Rampion 2 Wind Farm

Category 6: Environmental Statement

Volume 4, Appendix 24.1: Phase 1 geo-environmental desk study

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1. Introduction

1.1 Background

1.1.1 This Appendix 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 The purpose of this Appendix is to inform the baseline conditions for **Chapter 24: Ground conditions, Volume 2** of the ES (Document Reference: 6.2.24) of the Environmental Statement (ES) accompanying the Development Consent Order (DCO) Application. With reference to the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government (MHCLG), 2021), the report will assist in determining whether the Site is 'suitable for use'.

1.1.3 For the purposes of this Appendix, the term "the Site" has been used to refer to the land encompassed by the Proposed DCO Order Limits and within which the onshore elements of the Proposed Development will be constructed. A site location and layout plan covering the Proposed DCO Order Limits is presented as **Figure 24.1.1** in **Annex A**.

1.1.4 The ground conditions desk-top data which underpins this Appendix was originally obtained based on the assessment boundary issued as part of the Preliminary Environmental Information Report (RED, 2021) (PEIR). Supplementary data has since been obtained for additional areas of the assessment boundary identified as the design of the Proposed Development has evolved in response to baseline information, engineering design and stakeholder feedback (issued as part of the supplementary and further supplementary statutory consultations (PEIR Supplementary Information Report (SIR) (RED, 2022) and PEIR Further Supplementary Information Report (FSIR) (RED, 2023)). These additional areas are referred to as Longer Alternative Cable Routes (LACRs), which also include Alternative Cable Routes (ACRs), Modified Routes (MRs) and Alternative Accesses (AAs) where relevant as described in the PEIR SIR (RED, 2022) and PEIR FSIR (RED, 2023).

1.1.5 Consequently, some of the original desk-top data is no longer required to define the baseline conditions of the Site. However, as that data was used during the evolution of the design of the Proposed Development to inform those design changes, it has not been removed from this Appendix and is therefore presented for completeness. A plan showing the baseline data for areas which are no longer within the proposed DCO Order Limits is presented as **Annex B**.

1.1.6 The Conceptual Model (CM) and Preliminary Risk Assessment (PRA) presented in **Section 5** however, only considers those contaminant linkages from sources in or adjacent to areas being taken forward as part of the Proposed Development.

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** of the ES (Document Reference 6.2.4) and a summary is presented below.

1.2.2 Rampion Extension Development Limited (RED) proposes to develop Rampion 2 adjacent to the existing Rampion 1 offshore wind farm in the English Channel off the south coast of England. The Proposed Development comprises onshore and offshore infrastructure and this Appendix relates to the onshore elements only which include:

- a single proposed landfall site using Horizontal Directional Drilling (HDD) installation techniques;
- buried onshore cables in a single corridor approximately 38.8km in length;
- a new onshore substation proposed at Oakendene near Cowfold that will connect to the existing National Grid Bolney substation, Mid Sussex, via buried onshore cables; and
- additional infrastructure at the existing National Grid Bolney substation to connect Rampion 2 to the national grid electrical network.

1.2.3 Onshore cables will be installed in up to four trenches, with cables drawn through installed ducts. Trenchless crossing techniques (including 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 minimum 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 (up to 40m wide) along with a number of temporary construction compounds will be defined to allow temporary working areas to be established for access / construction.

1.3 Scope of work

1.3.1 This Appendix 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 assess the historical land uses and to identify potential contaminative activities;
- walkover of the key elements of the Site (conducted in October 2021 and October 2022) to verify desk study information as necessary;

- development of a 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 (Environment Agency, 2020); and
- identification of information gaps, geo-environmental development constraints and any requirements for further assessment.

1.4 Regulatory context

1.4.1 Development Consent Orders (DCOs) were introduced by the Planning Act 2008 for Nationally Significant Infrastructure Projects (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 (NPS) for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011)[1] 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 (MHCLG, 2021) (NPPF) does not contain specific policies for NSIPs; however, it sets out the UK 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, (MHCLG, 2021), 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 174 (I)]*"*
- *"remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate* [paragraph 174 (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 183 (a) to (c)].

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[1] There are no emerging expectations or changes to these requirements in the draft NPS EN1-EN5 (Department for Energy Security and Net Zero (DESNZ), 2023a; DESNZ, 2023b)) which the UK government published for consultation in September 2021 and subsequently in March 2023 with further amendments.

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). 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 November 2020);
- Groundsure EnviroGIS report (ref. GSIP-2022-13023, dated 04 October 2022);
- Environment Agency, Land contamination risk management (LCRM), October 2020;
- MHCLG, NPPF, 2021; MHCLG, NPPF, June 2019;
- Defra (2012) 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 (2021b);
- Multi Agency Geographic Information for the Countryside (MAGIC) interactive map (Defra, n.d.);
- Google Maps (Google, 2021a);
- Google Earth Pro (Google, 2021b);
- British Geological Survey (BGS) (2021a), GeoIndex;
- BGS (2021b), Geology of Britain Viewer;
- Coal Authority (2021), Interactive Map Viewer;
- Public Health England and British Geological Survey (2021), Indicative Atlas of Radon in England and Wales, Interactive Map;
- Zetica (2021), Unexploded Ordnance Threat Assessment, West Sussex;
- Zetica (2023), Unexploded Ordnance Desk Study and Risk Assessment, Report Ref. P9727-23-R1-C;
- Historical aerial photography, accessed via Google Earth Pro (Google, 2021b); and
- Site walkovers completed in October 2021 and October 2022.

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 obtained only from the sources highlighted in **Section 1.5**, which are related to the Site (as shown in **Figure 24.1.1** in **Annex A**) or onshore cable corridor routes which are no longer part of the Site (as shown on the figure which comprises **Annex B**);
- the desk study information is not necessarily exhaustive and further information relevant to the Site or onshore cable corridor routes which are no longer part of the Site may be available from other sources;
- the Site walkovers in October 2021 and October 2022 were undertaken to verify the key information on potential sources of contamination identified in the desk study and was not an exhaustive walkover of the whole of the Site or onshore cable corridor routes which are no longer part of the Site;
- 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; and
- this Phase 1 geo-environmental desk study report is written in the context of legislation and guidance available at the time it was prepared (May 2023). 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.

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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 National Grid Reference (NGR) TQ 006006 (approximate post code BN17 5RN).

2.1.2 The Site then continues as a roughly linear feature generally north-eastwards until it reaches the area of the proposed onshore substation at Oakendene near Cowfold at approximate NGR TQ 229227 (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 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, A284 and the A281. The Site location is shown on **Figure 24.1.1** in **Annex A**.

2.2 Site description

2.2.1 The Proposed Development within the Site (**Figure 24.1.1, Annex A**) includes several component parts including the proposed landfall location, onshore cable corridor, trenchless (including HDD) crossing points, temporary construction compounds, temporary construction and permanent accesses, a new onshore substation at Oakendene and an extension to the existing National Grid Bolney substation. A detailed description of the onshore elements of the Proposed Development is included in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference 6.2.4).

2.2.2 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.

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

2.2.4 The Site context is shown on **Figures 24.1.2a-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 industrial estates at The Vinery and Oakendene, which include vehicle maintenance and repair units.

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 (NGR TQ 096123). 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;
- The Vinery Industrial Estate was developed adjacent to the Site in circa 1990. This includes several small-scale but potentially contaminative uses including antiques dealers, a kitchen showroom and a small vehicle workshop. An extension to the industrial estate comprising offices and a distribution warehouse were built in circa 2015;
- 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 as part of the Groundsure reports (Groundsure, 2020; 2022); and

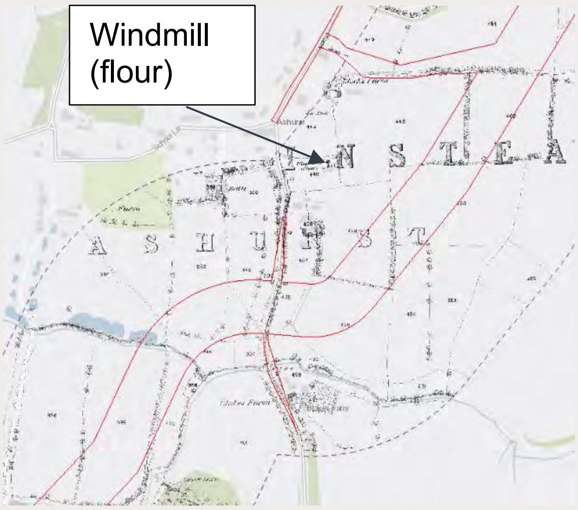
- at Warningcamp, the maps show a covered reservoir close to the Site boundary by 1974. At its closest point to the Site, it appears to be 70m from the onshore cable corridor, therefore, it is unlikely to be encountered on the Site.

3.1.3 The features described above are shown on **Figure 24.1.3a-3r** in **Annex A**.

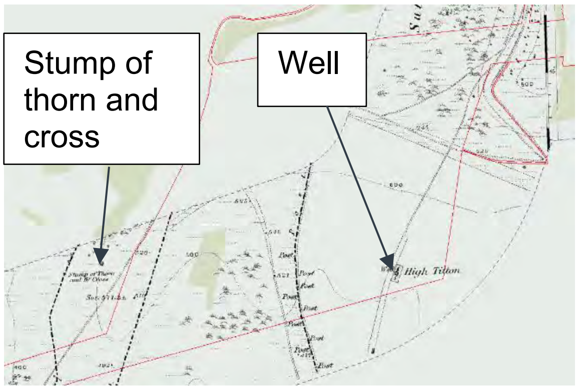
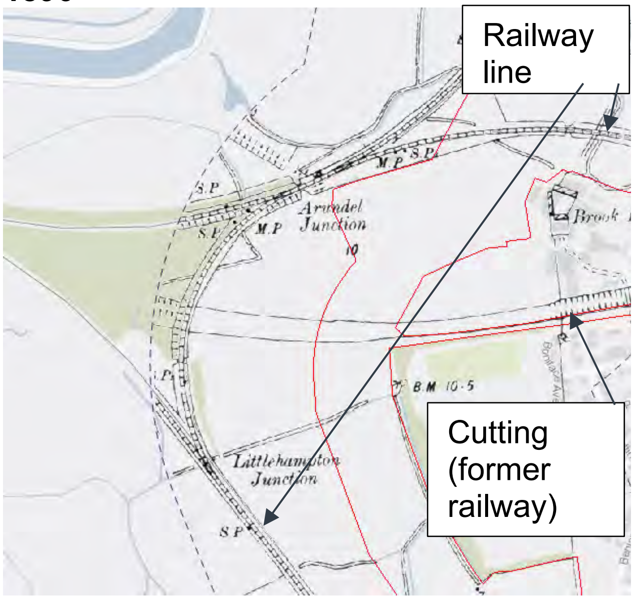
3.2 Detailed description

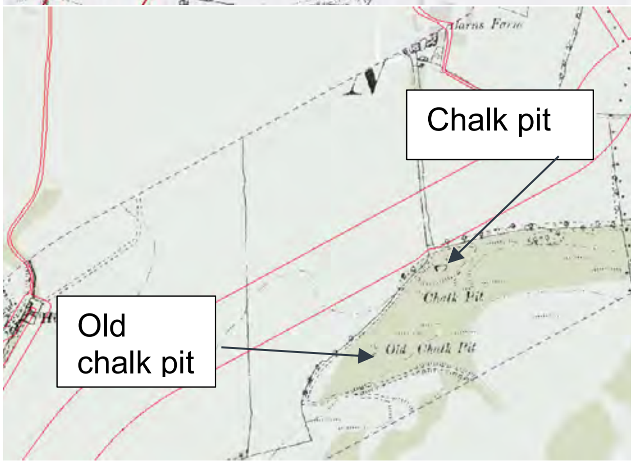
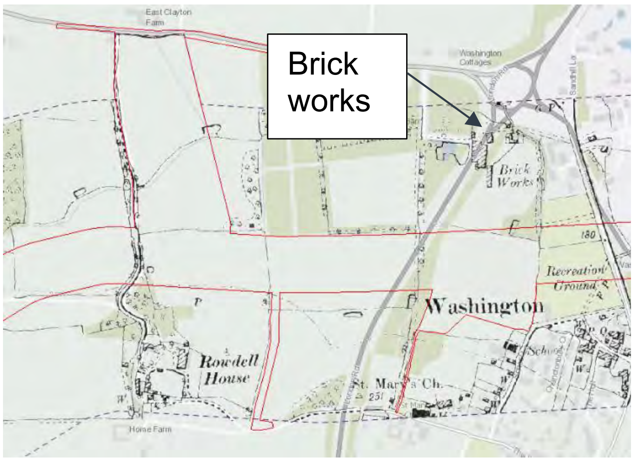
3.2.1 The historical land use of the Site and its immediate surrounding area has been established from a review of the historical mapping and historical land use data provided in the Groundsure reports (Groundsure, 2020; 2022). Google Earth Pro (Google, 2021b) has also been used to provide some historical 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 reports (Groundsure, 2020; 2022).

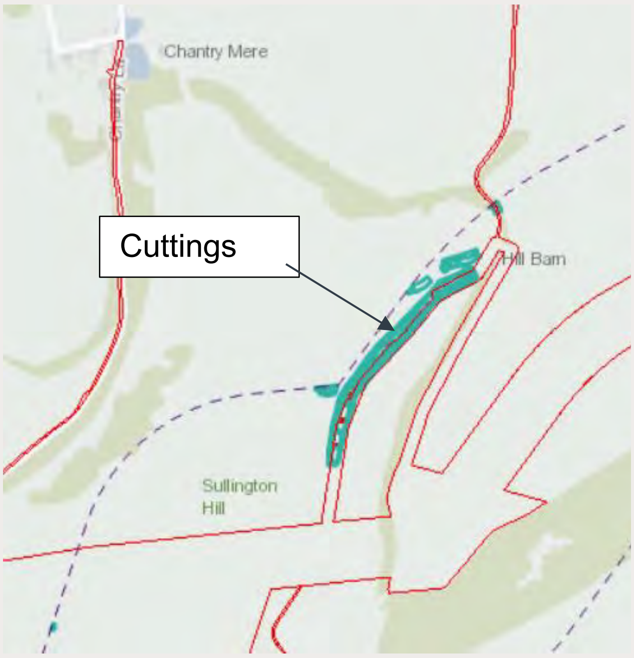
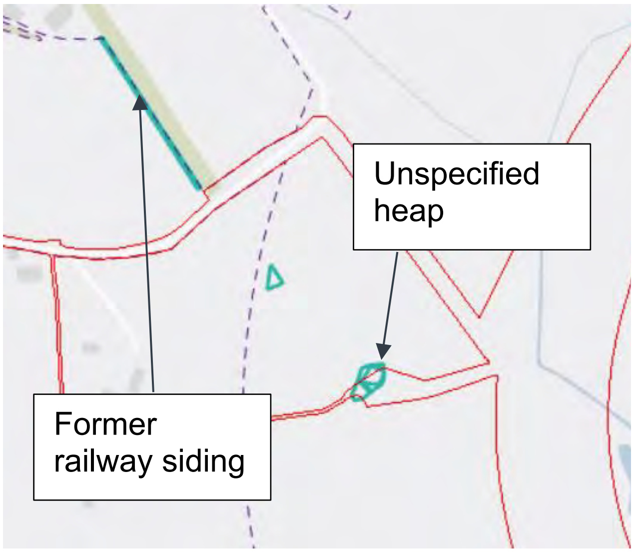
Table 3-1 Historical mapping summary

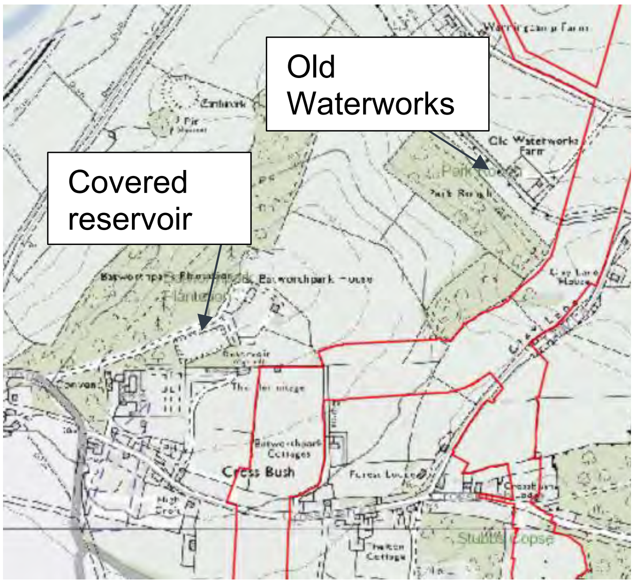
Edition (Scale)	Description[2]
Original PEIR Assessment Boundary	
1875 	**Offsite** A windmill (flour) is located at NGR TQ 182160, at Ashurst approximately 140m west of the Site.
1876	**Onsite**

[2] Comments on the historical mapping are either noted to be 'onsite' where a feature lies within either the Original PEIR Assessment Boundary or within the proposed DCO Order Limits and 'offsite' where that feature lies outside of those boundaries.

Edition (Scale)	Description[2]
Original PEIR Assessment Boundary	
	The 1876 map shows a well onsite at High Titton (NGR TQ 092113). **Offsite** Southwest of Sullington the 1876 map shows a stump of thorn and cross located west of the Site (NGR TQ 083113).
1888 	**Onsite** The 1888 map shows a railway running on a northwest to southeast axis through the Site south of Partridge Green (NGR TQ 197179).
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 (Groundsure, 2020; 2022) onsite at the access road east of Partridge Green (NGR TQ 206194), off the A281 (not shown on

Edition (Scale) Original PEIR Assessment Boundary	Description[2]
	available mapping). There are no other known former military uses at this area. The Groundsure historical land use data (Groundsure, 2020; 2022) shows an unspecified yard dating from 1896 on the Site boundary north of Eatons Farm (NGR TQ 186164). **Offsite** A knucker hole is shown east of the Site at Lyminster – this is a (deep) water-filled hole.
	Southeast of Arundel at Warningcamp, 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 TQ 105126) and an old chalk pit (NGR TQ 104124) are shown immediately south of the Site.
	A brick works is shown north of the Site at Washington (NGR TQ 124132) with a pit adjacent to the west. The brick works extends below what is now London Road (A24). The Groundsure historical land use data (Groundsure, 2020; 2022) shows the Brickworks extending up to the Site boundary by 1875.

Edition (Scale) Original PEIR Assessment Boundary	Description[2]
1914 	**Onsite** The Groundsure historical land use data (Groundsure, 2020; 2022) shows cuttings onsite east of Sullington Hill (NGR TQ 096123).
1947 	**Onsite** An unspecified heap is shown onsite at the access route north of Homelands Farm (NGR TQ 194183). **Offsite** The Groundsure data (Groundsure, 2020; 2022) also shows a former railway siding and cuttings north of Homestead Farm on the former railway line south of Partridge Green.
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.

Edition (Scale)	Description[2]
Original PEIR Assessment Boundary	
	
1974 	**Offsite** A covered reservoir is shown approximately 190m to the west of the Warningcamp. To the north of Warningcamp 'Old Waterworks Farm' is shown south of the Site, this corresponds to a 1938 pumping station identified in the Groundsure historical land use data (Groundsure, 2020; 2022).
1974 to 1992	**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 (Google, 2021b)) shows the footprint of the sewage works and it appears to be in use for external storage (possibly logs).

