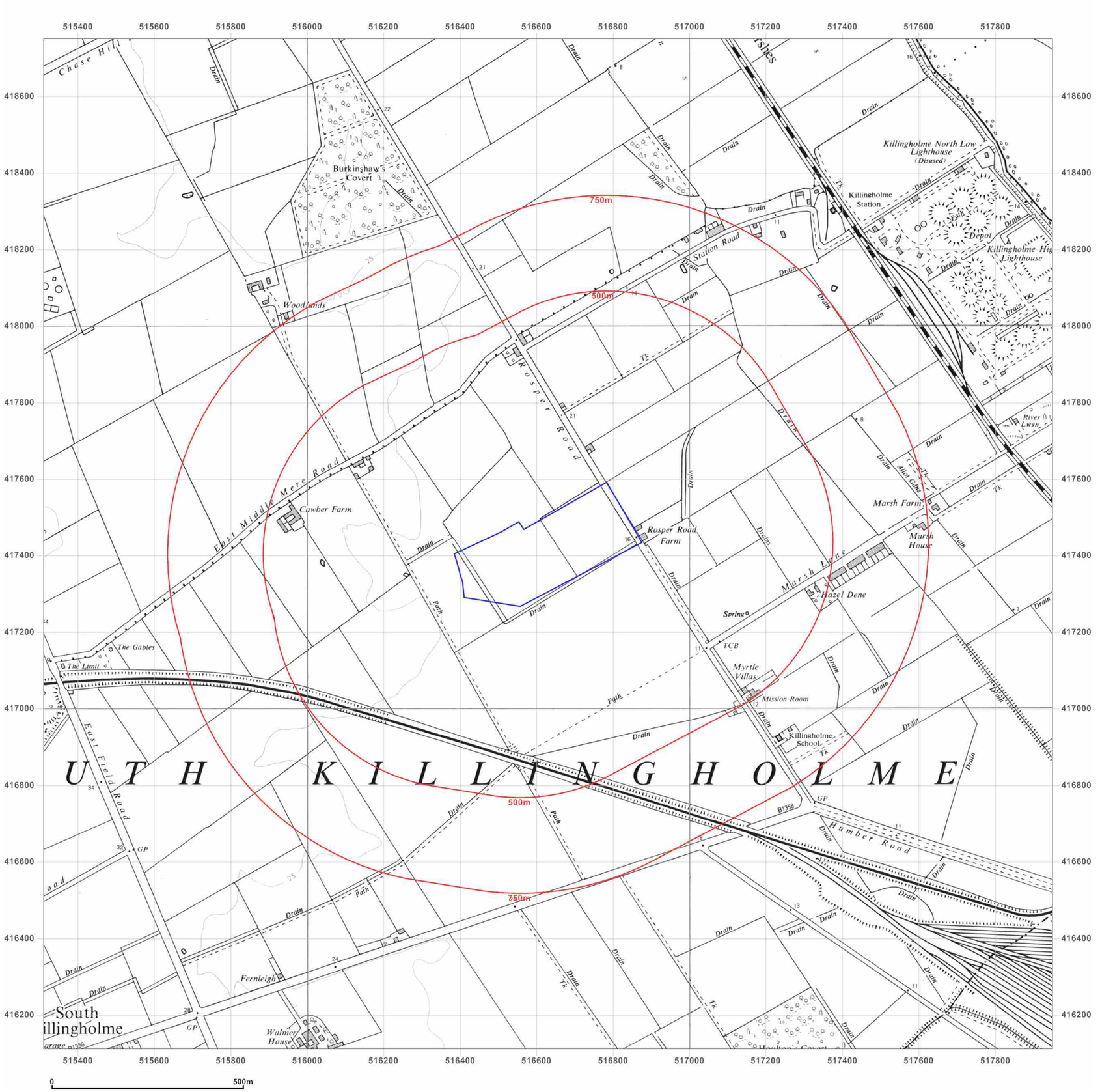
Production date: 13 June 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: Provisional

Map date: **1968**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1968
Revised 1968
Edition N/A
Copyright N/A
Levelled N/A

