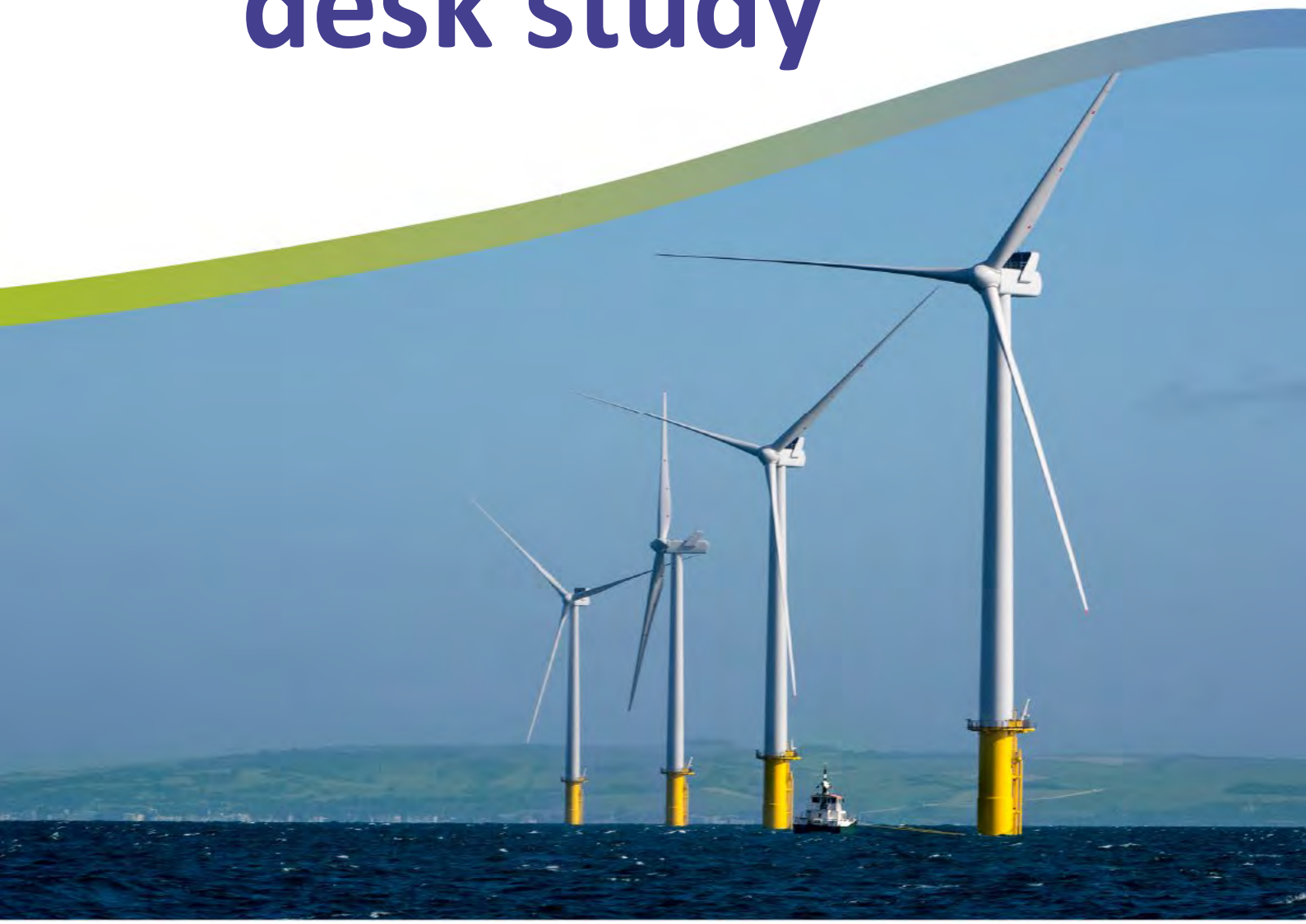
4.25.1

Rampion 2 WIND FARM

Volume 4, Appendix 25.1

Phase 1 Geo-environmental desk study



GoBe wood.

Contents

1. Introduction

1.1 Background

1.1.1 This report presents a Phase 1 Geo-environmental Desk Study on land in the south of England identified for the Proposed Development of the onshore elements of the Rampion 2 Offshore Wind Farm.

1.1.2 For the purposes of this report, the term “the Site” has been used to refer to the land encompassed by the PEIR assessment boundary and within which the onshore elements of the Proposed Development will be constructed. A site location and layout plan is presented as **Figure 25.1.1** in **Annex A**.

1.1.3 The purpose of this report is to inform **Chapter 25: Ground conditions, Volume 2** of the Preliminary Environmental Information Report (PEIR) and will inform the Environmental Statement (ES) to accompany the Development Consent Order (DCO) Application. With reference to the National Planning Policy Framework (“NPPF”), the report will assist in determining whether the Site is ‘suitable for use’.

1.2 The Proposed Development

1.2.1 A detailed description of the Proposed Development is presented in **Chapter 4: The Proposed Development, Volume 2** and a summary is presented below.

1.2.2 RED proposes to develop Rampion 2 adjacent to the existing Rampion Offshore Wind Farm in the English Channel off the south coast of England. The Proposed Development comprises onshore and offshore infrastructure and this report relates to the onshore items which include a single proposed landfall site (where Horizontal Directional Drilling (HDD) installation techniques will be used), buried onshore cables in a corridor approximately 36km in length, and a new onshore substation that will connect to the existing National Grid substation at Bolney, Mid Sussex.

1.2.3 Onshore cables will be installed in up to four trenches, with cables drawn through installed ducts. HDD will be used to avoid or minimise identified constraints, such as main watercourses, railways and roads that form part of the Strategic Highways Network. Where laid in trenches, the trenches will be backfilled following installation of the cables (which will not be oil-filled) with approximately 1m thickness of soil covering the cables and ducts. Transition joint bays will be installed at regular intervals along the onshore cable corridor to enable the cable installation and connection process. These will be subsurface structures with an associated link box located at or above the surrounding ground level and will also enable electrical checks and testing to be carried out during the cable system operation. During the construction phase, a temporary onshore construction corridor will be defined to allow temporary working areas to be established for access/construction working area, this will be approximately 50m in width, a larger working area will be needed at points where HDD is required to enable a small temporary pit to be excavated to launch the drill and to accommodate the required

equipment including a drilling rig and associated equipment and facilities such as a temporary site office.

1.3 Scope of work

1.3.1 This report comprises a Phase 1 Geo-environmental Desk Study and includes the following:

- identification and review of selected contemporary information including geological, environmental, hydrological and hydrogeological data, where available, for the Site and its surroundings;
- review of historical mapping for the Site and its surroundings to determine the historical land uses and to identify potential contaminative activities;
- a walkover of the key elements of the Site (conducted in 2021) to identify any potential evidence of contamination and verify desk study information as necessary[1];
- development of a Conceptual Model (CM) and a Tier 1: Preliminary Risk Assessment, to assess the status of any potential contamination and identify any potentially significant contaminant linkages that require further consideration in line with current guidance including Land Contamination Risk Management (LCRM) guidance published by the Environment Agency; and
- identification of information gaps, geo-environmental development constraints and any requirements for further assessment.

1.4 Regulatory context

1.4.1 DCOs were introduced by the Planning Act 2008 for NSIPs. The Planning Act 2008 (as amended) sets out the decision-making framework for NSIPs in conjunction with relevant National Planning Policy Statements. The Overarching National Policy Statement for Energy (EN-1) (DECC, 2011) requires that for developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination.

1.4.2 The National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2019) (NPPF) does not contain specific policies for NSIPs; however, it sets out the Government's planning policies and how these should be applied, and it is a material consideration in planning decisions.

1.4.3 Of relevance to ground conditions, the NPPF states that planning policies should contribute to and enhance the environment by:

- *"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.* [paragraph 170 (e)]"

[1] At the time of writing, the Site walkover has not yet been undertaken. The walkover will be undertaken prior to finalisation of this report and completion of the ES.

- *"remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate* [paragraph 170 (f)]*".*

1.4.4 Therefore, planning policies and decision should ensure that:

- *"a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation;"*
- *"after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and"*
- *"adequate site investigation information, prepared by a competent person, is available to inform these assessments.* [paragraph 178 (a) to (c)]*".*

1.4.5 Where land is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

1.4.6 The statutory definition of contaminated land is given under Part 2A of the Environmental Protection Act (EPA) 1990 (Part 2A) (Defra, 2012). This generally does not include land that is already regulated through other means, such as waste management legislation or the Environmental Permitting Regulations 2016.

1.5 Sources of information

1.5.1 The following sources of information were reviewed as part of this desk study:

- Groundsure EnviroGIS report (ref. GSIP-2020-10568-3137, dated 20/11/20);
- Environment Agency, Land contamination risk management (LCRM), October 2020, https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm;
- Ministry of Housing, Communities & Local Government, National Planning Policy Framework, June 2019;
- Department for Environment, Food and Rural Affairs (Defra), Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, Reference PB13735, April 2012;
- National House Building Council (NHBC) and Environment Agency R&D Publication 66: Guidance on the Safe Development of Housing on Land Affected by Contamination, 2008;
- Environment Agency Catchment Data Explorer https://environment.data.gov.uk/catchment-planning/, accessed April 2021;
- Multi Agency Geographic Information for the Countryside (MAGIC) interactive map, www.magic.gov.uk, accessed April 2021;
- Google Maps, https://www.google.co.uk/maps, accessed April 2021;
- Google Earth Pro, accessed April 2021;

- BGS, GeoIndex, http://mapapps2.bgs.ac.uk/geoindex/home.html, accessed April 2021;
- BGS, Geology of Britain Viewer, http://mapapps.bgs.ac.uk/geologyofbritain/home.html, accessed April 2021;
- Coal Authority, Interactive Map Viewer, http://mapapps2.bgs.ac.uk/coalauthority/home.html, accessed April 2021;
- Public Health England and British Geological Survey, Indicative Atlas of Radon in England and Wales, Interactive Map, https://www.ukradon.org/information/ukmaps, accessed April 2021;
- Zetica, Unexploded Ordnance Threat Assessment, West Sussex, https://zeticauxo.com/downloads-and-resources/risk-maps/,, accessed April 2021; and
- Historical aerial photography, accessed via Google Earth Pro, April 2021.

1.6 Assumptions and limitations

1.6.1 The following assumptions and limitations apply:

- this Phase 1 Geo-environmental Desk Study report provides available factual data for the Site obtained only from the sources highlighted in **Section 1.5**, which are related to the Site on the basis of its location (as shown in **Figure 25.1.1** in **Annex A**);
- the desk study information is not necessarily exhaustive and further information relevant to the Site may be available from other sources;
- the accuracy of historical maps cannot be guaranteed, and it should be recognised that different conditions onsite may have existed between and subsequent to the various map surveys;
- a site walkover survey has not yet been undertaken from which to verify the desk study information, this is scheduled in 2021 to further inform this report and the ES; and
- this Phase 1 Geo-environmental Desk Study report is prepared and written in the context of legislation and guidance available in April 2021. New information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission.

2. Site location and description

2.1 Site location

2.1.1 The Site is located in West Sussex, England, with its most southerly point located at the proposed landfall location at Climping Beach at approximate grid reference 500674, 100694 (approximate post code BN17 5RN).

2.1.2 The Site then continues as a roughly linear feature generally north-eastwards until it reaches the two onshore substation search areas. The Site's most northerly point is at approximate grid reference 522955, 122759 (approximate post code RH13 8AZ), south of the A272 road between Cowfold and Crosspost, West Sussex.

2.1.3 The predominant land use onsite is agriculture and the onshore cable corridor and associated options cross various surface watercourses including the River Arun, the River Adur, Ryebank Rife and Cowfold Stream, two active railway lines and several roads, including the A259, A27, A24, A283 and the A281. The Site location is shown on **Figure 25.1.1** in **Annex A**.

2.2 Site description

2.2.1 The Proposed Development within the Site (**Figure 25.1.1**) includes several component parts including the proposed landfall location, onshore cable corridor, HDD crossing points, temporary construction compounds, temporary construction access routes and an onshore substation (the location of which will be within one of two onshore substation search areas currently being considered).

2.2.2 For the purposes of this Phase 1 Geo-environmental Desk Study, the Site has been subdivided into the following components, in a consistent manner with the description of the Proposed Development in **Chapter 4: Alternatives, Volume 2**:

- landfall at Climping Beach;
- the onshore PEIR Assessment Boundary (including a range of optional routes) is 100m wide (in which a 50m construction corridor will sit) and approximately 36km in length. Key sections of the onshore cable corridor and associated infrastructure, including HDD crossing points and temporary and permanent access routes, are as follows:
  - Climping Beach to Warningcamp (includes crossing at River Arun, west of Littlehampton);
  - Warningcamp (two onshore cable corridor route options – Warningcamp B and C routes);
  - Buncton (includes crossing at Water Lane);
  - Bolney Road/Kent Street onshore substation search area (includes two onshore cable corridor options leading from the onshore substation to the National Grid Bolney substation);

- Wineham Lane North onshore substation search area (includes two onshore cable corridor options leading to the onshore substation search area from a common point along the onshore cable corridor); and

- Onshore substation search areas:
  - Bolney Road/Kent Street; and
  - Wineham Lane North.
- Temporary construction compounds.

2.2.3 The topography of the landscape within the Site varies from being relatively flat in the south towards the coast, rising to 238m above Ordnance Datum (m AOD) at Chanctonbury Hill within the central part of the South Downs National Park (SDNP), before dropping down into the low-lying vales at around 10m AOD in the northeast near Bolney. The landform rises again towards the High Weald Area of Outstanding National Beauty (AONB) beyond Bolney, Mid Sussex.

2.2.4 There are no above ground structures on the Site, however, between the landfall area at Climping Beach and the onshore substation search areas in the northeast, it crosses several watercourses, roads and two active railway lines.

2.2.5 The Site context is shown on **Figures 25.1.2a-2r** in **Annex A**.

2.3 Site surroundings

2.3.1 Climping Beach to the east of the Site is classified as a Site of Special Scientific Interest (SSSI), however, the designated area is over 100m east of the Site. The beach area onsite is accessible to the public. The surrounding area is mainly agricultural (arable and improved grassland), with several towns, villages and commercial areas connected by roads. The existing National Grid Bolney substation is adjacent to the Site in the north.

2.3.2 There are some industrial land uses in the area surrounding the Site including water and sewage pumping stations, electrical substations, tanks (mainly agricultural) and vehicle repair and servicing industrial units at the Oakendene Industrial Estate at Bolney Road, which is adjacent to the Site in the north.

3. Historical land use

3.1 Site history summary

3.1.1 A review of the available historical mapping reveals that the Site and its immediate surrounding area has generally remained in agricultural use since the mid-1800s. Notable historical land uses onsite include:

- a possible historical groundwater abstraction indicated onsite by the presence of a well at High Titton on the 1896 map, and two pumps close to the Site at Warningcamp;
- the railway that crosses the Site northwest of Littlehampton in two places was present by 1896, and there was also a former railway cutting located centrally between the two lines. The cutting was infilled and historical records indicate that it and the surrounding land on and offsite was used as a landfill (see **Section 4.7**). A former railway line or siding is shown onsite at Sullington Hill, south of Partridge Green, by 1888, this appears to follow the route of an existing access track in this area (National Grid Reference (NGR) 509664, 112364). Date of removal is not known;
- the 1980 map shows a dismantled railway running on a northwest to southeast axis through the Site south of Partridge Green, current aerial photography indicates this is now an access road/track; and
- numerous small scale historical pits, quarries, and some former ponds and other railway cuttings are identified on the Site that may have been infilled.

3.1.2 The wider area has seen small-scale development, notably as follows:

- a former sewage works by the River Arun was present by 1974 and removed by 1993. The footprint of the sewage works is still visible today and is excluded from the Site boundary, however, the potential for migration of contaminants onto the Site cannot be ruled out. The recent aerial photography indicates that the former sewage works is in agricultural or commercial use, possibly for external log storage;
- Oakendene Industrial Estate was developed adjacent to the Site at its northern extent by 2001. This includes several small-scale but potentially contaminative industrial uses including vehicle repair, testing and servicing, and metal polishing, that may have resulted in soil and groundwater contamination with potential to migrate onto the Site;
- mapping from 1896 shows various ground workings in proximity to the Site northeast of Sullington Hill, including a chalk pit and an old chalk pit immediately south of the Site. A brick works was located north of the Site at Washington, extending below what is now London Road (A24). Several small former pits, quarries and surface workings, and unspecified heaps/mounded ground are identified in **Section 4.1** (made ground), **Section 4.2** (surface workings) and in the historical land use data provided by GroundSure; and

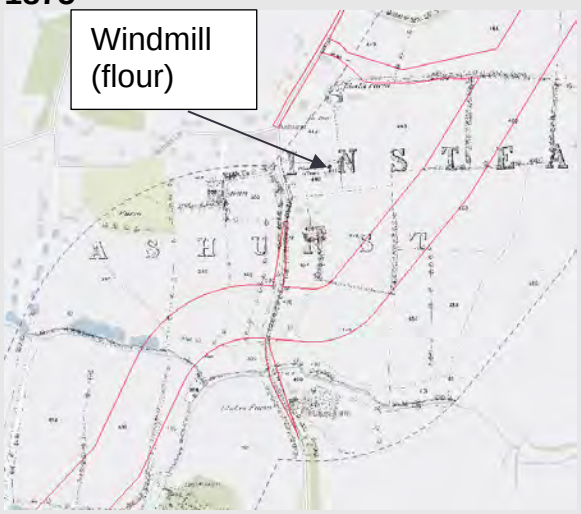
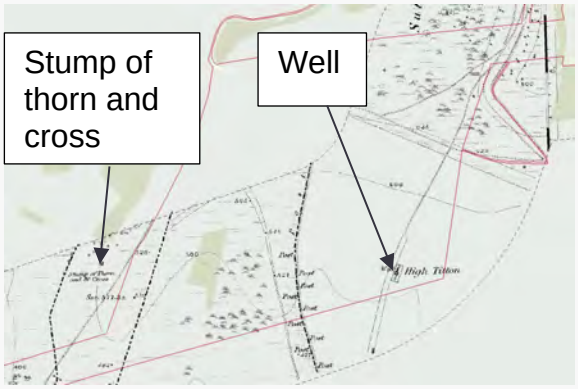
- at Warningcamp, the maps show a covered reservoir close to the Site boundary at the Warningcamp B onshore cable corridor option by 1974. At its closest point to the Site, it appears to be 70m from the Warningcamp B onshore cable corridor option, therefore, it is unlikely to be encountered on the Site.

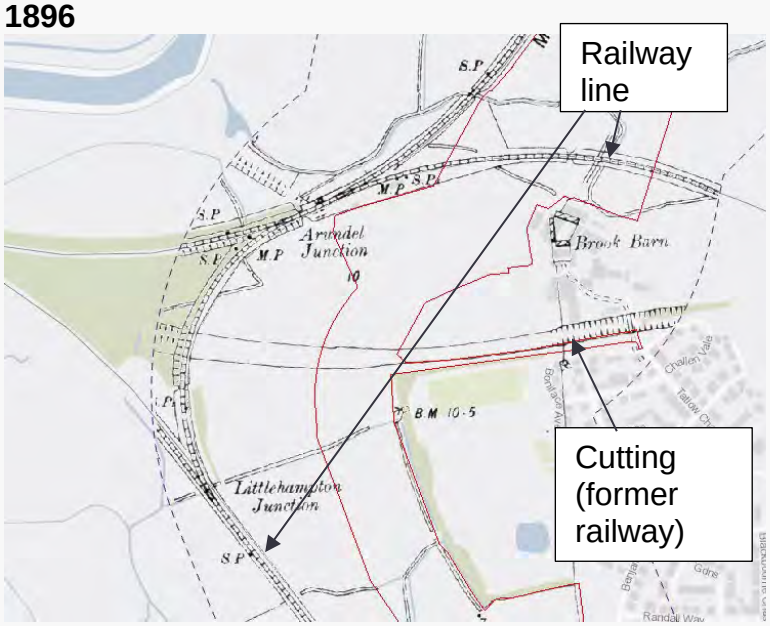
3.1.3 The features described above are shown on **Figure 25.1.3a-3r** in **Annex A**.

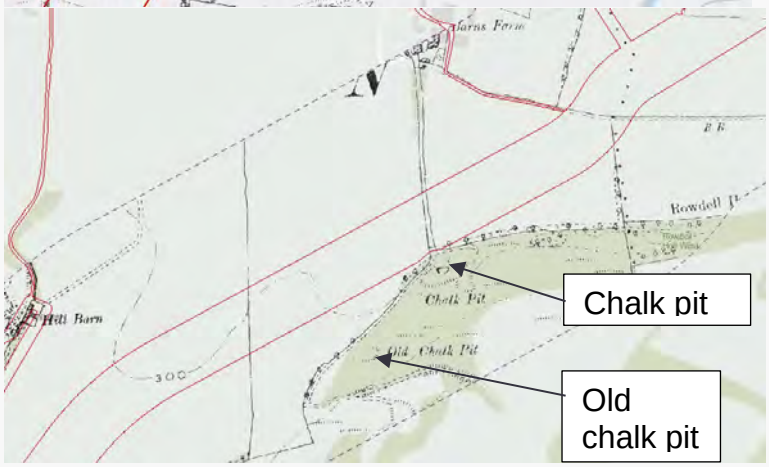
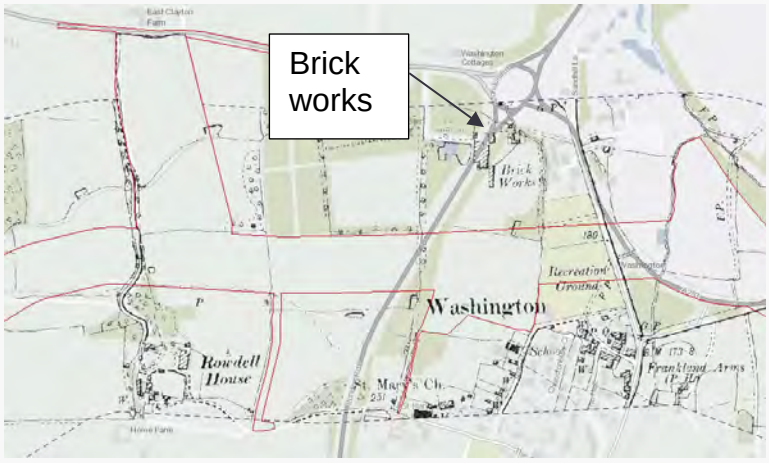
3.2 Detailed description

3.2.1 The historical land use of the Site and its immediate surrounding area has been established from a review of the historical mapping and historical land use data provided in the Groundsure EnviroGIS report. Google Earth Pro has also been used to provide some historical and recent aerial photographic coverage of the Site. Notable features and changes identified on the historical mapping are summarised below in **Table 3-1** included selected mapping extracts from the Groundsure EnviroGIS report.

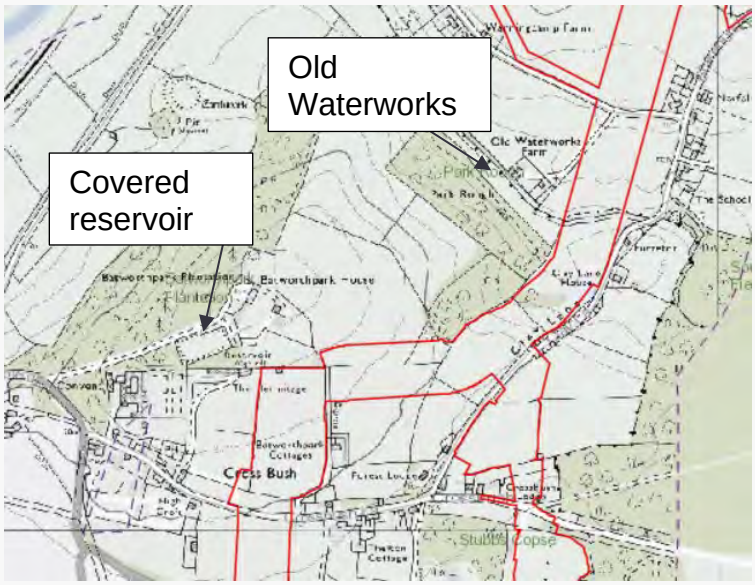
Table 3-1 Historical mapping summary

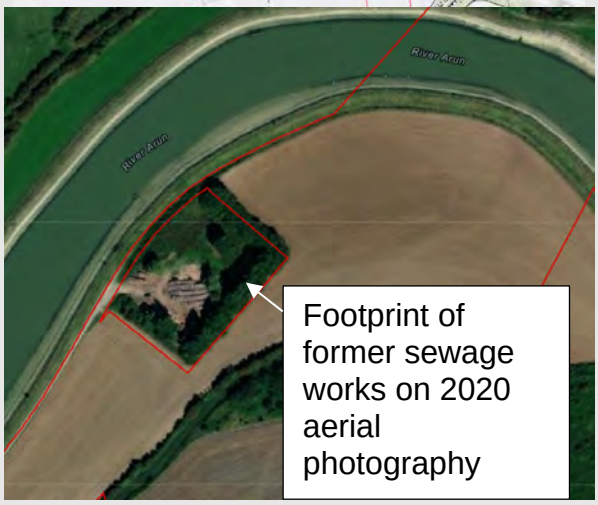
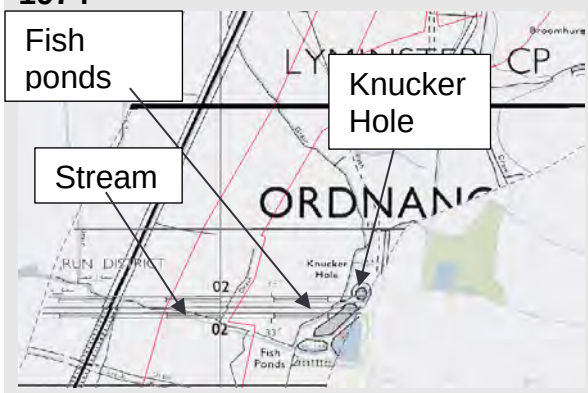
Edition (Scale)	Description
1875  	**Offsite** A windmill (flour) is located at NGR 518218, 116006, at Ashurst approximately 140m west of the Site.
1876  	**Onsite** The 1876 map shows a well onsite at High Titton (NGR 509202, 111389). **Offsite** Southwest of Sullington the 1876 map shows a stump of thorn and cross located west of the Site (NGR 508389, 111388).

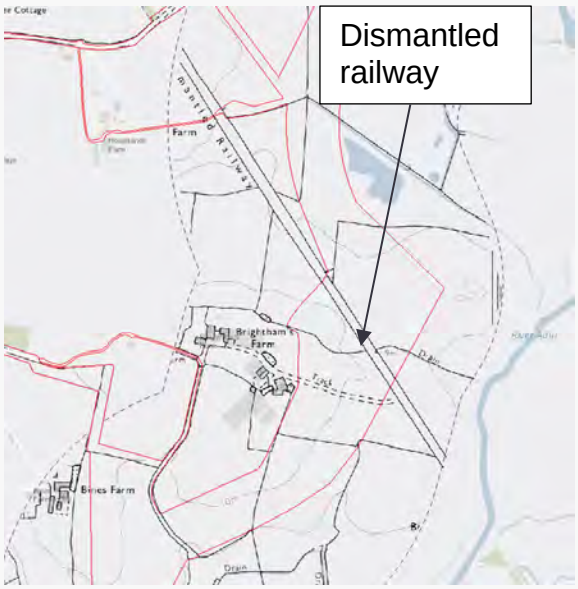
Edition (Scale)	Description
1888  	**Onsite** The 1888 maps shows a railway running on a northwest to southeast axis through the Site south of Partridge Green (NGR 519746, 117903).
1896  	**Onsite** The 1896 map shows railway lines crossing the Site northwest of Littlehampton in two places and running west of the Site boundary. There appears to be a former railway line between the two active railway lines that cross the Site, the former railway line is shown as a cutting. This corresponds to an area identified in **Section 4.1** as made ground and in **Section 4.7** as a historical landfill, indicating that the cutting was later infilled. Historical barracks are identified in the Groundsure historical land use data onsite at the access road east of Partridge Green (NGR 520670, 119495), off the A281 (not shown on available mapping). There are no other known former military uses at this area. The Groundsure historical land use data shows an unspecified yard dating from 1896 on the Site boundary north of Eatons Farm (NGR 518677, 116470).

Edition (Scale)	Description
	**Offsite** A knucker hole is shown east of the Site at Lyminster – this is a (deep) water-filled hole.
	Southeast of Arundel at the Warningcamp onshore cable corridor options, the 1896 map shows the remains of Calcetto (Augustinian) Priory and a convent to the west of the Site. Two pumps are shown at Warningcamp, which may be related to groundwater abstraction. Southeast of Sullington, a chalk pit (NGR 510522, 112614) and an old chalk pit (NGR 510400, 112446) are shown immediately south of the Site.
	A brick works is shown north of the Site at Washington (NGR 512473, 113298) with a pit adjacent to the west. The brick works extends below what is now London Road (A24). The Groundsure historical land use data shows the Brickworks extending up to the Site boundary by 1875.

Edition (Scale)	Description
1914  	**Onsite** The Groundsure historical land use data shows cuttings onsite east of Sullington Hill (NGR 509639, 112359).
1947  	**Onsite** An unspecified heap is shown onsite at the access route north of Homelands Farm (NGR 519494, 118323). **Offsite** The Groundsure data also shows a former railway siding and cuttings north of Homestead Farm on the former railway line south of Partridge Green.

Edition (Scale)	Description
1971  	**Offsite** An historical petrol station dating from 1971 is located 100m south of the Site at Washington. Based on available current aerial photography, this area appears to have been redeveloped for housing.
1974  	**Offsite** A covered reservoir is shown approximately 190m to the west of the Warningcamp B cable route option. At the northern point where the two Warningcamp routes converge 'Old Waterworks Farm' is shown south of the Site, this corresponds to a 1938 pumping station identified in the Groundsure historical land use data.

Edition (Scale)	Description
1974 to 1992   **Image © Google Maps**	**Offsite** By 1974 a sewage works is shown adjacent to the Site on the south bank of the River Arun. By 1993 the feature is no longer shown on the Site suggesting it ceased to operate just before this time. Recent aerial imagery from 2020 (available on Google Earth Pro) shows the footprint of the sewage works and it appears to be in use for external storage (possibly logs).
1974  	The knucker hole is still shown at Lyminster, in addition to several fish ponds which may connect to a stream (tributary of the River Arun) which crosses the Site.

Edition (Scale)	Description
1980  	**Onsite** The 1980 map shows the railway south of Partridge Green is dismantled.
2001  **Image © Google Maps**	**Offsite** Aerial photography from 2001 available on Google Earth Pro shows the Oakendene Industrial Estate developed adjacent to the Site in the north.

Map excerpts from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

4. Environmental setting

4.1 Geology

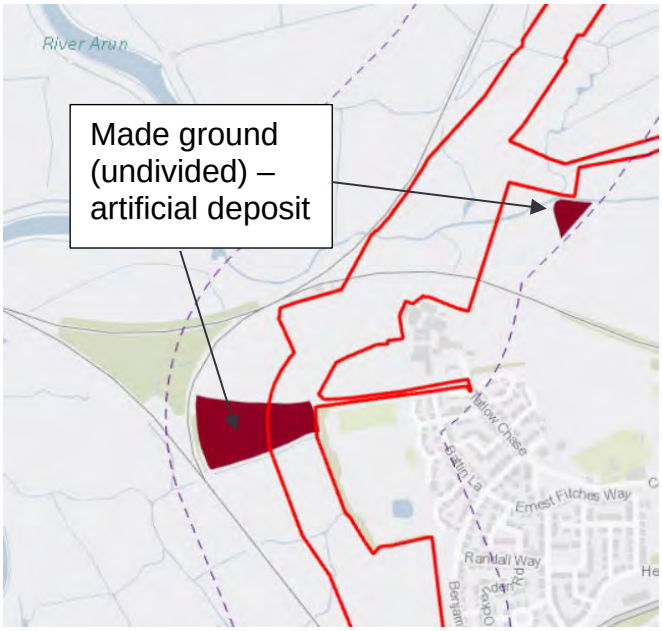
4.1.1 Information on the geological setting has been obtained from the British Geological Survey (BGS) 1:10,000 and 1:50,000 scale drift and solid geological mapping provided as part of a Groundsure EnviroGIS report.

Made ground

4.1.2 BGS 1:10,000 scale mapping shows made ground present in parts of the Site:

- An area of made ground onsite to the northwest of Littlehampton (NGR 501232, 103857) extends across the full width of the onshore cable corridor at this location and beyond the western Site boundary. This corresponds approximately to a historical landfill at Brookbarn Farm, Littlehampton (see **Section 4.7** and **Graphic 4-23**), however, the onsite made ground is noted to cover a slightly larger area than the portion of the landfill shown onsite.
- A smaller area further northeast, offsite but close to the Site boundary (NGR 501800 104200, corresponds to a portion of a former landfill known as Old Mead Road Tip (see **Section 4.7**), the landfill is noted to cover a larger area and is shown extending onto the Site (see **Graphic 4-23**).

Graphic 4-1 Made ground/artificial ground onsite northwest of Littlehampton



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Made Ground (Undivided)

- An area of made ground is shown 30m (NGR 505180, 109032) northwest of the Site at Norfolk Clump. No landfills or other waste activities are identified in this area.

Graphic 4-2 Made ground/Artificial ground at Norfolk Clump

Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Made Ground (Undivided)

- Made ground may be present on the Site associated with worked ground shown immediately southeast of the Site boundary (NGR 510542, 112614) at a section of the onshore cable corridor between Sullington Hill and London Road. This area is identified as worked ground, and as a void (disused quarry), and may have been infilled.

Graphic 4-3 Worked ground close to the Site boundary between Sullington Hill and London Road

Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Worked Ground (Undivided)

- A small area of made ground is shown onsite at Washington along the route of the A283 road (NGR 512259, 113132). Offsite to the north and further east along the onshore cable corridor, there is a larger area of made ground and worked ground. This appears to correspond to various former surface workings including Windmill Sandpit and Rock Common (see **Section 4.2**).

Graphic 4-4 Worked ground onsite at Washington

Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Made Ground (Undivided)

Worked Ground (Undivided)

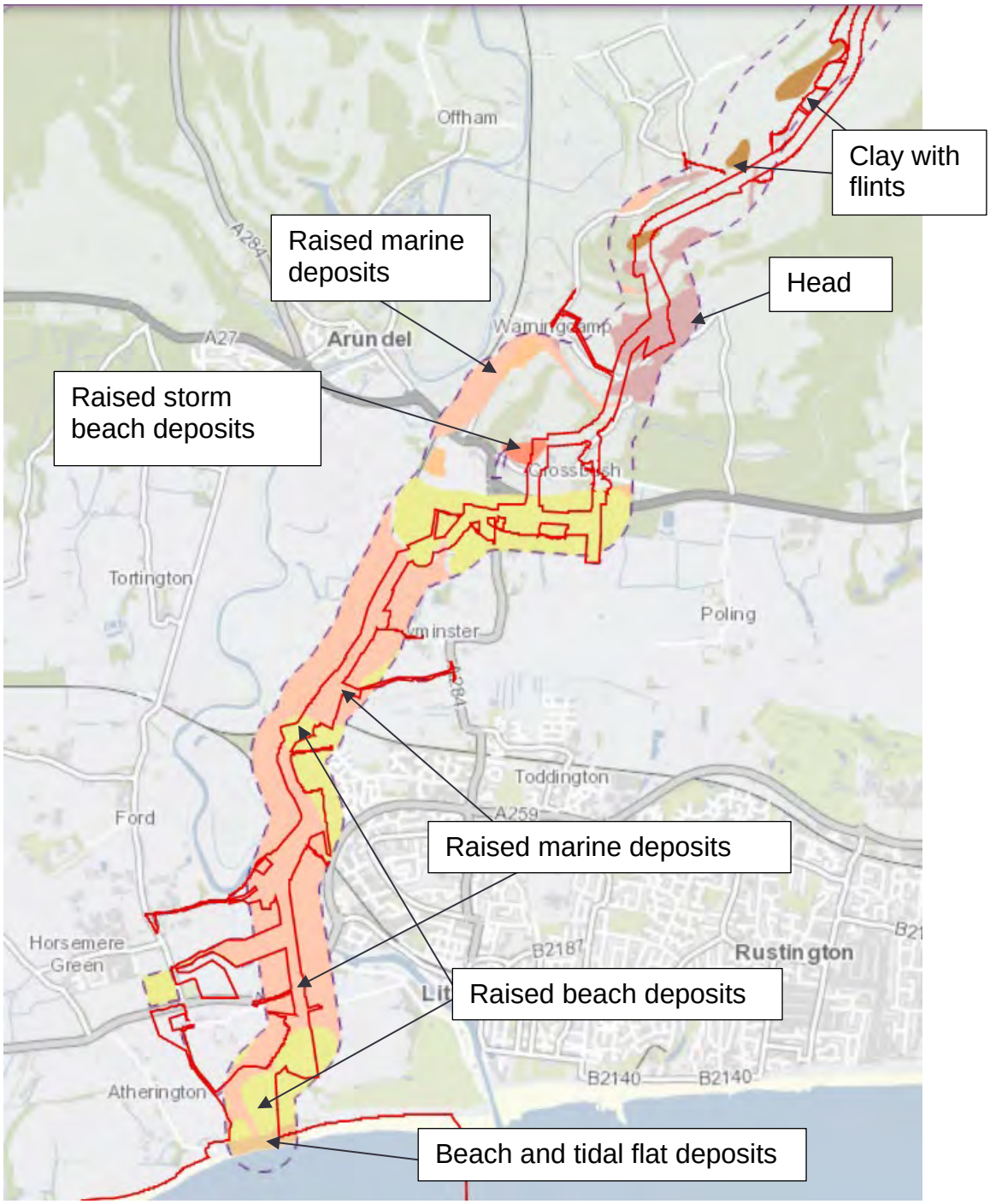
Superficial geology

4.1.3 The superficial geology is summarised from the BGS 1:50,000 scale mapping provided with the Groundsure data and available on the BGS website. Superficial deposits are present in the south of the Site, however, northeast of Warningcamp, the 1:50,000 scale mapping shows superficial deposits are absent from most of the Site. Areas where superficial deposits are present are described below.

4.1.4 From the landfall area at Climping Beach to the southern portion of the Warningcamp onshore cable corridor options, superficial deposits of beach and tidal flat deposits and raised marine deposits (clay, silt, sand and gravel) are present beneath the Site. Alluvium (clay, silt, sand and gravel) is also likely to be present associated with the River Arun and other streams crossing the Site.

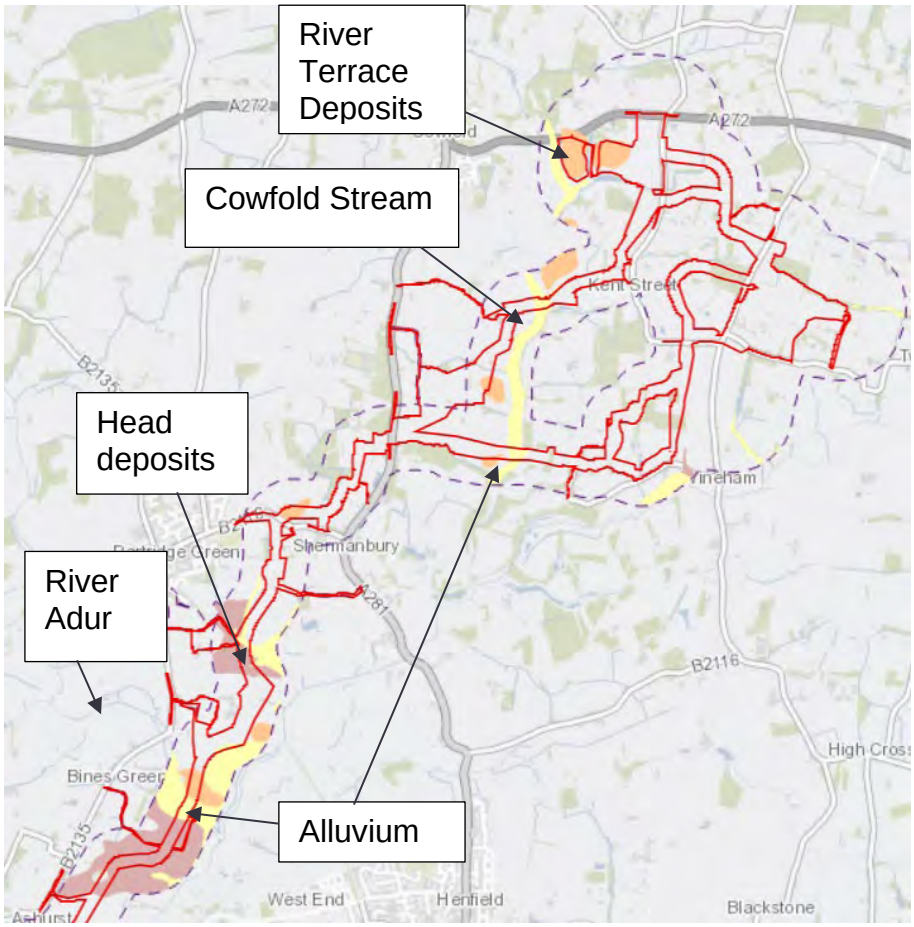
4.1.5 Northeast of Warningcamp the BGS 1:50,000 scale mapping shows large areas onsite where superficial deposits are absent, however, there are localised areas where head deposits and clay with flints (clay, silt, sand and gravel) are present. Alluvium is present at the River Adur where it crosses the Site south of Partridge Green, and in the north of the Site at Cowfold Stream, there are also localised areas with river terrace deposits (sand and gravel) and head deposits. Available BGS borehole records (see section below) indicate the potential presence of peat on the Site where alluvial deposits are present, though the peat encountered was at depths greater than 20m by the River Arun.