Edition (Scale)	Description[2]
Original PEIR Assessment Boundary	

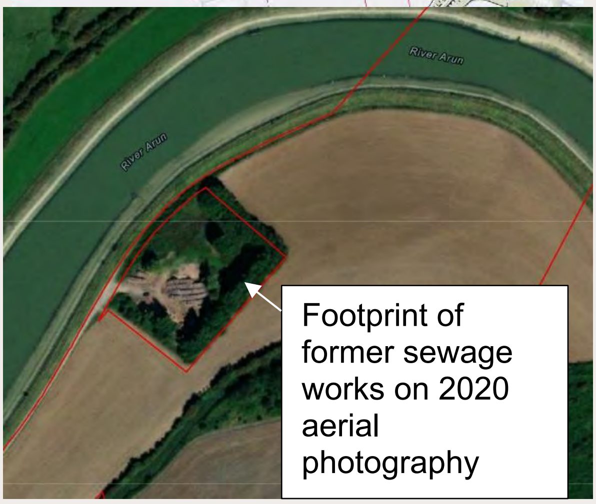
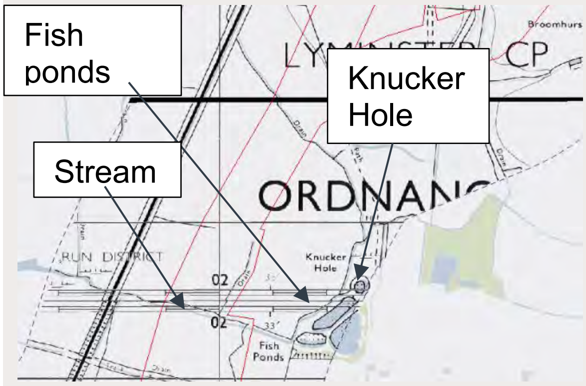


Image © Google Maps

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.

1980

Onsite
The 1980 map shows the railway south of Partridge Green is dismantled.

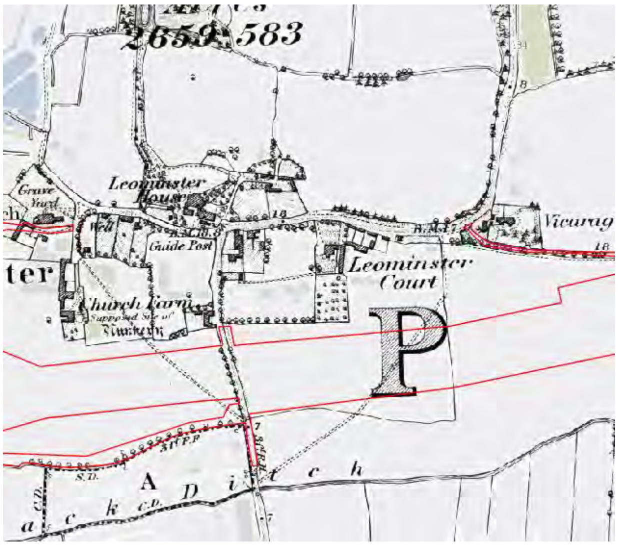
Edition (Scale)	Description[2]
Original PEIR Assessment Boundary	

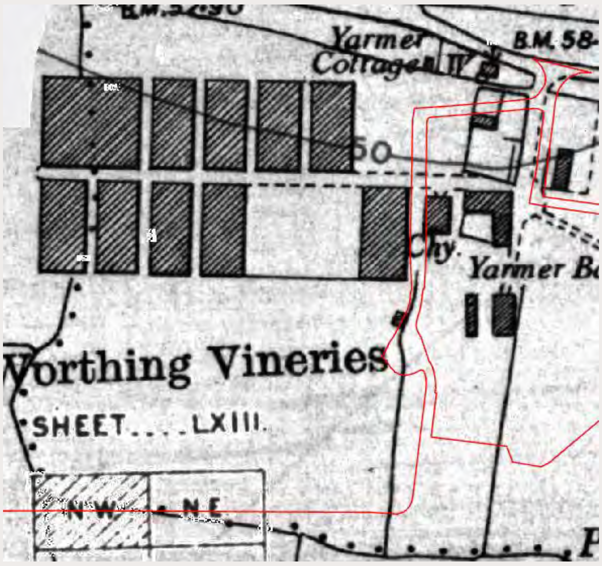
2001	**Offsite** Aerial photography from 2001 available on Google Earth Pro (Google, 2021b) shows the Oakendene Industrial Estate developed adjacent to the Site in the north.

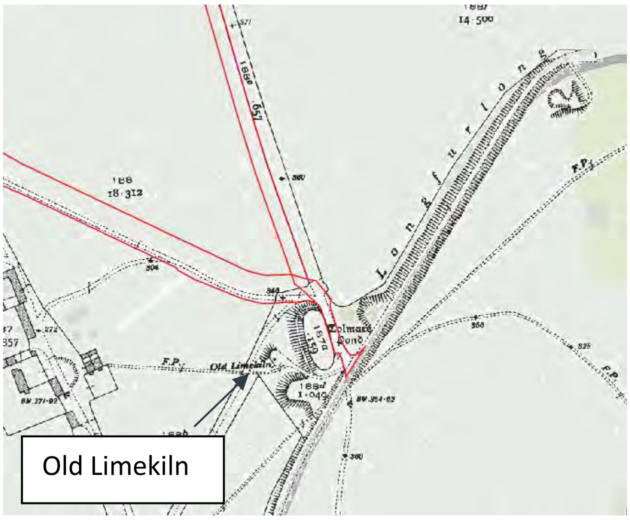
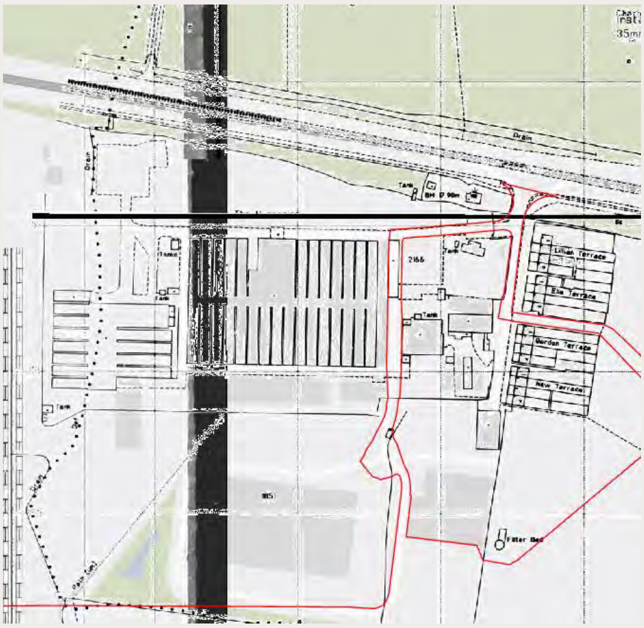
Image © Google Maps

Map excerpts from Groundsure 2020

Edition (Scale)	Description
Longer Alternative Cable Routes (LACRs)	
1875-1879	Leominster (Lyminster) village located approximately 150m to the north of the site boundary.

Edition (Scale)	Description
	Old Gravel Pits located within or adjacent to site boundary to the north-east of Hammerpot. These pits correlate to those identified in the Groundsure 2022 report.
1896-1900 	Old Quarry located to the east of Lee Farm, also identified in Groundsure 2022 reporting. An old chalk pit is also noted on site at NGR TQ 071071. Old chalk pit noted east of Tolmare Farm.
1909-1914	Pumping house and tank noted at NGR 505373, 105396. Windpump located approximately 100m east of the site at NGR TQ 071063.

Edition (Scale)	Description
	
1932-1938 	Worthing Vineries developed approximately 150m north of the site at NGR TQ 051055.
1942	Old Limekiln located east of Tolmare Farm (NGR TQ 109088) as well as approximately 500m of cuttings present along the road. Burial Ground identified 30m east of the site boundary at NGR TQ 109094.

Edition (Scale)	Description
	
1993-1995 	Expansion to the Vinery Industrial Estate.

Map excerpts from Groundsure 2022

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4. Environmental setting

4.1 Geology

4.1.1 Information on the geological setting has been obtained from the BGS 1:10,000 and 1:50,000 scale drift and solid geological mapping provided as part of the Groundsure reports (Groundsure, 2020; 2022).

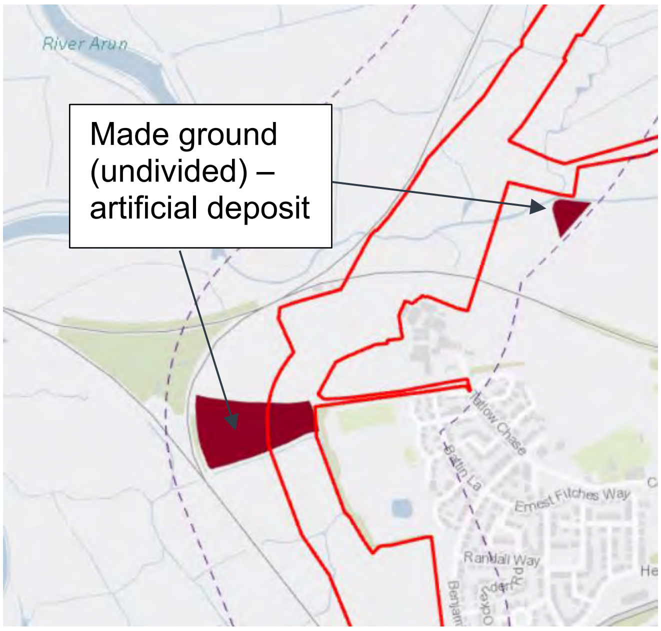
Made ground

Original PEIR Assessment Boundary

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 TQ 012038) 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**),**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 TQ 018042 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 4-23**).
- Anecdotal evidence provided by a member of the public has indicated there may be an unregistered landfill present in a field (NGR TQ 235223). This was raised as a result of the owner of the neighbouring property stating that large volumes of construction waste and soil had been spread into the site until it was capped in 2013.

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



Excerpt from Groundsure 2020

PEIR Assessment Boundary

Made Ground (Undivided)

- An area of made ground is shown 30m (NGR TQ 051090) 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 2020

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 TQ 105126) 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 2020

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 TQ 122131). 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 2020

PEIR Assessment Boundary

Made Ground (Undivided)

Worked Ground (Undivided)

LACRs

- Made Ground associated with the extent of the Old Mead Road Tip to the southwest of Lyminster extending eastwards along the southern bank of an unnamed stream.
- Small areas of Made Ground in various locations near Hammerpot.

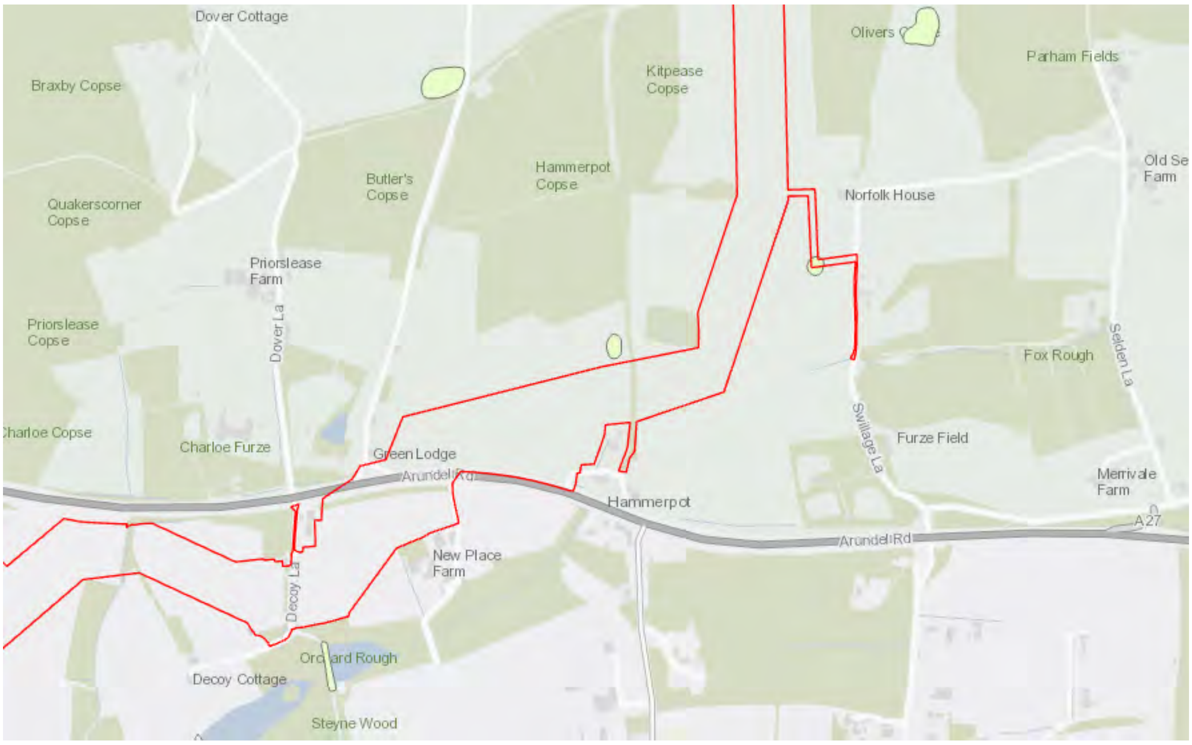
Graphic 4-5 Made Ground: Old Mead Road Tip southwest of Lyminster

Excerpt from Groundsure 2022

Artificial_and_Made_Ground_10k_BGS_polygon

LACR Assessment Boundary

Graphic 4-6 Made Ground: Multiple areas surrounding Hammerpot



Excerpt from Groundsure 2022

Artificial_and_Made_Ground_10k_BGS_polygon

LACR Assessment Boundary

Superficial geology

Original PEIR Assessment Boundary

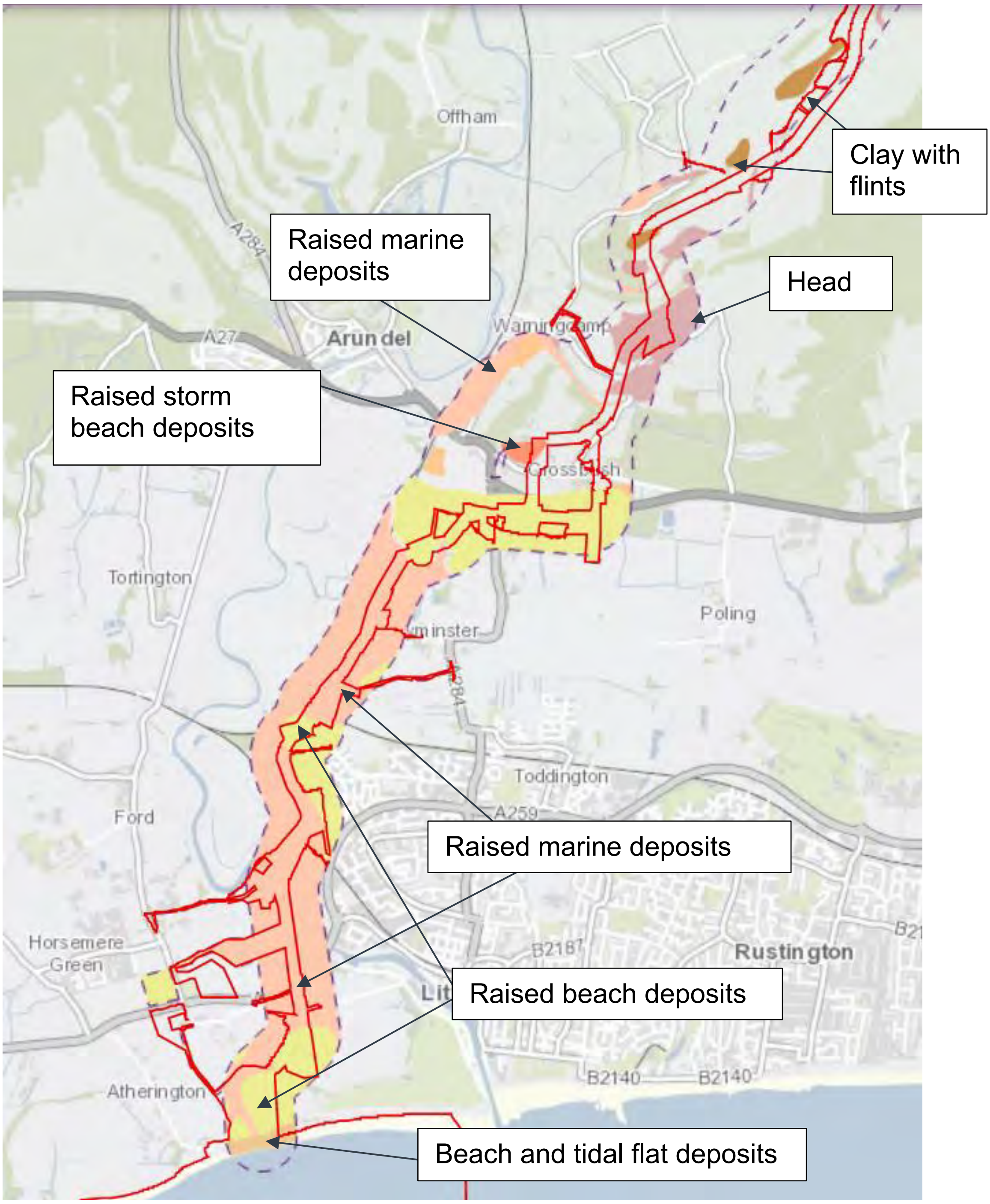
4.1.3 The superficial geology is summarised from the BGS 1:50,000 scale mapping provided with the Groundsure reports (Groundsure, 2020; 2022) and available on the BGS website (BGS, 2021b). Superficial deposits are present in the south of the Site, however, northeast of Warningcamp, the 1:50,000 scale 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 Warningcamp, 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

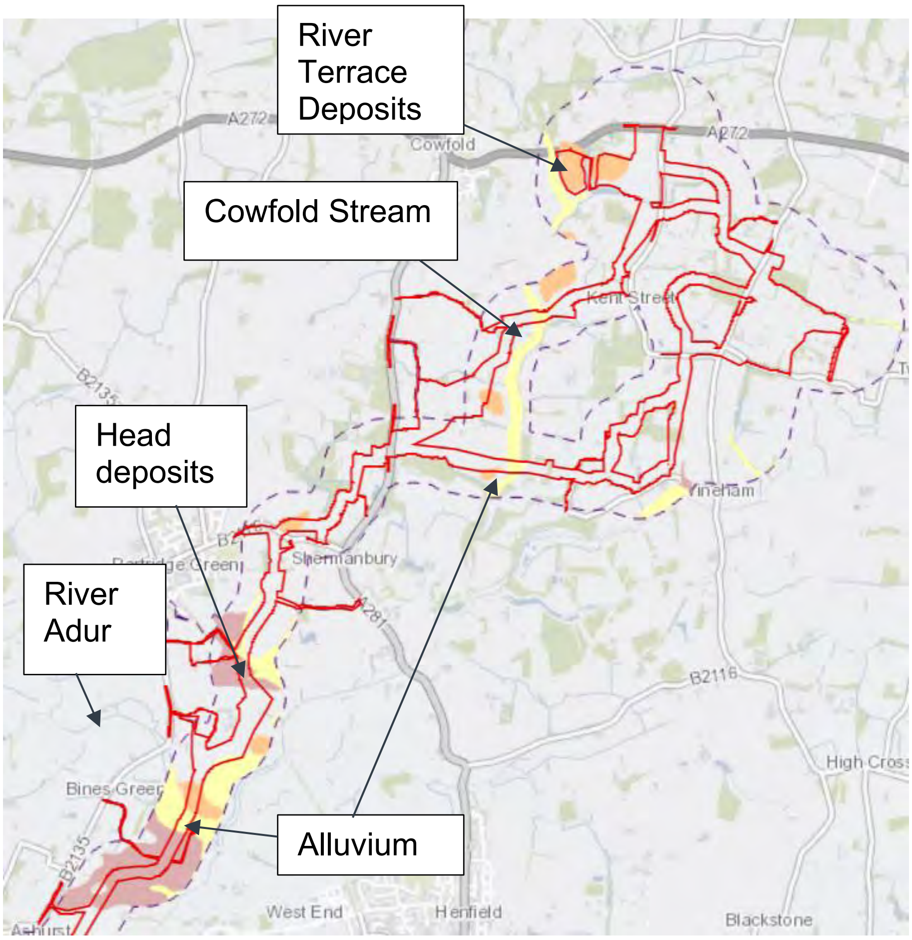
Green, and in the north of the Site at Cowfold Stream, there are also localised areas with river terrace deposits (sand and gravel) and head deposits. Available BGS borehole records (see section below) indicate the potential presence of peat on the Site where alluvial deposits are present, though the peat encountered was at depths greater than 20m by the River Arun.

