



Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects Environmental Statement

Volume 3

Appendix 17.1 – Land Quality Desk Study and Preliminary Risk Assessment Report (Revision B) (Tracked)

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Glossary of Acronyms

BGS	British Geological Survey
BRE	Building Research Establishment
CIRIA	Construction Industry Research Information Association
CSM	Conceptual Site Model
CoCP	Code of Construction Practice
DCO	Development Consent Order
DEFRA	Department for the Environment and Rural Affairs
DEP	Dudgeon Extension Project
EA	Environment Agency
FOI	Freedom of Information
GIS	Geographical Information System
HDD	Horizontal Directional Drilling
MAGIC	Multi Agency Government Information for the Countryside
MoD	Ministry of Defence
NVZ	Nitrate Vulnerable Zone
OS	Ordnance Survey
OS GR	Ordnance Survey Grid Reference
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PCL	Potential Contaminant Linkage
PHE	Public Health England
PRA	Preliminary Risk Assessment
RAF	Royal Air Force
SAC	Special Conservation Area

SEP	Sheringham Shoal Extension Project
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SVOC	Semi Volatile Organic Compound
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WFD	Water Framework Directive



Glossary of Terms

Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable corridor which would house HDD entry or exit points.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
Study area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP onshore site	The Sheringham Shoal Offshore Wind Farm Extension onshore area consisting of the SEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.

17.1 LAND QUALITY DESK STUDY AND PRELIMINARY RISK ASSESSMENT REPORT

17.1.1 Introduction

1. Royal HaskoningDHV has been commissioned by Equinor New Energy Limited (hereafter referred to as Applicant) to carry out a Land Quality Desk Study and Preliminary Risk Assessment (PRA). The report has been written to support the Environmental Statement (ES) for the onshore elements of the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP). The study area for this PRA is described within **Section 17.1.7** of this report.
2. SEP and DEP would consist of a number of offshore and onshore elements including offshore wind turbines and subsea array cables, offshore / onshore export cables and an onshore substation to accommodate the connection to the transmission grid. A full description of SEP and DEP is provided within **Chapter 4 Project Description (Revision B)** [\[document reference 6.4.1\]](#).

17.1.2 Objectives

3. The overall objectives of the PRA are as follows:
 - Provide information on the current conditions of the site with respect to contamination;
 - Provide an initial assessment of the site to identify and assess potential contaminant linkages associated with the study area and SEP and DEP; and
 - Provide high level recommendations for further works and assessments.

17.1.3 Scope of Works

4. To assist in meeting the objectives stated in **Section 17.1.2**, the scope of the report comprises:
 - Review of Envirocheck Geographical Information System (GIS) data, including historical maps to identify former land uses and potential contaminative activities within the study area;
 - A review of publicly available regulatory databases and information relating to hydrogeological features, hydrogeology, land use, ecologically sensitive areas and geology to establish the environmental setting of the study area and sensitivity of the location;
 - The development of a preliminary conceptual site model (CSM) following a source-pathway-receptor contaminant linkage approach; and
 - Provision of an outline of the environmental risks with regards to ground conditions, groundwater and ground gas conditions, which may potentially arise as liabilities or constraints associated with the onshore elements of SEP and DEP.

17.1.4 Policy, Legislation and Guidance

5. The assessment was undertaken in the context of:
 - Part 2A of The Environmental Protection Act (1990); and
 - The National Planning Policy Framework (2021).
6. The assessment was also undertaken in general accordance with the following good practice and statutory guidance:
 - Environment Agency (EA) 'Land Contamination Risk Management' Framework, April 2021;
 - Department of Environment, Food and Rural Affairs (Defra) 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance', PB13735 2012; and
 - Construction Industry Research and Information Association (CIRIA) 'Contaminated Land Risk Assessment – A Guide to Good Practice', C552 January 2001.

17.1.5 Sources of Information

7. The following information sources have been reviewed to inform the PRA:
 - Envirocheck GIS data comprising historical maps, environmental sensitivity data and permitting records within the study area;
 - British Geological Survey (BGS) Onshore Geoindex web portal (accessed October 2021);
 - Coal Authority Interactive Map Viewer (accessed October 2021);
 - Ministry of Defence Freedom of Information documents;
 - Multi Agency Government Information for the Countryside (MAGIC) map application (accessed October 2021); and
 - Public Health England UK maps of Radon.

17.1.6 Limitations

8. Limitations associated with this report are provided as [Annex A](#).

17.1.7 Study Area

9. The study area for the PRA consists of the onshore elements of the Development Consent Order (DCO) boundary, which includes the landfall, onshore cable corridor and the onshore substation area. The study area also consists of a 250m buffer around the onshore elements of the DCO.
10. The study area is located within the County of Norfolk in East Anglia and includes part of the north Norfolk coastline, agricultural land and woodland ([Figure 17.1.1](#)).
11. There are no settlements located within the study area, although several settlements are within close proximity including the towns / villages of Weybourne, Bodham,

Attlebridge and Colton. There are a series of roads and railway lines that cross the study area.

17.1.8 Environmental Setting

17.1.8.1 Geological Conditions

12. Information on geological conditions within the study area has been collated from the BGS datasets, including 1: 50,000 scale geological mapping, historical BGS borehole records and Envirocheck GIS data. The anticipated geological sequence, as shown on the BGS online viewer is outlined in **Table 17.1-1**. It must be noted, however, that the proportions of each stratum may be variable along the length of the onshore cable corridor and substation area when compared to specific landfall locations.

Table 17.1-1: Anticipated Geology

Stratum	Age	Unit	Description
Topsoil	-	-	Very soft to soft organic clay and peat.
Made Ground	-	-	Manmade or re-worked ground of variable description.
Superficial Deposits	Quaternary	Marine Beach Deposits	Shingle, sand, silt and clay; may be bedded or chaotic; beach deposits may be in the form of dunes, sheets or banks; in association with the marine environment.
		River Terrace Deposits	Sand and gravel, locally with lenses of silt, clay or peat.
	Holocene	Head Deposits	Poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes. Gravel, sand and clay depending on upslope source and distance from source. Locally with lenses of silt, clay or peat and organic material.
		Alluvium	Clay, silt, sand and gravel. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.
	Pleistocene	Sheringham Cliffs Formation	Consists of a thick glacial sequence that contains several distinctive subdivisions varying from stratified fine-grained sands, matrix-supported diamictons, clay and sand.
		Briton's Lane Sand and Gravel Member	Horizontal, massive and low angle planar cross-bedded gravels and cobble gravels with thin seams of horizontal and rippled sand. The lithology has a distinctive high flint content (c.85-89%) of which the majority is of non-chatter marked variety (c.78-85%).

Stratum	Age	Unit	Description
			The gravels also contain a wide range of far-travelled crystalline erratics including rocks of British and Scandinavian provenance.
		Weybourne Town Till Member	A highly calcareous silt and chalk-rich matrix supported diamicton.
		Lowestoft Formation	Chalky till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content.
		Happisburgh Glacial Formation	A range of diamictons, sands and gravels, sands and laminated silts and clays.
		Bacton Green Till Member	An extensive diamicton complex that consists of a stratified assemblage of stony diamicton with beds/laminae of sorted material including sand, silt and clay.
Bedrock	Pleistocene	Wroxham Crag Formation	Interbedded gravels, sands, silts and clays. The gravels are dominated by flint (up to c.80%) and by quartz and quartzite (up to c.60%).
	Cretaceous	White Chalk Subgroup (Lewes Nodular Chalk, Seaford Formation, Newhaven Chalk Formation, Culver Chalk Formation, Portsdown Chalk Formation)	Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout.

17.1.8.2 Mining and Mineral Extraction

13. Information provided in the Envirocheck GIS data indicates that there has been localised extraction of sands and gravels within the study area, all of which have ceased operation. There are three BGS records of mineral sites within the study area boundary, details of which are provided below in **Table 17.1-2** and shown on **Figure 17.1.2**.
14. A review of active extraction sites recorded on the Norfolk County Council website indicates that there are two active mineral extraction sites within the study area. Mangreen Quarry is located within the onshore substation area of the DCO order limits, adjacent to the A140 (Ordnance Survey Grid Reference (OS GR) 622047 Eastings (E), 303208 Northings (N)). Ketteringham Quarry is located within the 250m buffer of the DCO at a distance of 200m west of an access road to the onshore cable corridor (OS GR: 617289 E, 302567 N at its closest point).
15. A review of the Coal Authority Interactive Viewer indicates that the study area is not within an area affected by coal mining activity, in that there are no recorded mine entries, abandoned mines or past coal workings (both shallow and deep) recorded.



16. A Mineral Safeguarding Area is an area designated by the Mineral Planning Authority to protect deposits of mineral resources from unnecessary sterilisation by non-mineral development. A review of the Norfolk County Council interactive Mineral Safeguarding Areas map indicates that the study area crosses several Mineral Safeguarding Areas. The study areas contain clay, shale sand and gravel resources associated with the glacial deposits and Lowestoft Formation.

Table 17.1-2: Recorded Mineral Sites

Site Name	Commodity	Site Type	Status	Ordnance Survey Grid Reference (OS GR)
Onshore Cable Corridor				
Carvel Farm Pit (two records)	Sand and gravel	Opencast	Ceased	610052 E, 343528 N 610425 E, 343423 N
Barford Pit (two records)	Sand and gravel	Opencast	Ceased	611869 E, 308051 N 611866 E, 308011 N
Swardeston Hall Green Pit	Clay and shale	Opencast	Ceased	620982 E, 301869 N (150m north of the onshore cable corridor)
Ketteringham Quarry	Sand and gravel	Opencast	Active	617289 E, 302567 N (200m west of the onshore cable corridor)
Onshore Substation				
Mangreen Quarry	Sand and gravel	Opencast	Active	622047 E, 303208 N
Swardeston Hall Green Pit	Clay and shale	Opencast	Ceased	621029 E, 301968 N (150m north of the onshore substation)



17.1.8.3 Ground Stability

17. The ground stability hazard classification for the study area, as provided in the Envirocheck GIS data are provided below in **Table 17.1-3**:

Table 17.1-3: Ground Stability

Ground Stability	Landfall	Onshore cable corridor	Onshore substation
Collapsible ground	No hazard to very low risk	No hazard to very low risk	Very low risk
Compressible ground	No hazard to very low risk	No hazard to moderate risk	No hazard
Ground dissolution	No hazard to very low risk	No hazard to high risk	Very low risk
Landslides	Very low risk	No hazard to very low risk	Very low risk
Running sands	No hazard to moderate risk	No hazard to low risk	Very low risk
Shrinking or swelling clay	No hazard to very low risk	No hazard to low risk	Low risk

17.1.8.4 Radon Gas

18. The presence of radon gas is assessed in the UK according to the number of homes likely to be above the 'Radon Action Level' (200 becquerels per m³ (Bq m³)). Under building regulations, the requirement for protection measures (described in Building Research Establishment (BRE, 2001)) in the construction of new buildings, conversions or extension is dependent on radon potential.
19. The radon potential dataset is a definitive map of 'Radon Affected Area in Great Britain and Northern Ireland', created jointly by Public Health England (PHE) and the BGS using long-term radon measurements made in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland (without affecting householders' confidentiality), combined with geological map data.
20. PHE recommends that radon level should be reduced in homes where the annual average is at or above 200Bq m³. This is termed the Radon Action Level.
21. BGS data indicate that the study area is located within a lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level), therefore no protective measures are necessary in the construction of new buildings.

17.1.8.5 Unexploded Ordnance

22. An unexploded ordnance (UXO) risk map has been obtained from Zetica and is presented as **Annex B**. The map indicates that the study area is located within an area deemed as containing a low risk of UXO being encountered. The UXO risk map also indicates that there is a Luftwaffe target recorded approximately 30m north of the onshore cable corridor, located to the west of Weybourne at approximately



OS GR 610434 E, 343318 N. No additional targets were identified within 250m of the study area.

17.1.8.6 Hydrogeology and Groundwater Vulnerability

23. Hydrogeological information for the study area has been collated from an Envirocheck GIS data, BGS hydrogeological maps and the Environment Agency website. Superficial and bedrock strata are classified by the Environment Agency according to their resource value and vulnerability as shown in **Table 17.1-4**.

Table 17.1-4: Environment Agency Groundwater Classification

Stratum	Unit	Class
Superficial Deposits	Marine Beach Deposits	Secondary A Aquifer
	River Terrace Deposits	Secondary A Aquifer
	Head Deposits	Secondary (undifferentiated)
	Alluvium	Secondary A Aquifer
	Sheringham Cliffs Formation	Secondary (undifferentiated)
	Briton's Lane Sand and Gravel Member	Secondary A Aquifer
	Weybourne Town Till Member	Secondary (undifferentiated)
	Lowestoft Formation	Secondary (undifferentiated)
	Happisburgh Glacial Formation	Secondary B / Unproductive Strata
	Bacton Green Till Member	Secondary B Aquifer/ Unproductive strata
Bedrock	Wroxham Crag Formation	Principal Aquifer
	White Chalk Subgroup	Principal Aquifer

24. Principal Aquifers are defined by the Environment Agency as layers of rock or drift deposits that have high intergranular and / or fracture permeability. This means they usually provide a high level of water storage. They may support water supply and / or river base flow on a strategic scale.
25. Secondary A Aquifers are defined by the Environment Agency as permeable layers capable of supporting water supplies at a local scale rather than strategic scale, and in some cases form an important source of base flow to rivers.
26. Secondary B Aquifers are defined by the Environment Agency as containing predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
27. Secondary Undifferentiated Aquifers are defined by the Environment Agency as being assigned in cases where it has not been possible to attribute either category

- A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
28. Unproductive Strata are defined by the Environment Agency as comprising of predominantly rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.
 29. The MAGIC map application reports that the study area is located within an area of medium to high groundwater vulnerability. Areas of high groundwater vulnerability are areas that are easily able to transmit pollution to groundwater. They are characterised by high leaching soils and the absence of low permeability superficial deposits. Medium groundwater vulnerability areas offer some protection to the underlying groundwater.
 30. BGS flood risk information contained within the Envirocheck GIS data indicates that the majority of the study area is located in an area with limited potential for groundwater flooding to occur at the surface. Isolated areas throughout the study area are located within areas that have the potential for groundwater flooding to occur at the surface, these are largely located adjacent to recorded rivers within the study area.
 31. There are two Water Framework Directive (WFD) groundwater bodies recorded within the study area, these include the North Norfolk Chalk WFD groundwater body and the Broadland Rivers Chalk and Crag WFD groundwater body.
 32. Both the North Norfolk Chalk (Water Body ID: GB40501G400100) and Broadland Rivers Chalk and Crag (Water Body ID: GB40501G400300) WFD groundwater bodies had a chemical and quantitative classification of poor in 2019.

17.1.8.7 Groundwater Abstractions

33. Information provided by Environment Agency indicates the following groundwater abstractions are present within the study area:
 - Four private groundwater abstractions classified as being for domestic purposes within the DCO order limits;
 - Twenty-six domestic groundwater abstractions within 250m of the DCO order limits (eight within 50m) and two within 250m of the onshore substation area (none within 50m); and
 - Twelve deregulated abstractions within 250m of the DCO order limits (five within 50m) and one within 250m of the onshore substation area (none within 50m).
34. It should be noted that the data search has not included identification of unlicensed water supplies abstracting less than 20m³ of water per day. For abstractions below 20m³ per day a licence is not required provided that the abstraction is part of a single operation.
35. Groundwater abstraction points are illustrated on **Figure 18.4** within ES **Chapter 18 Water Resources and Flood Risk** [\[APP-104\]](#).

17.1.8.8 Groundwater Source Protection Zones

36. Groundwater Source Protection Zones (SPZ) are defined around boreholes used for potable water supply to delineate the area where release of a contaminant into the aquifer could impact on the abstraction¹.
37. A large proportion of the onshore cable corridor is within a total catchment (the recharge area of a particular groundwater body), SPZ 3 with the exception of the area between the landfall and north of the village of Weybourne and from the south of the village of Matlaske towards Oulton. These areas are not designated as SPZs. It is likely that the SPZ is protecting groundwater within the Principal Bedrock Aquifers that underlie the study areas. No areas designated as SPZ 1 or SPZ 2 are within the study area with the exception of minimal encroachment into an SPZ 2 at the very end of the cabling corridor adjacent to the substation location. An area designated as SPZ 1 is recorded approximately 340m east of the onshore cable corridor near the village of Matlaske. The locations of the SPZ are illustrated on **Figure 17.1.3**.

17.1.8.9 Surface Water

17.1.8.9.1 Hydrology and Drainage

38. Information provided in the Envirocheck GIS data indicates that six EA main rivers are crossed by the DCO order limits as described in **Table 17.1-5**. One of the main rivers is unnamed and so has not been included within the table below.

Table 17.1-5: Environment Agency Main Rivers with River Quality Data

River	Overall Quality	Quality
River Bure	Poor	Ecological quality - poor Chemical quality - good
River Wensum	Moderate	Ecological quality - moderate, Chemical quality - good
River Yare	Moderate	Ecological quality - moderate, Chemical quality - moderate
River Tiffey	Moderate	Ecological quality - moderate, Chemical quality - moderate
River Tud	Moderate	Ecological quality - moderate, Chemical quality - moderate

39. In addition to the larger named rivers presented in **Table 17.1-5**, there are a number of unnamed watercourses, agricultural drains, drainage channels, and ponds that are located either wholly or partially within the study area.

¹ The Inner Zone (Zone 1) is the most sensitive and certain potentially hazardous activities are restricted in this area. Outside this are the Outer Zone (Zone 2) and the Total Catchment (Zone 3) which indicates the recharge area that contributes to the water.



40. The landfall area is located on the coast of the North Sea.

17.1.8.10 Surface Water Abstractions

41. Information provided by Environment Agency indicates that there are three licenced surface water abstractions located within the onshore cable corridor. The use of the abstracted water is not recorded within the information received. Named surface water bodies from which abstraction takes place include the River Yare and the River Bure.

42. It should be noted that the data search has not included identification of unlicenced water supplies abstracting less than 20m³ of water per day. For abstractions below 20m³ per day a licence is not required provided that the abstraction is part of a single operation.

17.1.8.11 Flood Risk Zones

43. Information provided in the Envirocheck GIS data indicates that the study area is within both Flood Zones 2 and 3, these areas (which contain both Zones 2 and 3) are associated with the following rivers and streams:

- River Bure;
- Swannington Beck;
- River Wensum;
- River Tud;
- River Yare;
- River Tiffey; and
- Intwood Stream.

44. There are several other areas associated within both Flood Zones 2 and 3 that are associated with unknown streams, including within the Village of Weybourne towards the North Sea.

17.1.8.12 Sensitive Land Use

45. Information contained within the Envirocheck GIS data indicates that parts of the study area are located within Nitrate Vulnerable Zones (NVZ), these areas are designated, by Defra and the EA, as being at risk from agricultural nitrate pollution. Within the study area, the following NVZ have been identified:

17.1.8.12.1 Landfall

- Anglia Chalk (groundwater)

17.1.8.12.2 Onshore Cable Corridor

- Anglia Chalk (groundwater);
- Glaven NVZ (surface water);
- Saxthorpe (groundwater);
- Bure Broads Eutrophic Lake (eutrophic water);

- Norwich Crag and Gravels (groundwater);
 - Tud NVZ (surface water); and
 - Yare NVZ (surface water).
46. A section of the DCO order limits bisects the River Wensum which is designated as a Special Conservation Area (SAC) and a Site of Special Scientific Interest (SSSI) due to it being an enriched, calcareous lowland river.
47. There are no additional SSSIs located within the study area, however the following designated sites are located within 250m of the DCO order limits:
- Weybourne Cliffs (located immediately adjacent to the eastern edge of landfall) is designated as a geological SSSI, categorised as an historic site with outstanding Pleistocene section of national importance.
 - Greater Wash (located immediately adjacent to the northern edge of landfall) is designated as a Special Protection Area (SPA) due to mosaic habitats present and the bird species it supports.
 - Alderford Common (located 164m west of the onshore cable corridor at OS GR: 613196 E, 318348 N at its closest point) is designated as a SSSI due to wide range of habitats that have developed there in response to variations in soils and topography.
 - Kelling Heath (located approximately 210m west of the onshore cable corridor at OS GR: 610485 E, 342053 N at its closest point) is designated as a SSSI due to the area containing the best example of a glacial outwash plain in England.
48. **Figure 17.1.4** illustrate the sensitive sites within the study area.