Graphic 4-5 Superficial Geology: Landfall at Climping beach to Arundel



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Graphic 4-6 Superficial Geology: River Adur to the Site's northern extent



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Solid geology

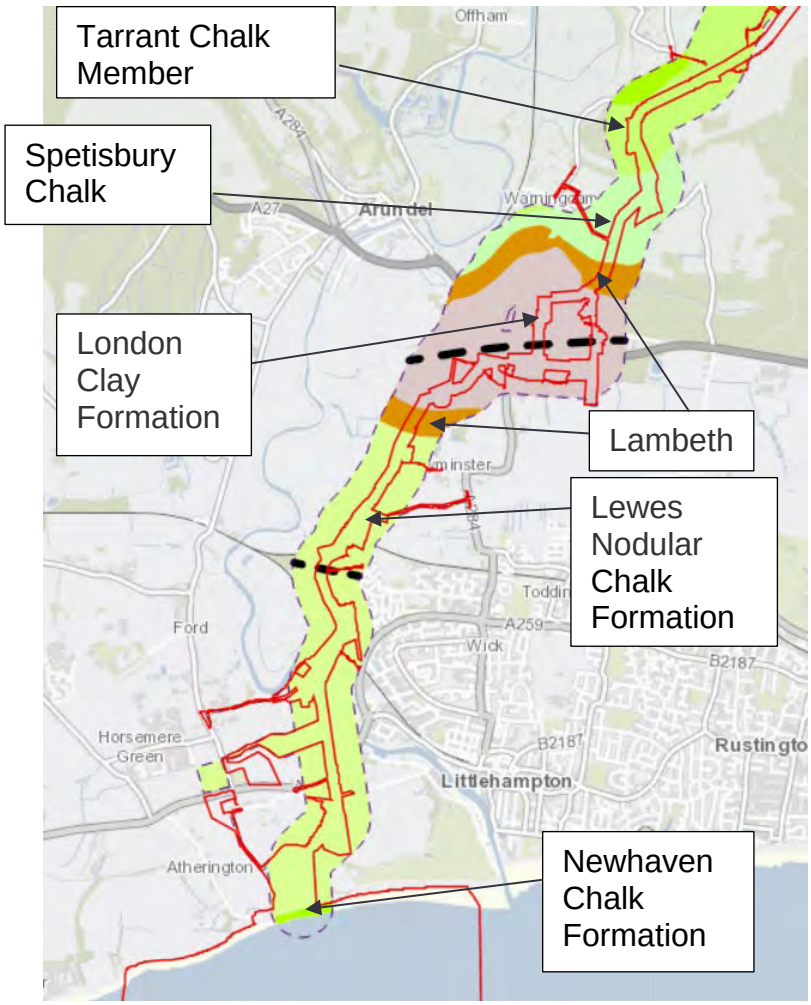
4.1.6 Bedrock geology in the southern portion of the Site is mainly comprised of Chalk, except southeast of Arundel where the Chalk is overlain by London Clay. Northeast of Sullington as the Site heads north-eastwards the bedrock geology changes to be predominantly mudstone, and to a lesser extent sandstone. There are several areas onsite, notably across much of the northern area, where bedrock is likely to be encountered at or close to surface. Several geological faults are present onsite, including two in the south at Littlehampton and Warningcamp, and eight in the northeast of the Site (see **Graphics 4-7** and **4-8**). Further details of the solid geology onsite are provided below.

4.1.7 Underlying the superficial deposits in the southwestern part of the Site from the landfall area at Climping Beach northwards, the solid geology comprises predominantly Chalk (the White Chalk Subgroup – including the Newhaven Chalk Formation and the Lewes Nodular Chalk Formation). At Warningcamp, southeast of Arundel, this is overlain by the Lambeth Group ((clay, silt, sand and gravel) and Thames Group (London Clay Formation – silty clay/mudstone, sandy silts and sandy clayey silts of marine origin). Northeast of Arundel the bedrock geology changes back to Chalk (including the Spetisbury Chalk Member, Tarrant Chalk Member, Newhaven Chalk Formation, Seaford Chalk Formation, West Melbury Marly Chalk Formation and the Zig Zag Chalk Formation), then at Sullington (NGR

510801, 112876) there are areas where the chalk is absent and bedrock is the Upper Greensand Formation (siltstone and sandstone), the Gault Formation (mudstone) or the Folkestone Formation (sandstone), or the Lower Greensand Formation (sandstone, silty). Much of the solid geology in the northern area of the Site comprises the Wealdon Group including the Weald Clay Formation (mudstone and also sandstone and limestone) and the Horsham Stone Member (sandstone).

4.1.8 The solid geology is illustrated below in **Graphics 4-7** and **4-8**.

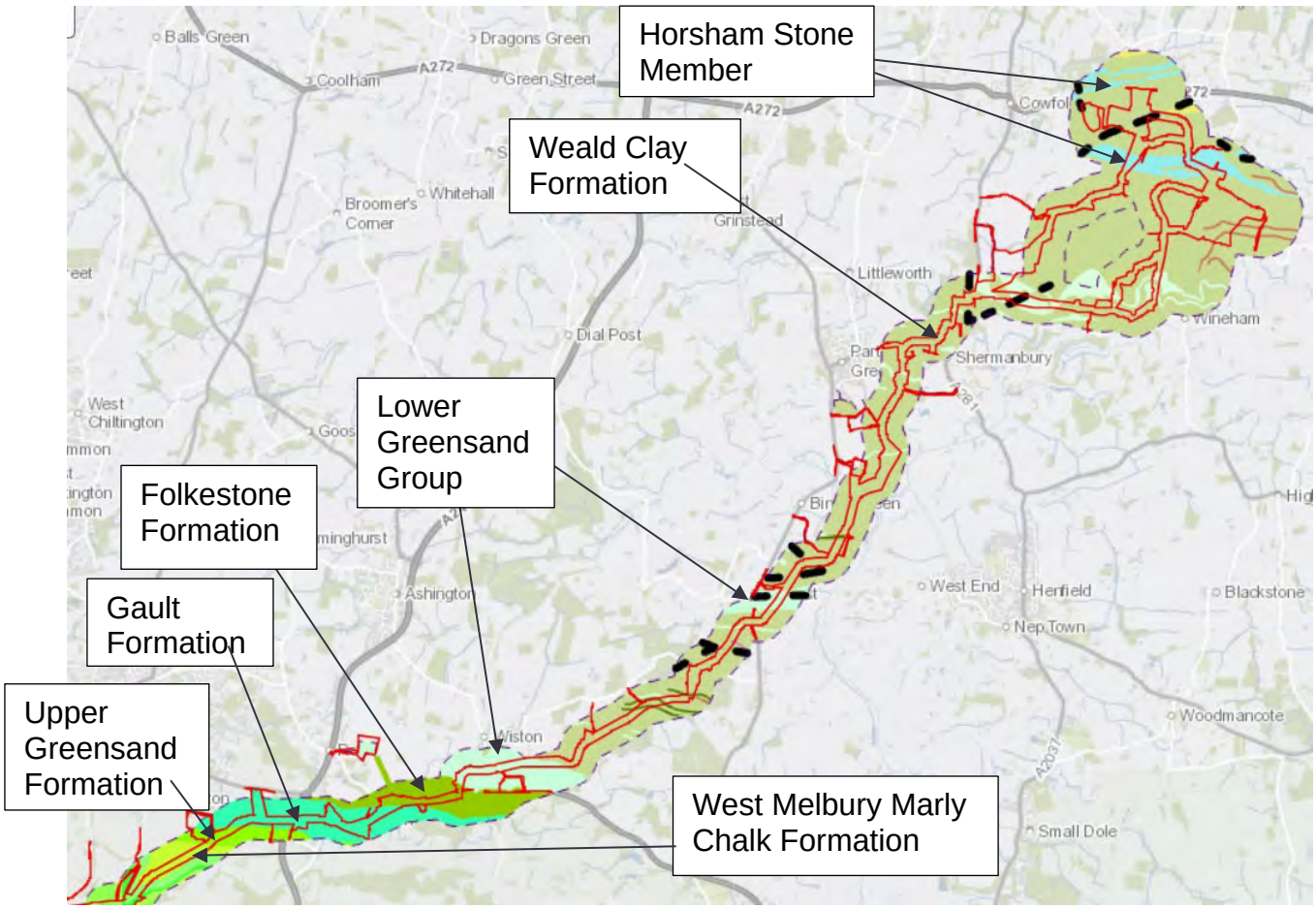
Graphic 4-7 Solid Geology: Landfall at Climping Beach to Arundel



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Bedrock_Faults_and_Linear_Features

Graphic 4-8 Solid Geology: Sullington to onshore substation search areas at Bolney Road/Kent Street and Wineham Lane North



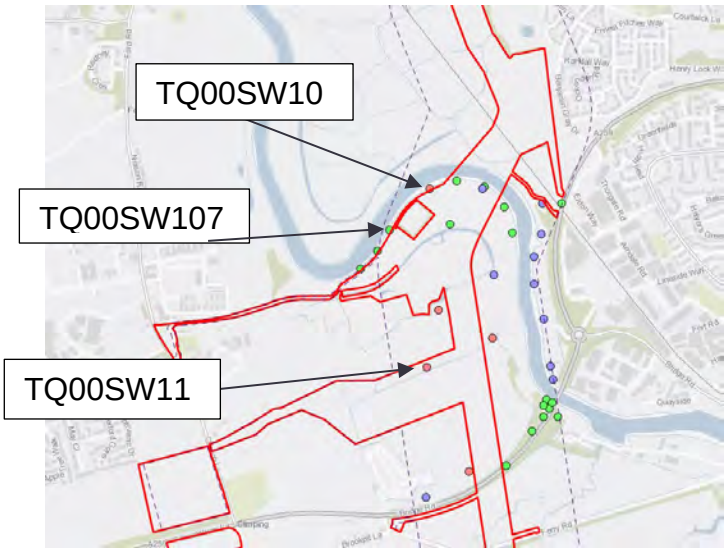
Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Bedrock_Faults_and_Linear_Features

BGS historical borehole records

4.1.9 A selection of available BGS borehole records located on or adjacent to the Site has been reviewed and these are summarised below.

Graphic 4-9 BGS boreholes near the River Arun



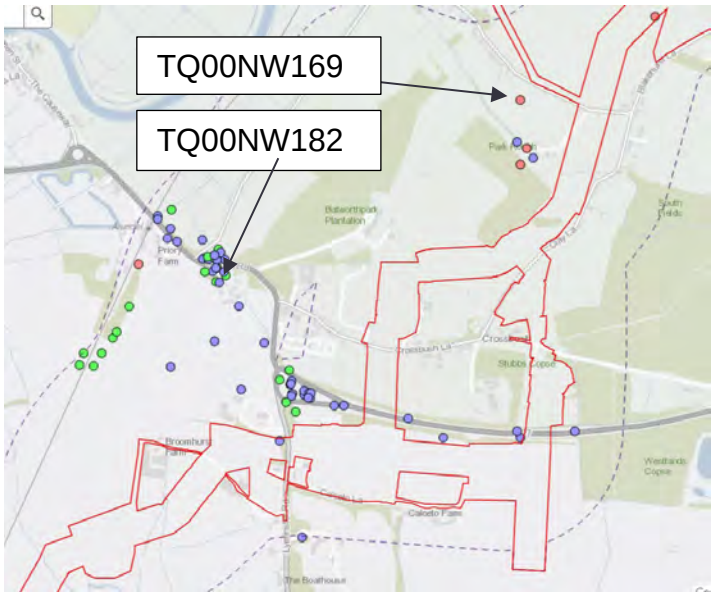
Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

4.1.10 Borehole log TQ00SW107, dated 1984, is noted to be named on the BGS Geoindex as 'Proposed Landfill Site W. Sussex BH4', though no landfill is recorded at this location. The borehole is at the Site boundary adjacent to the River Arun, southwest of the former sewage works and records superficial deposits extending to 12m, comprising firm very silty clay, underlain by clayey silty fine sand to 1.7m, then very silty clayey fine sand to 2.75m, then silty clay to 3.8m underlain by clayey fine sand to 8.1m, then bands of silty clay to the base of the borehole at 12m. Groundwater was encountered at 3.3m, rising to 2.7m in 20 minutes.

4.1.11 A deeper borehole, TQ00SW108, to the northwest of the former sewage works, also dated 1984 and labelled as 'Proposed Landfill Site W. Sussex BH5' records chalk bedrock encountered at 25.8m. From surface the borehole records layers of silty clay, silty sand, sandy silt to 24.4m where a 0.3m thick peat layer is recorded. The log records groundwater at 3.8m and 4.5m which did not rise (water was then added to facilitate boring from 4.5m).

4.1.12 Similar ground conditions were recorded in borehole TQ00SW115, also dated 1984, which encountered a 0.4m thick peat layer at 25.8m and chalk bedrock at 32.0m.

Graphic 4-10 BGS boreholes at Warningcamp

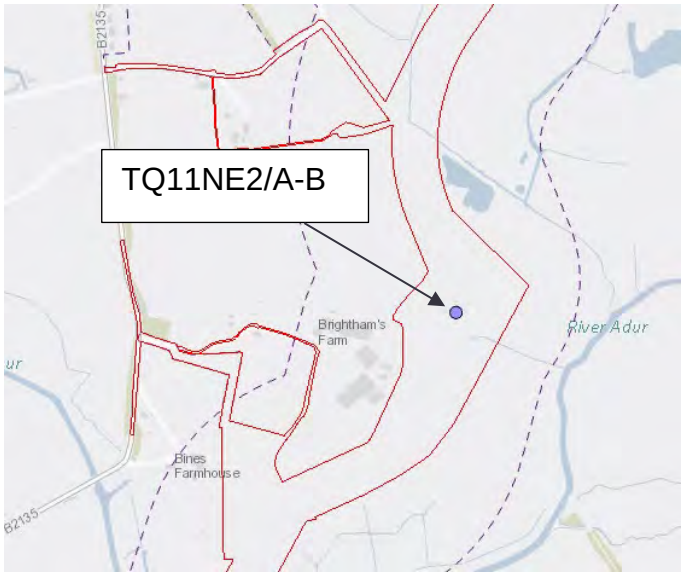


Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

4.1.13 BGS borehole TQ00NW169 near Warningcamp dates from 1996 and records topsoil to 0.2m, underlain by silty clay to 4.7m, underlain by coarse sand and gravel with occasional clay bands to 36m, beneath this hard chalk and flints was encountered from 36.0 to 44.0m. Groundwater strikes are recorded at 3.0m and 6.0m.

4.1.14 BGS borehole TQ00NW182 at The Causeway (A37) from 1977 records made ground to 1.4m including brick, pottery, and a hydrocarbon odour between 1.0m and 1.4m. This was underlain by sandy clay to the base of the borehole at 19.3m.

Graphic 4-11 BGS boreholes near Partridge Green



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

4.1.15 BGS borehole TQ11NE2/A-B is located onsite at the (now dismantled) railway south of Partridge Green. The borehole dates from 1965 and is recorded on the log as 'Ashurst Substation' site and ground level 1' to 8" below rail level (0.3m to 0.2m). The top 2.4m was made ground in a railway embankment consisting of ashes and clinker with track ballast. This was underlain by loose fine to medium angular gravel with sand to 4.9m, underlain by firm brown and grey mottles clay with fine decaying roots to 10.9m depth. Groundwater was struck at the base of the borehole as a seepage.

Previous ground investigation

4.1.16 No previous ground investigation reports have been available to review for the Site.

4.2 Mining and mineral extraction

Coal mining

4.2.1 The Coal Authority Interactive Map and the Groundsure EnviroGIS report reveal that the Site is not located within the Coal Authority Mining Reporting Area. Furthermore, geological mapping reveals that the Site is underlain by non-coal bearing geology that is unlikely to contain coal in exploitable quantities. As such, coal mining related subsidence is considered to represent a low risk to the onshore elements of the Proposed Development.

Other mining

Overview

4.2.2 The Groundsure EnviroGIS report includes a comprehensive dataset for former mineral workings including brine areas (none onsite), gypsum areas (none onsite), underground workings (none onsite), non-coal mining (none onsite), tin mining (none onsite), clay mining (none onsite), historical mineral planning areas, and surface ground workings. Where the Site is directly underlain by Chalk, the Groundsure EnviroGIS data indicates that sporadic underground mining of restricted extent may have occurred, however, the potential for difficult ground conditions is assessed unlikely and localised, and not requiring further consideration. In the Site areas northeast of Windmill Quarry, potential for historical localised small scale underground mining for iron ore or sand/building stone is identified, potential for difficult ground conditions is assessed as unlikely and localised, and not requiring further consideration. The Groundsure EnviroGIS report identifies numerous BritPits entries in proximity to the Site and where former mineral extraction areas are identified as polygons, these are discussed further below.

Surface workings

4.2.3 Numerous historical surface workings are shown on or close to the Site boundary and these are described below and shown in **Graphics 4-12** to **4-16**.

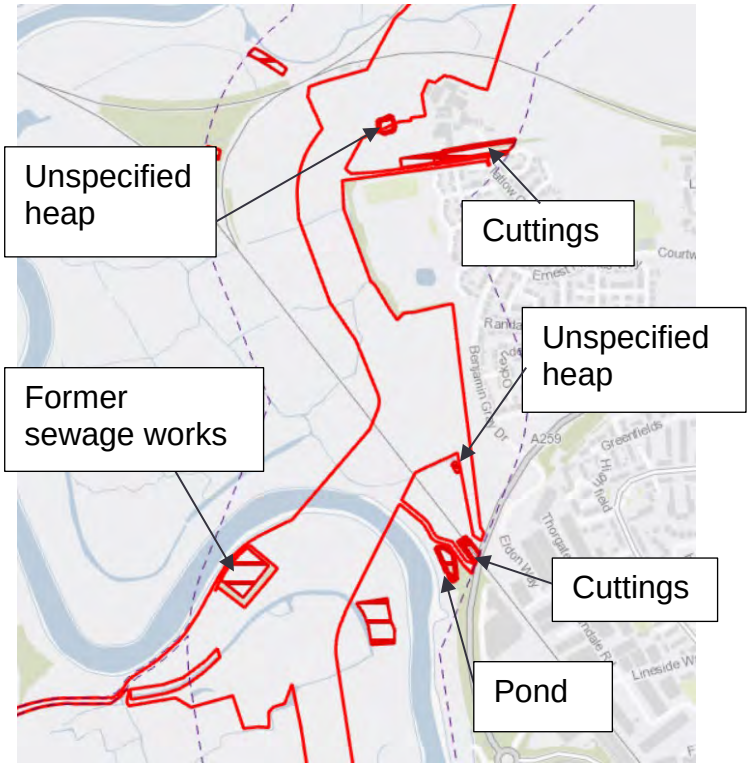
4.2.4 A small unspecified heap (see **Graphic 4-12**) is identified onsite in the south of the Site (NGR 501359, 101758) to the south of Ferry Road, this is not visible on recent aerial photography on Google Earth.

4.2.5 Various workings are identified on or close to the Site northwest of Littlehampton, these are labelled on **Graphic 4-12**.

4.2.6 The former sewage works adjacent to the Site south of the River Arun is also described in **Sections 3.1** and **3.2** of this report.

4.2.7 Two former cuttings are shown offsite (see **Graphic 4-12)** but adjacent to the eastern Site boundary at Littlehampton, the southernmost one is also identified as a landfill.

Graphic 4-12 Various workings onsite or close to the Site northwest of Littlehampton



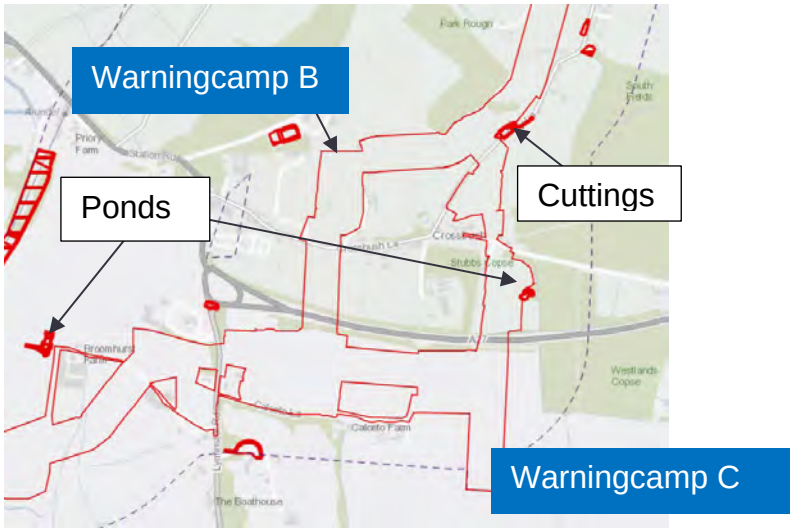
Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Surface_Ground_Workings

4.2.8 Various workings are shown at Warningcamp (see **Graphic 4-13**). A pond is onsite on the Warningcamp C onshore cable corridor option, and may have been infilled, a further pond is shown adjacent to site, west of Warningcamp and cuttings are shown overlapping the Site boundary where onshore cable corridor options Warningcamp B and C meet.

Graphic 4-13 Various workings onsite or close to the Warningcamp onshore cable corridor options



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

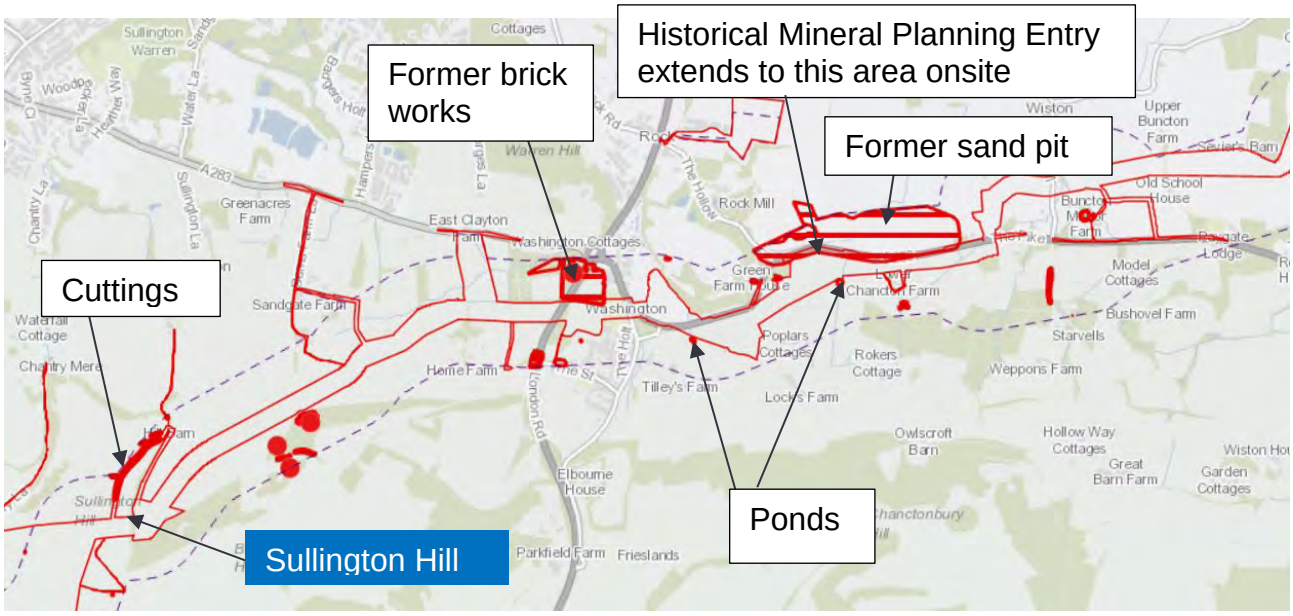
Surface_Ground_Workings

4.2.9 A covered reservoir is shown approximately 10m from the Site boundary at Norfolk Clump (NGR 505245, 109015).

4.2.10 Cuttings are shown onsite at an access route option at Sullington Hill (NGR 509642, 112365). A former brick works is shown north of the Site just south of the intersection of London Road (A24) with the A283 (NGR 511985, 113315). A former sand pit is shown north of the Site, and may extend onto the Site (NGR 513451, 113403) the surface ground workings area is shown slightly overlapping the Site boundary. This area has also been identified as a recent landfill (see Windmill Quarry Landfill in **Section 4.7**).

4.2.11 There are two Historical Mineral Planning Entries on the Site associated with the former sand pit at NGR 513451, 113403. These extend onto the Site and include two entries for Windmill Sandpit; one dated 1947 is valid whilst the other was refused. Two small ponds are also shown on or close to the Site boundary (see **Graphic 4-14**).

Graphic 4-14 Various workings onsite or close to Windmill Quarry



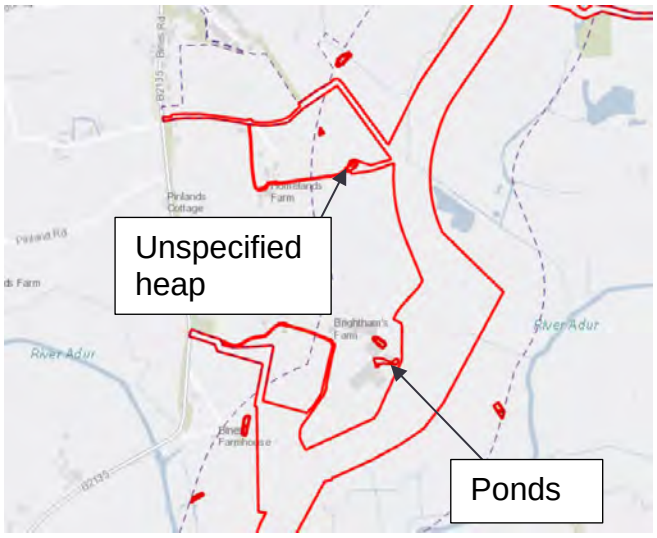
Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Surface_Ground_Workings

4.2.12 Some small surface workings are shown on the site north of the River Adur, two ponds are close to the Site at Brightman's Farm (NGR 519594 117792) and an unspecified heap is shown onsite at Homelands Farm at NGR 519515, 118322 (see **Graphic 4-15**).

Graphic 4-15 Various workings onsite or close to site north of the River Adur



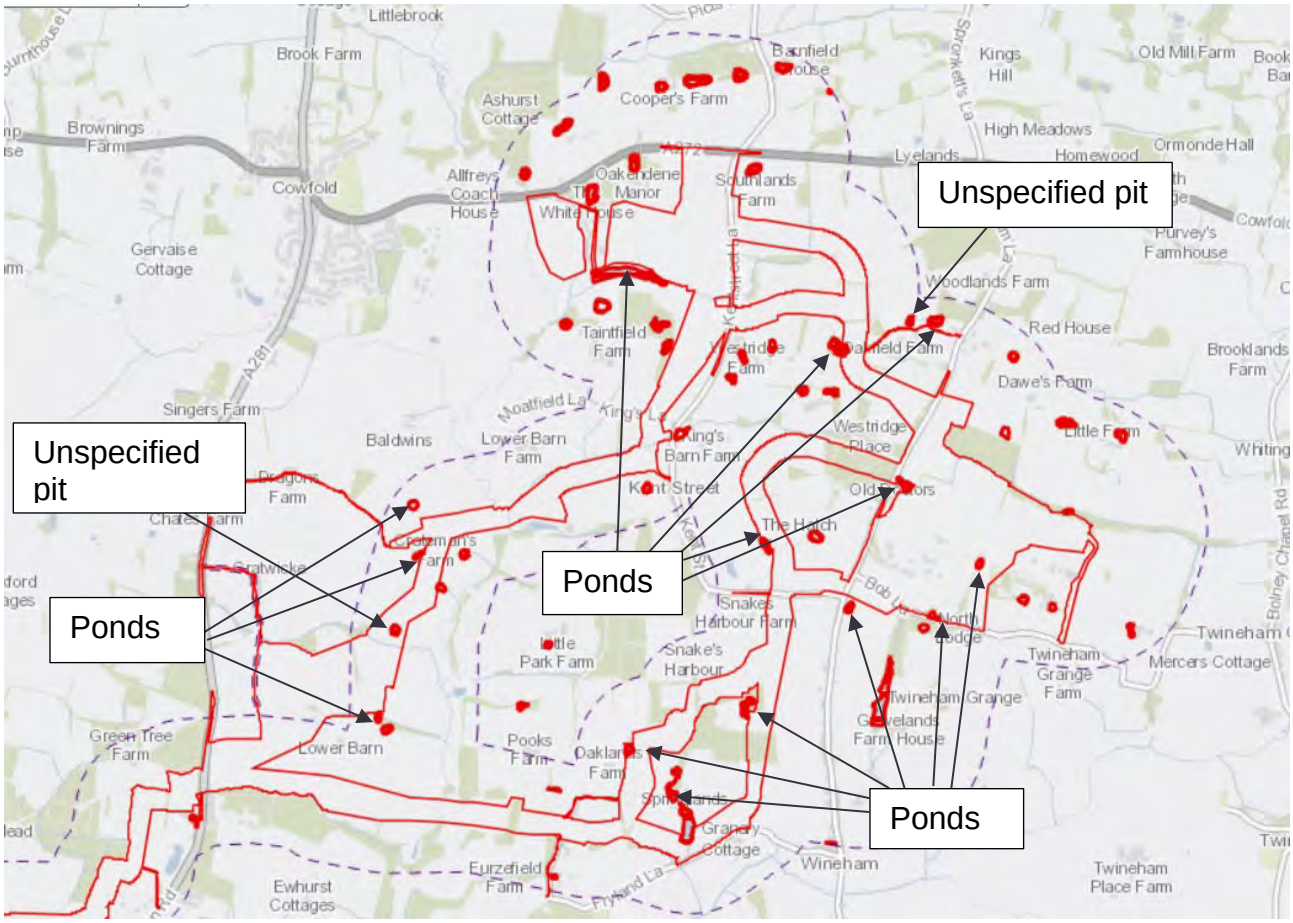
Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Surface_Ground_Workings

4.2.13 There are numerous ponds on or close to the onshore substation search areas at Bolney Road/Kent Street and Wineham Lane North. Two unspecified pits are shown onsite, one on the Bolney Road/Kent Street Route 1C & 1D (NGR 521718, 120708), and one on the Bolney Road/Kent Street Route 1D (NGR 524336, 121551). These features may have been infilled. Many of the ponds still contain water and, therefore, present a lower risk of having been infilled with contaminative materials.

Graphic 4-16 Various workings onsite or close to the onshore substation search areas at Bolney Road/Kent Street and Wineham Lane North



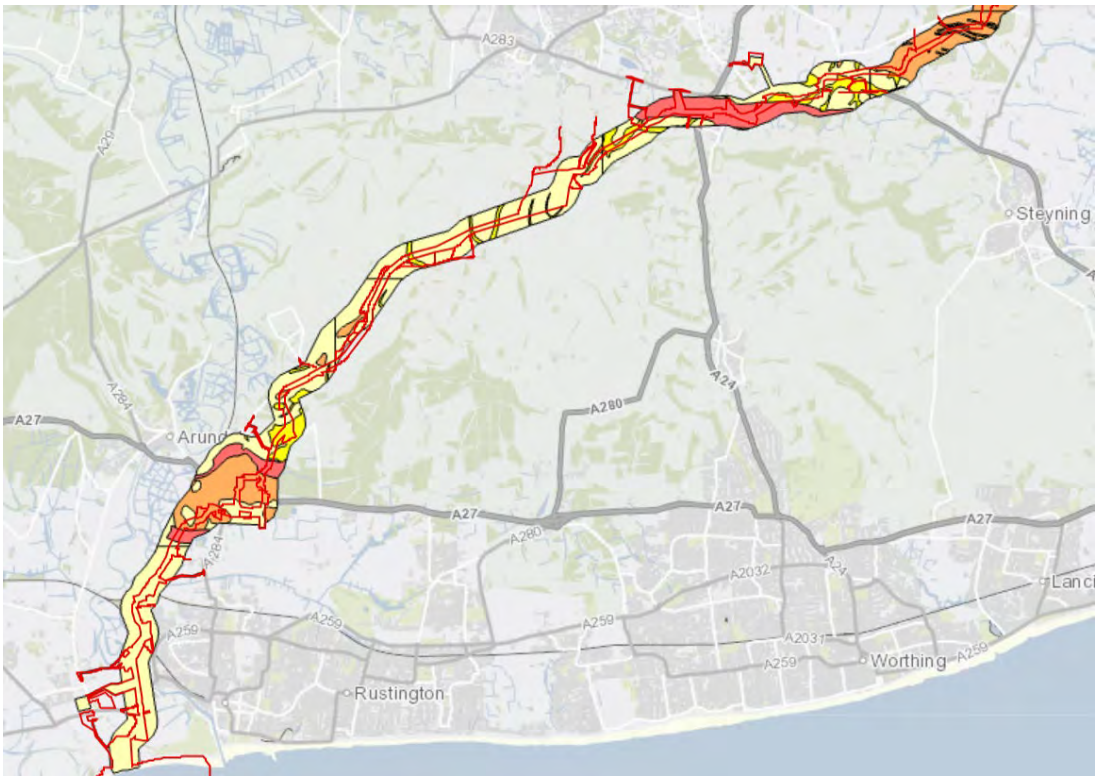
Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

4.3 Land Stability

4.3.1 Information included in the Groundsure EnviroGIS report indicates that there is generally a low risk of compressible ground, ground dissolution, running sand, collapsible ground and landslide stability hazards on the Site, with a few exceptions as described below.

- The Groundsure data records areas where swelling clays are possible, medium to high plasticity ground conditions are recorded onsite southeast of Arundel, high plasticity conditions at Sullington and medium plasticity conditions across most of the northern half of the Site. See orange to red coloured areas on **Graphic 4-17**.

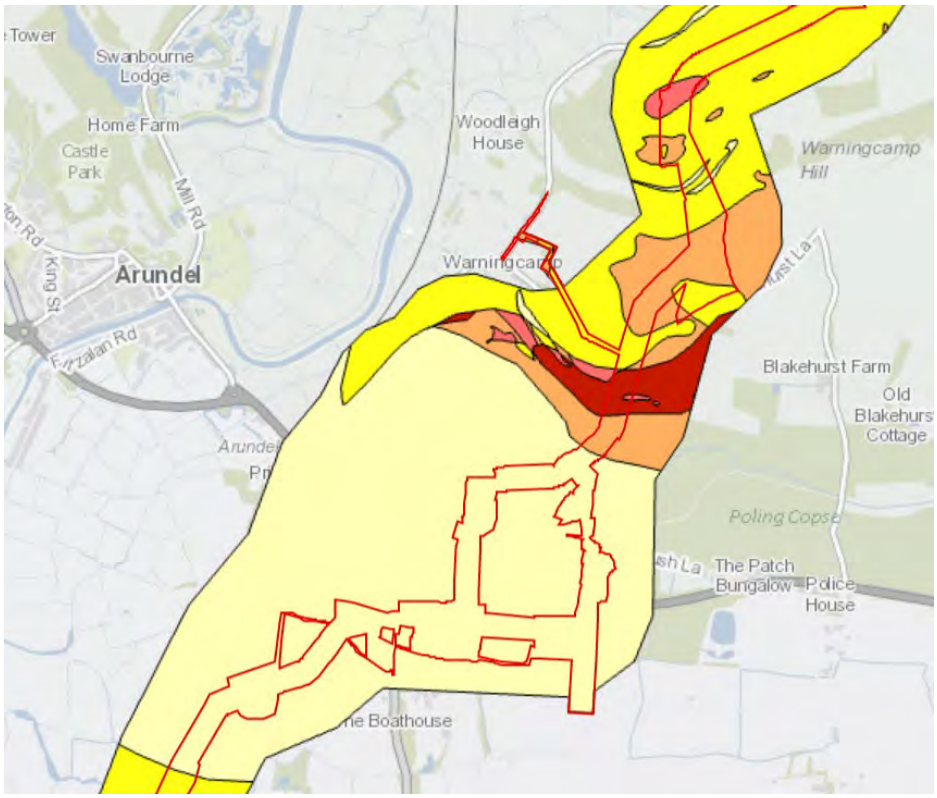
Graphic 4-17 Ground plasticity (from landfall to Sullington)



- Ground conditions predominantly non-plastic.
- Ground conditions predominantly low plasticity.
- Ground conditions predominantly medium plasticity.
- Ground conditions predominantly high plasticity.
- Ground conditions predominantly very high plasticity.

- Running sands and compressible ground hazards are likely to be present at the coastline at Climping Beach. There are also several localised areas in the northern half of the Site where running sands may be present in areas where sandstone bedrock is at or near surface, Localised areas where compressible ground hazards are probably present are also shown in localised areas on the northern half of the Site.
- An area where ground dissolution hazards with potential for localised subsidence should be investigated is shown at Warningcamp. See dark red coloured area on **Graphic 4-18**. There are also some localised areas with potential for these conditions to be present from Warningcamp to Sullington.

Graphic 4-18 Ground dissolution hazards (Warningcamp)



- Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.
- Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised subsidence are at a level where they need not be considered.
- Soluble rocks are present within the ground. Some dissolution features may be present. Potential for difficult ground conditions are at a level where they may be considered, localised subsidence need not be considered except in exceptional circumstances.
- Soluble rocks are present within the ground. Many dissolution features may be present. Potential for difficult ground conditions are at a level where they should be considered. Potential for subsidence is at a level where it may need to be considered.
- Soluble rocks are present within the ground. Numerous dissolution features may be present. Potential for difficult ground conditions should be investigated. Potential for localised subsidence is at a level where it should be considered.

4.4 Radon

4.4.1 The Public Health England Indicative Atlas of Radon in England and Wales (Miles et al., 2007) interactive map indicates that across most of the Site less than 1% of homes are affected by radon levels above the action level. Some areas in the south and central areas of the Site are classed as having between 1% and 3% of homes above the action level, and to a lesser extent between 5% and 10% above the action level. The highest radon concentrations are found in localised areas of

the Site between Arundel at grid reference 503761, 106866 and the area between Chantry Hill and Barnsfarm Hill near Sullington at grid reference 509674, 112045.

4.4.2 The onshore substation search areas are all located in lower probability radon areas where <1% of homes are above the action level.

4.4.3 On this basis, the risks associated with radon concentrations are considered to be low and, therefore, protective measures are not considered necessary in the construction of the onshore elements of the Proposed Development.

4.5 Hydrogeology

Introduction

4.5.1 The following section summarises the hydrogeology of the Site. A detailed groundwater assessment is included as part of **Chapter 27: Water Environment, Volume 2.**

4.5.2 The aquifer designations for the Site are summarised below.

Superficial aquifers onsite

- Alluvium, raised beach deposits, raised storm deposit and raised marine deposits, head deposits – Secondary A aquifers (permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers).
- The Groundsure EnviroGIS data shows the southern portion of the Site from Climping Beach to Arundel is underlain by a Secondary A superficial aquifer in the permeable beach deposits and alluvium. There are also smaller areas in the central and northern portions of the Site where Secondary A superficial aquifers are present, mainly associated with alluvium where watercourses cross the Site.

Bedrock aquifers onsite

- Thames Group – Unproductive aquifer (these are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow).
- Lambeth Group – Secondary A aquifer.
- White Chalk Subgroup – Principal aquifer (geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale).
- Grey Chalk Subgroup – Principal aquifer.
- Gault Formation and Upper Greensand Formation (undifferentiated) – Unproductive aquifer.
- Folkestone Formation (Sandstone) – Principal aquifer.
- Weald Clay Formation (Limestone) – Secondary A aquifer.