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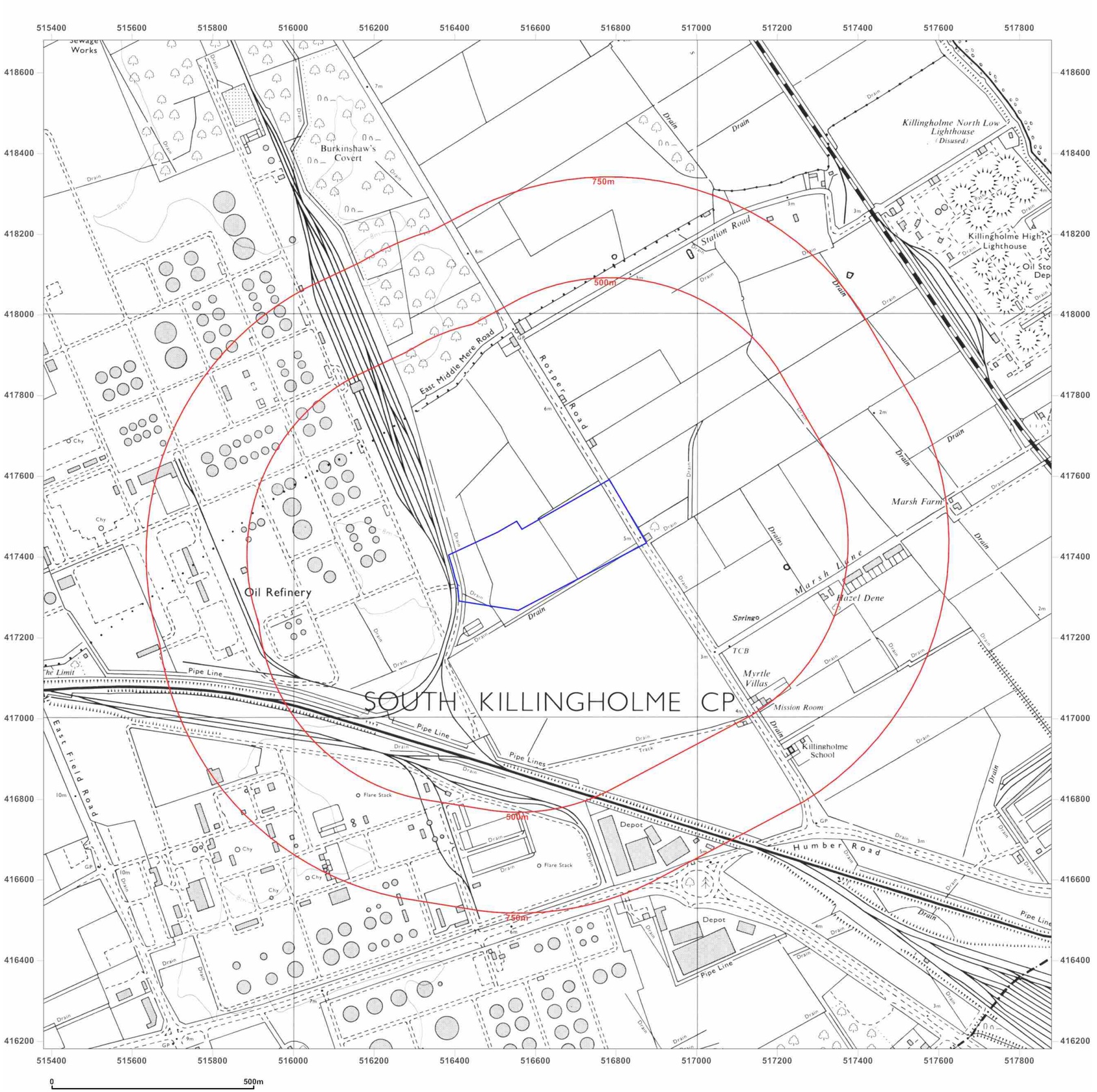
W: www.groundsure.com

Production date: 13 June 2017

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: National Grid

Map date: **1974**

Scale: 1:10,000

Printed at: 1:10,000

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Surveyed 1974
Revised 1974
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 13 June 2017

To view map legend click here *Legend*

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: National Grid

Map date: **1983**

Scale: 1:10,000

Printed at: 1:10,000

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Surveyed 1975
Revised 1983
Edition N/A
Copyright N/A
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Production date: 13 June 2017