17.1.9 Historical Land Use and Regulatory Information

17.1.9.1 Historical Land Use

49. Historical Ordnance Survey (OS) maps contained within the Envirocheck GIS data has been reviewed to identify potentially contaminative former land uses within the study area and a 250m buffer in order to identify potential sources of contamination that may directly have the potential to impact the study area.
50. The majority of the study area is shown to comprise agricultural land and woodland from the earliest available OS maps (1883 - 1887) to present date. The study area has been used for mineral extraction with multiple pits dispersed throughout the area in the earliest available OS maps (1893 - 1897). Some of the pits are no longer shown on recent maps suggesting they may have been infilled. Bodham Street Gravel Pit is shown to have been used as a refuge tip from the 1970s.
51. The Midland and Great Northern Railway, Eastern and Midlands Railway and East Norfolk Railway lines are shown to bisect the study area from the late 1800s to date, with some of the lines shown as being dismantled on recent maps. A camp, used by the military, is shown on maps from the 1950s to the 1990s to the north west of Weybourne (see **Section 17.1.9.1** for further information). A sewage works is

recorded from 1972 to date adjacent to a former camp in the landfall/onshore cable corridor area. The 1957 OS maps records a disused airfield bisecting the onshore cable corridor at Brandiston. A second disused airfield is shown to the north of Bluestone station during the same period. A small airstrip (approximately 550 m in length) is recorded on Google Earth Imagery dated 1999 onwards (images prior to this date were not available) adjacent to the onshore cable corridor.

52. The history of the study area and the surrounding area (250m) is described in **Table 17.1-6**.

17.1.9.1.1 Weybourne Military Camp

53. A Freedom of Information (FOI) request was made by Royal HaskoningDHV to the Ministry of Defence (MoD) in August 2021. The request was in relation to information held by the MoD about Weybourne former Military Camp (recorded as unnamed camp on historical mapping). A response to the request was received from the Air Historical Branch of the Royal Air Force (RAF) in September 2021 and a copy is included as **Annex C**.
54. The information received indicates that development at the camp commenced in the late 1930s with the initial construction of a hanger completed in January 1941. The Station Headquarters were located on the ground floor of Carvel Farmhouse with the upper floors used as accommodation for Officers and Senior Non-Commissioned Officers (SNCO). Accommodation for airmen was provided in the form of a wooden hut. Water was supplied via tanks mounted on a lorry and hot water supplied by a portable boiler. Earth latrines were utilised.
55. A workshop for the mechanical transport associated with the camp was located within one of the barns of Carvel Farmhouse. The kitchen of the farmhouse accommodated the site's armoury before it was relocated to an outbuilding.
56. The information received indicates that building works and ground defence training continued in May 1941 before coming to a temporary halt due to a Heinkel He 111 dropping four 250kg bombs, the nearest is recorded as landing 9m from the farmhouse. The unexploded bombs were removed by the Bomb Disposal Squad and works recommenced at the camp.
57. In 1942 the camp was disbanded and in June of the same year the hanger was dismantled.
58. In the 1960s the camp was reopened and was known as No. 26 Loran Station. The station is recorded as becoming a North Atlantic Treaty Organisation (N.A.T.O) location within the UK until 1977 when the station was closed.
59. The camp was later reopened in 1980 and returned to RAF charge. RAF Weybourne became a remote operating site for RAF Neatishead 1980 until 1997. Following the end of a permanent RAF presence and removal of a radar the site was used by a local Air Cadet unit until 2003.
60. Demolition of the accommodation block, kitchen and workshop which had been present since the 1940s was authorised in 2011 as the site was deemed beyond economic repair.

Table 17.1-6: Historical Map Review

Map Dates	On-Site Features	Off-Site Features
Landfall		
1883 - 1887 (OS map 1:2,500 and 1:10,560)	The landfall area is predominantly coastline with agricultural land to the south.	Agricultural land surrounds the landfall study area.
1906 - 1907 (OS map 1:2,500 and 1:10,560)	No significant change.	No significant change.
1928 (OS map 1:2,500)	No significant change.	No significant change.
1929 (OS map 1:10,560)	No significant change.	No significant change.
1952 (OS map 1:10,560)	No significant change.	Weybourne Military Camp is recorded to the immediate south west of the landfall study area.
1957 (OS map 1:10,560)	No significant change.	No significant change.
1972 (OS map 1:2,500)	No significant change.	A sewage works is recorded to the immediate south of the landfall location (predominantly located within the onshore cable corridor extending beyond the study area boundary).
1974 – 1975 (OS map 1:2,500 and 1:10,000)	No significant change.	No significant change.
1979 - 1988 (OS map 1:2,500 - partial coverage)	No significant change.	No significant change.
1995 (OS map 1:10,000 - partial coverage)	No significant change.	No significant change.
Onshore Cable Corridor		
1883 - 1887 (OS map 1:2,500 and 1:10,560)	There are multiple small pits located throughout the onshore cable corridor. Larger pits are discussed in the sections below:	The four railway lines located within the study area continue off-site. A brick yard is located approximately 90m west of the onshore cable corridor boundary to the east of



Map Dates	On-Site Features	Off-Site Features
	<p>A pit is located to the north west of the village of Weybourne (OS GR: 610057 E, 343529 N).</p> <p>An 'Old Gravel Pit' is located near Blackbreck Plantation (OS GR 612115 E, 314070 N).</p> <p>The Eastern and Midlands Railway (running north-west to south-east) is recorded as bisecting the study area (OS GR 613176 E, 327496 N) with Bluestone Station recorded within the study area (OS GR 614115 E, 326756 N).</p> <p>A second railway line, the East Norfolk Line, Western Extension, is shown travelling on a south-west to north-east axis, bisecting the study area (OS GR 614495 E, 325100 N)</p> <p>The Eastern and Midland Railway is shown travelling east to west across the onshore cable corridor (OS GR 613123 E, 317428 N).</p> <p>The Great Eastern Railway travelling south-west to north-east, bisects the study area near the village of Ketteringham (OS GR 615396 E, 303200 N).</p> <p>An L shaped building and a smaller rectangular building is recorded to the west of the village of Weybourne (OS GR: 610050 E, 343425 N).</p>	<p>the village of Cawston (OS GR 614034 E, 323738 N).</p> <p>A brick works is recorded approximately 120m west of the onshore cable corridor boundary adjacent to the village of Weston (OS GR 611464 E, 315761 N).</p> <p>A marl pit is located south of the village of Weston, 15m for the study boundary (OS GR 611352 E, 315507 N).</p> <p>A marl pit is located adjacent to Bodham Farm (OS GR 613201 E, 338592 N), 90m east of the onshore cable corridor.</p> <p>A marl pit is located 155m north of the onshore cable corridor to the south of Morton (OS GR 612474 E, 316172 N), a second is located 70m north of the onshore cable corridor (OS GR 612324 E, 316461 N).</p> <p>A gravel pit is located near Telegraph Hill (OS GR 611634 E, 313471 N), 50m east of the onshore cable corridor.</p> <p>A gravel pit east of Bodham (Bodham Street Gravel Pit) is located immediately adjacent to the onshore cable corridor (OS GR:613199 E, 340439 N).</p>



Map Dates	On-Site Features	Off-Site Features
		<p>Gravel pits are shown to the north of Oulton, adjacent to Blickling Road (17m and 158m east) (OS GR 613312 E, 329547 N and 612820 E, 329249 N).</p> <p>A marl pit is located south of Bluestone Hall (OS GR: 614327 E, 326085 N 180m west) and a gravel pit is located south of Bluestone Lodge (OS GR:614576 E, 325718 N 100m west).</p> <p>A pit is also located to the north west of the Weybourne (OS GR: 610419 E, 343421 N 25m east of the onshore cable corridor).</p>
<p>1906 - 1907 (OS map 1: 2,500 and 1:10,560)</p>	<p>The Eastern and Midland Railway (OS GR 613123 E, 317428 N) is now recorded as the Midlands and Great Northern Joint Railway.</p> <p>Weybourne Pits are recorded adjacent to Sandy Hill Lane (OS GR:611672 E, 341577 N).</p>	<p>The marl pit is located south of Bluestone Hall (OS GR: 614327 E, 326085 N) and gravel pit south of Bluestone Lodge (OS GR:614576 E, 325718 N) are no longer shown.</p> <p>Weybourne Station is present immediately to the north of the study area boundary (OS GR 611812 E, 341908 N).</p>
<p>1928 (OS map 1: 2,500 - Weybourne and east of Ketteringham only)</p>	<p>The L shaped building and smaller rectangular building are recorded as Carvel Farm.</p>	<p>A gravel pit is located to the east of Vernon Wood (OS GR 617554 E, 303154 N) 30m west of the onshore cable corridor.</p> <p>A water tower is recorded 220m south of the onshore cable corridor (OS GR 621177 E, 301304 N).</p>



Map Dates	On-Site Features	Off-Site Features
1929 (OS map 1:10,560 - partial coverage).	No significant change.	No significant change.
1952 (OS map 1:10.560)	An unnamed camp (Weybourne Military Camp) partially occupies the onshore cable corridor to the west of Weybourne.	The camp extends to the area immediately surrounding the onshore cable corridor and comprises a number of buildings.
1957 (OS map 1: 10,560)	<p>Bluestone Station (OS GR: 614115 E, 326756 N) is now labelled 'Bluestone Sidings'.</p> <p>A disused airfield bisects the onshore cable corridor in Brandiston (OS GR 613672 E, 320991 N).</p>	<p>A disused airfield in Bluestone (adjacent to Bluestone Sidings) is recorded 30m north east of the onshore cable corridor at its closest point (OS GR 614515 E, 326673 N).</p> <p>The disused airfield at Brandiston extends to the east of the onshore cable corridor.</p> <p>The brick yard located approximately 90m west of the onshore cable corridor boundary to the east of the village of Cawston is now recorded as a 'Works'.</p> <p>A gravel pit is shown at Grove Planation (OS GR 612052 E, 309277 N) 170m west of the onshore cable corridor.</p>
1970 to 1975 (OS maps 1:2,500)	<p>The unnamed camp to the west of Weybourne is labelled 'disused'.</p> <p>A sewage works is shown north of Weybourne (OS GR: 610833 E, 343615 N).</p>	<p>Some of the buildings associated with the unnamed camp near Weybourne are no longer recorded.</p> <p>The marl pit is located adjacent to Bodham Farm (OS GR 613201 E, 338592 N), 90m east of the onshore cable corridor is no longer recorded.</p>



Map Dates	On-Site Features	Off-Site Features
	<p>The Midland and Great Northern Joint Railway in the north of the study area (OS GR 612556 E, 342760 N) is now labelled 'North Norfolk Railway'.</p> <p>The Eastern Midlands Railway line is recorded as a dismantled railway, Bluestone station is still labelled.</p> <p>'The Midlands and Great Northern Joint Railway is no longer active and labelled 'Marriott's Way'.</p> <p>The 'Old Gravel Pit' is located near Blackbreck Plantation (OS GR 612115 E, 314070 N) is no longer recorded.</p>	<p>The gravel pit is located to the east of Vernon Wood (OS GR 617554 E, 303154 N) is no longer recorded.</p> <p>The gravel pit is shown at Grove Planation (OS GR 612052 E, 309277 N) is recorded as disused.</p> <p>The gravel pit to the north of Oulton, (158m east) (OS GR 612820 E, 329249 N) is recorded as disused.</p> <p>The gravel pit located near Telegraph Hill (OS GR 611634 E, 313471 N) is no longer recorded.</p> <p>The gravel pit (Bodham Street Gravel Pit); to the immediate east of the onshore cable corridor (OS GR:613199 E, 340439 N) is now labelled 'refuse tip'.</p> <p>The marl pit located to the south of Morton (OS GR 612474 E, 316172 N) is no longer recorded.</p> <p>A filling station is recorded adjacent to one of the Onshore Cable Corridor access roads to the west of Ketteringham (OS GR 614287 E, 303790 N).</p> <p>An electrical substation is recorded approximately 240m south of the end of the onshore cable corridor (OS GR 620740 E, 301227 N).</p>



Map Dates	On-Site Features	Off-Site Features
		<p>The brick works recorded adjacent to the village of Weston (OS GR 611464 E, 315761 N) are no longer recorded.</p> <p>The marl pit located south of the village of Weston, (OS GR 611352 E, 315507 N) is recorded as a pond.</p> <p>A sewage works is shown in the village of Swardeston, 170m north east of onshore cable corridor (OS GR 619628 E, 302705 N).</p> <p>The brick yard located to the east of the village of Cawston (OS GR 614034 E, 323738 N) is no longer shown.</p>
1979 - 1988 (OS map 1:2,500 - partial coverage)	The A11 has been constructed travelling in a south west to north east direction and bisecting the onshore cable corridor (OS GR 615350 E, 303212 N).	No significant change.
1981 (OS map 1:10,000)	Carvel Farm is no longer recorded.	A wireless station is recorded within the disused unnamed camp 120m west of the onshore cable corridor (OS GR: 609935 E, 343702 N).
1984 (OS map 1:10,000 - partial coverage)	No significant change.	No significant change.
1993 to 1995 (OS map 1:10,000 - partial coverage and 1:2:500)	The East Norfolk Line, Western Extension, (OS GR 614986 E, 325421 N) is now labelled Marriott's Way (path).	<p>The unnamed camp to the west of Weybourne is no longer shown.</p> <p>A sand and gravel pit is shown 50m to the south of the onshore cable corridor near Vernon Wood</p>



Map Dates	On-Site Features	Off-Site Features
	<p>The unnamed camp to the west of Weybourne is no longer shown.</p> <p>The pit is located to the north west of the village of Weybourne (OS GR: 610057 E, 343529 N) is no longer recorded.</p>	<p>(OS GR 617035 E, 303158 N). This is also recorded as an historical landfill site.</p>
1999 to 2019 (Google Earth imagery)	No significant change.	A small airstrip (approximately 550 m in length) is located adjacent to the onshore cable corridor at OS GR: 609895 E, 343545 N.
2021 (Norfolk County Council interactive map)	No significant change.	Ketteringham Quarry is located 200m west of an access road to the onshore cable corridor (OS GR: 617289 E, 302567 N at its closest point).
Onshore Substation		
1883 - 1887 (OS map 1: 2,500 and 1:10,560)	<p>Study area comprises agricultural land with some woodland.</p> <p>A gravel pit is recorded (OS GR: 622142 E, 302950 N).</p>	<p>A railway line (Eastern Union Line) borders the eastern edge of the onshore substation area.</p> <p>Sprow's Pits are recorded adjacent to the onshore substation area (OS GR 621440 E, 301727 N).</p>
1906 - 1907 (OS map 1: 2,500 and 1:10,560)	No significant change.	No significant change.
1928 (OS map 1: 2,500)	No significant change.	No significant change.
1929 (OS map a:10,560 - partial coverage)	No significant change.	No significant change.
1957 (OS map 1: 10,560)	No significant change.	No significant change.
1972 (OS map 1: 2,500)	No significant change.	No significant change.
1993 (OS map 1: 2,500 - partial coverage)	Pylons recorded bisecting the study area.	No significant change.



Map Dates	On-Site Features	Off-Site Features
	An Electricity Grid Transformation Station is recorded (OS GR: 621822 E, 302374 N).	
1995 (OS map 1:10,000 - partial coverage)	No significant change.	No significant change.
2021 (Norfolk County Council interactive map)	Mangreen Quarry is partially located within the DCO order limits surrounding the onshore substation area (OS GR: 622047 E, 303208 N).	Mangreen Quarry extends to the south west of the DCO order limits (centered at OS GR: 621813 E, 302821 N).



17.1.9.2 Regulatory Information

61. Regulatory information relating to potentially contaminative activities in the study area has been summarised in **Table 17.1-7**. Further details are provided in the Envirocheck GIS data.

Table 17.1-7: Regulatory Information

Environmental Records	Description
Discharge consents	There are four discharge consents recorded within the study area, one at landfall and three within the onshore cable corridor. There are three entries that relate to the discharge of sewage and one entry that relates to unknown discharges.
Pollution incidents	There are no recorded pollution incidents within the study area.
Registered landfill, historical landfill or other waste disposal sites	<p>There are no current authorised landfill sites within the study area.</p> <p>There are no historical landfill sites recorded within the study area. However, anecdotal information indicates that an area of land adjacent to a property off Chapel Street, Barford was historically used as a landfill (OS GR 611901 E, 307906 N).</p> <p>There are four historical landfill sites within 250m of the study areas:</p> <p>Bodham Pit, immediately to the east of the study area, was authorised to accept commercial waste, the dates of operation are not provided in the information reviewed (OS GR 613100 E,340400 N).</p> <p>Morbays Tip immediately south of the study area, authorised to accept inert, industrial and commercial waste. Operational between 1964 and 1984 (OS GR: 617100 E, 303000).</p> <p>Central Depot, 115m north of the study area. No information provided on accepted waste (OS GR:617300 E, 303600 N).</p> <p>Land south of Roseacre Estate, 230m west of the study area. Details of waste accepted and dates it was operational are not provided in the information reviewed (OS GR 612600 E,339800 N).</p>
Licensed waste management facilities	There are no records of licensed waste management sites within the study area.
Historical tanks	There is one record of a historical tank recorded within the onshore cable corridor. The tank is



Environmental Records	Description
	associated with the former (military) camp to west of the village of Weybourne. The contents of the tank is not recorded within the information reviewed; however anecdotal information indicates that the tank was utilised as a swimming pool by military personnel during the 1940s*. Ten additional tanks are recorded within the former camp area immediately adjacent to the onshore cable corridor.
Electrical features	There is one record of an electrical substation facility also recorded immediately adjacent to the onshore cable corridor within an area associated with the former camp (OS GR: 610465 E, 342883 N).
Contemporary trade directory records (active and former)	There are no records of contemporary trade (active or former) within the study area.
*Verbal communication between Dalcour Maclaren (Land agents) and Sir Michael Savory (landowner at landfall area), July 2021.	

17.1.10 Preliminary Conceptual Site Model and Qualitative Risk Assessment

62. Land contamination is assessed through the identification of Potential Contaminative Linkages (PCL). This assessment involves the development of a CSM which describes the relationship between on and offsite potential sources of contamination (and contaminants), potential receptors to such contamination and anticipated pathways between the two. Where all three (source-pathway-receptor linkage) are present or considered to be present, they are described as a PCL which can be subject to the risk assessment process.
63. The following discusses the potential sources, pathways, and receptors present.

17.1.10.1 Potential Sources

64. The potential sources of contamination and contaminants of concern are summarised below in **Table 17.1-8** and illustrated in **Figure 17.1.5**.

Table 17.1-8: Potential on Site Sources

Potential Sources	Potential Contaminants of Concern
Railway land	Railway land (both current and historical) is a potential source of contamination and Made Ground may be encountered. Contaminants associated with railway land include herbicides, metals, fuel hydrocarbons, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), glycols and sulphates. Asbestos can also be associated with the materials used within the track bedding material, fill used in the formation of embankments and within the trains themselves.



Potential Sources	Potential Contaminants of Concern
Sewage Works	The processing of sewage could release contaminants into the environment depending on the site's full operational history and usage. Potential contaminants could include metals, cyanides, nitrates, sulphates, asbestos, fuel hydrocarbons, semi volatile organic compounds (SVOC), volatile organic compounds (VOC), PCBs and polyfluoroalkyl substances (PFAS). Biological contaminants, such as pathogens, may also be associated with the sewage works.
Airfields and Military Camps.	Potential contaminants may include metals, VOCs and SVOCs, glycols, fuel/oil hydrocarbons, phenols, PFAS and PCBs. Explosive residues and other associated chemicals may be associated with the former armory located within the military camp. Asbestos had also been identified within the buildings associated with the former military camp.
Potentially infilled land (former pits)	Many former pits are located throughout the study area, some of which may have been infilled through unregulated waste disposal activity or as a licensed landfill. Contaminants of concern associated with the infilling of land are dependent on the age of emplacement of materials and the nature of materials used. Potential contaminants can include ground gas, SVOCs and VOCs, metals, asbestos, sulphates, fuel hydrocarbons, PAHs, phenols, cyanides, PCBs, dioxins, furans and asbestos.
Pipeline	During a site selection workshop, it was brought to the attention of the Applicant that a potential pipeline which may contain asbestos / asbestos containing materials may be located within the onshore cable corridor near the village of Little Barningham (see Figure 17.1.5).