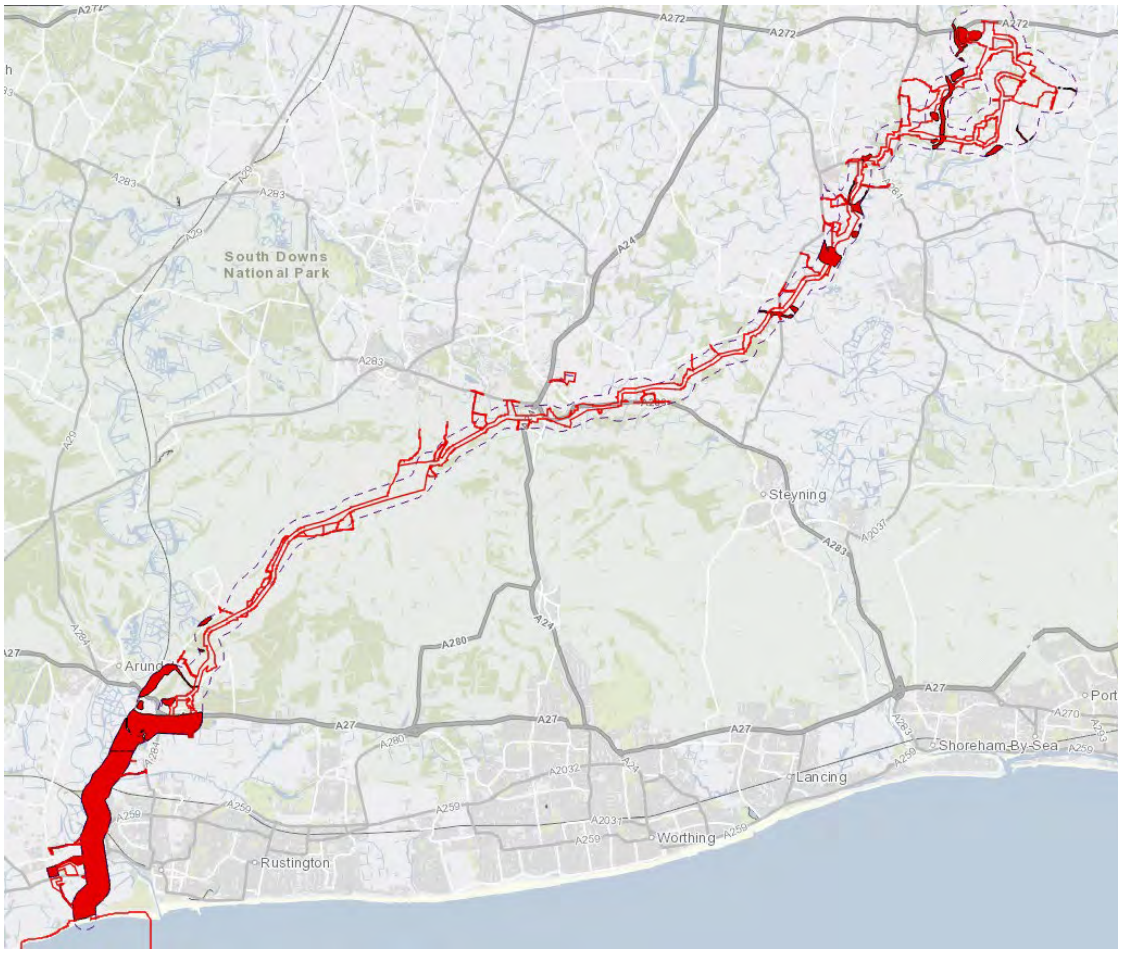
- Weald Clay Formation (Sandstone) – Secondary A aquifer.
- Horsham Stone Member (Sandstone) – Secondary A aquifer.
- Lower Greensand Group (Sandstone) – Principal aquifer.

4.5.3 In south of the Site, the Chalk principal aquifer is overlain by a Secondary A aquifer in the superficial deposits (mainly beach deposits). In the area of the Site north of Warningcamp, superficial deposits are largely absent and the Site is shown to be directly underlain by the Chalk Principal aquifer.

4.5.4 On the section of onshore cable corridor passing through Warren Hill, parts of the Site are directly underlain by a sandstone principal aquifer in the Folkestone Formation and Lower Greensand Group.

4.5.5 Secondary A bedrock aquifers are present at Warningcamp where the Site underlain by the Lambeth Group, and in the north of the Site where it is underlain by the Weald Clay Formation (Limestone), the Weald Clay Formation (Sandstone) and the Horsham Stone Member (Sandstone).

Graphic 4-19 Secondary A superficial aquifers onsite

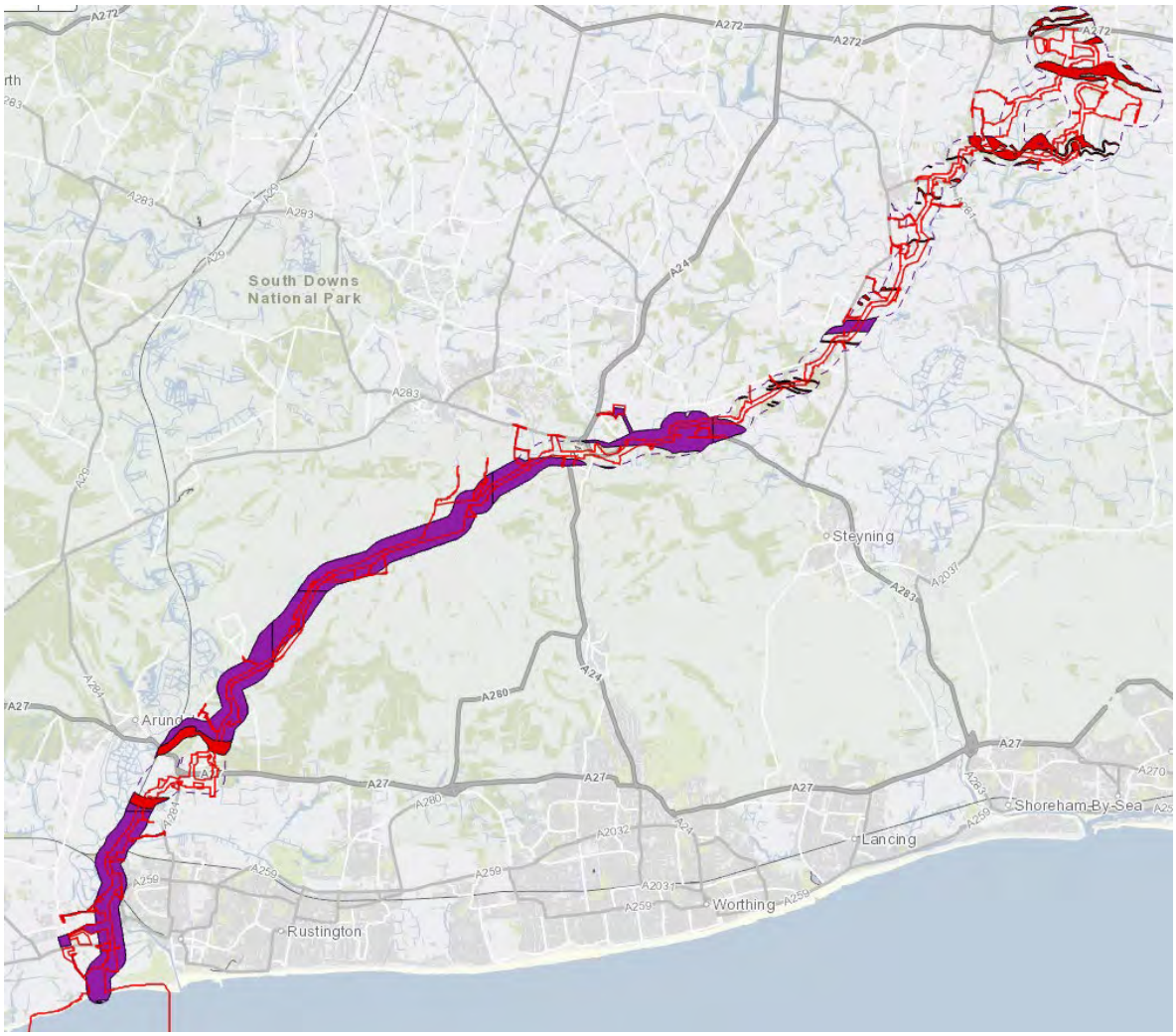


Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

Secondary A superficial aquifer

Graphic 4-20 Principal and Secondary A bedrock aquifers onsite



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

PEIR Assessment Boundary

BGS_Principal_Bedrock_Aquifer

Secondary A

4.5.6 Shallow groundwater is likely in the beach deposits and marine deposits in the southern portion of the Site and in alluvial deposits close to rivers and streams. Groundwater may also be encountered in permeable layers within the localised head deposits in the north of the Site, and potentially also in made ground, either as perched groundwater or in continuity with underlying permeable deposits.

4.5.7 In areas of the Site directly underlain by a principal chalk or sandstone aquifer, the bedrock aquifer is classified by the Environment Agency as having a high vulnerability. In the south of the Site where the Site is underlain by a Secondary A superficial aquifer, groundwater vulnerability is classed as having medium vulnerability. At Warningcamp where the Site is underlain by London Clay and in areas of the Site northeast of Sullington much of the Site is shown to be underlain by unproductive strata (Gault Formation and Upper Greensand Formation) and does not have a groundwater vulnerability classification.

4.5.8 Historical mapping identified wells close to the Site boundary (approximately 70m) in 1896 mapping at Warningcamp Farm (NGR 503535 106911) and at a school east of the Warningcamp C onshore cable corridor option (NGR 503947 106702), with two nearby pumps, suggesting water bearing strata is present.

Groundwater source protection zones

4.5.9 The Groundsure EnviroGIS report reveals that two parts of the Site lie within a groundwater source protection zone (SPZ), there are no parts of the Site within SPZ inner catchments:

- a portion of the onshore cable corridor running north from Warningcamp (NGR 5033803, 106831) to an area west of Barpham Hill (NGR 506463, 110436), is within the Outer Catchment and Total Catchment of two SPZs (one inner catchment is immediately east of the Site at grid reference NGR 504233, 107254 and one is immediately west at NGR 504245, 109318); and
- a portion of the onshore cable corridor north of Harrow Hill (NGR 508559, 111249) is within the total catchment of an SPZ.

Groundwater abstraction

4.5.10 The Groundsure report records no licensed groundwater abstractions onsite or within 200m of the Site.

4.5.11 There are no private water supply boreholes located onsite. West Sussex County Council, Arun District Council, Horsham District Council and Mid Sussex District Council were all contacted regarding the presence of private water supply boreholes in their administrative areas. Each provided a list of registered users with a total of 18 supplies identified, though all were not able to confirm the type or exact location of the supply. Further details of the identified supplies are included in **Chapter 27: Water Environment, Volume 2**.

4.6 Hydrology

Introduction

4.6.1 The following section summarises the Hydrology of the Site. A detailed hydrology assessment is included as part of **Chapter 27: Water environment, Volume 2.**

Surface water features

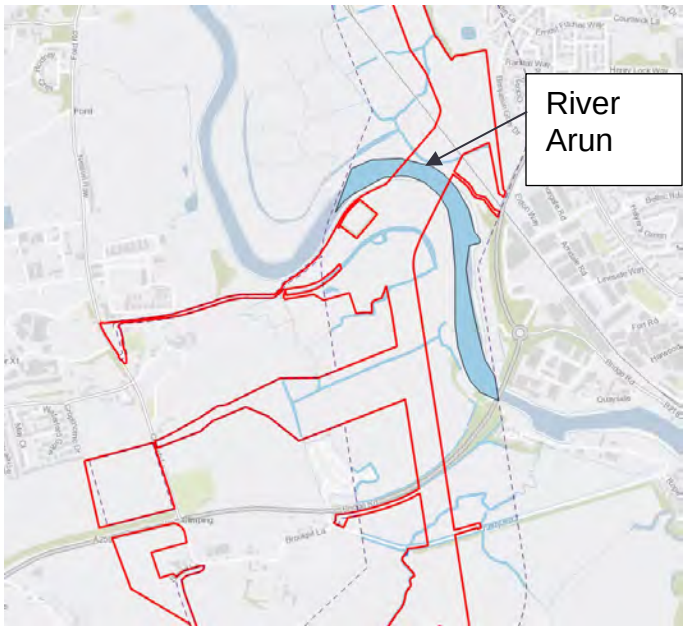
4.6.2 Climping Beach in the south of the Site is at the coast on the English Channel. The River Arun traverses the Site west of Littlehampton (NGR 501309, 103178). The River Adur and one of its tributaries traverses the Site west of Henfield (NGR 519179, 116968, and NGR 519141, 116882). There are also numerous streams and drains crossing the Site along the onshore cable corridor and several ponds are adjacent to the Site at its northeast extent at Bolney Road/Kent Street and Wineham Lane North.

4.6.3 The southern half of the Site is located within the Arun lower operational catchment and the northern half of the Site is located within the Adur upper operational catchment.

4.6.4 From south to north, the Site surface water catchments onsite are summarised below along with the latest Environment Agency monitoring results:

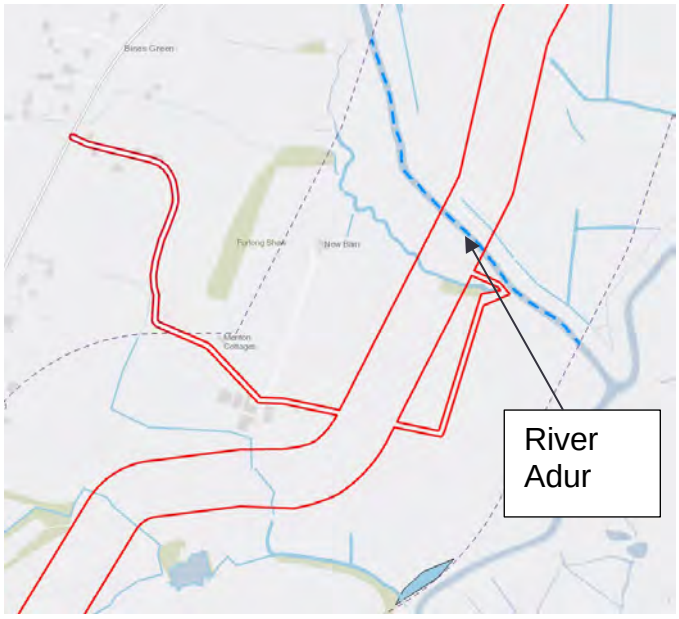
- Ryebank Rife, classed as moderate in 2019 (ecological – moderate, chemical – fail);
- Black Ditch (West Sussex), classed as poor in 2019 (ecological – poor, chemical – fail);
- Burpham Tributary (River Arun), classed as moderate in 2019 (ecological – moderate, chemical – fail);
- Black Ditch (West Sussex), classed as poor in 2019 (ecological – poor, chemical – fail);
- Stor, classed as moderate in 2019 (ecological – moderate, chemical – fail);
- Honeybridge Stream, classed as poor in 2019 (ecological – poor, chemical – fail);
- Adur (Lockbridge), classed as poor in 2019 (ecological – poor, chemical – fail);
- Adur East (Sakeham), classed as poor in 2019 (ecological – poor, chemical – fail);
- Cowfold Stream, classed as poor in 2019 (ecological – poor, chemical – fail);
- Adur (East), classed as moderate in 2019 (ecological – moderate, chemical – fail); and
- Bolney Sewer, classed as moderate in 2019 (ecological – moderate, chemical – fail).

Graphic 4-21 Site Hydrology: River Arun



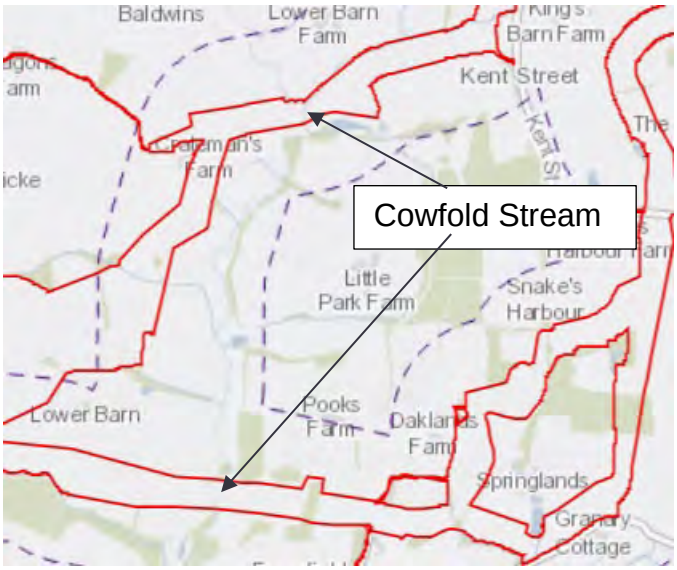
Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Graphic 4-22 Site Hydrology: River Adur



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Graphic 4-23 Site Hydrology: Cowfold Stream



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Surface water abstractions

4.6.5 No surface water abstractions are recorded on the Site or within 200m of the Site.

Surface water discharge consents

4.6.6 The Groundsure report shows three surface water discharge consents that may be active on or adjacent to the Site:

- Gratwicke Farm on the Site boundary at an access road in the north of the Site (NGR 521135, 120685), sewage discharge to freshwater river, dating from 1962;
- offsite at Oakdene Manor Farm Light Industrial Estate (NGR 522537, 122458), miscellaneous discharges to a freshwater river, dating from 1982; and
- Twineham Substation (which is located in the same location as the Rampion 1 substation), south of the Site boundary (NGR 524654, 121011), trade discharge to a tributary of the River Adur, dating from 2019.

Drinking water protected areas (surface water)

4.6.7 The Environment Agency website (Environment Agency, 2021) shows that the parts of the Site are within a drinking water safeguard zone. The Environment Agency data shows that areas of the Site at Warningcamp and Wepham are within safeguard zones (groundwater) designated due to a risk from nitrate. At Sullington, the Site passes through a drinking water safeguard zone (Surface Water) designated due to risks from: cryptosporidium, pesticides (2-4 D, carbetamide, glyphosate, 2-methyl-4-chlorophenoxyacetic acid (MCPA), mecoprop, metaldehyde, propyzamide) and turbidity, with trichloroacetic acid under consideration.

Flood risk

4.6.8 The Groundsure EnviroGIS report reveals that some areas of the Site are in zone 2 and zone 3 flood risk areas. Outside of these identified areas, the Site is outside of flood zones 2 and 3. Zone 2 indicates medium probability of flooding and is assigned to land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. Zone 3 indicates high probability of flooding, land having a 1 in 100 or greater annual probability of river flooding; or land having a 1 in 200 or greater annual probability of sea flooding, it also includes function floodplains (Ministry of Housing, Communities & Local Government, 2014).

4.6.9 The Groundsure report shows the zone 2 areas at the same locations as the zone 3 areas described below.

- Environment Agency flood risk mapping indicates a high risk of flooding (zone 3) across the majority of the Site from the landfall at Climping Beach northwards to Arundel.
- At the point where the onshore cable corridor crosses the River Adur, there is an associated zone 3 flood zone onsite, a portion of the flood zone associated with the River Adur is also onsite slightly further north, to the east of Homelands Farm (NGR 519655, 118353).
- Zone 3 flood areas are associated with Cowfold Stream at two locations in the north of the Site where the onshore cable corridor options cross the stream, firstly on the Wineham Lane North Route 1A and Wineham Lane South Route (NGR 521935, 119944) and secondly on the Bolney Road / Kent Street Route 1C & 1D (NGR 522146, 121194).

4.6.10 In an area of the Site southeast of Arundel, a historical flood event is recorded at a stream (tributary of the River Arun) crossing the onshore cable corridor (NGR 502146, 105373), this occurred in winter 2014. Also in 2014, two small areas of flooding are recorded on the Warningcamp B onshore cable corridor option (at NGR 503195, 106160 and NGR 503252, 106311).

4.6.11 A detailed assessment of flood risk is included as part of **Chapter 27, Volume 2**.

Pollution incidents

4.6.12 The Groundsure data includes Environment Agency pollution incident records. Several incidents are recorded on or close to the Site as outline below:

- east of the Site at the A259 road (NGR 501489 102268) a pollution incident relating to tyres occurred in 2003, a minor impact to land was recorded, no impact on controlled waters;
- south of the Site at Warningcamp (NGR 503646 106640) a pollution incident relating to final effluent (sewage) is recorded in 2003, a minor impact on controlled water was recorded, no impact on land;
- onsite, to the west of Windmill Quarry (NGR 513992 113 505), a pollution incident relating to oils and fuel occurred in 2001 with a minor impact to land was recorded, no impact on controlled waters;

- onsite at Ashurst (NGR 518124 116257), a pollution incident relating to oils and fuel (diesel) is recorded in 2002 with no impact on land or water; and

4.6.13 Given the nature of the incidents, the dates, and their locations, these are unlikely to have significantly influenced land quality on the Site.

4.7 Waste management facilities

Landfill

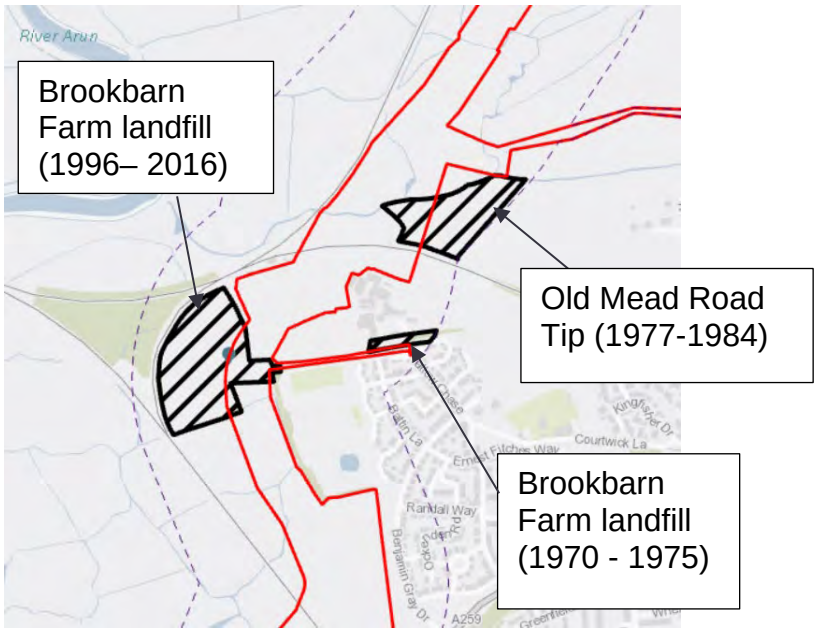
Historical landfills

4.7.1 The Groundsure EnviroGIS report shows three historical landfills onsite (see **Graphic 4-24**). These comprise:

- a landfill taking non-biodegradeable wastes operating between 1996 – 2016 at Brookbarn Farm, Courtwick Lane, Littlehampton (NGR 501248, 103859);
- a landfill taking inert, industrial, commercial, household, special, liquid sludge, operating between 1977 and 1984, at Old Mead Road Tip, Littlehampton, Sussex located at NGR 501608, 104208, respectively, in the northwest of Littlehampton; and
- a small area east of the main Brookbarn Farm landfill area (NGR 501584, 103936) is shown as a landfill taking inert, industrial waste and operating between 1970 and 1975. This is mainly offsite but extends up to the Site boundary at a potential access road location, and landfilled waste may extend beneath the Site.

4.7.2 Aerial photography (Google Earth) shows all three landfill areas appear to have been restored for agricultural use.

Graphic 4-24 Historical landfills onsite



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Key:

PEIR Assessment Boundary

Historical_Landfill

Graphic 4-25 Aerial view of landfills at Brookbarn Farm and Old Mead Tip (restored as fields)

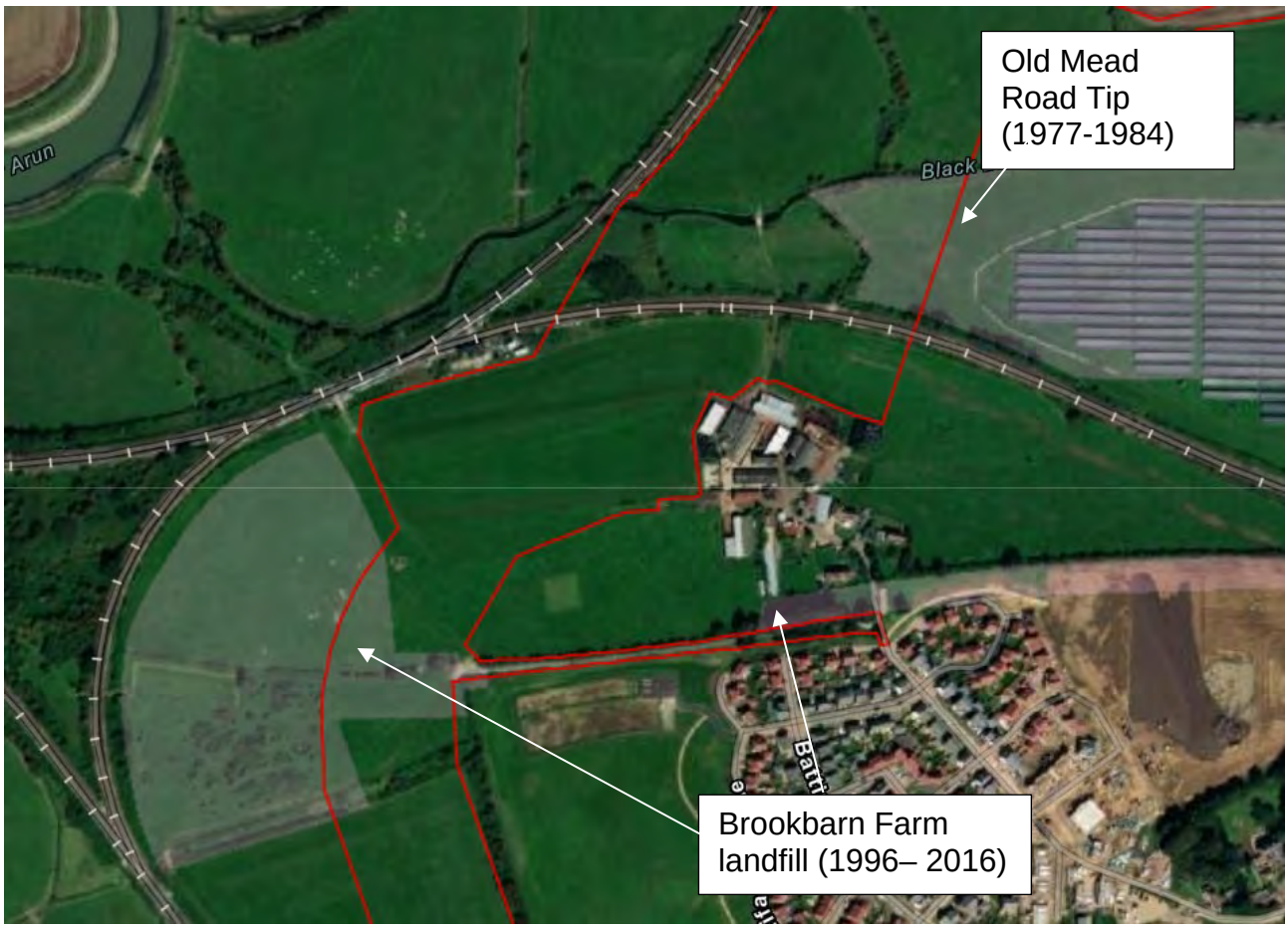


Image © Google Maps

Historical landfills offsite

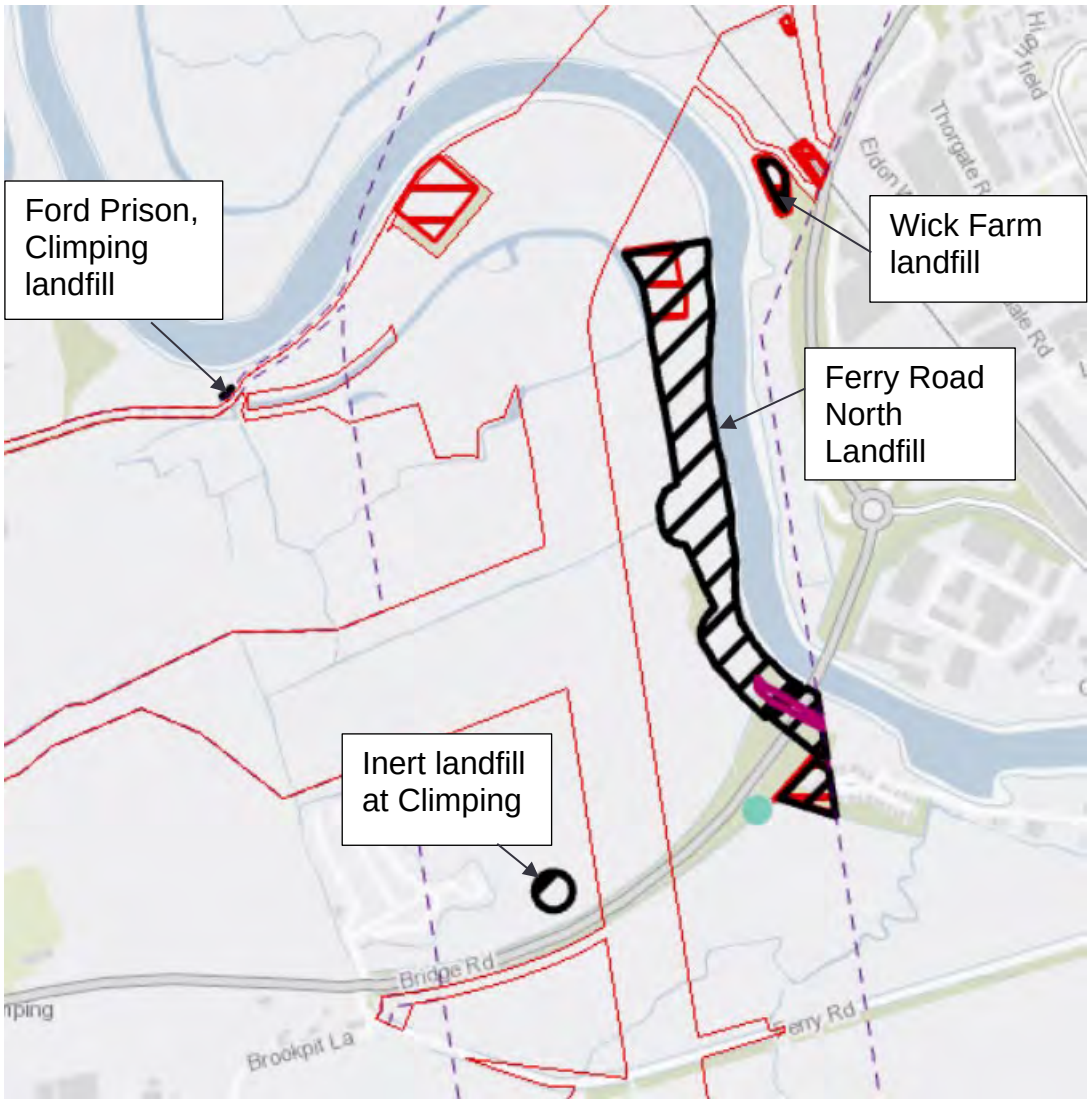
4.7.3 A historical landfill areas is shown east of the Site at Littlehampton (see **Graphic 4-26**). The Ferry Road North landfill is a large feature at the west bank of the River Arun, shown approximately 20m from the Site boundary (centred at NGR 501428 102599), which dates from 1946 to 1975 and waste types are recorded as inert, industrial, commercial, and household.

4.7.4 A smaller landfill to the north of the River Arun at Wick Farm (NGR 501523 103039) appears to be an infilled railway cutting. No details are available of the landfilled material.

4.7.5 A small area of landfill is recorded offsite close to the Site boundary between the Site and the River Arun (NGR 500799 102758). This small area of landfill is associated with Ford Prison, Climping dated 1976, the waste type is recorded as inert and industrial.

4.7.6 A circular area of inert landfill is recorded offsite, approximately 40m from the Site boundary, north of Bridge Road, at Climping (NGR 501232 102097), dating from between 1977 and 1978.

Graphic 4-26 Historical landfill offsite



Excerpt from Groundsure EnviroGIS report ref. GSIP-2020-10568-3137

Key:

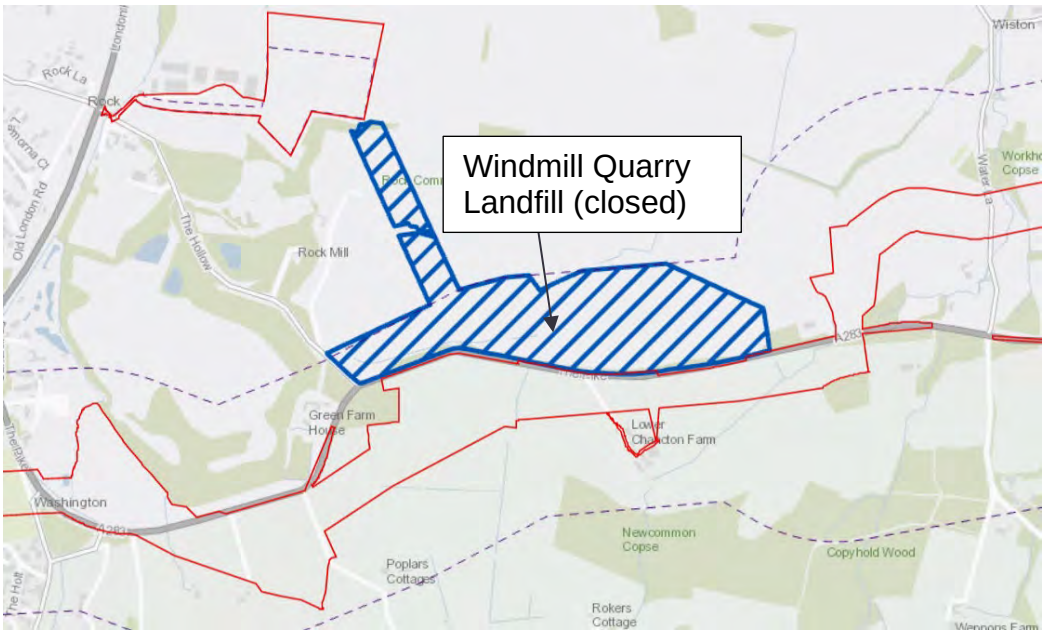
PEIR Assessment Boundary

Historical_Landfill

Active or recent landfills

4.7.7 Windmill Quarry Landfill is recorded immediately north of the Site at The Hollow, Storrington, Pullborough, RH20 3DA (NGR 513454, 113519). This is a large landfill site licensed to accept household, commercial and industrial waste operated by Biffa Waste Management Limited, with Environmental Permit reference EA/EPR/CP3694HR/S023. Windmill Quarry Landfill's status is currently listed as being at closure and aerial photography (Google Earth) shows the landfill area appears to have been restored for agricultural use. Information obtained from the West Sussex Planning Portal (2015) indicates that landfilling may have taken place since the 1980s at the Windmill Quarry site.

Graphic 4-27 Recent landfill immediately north of the Site



Key:

PEIR Assessment Boundary

Active_or_Recent_Landfill

Graphic 4-28 Aerial view of Windmill Quarry Landfill (restored as fields)

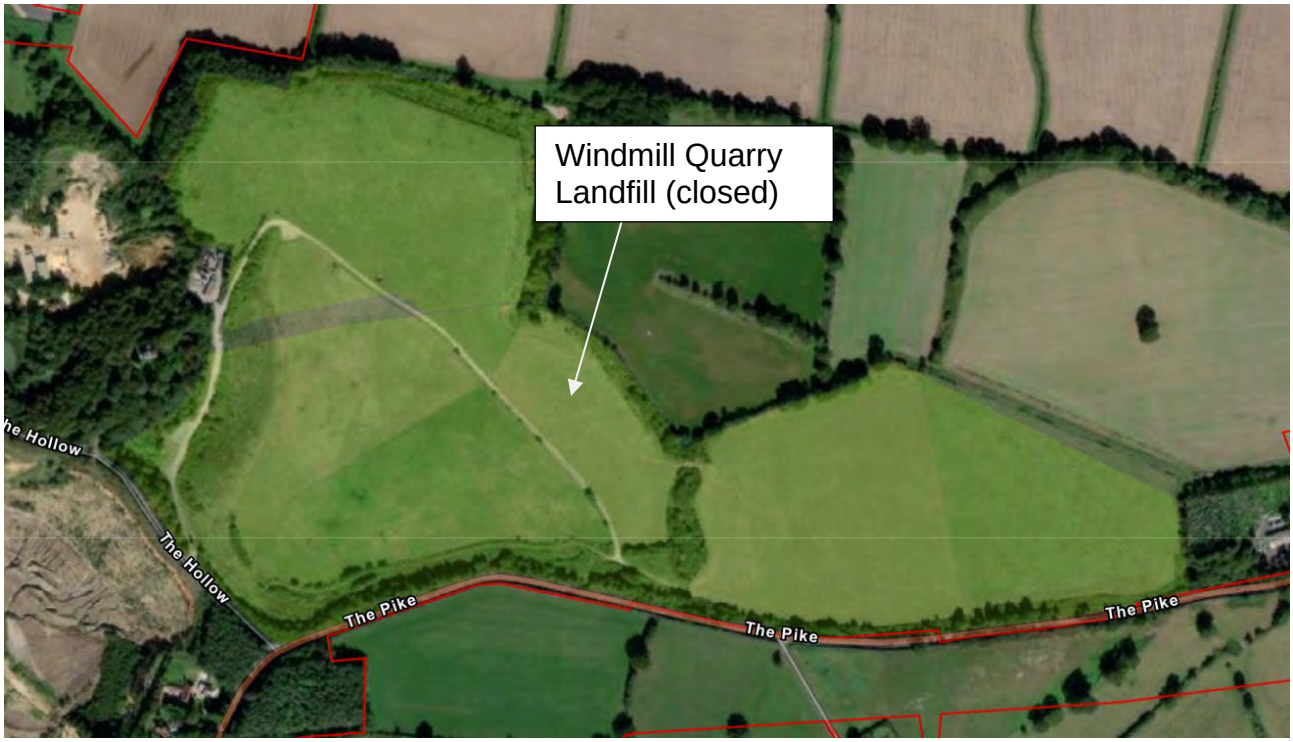


Image © Google Maps

Other waste management facilities (non-landfill)

4.7.8 A composting facility is shown at Stubbs Copse Wood, which is offsite between the Warningcamp B and C onshore cable corridor options (NGR 503500 105899). This is over 100m from the Site boundary and is unlikely to have significantly impacted on land quality at the Site.

4.7.9 North of the A272 road, and approximately 100m northeast of the Site, the Groundsure report records a licensed deposit of waste to land as a recovery operation at Barnfield House (NGR 523387 122838). Given its distance from the Site, this is unlikely to have significantly impacted on land quality at the Site.

4.7.10 A historical waste site is recorded at Delspride, Cowfold (NGR 523513 121876), this is offsite over 100m from the Site boundary. The waste site is indicated to relate to a scheme comprising the formation of earthworks and landfill to enable chicken units to be relocated for cleaning and is unlikely to have significantly impacted on land quality at the Site.

4.7.11 The Groundsure report also records numerous onsite waste storage exemptions, mainly for sludge storage on farms, also for spreading of plant matter to confer benefit, use of waste in construction and use of waste for other specified purposes. As these activities are recorded waste exemptions, they are not considered to present a significant contamination risk and are not considered further.

Potential infilled land

4.7.12 Other infilled land is discussed in **Section 4.1** (made ground) and **Section 4.2** (surface workings).

Hazardous substances

4.7.13 A release point for List 2 Hazardous Substances is identified offsite, south of Partridge Green, relating to a sewage treatment works discharge including copper, pH and zinc, to the River Adur.

4.7.14 The Groundsure report does not identify control of major accident hazard (COMAH) sites onsite or within the search buffer.

4.8 Regulatory records

Part 2A Contaminated Land Register Entries & Notices

4.8.1 The Groundsure report does not identify Part 2A contaminated land register entries or notices in relation to the Site or within the search buffer.

Registered Radioactive Substances

4.8.2 The Groundsure report does not identify Registered Radioactive Substances entries in relation to the Site or within the search area. One authorisation is recorded offsite close to the Site at Norfolk Clump at the Royal Brompton &

Harefield National Health Service (NHS) Foundation Trust at Harefield Hospital (NGR 505287, 109003).

Pollution prevention and control

4.8.3 There are no Integrated or local authority pollution prevention and control (LA PPC) entries in relation to the Site. The following entries are noted in the immediate surrounding area:

- A Licensed Pollutant Release under the Environmental Permitting (England and Wales) Regulations 2016 is recorded approximately 40m north of the Site at Warningcamp at Crossbush Service Station, Lyminster (NGR 502781, 105816) where a Part B permit (regulating air emissions) appears to be active for unloading of petrol into storage at a service station.
- A historical Part B permit is also identified at Ballamys London Road, approximately 80m north of the Site at Washington (NGR 512140, 113298), for petrol vapour recovery. According to Google Maps Streetview, this facility appears to be a car and motorbike showroom and the former fuel tanks or filling station are likely to have been removed.

Substantiated pollution incident register

4.8.4 The Groundsure EnviroGIS report records two incidents affecting land on or in proximity to the Site:

- a pollution incident involving blood and offal with category 3 (minor) impacts on land and water is recorded offsite at Brightman's Farm (NGR 519555, 117877) approximately 70m from the Site boundary; and
- a pollution incident is recorded in 2001 on or close to the Site at Windmill Quarry by the A283 road (NGR 514002, 113506). This is recorded as involving oils and fuel and the impact to land is classed as minor.