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



Excerpt from Groundsure 2020

Graphic 4-8 Superficial Geology: River Adur to the Site's northern extent



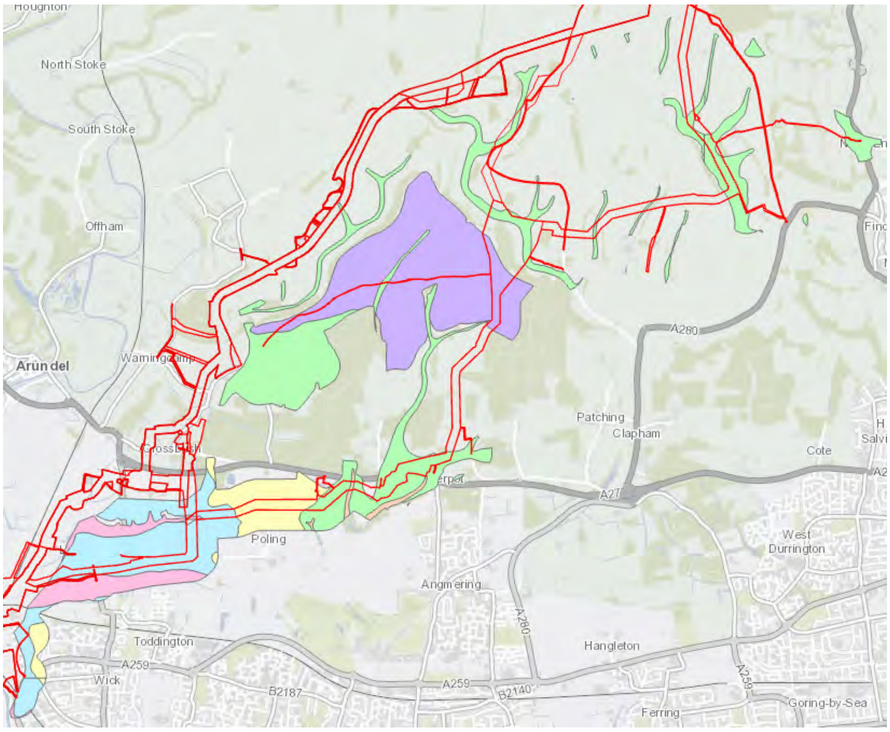
Excerpt from Groundsure 2020

LACRs

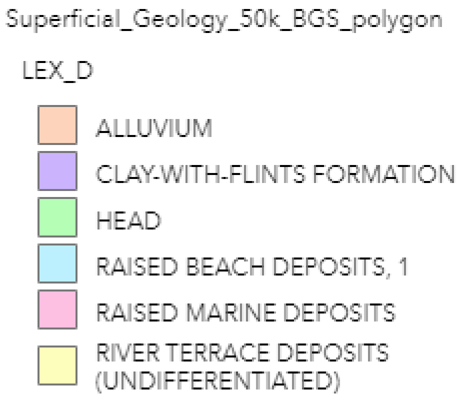
4.1.6 The superficial geology is summarised from the BGS 1:50,000 scale mapping provided with the Groundsure data (Groundsure, 2020; 2022) and available on the BGS website (BGS, 2021b). Superficial deposits are present in the south-west of LACRs before a break approximately 400m north of Arundel Road. In the north-east of the corridor, superficial deposits only sparsely underlay the Site.

4.1.7 The beginning of the LACRs to the west of Lyminster comprises Raised Beach Deposits directly underlying the Site, closely bounded by raised marine deposits along the site's southern boundary. The raised marine deposits then underly the site for a short distance before the path turns to the east. After 480m of further raised beach deposits, the superficial geology changes to undifferentiated river terrace deposits with one thin band of alluvium crossing the LACRs. The centre of the LACRs has one area underlain by clay with chalk-derived flints. The far north-east of the corridor is generally devoid of superficial deposits with some areas of head deposits made up of poorly sorted clay, silt, sand and gravel.

Graphic 4-9 Superficial Geology: LACRs



Excerpt from Groundsure 2022



Solid geology

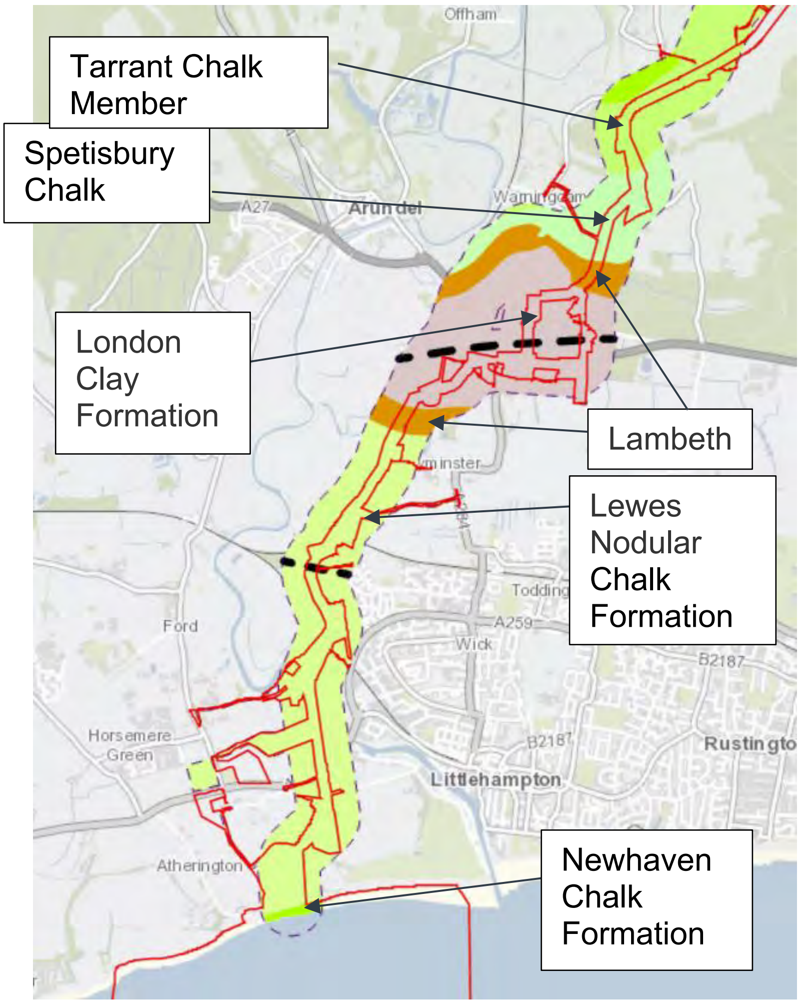
Original PEIR Assessment Boundary

4.1.8 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. Further details of the solid geology onsite are provided below.

4.1.9 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 TQ 108128) 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).

4.1.10 The solid geology is illustrated below in **Graphic 4-10** and **Graphic 4-11**.

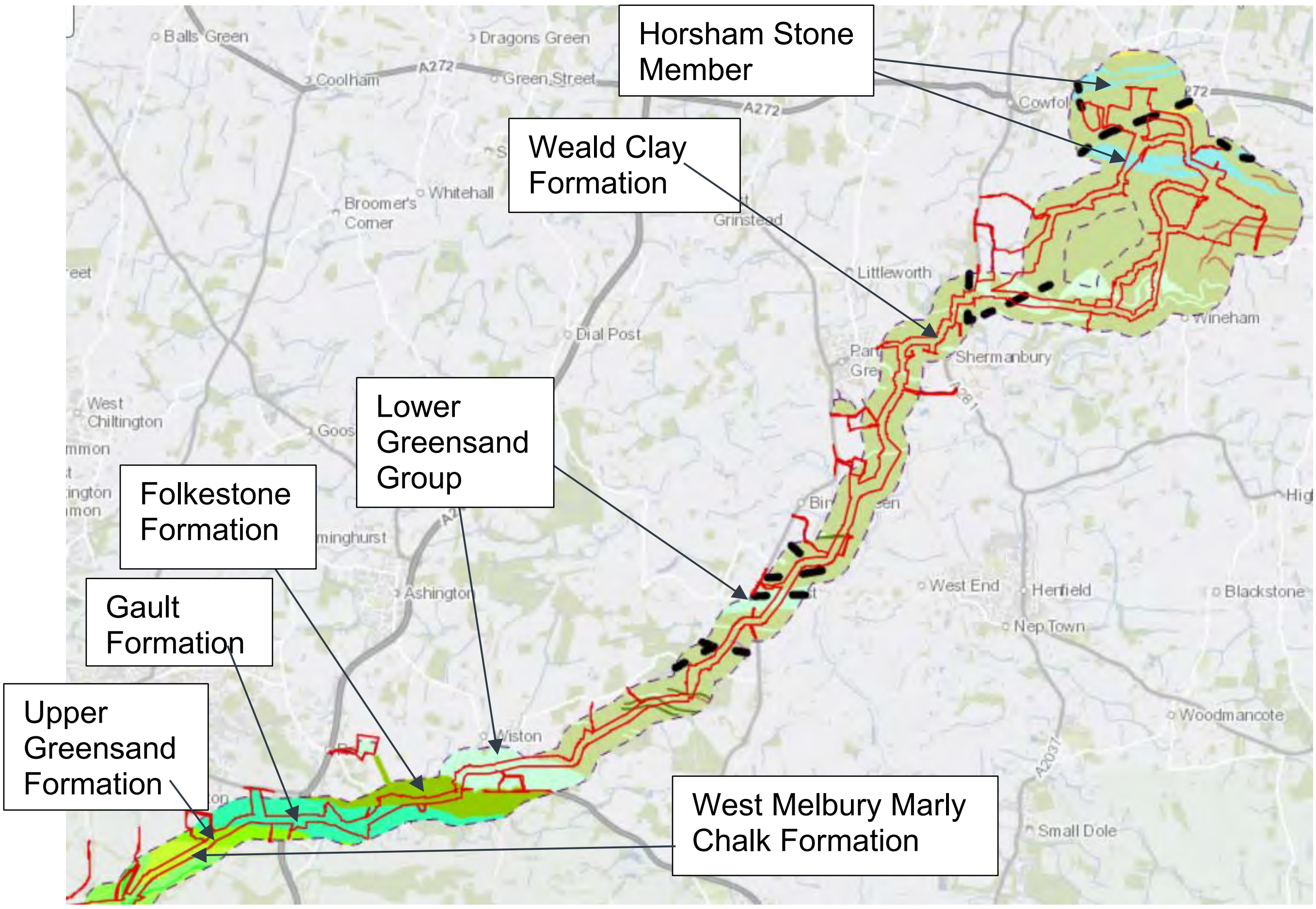
Graphic 4-10 Solid Geology: Landfall at Climping Beach to Arundel



Excerpt from Groundsure 2020

Bedrock_Faults_and_Linear_Features

Graphic 4-11 Solid Geology: Sullington to proposed Oakendene Substation Compound and existing Bolney Road Substation



Excerpt from Groundsure 2020

Bedrock_Faults_and_Linear_Features

LACRs

4.1.11 The solid geology underlying the LACRs consists almost entirely of chalk made up of various units except for a thin band of London Clay in the south west of the corridor.

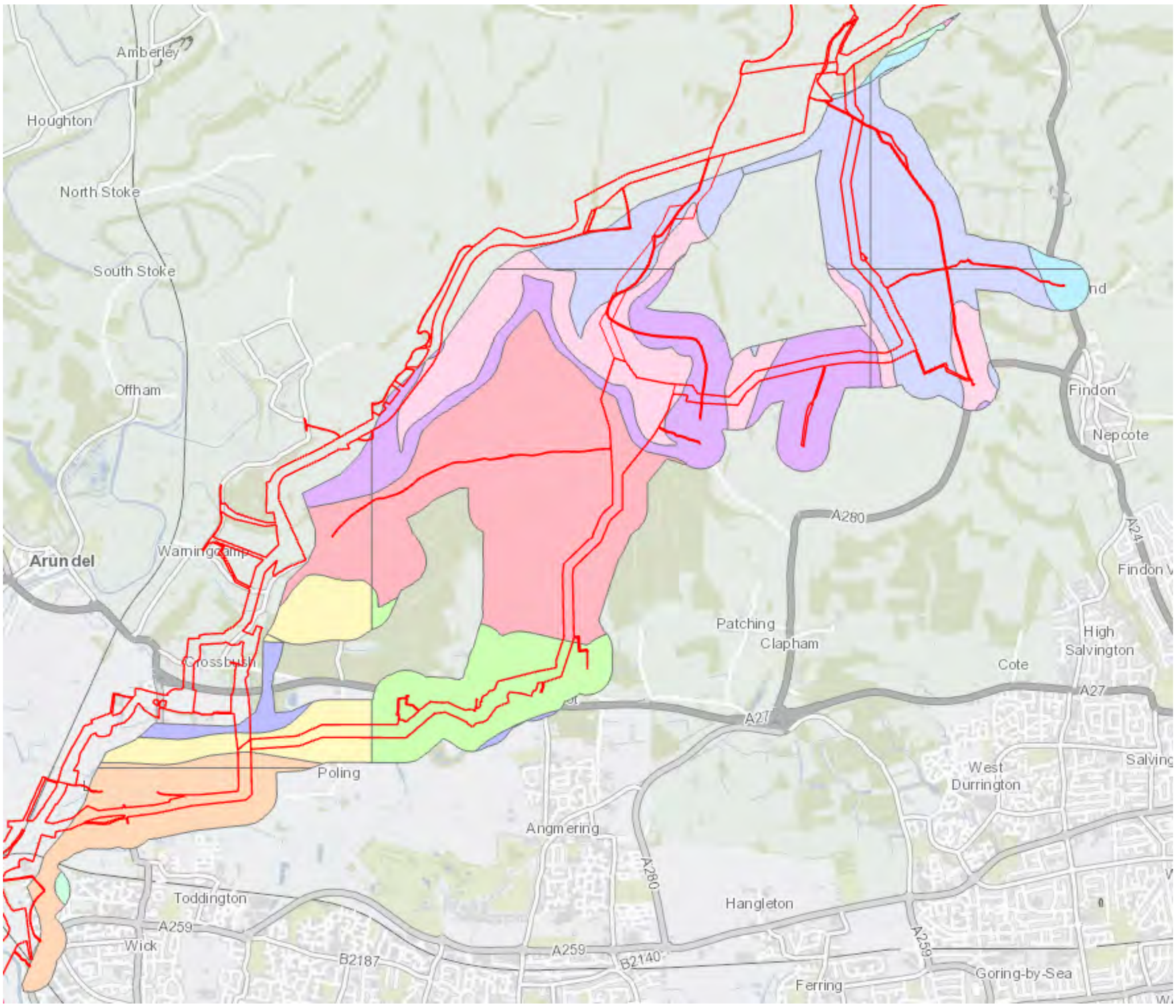
4.1.12 There are two geological faults which crosscut the site in the LACRs. The first of these is located in the south west of the site under Tatlow Close (NGR TQ 016038). The fault runs roughly east-west. The second, larger fault crosses the site at NGR TQ 061056, located in the solid geology of the Lambeth Chalk. This runs roughly east-west.

4.1.13 The far south west of the LACRs is underlain by an undifferentiated chalk deposit consisting of the Lewes Nodular Chalk, Seaford Chalk, Newhaven Chalk, Culver Chalk and Portsdown Chalk. This then progresses in to the Reading Chalk as the site moves to the north-east. The Reading Chalk is bordered to the east by the Lambeth Group. This consists of variable sequences of clays, limestones, lignite with occasional sandstones and conglomerates. For the next approximately 2km along the onshore cable corridor the solid geology changes to the Spetisbury

Chalk Member. The remainder of the LACRs comprises the London Clay and the Newhaven Chalk.

4.1.14 The solid geology is illustrated below in **Graphic 4-12.**

Graphic 4-12 Solid Geology: LACRs



Excerpt from Groundsure 2022

Bedrock_Geology_10k_BGS_polygon

LEX_D

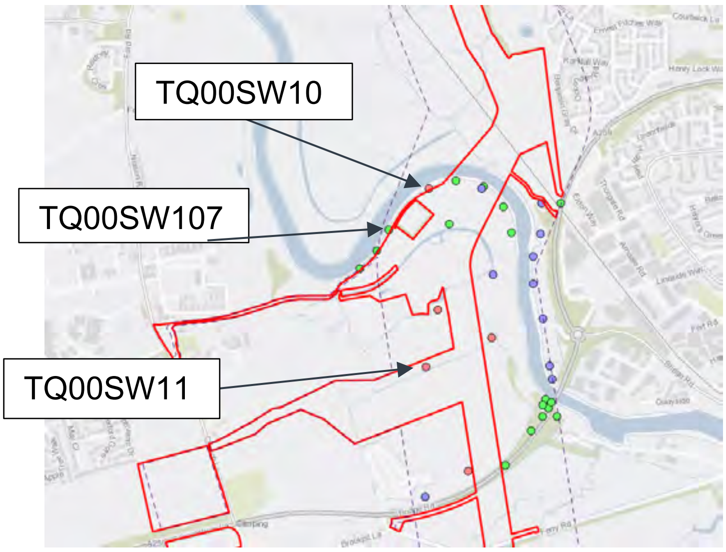
- Holywell Nodular Chalk Formation
- Lambeth Group
- Lewes Nodular Chalk Formation
- Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation And Portsdown Chalk Formation (Undifferentiated)
- London Clay Formation
- New Pit Chalk Formation
- Newhaven Chalk Formation
- Reading Formation
- Seaford Chalk Formation
- Spetisbury Chalk Member
- Tarrant Chalk Member
- Zig Zag Chalk Formation

BGS historical borehole records

Original PEIR Assessment Boundary

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

Graphic 4-13 BGS boreholes near the River Arun



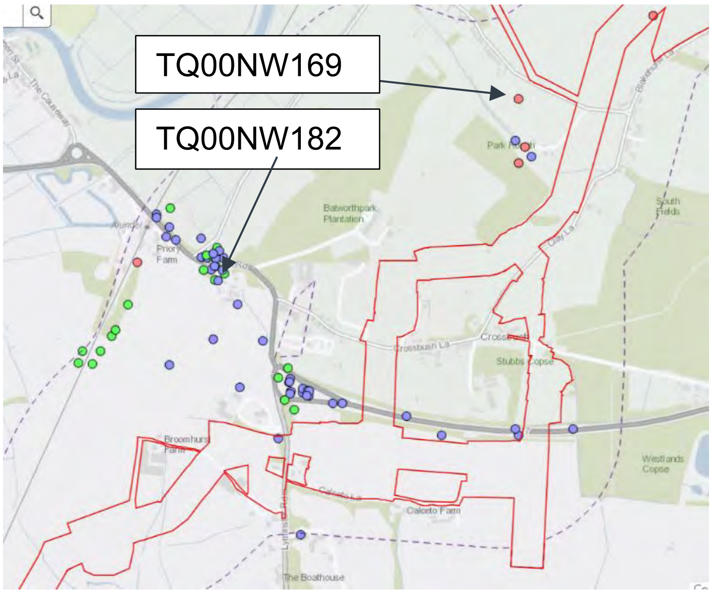
Excerpt from Groundsure 2020

4.1.16 Borehole log TQ00SW107, dated 1984, is noted to be named on the BGS (2021a) 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.