65. Several current and historical activities undertaken within 250m of the study area may have released contaminants into the ground, which may have subsequently migrated to the study area. These are identified in [Table 17.1-9](#) and illustrated in [Figure 17.1.5](#).

Table 17.1-9: Potential Offsite Sources

Potential Sources	Potential Contaminants of Concern dependent on source
Railway land	Asbestos, metals and metalloids, PAHs, fuel and oil hydrocarbons, VOCs and SVOCs, glycols, inorganic and organic contaminants, herbicides, PCBs, PFAS, explosive residues. Ground gas.
Brick works	
Potentially infilled land / refuse sites	
Airfield and military camp	



Potential Sources	Potential Contaminants of Concern dependent on source
Sewage works	
Electricity substation	
Filling station	
Potential pipeline	

17.1.10.2 Potential Receptors and Pathways

66. Potential receptors and pathways are outlined in **Table 17.1-10**.

Table 17.1-10: Receptors and Pathways

Receptors	Pathways
Human Health	
Future site users not involved with the project (e.g. farmers) during construction and operation	Direct exposure through dermal contact, ingestion or inhalation of soils/dusts and asbestos fibers; and Inhalation of ground gas and volatile contaminants.
Neighbouring site users (commercial and residential) during construction	
Construction/ground workers during construction phases Maintenance workers during the operational phase	Direct exposure through dermal contact, ingestion or inhalation of soils and dusts during ground-breaking activities: <ul style="list-style-type: none">• Inhalation of asbestos containing soils and dusts; and• Inhalation of ground gas and volatile contaminants.
Controlled Waters	
Surface waters: River Bure, Swannington Beck, River Wensum, River Tud, River Yare, River Tiffey, unnamed main river; and Intwood Stream. In addition to the named watercourses, multiple smaller unnamed waterbodies.	Lateral migration of contaminants and discharge of contaminated groundwater and surface water runoff.
Groundwater within superficial deposits (Secondary A, B and Undifferentiated Aquifers) and bedrock (Principal Aquifers). Zone III SPZ, minimally Zone II SPZ and local groundwater abstractions.	Leaching, dissolution and migration of contaminants from unsaturated soils; and Vertical migration through the creation of preferential pathways.
Buildings and Utilities	
Existing buildings and utilities	Migration and accumulation of ground gases / vapours within new buildings and structures: Direct contact with concrete foundations; and Direct contact and diffusion into services such as new potable water pipes.
Future substation buildings and utilities	



Receptors	Pathways
Ecologically Sensitive Sites	
River Wensum SAC and SSSI (onsite), Greater Wash SPA (adjacent to landfall) and Alderford Common SSSI (164m west).	Migration of dissolved contaminants in groundwater and discharge to surface water.

17.1.10.3 Preliminary Conceptual Site Model and Qualitative Risk Assessment

67. The CSM and Preliminary Qualitative Risk Assessment are presented in **Table 17.1-11**. Definitions of probability and consequence have been based on guidance outlined in CIRIA 552 and summarised in **Annex D**.
68. A combination of probability and consequences produces a risk level based on the risk evaluation and likely action required. The land contamination risk, which is a function of the probability and the consequence, can then be defined using the risk matrix.



Table 17.1-11: Conceptual Site Model and Preliminary Risk Assessment

Source	Pathway	Receptor	Associated hazard	Potential consequence of contaminant linkage	Likelihood of contaminant linkage	Risk classification (pre mitigation)	Justification
On site sources as described in Table 17.1-8	Dermal contact, ingestion and inhalation of soils, dusts and asbestos fibres. Inhalation of volatile contaminants.	Future onsite users	Human health	Severe	Low likelihood	Moderate risk	The study area is predominantly agricultural or undeveloped land which are considered low risk in terms of contamination. However, there is the potential for there to be localised contamination associated with the sources described in Table 17.1-8 . In these areas, contaminants may be brought to the surface or mobilised during construction which if not mitigated could present an unacceptable risk to human health.
		Construction/ground workers and neighbouring site users during construction. Maintenance workers during the operational phase.		Severe			
	Leaching and migration from unsaturated contaminated soils.	Groundwater within superficial deposits (Secondary A, B and Undifferentiated Aquifers).	Pollution of controlled waters	Medium	Low likelihood	Moderate to low risk	Contaminants present in soils have the potential to be mobilised during construction and leach into the underlying superficial aquifers potentially impacting groundwater quality.
	Vertical migration through the creation of preferential pathways.			Medium			
	Leaching and migration from unsaturated contaminated soils.	Groundwater within bedrock (Principal Aquifers), Zone III SPZ and local groundwater abstractions.	Pollution of controlled waters	Severe	Low likelihood	Moderate risk	A large proportion of the study area is within Zone III SPZ, minimally within an SPZII and underlain by a Principal Aquifer. These zones are not considered to be at risk from the general cable construction works as excavations would generally be shallow. However, where trenchless crossing techniques (e.g. HDD) or piling (for the construction of the substation) are to be undertaken these could present a risk to the Principal Aquifer, SPZs and local abstractions and requires further consideration.
	Vertical migration through the creation of preferential pathways.			Severe			
	Lateral migration and discharge of groundwater and surface water runoff.	River Bure, Swannington Beck, River Wensum, River Tud, River Yare, River Tiffey, unnamed main river; and Intwood Stream. In addition to the named watercourses, multiple smaller unnamed waterbodies.	Pollution of ecologically sensitive sites	Medium	Low likelihood	Moderate to low risk	Surface water receptors across the study area may be impacted by the works if appropriate mitigation is not implemented. An example of a potential mitigation measure includes a pre-construction targeted ground investigation in areas identified as potential sources of contamination. Identification, characterisation, understanding of extent and magnitude of potential source of contamination allows appropriate management of the potential pathway.
	Migration of dissolved contaminants in groundwater and discharge to surface water.	River Wensum SAC and SSSI (onsite), Greater Wash SPA (adjacent to landfall) and Alderford Common SSSI (164m west)		Medium			



Source	Pathway	Receptor	Associated hazard	Potential consequence of contaminant linkage	Likelihood of contaminant linkage	Risk classification (pre mitigation)	Justification
							<p>associated with the designations determines how plausible the potential contaminant linkage is.</p> <p>Pre-construction targeted ground investigation in conjunction with understanding the plausibility of species specific potential contaminant linkage can mitigate and allow management of potential impacts.</p>
	Direct contact with concrete foundations; and Direct contact and diffusion through drinking water pipes.	Existing and new buildings	Building and foundation corrosion and impact to potable water	Medium	Low likelihood	Moderate to low risk	<p>Potential contamination could impact on the integrity of concrete foundations through creating aggressive ground conditions.</p> <p>Potential organic contaminants could permeate potable water supplies (if present or proposed) and have detrimental impacts on human health.</p>
	Gas and vapour migration and accumulation in buildings.	Future onsite users and neighbouring residents	<p>Health risk (methane, carbon dioxide and volatiles)</p> <p>Explosion (methane)</p>	Severe	Low likelihood	Moderate risk	<p>There is potential for ground gas and vapours to be produced from materials used in localised areas associated with potentially infilled pits. In these areas, contaminants may be brought to the surface or mobilised during construction which if not mitigated could present an unacceptable risk to human health.</p> <p>The excavation of the onshore cable corridor has the potential to create a preferential pathway for any gases or vapours to migrate and accumulate in enclosed spaces and present a risk of asphyxia and / or explosion. It is proposed that the material excavated during construction of the onshore cable corridor would be re-instated following installation, this would lower the potential risks associated with creating preferential pathways as these soils are likely to have a porosity than coarse granular hardcore material.</p> <p>It is also proposed that the length of the onshore cable corridor is lined with cement bound sand primarily to reduce thermal impacts to the surrounding soils.</p>
		<p>Construction/ground workers and neighbouring site users during construction.</p> <p>Maintenance workers during the operational phase.</p>	<p>Health risk (methane, carbon dioxide and volatiles)</p> <p>Explosion (methane)</p>	Severe	Low likelihood	Moderate risk	<p>The potential to create contaminant pathways during construction and maintenance activities exist through the excavation works required to create the onshore cable corridor and the onshore substation. Potential ground gas and vapours could migrate and result in acute or chronic effects to workers.</p> <p>Within the onshore substation potential ground gas and vapours could accumulate within the building which would be accessed by maintenance workers during the operational phase of SEP and DEP.</p> <p>Targeted intrusive ground investigation and/or multiple lines of evidence approach can be adopted to determine the plausibility of potential ground gas or vapour sources identified at the specific locations this risk relates to.</p> <p>To mitigate the risks to construction workers during excavation activities (particularly if entry into confined spaces is required) the use of appropriate</p>



Source	Pathway	Receptor	Associated hazard	Potential consequence of contaminant linkage	Likelihood of contaminant linkage	Risk classification (pre mitigation)	Justification
							<p>working methods incorporated into a CoCP and use of PPE would be required. This would lower the risk to low.</p> <p>Impacts to maintenance works during the operational phase of the project can be mitigated with the use of appropriate working methods and PPE.</p>
Offsite sources as described in Table 17.1-9	Direct exposure via windblown soils and dusts and asbestos fibres.	Future onsite users.	Human health	Severe	Low likelihood	Moderate risk	Areas of localised potential contamination lie adjacent to the study area such as landfills and infilled land. There is the potential for contaminants within soils, leachates or groundwater to migrate into the study area and be encountered, exposed or mobilised during construction works. Pre-construction targeted ground investigations, would help to establish whether areas of the study area have the potential to be impacted by offsite sources of potential contamination.
	Lateral migration of vapours or contaminated groundwater.	Construction/ground workers during construction.		Severe	Low likelihood	Moderate risk	
	Lateral migration of ground gas.	Maintenance workers during the operational phase.					
	Lateral migration of dissolved phase contaminants in groundwater and migration onto site including non-aqueous liquids.	Groundwater within superficial deposits (Secondary A, B and Undifferentiated Aquifers)	Pollution of controlled waters beneath the cable corridor	Medium	Low likelihood	Moderate to low risk	
Leaching and migration from unsaturated contaminated soils.	Bedrock (Principal Aquifers). Zone III SPZ and local groundwater abstractions.	Severe		Low likelihood	Moderate risk		



17.1.11 Conclusions and Recommendations

17.1.11.1 Conclusions

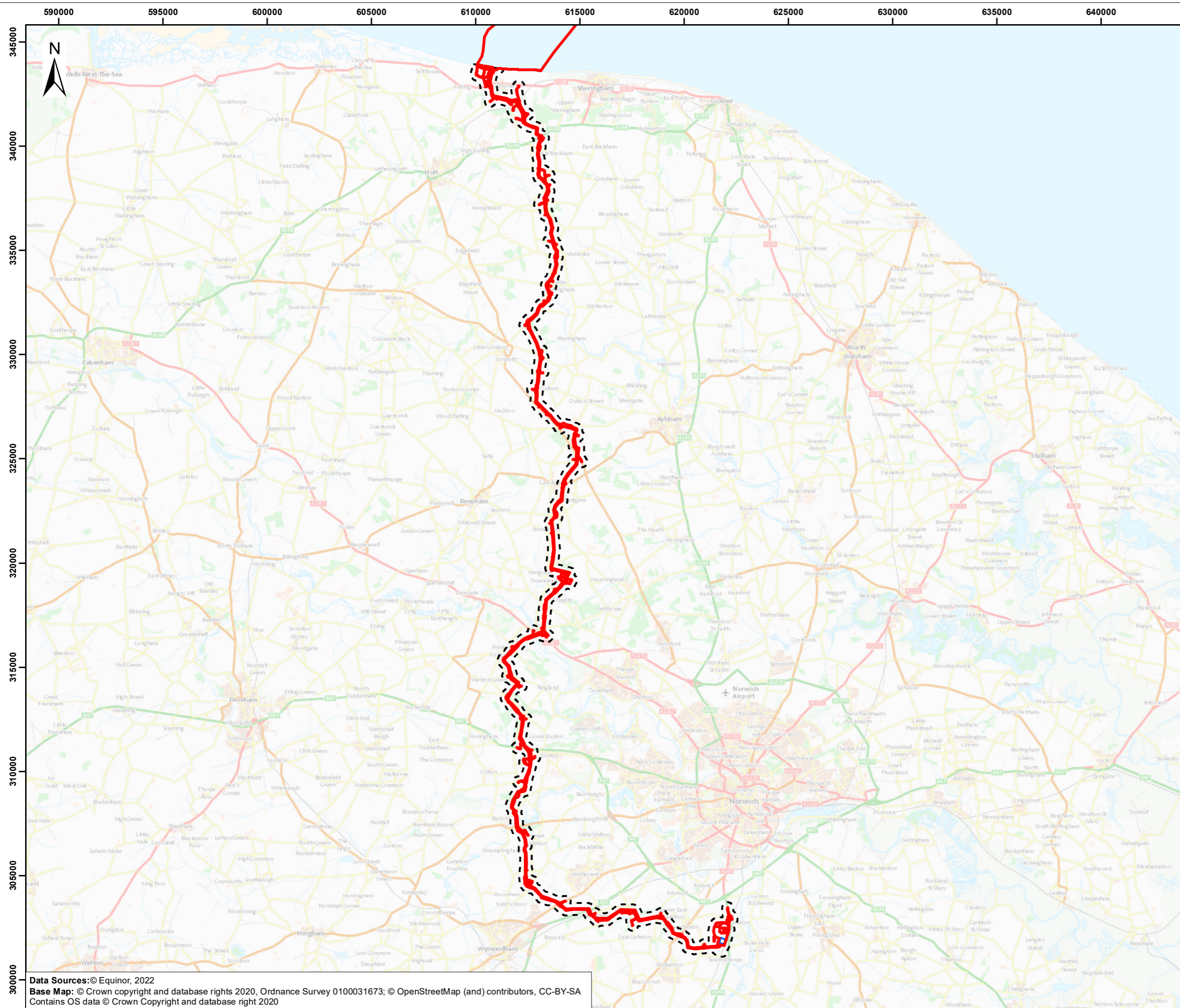
69. The key objectives of the PRA were to provide information on the current conditions within and around the SEP and DEP study area with respect to land contamination, characterise the baseline environment to inform and support the development of the site, and to identify potential land quality risks and constraints associated with SEP and DEP.
70. BGS records indicate the study area is predominantly underlain by superficial deposits laid during the Pleistocene ranging from sands and gravels to clayey Glacial Till. These are underlain by bedrock comprising the Wroxham Crag Formation and White Chalk Subgroup. The superficial deposits are classified as a Secondary A, Secondary B, Secondary undifferentiated Aquifers and unproductive strata. The bedrock underlying the site is classified as a Principal Aquifer. Parts of the study area site lie within a Zone III SPZ and minimally an Zone II SPZ which is likely to protect large groundwater abstractions. Main rivers, their tributaries, ponds and other surface water features are also present within the study area.
71. The study area has largely been used as agricultural land, woodland or residential development since the late 1800s. However, there are localised areas which have had a potentially contaminative use including the unregulated infilling of pits, landfills, railway land, airfields, military land and a sewage works.
72. These areas are considered to be a moderate risk in terms of contamination. Where potential sources of contamination cannot be avoided, a targeted ground investigation shall be undertaken during the pre-construction stage of the project so that the potential risks can be identified, and appropriate mitigation measures put in place to protect key receptors. Consideration is also required in relation to ground gas and vapour migration which may occur due to the creation of preferential pathways as a result of construction activities. It is proposed that the material excavated during the installation of the onshore cable corridor would be re-instated following completion and lined with cement bound sand to reduce thermal impacts. However should this change or a significant source of gas / vapour generating material is encountered during construction further consideration would be required.
73. Potential off-site sources include railway land, unregulated infilled land, landfills, filling stations, military land, airfields, sewage works, a potential pipeline and substation. These may also present a moderate risk in terms of contamination (including the onsite migration of ground gas, vapours, leachate and contaminated groundwater) and have the potential to present a constraint to SEP and DEP, for example the location of the onshore cable corridor should it be required to be relocated adjacent to a potential source of contamination. Targeted pre-construction ground investigation could support the identification of potential offsite migration, the onshore cable corridor is a potential migration pathway to sensitive receptors.
74. It should be noted that the PRA has been developed based on a desk-based review of information, and in the absence of ground investigation data, the CSM had adopted a precautionary approach.

17.1.11.2 Recommendations

75. Based on the findings of the PRA the following work is recommended prior to construction:
- A post consent targeted intrusive ground investigation in potential source areas and generic quantitative risk assessment (GQRA) to help better determine the presence, magnitude and extent of contaminants within the study area and inform discussions on appropriate mitigation measures to lower the risk to the potential receptors identified within this PRA;
 - Development of a CoCP (document number 9.17 for use during construction works to protect construction workers, neighbouring site users, groundwater and surface water. The report should be informed by the results of the targeted intrusive ground investigation;
 - To protect construction workers, the works should be undertaken in accordance with the requirements of the Health and Safety at Work Act 1974 and the Construction (Design and Management) (CDM) Regulation 2015;
 - Protocols for dealing with unexpected contamination should be set in place prior to construction to ensure that procedures are known and agreed with the Regulators should unexpected, contaminated materials be encountered;
 - Should contamination be identified and piling be required in a sensitive water environment receptor, such as Principal Aquifer, SPZ or potable groundwater abstractions a post consent hydrogeological piling risk assessment to be undertaken (potentially associated with the construction of the onshore substation) to protect the water environment;
 - The movement and reuse of materials on site should be undertaken in accordance with the CL:AIRE Code of Practice (CL:AIRE 2011) 'The definition of waste: Development Industry Code of Practice', where applicable; or an environmental permit that authorises the deposit of excavated material for recovery; and
 - The management of any waste material off-site must be at a site with an environmental permit and any waste activity must consider the waste hierarchy; hazardous waste must be managed in accordance with Hazardous Waste Regulations 2005; and any disposal of materials off-site to landfill should be undertaken in accordance with the Landfill Regulations 2002.
76. It is also recommended that the Regulators (local authority and Environment Agency) are consulted at an early stage (pre intrusive ground investigation) to agree the scope of works and gain agreement to the proposed approach.