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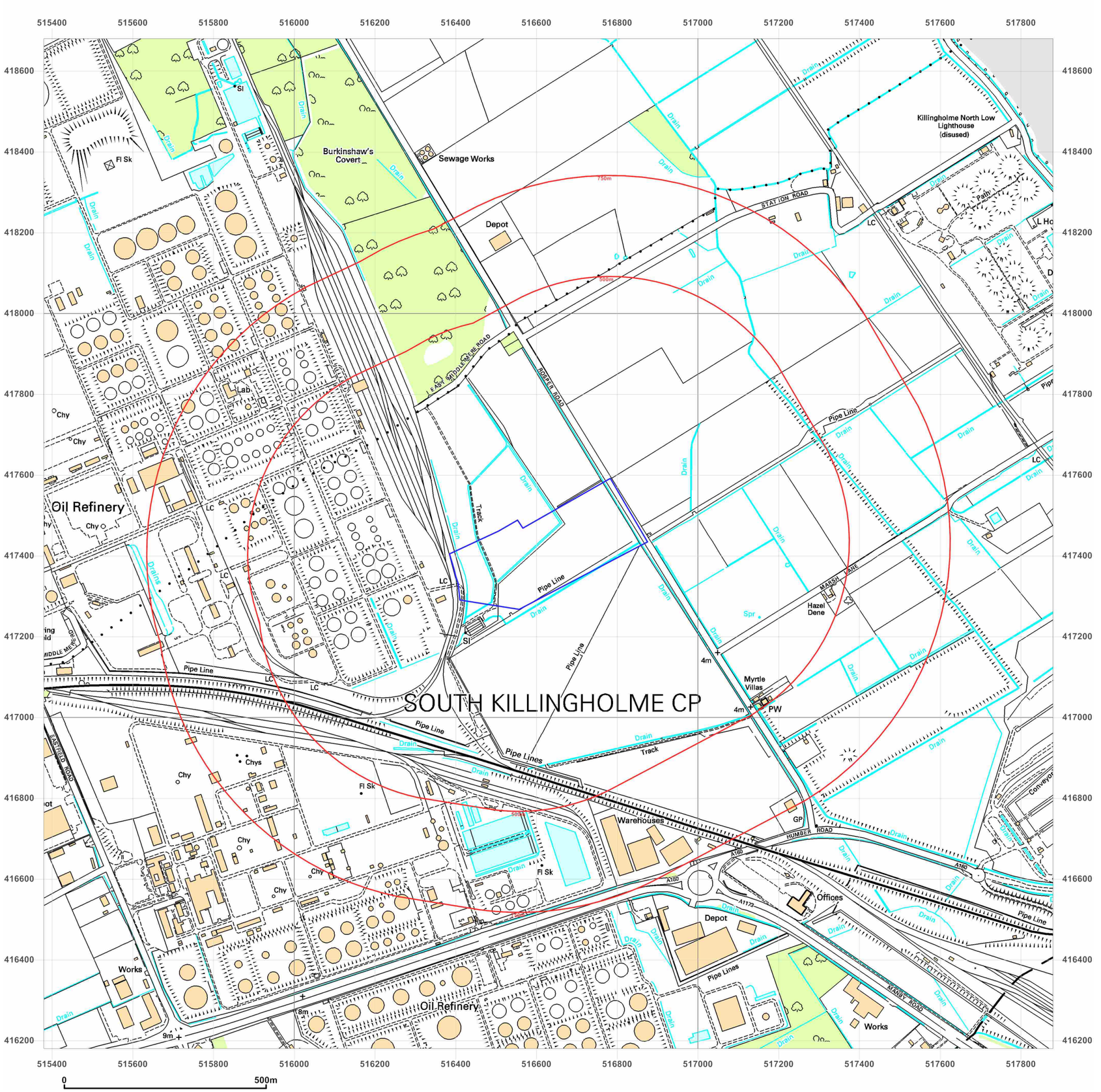

Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: 1:10,000 Raster
Map date: **2002**
Scale: 1:10,000
Printed at: 1:10,000

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Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY
LTD, EASTFIELD ROAD,
IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

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Production date: 13 June 2017

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Groundsure INSIGHTS

Site Details:

TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW

Client Ref: Oil_Refinery
Report Ref: GS-3982432
Grid Ref: 516629, 417430

Map Name: National Grid
Map date: **2014**
Scale: 1:10,000
Printed at: 1:10,000

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Production date: 13 June 2017

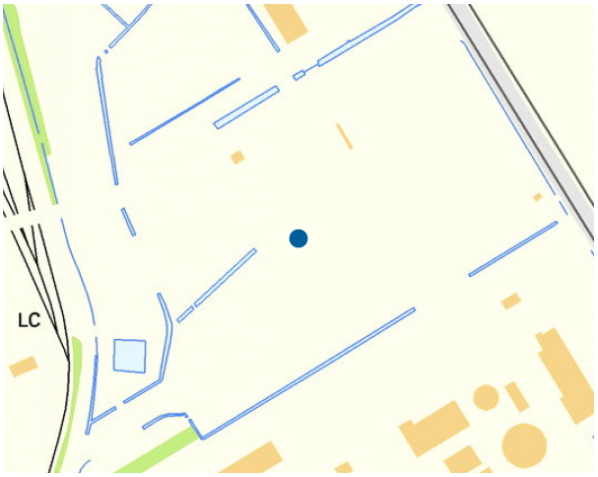
To view map legend click here *Legend*

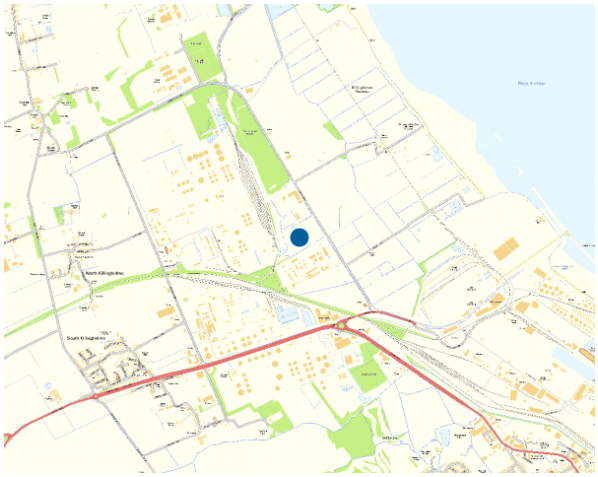
Appendix C: UXO Report

Groundsure
LOCATION INTELLIGENCE

BombRisk.com

Preliminary Unexploded Ordnance Risk Assessment





Project: TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW

Groundsure Ref: GS-3982433

Report prepared by Dynasafe BACTEC Limited and FIND Mapping Limited

Report reference: 502279

DYNASAFE Area Clearance

Dynasafe BACTEC Limited

FIND
PROFESSIONAL MAPPING INTELLIGENCE

Preliminary Unexploded Ordnance Threat Assessment

TOTAL LINDSEY OIL REFINERY LTD, EASTFIELD ROAD, IMMINGHAM, DN40 3LW

Contents *Page*

1 **Executive Summary** 02

2 **Introduction** 03

3 **Methodology** 05

4 **Search Results** 06

5 **Risk of UXO based on WWII German bombing density** 07

6 **Conclusions** 08

1 Executive Summary

1 Has a potential unexploded ordnance (UXO) risk been identified at the site in question?

NO

Indicative British / Allied UXO Risk	**NEGLIGIBLE**
Indicative German UXO Risk	**LOW**

2 Does the site in question require further research to clarify the unexploded ordnance (UXO) risk to future ground works?

NO

3 Dynasafe BACTEC's recommendation:

It is recommended that an Explosive Ordnance Safety Awareness briefing is provided by a suitably experienced UXO Specialist.

2 Introduction

About Dynasafe BACTEC Limited

Since 1991, Dynasafe BACTEC Limited has supported the UK construction industry by assessing the risk of encountering items of unexploded ordnance (UXO) during intrusive works. Dynasafe BACTEC's specialist advice provides essential information for threat assessments, improving safety and enhancing reputations, helping contractors avoid costly delays.

Dynasafe BACTEC holds the following accreditations: Occupational Health & Safety Management Systems (OHAS 18001:2007), Environmental Management Systems (ISO 14001:2004) and Quality Management Systems (ISO 9001:2008).