4.9 Industrial land uses

4.9.1 The Groundsure report records the following industrial features on or close to the Site boundary:

- a water pumping station located to the north of the Climping Beach area (NGR 500791, 101347) on or close to the Site boundary;
- a sewage pumping station located west of Littlehampton on or close to the Site's eastern boundary (NGR501534, 103565).
- an electrical substation located northwest of the Site to the northwest of Littlehampton, which looks to be entirely offsite (NGR501296, 104120);
- a discharge of final (sewage) effluent to land is recorded as being issued in 1987 and revoked in 1997 on Warningcamp C onshore cable corridor option at NGR503797, 106502;
- an electrical substation located on or close to the southern Site boundary south of Warningcamp C onshore cable corridor option (NGR 503405, 105531);

- a water pumping station located on Warningcamp C onshore cable corridor option at NGR503637, 105933. A further water pumping station is located just to the north of this at NGR503664, 106065, which is on or close to the Site boundary on the Warningcamp C onshore cable corridor option;
- two tanks (no detail on type) are identified on the Warningcamp C onshore cable corridor option at NGR503624, 106121. The tanks are not visible on available aerial imagery. However, based on the surrounding land use they appear likely to be either agricultural, or as there are water pumping stations nearby, may be associated with water infrastructure;
- Wells Fireworks (explosives site) is recorded onsite at Home Farm, Wepham (NGR505068, 108611) by Norfolk Clump;
- a disused quarry is recorded approximately 10m south of the Site at Rowdell Holt West (NGR510562, 112596), this may have been infilled, however, the Site is not recorded as a landfill (landfills are outlined in **Section 4.7**). Available aerial photography shows the area partially covered by vegetation including some trees, this feature does not appear to extend onto the Site;
- farm hoppers and silos are recorded offsite at Windmill Quarry (NGR514679, 113633). According to available aerial imagery (Google Earth), these are above ground features and are still present;
- slurry beds are recorded offsite approximately 40m from the Site boundary at Brightman's Farm (NGR519497, 117821);
- tanks are shown onsite at the access road west of the A281 at St High's Monastery (NGR521116, 120853);
- a sewage discharge to a freshwater river, which may be active is recorded on or close to the Site boundary at Gratwick Farm on the access road west of the A281 (NGR521135, 120679);
- the National Grid Bolney substation located adjacent to the Wineham Lane North substation search area has associated tanks which are shown adjacent to the Site at the southwest corner of the substation. The Groundsure information indicates the National Grid Bolney substation dates from 1974; and
- An industrial estate (Oakendene Industrial Estate) is immediately adjacent to the Bolney Road/Kent Street substation search area. This industrial estate includes various vehicle repair, testing and servicing, Glass Fibre Services, Cowfold Precision Engineering and A M Metal Polishing – industrial coatings and finishings.

Fuel station entries

4.9.2 Two service stations are identified in the Groundsure data close to the Site:

- Crossbush Service Station is located offsite approximately 40m north of the Site at Warningcamp (NGR502783, 105822). Google Earth imagery confirms this has been present since at least 2001; and
- a historical petrol station dating from 1971 is located offsite approximately 100m south of the Site at Washington (NGR 512219 112985). Based on

available current aerial photography this area appears to have been redeveloped for housing

4.10 Sensitive land uses

4.10.1 The eastern extent of the onsite landfall area at Climping Beach is adjacent to (but not within) the Climping Beach Site of Special Scientific Interest (SSSI) and the West Beach Local Nature Reserve (LNR) (which overlaps the SSSI). The MAGIC interactive map shows the SSSI is in a favourable condition (MAGIC, 2021). The SSSI relates to a stretch of coast with a vegetated shingle beach, behind which is a sand dune system. The intertidal zone supports important populations of wintering birds and the numbers of wintering sanderling, in particular, are of European significance (Natural England, 2021a).

4.10.2 Amberley Mount to Sullington Hill SSSI (Natural England, 2021b) is immediately northwest of the Site at a proposed access route at Sullington Hill (approximate NGR 509648, 112360).

4.11 Initial unexploded ordnance (UXO) risk assessment

4.11.1 The Zetica Regional Unexploded Bomb (UXB) Risk Map for West Sussex indicates that most of the Site is in an area of low unexploded ordnance risk, with the exception of the eastern extent of the landfall area at Climping Beach (see **Annex B**) where the risk rises to moderate. No specific World War II targets are identified on or in proximity to the Site, however, a World War II target and some unexploded ordnance (UXO) discoveries are identified near the mouth of the River Arun.

4.11.2 Based on the above information there is considered to be a low risk of encountering UXO across the majority of the Site, however, specialist UXO advice should be obtained prior to excavation or HDD in moderate risk areas to define UXO risk mitigation measures.

5. Initial conceptual model and preliminary risk assessment

5.1 Conceptual model

5.1.1 The Conceptual Model (CM) and plausible contaminant linkages are outlined in the following sections based on the desk study review of available information collated in the previous sections. The CM is carried out in line with Land Contamination Risk Management (LCRM) guidance and is based on the current and proposed uses. The CM provides an assessment of the Site's potential contamination status and identifies the presence of potentially significant contaminant linkages that require further consideration.

5.2 Potential contamination (sources)

5.2.1 A review of the Site history and environmental setting has identified potential contaminant sources on the Site and the surrounding area, as summarised below in **Table 5-1**. The list of contaminants has been established through a review of Annex 3 in the Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008 Volume 2 (NHBC and Environment Agency, 2008).

Table 5-1 Potential Sources of Contamination

No.	Source	Potential Contaminants	Location	Source to be considered further?
ONSITE SOURCES				
1	Three landfill areas at Littlehampton	Asbestos, heavy metals, total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAH), cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Brookbarn Farn landfill (two areas) and Old Mead Road Tip	Yes
2	Recent landfill: Windmill Quarry Landfill (closed)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Immediately north of Site boundary west of the onshore cable corridor, however, surface workings	Yes

No.	Source	Potential Contaminants	Location	Source to be considered further?
			information indicates it is possible a cross boundary feature	
3	Made ground associated with other infilled land includes ponds, former quarries, former railway land (includes areas currently in agricultural use)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Various surface workings, made ground, infilled former railway cuttings identified onsite	Yes
OFFSITE SOURCES				
4	Former sewage works	Heavy metals, cyanide, TPH, PAH, ground gas (carbon dioxide and methane) and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Adjacent to Site south of River Adur, Littlehampton	Yes
5	Four historical landfills near Littlehampton	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Adjacent to Site (Ford Prison, Climping landfill), between Site and River Arun (Ferry Road North Landfill), northwest of site by Bridge Road, and adjacent to Site (Wick Farm landfill)	Yes

No.	Source	Potential Contaminants	Location	Source to be considered further?
6	Oakendene Industrial Estate, includes various vehicle repair, testing and servicing, and metal polishing	Heavy metals, TPH, PAH, chlorinated solvents	Immediately adjacent to the Site at its northern extent at Bolney Road/Kent Street substation search area	Yes
7	Made ground associated with other infilled land includes ponds, former quarries (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Various adjacent to Site and in the immediate surrounding area	Yes
8	Crossbush Service Station (underground fuel tanks including petrol)	TPH including benzene, toluene, ethylbenzene and xylene (BTEX), PAH	Approximately 40m north of the Site at Warningcamp	Yes
9	Former service station from 1971	TPH including BTEX, PAH	Approximately 100m south of Washington	No – this site appears to have been redeveloped for housing and should have been suitable for the proposed use under the Planning Act 2008

No.	Source	Potential Contaminants	Location	Source to be considered further?
10	Former petroleum storage facilities associated with vehicle showroom	TPH including BTEX, PAH	Approximately 80m north of Washington	Yes

5.3 Potential receptors and pathways

5.3.1 Potential receptors and associated pathways, which have been taken forward for consideration in the CM are summarised in **Table 5-2**.

Table 5-2 Potential receptors and pathways

Receptor	Pathway
Current site users (workers, land owners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases
Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases
Current adjacent land users (residents, workers, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases
Future adjacent land users (residents, workers, members of the public) following development	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases
Current property (infrastructure and utilities, agricultural land including crops)	Direct contact, migration and accumulation of gases
Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact, migration and accumulation of gases
Current adjacent property (infrastructure and utilities, agricultural land including crops)	Direct contact and gas migration / accumulation.
Future adjacent property (infrastructure and utilities, agricultural land including crops)	Direct contact and gas migration / accumulation.

Receptor	Pathway
Current controlled waters (Surface water – River Arun, River Adur, Ryebank Rife, Cowfold Stream, other streams and drains)	Surface water runoff, leaching and groundwater migration
Future controlled waters (Surface water – River Arun, River Adur, Ryebank Rife, Cowfold Stream, other streams and drains)	Surface water runoff, leaching and groundwater migration
Current controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration
Future controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration
Current controlled water (Groundwater – Principal bedrock aquifer/Secondary A bedrock aquifer)	Leaching and groundwater migration
Future controlled water (Groundwater – Principal bedrock aquifer/Secondary A bedrock aquifer)	Leaching and groundwater migration
Current and future ecological receptors (Amberley Mount to Sullington Hill SSSI adjacent to Site)	Uptake, direct contact and bioaccumulation

5.4 Exclusions from risk assessment

Redevelopment workers

5.4.1 The CM does not consider risks to construction/site maintenance workers on the basis that risks to workers will be dealt with under the Health and Safety at Work Act (1974) and regulations made under the Act. Site-specific contamination data obtained from all site investigations should be included in the pre-construction information (a requirement of Construction Design and Management (CDM) Regulations 2015 [Health and Safety Executive, 2015]) for the proposed works, to enable any contractors to address potential risk from contamination as necessary in their risk assessments and method statements. Moreover, as the exact details of the method adopted are not currently known, it is not considered appropriate to provide a wide ranging and speculative risk assessment for redevelopment workers.

Invasive species

5.4.2 Identification of invasive species (such as Japanese knotweed and giant hogweed) is outside of the scope of works and are not considered within the risk

assessment. Invasive species are considered as part of **Chapter 23: Terrestrial ecology and nature conservation, Volume 2**.

Ecological receptors

5.4.3 Ecological receptors are present adjacent to the Site, including the Climping Beach SSSI and West Beach LNR, also at Climping Beach. No potential sources of contamination have been identified at the landfall area and, therefore, these receptors have been excluded from the risk assessment, as it is unlikely that potential land contamination associated with the Site could impact these receptors.

5.4.4 Ecological receptors are considered further as part of **Chapter 23, Volume 2**.

5.5 Preliminary risk assessment

Introduction

5.5.1 For land contamination risk to be realised, a 'contaminant linkage' must exist. A contaminant linkage requires the presence of a:

- source of contamination;
- receptor capable of being adversely affected by a contaminant; and
- pathway capable of exposing a receptor to the contaminant.

5.5.2 A preliminary risk assessment has been undertaken for these potential contaminant linkages to identify potentially unacceptable risks on a qualitative basis. Risk is, therefore, based on a consideration of both:

- the likelihood of an event (probability – takes into account both the presence of the hazard and receptor and the integrity of the pathway); and
- the severity of the potential consequence (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

5.5.3 Further information on the risk assessment methodology used is given in **Annex C**. The method of dealing with identified risks and the level of significance of those risks will be a function of site use. The risk assessment is based on the current and future proposed land use and assumes no control measures to manage the risk (e.g. source removal or capping) have been incorporated in the Proposed Development.

5.5.4 Where the risk is considered to be of moderate status or greater, based on the preliminary risk assessment and conceptual model, the contaminant linkage may require further consideration.

5.5.5 The preliminary risk assessment is presented in **Table 5-3**.

Overview

5.5.6 The preliminary risk assessment has identified 15 potentially significant contaminant linkages. Potentially significant contaminant linkages are those that are considered to represent a moderate or higher risk. The risks identified are:

- moderate risks to future site infrastructure (property) associated with three onsite landfill areas near Littlehampton, where potential contaminants include ground gas;
- moderate risks to current and future surface water (tributaries of the River Arun) and groundwater (superficial Secondary A aquifer) associated with the three onsite landfill areas near Littlehampton;
- moderate risks to future site infrastructure (property) associated with various areas of potential made ground onsite including infilled pits/quarries, infilled ponds and infilled former railway cuttings, where potential contaminants include asbestos, heavy metals, hydrocarbons, cyanide, inorganic compounds (such as ammonia and nitrate) and ground gas;
- moderate risks to current and future surface water and groundwater (superficial Secondary A aquifer) associated with the various areas of potential made ground onsite including infilled pits/quarries, infilled ponds and infilled former railway cuttings;
- moderate risk to current and future groundwater (superficial Secondary A aquifer) associated with the offsite former sewage works which is adjacent to the Site near Littlehampton, due to the potential for contaminants including heavy metals, other inorganics and hydrocarbons to migrate onto the Site in shallow groundwater;
- moderate risk to current and future groundwater (superficial Secondary A aquifer) associated with four offsite historical landfills close to the Site near Littlehampton, due to the potential for contaminants including heavy metals, other inorganics and hydrocarbons to migrate onto the Site in shallow groundwater;
- moderate risk to current and future groundwater (superficial Secondary A aquifer) associated with offsite activities at Oakendene Industrial Estate, due to the potential for contaminants including fuels and oils to have been spilled or leaked offsite and then migrate onto the Site in shallow groundwater; and
- moderate risk to current and future groundwater (superficial Secondary A aquifer) associated with filling station at Crossbush and the vehicle showroom approximately 80m north of Washington, due to the potential for contaminants including fuels and oils to have been spilled or leaked offsite and then migrate onto the Site in shallow groundwater.

5.5.7 There are also several potential contaminant linkages where the risk from onsite and offsite sources has been assessed to be moderate/low and these include risks to current site users, future site users, future property (the onshore elements of the Proposed Development such as cables, joint bays and onshore substation), groundwater and surface water. Whilst these risks indicate there is less chance of a contaminant linkage being realised they should still be considered and addressed in the design of the onshore elements of the Proposed Development.

5.5.8 The Site has had limited historical development; however, the historical review has identified onsite historical landfill areas, and potential for other made ground onsite resulting from historical activities including infilling of voids resulting from mineral extraction or former railway cuttings.

5.5.9 There has been limited industrial development in the wider area, however, nearby land uses with potential to impact on the Site's land quality include historical landfills and other areas of made ground, a former sewage works, and an industrial estate at Oakendene where activities include various vehicle repair, testing and servicing, a service station, a vehicle showroom with petroleum storage, and metal polishing services.

5.5.10 It is noted that in the case of the Oakendene industrial estate, the potential for there to be impacts on the Site's land quality only occurs if the final onshore substation is taken forward within the search area at Bolney Road / Kent Street. If the final onshore substation location is within the search area at Wineham Lane North, the distance to the Oakendene industrial estate from the Wineham Lane North search area will be such that there will not be the potential for impacts on the Site's land quality.

5.6 Further discussion

Current and future site users (human health)

Current site users

5.6.1 There are no buildings onsite and site users will largely be limited to occasional site users such as landowners, members of the public and workers (mainly in an agricultural context).

5.6.2 For the localised potential contamination sources identified, potential pathways for current site users for exposure to contamination are unlikely to include dermal contact, ingestion and inhalation of dusts and vapours due to the presence of topsoil and vegetation at surface or road surfacing, and the lack of enclosed spaces or buildings.

5.6.3 There are a limited number of offsite potentially contaminated land uses and these are considered unlikely to pose a direct risk to current site users due to the presence of vegetation or road surfacing at surface, and the lack of enclosed spaces or buildings.

Future site users

5.6.4 The onshore elements of the Proposed Development are predominantly comprised of cables to be laid by open trenching or using HDD to cross watercourses, roads and railways. Where trenching is used, the surface soil or road surface will be reinstated at surface, or reinstatement will take the form of a joint bay with a surface access point (e.g. a concrete structure with access for maintenance). This will result in very little change to the current land use, and the as-built development footprint will only occupy a small proportion of the Site boundary currently under consideration.

5.6.5 There are potential sources of contamination onsite including historical landfills and other made ground, that could be contaminated with asbestos, heavy metals, hydrocarbons, and other contaminants.

5.6.6 The onshore elements of the Proposed Development could introduce potential direct contaminant linkages between made ground and future site users in the form of contact with made ground contaminated with contaminants such as heavy metals and hydrocarbons. The overall risk is assessed as moderate. In regard to ground gas, the overall risk to future users is considered to be low given that there will be no buildings in proximity to the identified sources of contamination and access to joint bays is likely to be limited with controls in place to manage health and safety risk under the Health and Safety at Work Act 1974.

5.6.7 Adjacent current and historic industrial land uses are considered to pose a moderate/low risk to future site users, some large sources of potential contamination including landfills are present, however, following development, the potential pathways for future site users for exposure to contamination are unlikely to include dermal contact, ingestion and inhalation of dusts and vapours due to the presence of topsoil and vegetation at surface or road surfacing, and the lack of enclosed spaces or buildings.

5.6.8 The lack of buildings in the future development also lowers the risk of future site users' exposure to vapours from contaminants migrating in groundwater.

Adjacent land users

5.6.9 The immediate uses surrounding the Site are similar to the site use and include landowners, members of the public and workers, mainly in an agricultural context. There are no residential properties directly adjacent to the Site, however, there are some properties within approximately 100m of the Site.

5.6.10 Whilst most of the Site is expected to be free from contamination, there are potentially significant sources of contamination onsite associated with historical landfill areas and other made ground. Moderate risks to adjacent site users have, therefore, been assessed for adjacent site users in these areas due to the lack of information on the ground conditions and the potential for contamination to be present near surface or for the development works to create new contaminant migration pathways.

Controlled waters

Groundwater – Secondary A Superficial Aquifers, Principal and Secondary A Chalk and Sandstone Aquifers

5.6.11 Some areas of the Site are underlain by Secondary A superficial aquifers and/or Principal bedrock aquifers (mainly chalk and also sandstone), and in these areas, groundwater sensitivity is moderate to high. On this basis, there are moderate risks to groundwater from onsite sources including historical landfills and made ground. Around Windmill Quarry Landfill, the Site is likely to be directly underlain by a principal sandstone aquifer and the risk of contaminants migrating and leaching to the principal aquifer is assessed as moderate.

5.6.12 Some current and historical industrial land uses have also been identified that pose a potential risk to the onsite groundwater quality and potential for contaminated groundwater to migrate onto the Site in some parts of the Site. The risks to groundwater associated with the offsite former sewage work and offsite

historical landfills at Littlehampton are assessed to be moderate in relation to the Secondary A superficial aquifer. At the Oakendene Industrial Estate, a moderate risk to groundwater in the Secondary A superficial aquifer has also been assessed due to potential for pollutants such as fuels and oils to have been released to ground from activities including vehicle repair and metal polishing.

5.6.13 It is noted that in the case of the Oakendene Industrial Estate, there will not be the potential for impacts on the Site's land quality if the final onshore substation location is within the search area at Wineham Lane North due to the distance of the industrial estate from the search area.

Surface Water

5.6.14 Several surface watercourses are present on and close to the Site, and in areas of the Site where Secondary A aquifers are present, these aquifers are likely to provide base flow to nearby surface watercourses. Where potential sources of contamination have been identified in proximity to surface water or where Secondary A aquifers are present close to offsite surface watercourses, moderate risks to surface water have been assigned, this includes at onsite historical landfills and other areas of made ground.

Property

Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)

5.6.15 The risks to future property including the cables, joint bays and onshore substation range from low to moderate, with the higher risks associated with the historical landfill areas at Littlehampton and the potential for aggressive ground conditions and/or ground gas to be present. Other made ground could also give rise to aggressive ground conditions.

Adjacent property (infrastructure and utilities, agricultural land including crops)

5.6.16 The risks to adjacent property are assessed as low, the onshore elements of the Proposed Development could potentially result in new contaminant migration pathways or mobilisation of contaminants in the subsurface, however, there is no indication that impacts on adjacent property have taken place in the past and conditions are unlikely to be significantly changed following the Site development. There are no nearby properties likely to be affected by gas migration at the identified source areas.

Table 5-3 Preliminary Risk Assessment -– Risks to current and future site users and environment from current and historical sources

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity][2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
1	Source 1: Three landfill areas at Littlehampton)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Landfill areas appear to be reinstated with vegetation at surface, lowering the risk of a contaminant linkage.
2	Source 1: Three landfill areas at Littlehampton)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils by the development, or gas ingress.
3	Source 1: Three landfill areas at Littlehampton)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current adjacent land users (residents, workers, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils by the development, or gas ingress.
4	Source 1: Three landfill areas at Littlehampton)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Future adjacent land users (residents, workers, members of the public) during/following development	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils that could then migrate offsite in the subsurface or blow offsite as dust. Development work could potentially create new leachate or gas migration pathways however this is less likely to result in a contaminant linkage given the distances to the nearest building identified is ~90m from onsite landfill.

[2] Potential sources and pollutants as detailed in **Section 5.2**. Potential receptors and pathways as detailed in **Section 5.3**. Hazard severity, likelihood and risk/significance as detailed in **Annex C**.

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
5	Source 1: Three landfill areas at Littlehampton)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current property (infrastructure and utilities, agricultural land including crops)	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Limited receptors present, no issues known of.
6	Source 1: Three landfill areas at Littlehampton)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Low**	**Moderate**	Potential for damage to cables or concrete structures in aggressive ground conditions, potential for gas accumulation in structures such as joint bays however no structures or buildings are planned close to landfill areas.
7	Source 1: Three landfill areas at Littlehampton)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current adjacent Property (infrastructure and utilities, agricultural land including crops)	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Limited receptors present, no issues known of.
8	Source 1: Three landfill areas at Littlehampton)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Future adjacent Property (infrastructure and utilities, agricultural land including crops)	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	The onshore elements of the Proposed Development could potentially result in new contaminant migration pathways or mobilisation of contaminants in the subsurface however there is no indication that impacts on adjacent property have taken place in the past and conditions are unlikely to be significantly changed following the Site development. There are no nearby properties likely to be affected by gas migration at the identified source areas.

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
9	Source 1: Three landfill areas at Littlehampton)	Heavy metals, TPH, PAH, cyanide, pH, ammonia, other inorganics	Current and future controlled Waters (Surface water – River Arun, River Adur, Ryebank Rife, Cowfold Stream, other streams and drains)	Surface water runoff, leaching, groundwater migration	Surface Water pollution **[Medium]**	**Likely**	**Moderate**	No monitoring data is available or details of landfill capping therefore current conditions may be such that contaminants are migrating from the landfill areas to surface water. In the onshore elements of the Proposed Development, if not adequately identified and controlled, there may be potential for development activity to cause contaminative materials to be disturbed, mobilised or mixed with surface soils that could then migrate offsite in the subsurface or as surface water run-off to tributaries of the River Arun.
10	Source 1: Three landfill areas at Littlehampton)	Heavy metals, TPH, PAH, cyanide, pH, ammonia, other inorganics	Current and future controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Likely**	**Moderate**	Shallow groundwater contamination is likely as a result of the historical landfilling activity under current conditions. In the onshore elements of the Proposed Development, if not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, and mobilised resulting in new impact to groundwater onsite and potentially migrating offsite to tributaries of the River Arun.
11	Source 1: Three landfill areas at Littlehampton)	Heavy metals, TPH, PAH, cyanide, pH, ammonia, other inorganics	Current and future controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low**	**Moderate / Low**	There is potential for vertical migration based on the anticipated geological sequence, however based on available BGS logs the underlying Chalk may be

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity][2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
								encountered within the top 20m[3].
12	Source 2: Recent landfill: Windmill Quarry Landfill (closed)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Landfill areas appear to be reinstated with vegetation at surface, lowering the risk of a contaminant linkage. Landfill operated under an Environmental Permit with gas and leachate controls.
13	Source 2: Recent landfill: Windmill Quarry Landfill (closed)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils. Landfill operated under an Environmental Permit with gas and leachate controls. Development not passing through the landfill area.
14	Source 2: Recent landfill: Windmill Quarry Landfill (closed)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc)	Current and future adjacent land users (residents, workers, members of the public) during / following development	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate/Low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils that could then migrate offsite in the subsurface or blow offsite as dust. Landfill operated under an Environmental Permit with gas and leachate controls. Development work not passing through the landfill area reducing risk of disturbing materials and creating pathways.
15	Source 2: Recent landfill: Windmill	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other	Future property (onshore elements of the Proposed Development including	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Potential for damage to cables or concrete structures in aggressive ground conditions and potential for

[3] http://scans.bgs.ac.uk/sobi_scans/boreholes/569765/images/12186370.html, Accessed April 2021

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
	Quarry Landfill (closed)	organic and inorganic compounds (for example ammonia, nitrate etc.)	cables, joint bays and onshore substation)					gas accumulation in structures such as joint bays however no buildings are planned close to landfill area. Landfill operated under an Environmental Permit with gas and leachate controls.
16	Source 2: Recent landfill: Windmill Quarry Landfill (closed)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Adjacent property (infrastructure and utilities, agricultural land including crops)	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	The onshore elements of the Proposed Development could potentially result in new contaminant migration pathways or mobilisation of contaminants in the subsurface however there is no indication that impacts on adjacent property have taken place in the past and conditions are unlikely to be significantly changed following the Site development. There are no nearby properties likely to be affected by gas migration at the identified source areas. Landfill operated under an Environmental Permit with gas and leachate controls.
17	Source 2: Recent landfill: Windmill Quarry Landfill (closed)	Heavy metals, TPH, PAH, cyanide, pH, and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current and future Controlled Waters (Surface water – River Arun, River Adur, Ryebank Rife, Cowfold Stream, other streams and drains)	Surface water runoff, leaching and groundwater migration	Surface Water pollution **[Medium]**	**Low**	**Moderate / low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils that could then migrate offsite in the subsurface or as surface water run-off to nearby surface water drains / streams. Landfill operated under an Environmental Permit with gas and leachate controls. No development within the Windmill Quarry Landfill boundary.

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
18	Source 2: Recent landfill: Windmill Quarry Landfill (closed)	Heavy metals, TPH, PAH, cyanide, pH, and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current and future Controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low**	**Moderate / Low**	Some superficial deposits may be present however bedrock is expected to be shallow in this area, vertical migration and leaching of contaminants in soils is possible. Landfill operated under an Environmental Permit with gas and leachate controls. No development within the Windmill Quarry Landfill boundary.
19	Source 2: Recent landfill: Windmill Quarry Landfill (closed)	Heavy metals, TPH, PAH, cyanide, pH,and other organic and inorganic compounds (for example ammonia, nitrate etc.)	Current and future Controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low**	**Moderate / Low**	There is potential for vertical migration based on the anticipated geological sequence, that could impact the underlying Sandstone aquifer. Landfill operated under an Environmental Permit with gas and leachate controls which limits likelihood.
20	Source 3: Made ground associated with other infilled land includes ponds, former quarries, former railway land (includes areas currently in agricultural use)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH	Current site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Areas appear to be reinstated with vegetation or road surfacing, lowering the risk of a contaminant linkage.
21	Source 3: Made ground associated with other infilled land includes ponds, former quarries,	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils by the development, or gas ingress.

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
	former railway land (includes areas currently in agricultural use)							
22	Source 3: Made ground associated with other infilled land includes ponds, former quarries, former railway land (includes areas currently in agricultural use)	Asbestos, heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH	Adjacent land users (residents, workers, members of the public) during / following development	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic **[Severe]**	**Unlikely**	**Moderate / Low**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils that could then migrate offsite in the subsurface or blow offsite as dust. Work associated with the onshore elements of the Proposed Development could potentially create new leachate or gas migration pathways however this is less likely to result in a contaminant linkage given the likely small scale of the infilled ground and limited presence of buildings in the surrounding area.
23	Source 3: Made ground associated with other infilled land includes ponds, former quarries, former railway land (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Low**	**Moderate**	Some potential for damage to cables or concrete structures in aggressive ground conditions, potential for gas accumulation in structures such as joint bays however no buildings are planned close to landfill areas.
24	Source 3: Made ground associated with other infilled land	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH	Adjacent property (infrastructure and utilities, agricultural land including crops)	Direct contact and gas migration / accumulation	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	The onshore elements of the Proposed Development could potentially result in new contaminant migration pathways or mobilisation of

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity][2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
	includes ponds, former quarries, former railway land (includes areas currently in agricultural use)							contaminants in the subsurface however there is no indication that impacts on adjacent property have taken place in the past and conditions are unlikely to be significantly changed following the Site development. There are no nearby properties likely to be affected by gas migration at the identified source areas.
25	Source 3: Made ground associated with other infilled land includes ponds, former quarries, former railway land (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, pH	Current and future Controlled Waters (Surface water – River Arun, River Adur, Ryebank Rife, Cowfold Stream, other streams and drains)	Surface water runoff, leaching and groundwater migration	Surface Water pollution **[Medium]**	**Likely**	**Moderate**	If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, mobilised or mixed with surface soils that could then migrate offsite in the subsurface or as surface water run-off to nearby streams, drains or rivers.
26	Source 3: Made ground associated with other infilled land includes ponds, former quarries, former railway land (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, pH	Current and future Controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Likely**	**Moderate**	Localised shallow groundwater contamination is likely as a result of historical infilling of voids with construction or other wastes. If not adequately identified and controlled, there may be potential for contaminative materials to be disturbed, and mobilised resulting in new impact to groundwater onsite and potentially migrating offsite to surface water.
27	Source 3: Made ground associated with other infilled land	Heavy metals, TPH, PAH, cyanide, pH	Current and future Controlled water (Groundwater – Principal bedrock	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low**	**Moderate / Low**	In some areas of the Site bedrock is shallow or is overlain by permeable superficial deposits, and vertical migration to the

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
	includes ponds, former quarries, former railway land (includes areas currently in agricultural use)		aquifer / Secondary A bedrock aquifer)					bedrock aquifer would be possible.
28	Source 3: Made ground associated with other infilled land includes ponds, former quarries, former railway land (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, pH	Current and future ecological receptors (Amberley Mount to Sullington Hill SSSI adjacent to site)	Uptake, direct contact and bioaccumulation	Damage to flora and fauna from direct contact or uptake of contaminants **[Mild]**	**Low**	**Low**	The onshore elements of the Proposed Development adjacent to the SSSI is an access road, located on a former railway cutting. If not adequately identified and controlled, there may be potential for contaminative materials in the ground onsite to be disturbed, mobilised or mixed with surface soils and then migrate offsite in the subsurface or blow offsite as dust to the SSSI.
29	Source 4: Offsite former sewage works	Heavy metals, cyanide, TPH, PAH, ground gas (carbon dioxide and methane) and inorganic compounds (for example ammonia, nitrate etc.)	Current site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Area appears to be reinstated with vegetation, limiting potential for contaminants to migrate onto the Site in the near surface.
30	Source 4: Offsite former sewage works	Heavy metals, cyanide, TPH, PAH, ground gas (carbon dioxide and methane) and inorganic compounds (for example ammonia, nitrate etc.)	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	If not adequately identified and controlled, there may be potential for contaminative materials migrating from the adjacent former sewage work to be disturbed, mobilised or mixed with surface soils by the development. Development not directly on sewage works.
31	Source 4: Offsite former sewage works	Heavy metals, cyanide, TPH, PAH, pH, ammonia and inorganic compounds (for	Future property (onshore elements of the Proposed Development including	Direct contact, migration and accumulation of gases	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Some potential for damage to cables or concrete structures in aggressive ground conditions, potential for gas

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
		example ammonia, nitrate etc.)	cables, joint bays and onshore substation)					accumulation in structures such as joint bays due to contaminants migrating from the former sewage works. The onshore elements of the Proposed Development are not directly located within the area of sewage works.
32	Source 4: Offsite former sewage works	Heavy metals, cyanide, TPH, PAH, pH, ammonia and inorganic compounds (for example ammonia, nitrate etc.)	Current and future Controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Likely**	**Moderate**	Shallow groundwater contamination is possible and could potentially migrate onto the Site.
33	Source 4: Offsite former sewage works	Heavy metals, cyanide, TPH, PAH, pH, ammonia and inorganic compounds (for example ammonia, nitrate etc.)	Current and future Controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low**	**Moderate / Low**	Given the depth to the underlying Principal aquifer some attenuation, dilution of contaminants is likely however there could be some impact onsite from the adjacent sewage works.
34	Source 5: Offsite four historical landfills near Littlehampton	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and inorganic compounds (for example ammonia, nitrate etc.)	Current site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Areas appear to be reinstated with vegetation, limiting potential for contaminants to migrate onto the Site in the near surface.
35	Source 5: Offsite four historical landfills near Littlehampton	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and inorganic compounds (for example ammonia, nitrate etc.)	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	The landfill areas appear to be covered by vegetation and are not close to any proposed future buildings, lowering the risk of a contaminant linkage occurring, despite potential for some migration of contaminants onto the Site via the shallow soils.
36	Source 5: Offsite four historical landfills near Littlehampton	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and inorganic compounds (for example ammonia, nitrate etc.)	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact, migration and accumulation of gases	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate / Low**	Some potential for damage to cables or concrete structures in aggressive ground conditions, potential for gas accumulation in structures such as joint bays however

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
								no buildings are planned close to landfill area.
37	Source 5: Offsite four historical landfills near Littlehampton	Heavy metals, TPH, PAH, cyanide, pH, ammonia	Current and future Controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Likely**	**Moderate**	Shallow groundwater contamination is possible and could potentially migrate onto the Site.
38	Source 5: Offsite four historical landfills near Littlehampton	Heavy metals, TPH, PAH, cyanide, pH, ammonia	Current and future Controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low**	**Moderate / Low**	Given the depth to the underlying Principal aquifer some attenuation, dilution of contaminants is likely however there could be some impact onsite from the nearby landfills.
39	Source 6: Offsite Oakendene Industrial Estate, includes various vehicle repair, testing and servicing, and metal polishing	Heavy metals, TPH, PAH, chlorinated solvents	Current site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, asbestos fibres	Toxic hazardous to human health, carcinogenic **[Medium]**	**Low likelihood**	**Moderate / low**	Industrial units are active and subject to current health, safety and environmental legislation, therefore risks to current site users should be controlled.
40	Source 6: Offsite Oakendene Industrial Estate, includes various vehicle repair, testing and servicing, and metal polishing	Heavy metals, TPH, PAH, chlorinated solvents	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts	Toxic hazardous to human health, carcinogenic **[Medium]**	**Low**	**Moderate / Low**	Sources likely to be small scale however there is potential for historical leaks and spills to have impacted land.
41	Source 6: Offsite Oakendene Industrial Estate,	Heavy metals, TPH, PAH, chlorinated solvents	Future property (onshore elements of the Proposed Development including	Direct contact, migration and accumulation of vapours	Degradation **[Mild]**	**Low**	**Low**	Some potential for damage to cables or concrete structures in aggressive ground conditions. Linkage will not be realised if onshore

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
	includes various vehicle repair, testing and servicing, and metal polishing		cables, joint bays and onshore substation)					substation option at Wineham Lane North is taken forward.
42	Source 6: Offsite Oakendene Industrial Estate, includes various vehicle repair, testing and servicing, and metal polishing	Heavy metals, TPH, PAH, chlorinated solvents	Current and future Controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Toxic hazardous to human health, carcinogenic **[Medium]**	**Likely**	**Moderate**	Shallow groundwater contamination is possible and could potentially migrate onto the Site. Potential for leakages of contaminants including fuels and oils to have taken place within industrial units. Linkage from migration onto Site will not be realised if onshore substation option at Wineham Lane North is taken forward.
43	Source 6: Offsite Oakendene Industrial Estate, includes various vehicle repair, testing and servicing, and metal polishing	Heavy metals, TPH, PAH, chlorinated solvents	Current and future Controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and groundwater migration	Toxic hazardous to human health, carcinogenic **[Medium]**	**Unlikely**	**Moderate / Low**	Bedrock is mudstone and of low permeability.
44	Source 7: Offsite made ground associated with other infilled land includes ponds, former quarries (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Low**	**Moderate**	Most areas of potential made ground appear to be covered by vegetation or road surfacing, lowering the risk of a contaminant linkage with site users occurring. There is potential for migration of contaminants onto the Site via shallow soils, via gas / vapour migration through the soil profile or via shallow groundwater migration however the absence of buildings across the majority

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
								of the onshore elements of the Proposed Development lowers the risk.
45	Source 7: Offsite made ground associated with other infilled land includes ponds, former quarries (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact, migration and accumulation of vapours / gases	Degradation, explosion **[Severe]**	**Low**	**Moderate**	Some potential for damage to cables or concrete structures in aggressive ground conditions, potential for gas accumulation in structures such as joint bays due to contaminants migrating from the landfills. Possible vapour migration into any enclosed spaces in a future onshore substation.
46	Source 7: Offsite made ground associated with other infilled land includes ponds, former quarries (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, pH	Current and future Controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Likely**	**Moderate**	Shallow groundwater contamination is possible and could potentially migrate onto the Site.
47	Source 7: Offsite made ground associated with other infilled land includes ponds, former quarries (includes areas currently in agricultural use)	Heavy metals, TPH, PAH, cyanide, pH	Current and future Controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low**	**Moderate / Low**	In areas of the Site underlain by Chalk or Sandstone Principal aquifers or by the Lambeth Group, Weald Clay or Horsham Stone Member Secondary A aquifers, there may be potential for contamination to be present beneath the Site due to contaminants from offsite sources migrating in the bedrock aquifer.

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
48	Source 8-10: Offsite Crossbush Service Station and former vehicle garage tanks (underground fuel tanks including petrol)	TPH including BTEX and PAH	Future site users (workers, landowners, members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Low**	**Moderate**	Presence of alluvium in this area means there is potential for contaminants to migrate in soil or as LNAPL in shallow groundwater onto the Site. No currently known issues.
49	Source 8-10: Offsite Crossbush Service Station and former vehicle garage tanks (underground fuel tanks including petrol)	TPH including BTEX and PAH	Current property (infrastructure and utilities, agricultural land including crops)	Direct contact, migration and accumulation of vapours / gases	Degradation, explosion **[Severe]**	**Low**	**Moderate**	No known issues.
50	Source 8-10: Offsite Crossbush Service Station and former vehicle garage tanks (underground fuel tanks including petrol)	TPH including BTEX and PAH	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact, migration and accumulation of vapours / gases	Degradation, explosion **[Severe]**	**Low**	**Moderate**	Some potential for damage to cables due to contact with hydrocarbons, potential for vapour accumulation in structures such as joint bays due to contaminants migrating in soil or groundwater. However, no structures proposed in vicinity of the service station.
51	Source 8-10: Offsite Crossbush Service Station and former vehicle garage tanks (underground fuel tanks	TPH including BTEX and PAH	Current and future controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Likely**	**Moderate**	Shallow groundwater contamination is possible and could potentially migrate onto the Site.

Linkage No.	Potential Source[2]	Potential Pollutant[2]	Potential Receptors[2]	Potential Pathways to Receptors[2]	Associated Hazard [Severity] [2]	Likelihood of Occurrence[2]	Risk / Significance[2]	Comment
	including petrol)							
52	Source 8-10: Offsite Crossbush Service Station and former vehicle garage tanks (underground fuel tanks including petrol)	TPH including BTEX and PAH	Current and future controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and groundwater migration	Groundwater pollution **[Medium]**	**Low likelihood**	**Moderate / Low**	This area is underlain by London Clay however permeable layers (e.g. Lambeth Group) may be present.

6. Geohazards

6.1.1 A review of potential geohazards has been completed, using the sources of information listed in **Section 1.5**. The following constraints have been identified.

6.1.2 There are limited data available on the ground and groundwater conditions on the Site. Localised difficult ground conditions, including shallow rockhead, shallow groundwater, three historical landfill areas and other made ground of unknown properties, may be encountered at various points on the Site. Precise locations of such constraints are difficult to predict at this stage. Consideration should be given to the cost-effectiveness of comprehensive ground investigation, as opposed to provision of contingency plans to deal with problematic ground conditions as and when they may be encountered.

- Information on the ground and groundwater conditions obtained in advance through ground investigation, will be of value at either side of the various road, rail and river crossings where trenchless methods are proposed to be used. Information on the ground and groundwater conditions should be obtained at these locations to inform temporary works design and the trenchless technology specification.
- Soft deposits may be present in some areas, including made ground and alluvium, these are unlikely to provide a competent founding stratum for permanent structures such as the joint bays due to the risk of settlement. Ground investigation is recommended at these locations as part of the detailed design.
- Potential for slope stability issues is identified onsite in the vicinity of the Warningcamp B and C onshore cable corridor option and this could pose a risk to the future cables and joint bays. Ground investigation is recommended at this location as part of the detailed design if this onshore cable corridor option is to be pursued.
- The onshore cable corridor is likely to encounter several underground utilities. It is recommended these utilities are physically located prior to construction activities so that they can be avoided or protected as necessary.
- Former railway lines are present onsite and there may be relic structures associated with these features or other historical land uses that could need breaking up and removal.
- Parts of the Site are within flood risk areas. The permanent and temporary works design will need to consider the potential risks posed to the onshore elements of the Proposed Development from flooding.

7. Conclusions and recommendations

7.1 Conclusions

Contamination

7.1.1 The initial conceptual model and preliminary risk assessment has identified 15 potentially significant contaminant linkages representing moderate risks to future property and surface water and groundwater. These linkages relate to historical landfills and other made ground onsite. Offsite sources with the potential to affect site groundwater quality due to contaminated groundwater migrating onto the Site have been identified, and these include offsite historical landfills, made ground, a former sewage works, an industrial estate (which includes vehicle repair and metal polishing activities) and petroleum storage.