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Title:
Figure 17.1.1 Land Quality Study Area

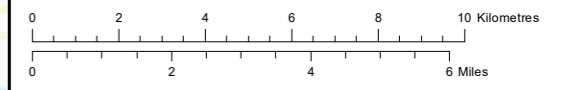
Document:
Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- DCO Boundary
 - Onshore Substation Site
 - 250m Study Area



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



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Equinor Doc. no.: C282-RH-Z-GA-00075
RHDHV Doc. no.: PB8164-RHD-ZZ-ON-DR-Z-0057

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A	25/04/2022	First Issue	AZ	OB	SM

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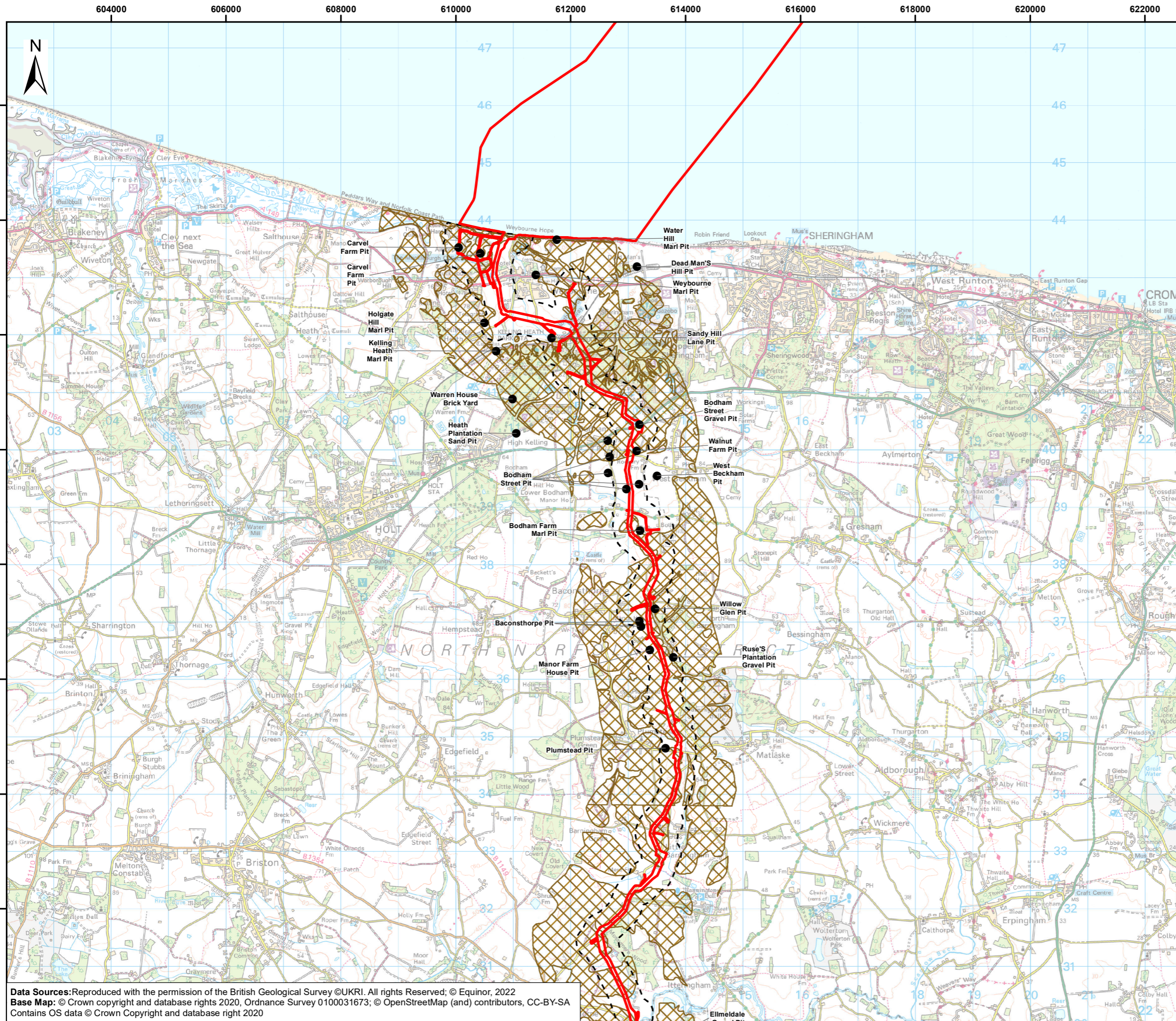
Sheringham Shoal and Dudgeon Extension Projects

Title:
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Sheet 1 of 4

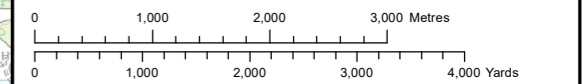
Document:
Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- DCO Boundary
 - 250m Study Area
 - Mineral Site Location
 - Mineral Safeguarding Area



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



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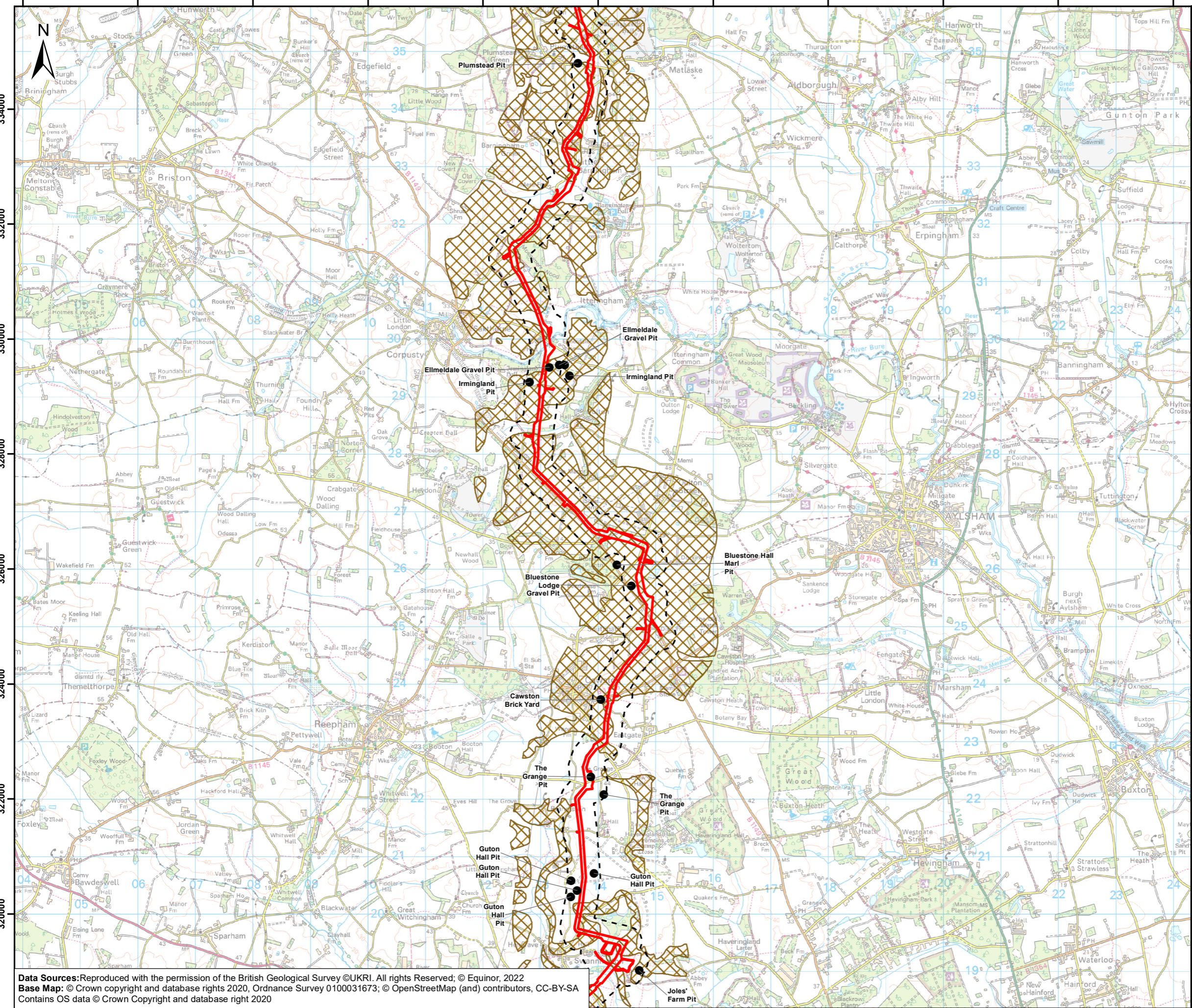
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Title:
Figure 17.1.2 Mineral Safeguarding Areas
Sheet 2 of 4

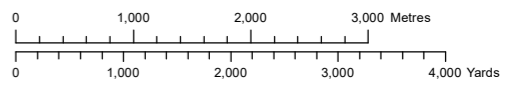
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Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- DCO Boundary
 - 250m Study Area
 - Mineral Site Location
 - Mineral Safeguarding Area



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



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Scale at size: A3

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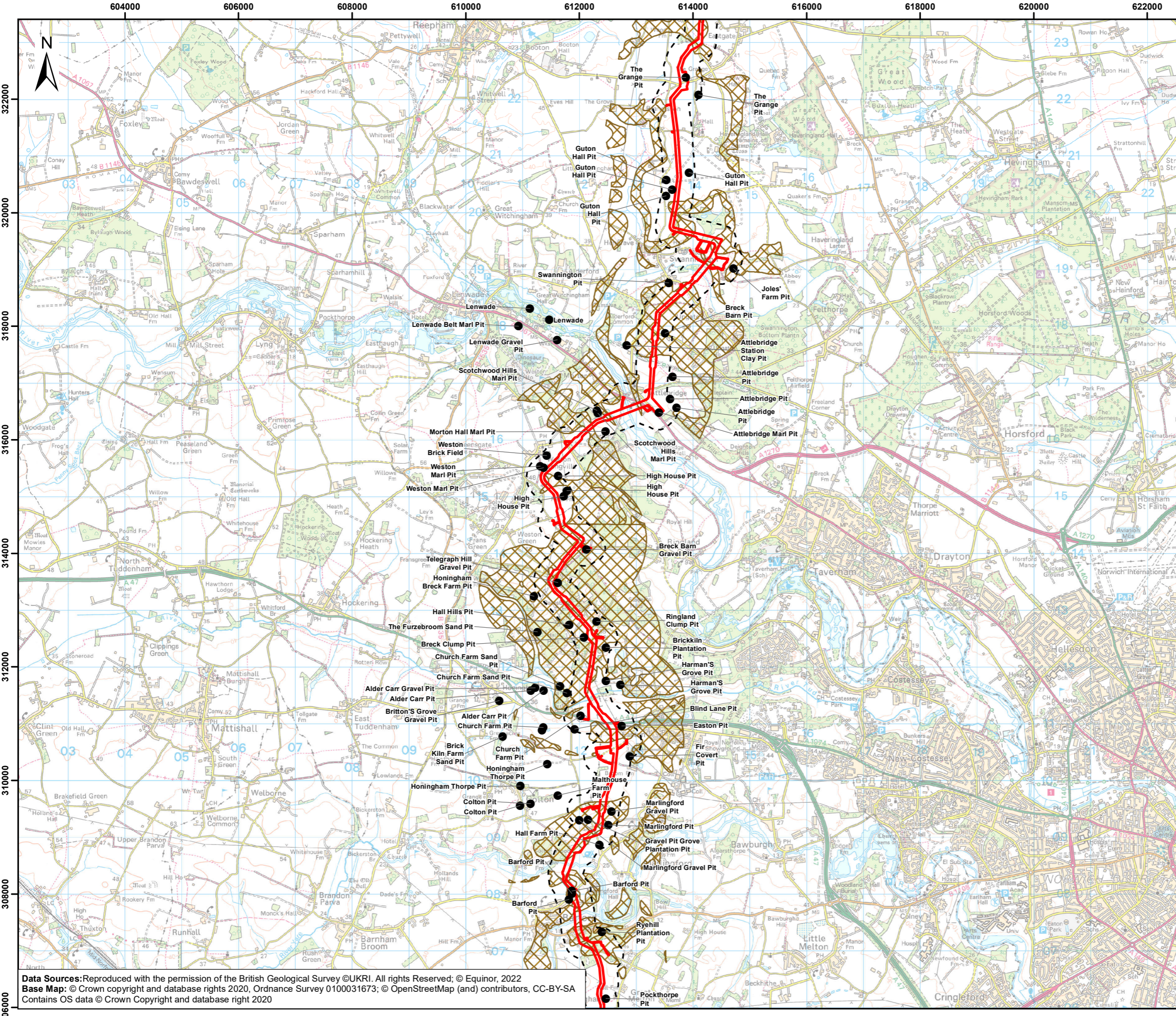
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Sheet 3 of 4

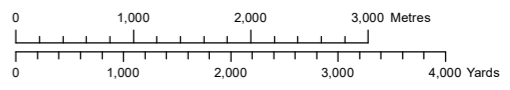
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Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- DCO Boundary
 - 250m Study Area
 - Mineral Site Location
 - Mineral Safeguarding Area



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



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A	25/04/2022	First Issue	AZ	OB	SM

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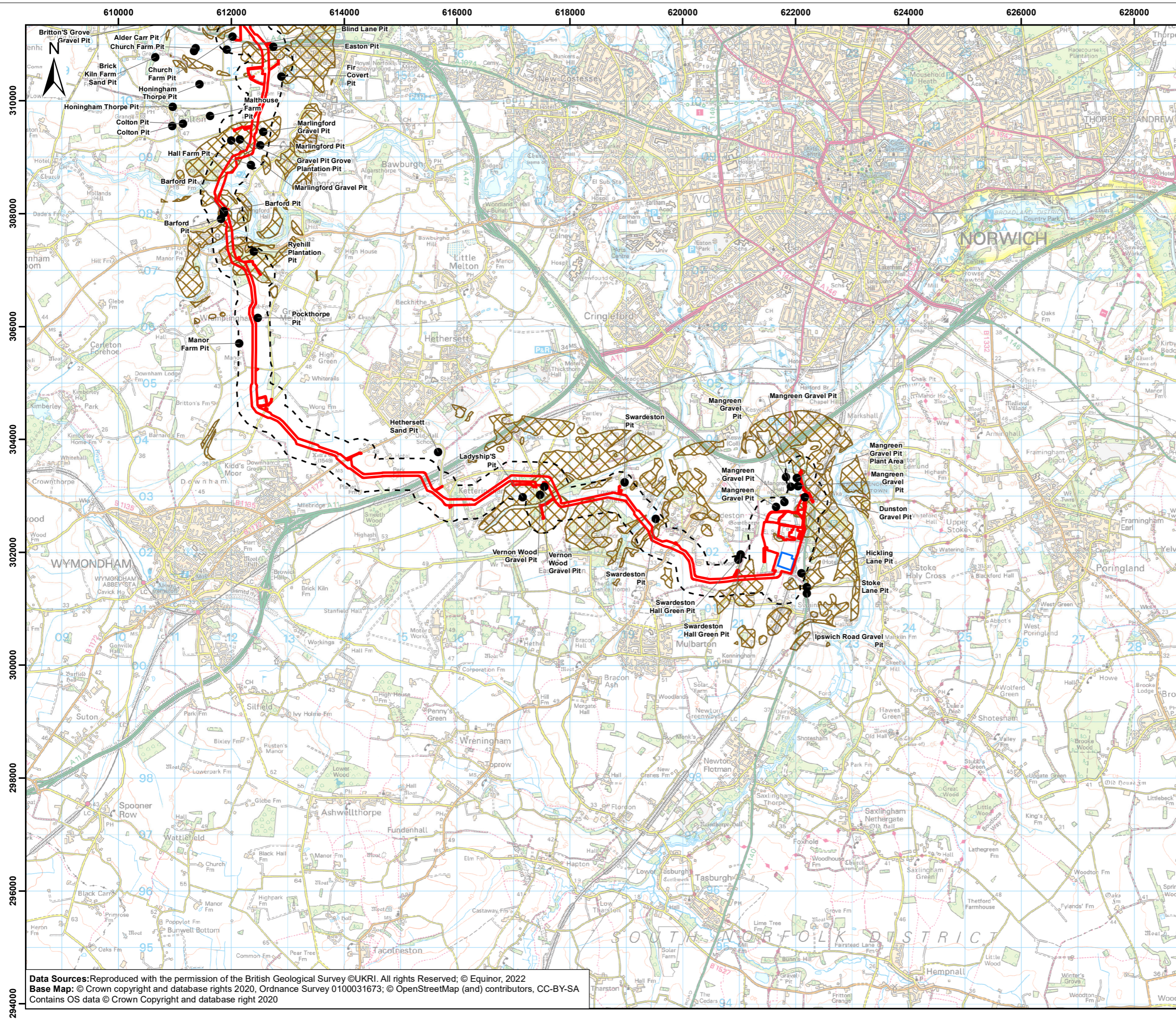
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Title:
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Sheet 4 of 4

Document:
Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- DCO Boundary
 - Onshore Substation Site
 - 250m Study Area
 - Mineral Site Location
 - Mineral Safeguarding Area



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 1,000 2,000 3,000 Metres
0 1,000 2,000 3,000 4,000 Yards

Scale: 1:64,438 Scale at size: A3

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Title:
Figure 17.1.3 Geology and Ground Conditions
Sheet 1 of 4

Document:
Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

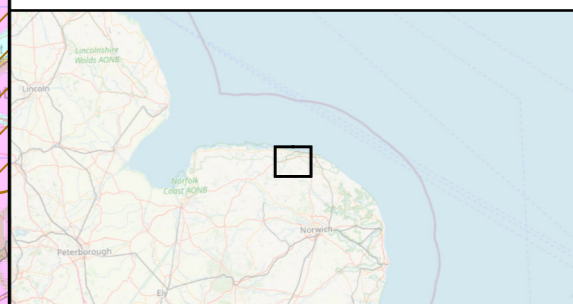
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- Legend:
- DCO Boundary
 - 250m Study Area
 - WFD Waterbody
- Source Protection Zones**
- 1
 - 1c
 - 2
 - 2c
 - 3

- BGS 50k Superficial Geology**
- Alluvium - Clay, Silt, Sand And Gravel
 - Bacton Green Till Member - Diamicton
 - Briton's Lane Sand And Gravel Member - Sand And Gravel
 - Glaciofluvial Deposits - Sand And Gravel
 - Glaciofluvial Deposits, Mid Pleistocene - Sand And Gravel
 - Head - Clay, Silt, Sand And Gravel
 - Holkham Till Member - Diamicton
 - Lowestoft Formation - Sand And Gravel
 - Marine Beach Deposits - Sand And Gravel
 - Peat - Peat
 - Ringstead Sand And Gravel Member - Gravel
 - Sheringham Cliffs Formation - Clay, Silt, Sand And Gravel
 - Storm Beach Deposits - Gravel, Sand And Silt
 - Tidal Flat Deposits - Gravel, Sand, Silt And Clay
 - Tidal River Or Creek Deposits - Clay And Silt
 - Weybourne Town Till Member - Diamicton

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Transformation WGS84: OSGB_1936_To_WGS_1984_7

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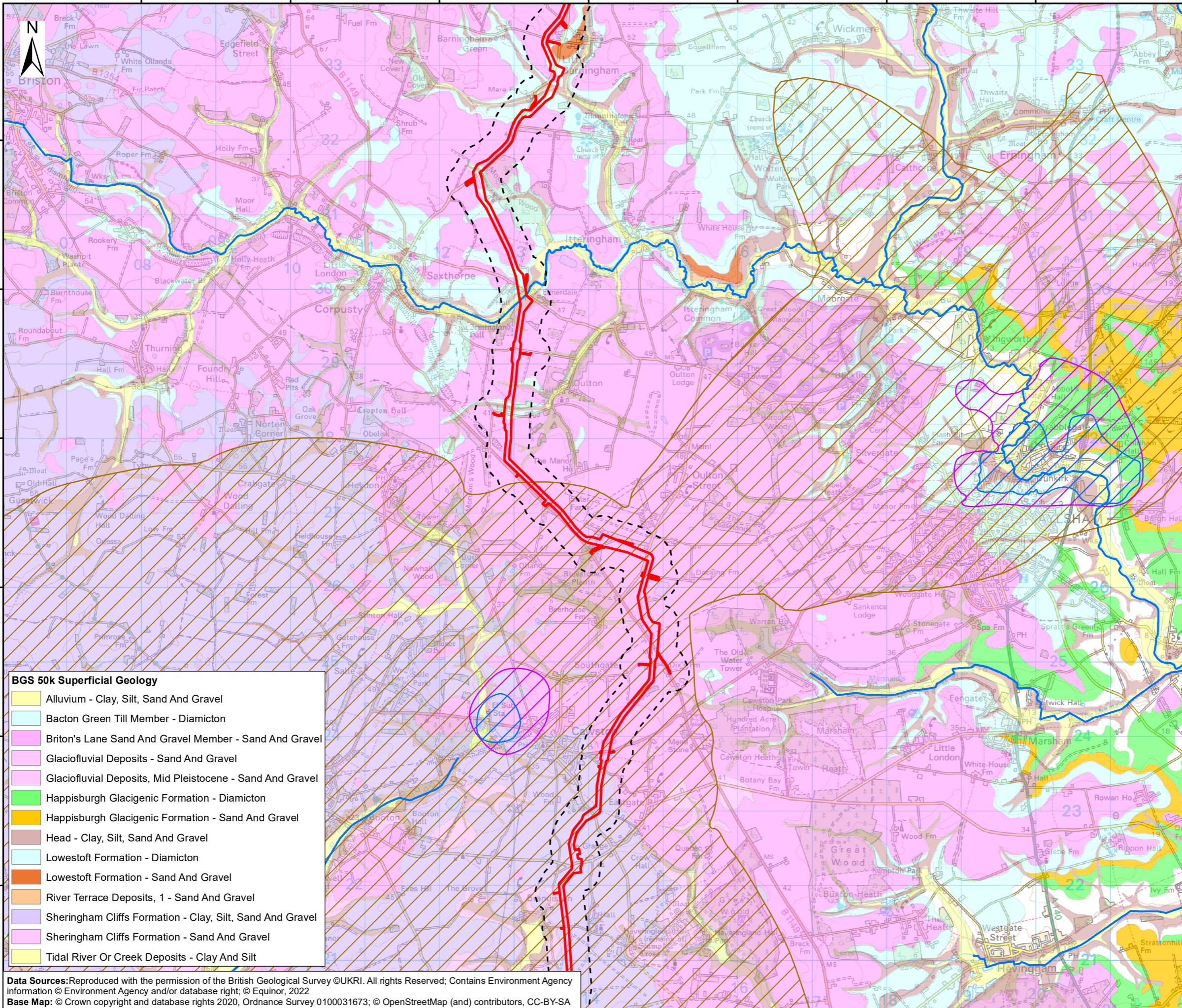
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Figure 17.1.3 Geology and Ground Conditions
Sheet 2 of 4