The risk of encountering UXO on most sites in the UK is low. However, where a site is at increased risk it is necessary to take measures to mitigate that risk. The factors affecting UXO threat assessment are based upon the history and previous usage of a site and its surroundings.

In 2009, the Construction Industry Research and Information Association (CIRIA) established a set of guidelines to assist industry professionals.

CIRIA recommends a four stage risk management process:

- **Preliminary threat assessment**
- **Detailed threat assessment**
- **Risk mitigation**
- **Implementation**

The preliminary threat assessment enables a non-UXO specialist to place a site in context and to identify whether a more detailed assessment is necessary. The assessment is based upon data obtained from desktop reviews of the site's history and its proximity to potential indicators of UXO contamination.

There are two principal groups of onshore UXO in the UK:

- **British / Allied Army, Air Force and Navy activities – domestic military activity**
- **Enemy bombing during WWI and WWII – aerial bombing and naval bombardment**

These two groups comprise many potential UXO risk contributing sources within the UK, the most significant of which are listed below. Georeferenced databases containing this information are used by BombRisk.com to identify areas of potentially elevated UXO risk.

- **Historic army, navy and air-force facilities**
- **Explosives / ammunition factories**
- **Munitions storage depots**
- **Historic military training areas and firing ranges**

- **British army explosive ordnance clearance tasks / recces**
- **WWII heavy anti-aircraft batteries**
- **WWII anti-invasion defensive fortifications**
- **Miscellaneous WWII pipe mined locations**
- **WWII prisoner of war camps**
- **WWII German bombing density statistics**
- **WWII bombing decoy sites**
- **Press articles regarding UXO finds**
- **Locations of Dynasafe BACTEC UXO finds**
- **Locations of Dynasafe BACTEC desktop threat assessments**
- **Locations of Dynasafe BACTEC on-site support services**

About FIND Mapping Limited

Established in 2006, FIND Mapping Limited is a pioneering web mapping and spatial data technology company offering online mapping and consultancy services. FIND technology powers the generation of this report.

www.findmaps.co.uk provides detailed mapping and a wealth of data sets to hundreds of the UK's top property, environmental and design/build companies.

FIND's consultancy services provide bespoke internet mapping solutions to a range of businesses enabling them to manage their spatial data more effectively.

While working closely with a wide range of reputable data providers including Ordnance Survey and the Environment Agency, FIND works independently of these organisations. A similar arm's-length relationship is maintained in terms of software and hardware providers. This enables the team at FIND to offer truly independent advice.

3 Methodology

Dynasafe BACTEC Limited and FIND have compiled a geo-referenced database of potential sources of UXO risk within the UK. From this information a range of risk zones have been defined.

The weighting of these zones is based upon the influence of all relevant factors. A WWII-era RAF airfield, for example, has a far greater zone of influence than a single WWII-era Anti-Aircraft Battery, as it would have covered a larger area, housed a much greater quantity / variety of munitions, seen more domestic troop training activities and would have been a more likely target for enemy bombers.

An online Preliminary Automated UXO Threat Assessment will determine an indicative level of UXO risk relating to a site. Note that these risk levels could be subject to change following the completion of any Detailed Desktop Threat Assessment for the same site.

The assessment will list all factors contributing to this weighting and will also give appropriate recommendations for further action, if considered necessary.