4.1.17 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).

4.1.18 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 4-14 BGS boreholes at Warningcamp

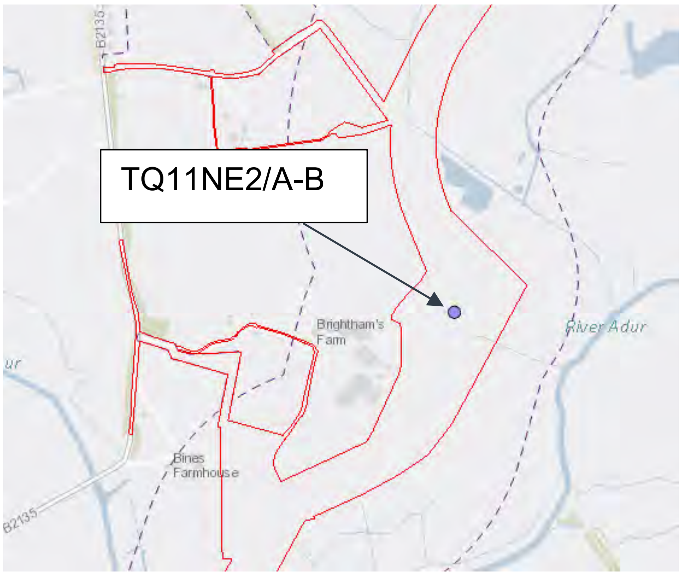


Excerpt from Groundsure 2020

4.1.19 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.

4.1.20 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 4-15 BGS boreholes near Partridge Green



Excerpt from Groundsure 2020

4.1.21 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.

LACRs

4.1.22 BGS borehole TQ00SW38 is located 80m southeast of the additional corridor in Littlehampton (NGR TQ 017036). This borehole date from 1944 and documents the ground conditions and doesn’t record any topsoil or made ground overlying the superficial deposits. The log records brown clay (brickearth) from the surface to a depth of 2.74m. This is then underlain by brown sand to 4.27m and gravel to 5.79m, these strata are grouped to be part of a raised beach unit. This is underlain by a marl band to 6.40m before hard chalk begins and remains until the borehole is terminated at 30.48m. The log notes that the marl and chalk could be grouped together into middle chalk unit.

4.1.23 BGS borehole TQ00SW/33-34 located approximately 30m north of the site boundary (NGR TQ 023046) was drilled in 1910. The log records clay (brickearth) to a depth of 2.7m which is underlain by marl to 4.9m. This is then underlain by chalk and flints down to a depth of 20.1m where the borehole is terminated. Groundwater was recorded as resting at 5.64m.

4.1.24 BGS borehole TQ00NW65 was drilled approximately 80m south of the site boundary at NGR TQ 042051 in 1972. The log records topsoil down to a depth of 0.69m before transitioning to the Brighton Raised Beach Formation consisting of clay, gravel and running sand containing water to a depth of 1.52m. This is then underlain by the Reading Beds consisting of clays with one bed of fine brown gravel containing water at 21.3m to 23.1m. At 26.21m depth, the Upper Chalk formation begins and remains until 48.77m depth where the borehole is terminated.

4.1.25 BGS Borehole TQ00NW80 is located 70m south of the site boundary at NGR TQ 046052. The log shows that Clays & Stones of the Brighton Raised Beach make up the first 3.3 metres below ground level (mbgl). This is then underlain by the Reading Beds consisting of Clay, Mottled Clay and Rock until a depth of 38.1m. This then grades to the Upper Chalk until 56.7mbgl, where the borehole terminates.

4.1.26 BGS Borehole TQ00NE35 is located on site (NGR TQ 052055). The log shows Brickearth (Clay) from the surface down to a depth of 3.35mbgl. This is then underlain by the Brighton Raised Beach (Sand or Coarse Gravel) to a depth of 5.45mbgl which is in turn underlain by the Reading Beds down to 60.96mbgl. The Upper Chalk is then encountered, and the borehole is terminated.

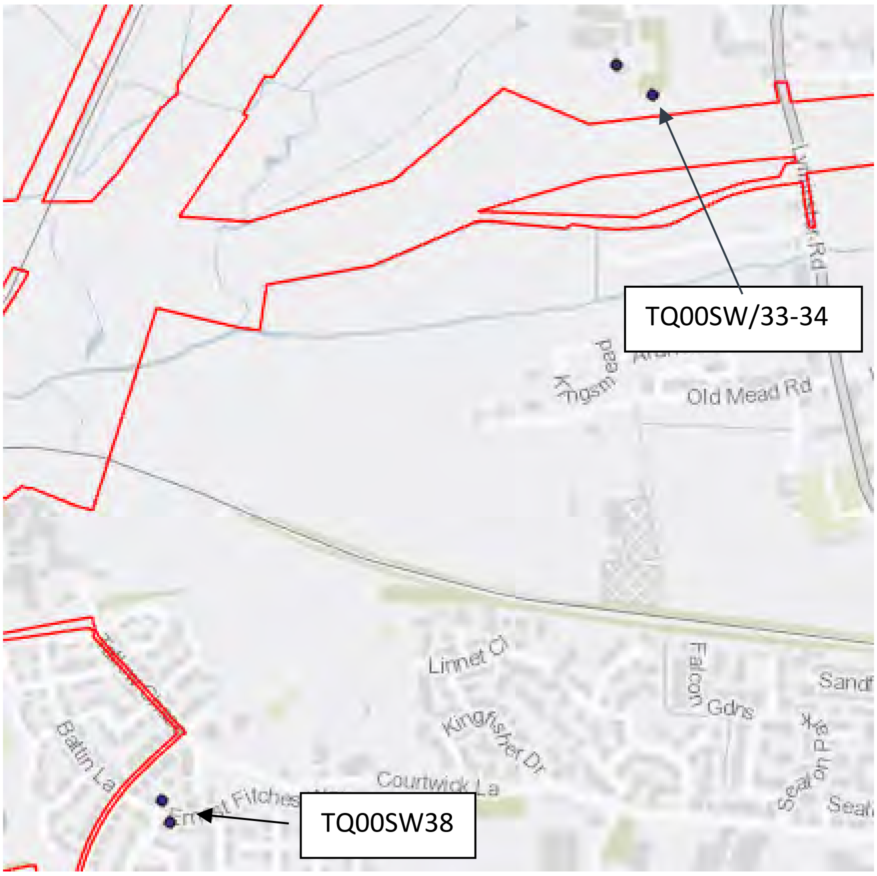
4.1.27 BGS Borehole TQ00NE93 is located 10m north of the site boundary at NGR TQ 057056. The log shows made ground consisting of gravelly silts and clays to a depth of 1.05mbgl. This is underlain by firm light grey and brown clay to 3.60mbgl where the borehole terminates.

4.1.28 BGS Borehole TQ00NE70 is located on site (NGR TQ 067058). The log shows topsoil to a depth of 1.20mbgl, sandy clay to 14.10mbgl and a thin band of slightly sandy gravel to 14.50mbgl. The Upper Chalk in then encountered and is recorded to a depth of 71.00mbgl, where the borehole is terminated.

4.1.29 BGS Borehole TQ00NE19 is located on site (NGR TQ 073095). This log records topsoil from the surface to 0.25mbgl. From this point the Upper Chalk is present down to 94.5mbgl. There is then a band of shingle where it is noted that it did not feel like pulverised flint.

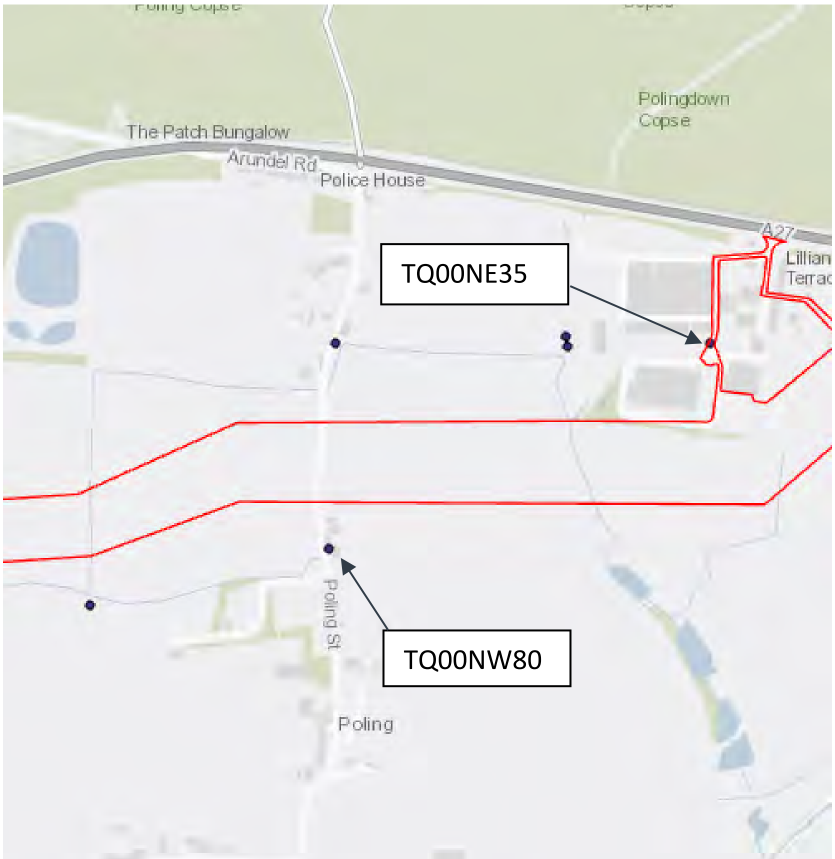
4.1.30 BGS Borehole TQ10NW10/B is located 20m south-east of the site boundary at NGR TQ 103098. The borehole records no topsoil or superficial deposits. Chalk and Flints are listed until the completion of the borehole at 137.16mbgl.

Graphic 4-16 BGS boreholes near Littlehampton



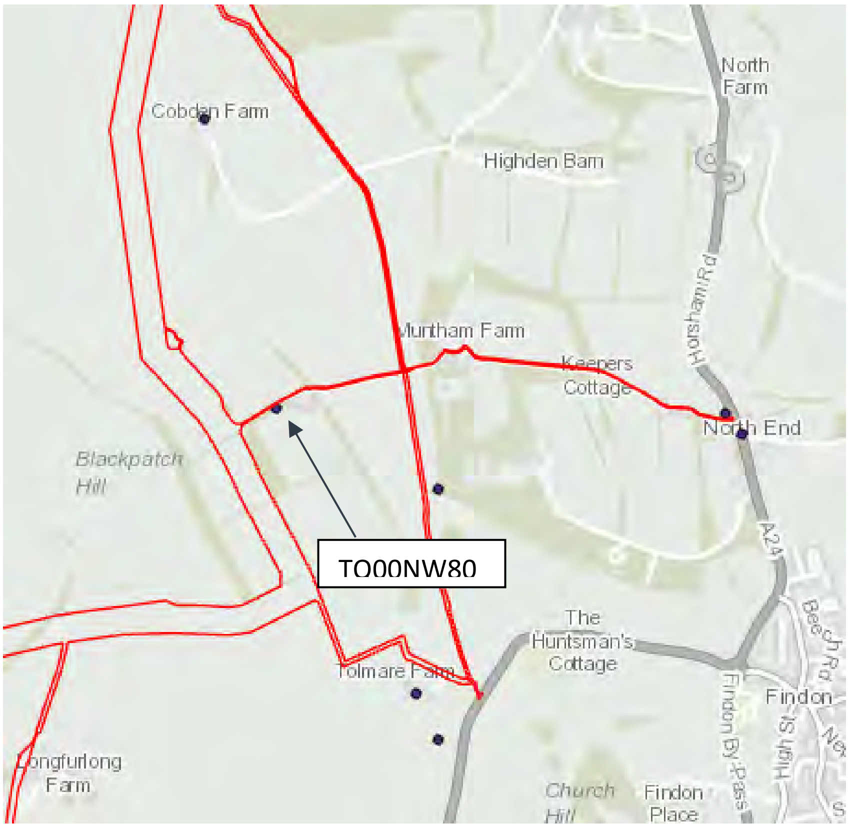
Excerpt from Groundsure 2022

Graphic 4-17 BGS boreholes near Vinery Industrial Estate



Excerpt from Groundsure 2022

Graphic 4-18 BGS Boreholes along northeast of LACRs



Excerpt from Groundsure 2022

Previous ground investigation

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

4.1.32 A land contamination assessment was submitted to Arun District Council as part of the planning application for buildings in the south of the Vinery Industrial Estate (planning application reference A/74/13 (Ashdown Site Investigation Limited (n.d.)), located immediately adjacent to the LACRs on the A27 near Poling. The land contamination assessment indicated that risks to groundwater were low and therefore the risk of historic contamination from the industrial estate being encountered in the area of the onshore cable corridor where excavations will take place is considered to be limited.

4.2 Mining and mineral extraction

Coal mining

4.2.1 The Coal Authority Interactive Map and the Groundsure reports (Groundsure, 2020; 2022) 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

Original PEIR Assessment Boundary

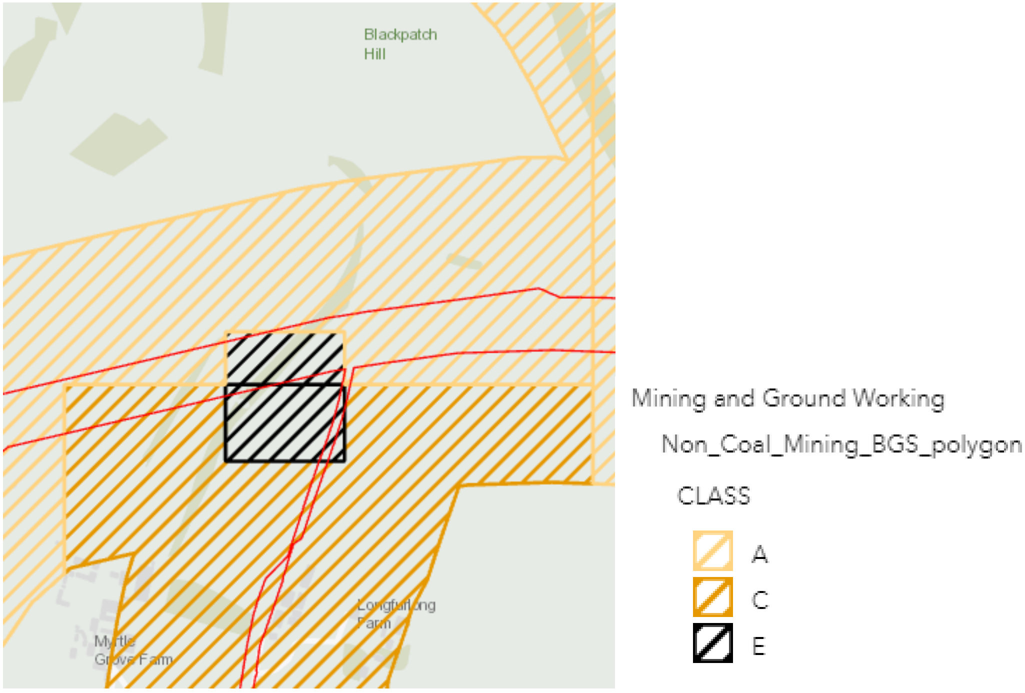
4.2.2 The Groundsure report (Groundsure, 2020; 2022) includes a comprehensive dataset for former mineral workings including brine areas (none onsite), gypsum areas (none onsite), underground workings (none onsite), non-coal mining (none onsite), tin mining (none onsite), clay mining (none onsite), historical mineral planning areas, and surface ground workings. Where the Site is directly underlain by Chalk, the Groundsure report (Groundsure, 2020; 2022) 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.

4.2.3 In the 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 reports (Groundsure, 2020; 2022) identify numerous BritPits entries in proximity to the Site and where former mineral extraction areas are identified as polygons, these are discussed further below.

LACRs

4.2.4 Non-coal mining activities are identified in the Groundsure report (Groundsure, 2020; 2022) at Blackpatch Hill (NGR TQ 094090). The activities are indicated to have comprised a Flint/Chalk mine and the Groundsure report (Groundsure, 2020; 2022) identifies the potential for hazards resulting from underground mine workings as requiring consideration (Class C) or being highly likely (Class E) as shown on **Graphic 4-19**.

Graphic 4-19 Non-Coal Mining Activities near Blackpatch Hill

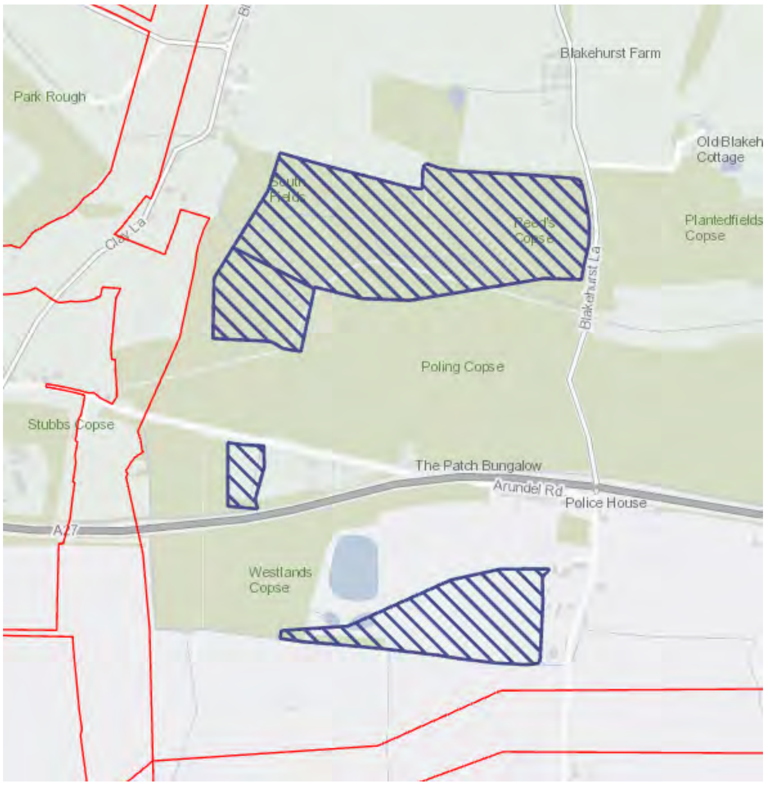


Excerpt from Groundsure 2022

4.2.5 No areas of tin mining, gypsum, clay mining or brine areas were identified within the LACRs.

4.2.6 Three historical mineral planning areas are present in the southwest of the LACRs (**Graphic 4-20**). These areas are all associated with historical surface mineral workings for brick clay.