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Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

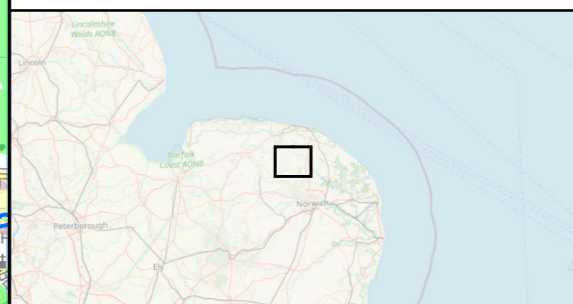
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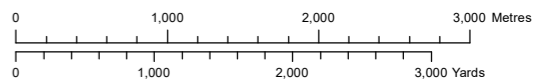
-  DCO Boundary
-  250m Study Area
-  WFD Waterbody
- Source Protection Zones**
-  1
-  1c
-  2
-  2c
-  3



- BGS 50k Superficial Geology**
-  Alluvium - Clay, Silt, Sand And Gravel
 -  Bacton Green Till Member - Diamicton
 -  Briton's Lane Sand And Gravel Member - Sand And Gravel
 -  Glaciofluvial Deposits - Sand And Gravel
 -  Glaciofluvial Deposits, Mid Pleistocene - Sand And Gravel
 -  Happisburgh Glacigenic Formation - Diamicton
 -  Happisburgh Glacigenic Formation - Sand And Gravel
 -  Head - Clay, Silt, Sand And Gravel
 -  Lowestoft Formation - Diamicton
 -  Lowestoft Formation - Sand And Gravel
 -  River Terrace Deposits, 1 - Sand And Gravel
 -  Sheringham Cliffs Formation - Clay, Silt, Sand And Gravel
 -  Sheringham Cliffs Formation - Sand And Gravel
 -  Tidal River Or Creek Deposits - Clay And Silt



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



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Equinor Doc. no.: C282-RH-Z-GA-00075
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Title:
Figure 17.1.3 Geology and Ground Conditions
Sheet 3 of 4

Document:
Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- DCO Boundary
 - 250m Study Area
 - WFD Waterbody
- Source Protection Zones**
- 1
 - 1c
 - 2
 - 2c
 - 3

- BGS 50k Superficial Geology**
- Alluvial Fan Deposits - Clay And Silt
 - Alluvium - Clay, Silt, Sand And Gravel
 - Bacton Green Till Member - Diamicton
 - Briton's Lane Sand And Gravel Member - Sand And Gravel
 - Glaciofluvial Deposits - Sand And Gravel
 - Happisburgh Glacigenic Formation - Diamicton
 - Head - Clay, Silt, Sand And Gravel
 - Leet Hill Sand And Gravel Member - Sand And Gravel
 - Lowestoft Formation - Diamicton
 - Lowestoft Formation - Sand And Gravel
 - Peat - Peat
 - River Terrace Deposits, 1 - Sand And Gravel
 - Sheringham Cliffs Formation - Clay, Silt, Sand And Gravel
 - Sheringham Cliffs Formation - Sand And Gravel
 - Weybourne Town Till Member - Diamicton



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7

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0 1,000 2,000 3,000 Yards

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Equinor Doc. no.: C282-RH-Z-GA-00075
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Sheringham Shoal and Dudgeon Extension Projects

Title:
Figure 17.1.3 Geology and Ground Conditions
Sheet 4 of 4

Document:
Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

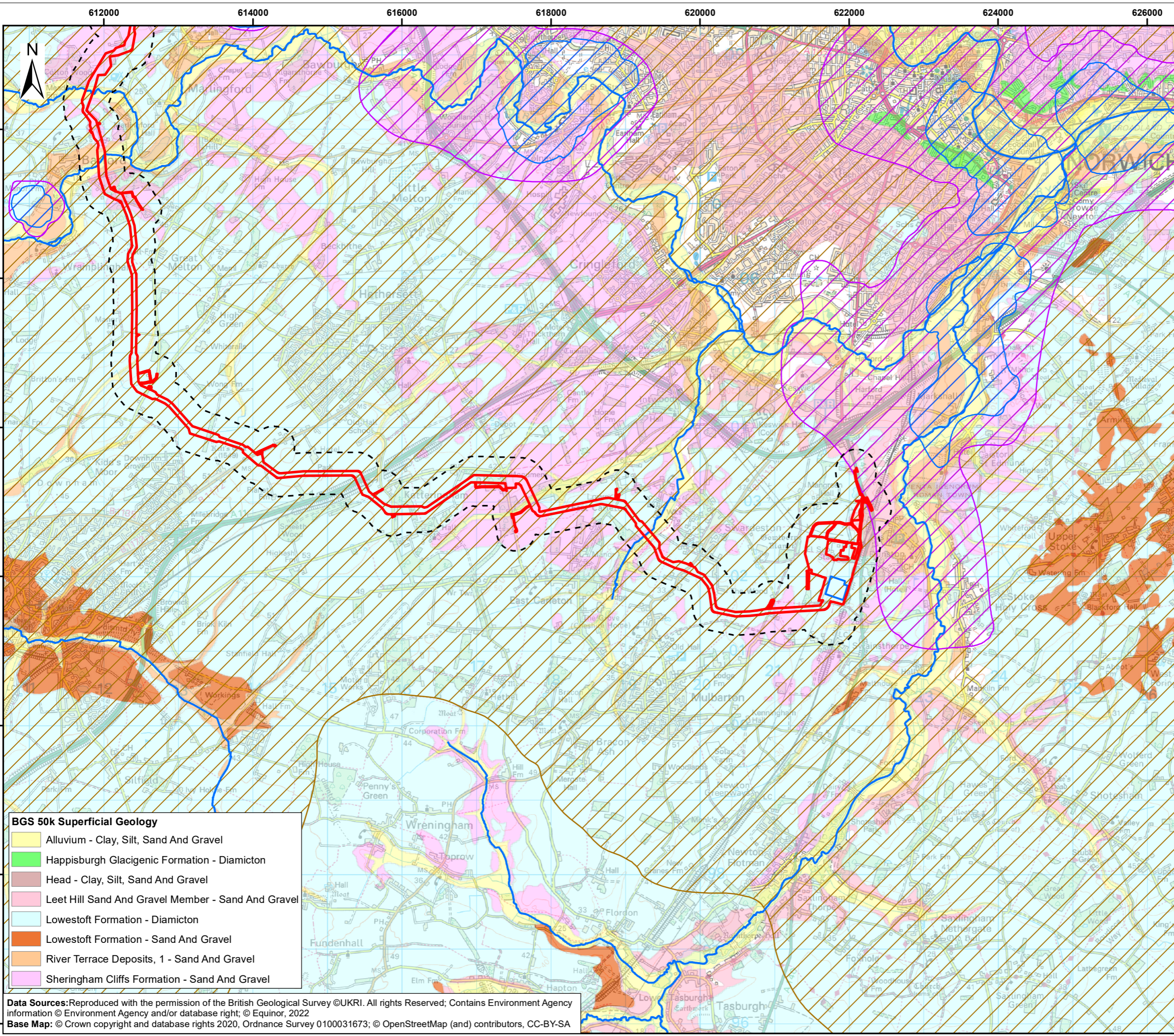
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Legend:

- DCO Boundary
- Onshore Substation Site
- 250m Study Area
- WFD Waterbody

Source Protection Zones

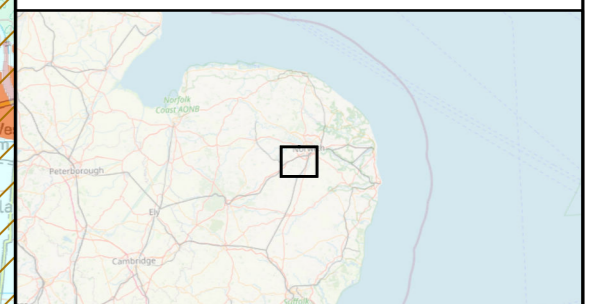
- 1
- 1c
- 2
- 2c
- 3



BGS 50k Superficial Geology

	Alluvium - Clay, Silt, Sand And Gravel
	Happisburgh Glacigenic Formation - Diamicton
	Head - Clay, Silt, Sand And Gravel
	Leet Hill Sand And Gravel Member - Sand And Gravel
	Lowestoft Formation - Diamicton
	Lowestoft Formation - Sand And Gravel
	River Terrace Deposits, 1 - Sand And Gravel
	Sheringham Cliffs Formation - Sand And Gravel

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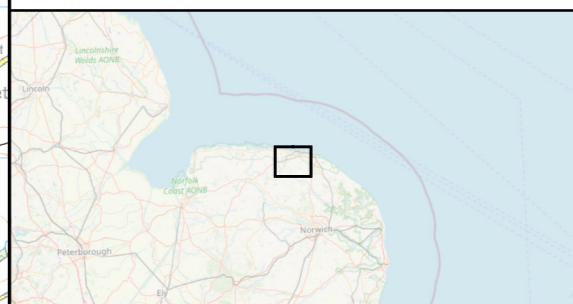
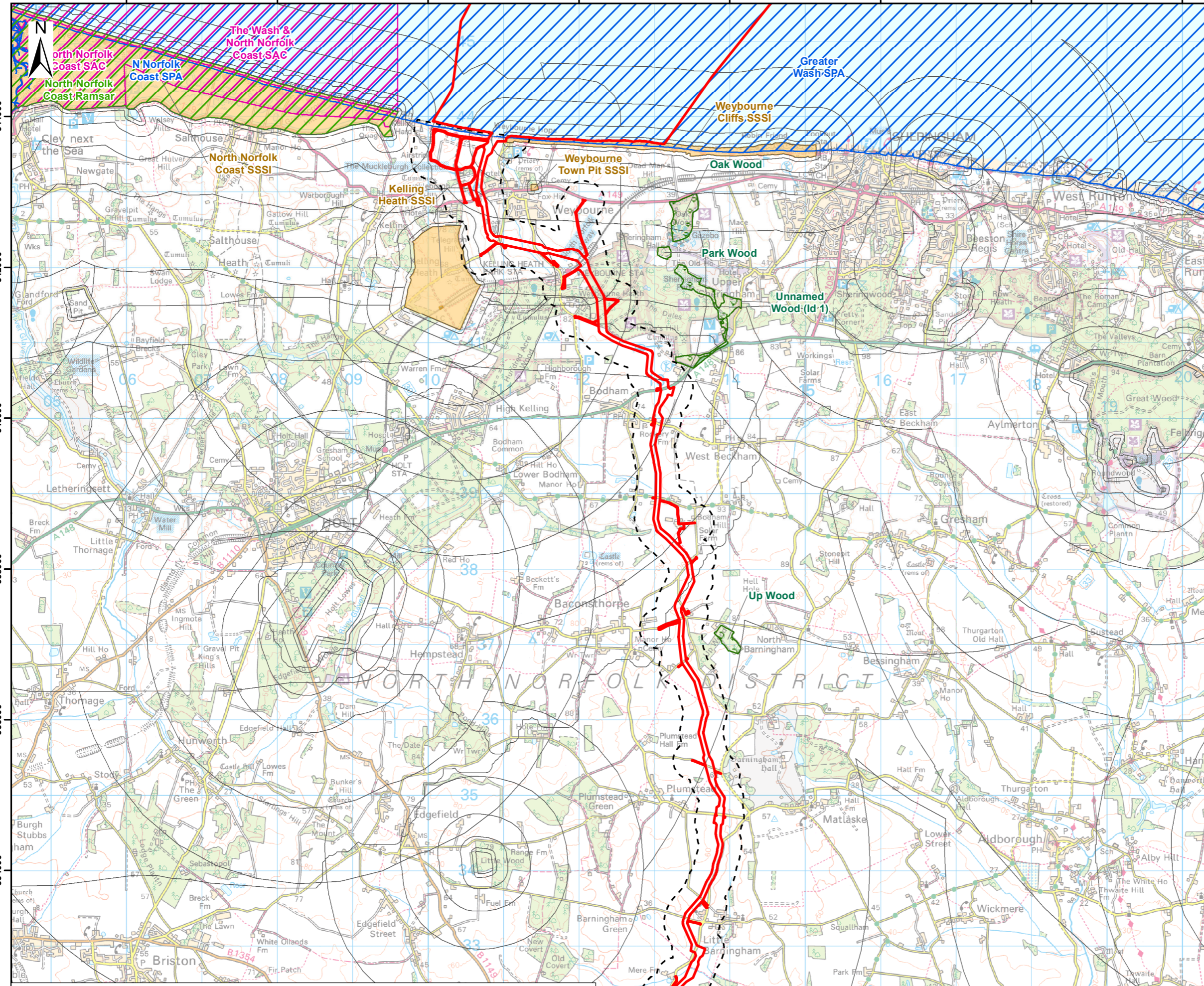
Sheringham Shoal and Dudgeon Extension Projects

Title:
Figure 17.1.4 Sensitive Land Uses
Sheet 1 of 4

Document:
Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- Order Limits
 - 250m Study Area
 - SSSI Impact Risk Zone
 - Ancient Woodland
 - Ramsar
 - Special Protection Area (SPA)
 - Special Area of Conservation (SAC)
 - Sites of Special Scientific Interest (SSSI)



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7

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Scale: 1:50,000 Scale at size: A3

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Figure 17.1.4 Sensitive Land Uses
Sheet 2 of 4

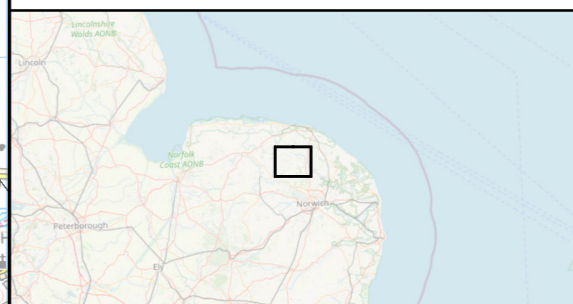
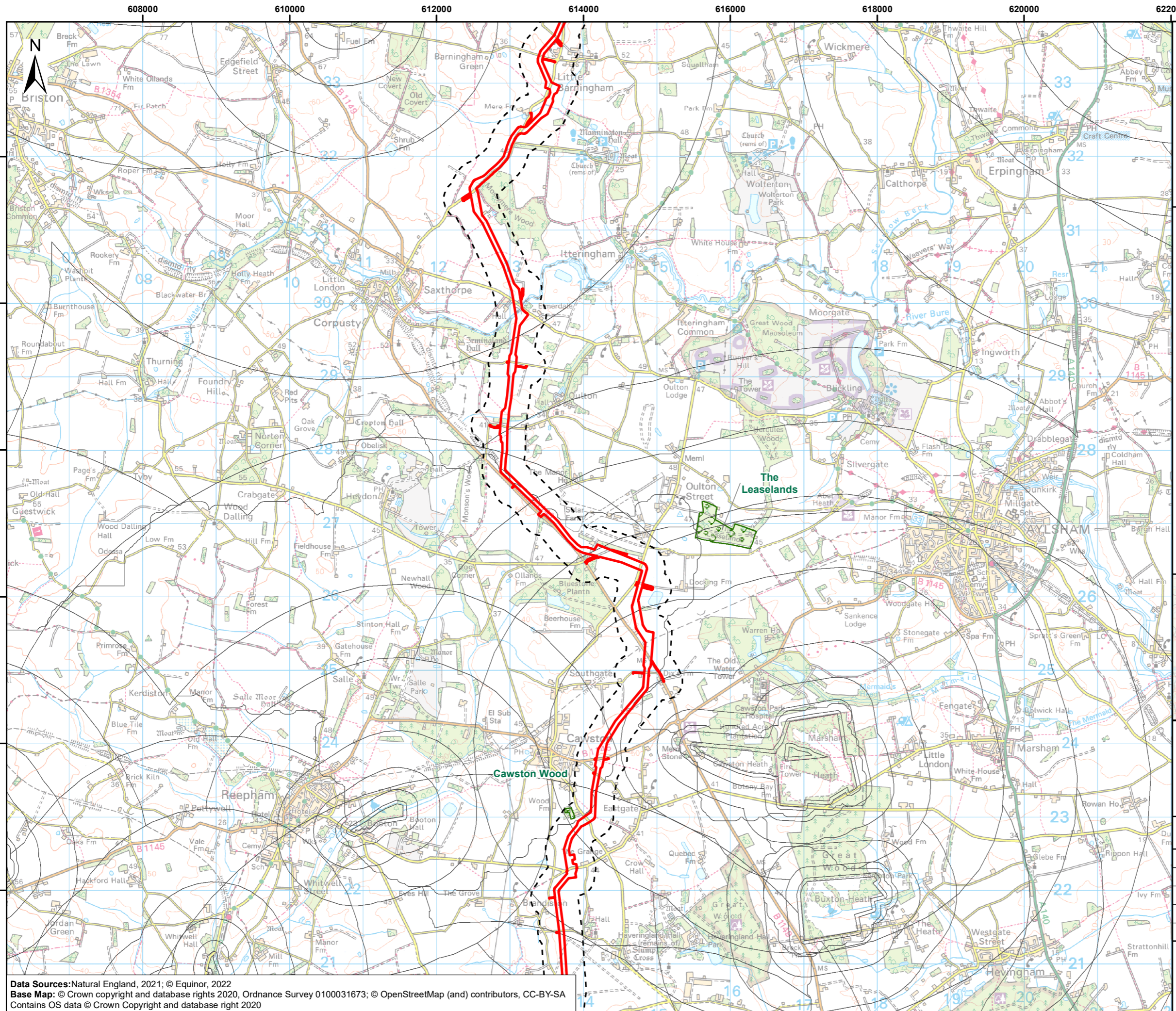
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Preliminary Risk Assessment Report

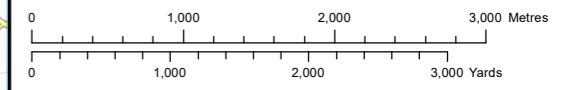
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Legend:

- Order Limits
- 250m Study Area
- SSSI Impact Risk Zone
- Ancient Woodland



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



Scale: 1:50,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00075
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Title:

Figure 17.1.4 Sensitive Land Uses
Sheet 3 of 4

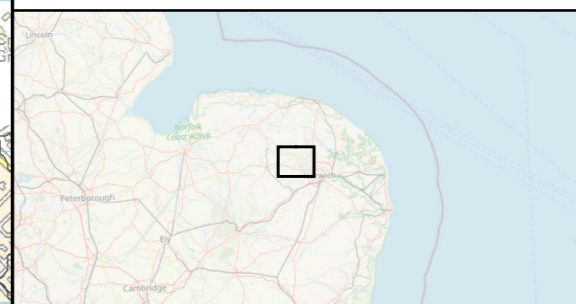
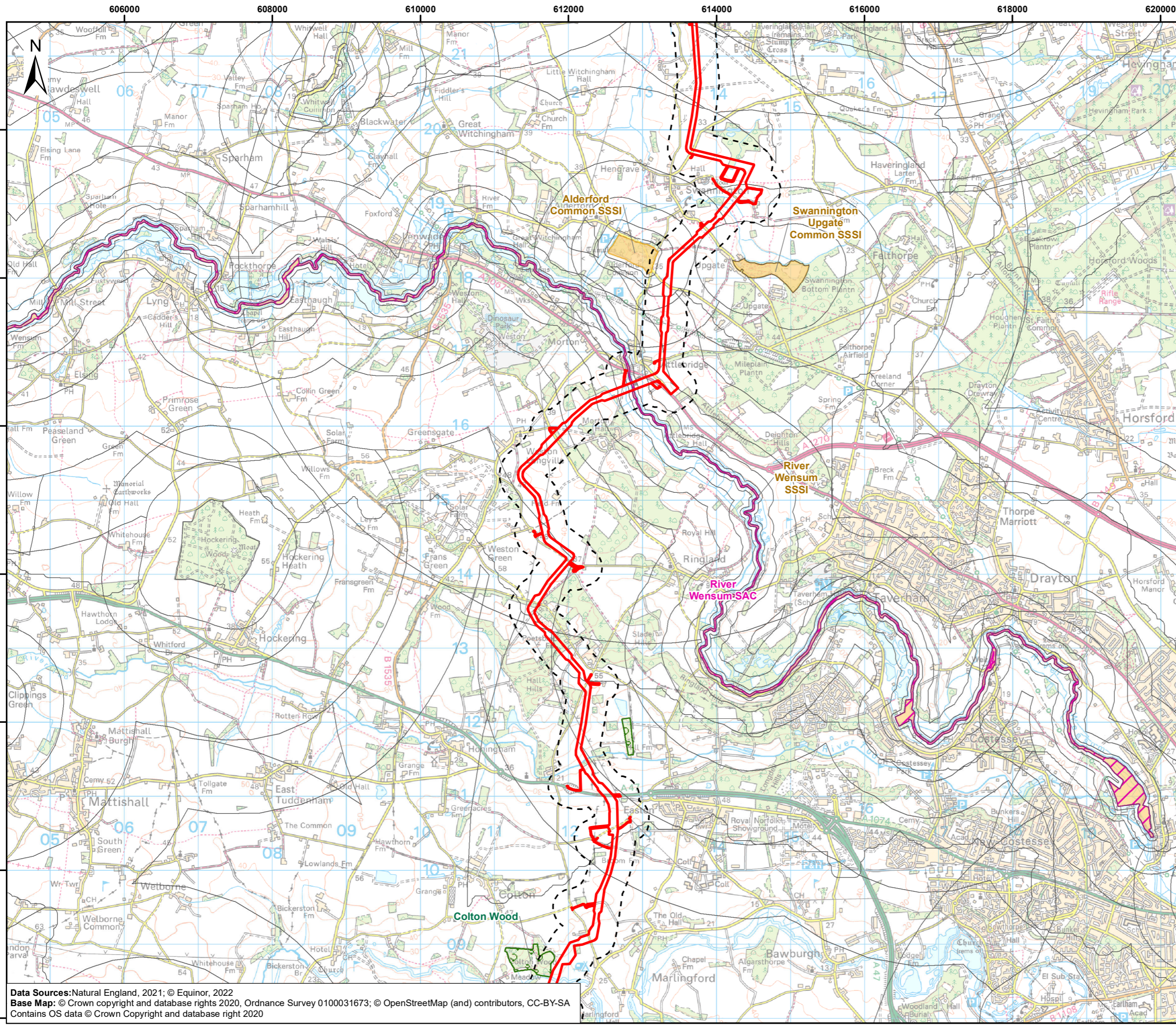
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Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

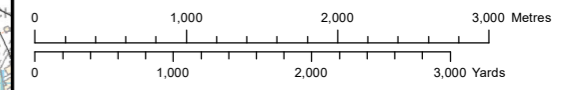
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Legend:

- Order Limits
- 250m Study Area
- SSSI Impact Risk Zone
- Ancient Woodland
- Special Area of Conservation (SAC)
- Sites of Special Scientific Interest (SSSI)



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



Scale: 1:50,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00075
RHDHV Doc. no.: PB8164-RHD-ZZ-ON-DR-Z-0060

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A	25/04/2022	First Issue	AZ	OB	SM

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Title:

Figure 17.1.4 Sensitive Land Uses
Sheet 4 of 4

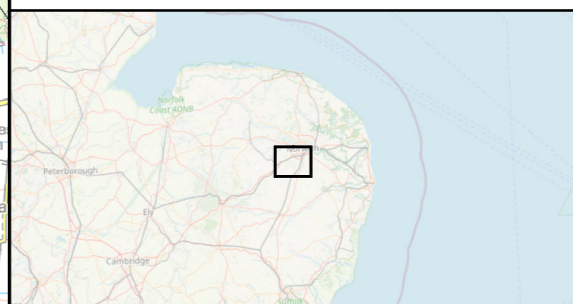
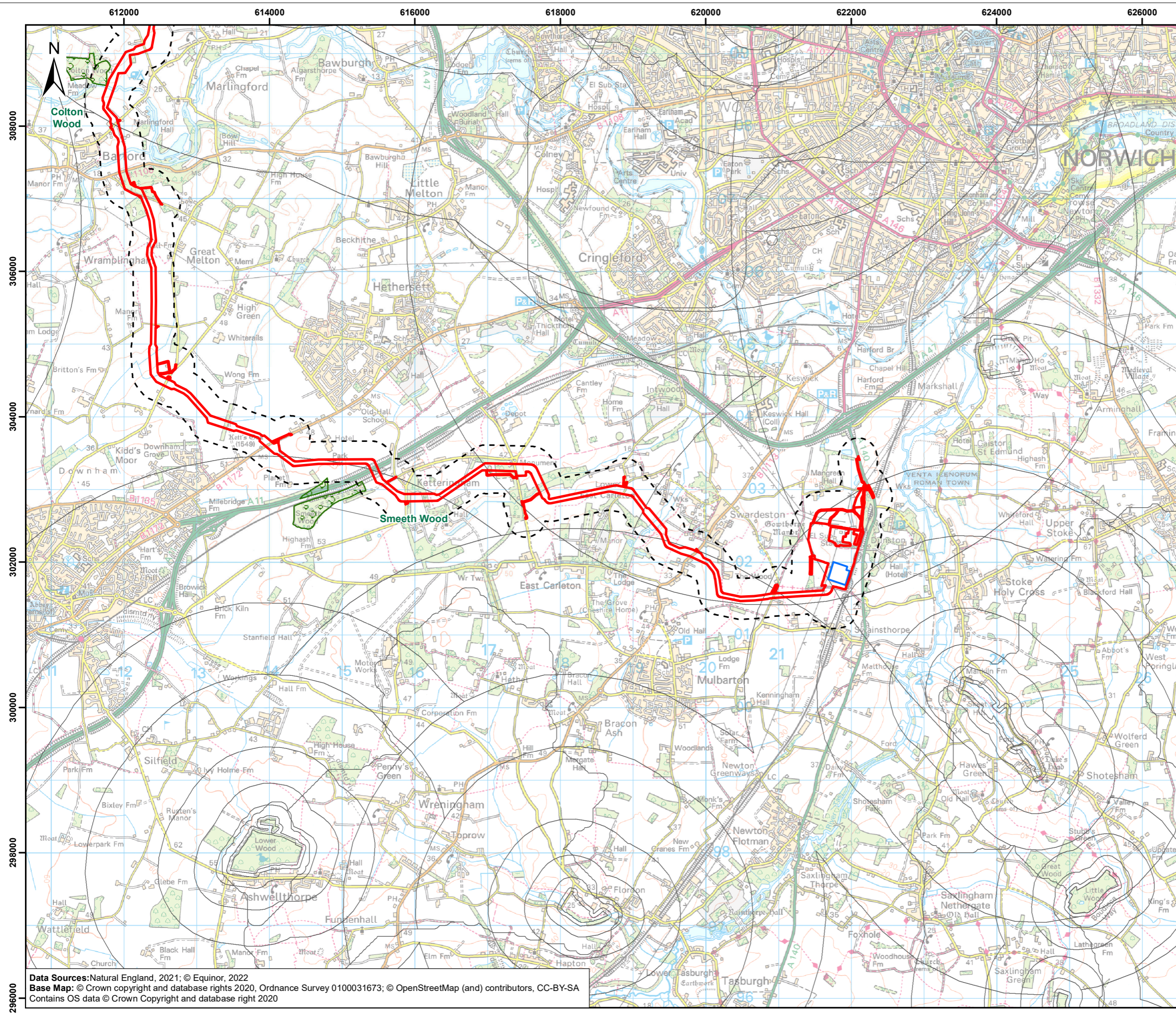
Document:

Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and
Preliminary Risk Assessment Report

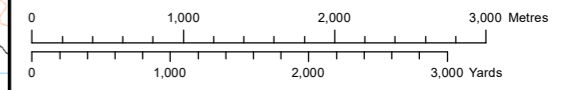
Application Doc. no.: 6.3.17.1

Legend:

- Order Limits
- Onshore Substation Site
- 250m Study Area
- SSSI Impact Risk Zone
- Ancient Woodland



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



Scale: 1:50,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00075
RHDHV Doc. no.: PB8164-RHD-ZZ-ON-DR-Z-0060

REV	DATE	STATUS	DRW	CHK	APR
B	13/04/2023	Second Issue	DE	SM	ES
A	25/04/2022	First Issue	AZ	OB	SM

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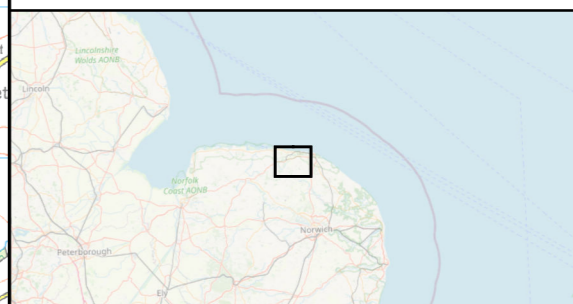
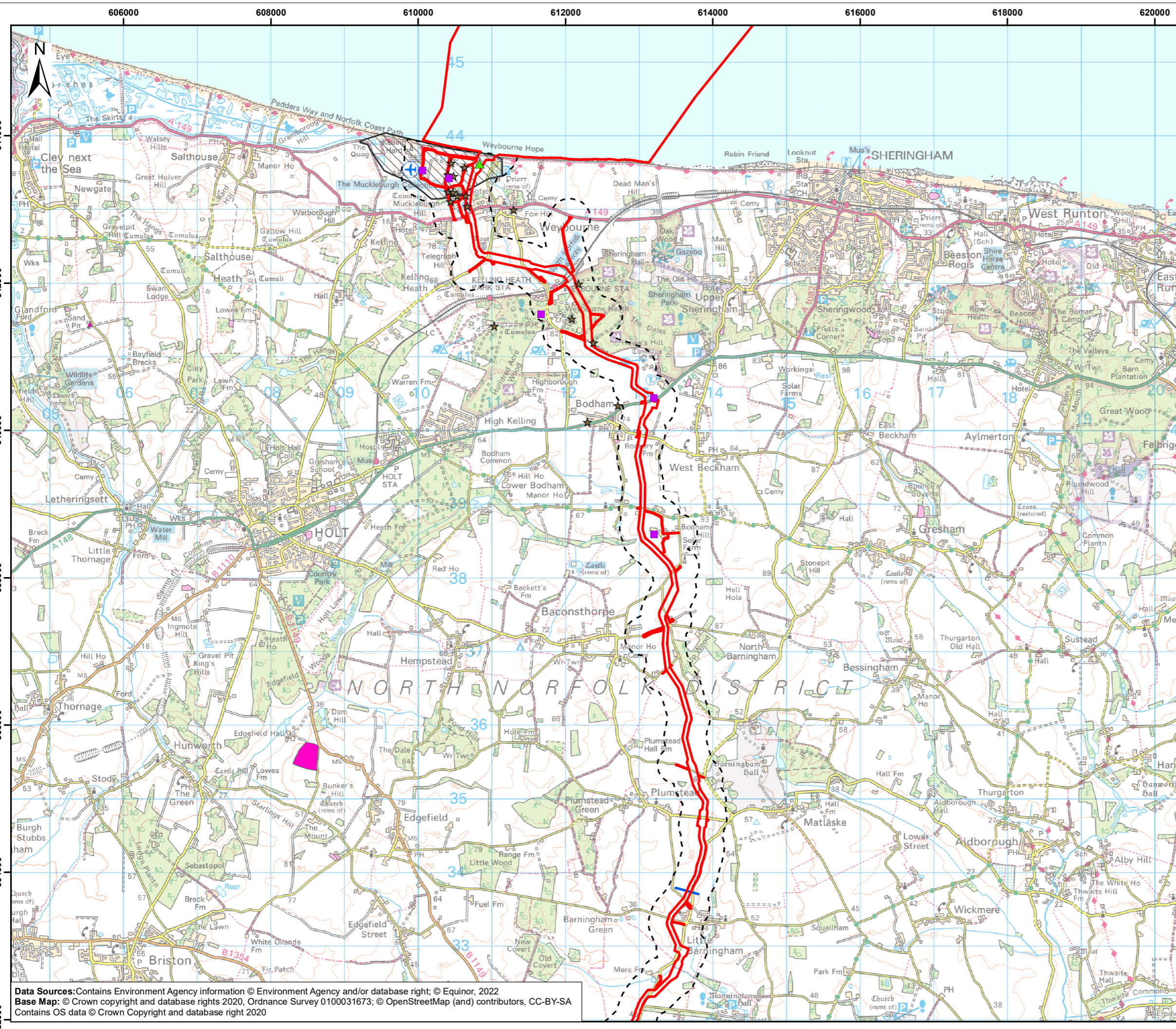
Sheringham Shoal and Dudgeon Extension Projects

Title: Figure 17.1.5 Potential Sources of Contamination
Sheet 1 of 4

Document: Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
- DCO Boundary
 - 250m Study Area
 - + Airfield
 - Pit
 - ▲ Sewage Works
 - ★ Historical Tank
 - Potential Asbestos Pipeline
 - Weybourne Camp
 - Authorised Landfill Site
 - Historic Landfill Site



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 1,000 2,000 3,000 Metres
0 1,000 2,000 3,000 Yards

Scale: 1:50,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00075
RHDHV Doc. no.: PB8164-RHD-ZZ-ON-DR-Z-0059

REV	DATE	STATUS	DRW	CHK	APR
C	13/04/2023	Third Issue	DE	SM	ES
B	21/07/2022	Second Issue	GC	OB	SM
A	25/04/2022	First Issue	AZ	OB	SM

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Title: Figure 17.1.5 Potential Sources of Contamination
Sheet 2 of 4

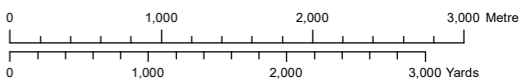
Document: Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

- Legend:
-  DCO Boundary
 -  250m Study Area
 -  Airfield
 -  Brickwork/Yard
 -  Pit
 -  Railway
 -  Historical Tank
 -  Potential Asbestos Pipeline
 -  Authorised Landfill Site
 -  Historic Landfill Site



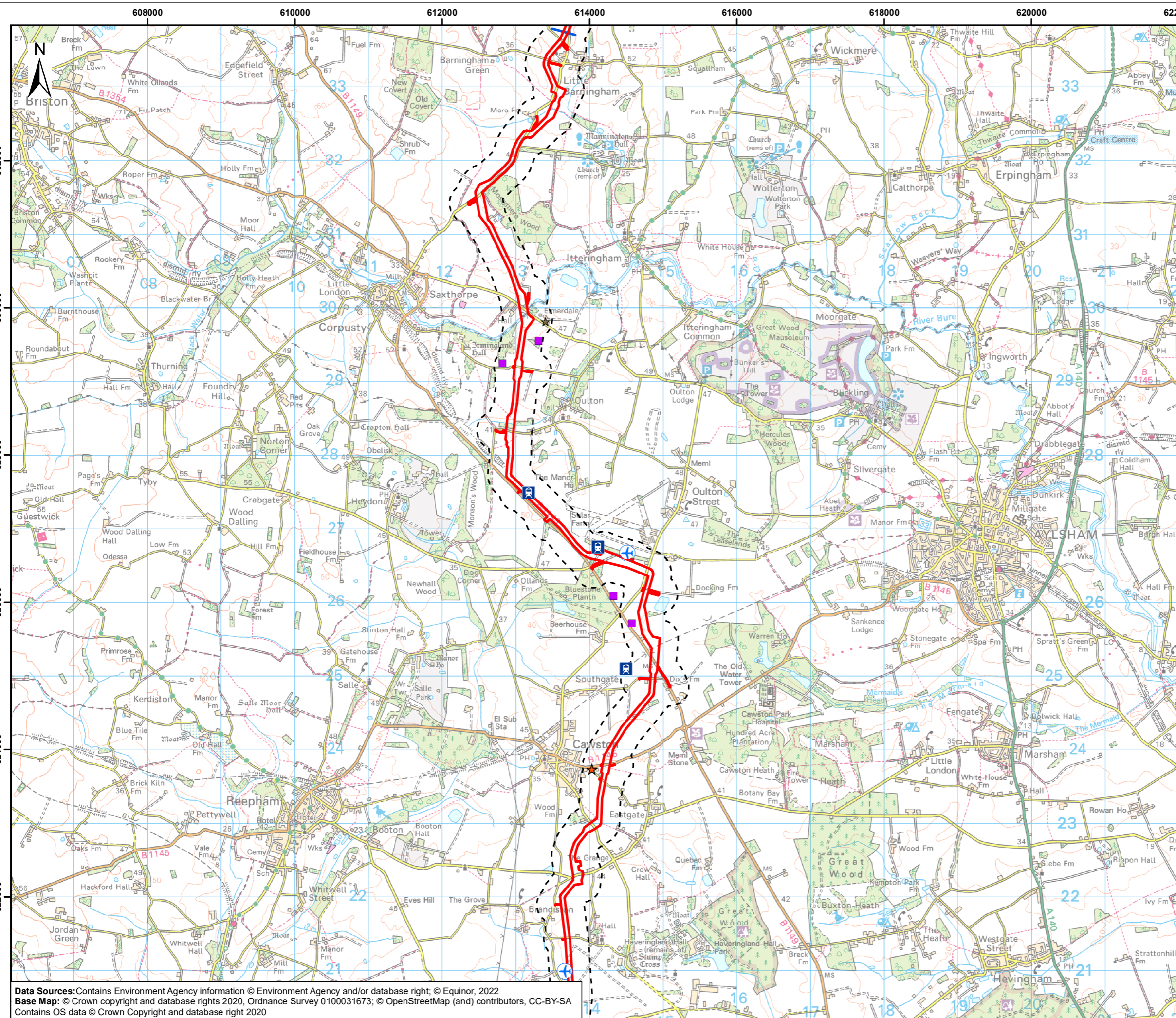
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Transformation WGS84: OSGB_1936_To_WGS_1984_7



Scale: 1:50,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00075
RHDHV Doc. no.: PB8164-RHD-ZZ-ON-DR-Z-0059