4 Search Results

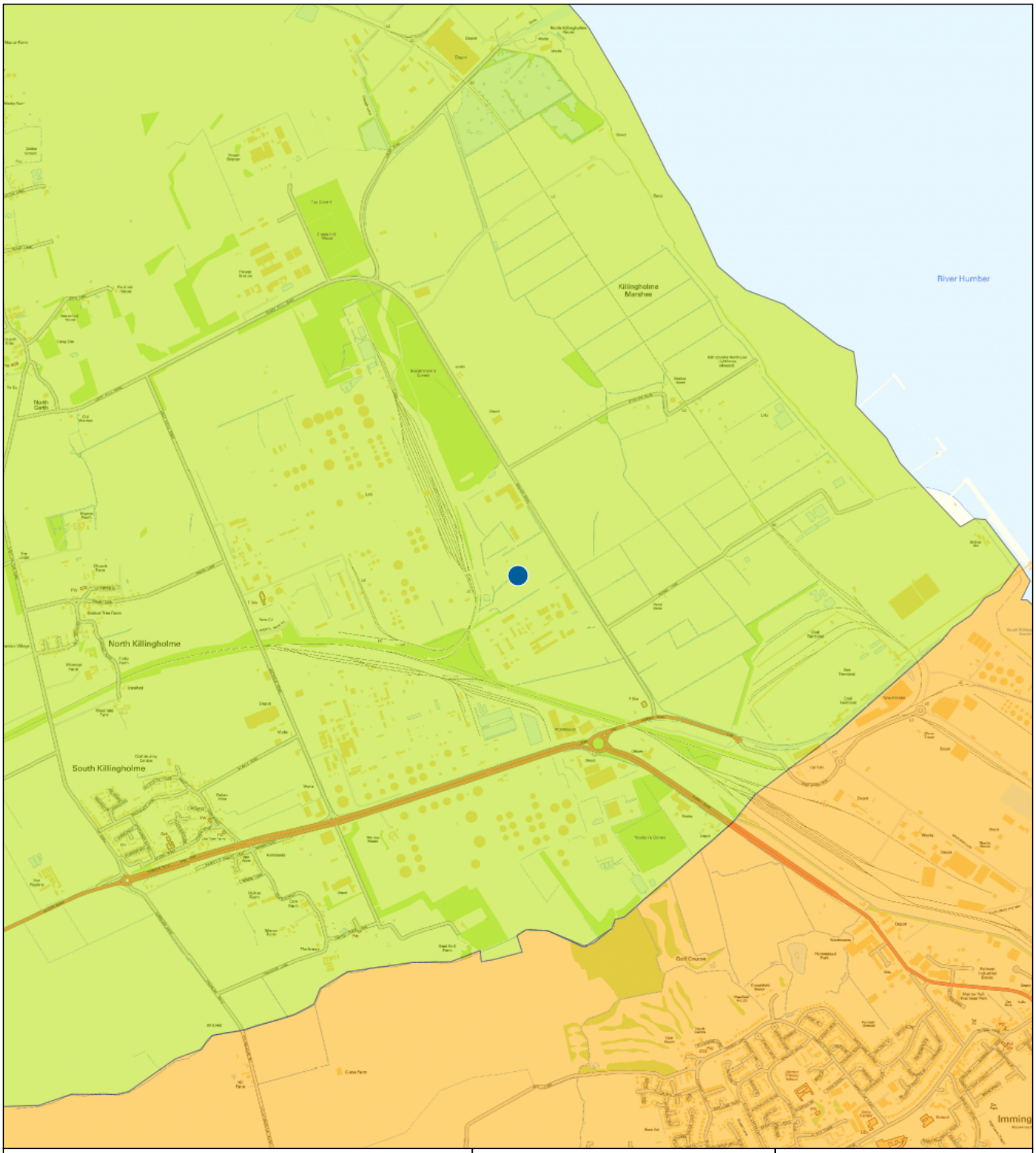
Dynasafe BACTEC Limited's UXO Source Database

Within 10km of the site the following potential sources of explosive ordnance have been recorded:

Source	*Number within 10km*
Military Airfield Sites	6
Bombing Decoy Sites	8
WWII Defence Related Positions & Pillboxes	37
Historic Army Camps	1
Prisoner of War Camps	1
Heavy Anti-Aircraft Batteries	17
Army Explosive Ordnance Clearance Tasks/Recces	2
Dynasafe BACTEC Desk-top Threat Assessments	2
Abandoned Bombs	None recorded
Press Articles regarding UXO Finds	None recorded
Military Training Areas and Firing Ranges	None recorded
Pipe Mined WWII Airfields	None recorded
Miscellaneous WWII Pipe Mined Locations	None recorded
Sites Related to the Manufacture of Explosives and Explosive Ordnance	None recorded
Dynasafe BACTEC Unexploded Ordnance Finds	None recorded
Dynasafe BACTEC On-Site Support Services	None recorded

None of these sources are deemed significant enough to be a risk and therefore do not warrant further research.