7.1.2 Although in some instances the likelihood of potentially significant linkages relating to human health is assessed as low, where there are potentially severe consequences the overall risk is assessed as moderate, and such risks should be subject to future investigation.

Geohazards

7.1.3 A review of geohazards has identified six potential constraints. These are generally in relation to the limited data on ground conditions, the presence of potentially soft ground, potential slope instability and the possible presence of physical constraints such as utilities or relic structures. In addition, there is no information on the ground and groundwater conditions in the location of the proposed trenchless crossings for road, rail and river which will require temporary works design for launch and reception pits.

7.1.4 These constraints will require further assessment as part of the detailed design process.

7.2 Recommendations

7.2.1 Based on the available information for the Site and the preliminary risk assessment, several moderate risk contaminant linkages have been identified. Targeted Phase 2 intrusive site ground investigation is considered prudent either prior to the detailed design or prior to construction to:

- characterise the onsite historical landfills;
- characterise made ground in other areas where infilling of voids has taken place;
- confirm or discount any potential contaminant linkages in relation to the historical landfills and made ground;

- investigate the depth to groundwater onsite where shallow groundwater may be anticipated in superficial deposits and where Principal bedrock aquifers are present at or close to surface;
- investigate the potential impacts on groundwater quality from the onsite sources and offsite sources including a historical sewage works, landfills, and adjacent industrial activities;
- allow in-situ geotechnical testing;
- install monitoring standpipes and groundwater level monitoring;
- collect soil and groundwater samples;
- carry out laboratory analysis of soil and groundwater for potential contamination;
- carry out geotechnical laboratory testing of soils; and
- allow interpretative reporting to inform the temporary works design and the detailed design of the onshore elements of the Proposed Development.

8. Glossary of terms and abbreviations

Table 8-1 Glossary of terms and abbreviations

Term (acronym)	Definition
AOD	Above Ordnance Datum
AONB	Area of Outstanding National Beauty
BGS	British Geological Survey
BTEX	Ethylbenzene and Xylene
CDM	Construction Design and Management
CM	Conceptual Model
COMAH	Control of Major Accident Hazard
Development Consent Order (DCO)	This is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects, under the Planning Act 2008.
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.
EPA	Environmental Protection Act
GIS	Geographical Information Systems
Horizontal Directional Drilling (HDD)	An engineering technique avoiding open trenches.
LA PPC	Local Authority Pollution Prevention & Control
LCRM	Land Contamination Risk Management
LNR	Local Nature Reserve
MCPA	Methyl Chlorophenoxyacetic Acid
NGR	National Grid Reference
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project
PAH	Polyaromatic Hydrocarbons
PEIR Assessment Boundary	The PEIR Assessment Boundary combines the search areas for the offshore and onshore infrastructure

Term (acronym)	Definition
	associated with the Proposed Development. It is defined as the area within which the Proposed Development and associated infrastructure will be located, including the temporary and permanent construction and operational work areas.
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
RED	Rampion Extension Development Limited. The DCO Applicant.
SPZ	Source Protection Zones
SSSI	Special Site of Scientific Interest
TPH	Total Petroleum Hydrocarbons
UXB	Unexploded Bomb
UXO	Unexploded Ordnance

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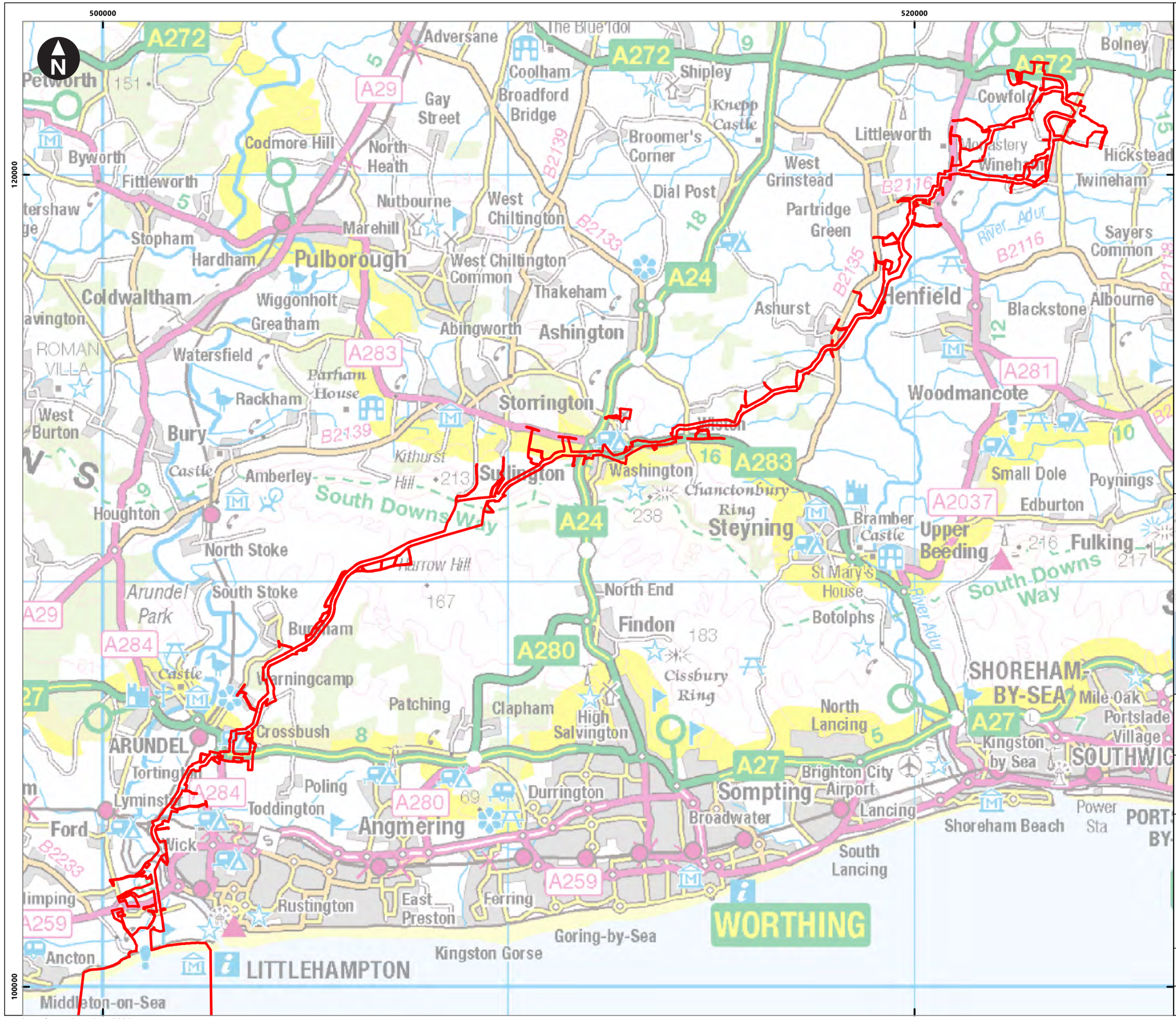
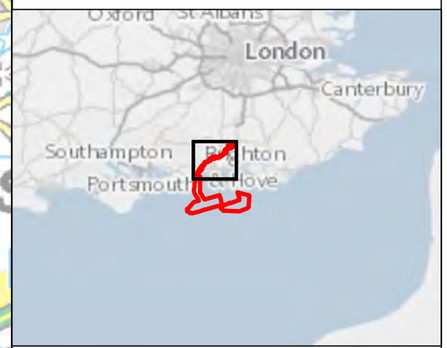
Annex A
Figures



Key

PEIR Assessment Boundary



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British National Grid Transverse Mercator

Rampion Extension Development

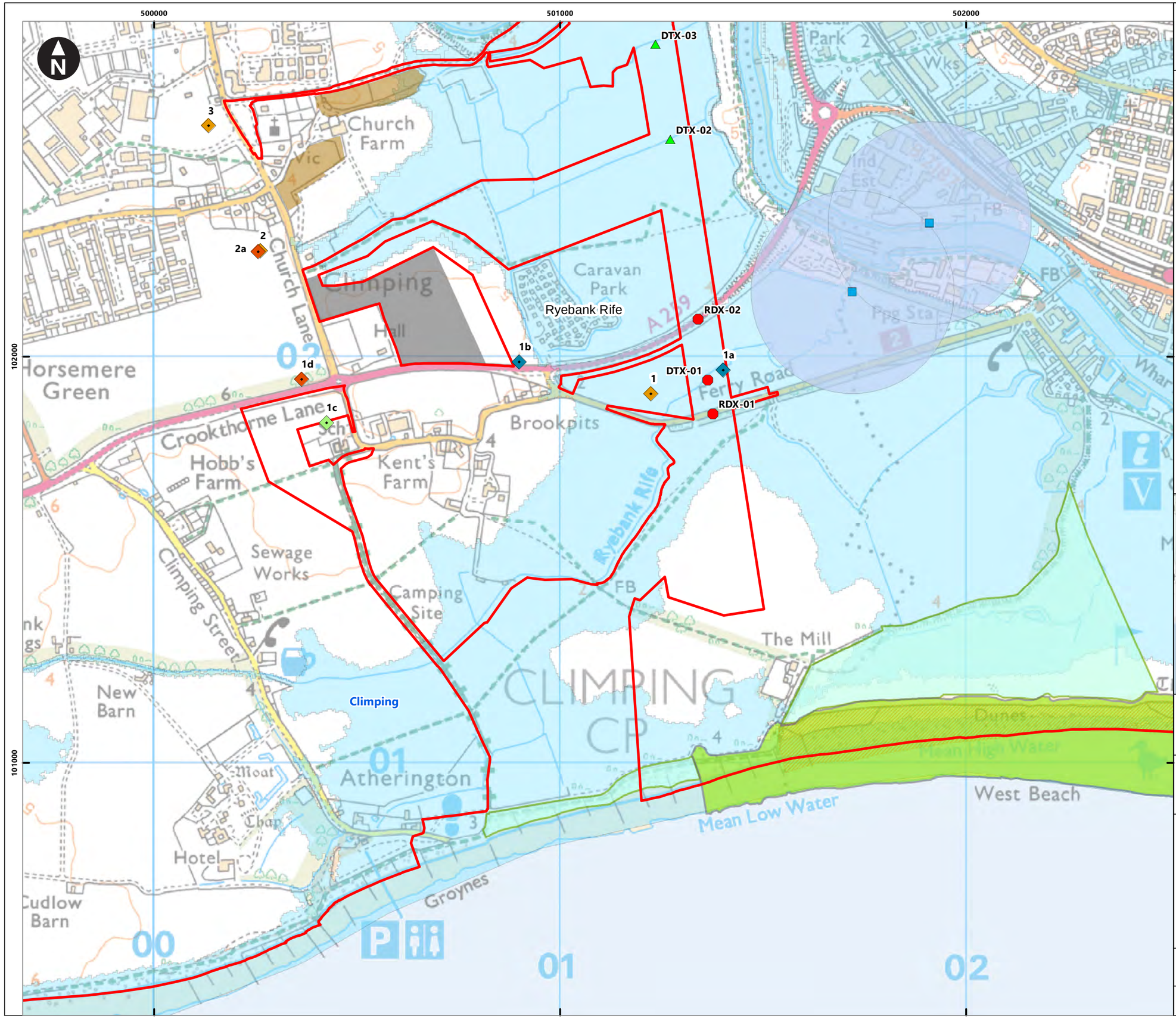
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.1 Site Location

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9040				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: DOUGG	Drawn Date: 25/06/2021	Status: Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

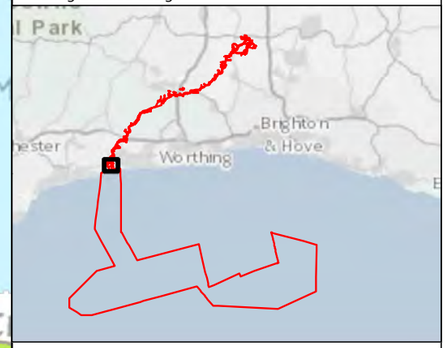
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



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British National Grid Transverse Mercator

Rampion Extension Development

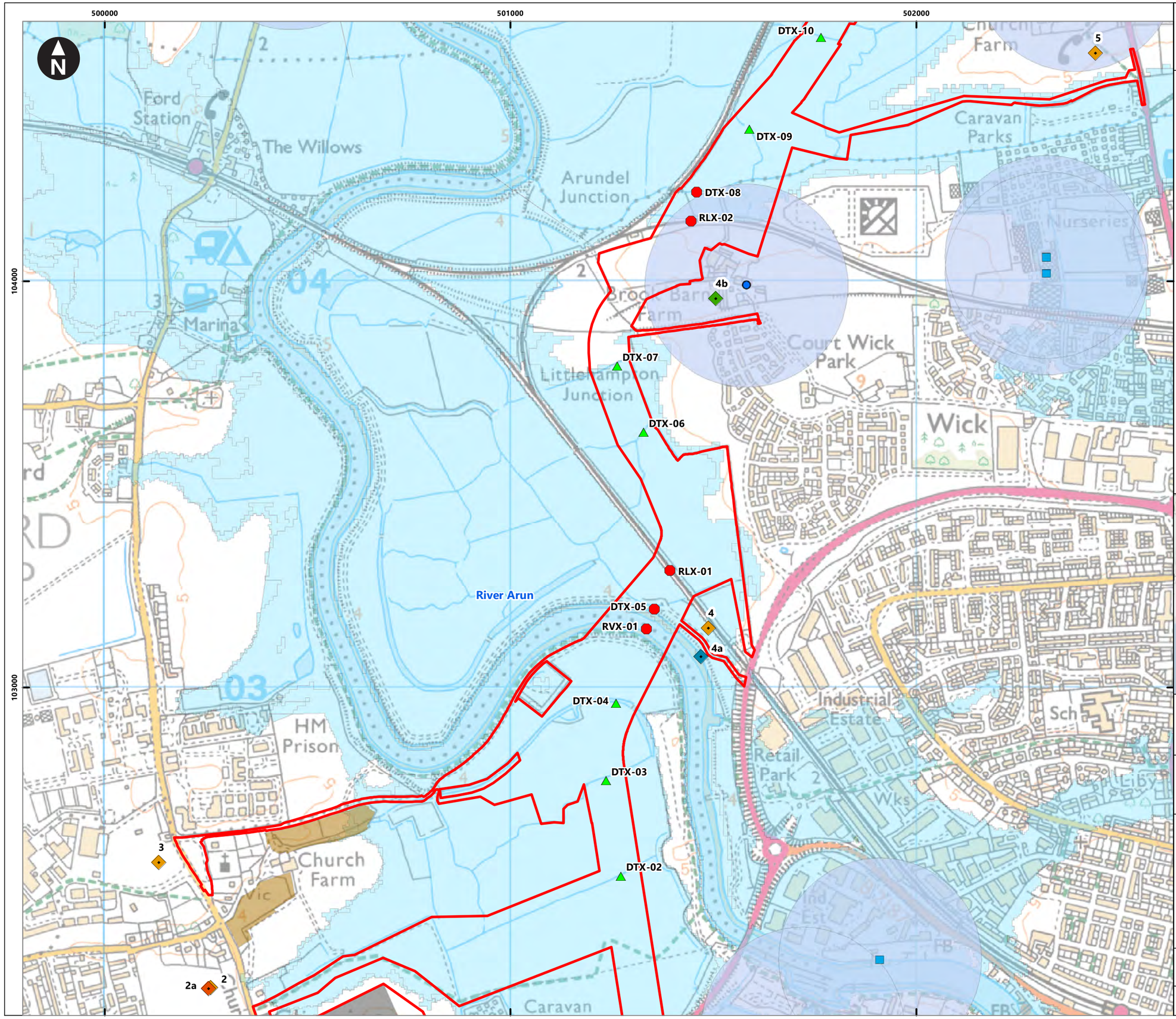
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2a Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

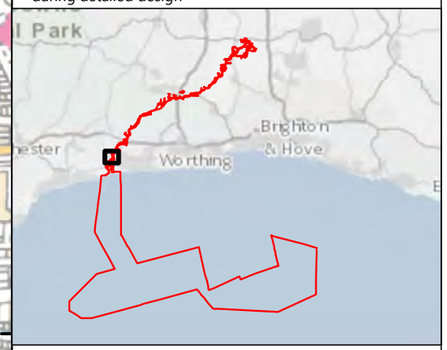
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

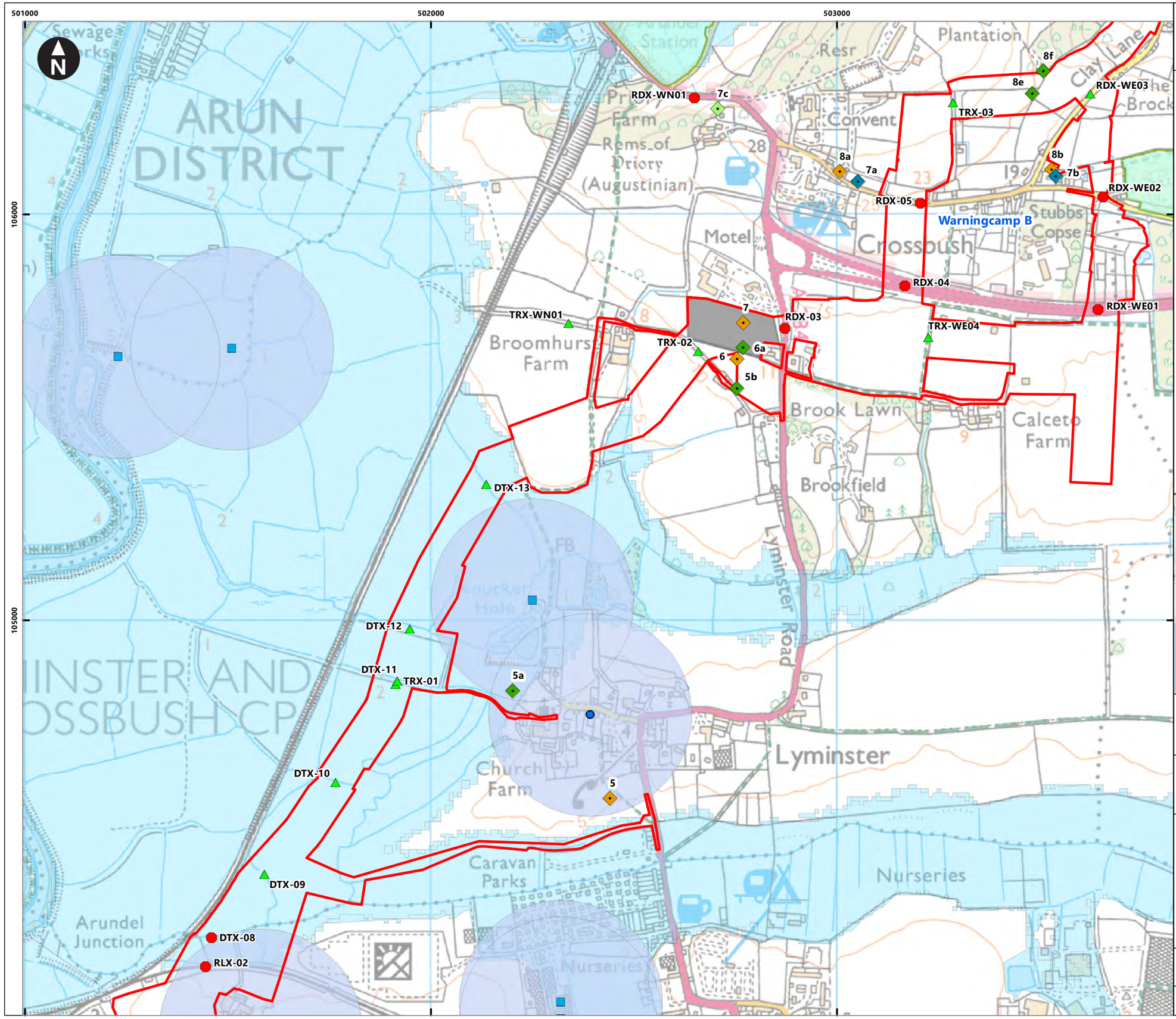
Rampion 2 Offshore Wind Farm

Figure 25.1.2b Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

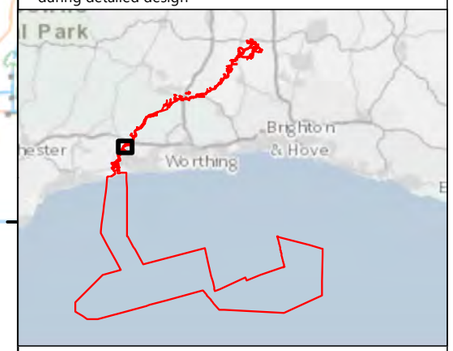
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

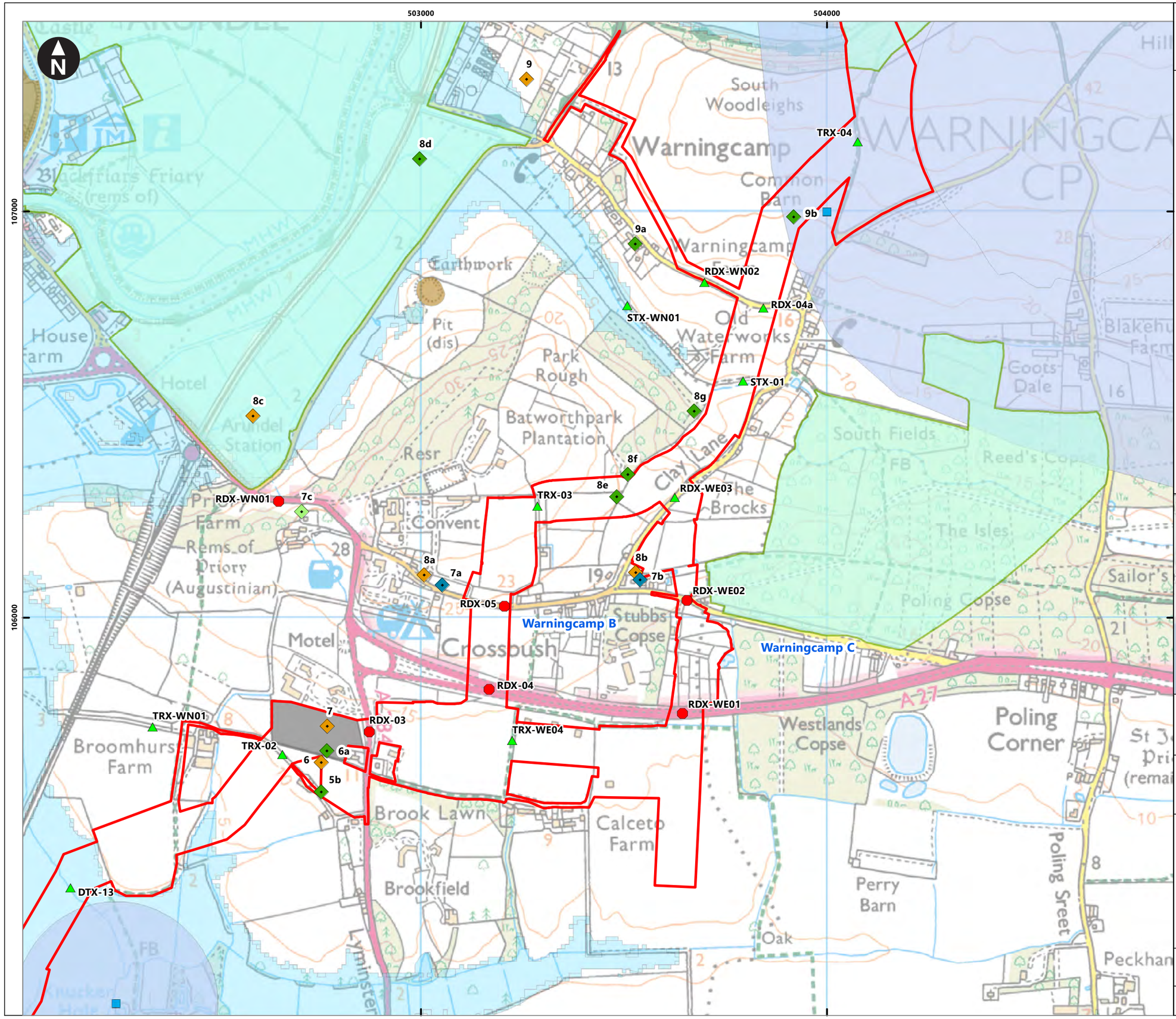
Rampion 2 Offshore Wind Farm

Figure 25.1.2c Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design

Kilometres
0 0.05 0.1 0.2 0.3 0.4
1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

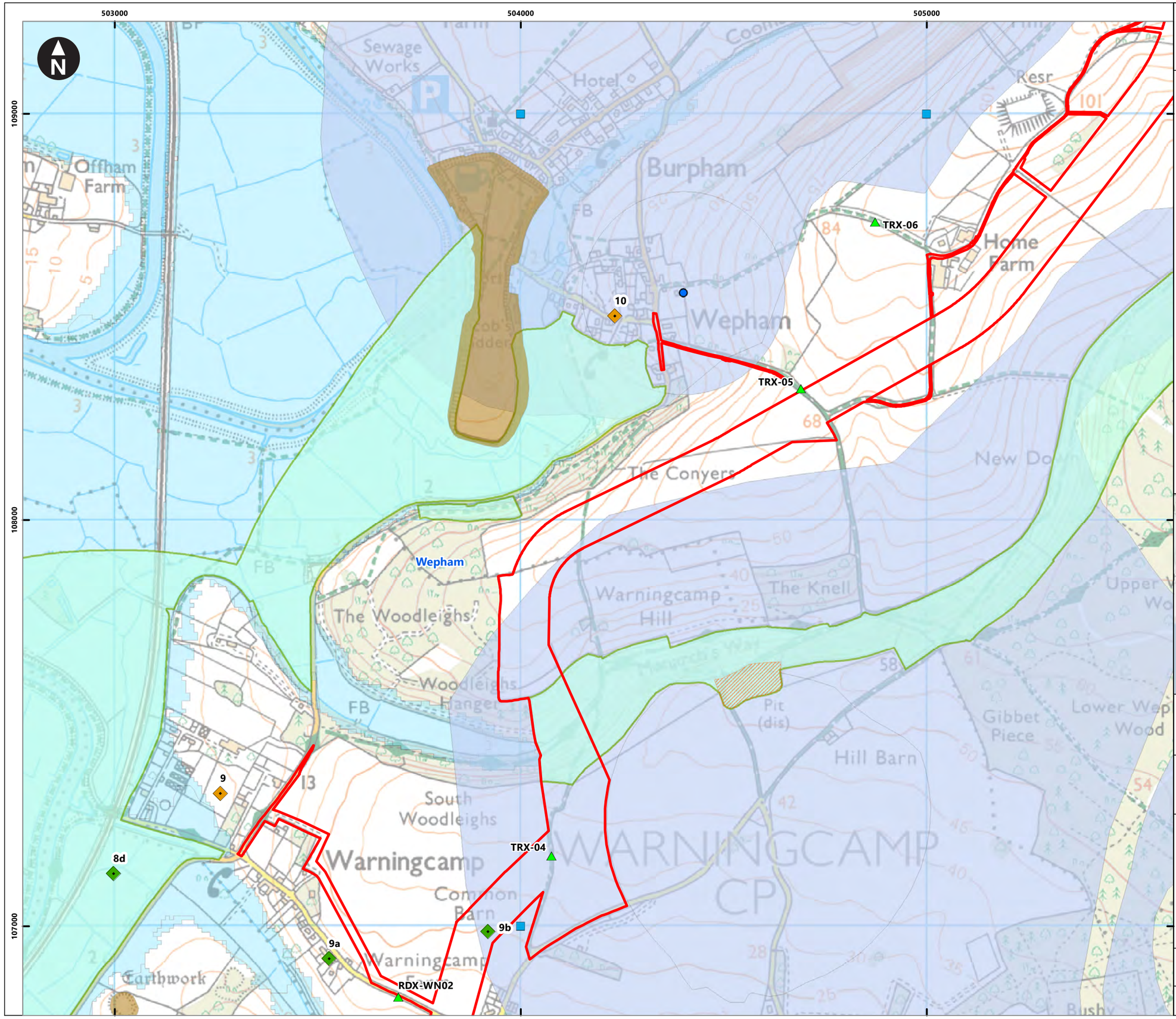
Rampion 2 Offshore Wind Farm

Figure 25.1.2d Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

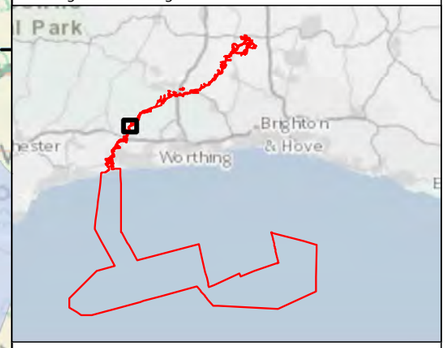
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

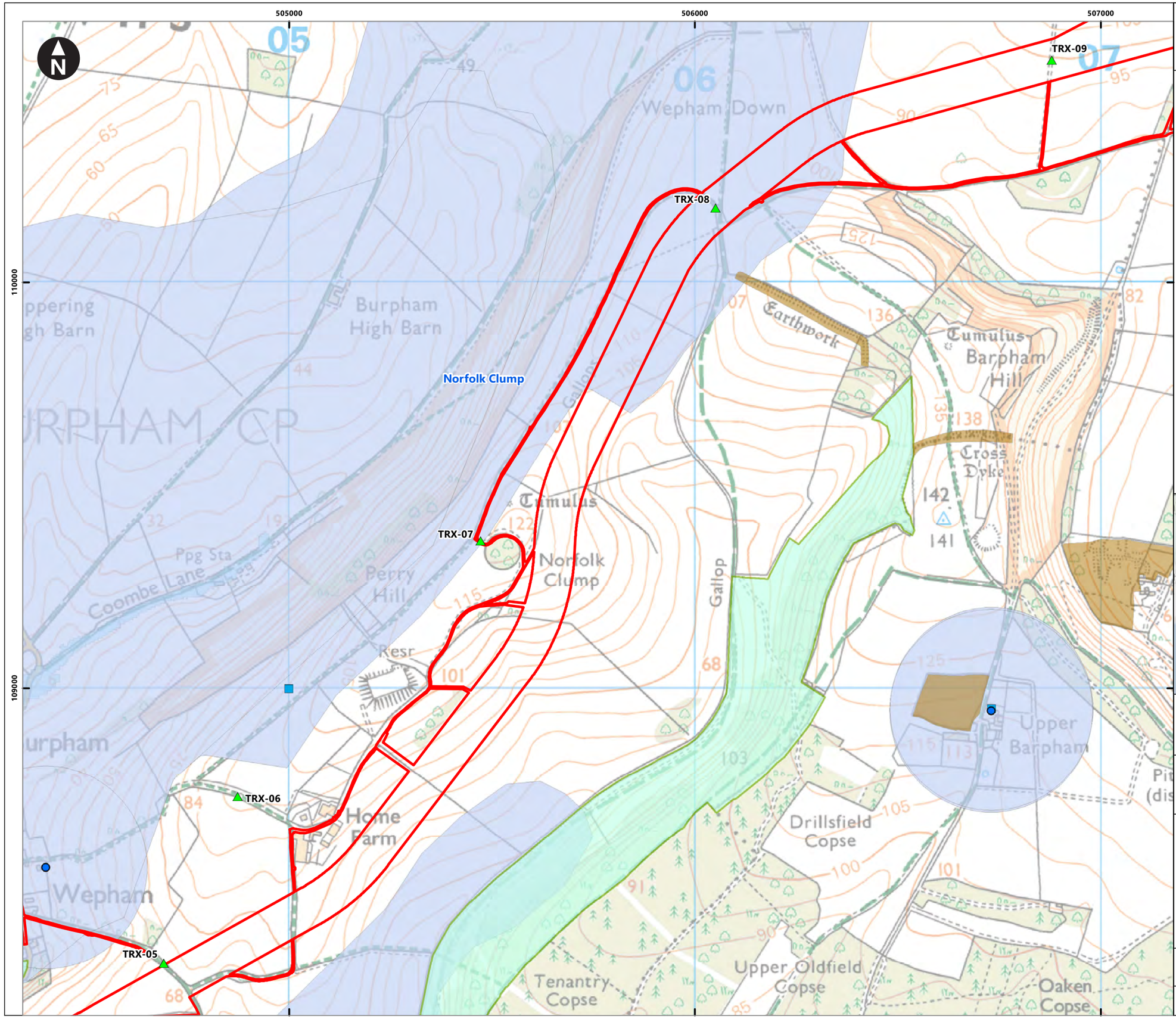
Rampion 2 Offshore Wind Farm

Figure 25.1.2e Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

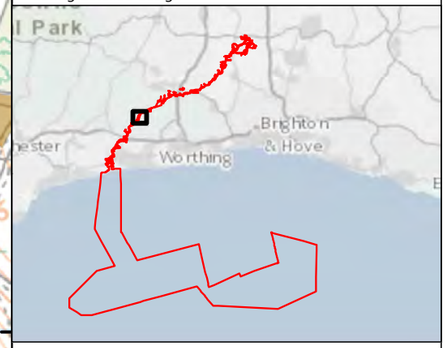
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

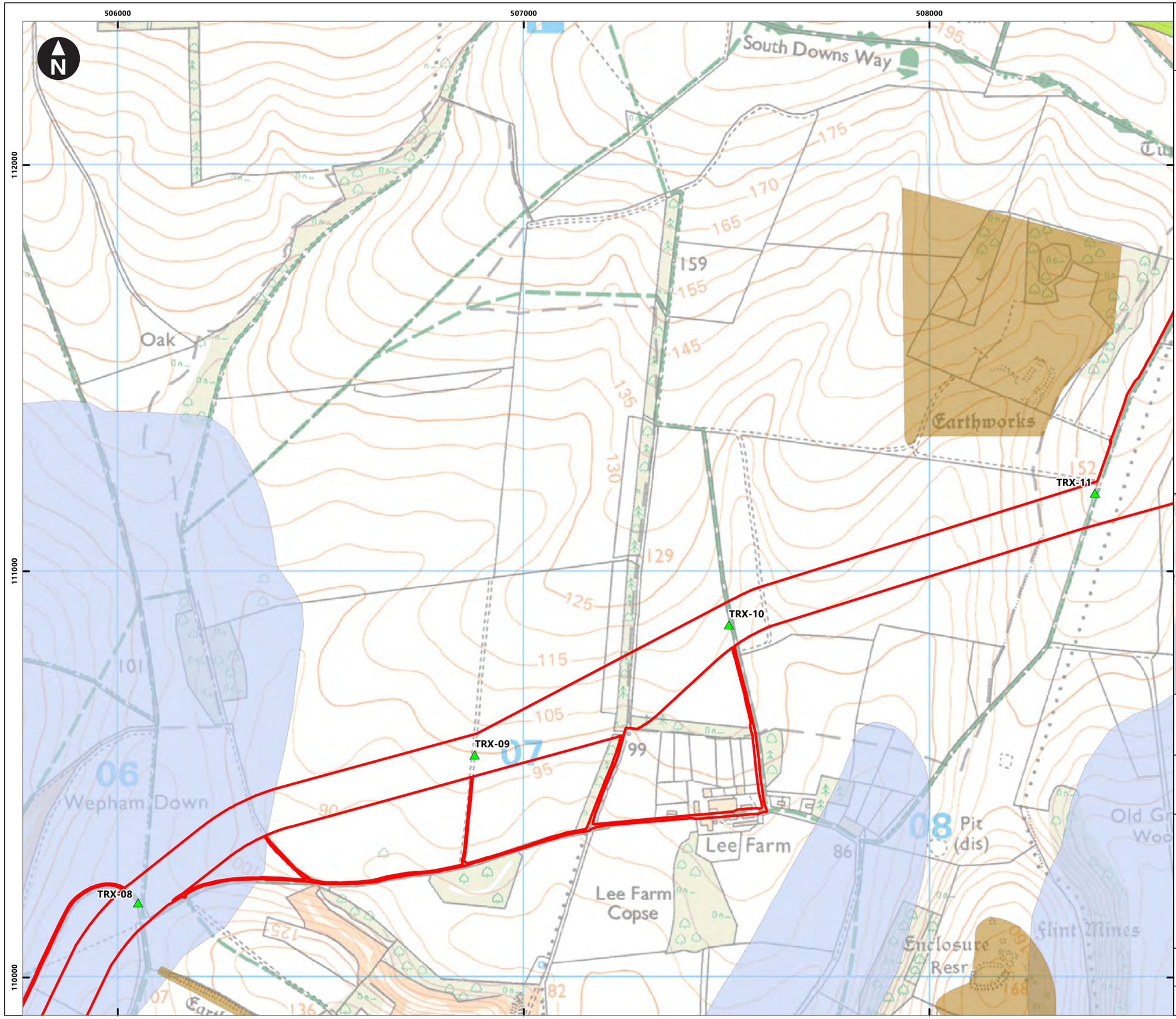
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2f Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

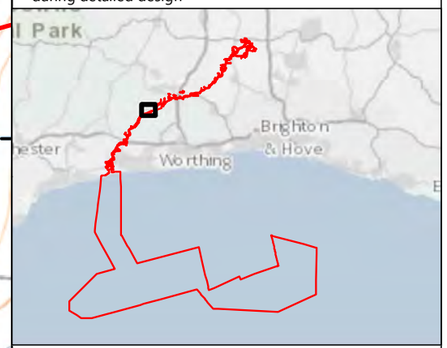
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

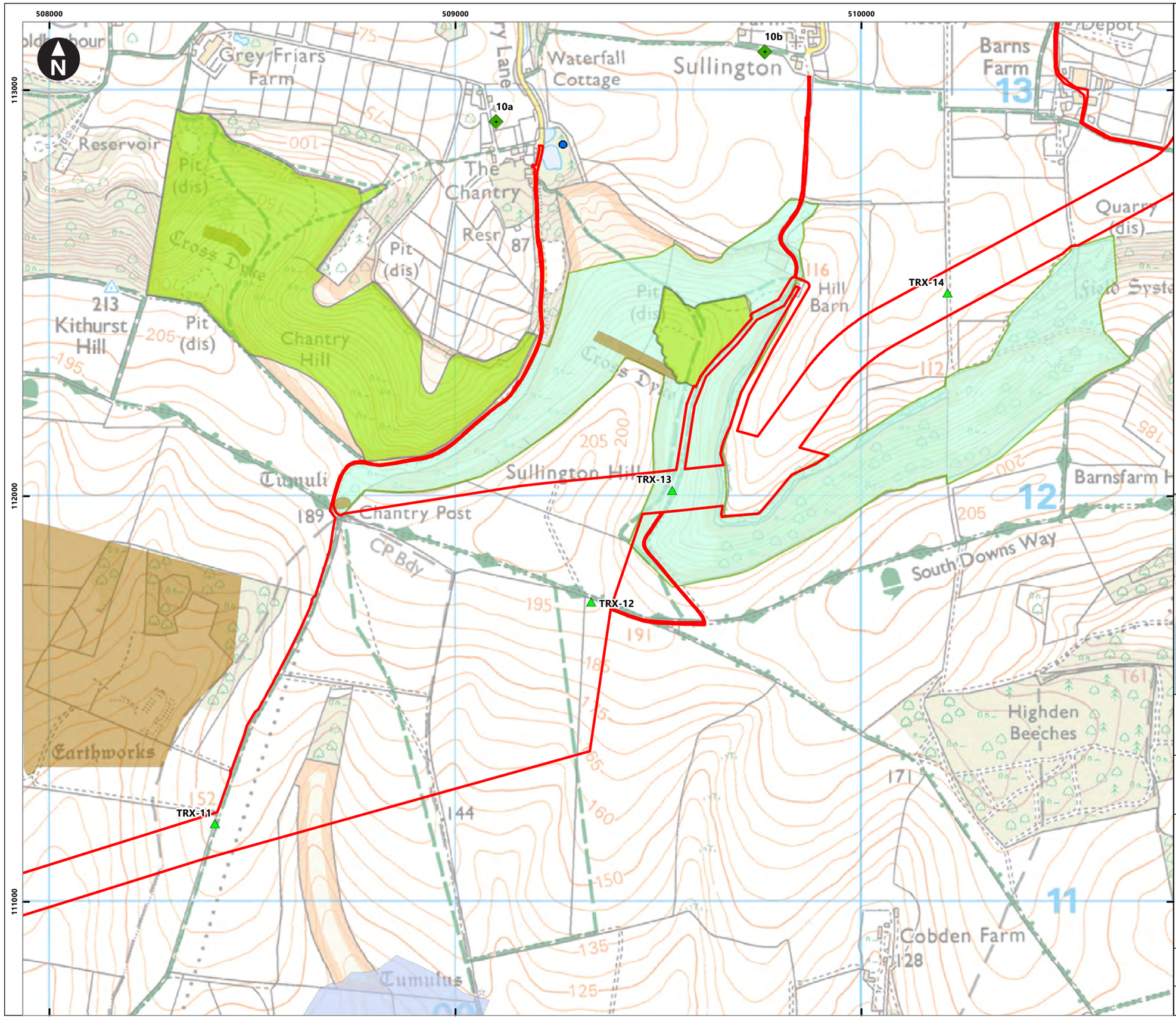
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2g Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