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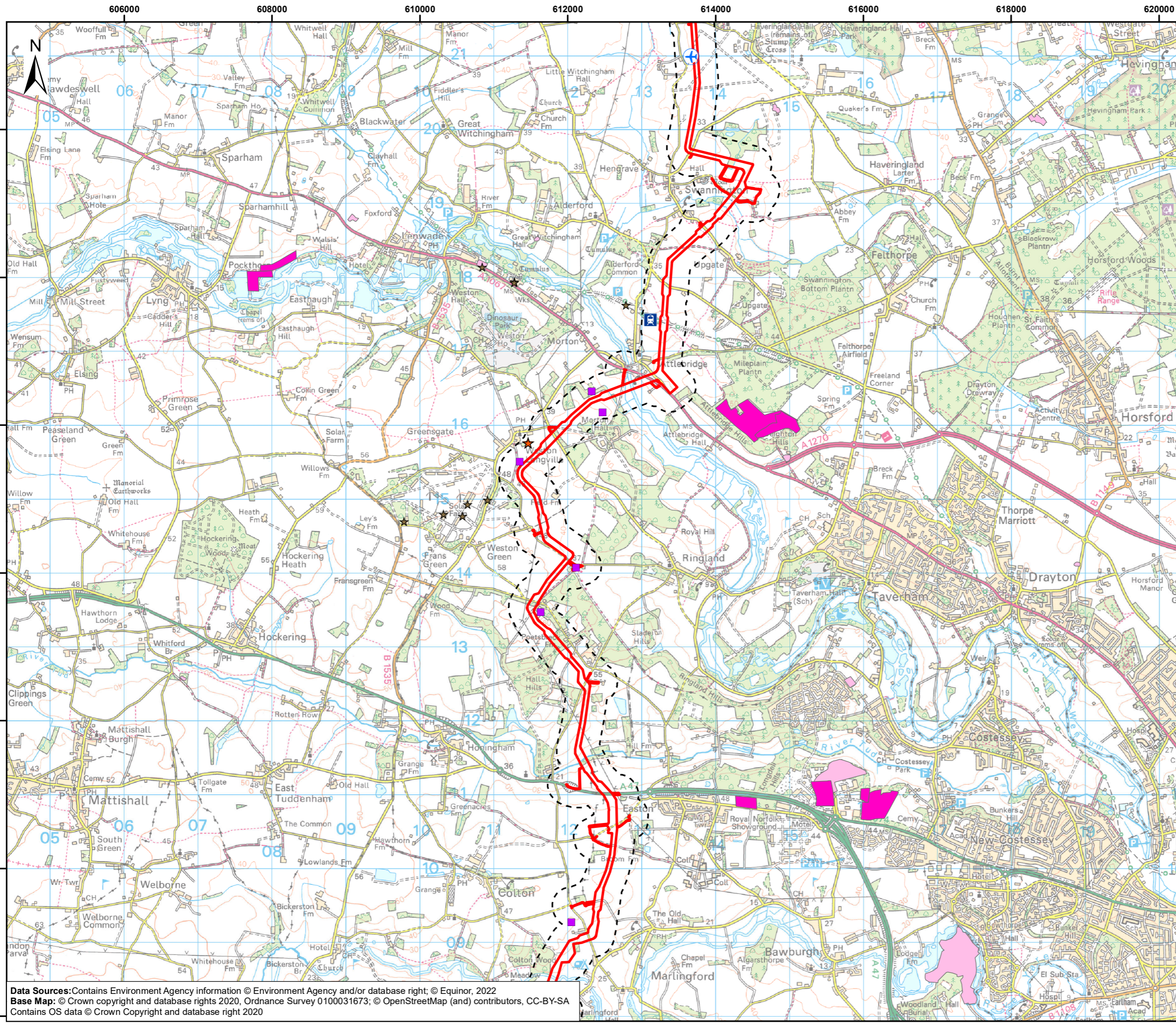
Title: Figure 17.1.5 Potential Sources of Contamination
Sheet 3 of 4

Document: Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and Preliminary Risk Assessment Report

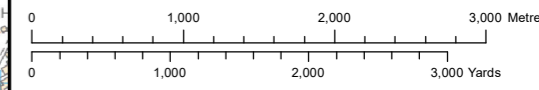
Application Doc. no.: 6.3.17.1

Legend:

- DCO Boundary
- 250m Study Area
- + Airfield
- ★ Brickwork/Yard
- Pit
- 🚂 Railway
- ★ Historical Tank
- Authorised Landfill Site
- Historic Landfill Site



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7



Scale: 1:50,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00075
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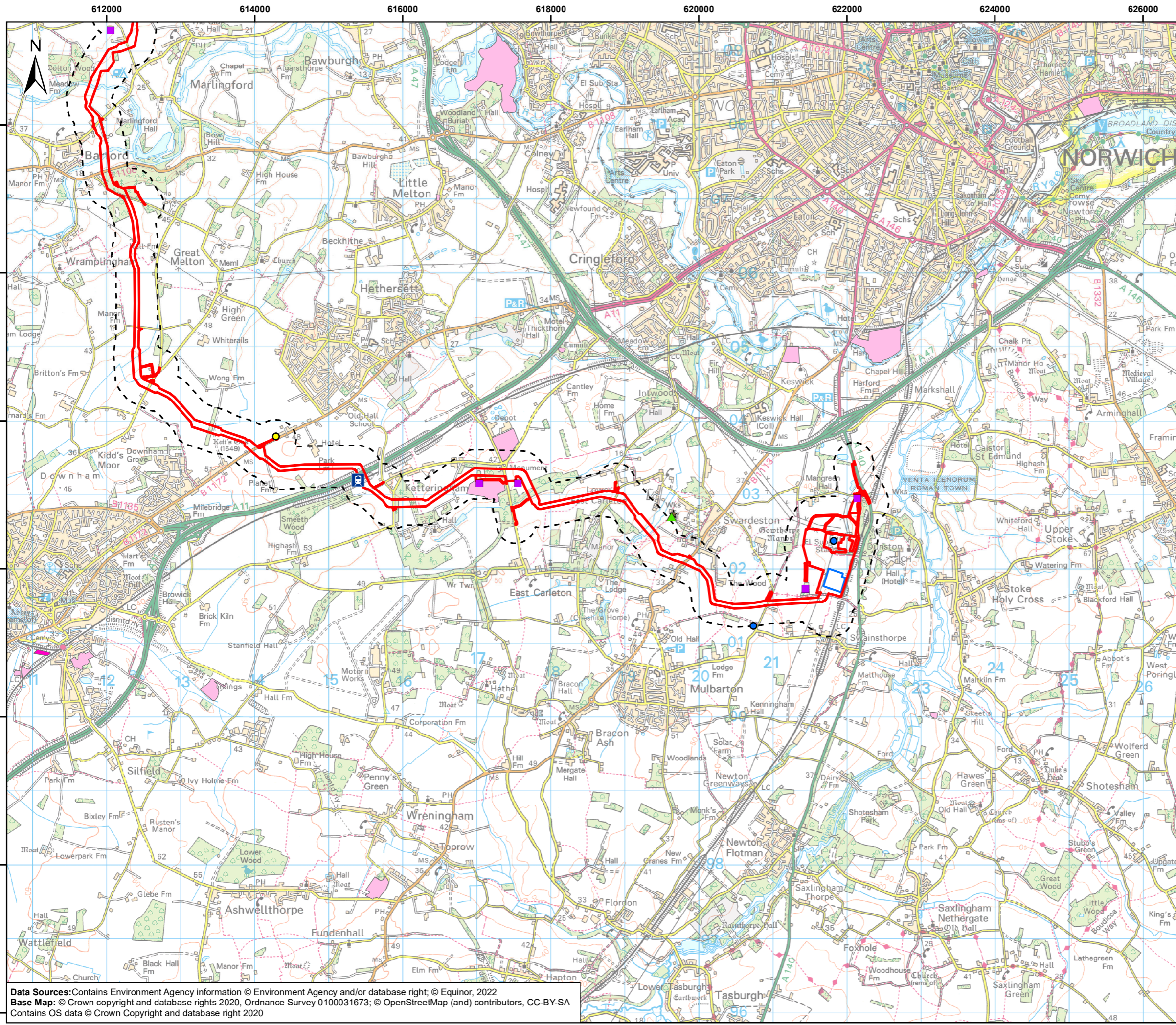
Title: Figure 17.1.5 Potential Sources of Contamination
Sheet 4 of 4

Document: Environmental Statement (ES)
Appendix 17.1 Land Quality Desk Study and Preliminary Risk Assessment Report

Application Doc. no.: 6.3.17.1

Legend:

- DCO Boundary
- Onshore Substation Site
- 250m Study Area
- Filling Station
- Pit
- Railway
- ▲ Sewage Works
- Substation
- ★ Historical Tank
- Authorised Landfill Site
- Historic Landfill Site



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 1,000 2,000 3,000 Metres
0 1,000 2,000 3,000 Yards

Scale: 1:50,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00075
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Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Annex A: Limitations

ANNEX A: LIMITATIONS

1. The direct assessments and judgements given in this report are limited by both the finite data on which they are based and the proposed works to which they are addressed. The acquisition of data is constrained by both physical and economic factors and, by definition, is subject to limitations. Conditions at the site will change over time due to natural variations and may be affected by human activities.
2. This document has been prepared for the titled project and should not be relied upon or used for any other project. Royal HaskoningDHV accepts no responsibility or liability for the consequences of this document being used for a purpose other than that purpose for which it was commissioned. The assessments and judgements contained herein should not be relied upon as legal opinion.
3. The findings and opinions are relevant to the dates of the information reviewed and should not be relied upon to represent conditions at later dates. The opinions included herein are based on the information obtained from the assessments undertaken in the study area and from the experience of the reviewers.
4. This Phase I Land Quality Assessment has utilised a variety of publicly available data sources such as the Environment Agency, Envirocheck, historical maps and the British Geological Survey. Therefore, the study is limited by the age and limitations inherent in the data described.

Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Annex B UXO Risk Maps

UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Weybourne, Norfolk
Map Centre: 611500,342500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

You can incorporate the map into your preliminary risk assessment* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment* is necessary.

What do I do if my site is in a moderate or high risk area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites in a moderate or high UXB risk area.

Similarly, if your site is near to a designated Luftwaffe target or bombing decoy then additional detailed research is recommended.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

If I have any questions, who do I contact?

tel: **+44 (0) 1993 886682**

email: **uxo@zetica.com**

web:

The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website:

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It is important to note that this map is not a UXO risk assessment and should not be reported as such when reproduced.

*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.

UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Bodham, Norfolk
Map Centre: 612500,340500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: West Beckham, Norfolk
Map Centre: 613500,339500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- | | | |
|-----------|---------------|-------------------|
| military | industry | UXO find |
| transport | dock | Luftwaffe targets |
| utilities | Bombing decoy | other |

How to use your Unexploded Bomb (UXB) risk map?

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Baconsthorpe, Norfolk
Map Centre: 612500,337500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

How to use your Unexploded Bomb (UXB) risk map?

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Baconsthorpe, Norfolk
Map Centre: 612500,337500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Baconsthorpe, Norfolk
Map Centre: 612500,337500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

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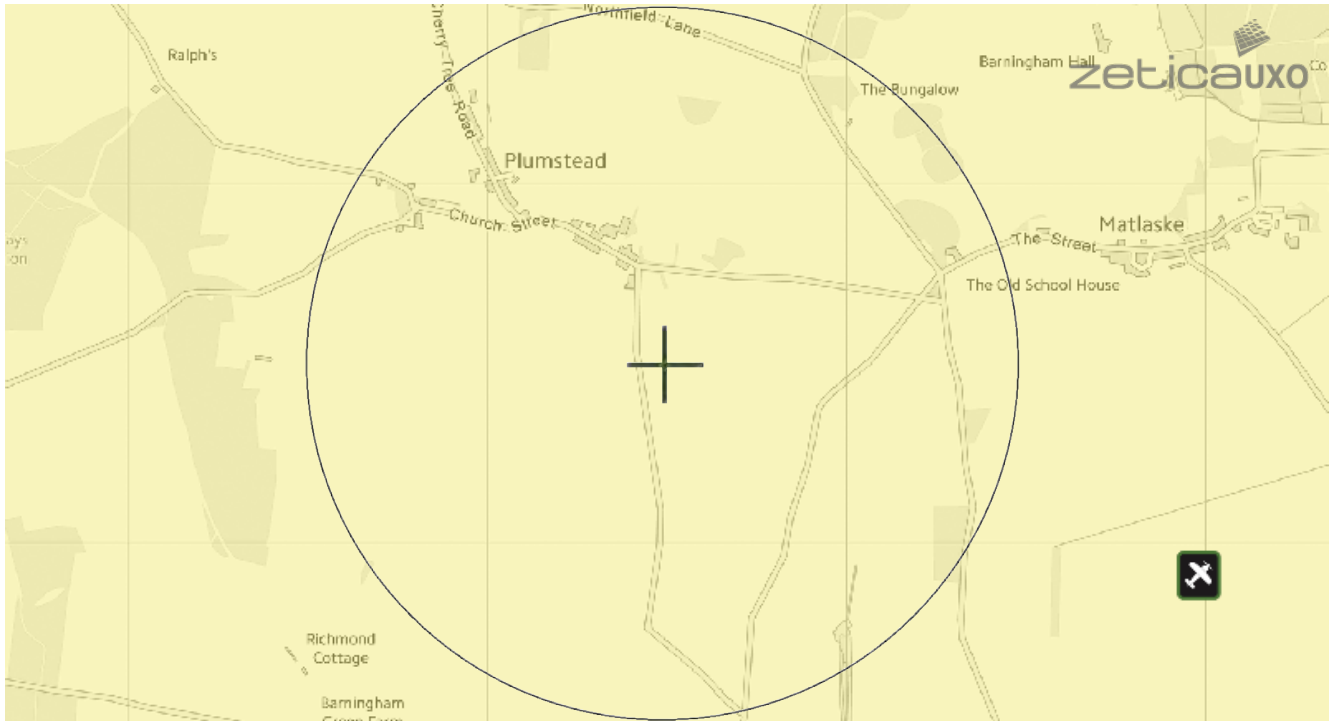
*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.

UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Plumstead, Norfolk
Map Centre: 613500,334500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

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If I have any questions, who do I contact?

tel: **+44 (0) 1993 886682**

email: **uxo@zetica.com**

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Little Barningham, Norfolk
Map Centre: 613500,333500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Oulton, Norfolk
Map Centre: 613500,328500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

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UNEXPLODED BOMB RISK MAP



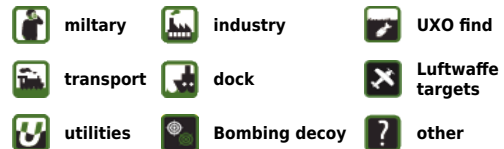
SITE LOCATION

Location: Southgate, Norfolk
Map Centre: 586500,334500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
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UNEXPLODED BOMB RISK MAP



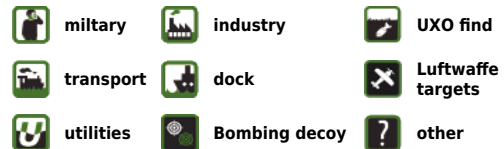
SITE LOCATION

Location: Eastgate, Norfolk
Map Centre: 614500,323500



LEGEND

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Brandiston, Norfolk
Map Centre: 613500,321500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

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UNEXPLODED BOMB RISK MAP



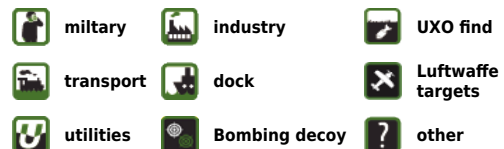
SITE LOCATION

Location: Swannington, Norfolk
Map Centre: 613500,319500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Weston Green, Norfolk
Map Centre: 610500,314500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- | | | |
|-----------|---------------|-------------------|
| military | industry | UXO find |
| transport | dock | Luftwaffe targets |
| utilities | Bombing decoy | other |

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Colton, Norfolk
Map Centre: 610500,309500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

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UNEXPLODED BOMB RISK MAP



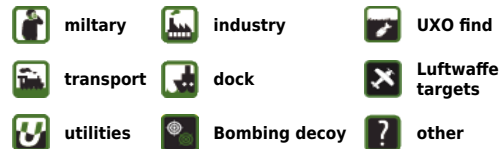
SITE LOCATION

Location: Honingham, Norfolk
Map Centre: 610500,311500



LEGEND

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Great Melton, Norfolk
Map Centre: 613500,306500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
- Bombing decoy
- other

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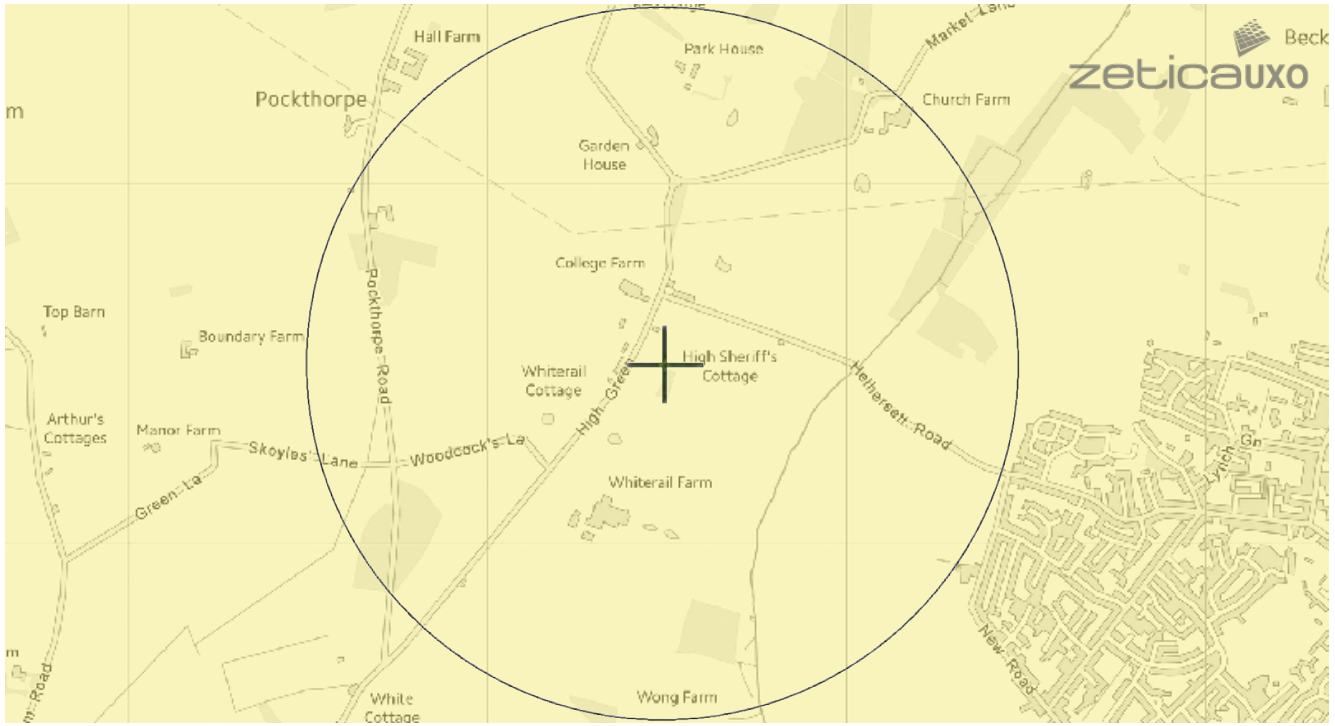
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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: High Green, Norfolk
Map Centre: 613500,305500



LEGEND

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- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
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- Bombing decoy
- other

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If I have any questions, who do I contact?