Graphic 4-20 Historical Mineral Planning Areas



Excerpt from Groundsure 2022

Surface workings

Original PEIR Assessment Boundary

4.2.7 Numerous historical surface workings are shown on or close to the Site boundary and these are described below and shown in **Graphic 4-21** to **Graphic 4-25**.

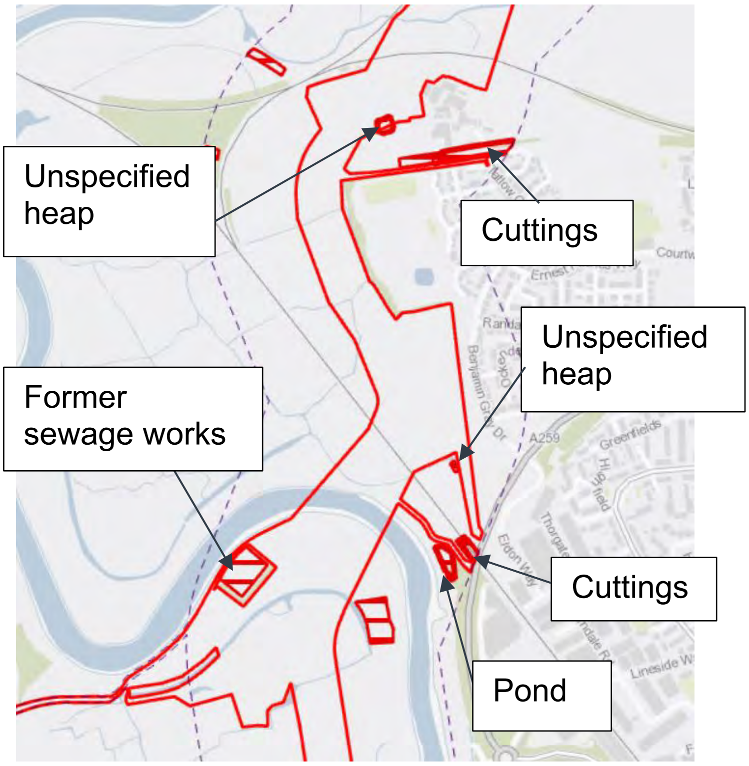
4.2.8 A small unspecified heap (see **Graphic 4-21**) is identified onsite in the south of the Site (NGR TQ 013017) to the south of Ferry Road, this is not visible on recent aerial photography on Google Earth.

4.2.9 Various workings are identified on or close to the Site northwest of Littlehampton, these are labelled on **Graphic 4-21**.

4.2.10 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 Appendix.

4.2.11 Two former cuttings are shown offsite (see **Graphic 4-21**) but adjacent to the eastern Site boundary at Littlehampton, the southernmost one is also identified as a landfill.

Graphic 4-21 Various workings onsite or close to the Site northwest of Littlehampton



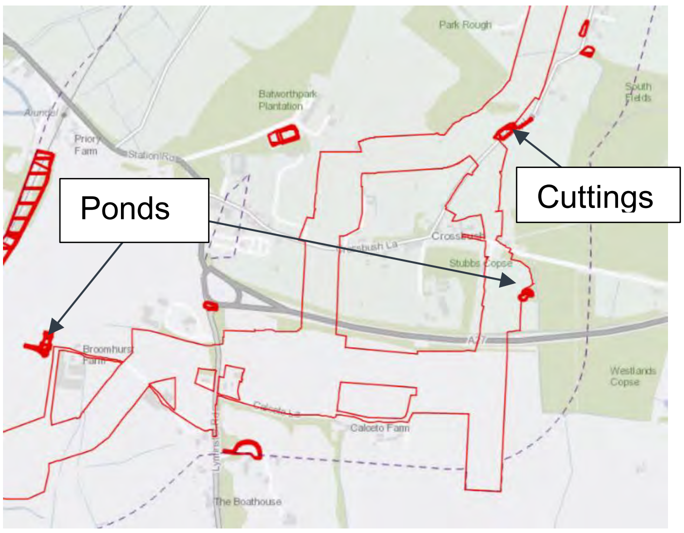
Excerpt from Groundsure 2020

PEIR Assessment Boundary

Surface_Ground_Workings

4.2.12 Various workings are shown at Warningcamp (see **Graphic 4-22**) including a number of ponds and cuttings which may have been infilled,

Graphic 4-22 Various workings onsite or close to Warningcamp



Excerpt from Groundsure 2020

PEIR Assessment Boundary

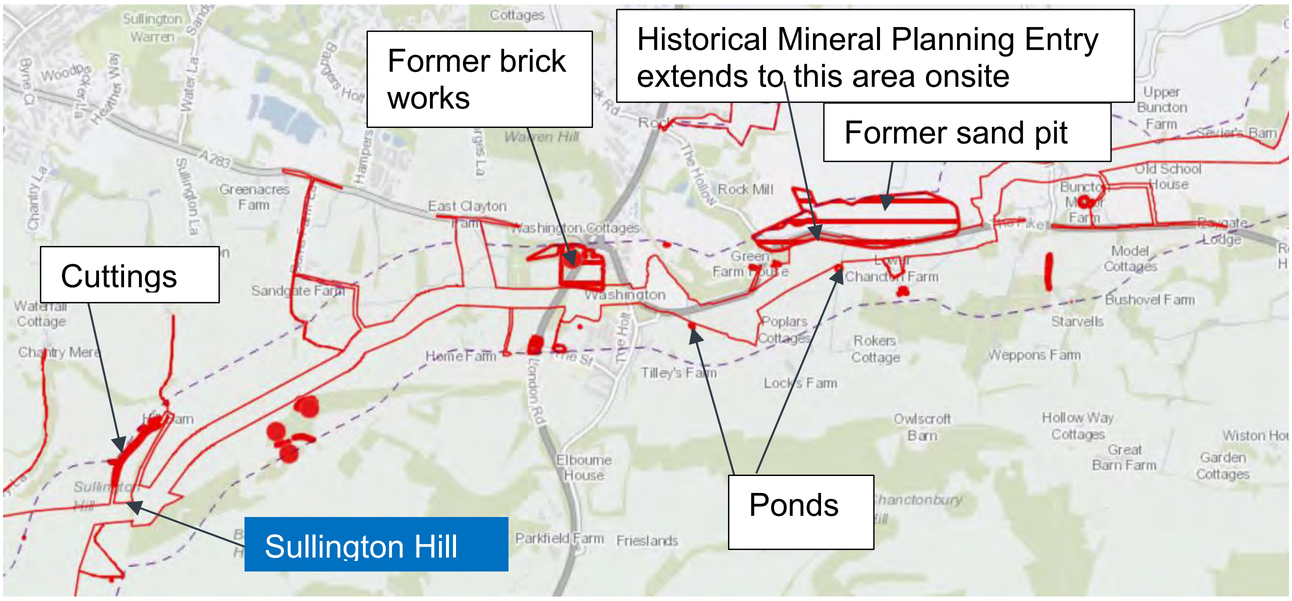
Surface_Ground_Workings

4.2.13 A covered reservoir is shown approximately 10m from the Site boundary at Norfolk Clump (NGR TQ 052090).

4.2.14 Cuttings are shown onsite at an access route option at Sullington Hill (NGR TQ 096123). A former brick works is shown north of the Site just south of the intersection of London Road (A24) with the A283 (NGR TQ 119133). A former sand pit is shown north of the Site, and may extend onto the Site (NGR TQ 134134) the surface ground workings area is shown slightly overlapping the Site boundary. This area has also been identified as an authorised landfill (see **Section 4.7**).

4.2.15 There are two Historical Mineral Planning Entries on the Site associated with the former sand pit at NGR TQ 134134. 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 4-23**).

Graphic 4-23 Various workings onsite or close to Windmill Quarry



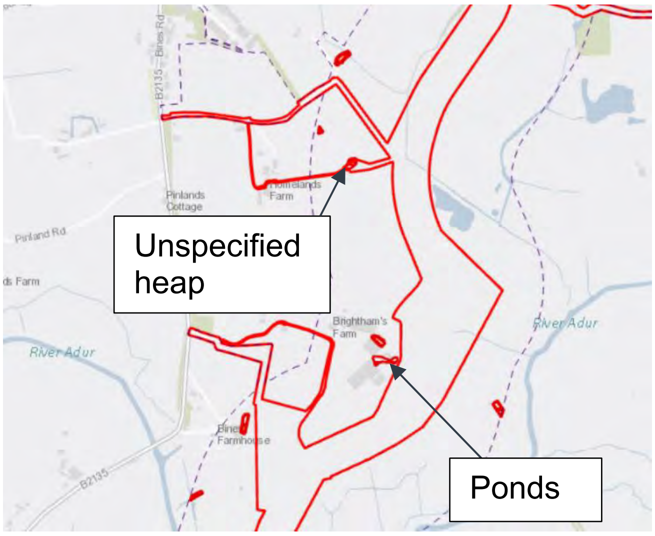
Excerpt from Groundsure 2020

PEIR Assessment Boundary

Surface_Ground_Workings

4.2.16 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 TQ 195177) and an unspecified heap is shown onsite at Homelands Farm at NGR TQ 195183 (see **Graphic 4-24**).

Graphic 4-24 Various workings onsite or close to site north of the River Adur



Excerpt from Groundsure 2020

PEIR Assessment Boundary

Surface_Ground_Workings

4.2.17 There are numerous ponds on or close to the proposed onshore substation site at Oakendene and the existing National Grid Bolney Substation. Two unspecified pits are shown onsite, one at NGR TQ 217207, and one at NGR TQ 243215. 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.

LACRs

4.2.18 Two ponds centred on NGR 506104, 105356 to the south of the site boundary by 70m. Another pond is present on the opposing northern site boundary (NGR TQ 061058) approximately 50m to the north-west of the site boundary, across the A27 road. All three of these ponds are visible from satellite imagery.

4.2.19 An old gravel pit located on site (NGR TQ 070061). This is not visible from satellite imagery so is likely to have been infilled.

4.2.20 An old chalk pit located on site (NGR TQ 071071). Not visible on satellite imagery.

4.2.21 An old chalk pit located at NGR TQ 075098. This is referenced in more detail in **Section 4.9**.

4.2.22 Unspecified groundworkings located on site centred on NGR TQ 074086. Covered in dense vegetation on sattelite images.

4.2.23 Two old chalk pits peither side of the site boundary (NGR TQ 093089 and TQ 095091). Referenced further in **Section 4.9**.

4.2.24 Cuttings, a pond in a former chalk pit and an unspecified heap east of Tolmare Farm. Located adjacent to the site boundary (NGR TQ 110088). These features are not visible on the sattelite imagery from 2022 so are likely to have been infilled.

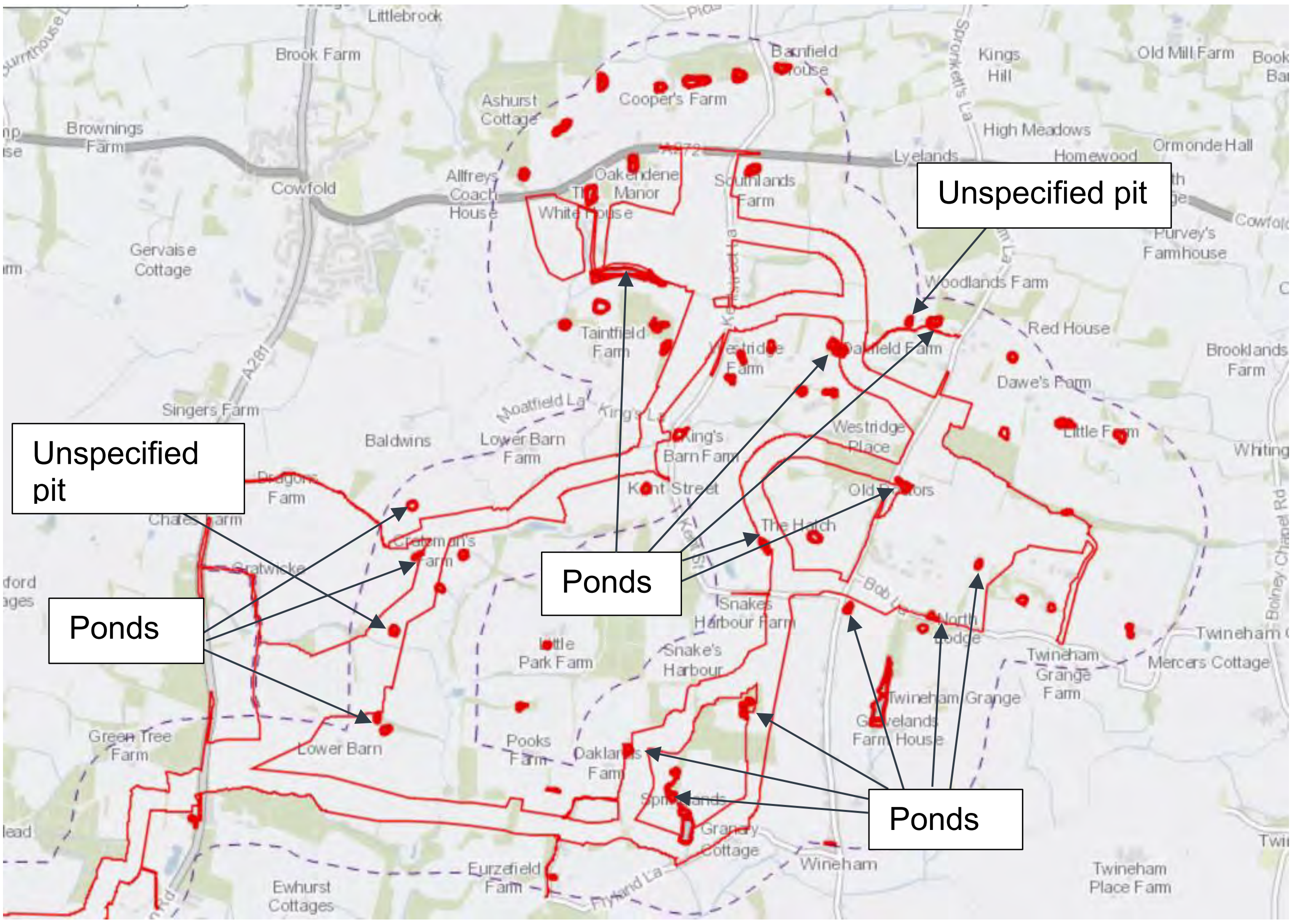
4.2.25 A circular area located approximately 20m east of the site (NGR TQ 109094). The Groundsure report (Groundsure, 2020; 2022) labels this as a burial ground. From the satellite imagery there is a distinct circle of dense tree coverage visible in contrast to the surrounding agricultural field. Suggesting the area is known and protected. Another circular unspecified pit is present nearby, 40m west of the site boundary (NGR TQ 107093). To the north of the burial ground at NGR TQ 108097 is an unspecified pit which encroaches slightly within the eastern edge of the site boundary.

4.2.26 An area listed as both an unspecified pit and unspecified groundworkings is located at NGR TQ 104099. The Groundsure report (Groundsure, 2020; 2022) shows the the pit/workings may slightly encroach onto the site at this point.

4.2.27 An unspecoified heap is present at NGR TQ 080103 10m east of the site boundary. The heap is still visible on sattelite imagery and appears to be associated with the neary farm to the west. The Groundsure report (Groundsure, 2020; 2022) also indicates a ponds presence on the farm at NGR TQ 077104. Thought this is not visible on the sattelite imagery and is likely to have been infilled.

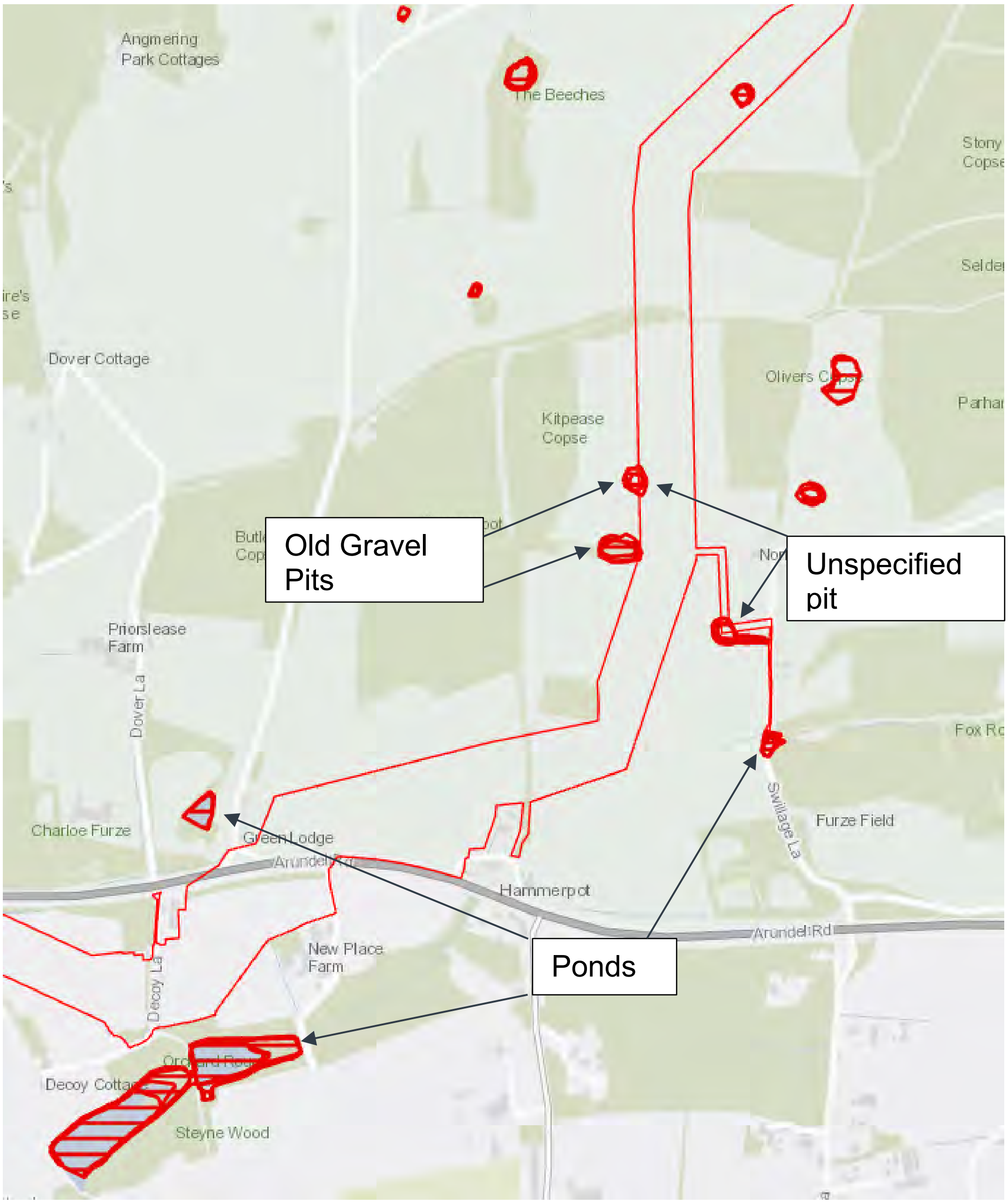
4.2.28 Old chalk pit 20m to the east of the site boundary (NGR TQ 098111), although there is no evidence of its presence on satellite imagery.