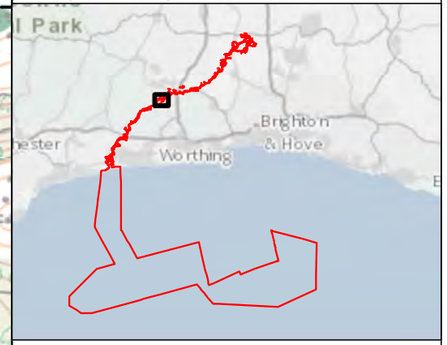
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

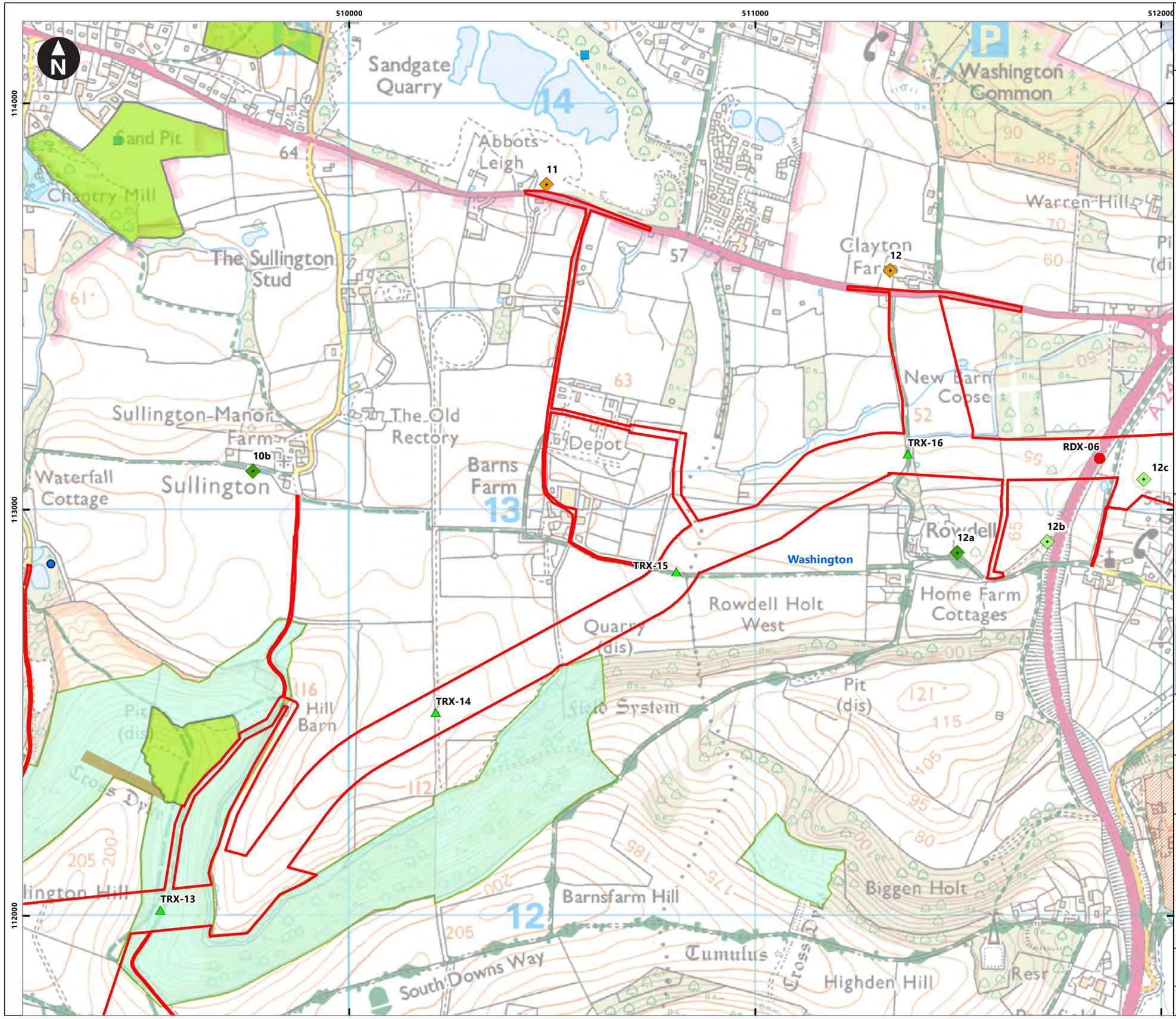
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2h Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design

Kilometres
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1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

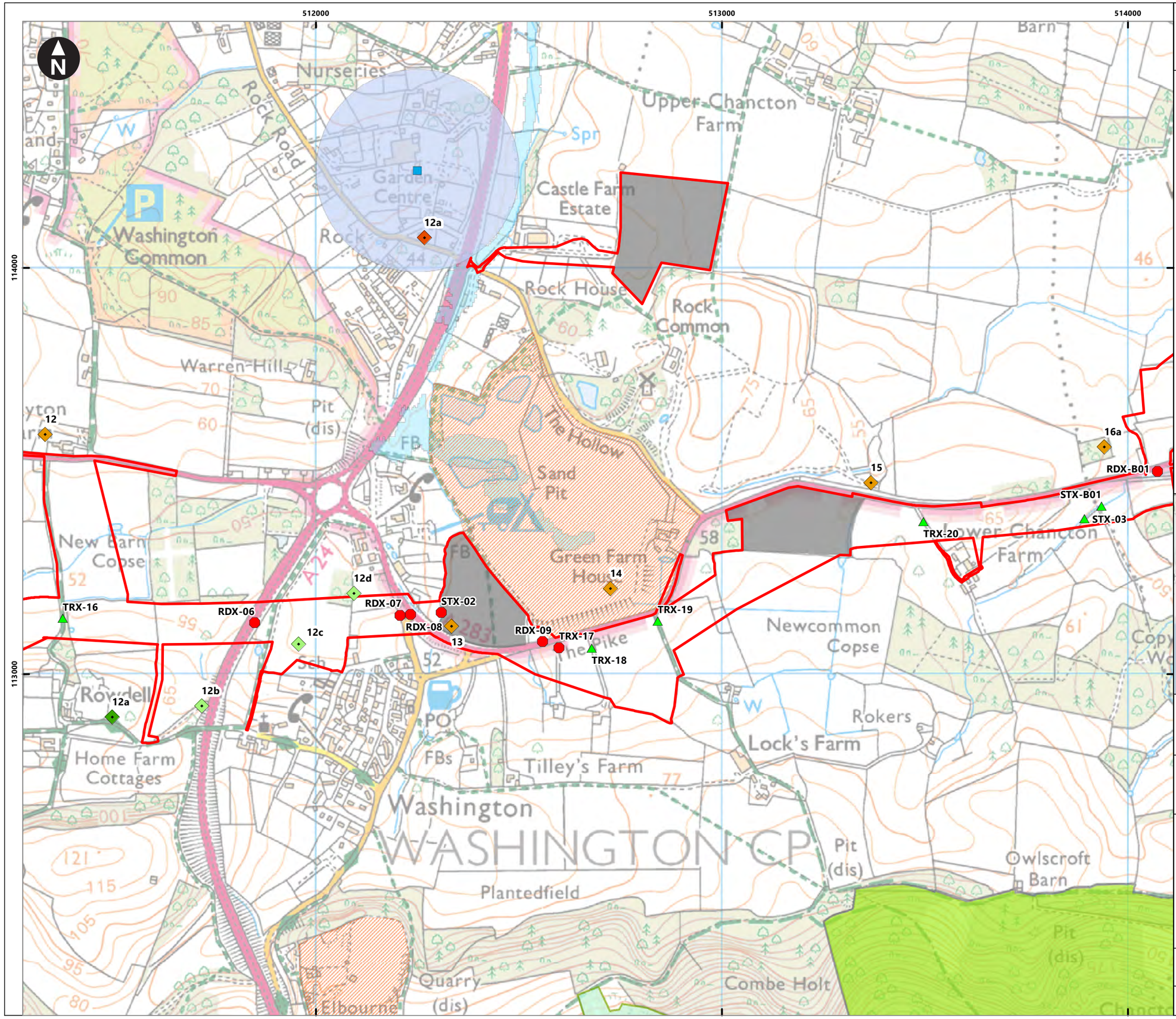
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2i Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

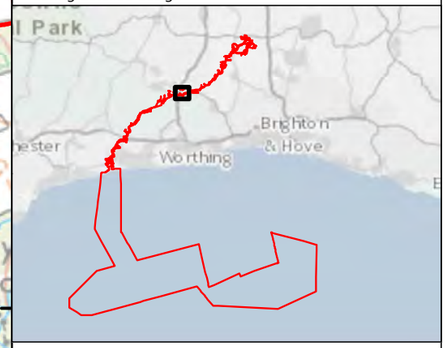
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

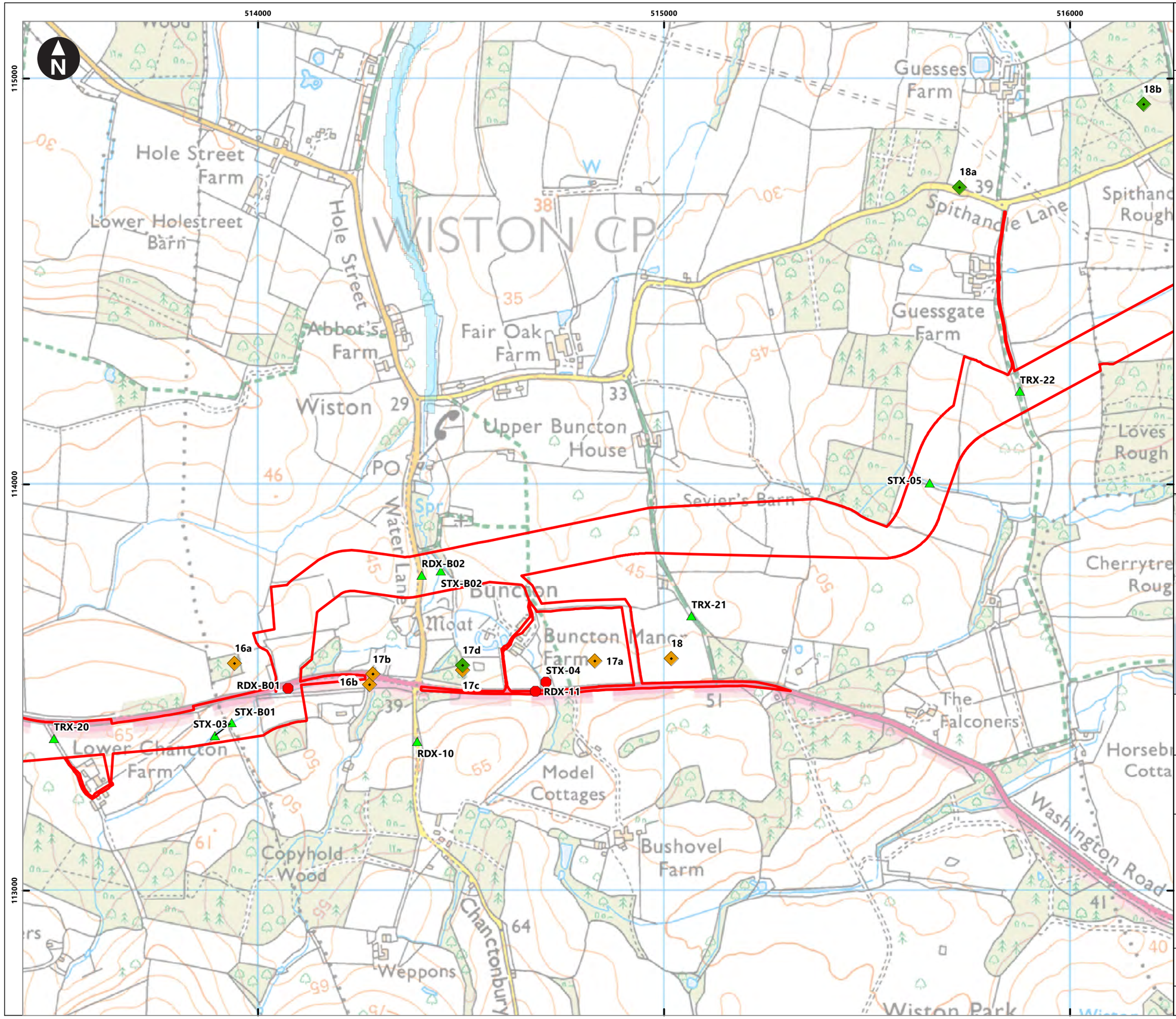
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2j Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

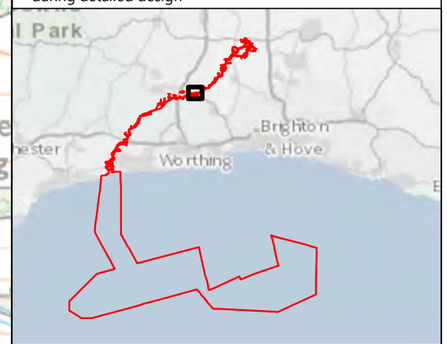
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

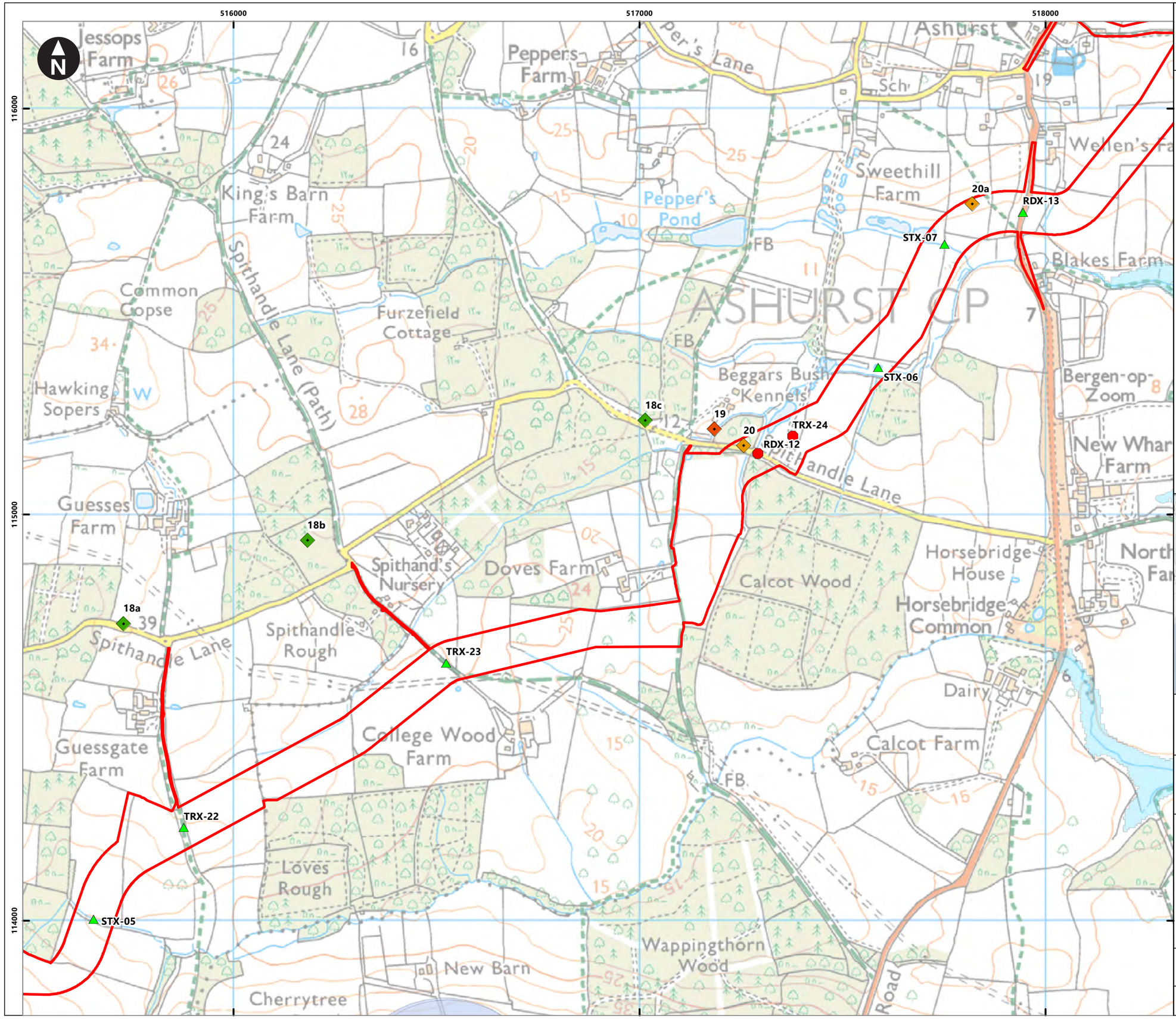
Rampion 2 Offshore Wind Farm

Figure 25.1.2k Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design

Kilometres
0 0.05 0.1 0.2 0.3 0.4
1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

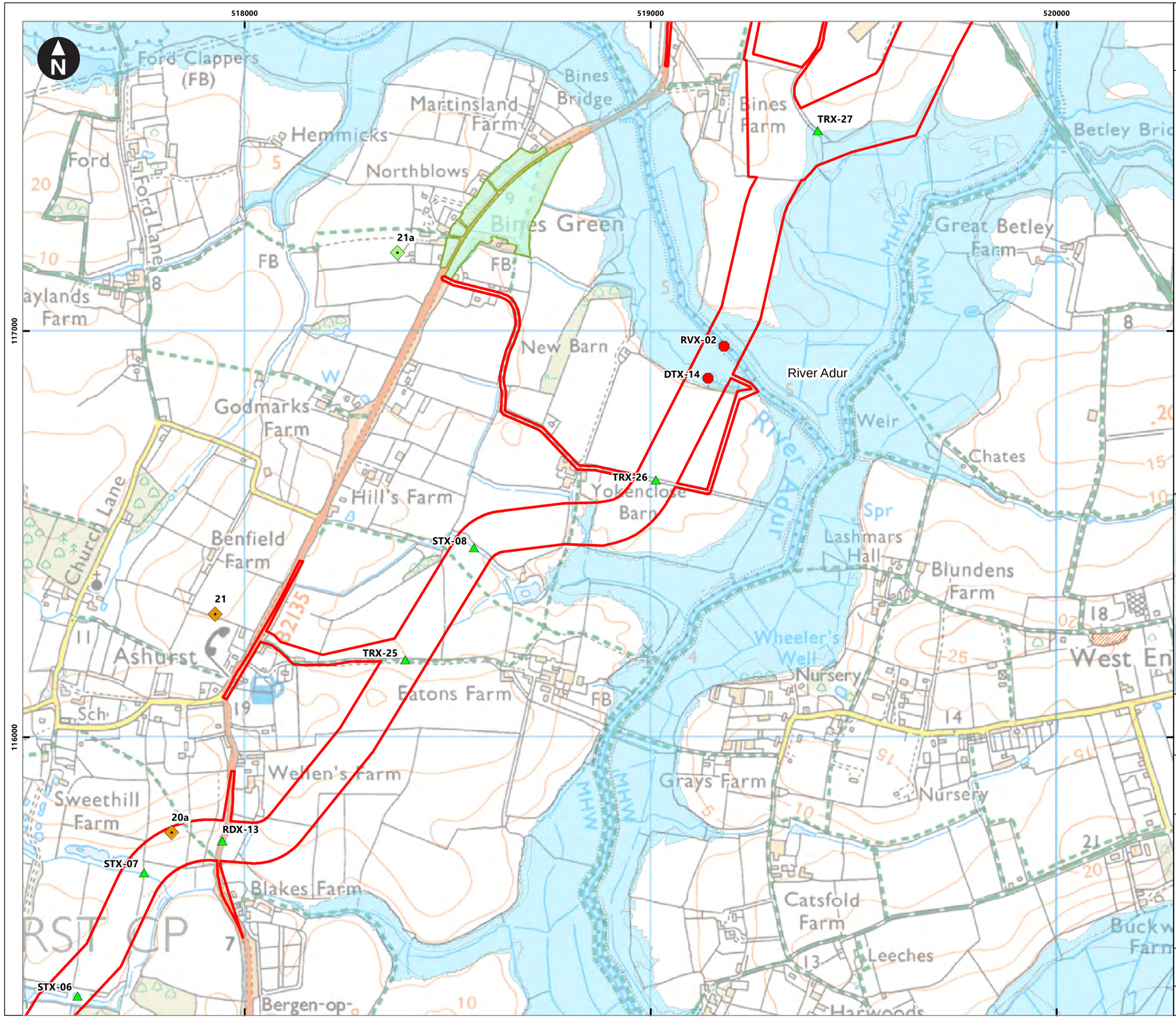
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2l Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design

Kilometres
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1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

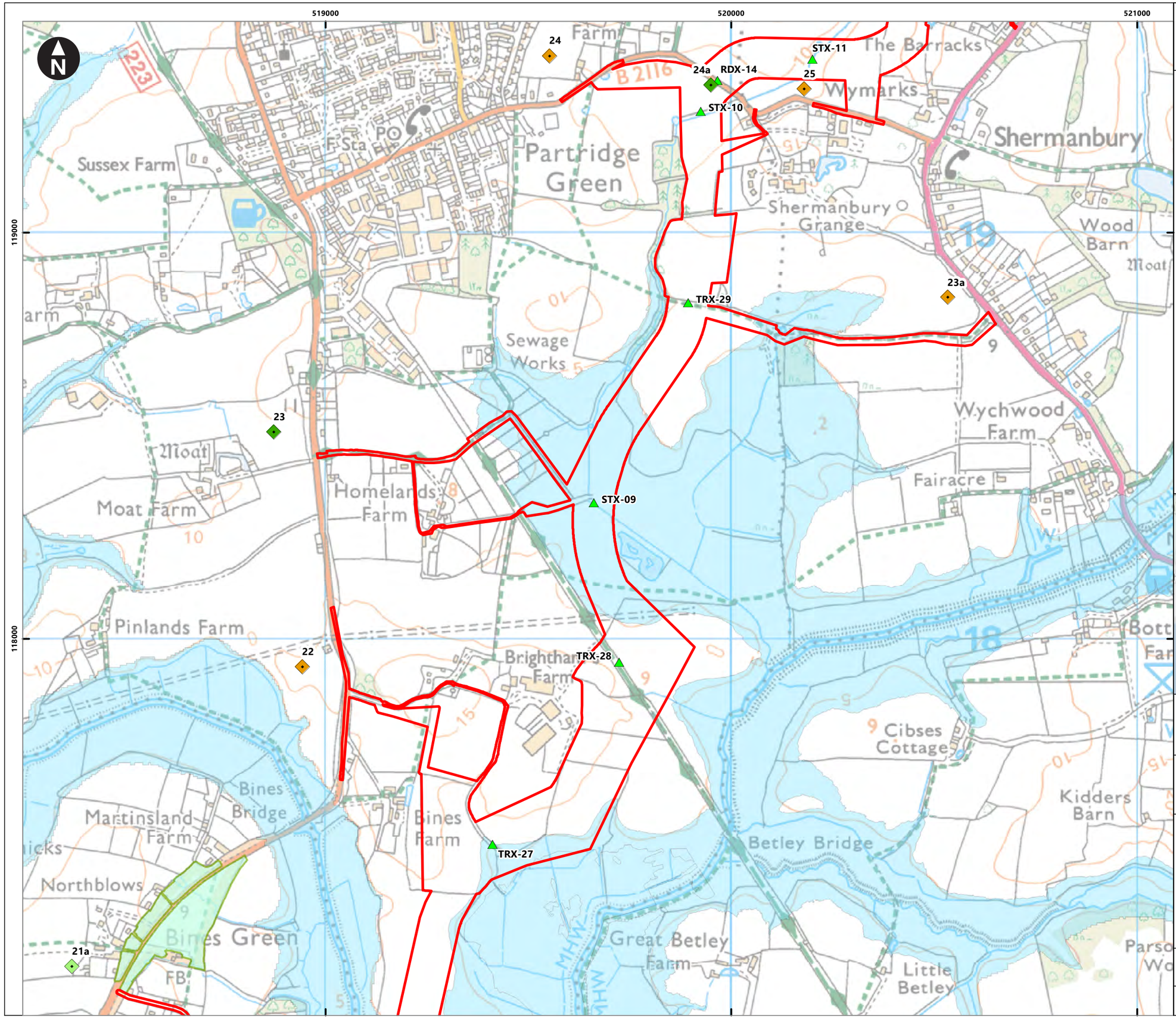
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2m Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

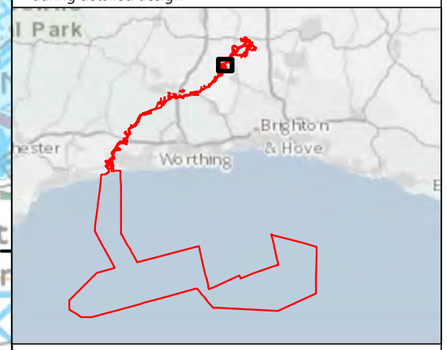
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

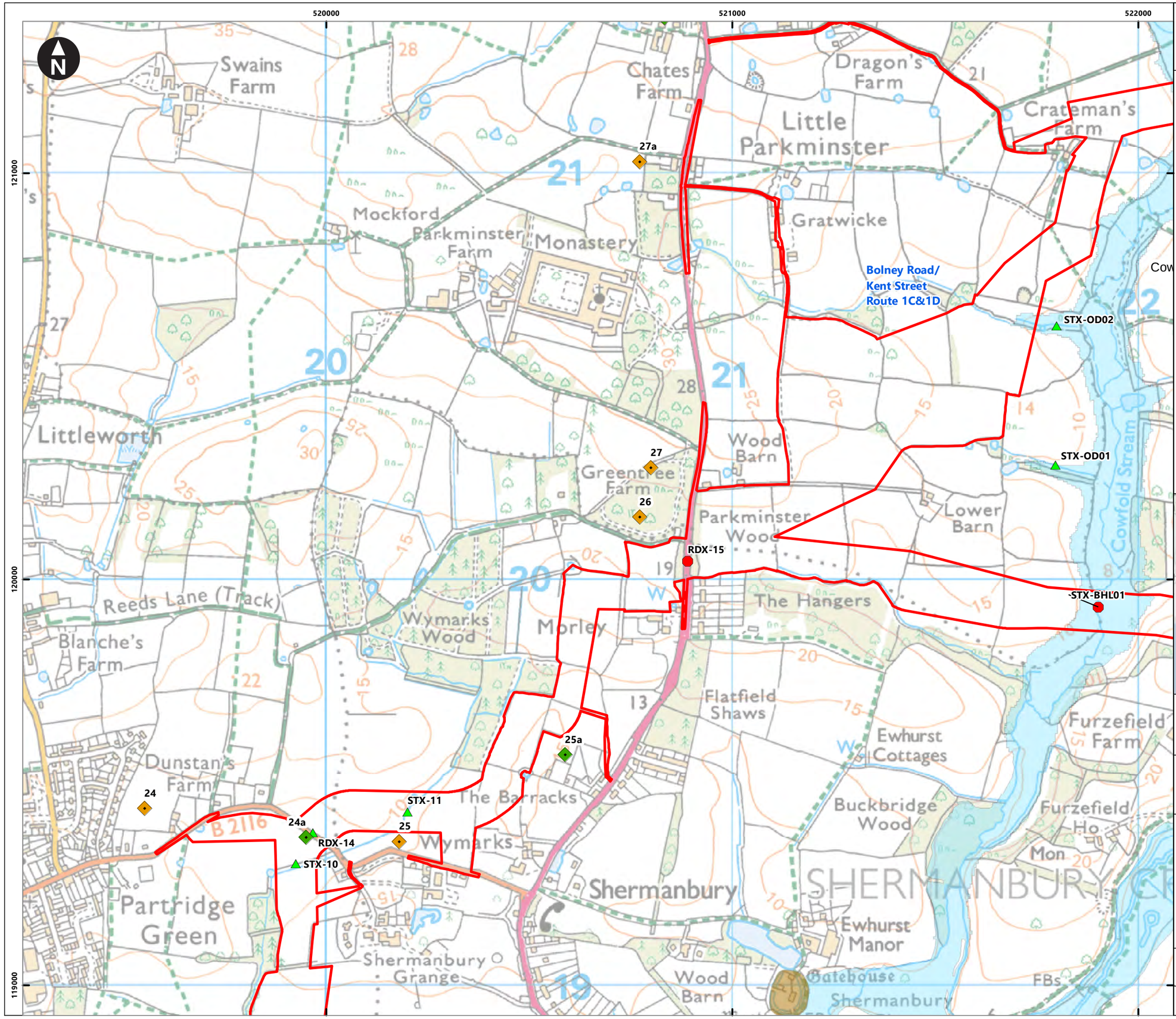
Rampion 2 Offshore Wind Farm

Figure 25.1.2n Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design

Kilometres
0 0.05 0.1 0.2 0.3 0.4
1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

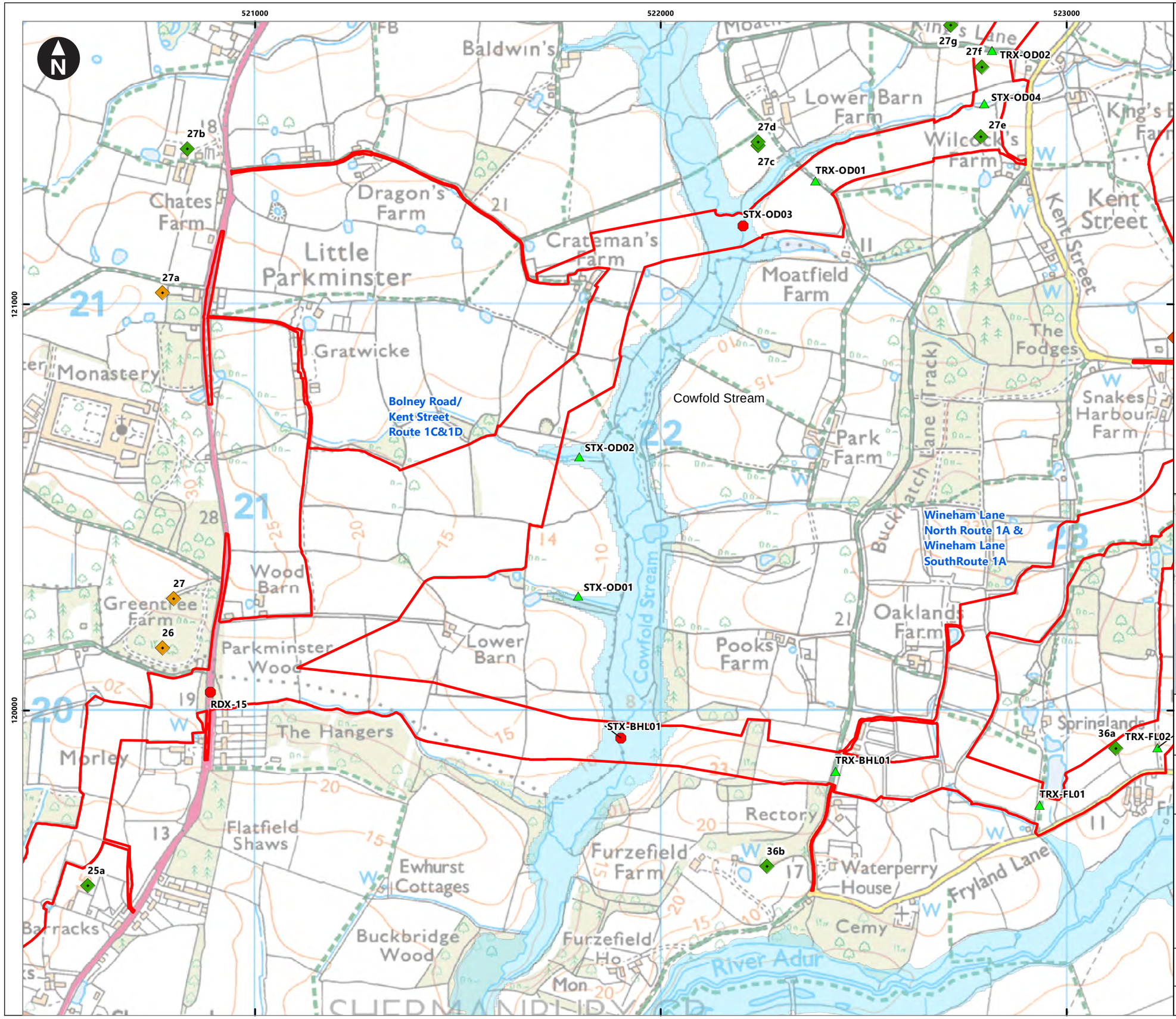
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2o Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design

Kilometres
0 0.05 0.1 0.2 0.3 0.4
1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

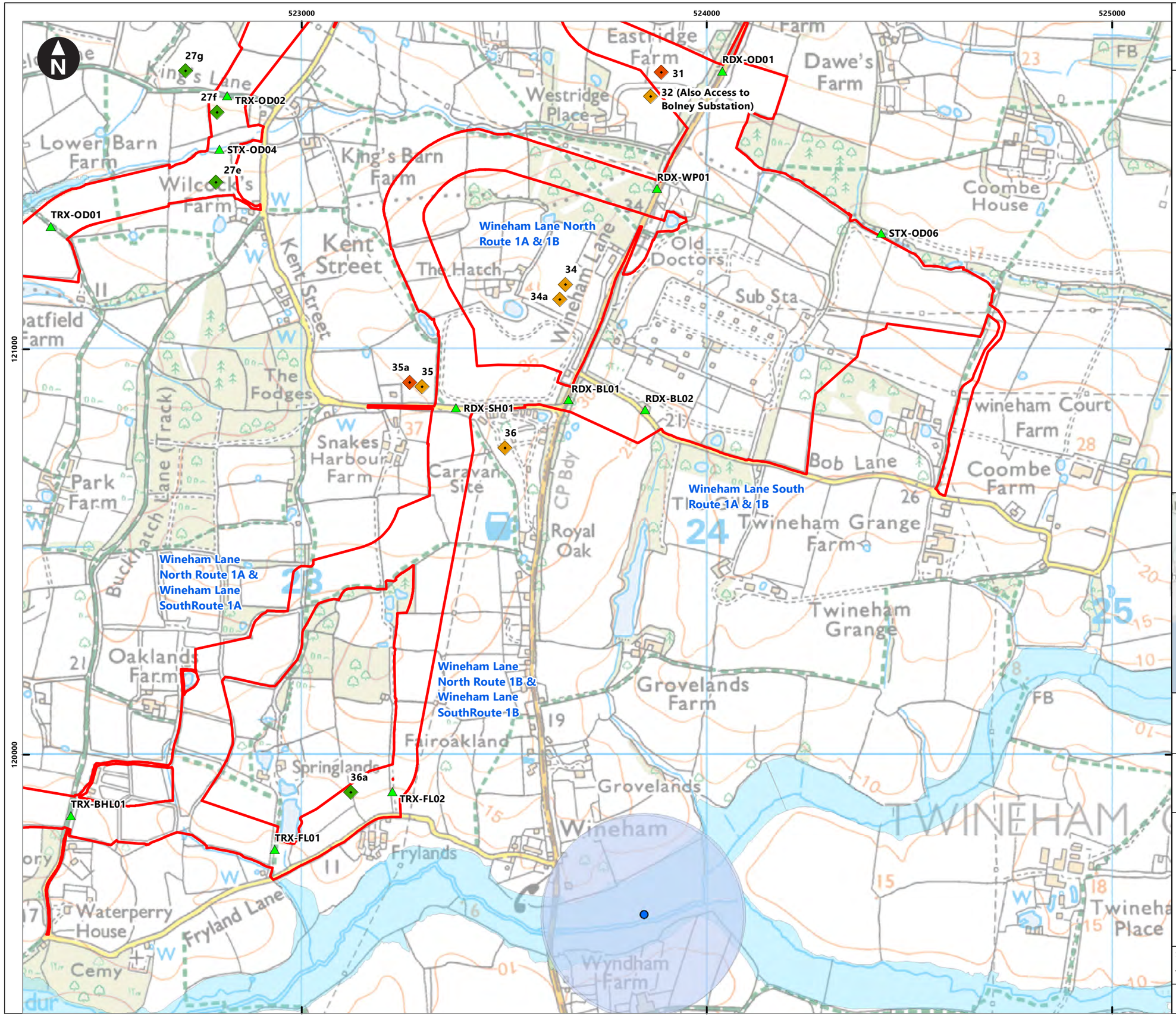
Rampion 2 Offshore Wind Farm

Figure 25.1.2p Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

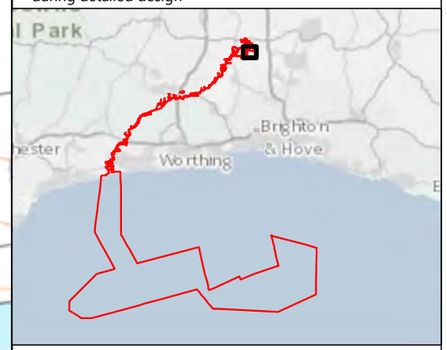
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
0 0.05 0.1 0.2 0.3 0.4

1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

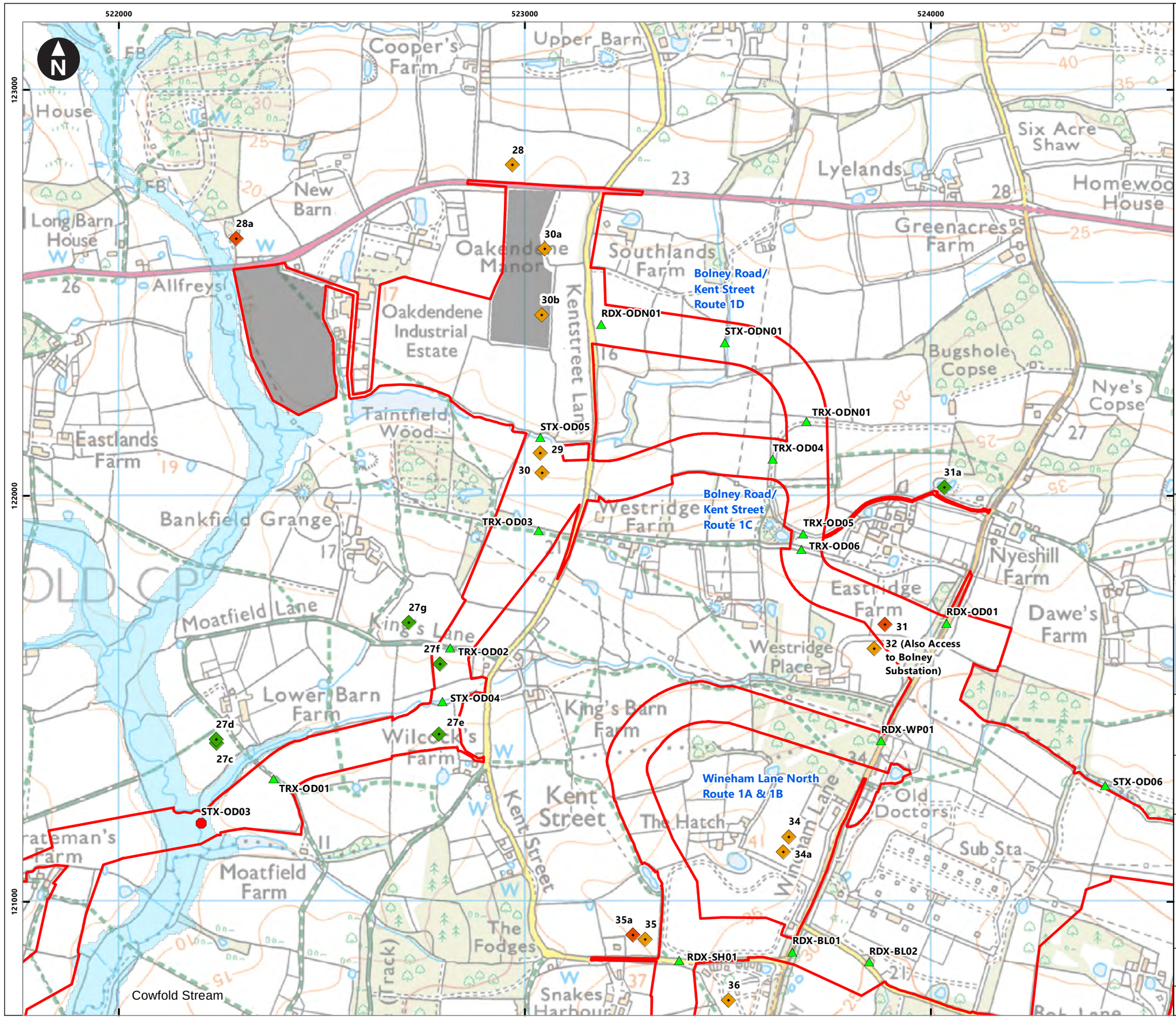
Rampion 2 Offshore Wind Farm

Figure 25.1.2q Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-9614	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	RAINB	25/06/2021	Final