tel: **+44 (0) 1993 886682**

email: **uxo@zetica.com**

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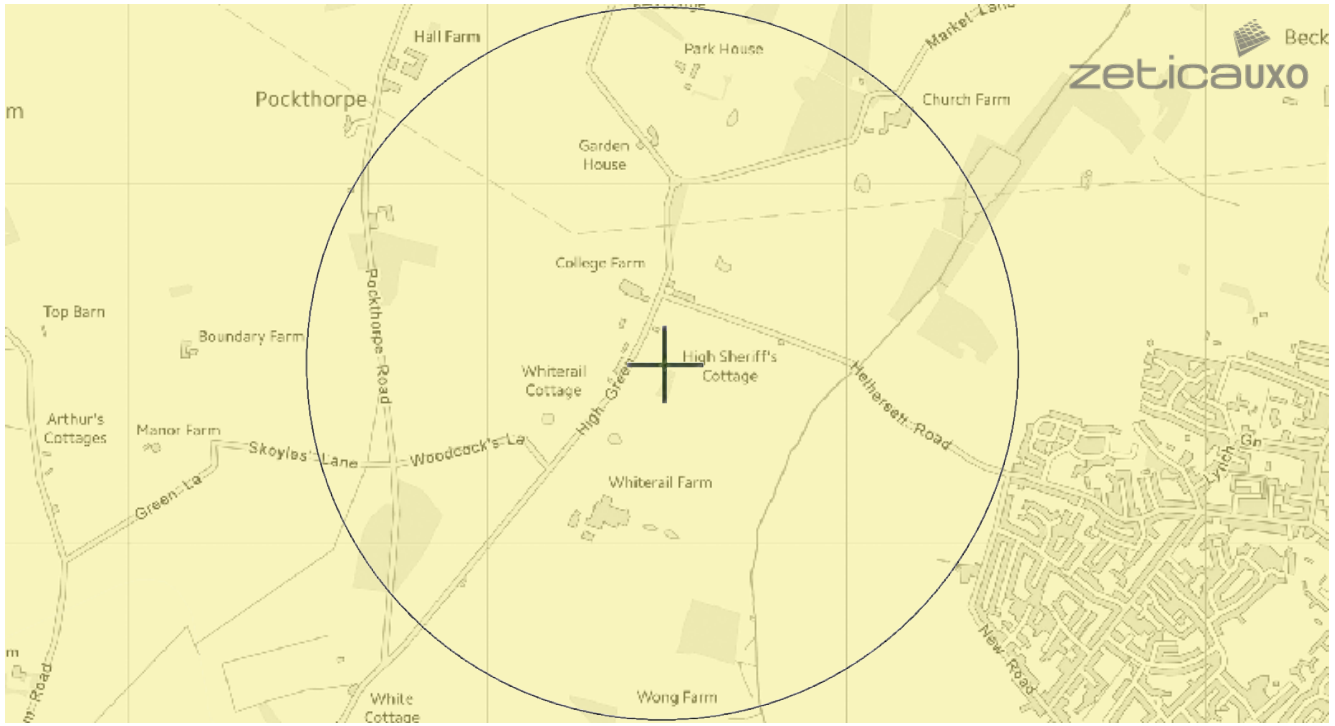
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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: High Green, Norfolk
Map Centre: 613500,305500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military
- industry
- UXO find
- transport
- dock
- Luftwaffe targets
- utilities
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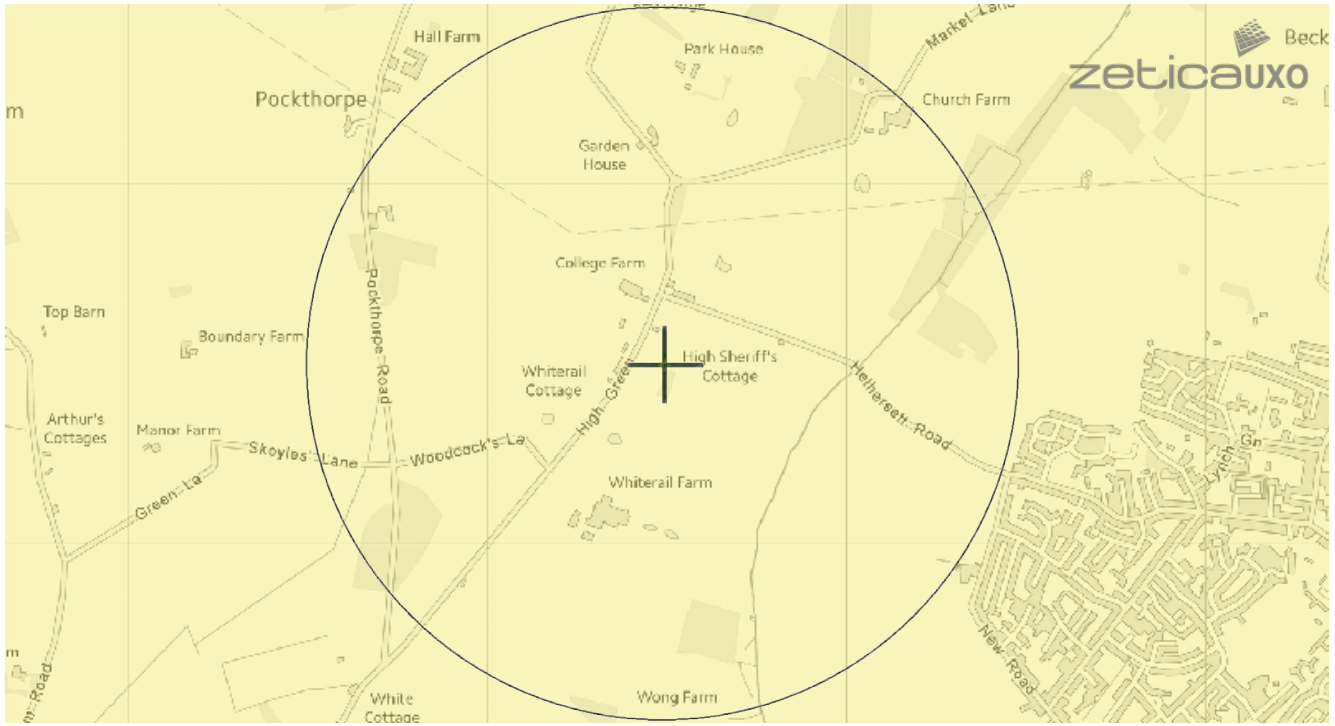
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Map Centre: 613500,305500



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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Ketteringham, Norfolk
Map Centre: 616500,302500



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
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- military
- industry
- UXO find
- transport
- dock
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- utilities
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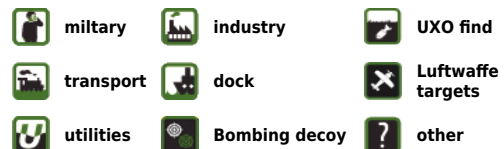
SITE LOCATION

Location: Swardeston, Norfolk
Map Centre: 620500,302500



LEGEND

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UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: Attlebridge, Norfolk
Map Centre: 612500,316500



LEGEND

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- transport
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- utilities
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**Sheringham Shoal and Dudgeon Offshore
Wind Farm Extension Projects**
Annex C Freedom of Information
Documents



Ministry
of Defence

Air Historical Branch (RAF)
Bldg 824
RAF Northolt
West End Road
Ruislip
HA4 6NG
United Kingdom

Telephone [MOD]: +44 (0)20 8833 8156
Facsimile [MOD]: +44 (0)20 8833 8170

Ref: FOI2021/08575



6 September 2021

Dear

Thank you for your email, dated 5 August 2021 and received by the Air Historical Branch (RAF) requesting the following:

"We would be grateful if you could search the military archive records associated with Weybourne Military Camp so that we can further inform the contaminated land assessment. Information of interest would include details on the following:

- An inventory of building usages and activities undertaken on site, such as manufacturing or engineering workshops.*
 - Details regarding building construction.*
 - Historical plans of the camp layout.*
 - Utility plans including water supply pipes which may have connected to the EWS tanks; and*
 - Historical photographs of the former camp (including aerial) and this area in particular.*
- I would gratefully receive any information you may hold in relation to the camp"*

I am treating your correspondence as a request for information under the Freedom of Information Act 2000 (FOIA).

A search for the information has now been completed within the Ministry of Defence, and we can confirm that some information in scope of your request is held.

Please find attached a short history of RAF Weybourne, a card index to the SD155 Secret Organisational Memoranda entries relating to the site, and a form relating to the demolition of buildings.

I can also confirm that the MoD holds the information contained within the SD155 Secret Organisational Memoranda. However, the information contained in these documents falls entirely within the scope of the absolute exemption provided for at Section 21 (Information reasonably accessible to the applicant by other means) and is therefore exempt from


disclosure. These documents are held by The National Archives (TNA), at Kew, in series AIR10.

A catalogue of TNA's holdings is available via their website www.nationalarchives.gov.uk together with all the necessary details to arrange a visit. If you are unable to visit TNA yourself TNA offer a paid research service or alternatively provide lists of independent private researchers who may undertake the work for you for an agreed fee. Details are available by following the link on the website: 'Records > paying for research'. Alternatively, TNA may be contacted as follows:

The National Archives
Ruskin Avenue
Kew
Richmond
Surrey
TW9 4DU
Tel: 020 8876 3444

Under Section 16 (Advice and Assistance) you may wish to note that there may be other files relating to Weybourne at TNA.

If you wish to complain about the handling of your request, or the content of this response, you can request an independent internal review by contacting the Information Rights Compliance team, Ground Floor, MOD Main Building, Whitehall, SW1A 2HB (e-mail CIO-FOI-IR@mod.gov.uk). Please note that any request for an internal review should be made within 40 working days of the date of this response.

If you remain dissatisfied following an internal review, you may raise your complaint directly to the Information Commissioner under the provisions of Section 50 of the Freedom of Information Act. Please note that the Information Commissioner will not normally investigate your case until the MOD internal review process has been completed. The Information Commissioner can be contacted at: Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF. Further details of the role and powers of the Information Commissioner can be found on the Commissioner's website at 

Yours sincerely,

Air Historical Branch (RAF)

✓ As Appropriate

Proposal for the: Re-appropriation Demolition of Buildings

RAF Form 1318

(Revised 1/99)

Station: **RRH Neatishead** Building No. and Title: **Weybourne Tx hall & Accom block** Serial No: Year: **2011**

Part 1. For completion by Station submitting proposal

Part 2.

1. Present authorised use:	Accommodation block, kitchen and workshop		
2a. <input type="checkbox"/> Re-appropriation (QR1775) Proposed use/necessary because			
2b. <input checked="" type="checkbox"/> Demolition (QR1783) Building Condition and reason for demolition	Poor, beyond economic repair		
3. Amount required for:	£	Works Services	
	£ 25,000	Demolition Costs	
Source of funding (ie Project/RPC or other)	RPC		
4. Remarks by RPC representative (QR J1751)	The asset is beyond its economic life and at present is being maintained as Wind and Weather. Date: 26 May 11 Signed: Appt: SETL Roberson Bks		
5. NATO funded?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Deletion from NATO inventory sought?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
6. Remarks by Station Commander	This Unit no longer has an operational requirement for this asset and is acting on advice from DIO for its demolition. This site was last permanently manned over a decade ago and due to the limited amount of equipment now being located there is unlikely to be manned in the future. Date: 26 May 11 Signed:		

7. <input type="checkbox"/> Re-appropriation Approved <input type="checkbox"/> Not approved for reasons stated overleaf	AOCinC (Command) Signed: Date:	
8. <input type="checkbox"/> Demolition Approved <input type="checkbox"/> Not approved for reasons stated overleaf	AOCinC (Command) Signed: Date:	
9. Demolitions of buildings subject to NATO funding Deletion from NATO inventory confirmed.	AOCinC (Command) Signed: Date:	
10. For re-appropriation or demolition requiring MOD approval. Submitted to MOD together with explanatory covering letter.	AOCinC (Command) Signed: Date:	
11. For MOD approvals <input type="checkbox"/> Not approved for reasons stated overleaf <input type="checkbox"/> Re-appropriation Approved <input type="checkbox"/> Demolition Approved	Appointment: Signed: Date:	
12. Reported on the following, as appropriate Form 782 <input type="checkbox"/> F/Lands 510 <input type="checkbox"/>		

ROYAL AIR FORCE STATION, WEYBOURNE 1941 - 1942

By the end of 1940, increased demands by the Army made necessary the formation of another Queen Bee Flight to provide co-operation at Weybourne in Norfolk. The formation of the new flight was delayed due to the shortage of specialist officers and accommodation at Weybourne but once the flight commenced to form at Headquarters No.1 AACU, Farnborough on 6 January 1941, things began to move fast.

Before the end of the month a hangar had been erected and was ready for use, airmen moved to Weybourne and stores began to arrive. The main party left Farnborough on 3 February 1941 to find conditions at their new station somewhat primitive.

Office accommodation for Station Headquarters was arranged on the ground floor of Carvel Farmhouse. The officers and SNCOs slept upstairs and the airmen were accommodated in a wooden hut supplied by the Army. The water supply consisted of a 200-gallon tank mounted on a lorry with a 30-gallon tank for drinking water; the only hot water came from a 15-gallon portable boiler. The old pre-war summer camp ablutions and earth latrines had to be re-opened. Cold comfort on the bleak East Coast in mid-winter!

A portable wooden hut measuring 14 feet by 10 feet was acquired from Bircham Newton as a motor transport office and the barn was repaired to act as a workshop for the limited amount of mechanical transport allotted to the station. The armoury which had been housed in the kitchen of the farmhouse was moved to an outbuilding and someone even thought of putting up a gate to restrict entry (and exit?).

In March 1941, Flying Officer J.E.Parker came from Farnborough to visit the station and to discuss with the C.O., Squadron Leader A Ovenden, the possibilities of "land to land" Queen Bee operation. Tests were carried out to see whether this method of operation would obviate the necessity for a salvage vessel with its attendant expenses and delays. At that time a seaplane tender was based at Wells-next-the-Sea.

At the beginning of April, while the camp was looking more like a building site than a RAF station, the first Queen Bee for anti-aircraft co-operation was catapulted off with wheels. Alas, it would not take signals after launching and disappeared in a straight climb and was never seen again. This was most unfortunate as it happened on the same day that HRH The Duke of Gloucester visited the station unexpectedly for a few minutes while on a tour of Coast Defences.

Building work and ground defence training went on apace but came to a temporary halt on the night of 24/25 May when a Heinkel He 111 dropped four 250-kg bombs at intervals of 70 yards, the nearest landing only 10 yards from the farmhouse. The Bomb Disposal Squad was called to remove the unexploded bombs and in four days it was "business as usual".

A week after this event, the Air Officer Commanding No.70 Group, Air Commodore Cole Hamilton accompanied by Wing Commander Unwin arrived to attend a special demonstration of rockets firing at a Queen Bee as a prelude to bigger things to come.

On 6 June 1941, the Prime Minister and a large and distinguished company which included the Chief of Air Staff came to Weybourne to see a rocket firing demonstration for which T Flight, No.1 AACU launched Queen Bee V4797 from the catapult successfully. It was flown at cloud level, 400 feet, on courses approaching the rockets from the sea. One hundred and sixty rockets were fired at it but it was successfully landed on the sea and was picked up by the salvage boat. Another aircraft was to be launched to continue the demonstration but lack of time and bad weather prevented further flying that day.

The Prime Minister and his party had been entertained by the Army to lunch in the Officers' Mess. On the same day at RAF Weybourne, the Air Ministry Works Department were just about to decide where to erect the airmen's dining hall, as the only facilities provided so far were six wooden huts to accommodate one hundred and twenty airmen and twelve NCOs, plus another hut which had been adapted to house a NAAFI with a Sergeants' Mess ante-room adjoining.

T Flight continued to provide co-operation and a few days later Queen Bee V4755 took off pilotless and flew at 9,000 feet for two hours and at 5,000 feet for the last half hour, during which time ninety rockets were fired in salvos of six and nine by 101 Battery. No hits were registered. Fortified by lunch the Army tried again and during the afternoon session when Queen Bee P4780 took off and flew at 2,000 feet for practice with PE rockets, many hits being registered.

Thus encouraged, the Army invited the Prime Minister and his party for a second visit to Weybourne and on 18 June 1941, Queen Bee V4797 was launched and after three-quarters of an hour a near burst put the aircraft out of control. At 19.00 hours Queen Bee L5894 was launched and the demonstration continued with a further forty minutes of rocket firing at 5,000 feet, followed by Bofors firing at 1,000 feet, until the aircraft plunged into the sea. Both Queen Bees were write-offs but were salvaged and later were collected from Wells by road transport from No.54 MU.

After this successful demonstration, T Flight continued to provide routine co-operation as and when required by the Army until ten months later when notification was received that T Flight, No.1 AACU was to be disbanded forthwith.

This must have been a surprise in view of the fact that in September 1941 the AOC had visited the station and had inspected areas outside the aerodrome boundary with a view to extending the airfield and work started shortly afterwards to build accommodation for a cypher office and signals section with an Anti-Aircraft Co-op R/T set, Point-to-Point and K-type receivers, etc.

However, the run-down was as rapid as had been the build-up. Within days, all the equipment was back in the Main Store and the Station Commander, Wing Commander Ovenden, had been posted to Headquarters, Flying Training Command. On 30 May 1942, the last Queen Bee had been despatched to Langham and the aerodrome obstructed. On 8 June, the hangar was dismantled and returned to No.3 MU and on the 17th the Signals Section closed down at 21.00 hours and departed for Shobdon. This left Flight Lieutenant G. Wallas, who closed the station on 30 July 1942 when he left on posting to No.41 Operational Training Unit at Old Sarum.

Weybourne

OM 131/39. Queen Bee Flt formed at HENLOW & will move here between 1-4-39 and 1-5-39.

DM.
149 & 156/39. Date of moving in 16.5.39.

943/40. "T" ~~Queen Bee~~ Flt to form at RAF Station ST ATHAN & move to WEYBOURNE 7.10.40.

AM.C.O
B 396/40. Queen Bee Flt disbanded 1.10.40.

292/42. "T" Flight disbanded forthwith.

864/42. Land & Buildings transferred to WAR OFFICE 19/8/42.

* 92/63. N° 26 Loran Station formed with retro: effect from 7.7.62 & Weybourne became a N.A.T.O location in U.K., parented by Sig's Cmd.

Weybourne

W of SHERINGHAM

NORFOLK

67/72

Location transferred with the rest of No 90(S) Group from Strike Command to Maintenance Command 1.5.72.

Note:

Mqs remain parented by RAF Coltishall, No 11 Group Strike Command (STC Parenting Statement 1972).

30/73

No 26 Loran Station and location placed in Support Command 1.9.73 on the disbandment of No 90(S) Group and Maintenance Cmd.

37/78

No 26 Loran Station - Weybourne closed on 31-12-77.

~~XXXXXXXXXXXXXXXXXXXX~~

Note:

Property passed to PSA for disposal-D/DDO(RAF)/77/2 E.27.

wef 19 June 1979

26/80

Site reactivated and returned to RAF charge, RAF Weybourne became a remote operating site for RAF Neatishead (No 11 Gp STC) on 13 Oct 1980.

Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Annex D: Qualitative Human Health and Environmental Risk Assessment Methodology

ANNEX D: QUALITATIVE HUMAN HEALTH AND ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

- The risk assessment considers the sources and potential receptors identified, together with linking pathways. These linkages are summarised in the Preliminary Conceptual Site Model and Qualitative Risk Assessment within the report, where the associated environmental risk is assessed for a given source and the end-use of the site. This assessment also takes account of specific chemicals of concern or groups of similar chemicals of concern. The column designated as 'Potential Consequence of Source Pathway – Receptor Linkage' in the Preliminary Conceptual Site Model and Qualitative Risk Assessment gives an indication of the sensitivity of a given receptor to a particular source/chemical of concern being considered. It is a worst-case classification and is based on full exposure via the particular linkage being examined. The derivation of the classes used to rank this particular aspect is as follows based on CIRIA 552 'Contaminated Land Risk Assessment, A Guide to Good Practice' 2001:

Classification	Human Health	Controlled Waters	Ecological	Built Environment
Severe	Acute risk to human health likely to result in 'significant harm' as defined by the Environmental Protection Act 1990, Part 2A.	Substantial pollution of sensitive water resources.	Significant change to the number of one or more species or ecosystems.	Catastrophic damage to buildings, structures or the environment.
Moderate	Chronic damage to human health ('significant harm').	Pollution of sensitive water resources.	Change to population densities of non-sensitive species.	Damage to sensitive buildings, structures or the environment.
Mild	Harm but not necessarily significant harm to humans.	Pollution to non-sensitive water resources.	Some change to population densities but with no negative effects on the function of the ecosystem.	Easily repairable effects of damage to buildings or structures.
Minor	Harm but not necessarily significant harm to humans which can easily be prevented with the use of PPE.	Slight pollution to non-sensitive water resources.	No significant changes to population densities in the environment or in any ecosystem.	Very slight non-structural damage or cosmetic harm to buildings or structures.

- Subsequently, in the column designated 'Likelihood of PCL, an assessment is made of the probability of the selected source and receptor being linked by the identified pathway. This assessment is ranked based on-site specific conditions as follows:

Classification of probability	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.

Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur in the very long term.

3. The 'Risk Classification' column is an overall assessment of the actual risk, which considers the likely consequence of a given risk being realised and the likelihood of that risk being realised. The risk classifications are assigned using the following consequence/likelihood matrix:

Matrix				
Severe	Moderate to low	Moderate	High	Very High
Medium	Low	Moderate to Low	Moderate	High
Mild	Very Low	Low	Moderate to Low	Moderate
Minor	Very Low	Very Low	Low	Moderate to Low
Likelihood	Unlikely	Low likelihood	Likely	High likelihood

4. Overall risks are described as follows:

Very Low	The presence of the identified source does not give rise to the potential to cause unacceptable harm.
Low	It is possible that harm could arise to a designated receptor from an identified source, however, this is unlikely to be unacceptable.
Moderate	It is possible that harm could arise to a designated receptor from an identified source, but it is likely that such harm would be relatively localised or non-permanent - remedial action may be necessary.
High	A designated receptor is likely to experience unacceptable harm from an identified source without remedial action.
Very High	There is a high probability that severe unacceptable harm could arise to a designated receptor from an identified source without appropriate remedial action.

5. In cases of physical features, such as foundations and underground services, harm is defined as impact which would result in non-serviceability of the identified receptor or extra over build costs associated with redevelopment.