Graphic 4-25 Various workings onsite or close to the proposed Oakendene Substation Temporary Construction Compound and existing National Grid Bolney substation



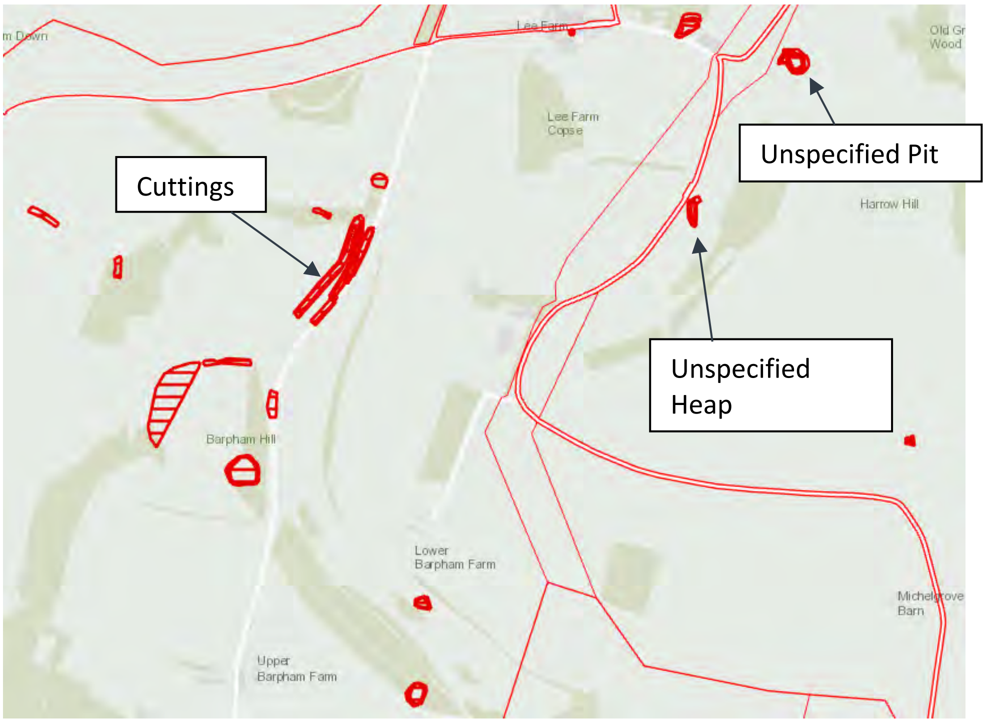
Excerpt from Groundsure 2020

Graphic 4-26 Surface Workings in the south-east of the LACRs



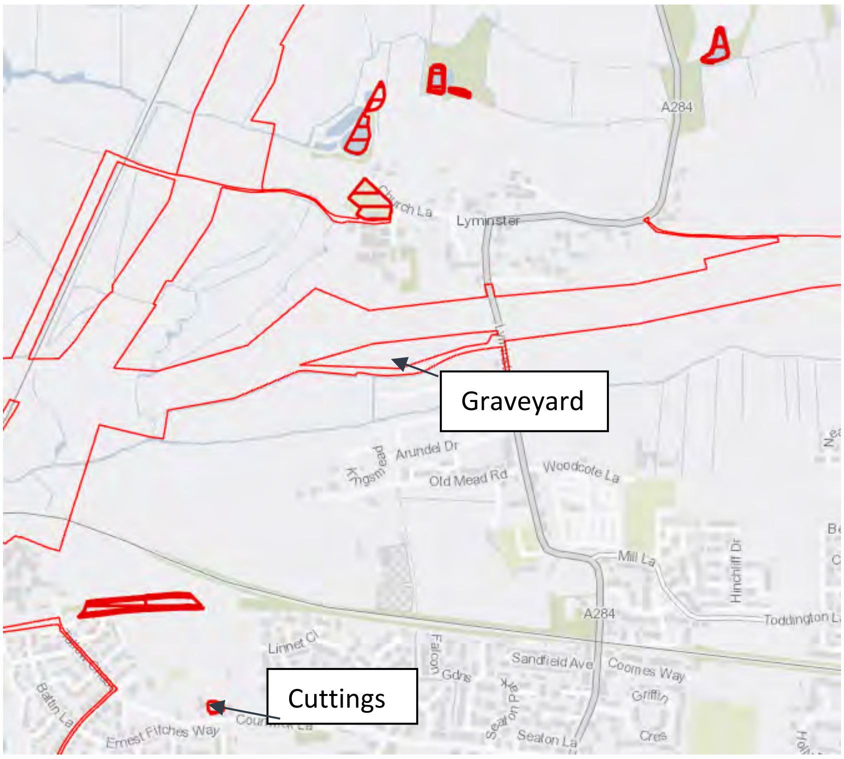
Excerpt from Groundsure 2022

Graphic 4-27 Surface Workings in the north-west of the LACRs



Excerpt from Groundsure 2022

Graphic 4-28 Surface Workings in the south-west of the LACRs



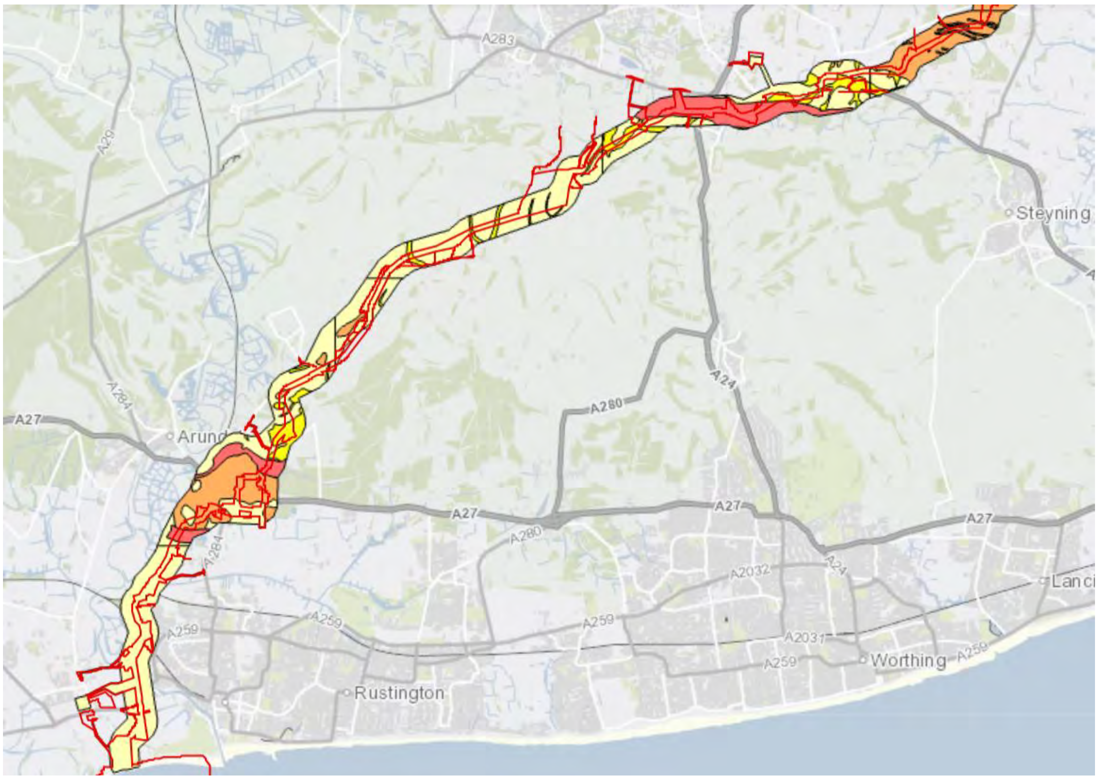
Excerpt from Groundsure 2022

4.3 Land Stability

4.3.1 Information included in the Groundsure report (Groundsure, 2020; 2022) 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 report (Groundsure, 2020; 2022) 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 4-29**.

Graphic 4-29 Ground plasticity (from landfall to Sullington)



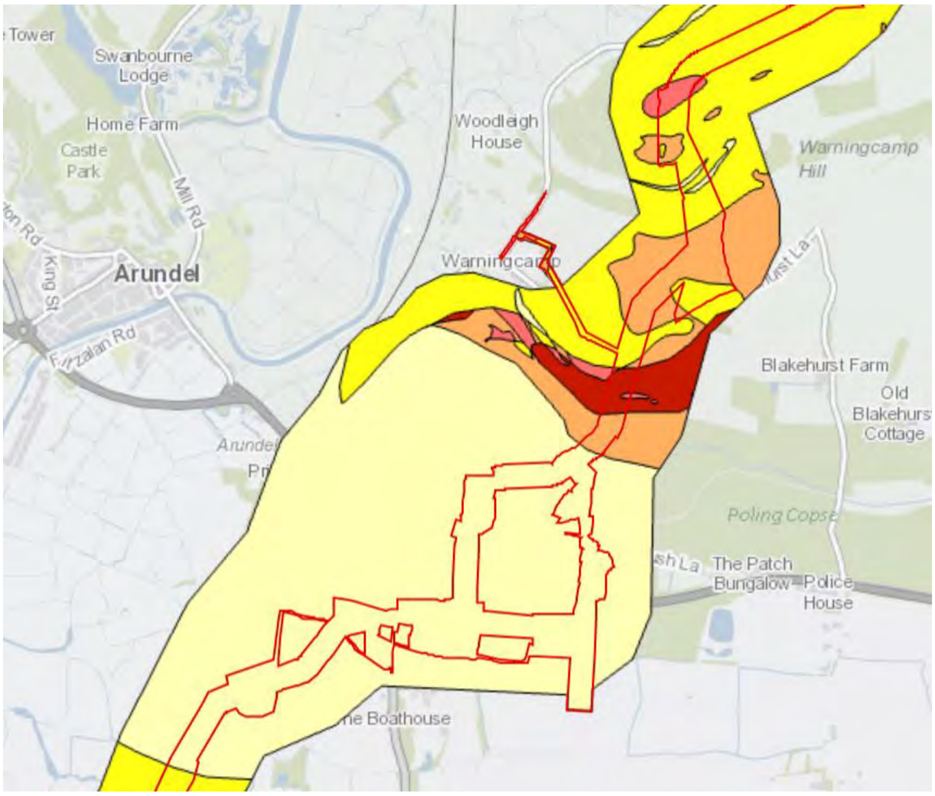
Excerpt from Groundsure 2020

- 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 4-30**. There are also some localised areas with potential for these conditions to be present from Warningcamp to Sullington.

Graphic 4-30 Ground dissolution hazards (Warningcamp)



Excerpt from Groundsure 2020

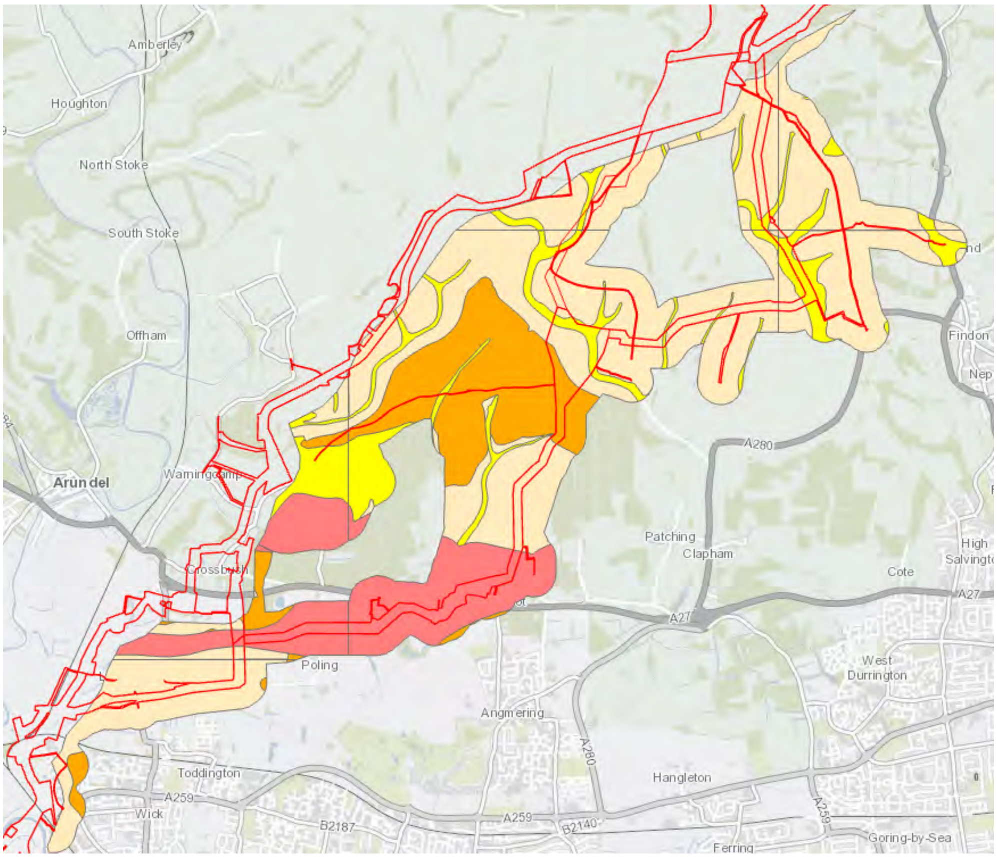
- Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.
- Soluble rocks are present within the ground. Few dissolution features are likely to be present. Potential for difficult ground conditions or localised 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.

LACRs

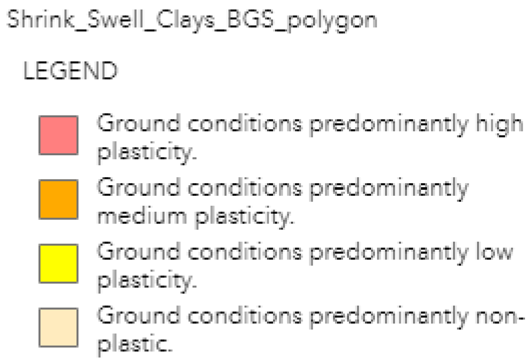
The Groundsure report (Groundsure, 2020; 2022) indicates a generally low risk of land stability hazards with exceptions described below.

- A small area where running sands may be present associated with the presence of brickearth to the north of Poling. These deposits are also noted, in places, to have the potential to collapse in places when loaded.
- In the south-west of the LACRs there are areas of predominantly high ground plasticity. These areas coincide with the appearance of clay containing members underlying the site (Lambeth Group, London Clay and Reading formation). There is also an area of medium ground plasticity associated with the Clay-with-Flints (**Graphic 4-31**). The north-east of the cable corridor only contains areas of non-plastic ground or low plasticity.
- A thin area of the site around NGR TQ 057056 coinciding with alluvium deposits where compressible and uneven settlement deposits are probably present.
- A large area of the site where soluble ricks are present within the ground giving a type D risk of ground dissolution stability hazards. Primarily associated with the clay-with-flints and Spetisbury Chalk formations (**Graphic 4-32**).

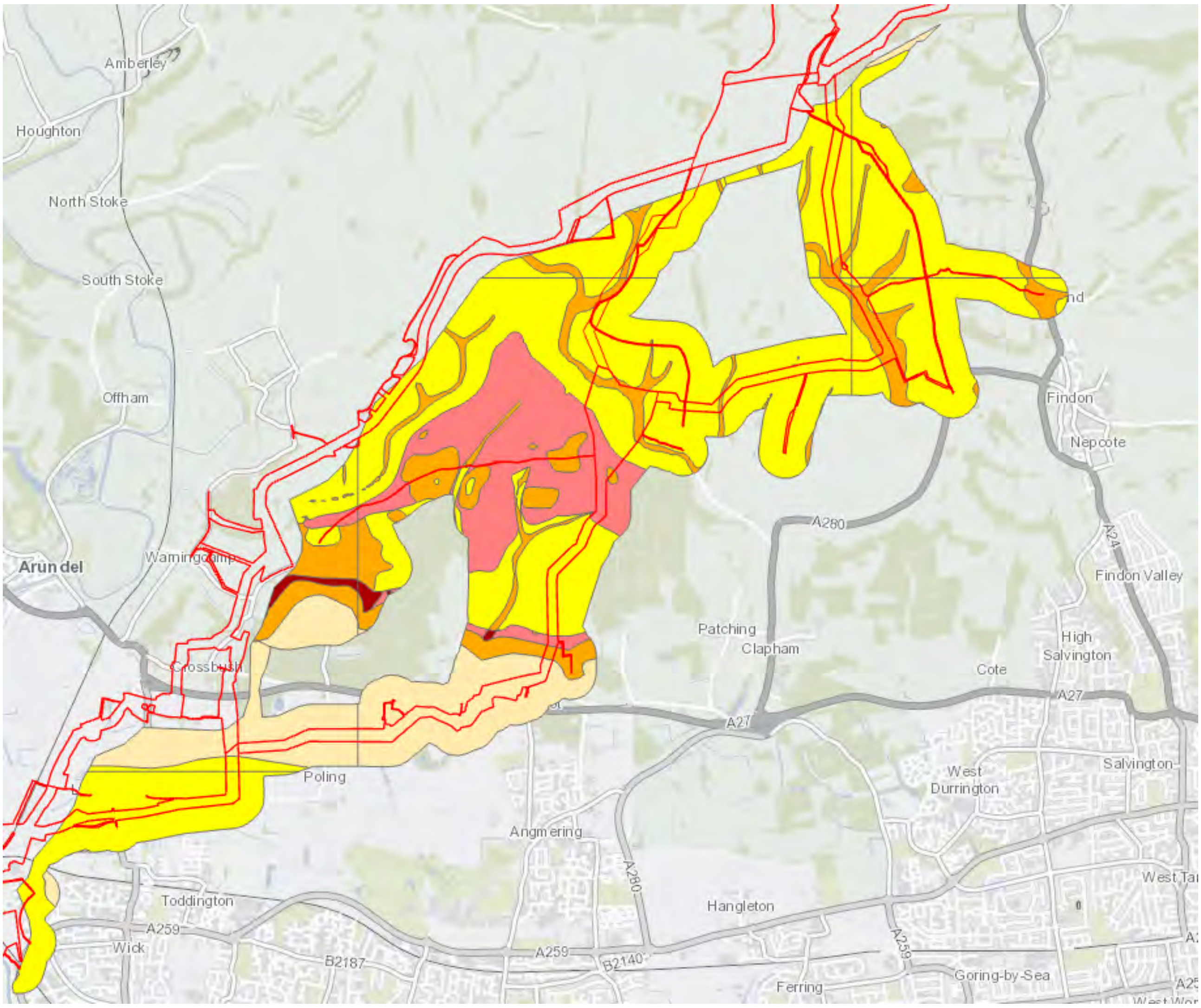
Graphic 4-31 Ground Plasticity (LACRs)



Excerpt from Groundsure 2022



Graphic 4-32 Ground Dissolution hazards (LACRs)



Excerpt from Groundsure 2022

Ground_Dissolution_of_Soluble_Rocks_BGS_polygon

RuleID

- 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

Original PEIR Assessment Boundary

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 NGR TQ 037068 and the area between Chantry Hill and Barnsfarm Hill near Sullington at NGR TQ 096120.