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Key

Proposed development and construction access layout

- PEIR Assessment Boundary
- Temporary construction compounds

Access

- Construction
- Construction & operational
- Light construction
- Light construction & operational
- Operational
- Open cut crossing
- Trenchless crossing

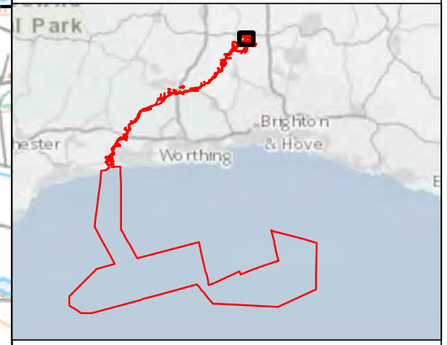
Environmental setting

- SSSI
- Local nature reserve
- Scheduled Monument
- Local geological sites
- Local wildlife sites

Water Supplies

- Private water supplies
- Licensed abstractions
- Source protection zones
- Flood zone 2

Note: the proposed development and construction access layout is indicative only and may be subject to change during detailed design



Kilometres
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British National Grid Transverse Mercator

Rampion Extension Development

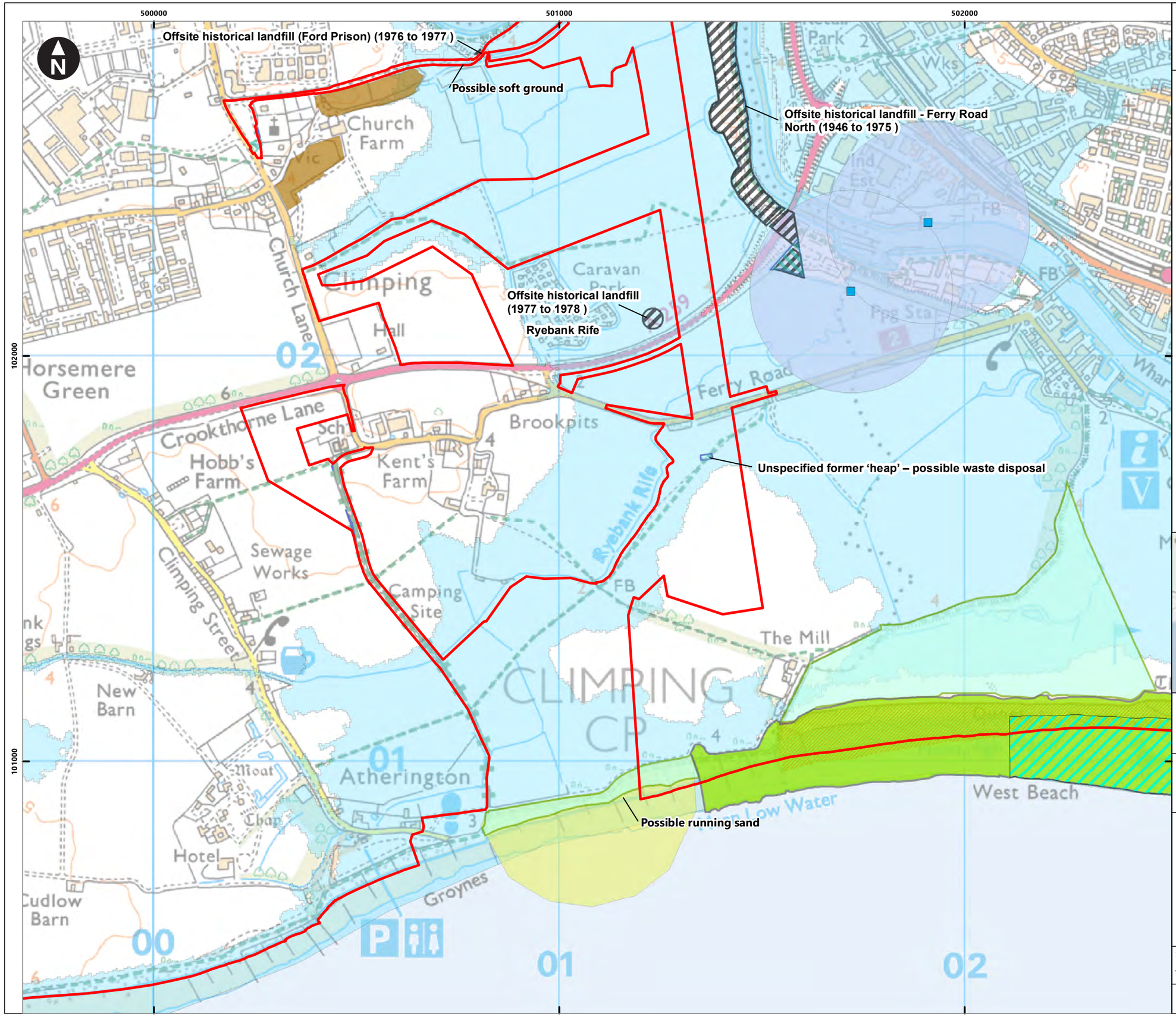
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.2r Site layout

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-9614				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: RAINB	Drawn Date: 25/06/2021	Status: Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

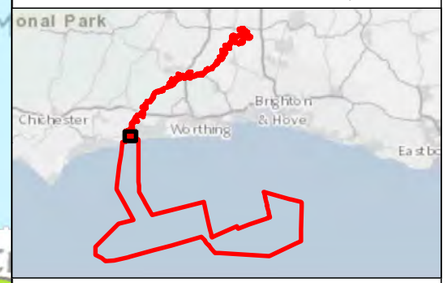
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

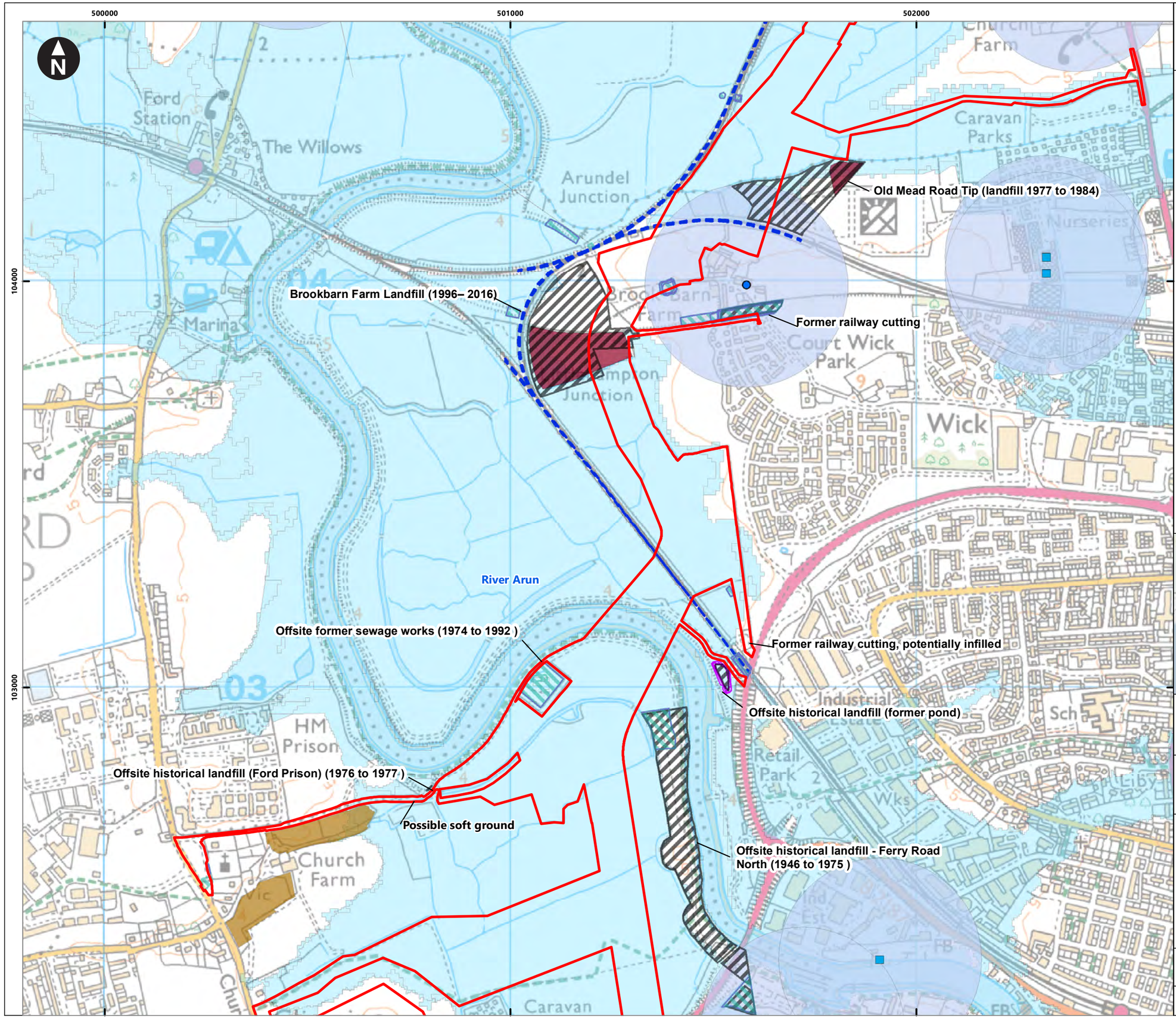
Rampion 2 Offshore Wind Farm

Figure 25.1.3a Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-8409	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

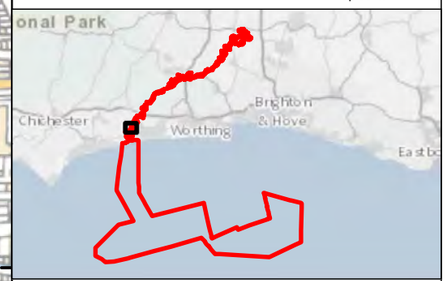
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

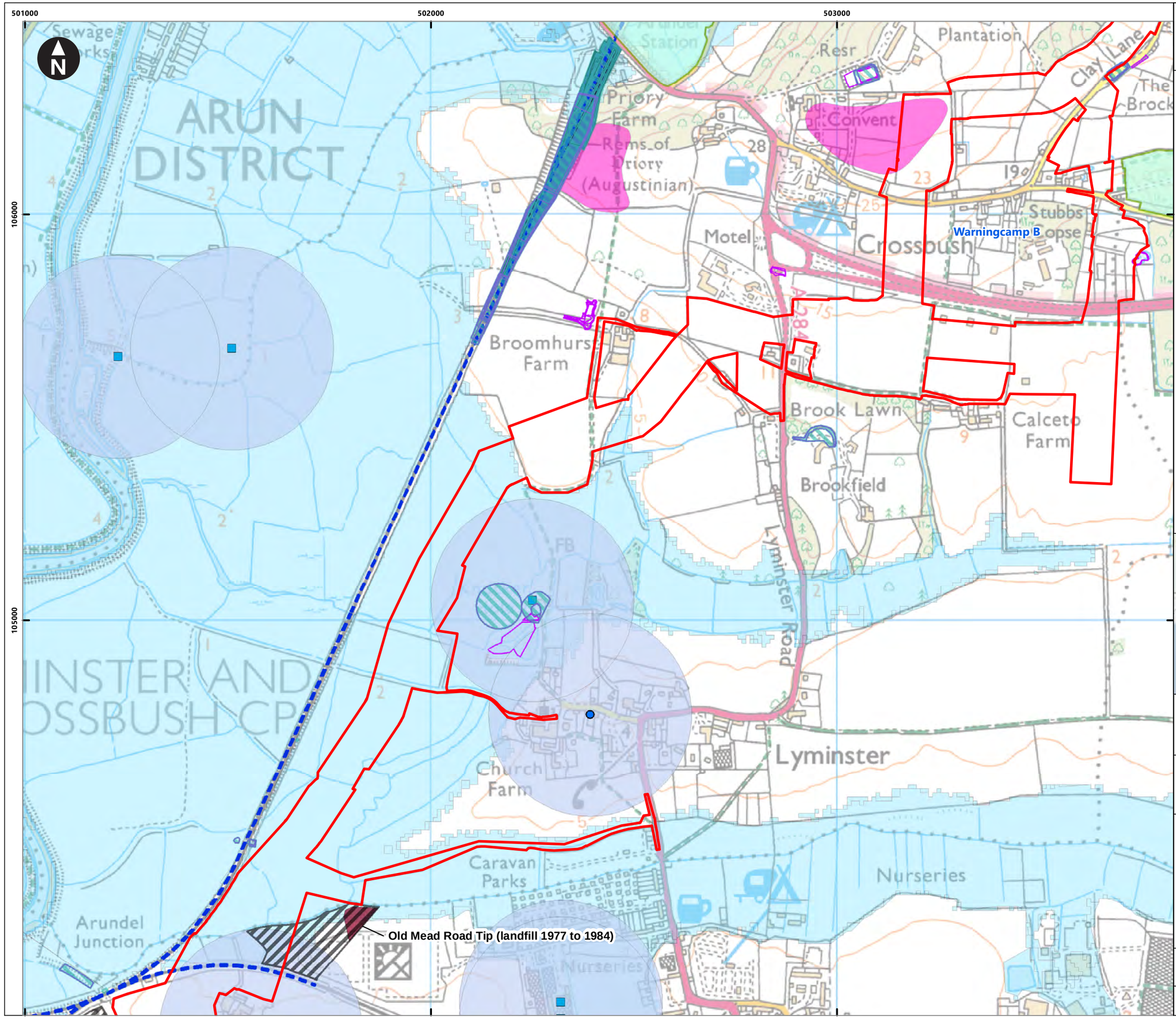
Rampion 2 Offshore Wind Farm

Figure 25.1.3b Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-8409	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

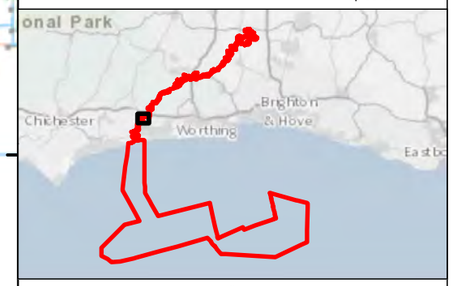
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

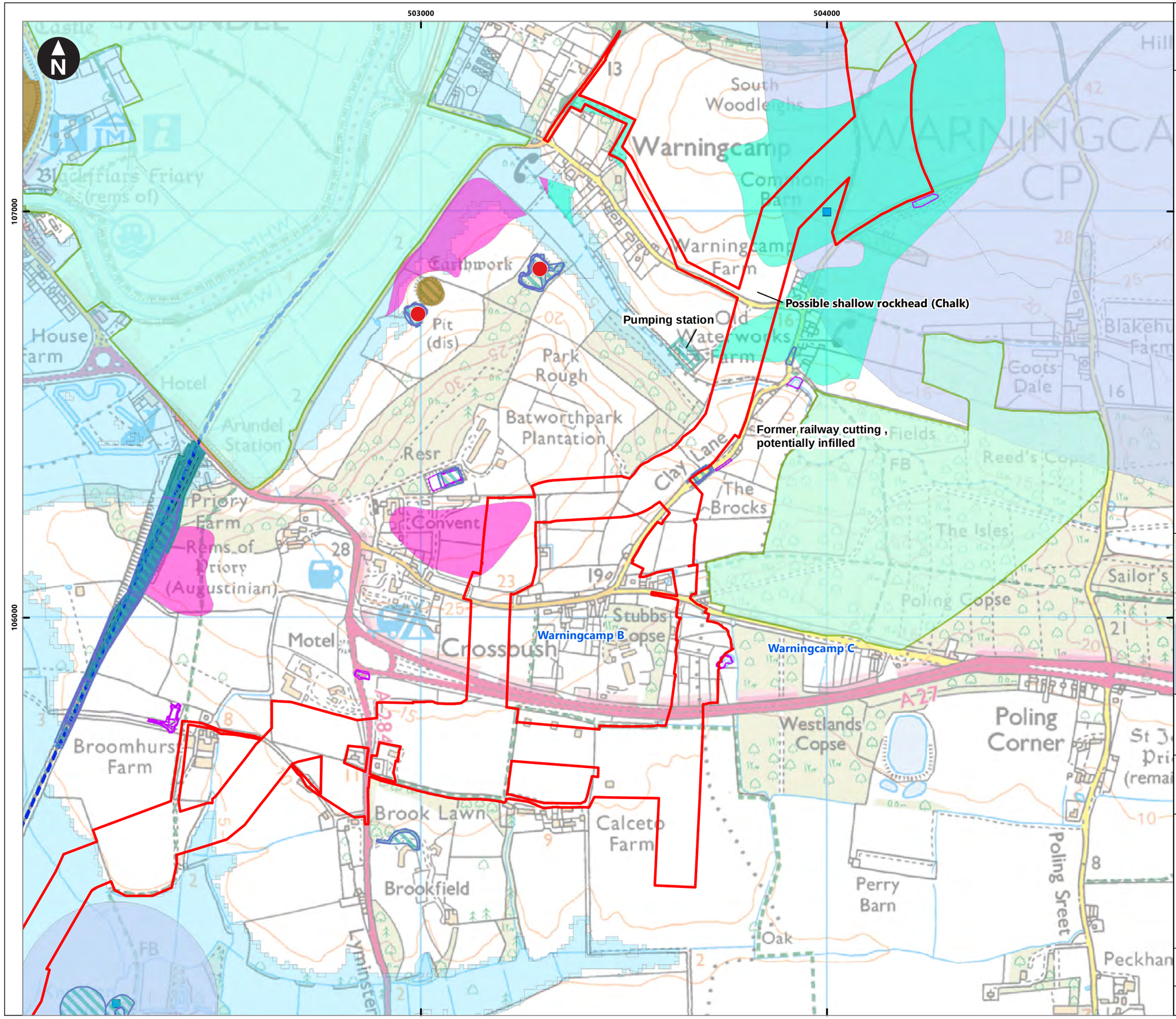
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3c Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits

Rampion Extension Development

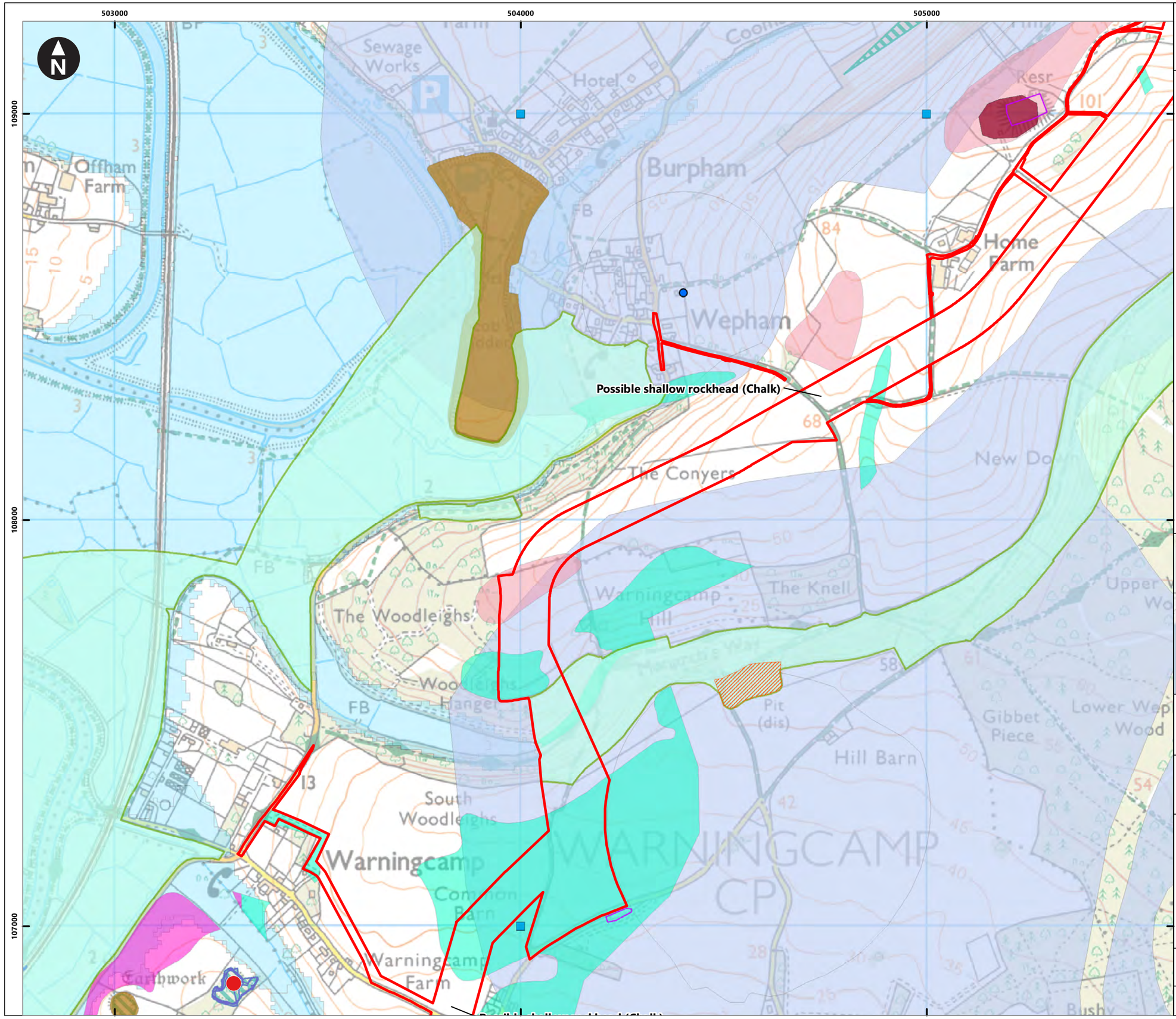
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3d Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

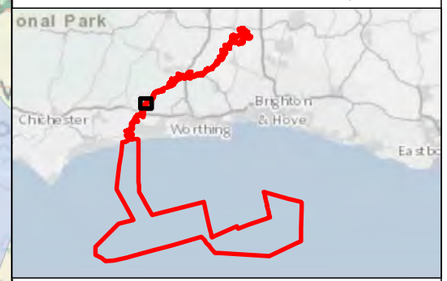
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

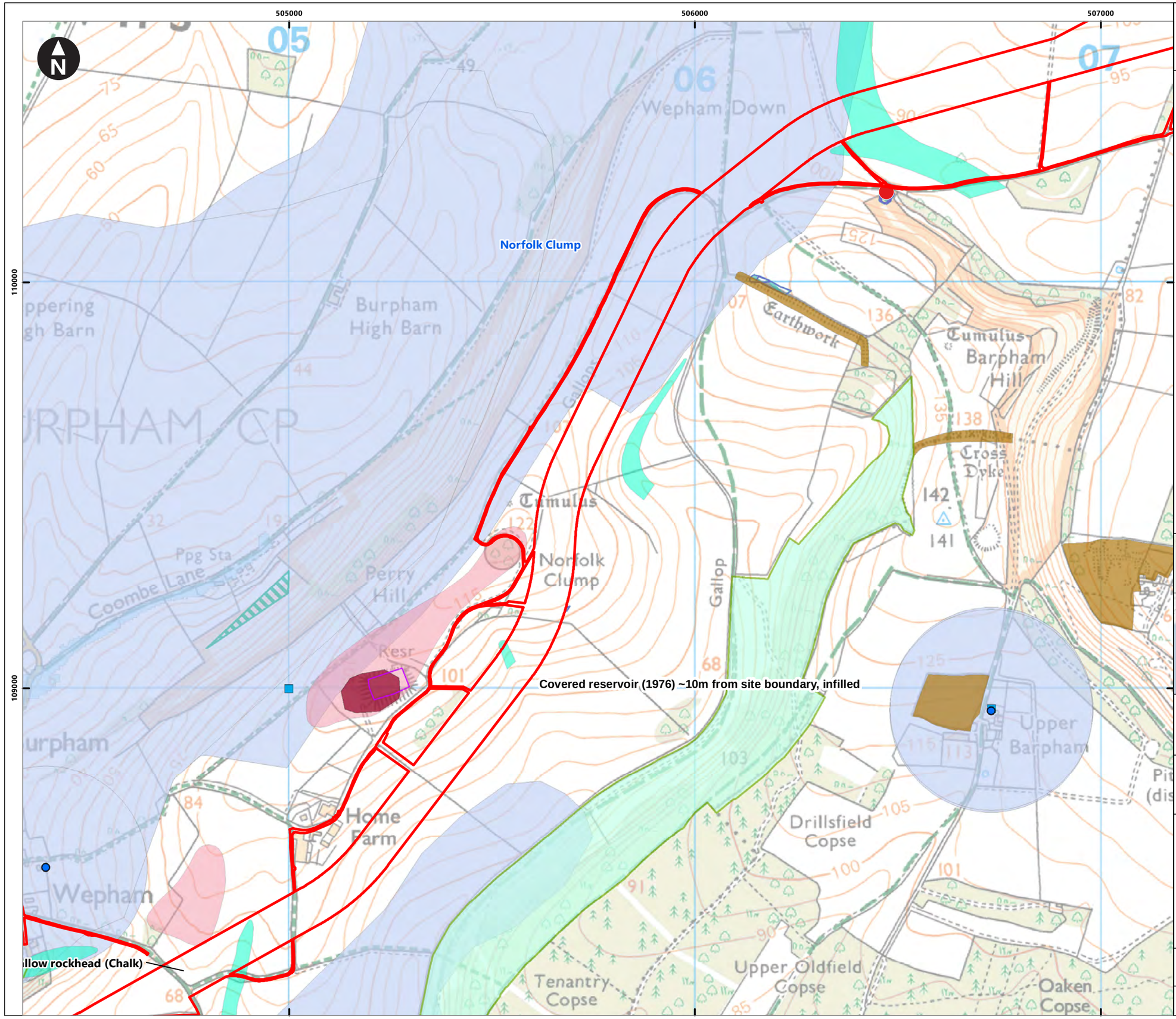
Rampion 2 Offshore Wind Farm

Figure 25.1.3e Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-8409	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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Key

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- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

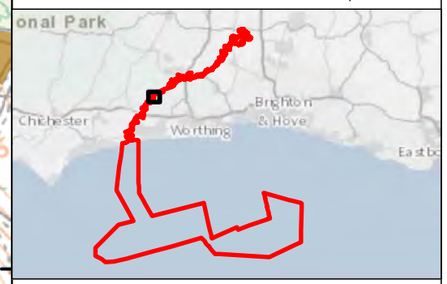
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3f Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
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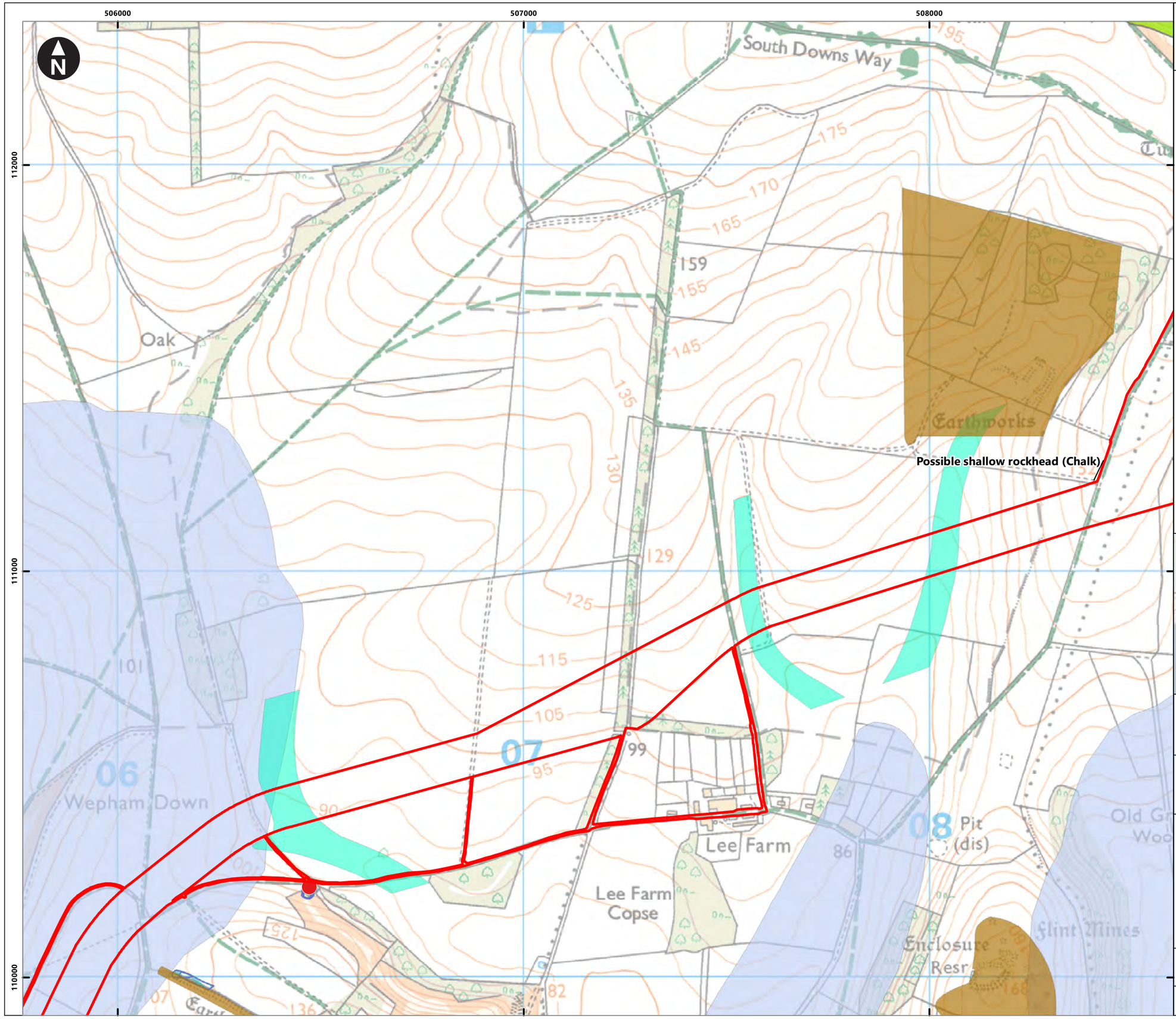
Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

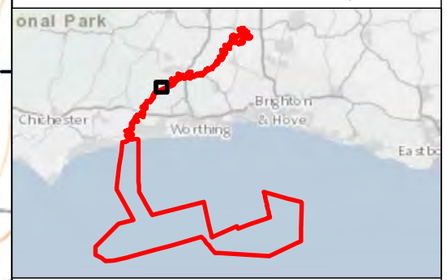
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

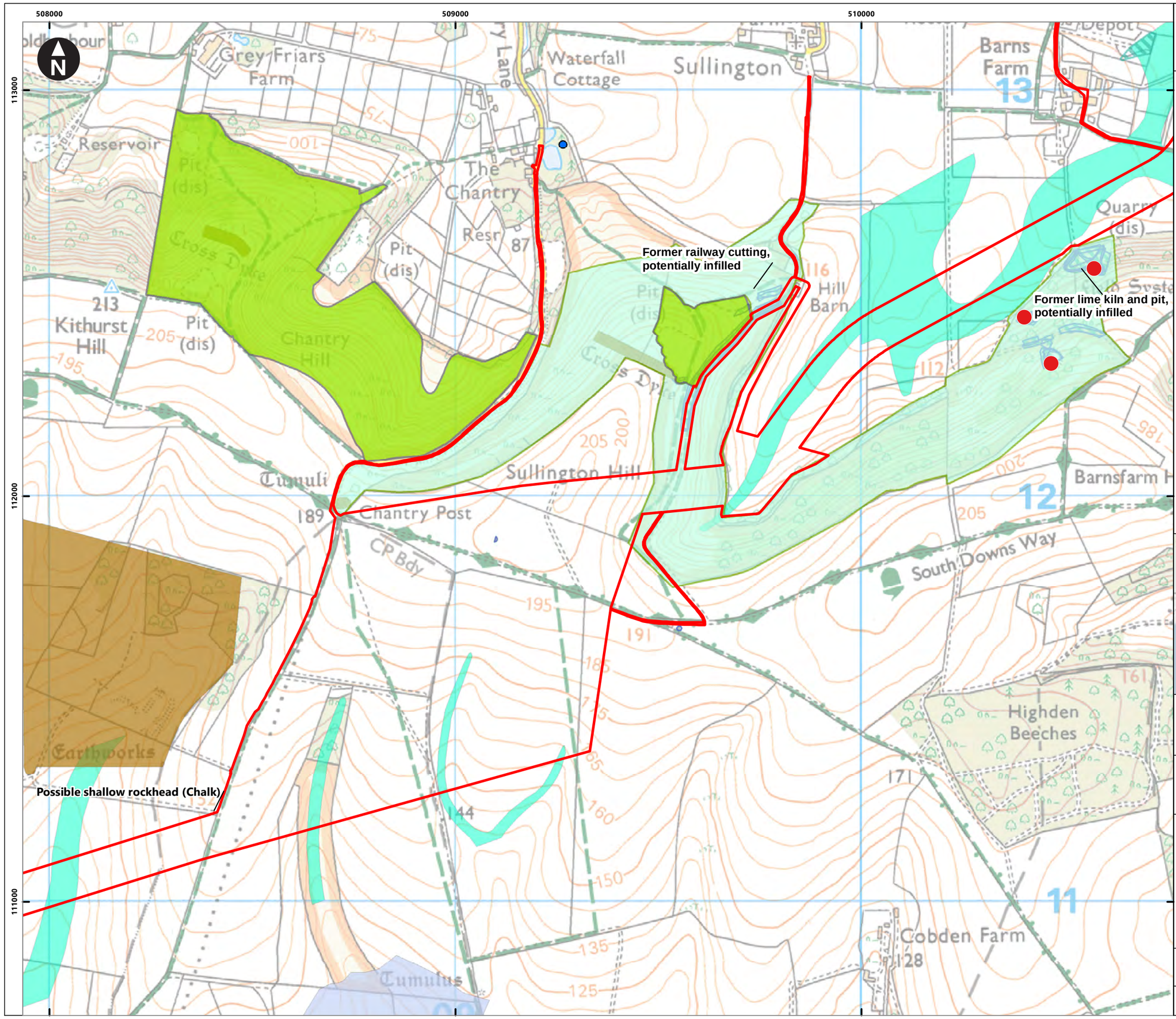
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3g Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

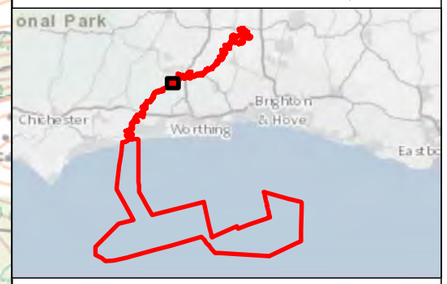
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

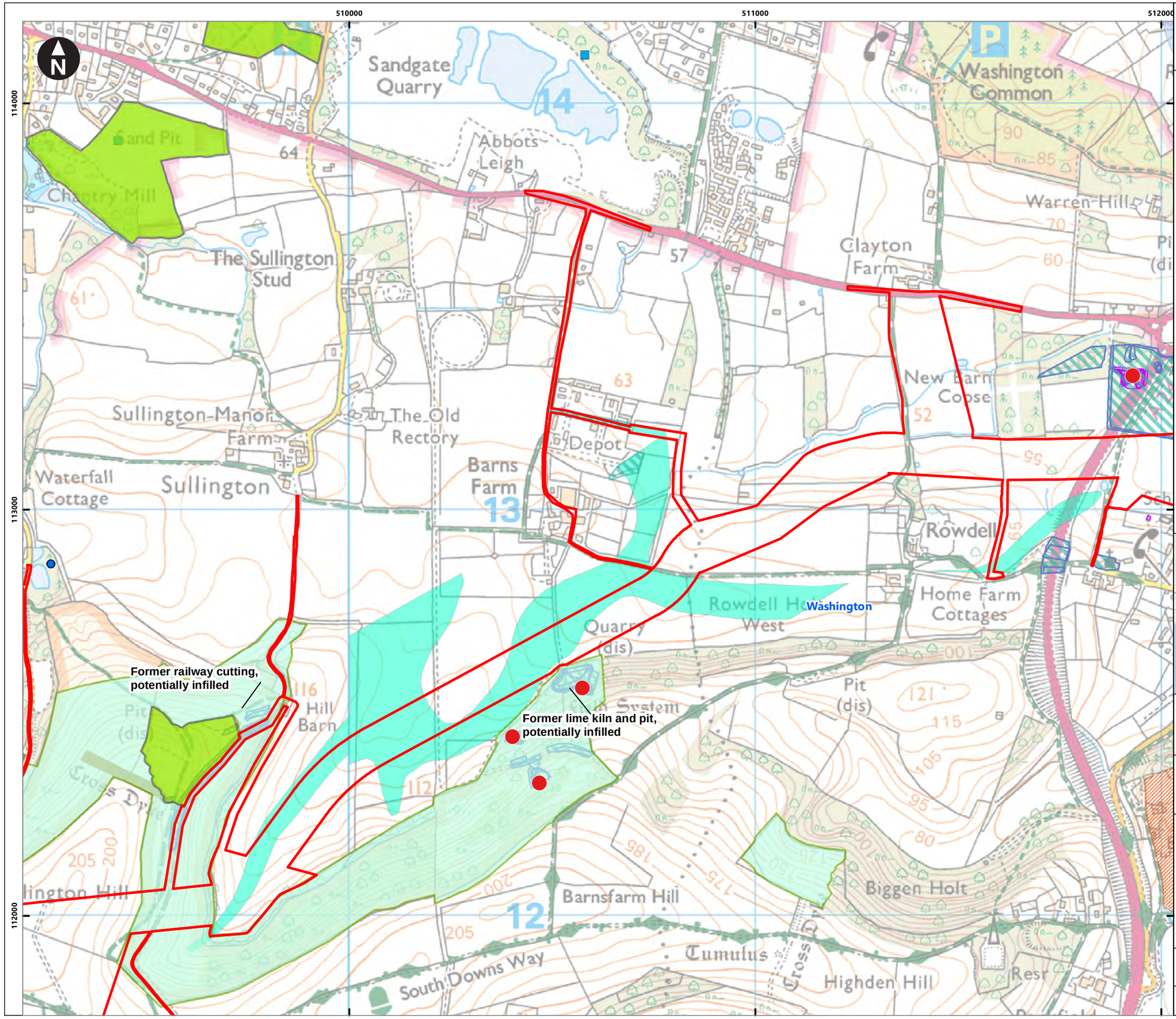
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3h Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



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Key

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- Light industrial units with potential for land contamination
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- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

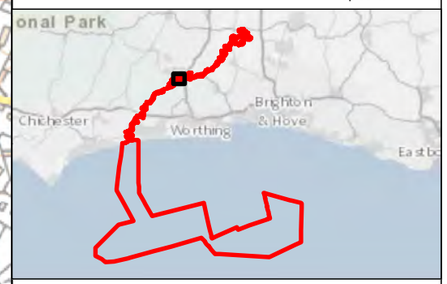
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

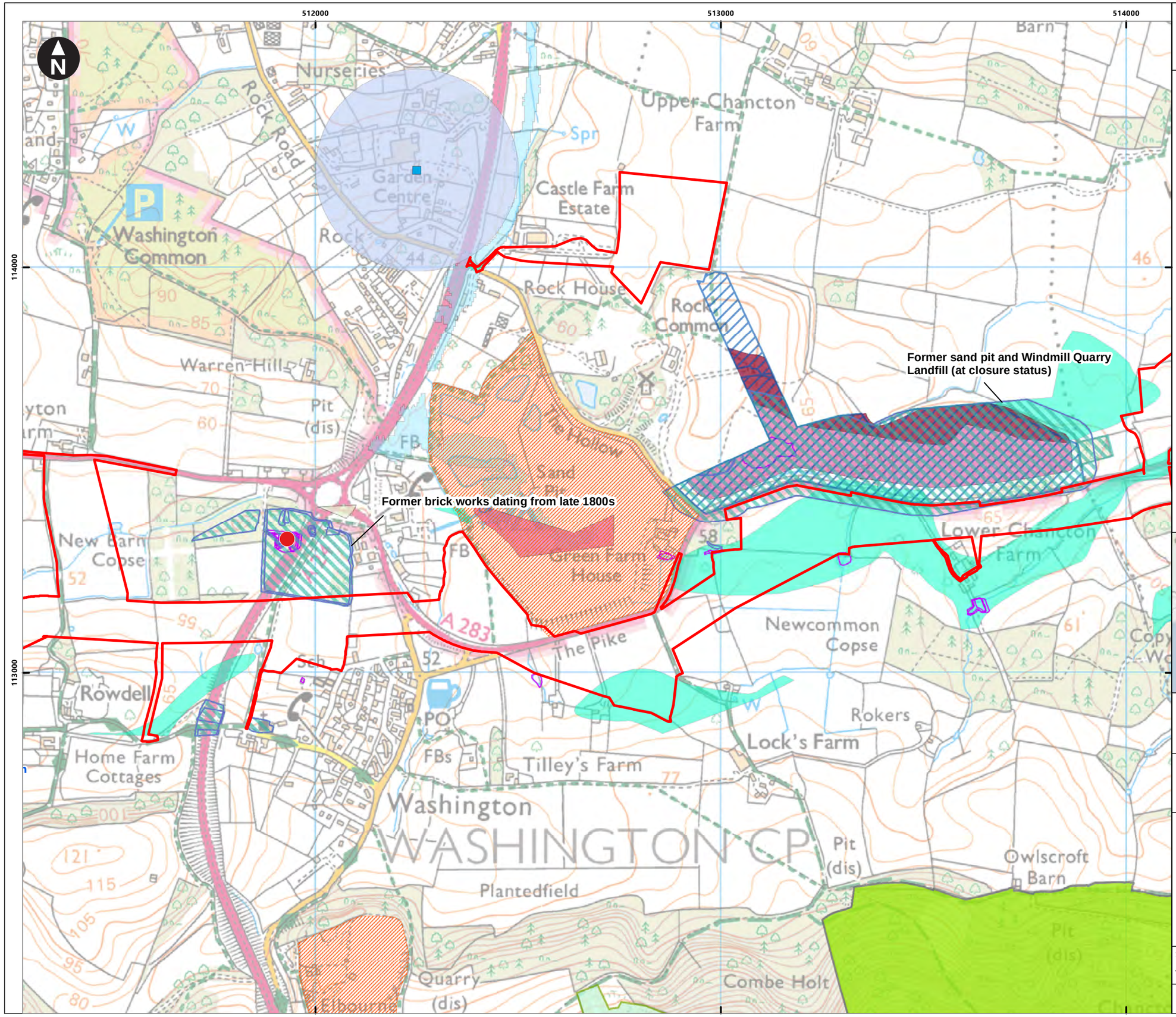
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3i Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