5 Risk of UXO based on WWII German bombing density



BombRisk.com

Dynasafe BACTEC Limited

DYNASAFE Area Clearance

FIND PROFESSIONAL MAPPING INTELLIGENCE

Map data

NEGLIGIBLE
LOW
MEDIUM
HIGH

1:20000

N W E S

0 400 800

Metres

6 Conclusions

Risk Levels and Recommendation

Indicative British / Allied UXO Risk

NEGLIGIBLE

There are no potential sources of British / Allied UXO recorded in Dynasafe BACTEC's historical database in close proximity to the site. If there is any empirical evidence of actual or potential contamination, Dynasafe BACTEC should be contacted for advice. Otherwise, the risk on site from UXO is considered to be Negligible.

Indicative German UXO Risk

LOW

Historical records indicate that the area was subjected to a low level of bombing density. If there is empirical evidence of UXB risk (i.e. anecdotal evidence) then please contact Dynasafe BACTEC for further advice.

This preliminary assessment has identified a Low risk from German unexploded bombs at this site.

Conclusion

This preliminary assessment has resulted in an overall Low risk from UXO. Unless any empirical evidence of actual or potential UXO contamination is available, Dynasafe BACTEC do not consider a full Explosive Ordnance Desktop Study necessary for this site. It is recommended that an Explosive Ordnance Safety Awareness briefing is provided by a suitably experienced UXO Specialist.

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Appendix D: Risk Assessment Principles

CSM Risk Assessment Principles

Current good practice recommends that the determination of hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Environment Agency (EA) guidance on Model Procedures for the Management of Land Contamination (CLR 11). For a risk to be present, there must be a viable pollutant linkage; i.e. a mechanism whereby a source of contamination impacts on a sensitive receptor via a pathway.

Using criteria broadly based on those presented in the EA, Chartered Institute of Environmental Health (CIEH) and National House Building Council (NHBC) R&D Publication 66: 'Guidance for the Safe Development of Housing on Land Affected by Contamination' (2008), the magnitude of the risk associated with potential contamination at the site has been assessed. To do this an estimate is made of:

- The magnitude of the potential consequence (i.e. severity); and
- The magnitude of probability (i.e. likelihood).

The severity of the risk is classified according to the criteria in **Table A**, below:

Table A: Severity of Potential Pollutant Linkages

SEVERITY	EXAMPLES
Major	- Acute damage to human health, likely to result in significant harm. - Catastrophic damage to buildings/property (e.g. by explosion, sites with high gassing potential, extensive VOC contamination). - Major pollution of controlled waters (e.g. surface watercourses or Principal aquifers/source protection zones). - Significant and lasting damage to sensitive ecosystems or species.
Moderate	- Chronic (long-term) risk to human health likely to result in a reduced quality of life. - Significant and costly damage to property, buildings, structures or services. - Pollution of sensitive controlled waters (e.g. surface watercourses or Principal/ Secondary aquifers). - Damage to sensitive ecosystems or species.
Minor	- Non-permanent human health effects. - Moderate damage to buildings structures or services. - Pollution of non-sensitive waters (e.g. smaller surface watercourses or non-aquifers). - Damage to non-sensitive ecosystems or species.
Minimal	- Temporary discomfort. - Minor (easily repairable) damage to buildings, structures or services. - Short-term decrease in non-sensitive waters quality. - Temporary disturbance of non-sensitive ecosystems.

The probability of the risk occurring is classified according to the criteria in **Table B**, below:

Table B: Likelihood of Risk Occurrence

LIKELIHOOD	EXPLANATION
Highly Likely	- Contaminant linkage may be present that appears very likely in the short-term and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Likely	- Contaminant linkage may be present, and it is probable that the risk will occur over the long term.
Possible	- Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will.
Unlikely	- Contaminant linkage may be present but the circumstances under which harm could occur are improbable.

An overall evaluation of the magnitude of the risk is gained from a comparison of the severity and probability, as shown in **Table C**, below:

Table C: Risk Based on Comparison of Likelihood and Severity

		SEVERITY			
LIKELIHOOD		MAJOR	MODERATE	MINOR	MINIMAL
	HIGHLY LIKELY	Very High	High	Considerable	Medium
	LIKELY	High	Considerable	Medium	Low
	POSSIBLE	Considerable	Medium	Low	Very Low
	UNLIKELY	Medium	Low	Very Low	Negligible