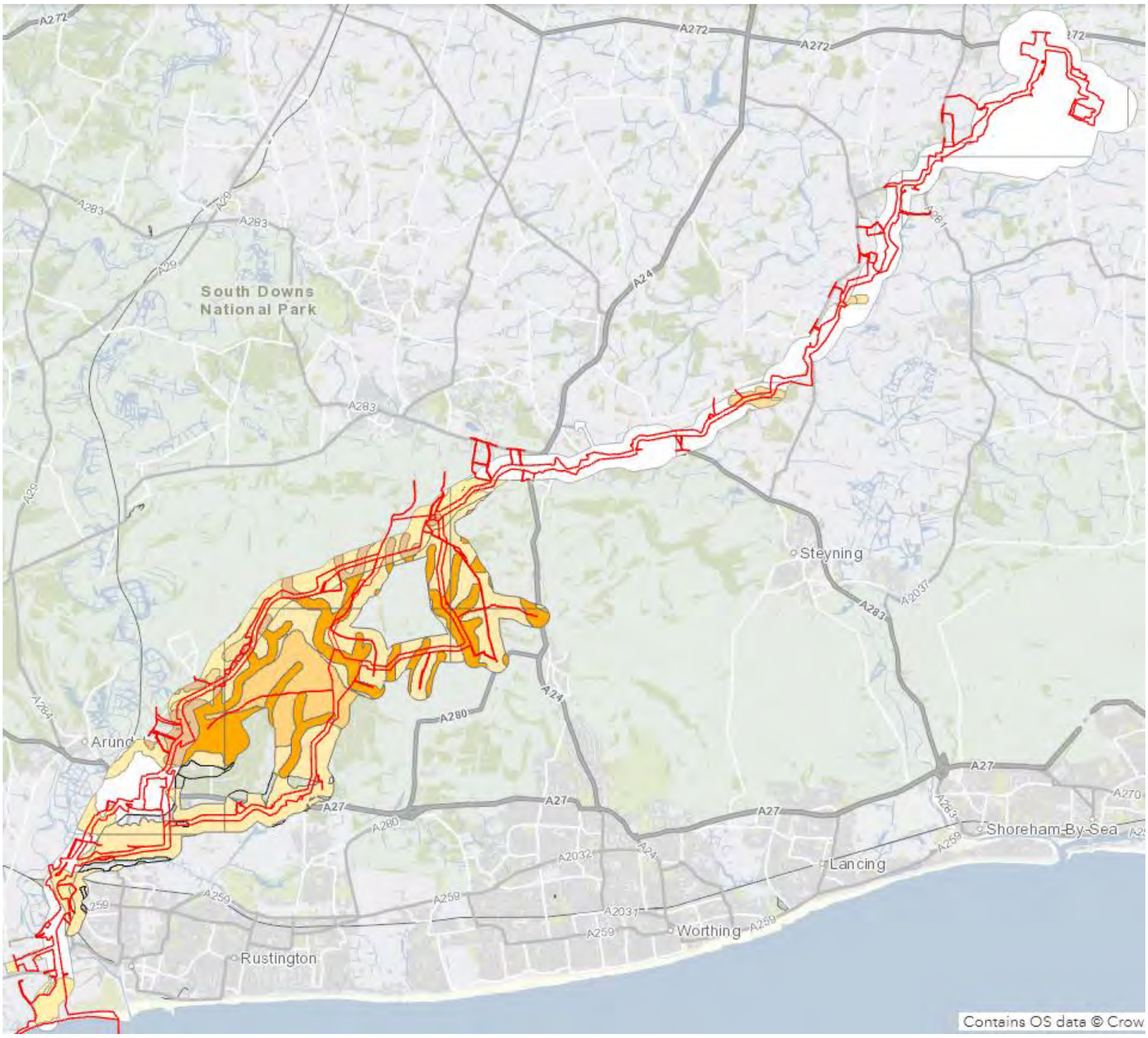
LACRs

4.4.2 The majority of the LACRs are in areas classed as having between 1% and 3% of homes above the action level with a number of localised areas between Polling and Sullington with between 5-10% of properties above the action level.

4.4.3 The onshore substation will be located in lower probability radon areas where <1% of homes are above the action level.

4.4.4 On this basis and taking into account that the Proposed Development does not comprise residential dwellings or permanent buildings, the risks associated with radon concentrations are generally considered to be low.

Graphic 4-33 Radon Levels



Excerpt from Groundsure 2020 and 2022

Key:

- Less than 1%
- Between 1% and 3%
- Between 3% and 5%
- Between 5% and 10%
- Between 10% and 30%

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 26: Water environment, Volume 2** of the ES (Document Reference: 6.2.26).

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 reports (Groundsure, 2020; 2022) show 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.
- A Secondary A superficial aquifer is present in the southwest of the Site, associated with the presence of raised beach deposits and terrace deposits. This continues until the emergence of head deposits on site south of Lillian terrace (NGR TQ 054055). At this point, the aquifer changes to Secondary Undifferentiated. The secondary undifferentiated aquifer reappears in conjunction with head deposits for the remainder of the corridor.
- An unproductive superficial aquifer associated with the superficial geology changing to clays with flints begins at NGR TQ 073075 and ceases at NGR TQ 073087.

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; and
- 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).

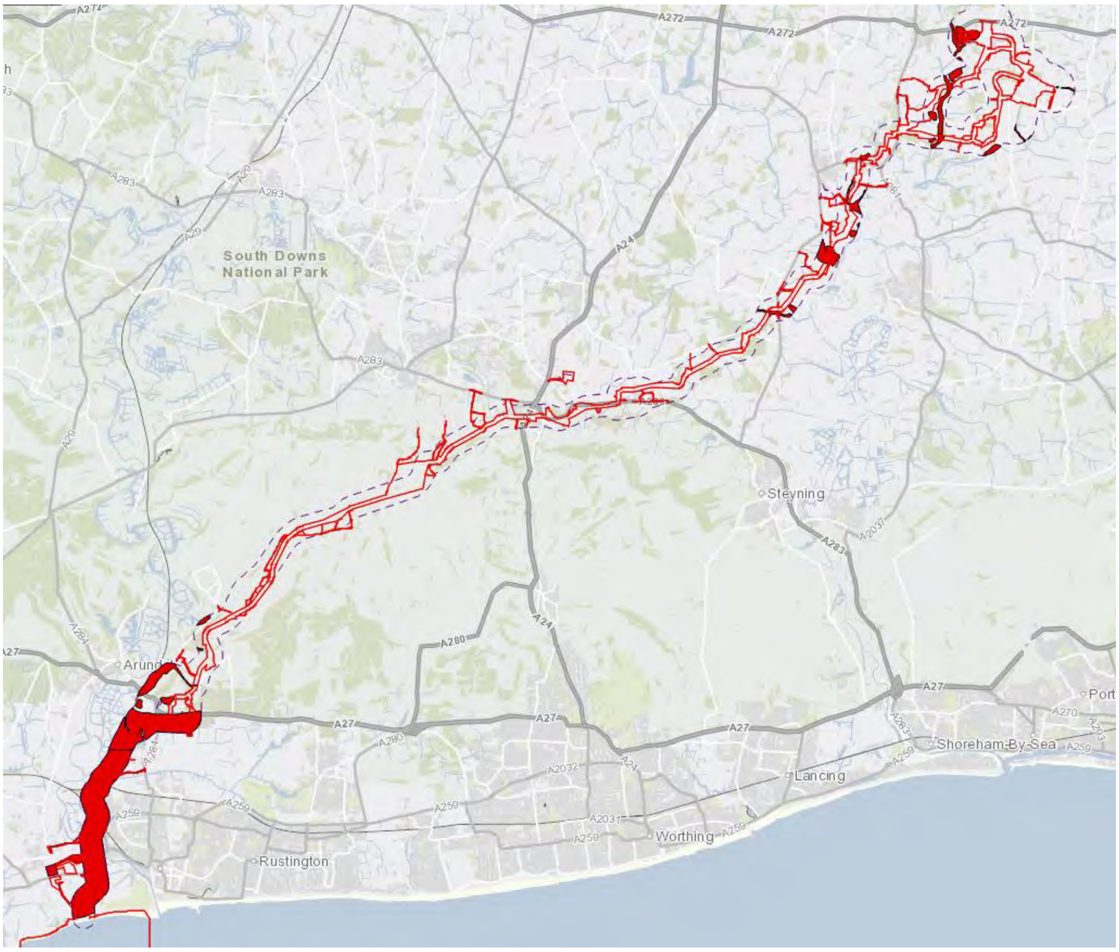
LACRs

4.5.6 The majority of the bedrock aquifers in the additional section are principal aquifers. These aquifers are associated with the bedrock geology consisting of one of the chalk groups which underlay much of the onshore cable corridor.

4.5.7 The secondary A bedrock aquifer between NGR TQ 037052 and TQ 069062 is associated with the presence of the Lambeth group underlying the superficial deposits.

4.5.8 Unproductive bedrock aquifers are present in areas where the London Clay underlays the site.

Graphic 4-34 Secondary A superficial aquifers – Original PEIR Assessment Boundary

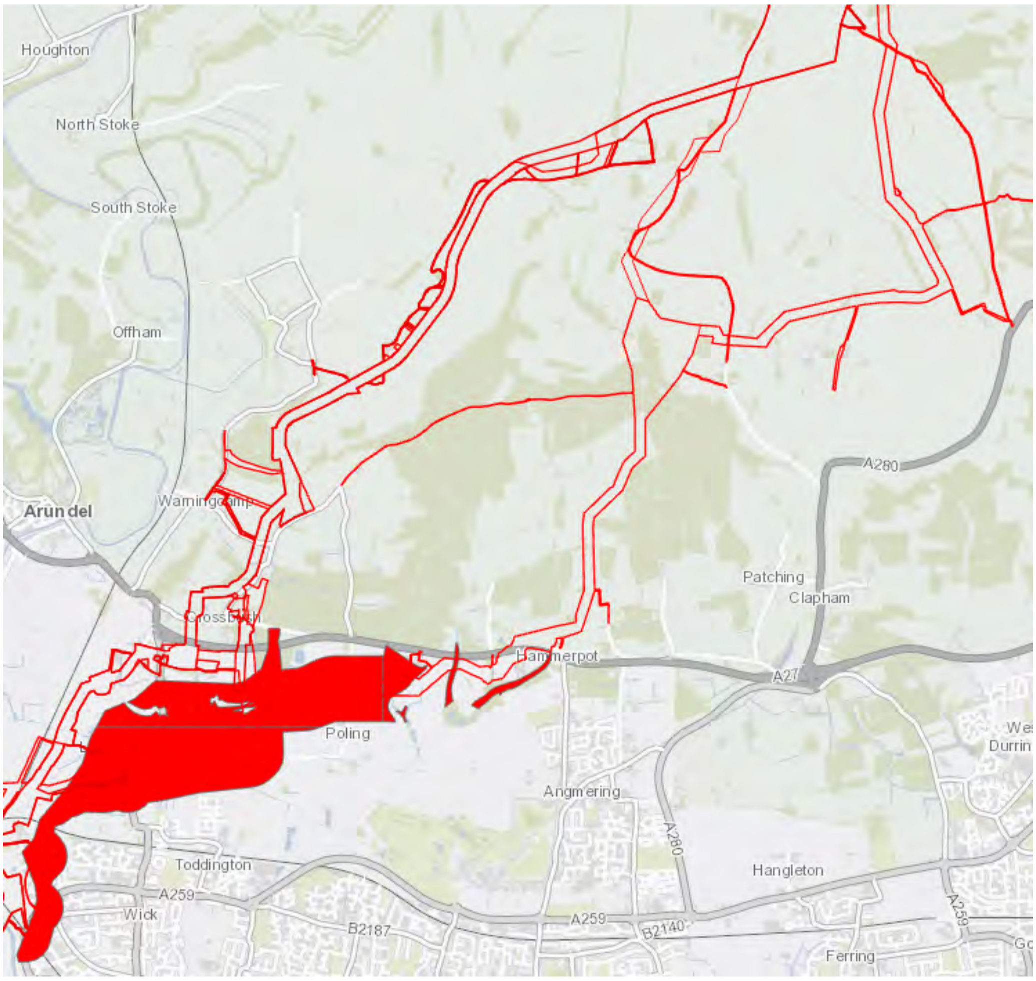


Excerpt from Groundsure 2020

PEIR Assessment Boundary

- Secondary A superficial aquifer

Graphic 4-35 Secondary A Superficial Aquifers – LACRs

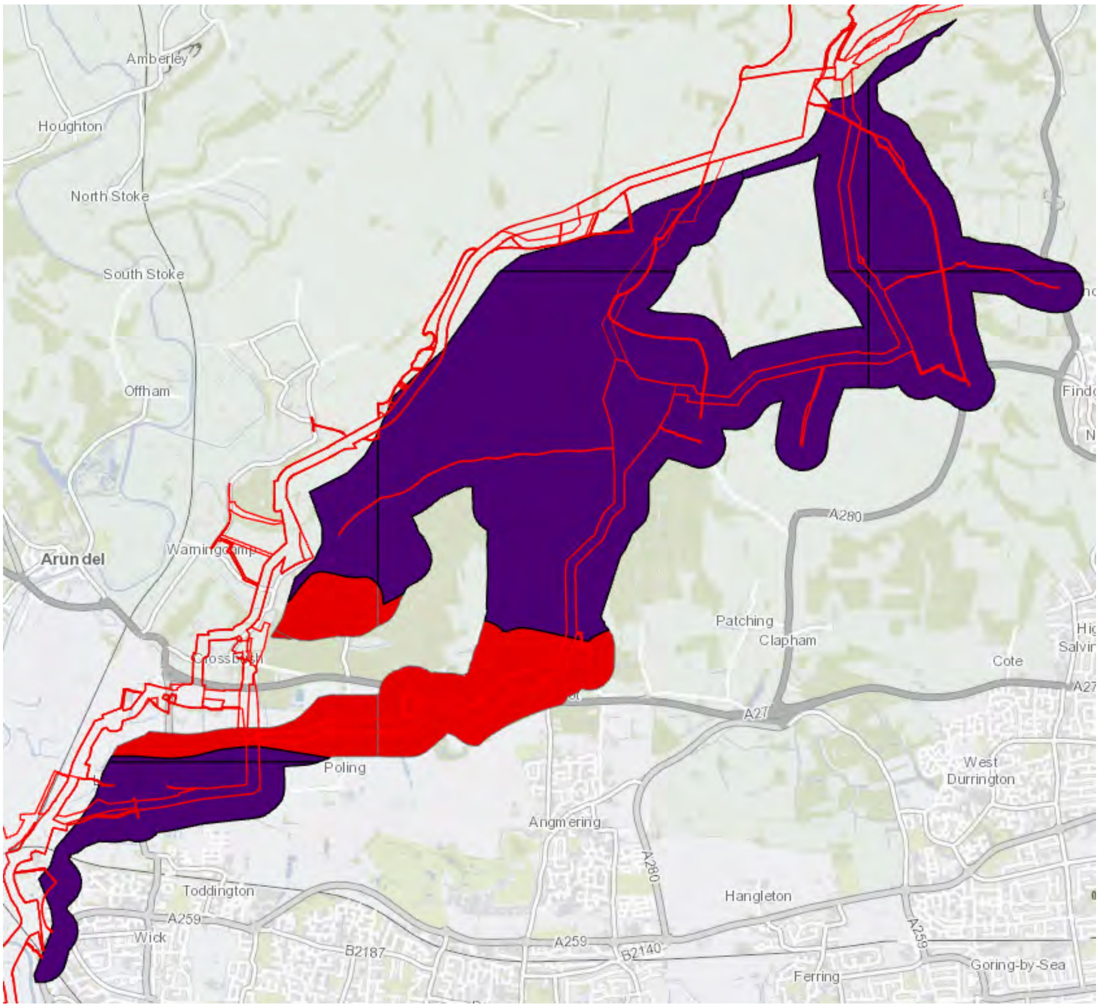


Excerpt from Groundsure 2022

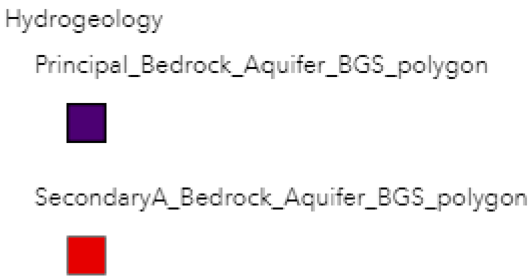
Hydrogeology

SecondaryA_Superficial_Aquifer_BGS_polygon

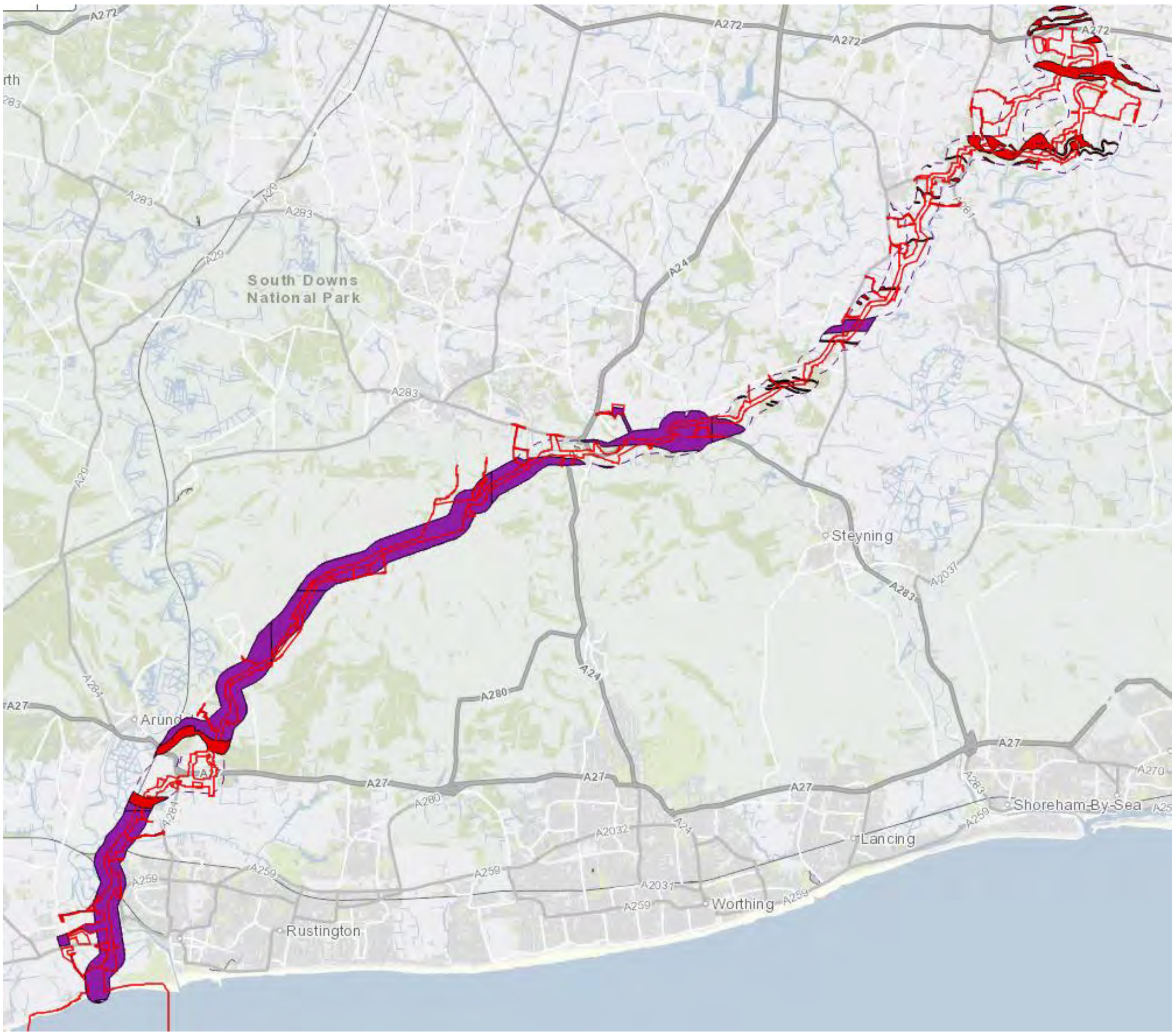
Graphic 4-36 Principal and Secondary A bedrock aquifers – LACRs



Excerpt from Groundsure 2022



Graphic 4-37 Principal and Secondary A bedrock aquifers – Original PEIR Assessment Boundary



Excerpt from Groundsure 2020

PEIR Assessment Boundary

BGS_Principal_Bedrock_Aquifer

Secondary A

4.5.9 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.