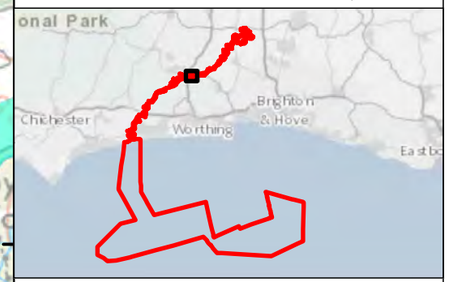
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

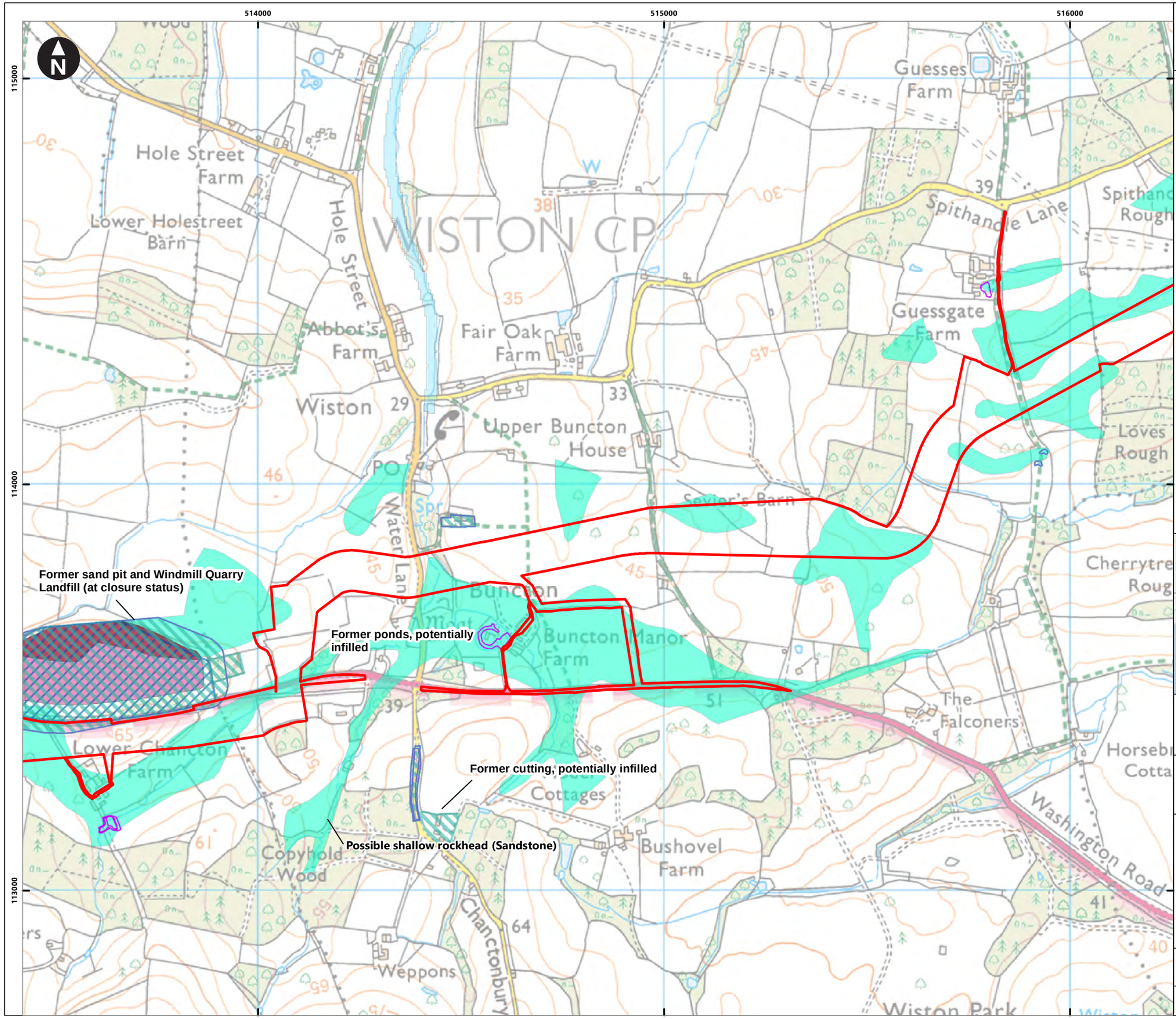
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3j Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
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- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

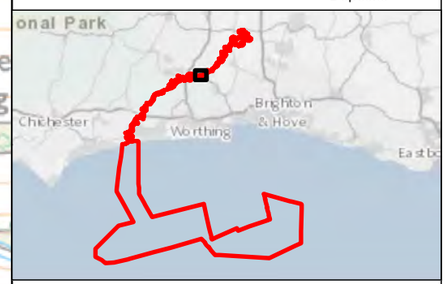
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

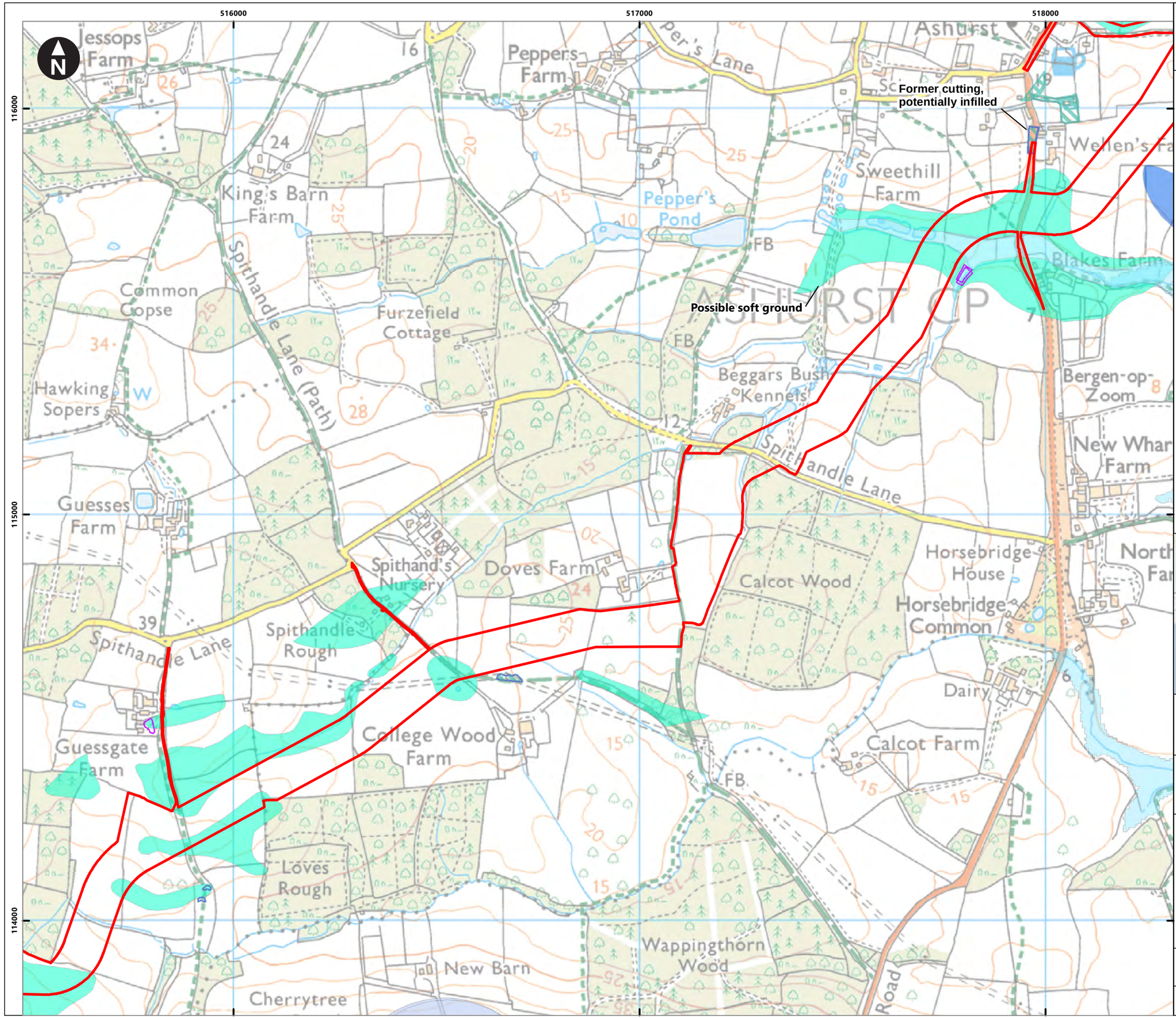
Rampion 2 Offshore Wind Farm

Figure 25.1.3k Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-8409	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

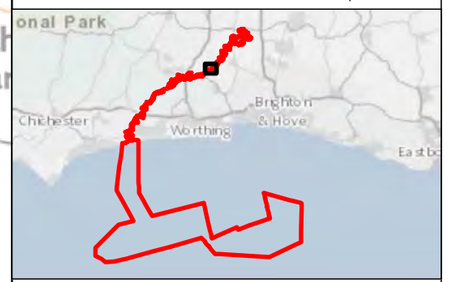
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

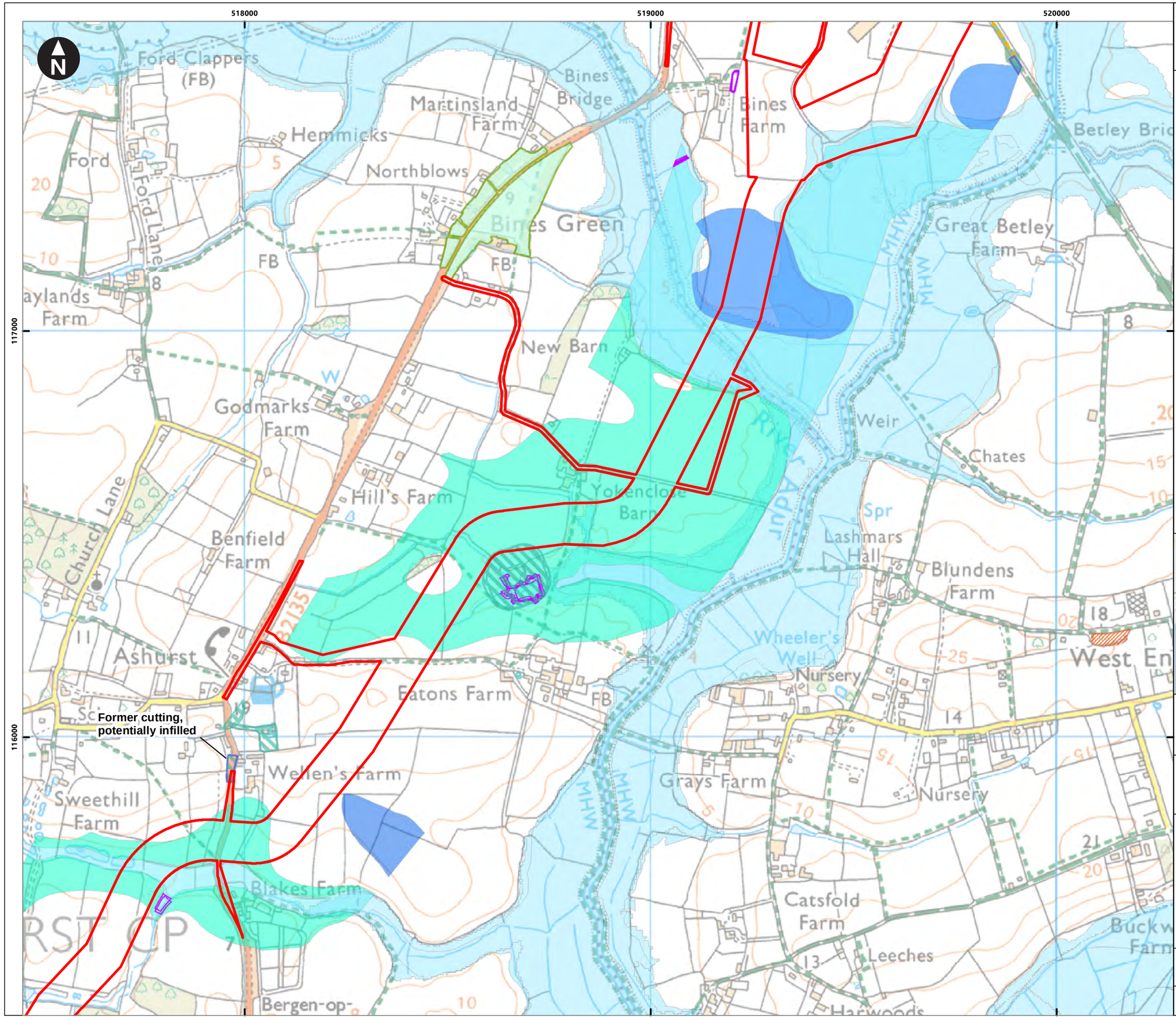
Rampion 2 Offshore Wind Farm

Figure 25.1.3l Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-8409	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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Key

- PEIR Assessment Boundary
- Onshore substation search
- Light industrial units with potential for land contamination
- Brit pits
- Historical industrial land uses
- Active or recent Landfill
- Historical landfill
- Surface ground workings
- Railways
- Historical railways
- Historical railway features
- Source protection zones
- Flood zone 2

Water supplies

- Private water supplies
- Licensed abstractions

Artificial and made ground

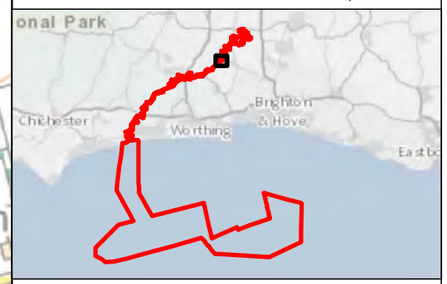
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Disturbed Ground (Undivided)
- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
- River Terrace Deposits (Adur)
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

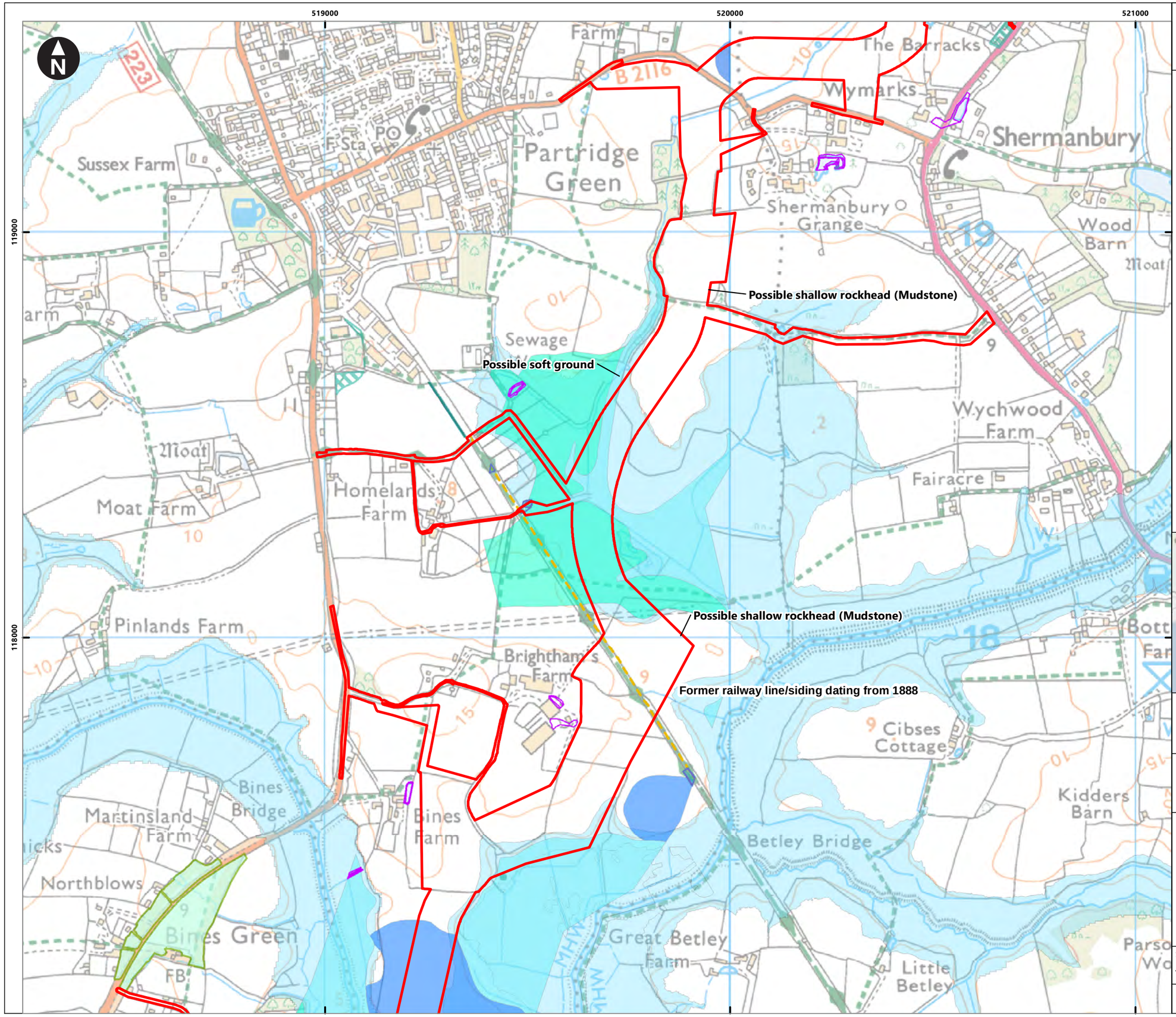
Rampion 2 Offshore Wind Farm

Figure 25.1.3m Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-8409	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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Key

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- Historical railways
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- Licensed abstractions

Artificial and made ground

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- Landscaped Ground (Undivided)

Environmental setting

- Local nature reserve
- SSSI
- Local geologcal sites
- Local wildlife sites
- Scheduled Monument

Superficial geology

- Alluvium
- Beach And Tidal Flat Deposits
- Clay-With-Flints Formation
- Head
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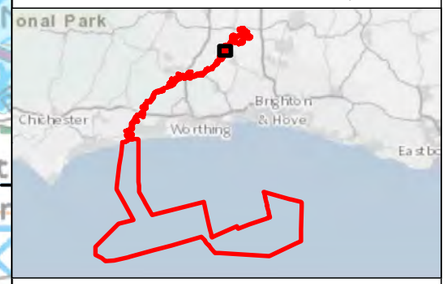
- River Terrace Deposits



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British National Grid Transverse Mercator

Rampion Extension Development

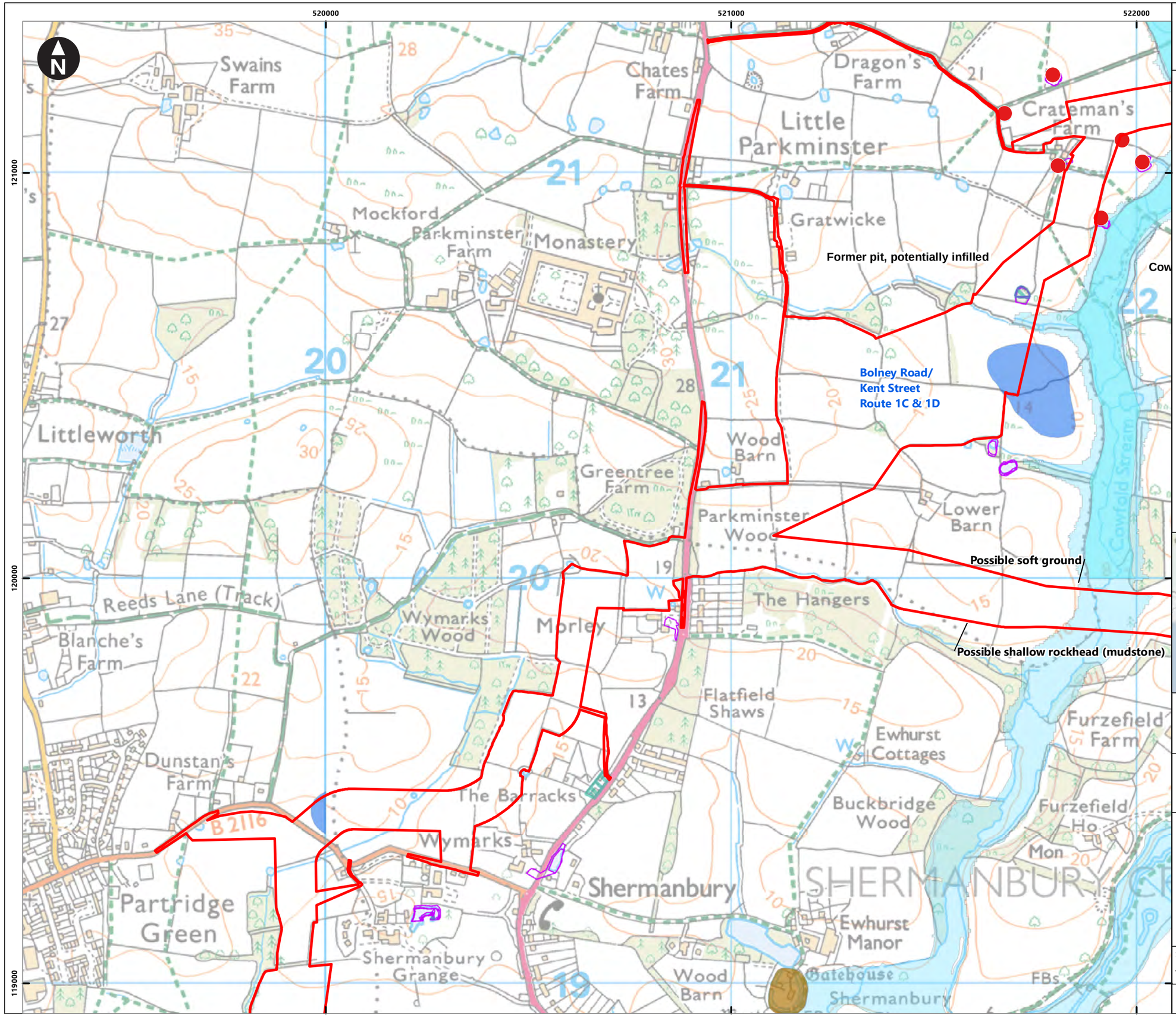
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3n Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

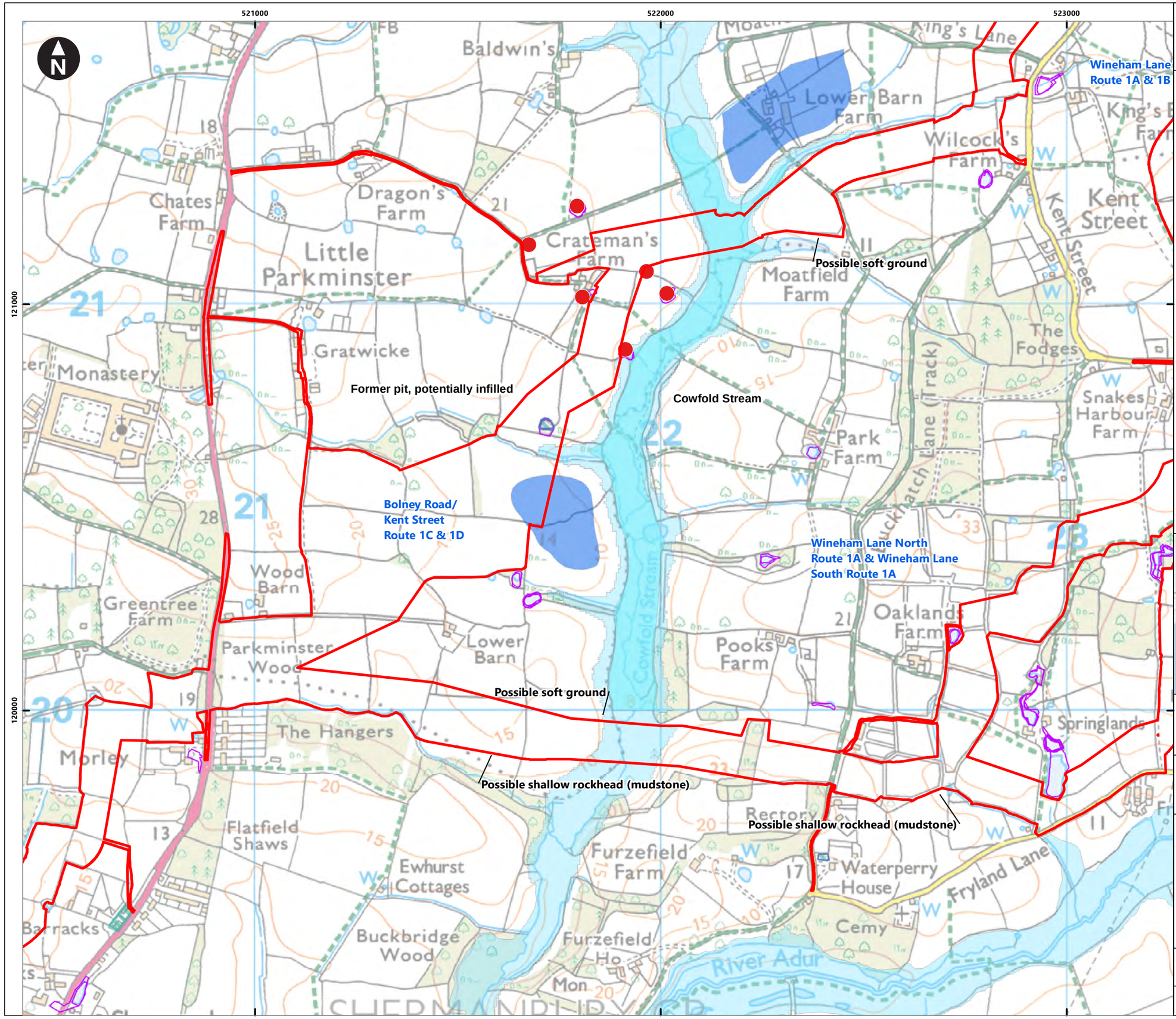
Rampion 2 Offshore Wind Farm

Figure 25.1.3o Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
42285-WOOD-PE-ON-FG-OG-8409	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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- Onshore substation search
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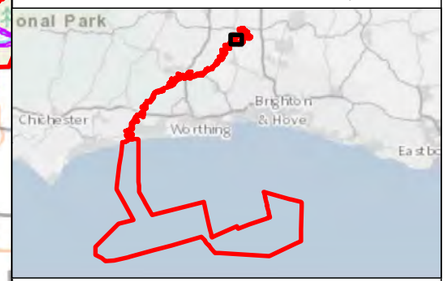

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British National Grid Transverse Mercator

Rampion Extension Development

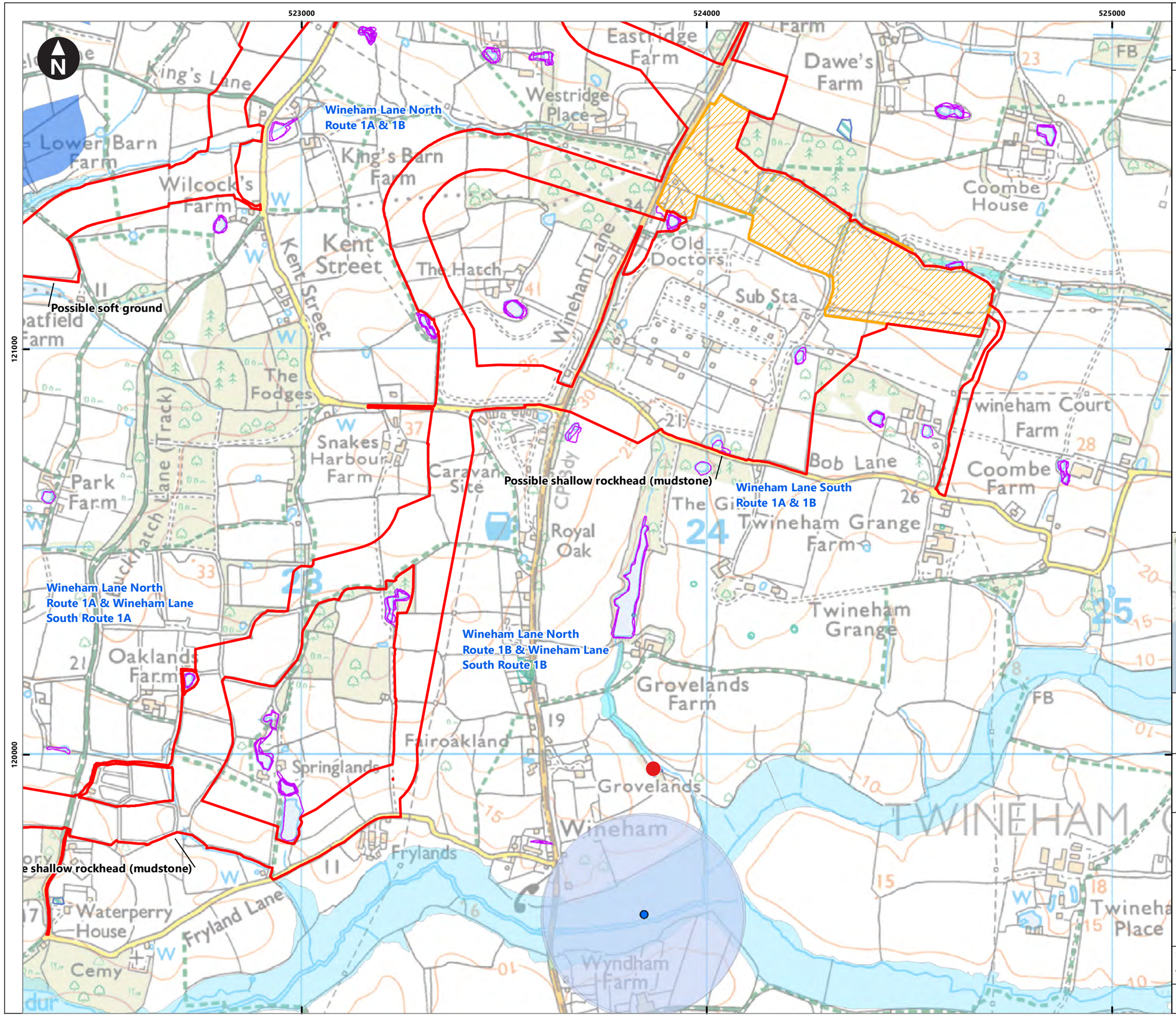
Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3p Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
42285-WOOD-PE-ON-FG-OG-8409				1.0
Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final



Key

- PEIR Assessment Boundary
- Onshore substation search
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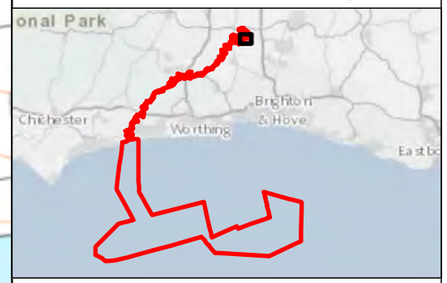

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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3q Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:	Version:
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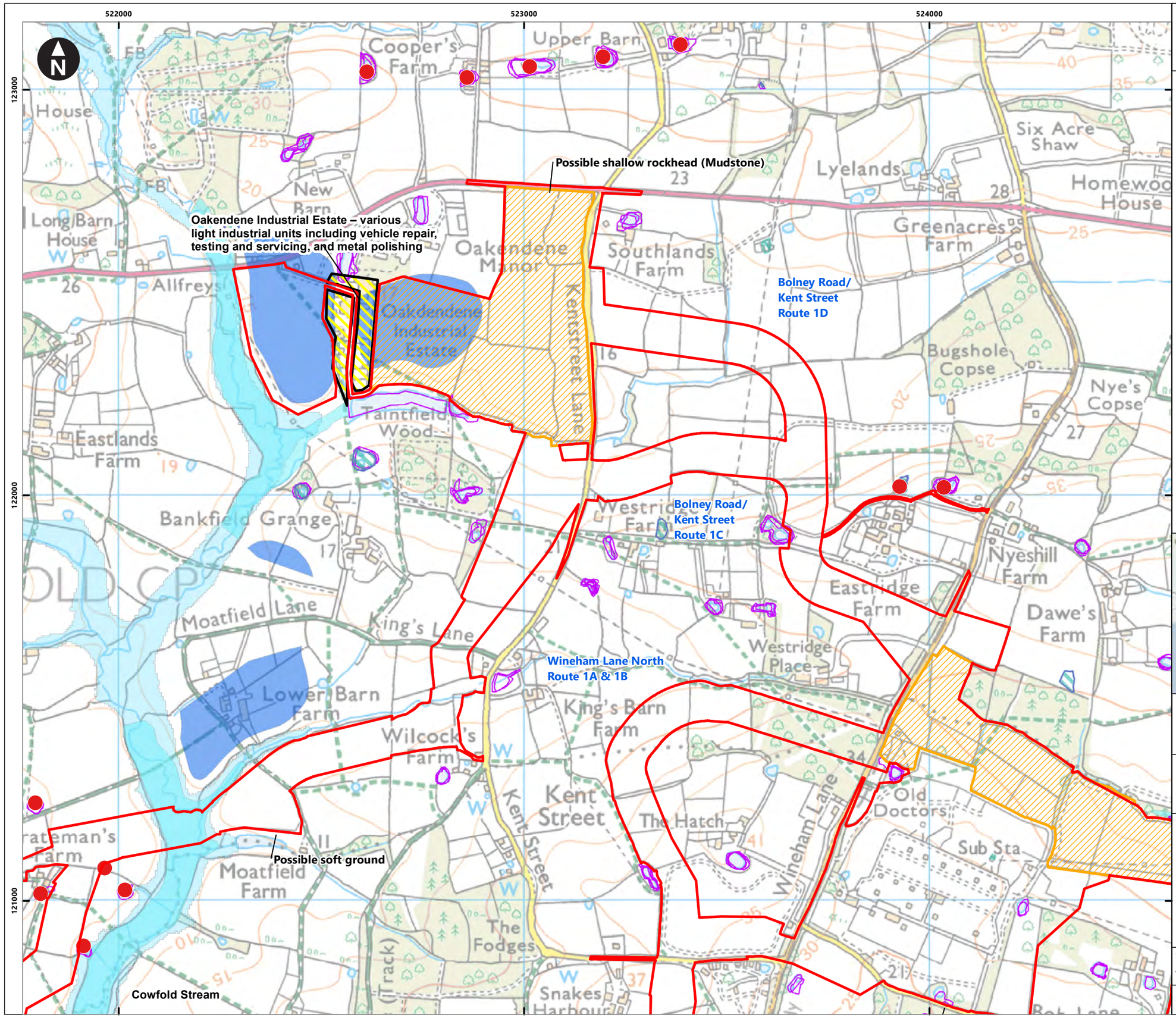
Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
Wood	BARNB	LYNNG	25/06/2021	Final



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Key

- PEIR Assessment Boundary
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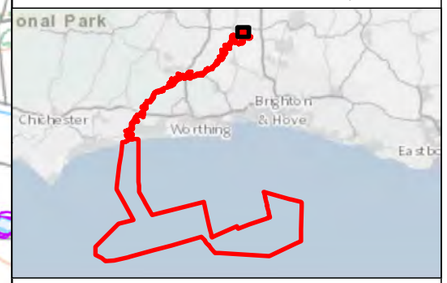
- River Terrace Deposits



Kilometres
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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 25.1.3r Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

System Identifier:				Version:
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Company: Wood	Drawn By: BARNB	Chk/Aprvd: LYNNG	Drawn Date: 25/06/2021	Status: Final

Annex B
Zetica Unexploded Ordnance Risk Map (excerpt)

UNEXPLODED BOMB RISK MAP

zeticauxo

SITE LOCATION

Map Centre: 502150,101275

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.

miltary | **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: **www.zeticauxo.com**

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: **(https://zeticauxo.com/downloads-and-resources/risk-maps/)**

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'.

Annex C
Preliminary Risk Assessment Methodology

The environmental risk assessment aims to assess the significance of each potential contaminant linkage. The key to the classification is that the designation of risk is based upon the consideration of both:

- **the magnitude of the potential consequence (i.e. severity).** It takes into account both the potential severity of the hazard and the sensitivity of the receptor; and
- **the magnitude of probability (i.e. likelihood).** It takes into account both the presence of the hazard and receptor and the integrity of the pathway.

The definitions for the qualitative risk assessment have been taken from 'Guidance for the Safe Development of Housing on Land Affected by Contamination' Annex 4 R&D Publication 66: 2008 Volume 2.

The Likelihood Probability Classifications of SPR Linkage being realised is presented in **Table C-1**

Table C-1 Likelihood Probability Classifications of SPR Linkage being realised

Classification	Definition	Examples
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	a) Elevated concentrations of toxic contaminants are present below hardstanding. b) Light industrial unit <10 yrs old containing a double skinned Underground Storage Tanks (UST) with annual integrity testing results available.
Low Likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.	a) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space. b) Ground / groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.

Classification	Definition	Examples
Likely	There is pollutant 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.	a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space. b) Ground / groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.	a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden. b) Ground / groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.

“Potential Consequence of Contaminant Linkage” gives an indication of the sensitivity of a given receptor to a particular source or contaminant of concern under consideration. It is based on full exposure via the particular linkage being examined. The classification of consequence is presented in **Table C-2**.

Table C-2 Outline of Hazard Consequence Classifications for Receptor Types from Contamination Impact:

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Examples
Severe	Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs.	Equivalent to Environment Agency Category 1 pollution incident including persistent and / or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce.	Major damage to aquatic or other ecosystems, which **is likely** to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population.	Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in Circular 01/2006 as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of Hazardous or priority substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Examples
Medium	Elevated concentrations which **could** result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs.	Equivalent to Environment Agency Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce.	Significant damage to aquatic or other ecosystems, which **may** result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population.	Significant damage to crops, buildings or property.	Significant harm to humans is defined in Circular 01/2006 as death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability). Ingress of contaminants through plastic potable water pipes.
Mild	Exposure to human health **unlikely** to lead to "significant harm".	Equivalent to Environment Agency Category 3 pollution incident	Minor or short lived damage to aquatic or other ecosystems, which **is unlikely** to result in a substantial	Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Examples
		including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce.	adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.		
Minor	No measurable effects on humans	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.

The risk matrix to link the likelihood and consequence is shown in **Table C-3.**

Table C-3 Risk Matrix

Likelihood:	**Unlikely**	**Low Likelihood**	**Likely**	**High Likelihood**
Potential Consequence:				
Severe	Moderate / low risk	**Moderate Risk**	**High Risk**	**Very High Risk**
Medium	Low	Moderate / low risk	**Moderate Risk**	**High Risk**
Mild	Very low risk	Low Risk	Moderate / low risk	**Moderate Risk**
Minor	Very low risk	Very low risk	Low Risk	Low Risk

The overall risk definitions are summarised in **Table C-4.**

Table C-4 Risk Definitions

Risk	**Definition**
Very Low	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.
Low	It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the Site owner / or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner / or occupier. Some remediation works may be required in the longer term.
High	Harm is likely to arise to a designated receptor from an identified hazard at the Site without remediation action. Realisation of the risk is likely to present a substantial liability to the Site owner / or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.

Risk	Definition
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the Site without remediation action or there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner / or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.