4.5.10 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.

4.5.11 Historical mapping identified wells close to the Site boundary (approximately 70m) in 1896 mapping at Warningcamp Farm (NGR TQ 035069) and at a school east of Warningcamp (NGR TQ 039067), with two nearby pumps, suggesting water bearing strata is present.

LACRs

4.5.12 The groundwater vulnerability in the LACRs underlain by principal chalk aquifers are classified as having a high vulnerability.

4.5.13 Small areas in the north-east of the LACRs which are not directly underlain by bedrock do not have a vulnerability classification.

4.5.14 The south-west of the LACRs begins with secondary superficial aquifers classified as having medium vulnerability. This vulnerability changes moving north-east to high vulnerability in association with the superficial geology changing to undifferentiated river terrace deposits.

Groundwater source protection zones

Original PEIR Assessment Boundary

4.5.15 The Groundsure report (Groundsure, 2020; 2022) 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 TQ 033068) to an area west of Barpham Hill (NGR TQ 064104), is within the Outer Catchment and Total Catchment of two SPZs (one inner catchment is immediately east of the Site at grid reference NGR TQ 042072 and one is immediately west at NGR TQ 042093); and
- a portion of the onshore cable corridor north of Harrow Hill (NGR TQ 085112) is within the total catchment of an SPZ.

LACRs

4.5.16 The Groundsure report (Groundsure, 2020; 2022) shows two areas of the LACRs are located within source protection zones. Neither of these are located within an inner catchment area.

- A portion of the LACRs north of Hammerpot beginning at NGR TQ 069061 which is within the outer catchment of a SPZ. At NGR TQ 072072 this then changes to being the within the total catchment zone. This total catchment area ends along the corridor at NGR TQ 074079. The inner catchment zone is located approximately 100m to the west of the onshore cable corridor at NGR TQ 069066.
- The north-eastern area of the LACRs also falls within the total and outer catchment areas of an SPZ. This area can be seen in **Graphic 4-36**.

Groundwater abstraction

4.5.17 The Groundsure report (Groundsure, 2020; 2022) records no licensed groundwater abstractions onsite or within 200m of the Site.

4.5.18 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 26: Water environment, Volume 2** of the ES Document Reference: 6.2.26).

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 26: Water environment, Volume 2** of the ES (Document Reference: 6.2.26).

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 TQ 013031). The River Adur and one of its tributaries traverses the Site west of Henfield (NGR TQ 191169, and NGR TQ 191168). 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 the proposed Oakendene Substation temporary construction compound and existing National Grid Bolney Substation Compound.

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 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);

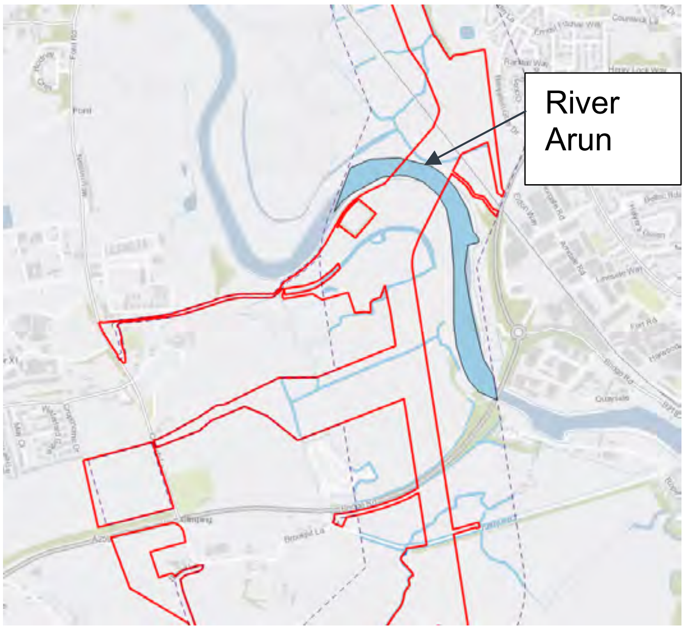
- Honeybridge Stream, classed as poor in 2019 (ecological – poor, chemical – fail);
- Adur (Lockbridge), classed as poor in 2019 (ecological – poor, chemical – fail);
- Adur East (Sakeham), classed as poor in 2019 (ecological – poor, chemical – fail);
- Cowfold Stream, classed as poor in 2019 (ecological – 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).

LACRs

4.6.5 The only surface water features crossing the LACRs are a series of small unnamed linear features in the south west of the corridor between NGR TQ 038052 and TQ 060055). Between these points, there are features either partially or fully crossing the site in a general north-south direction.

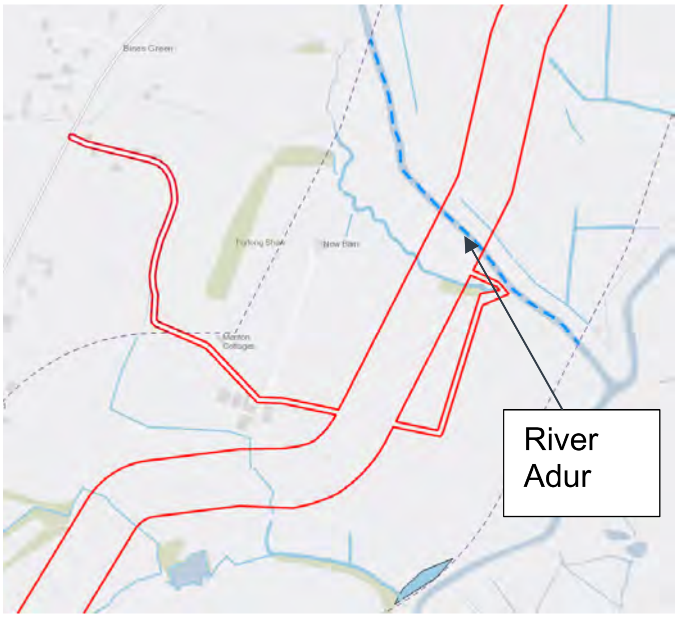
- Black Ditch (West Sussex), classed as poor in 2019 (ecological – moderate, chemical – fail);
- Teville Stream, classed as bad in 2019 (ecological – bad, chemical – fail); and
- Stor, classed as moderate in 2019 (ecological – moderate, chemical – fail).

Graphic 4-38 Site Hydrology: River Arun



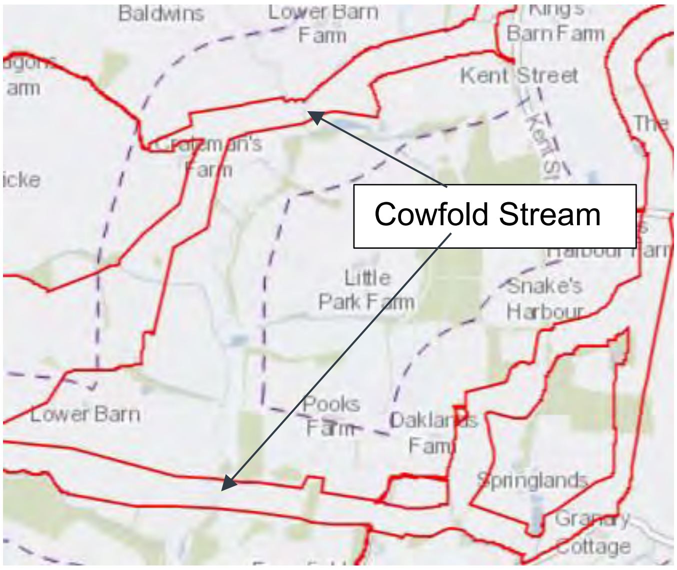
Excerpt from Groundsure 2020

Graphic 4-39 Site Hydrology: River Adur



Excerpt from Groundsure 2020

Graphic 4-40 Site Hydrology: Cowfold Stream



Excerpt from Groundsure 2022

Surface water abstractions

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

Surface water discharge consents

4.6.7 The Groundsure report (Groundsure, 2020; 2022) 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 TQ 211206), sewage discharge to freshwater river, dating from 1962;
- offsite at Oakendene Manor Farm Light Industrial Estate (NGR TQ 225224), 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 TQ 246210), trade discharge to a tributary of the River Adur, dating from 2019.

Drinking water protected areas (surface water)

Original PEIR Assessment Boundary

4.6.8 The Environment Agency website (Environment Agency, 2021a) 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 various chemical compounds.

LCARs

4.6.9 The area around Tolmare farm is located within a Drinking Water Safeguard zone (Groundwater). This is the Stanhope Lodge safeguard zone and is designated as a result of nitrate risk.

4.6.10 Another Drinking Water Safeguard Zone is present to the east of Michelgrove House (NGR TQ 083084), spanning up to north of Harrow Hill (NGR TQ 088108). This is listed as the Patching Safeguard Zone and is at risk due to nitrates.

Flood risk

Original PEIR Assessment Boundary

4.6.11 The Groundsure report (Groundsure, 2020; 2022) 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 (MHCLG, 2014).

4.6.12 The Groundsure report (Groundsure, 2020; 2022) 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 TQ 196183).
- Zone 3 flood areas are associated with Cowfold Stream at two locations in the north of the Site near Wineham Lane (NGR TQ 219199) and Bolney Road (NGR TQ 221211).

4.6.13 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 TQ 021053), this occurred in winter 2014. Also in 2014, two small areas of flooding are recorded near Warningcamp (at NGR TQ 031061 and NGR TQ 032063).

4.6.14 A detailed assessment of flood risk is included as part of **Chapter 26: Water environment, Volume 2** of the ES (Document Reference: 6.2.26).

LCARs

4.6.15 The Groundsure report (Groundsure, 2020; 2022) shows some areas in the southwest of the LACRs are listed as being within flood zone 2 and flood zone 3 areas. These areas are identified below.

- An area centred on NGR TQ 028050 to the north of Lyminster with a zone 2 flood risk as well as an associated zone 3 risk. The southwestern extent of this flood zone cross cuts the site at approximately NGR TQ 021047.
- Another large area south of Lyminster centred on NGR TQ 028043. Which is classified as a zone 3 flood zone as well as an associated zone 2. The far western extent of this zone extends onto the site partially.
- An area which cross cuts the site at NGR TQ 057056 to the east of the Vineries industrial estate and to the north of Decoy Wood.
- Another zone 3 flood area centred on NGR TQ 064055 which extends onto the site at its far north eastern extent as well as cross cutting the A27 (Arundel Road).

Pollution incidents

Original PEIR Assessment Boundary

4.6.16 The Groundsure report (Groundsure, 2020; 2022) 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 TQ 014022) 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 TQ 036066) 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 TQ 139135), 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 TQ 181162), a pollution incident relating to oils and fuel (diesel) is recorded in 2002 with no impact on land or water; and

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

LACRs

- South of the site near Lyminster (NGR TQ 025043) in 2001, an unidentified pollutant caused an incident with minor impacts on water but no impact to air or land.
- South of the site boundary (NGR TQ 058053) at Decoy Cottage. An incident caused by Household Waste in 2003 caused minor impacts to air and land with no impact to land.
- An incident occurred on site in 2002 (NGR TQ 066057). The pollutant is listed as suspended soils and resulted in minor impacts to water and no impact to air or land.

4.6.18 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 Historical Landfills

Onsite Historical Landfills – Original PEIR Assessment Boundary

4.7.1 The Groundsure report (Groundsure, 2020; 2022) shows three historical landfills onsite (see **Graphic 4-41**). These comprise:

- a landfill taking non-biodegradable wastes operating between 1996 – 2016 at Brookbarn Farm, Courtwick Lane, Littlehampton (NGR TQ 012038);
- 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 TQ 016042, respectively, in the northwest of Littlehampton; and
- a small area east of the main Brookbarn Farm landfill area (NGR TQ 015039) 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.

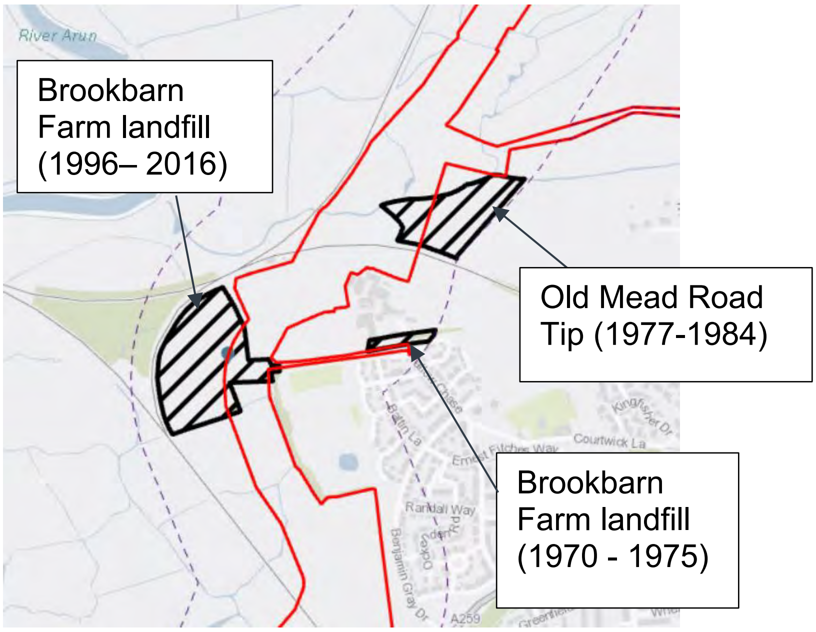
4.7.2 Aerial photography (Google Earth (Google, 2021a)) shows all three landfill areas appear to have been restored for agricultural use.

4.7.3 The site walkover (October 2021) verified that these areas had been restored for agricultural use and at the time of the visit the fields were grassed. No obvious signs of former landfill infrastructure (such as boreholes or gas/leachate wells) were observed.

Onsite Historical Landfills – LACRs

4.7.4 The Groundsure report (Groundsure, 2020; 2022) shows there are no historical landfill sites located within the LACRs.

Graphic 4-41 Historical landfills onsite



Excerpt from Groundsure 2020
Key:

PEIR Assessment Boundary

Historical_Landfill

Graphic 4-42 Aerial view of landfills at Brookbarn Farm and Old Mead Tip (restored as fields)

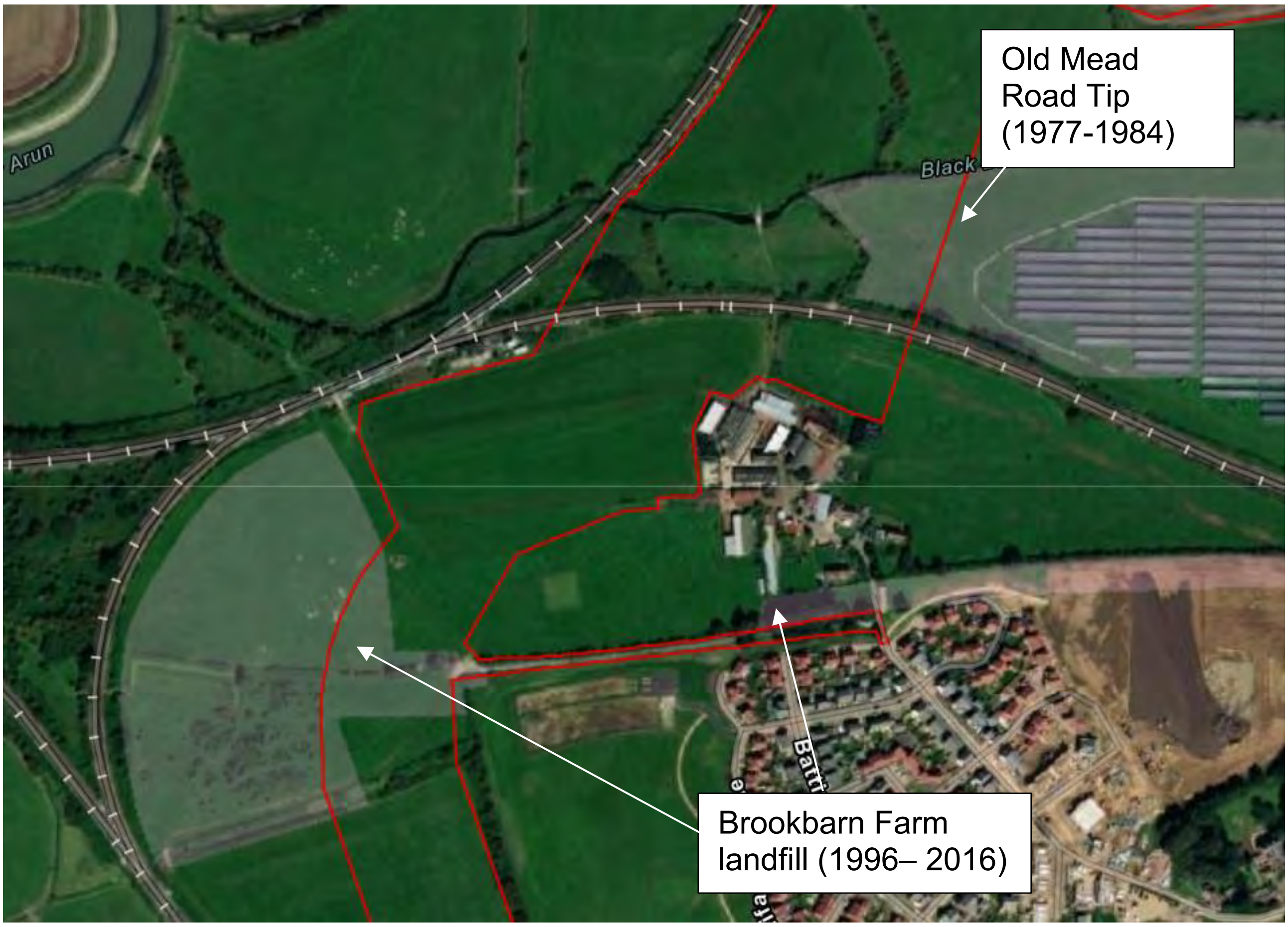


Image © Google Maps

Offsite Historical Landfills – Original PEIR Assessment Boundary

4.7.5 Areas of historical landfill are shown east of the Site at Littlehampton (see **Graphic 4-43**). 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 TQ 014025), which dates from 1946 to 1975 and waste types are recorded as inert, industrial, commercial, and household.

4.7.6 A smaller landfill to the north of the River Arun at Wick Farm (NGR TQ 015030) appears to be an infilled railway cutting. No details are available of the landfilled material.

4.7.7 A small area of landfill is recorded offsite close to the Site boundary between the Site and the River Arun (NGR TQ 007027). This small area of landfill is associated with Ford Prison, Climping dated 1976, the waste type is recorded as inert and industrial.

4.7.8 A circular area of inert landfill is recorded offsite, approximately 40m from the Site boundary, north of Bridge Road, at Climping (NGR TQ 012020), dating from between 1977 and 1978.

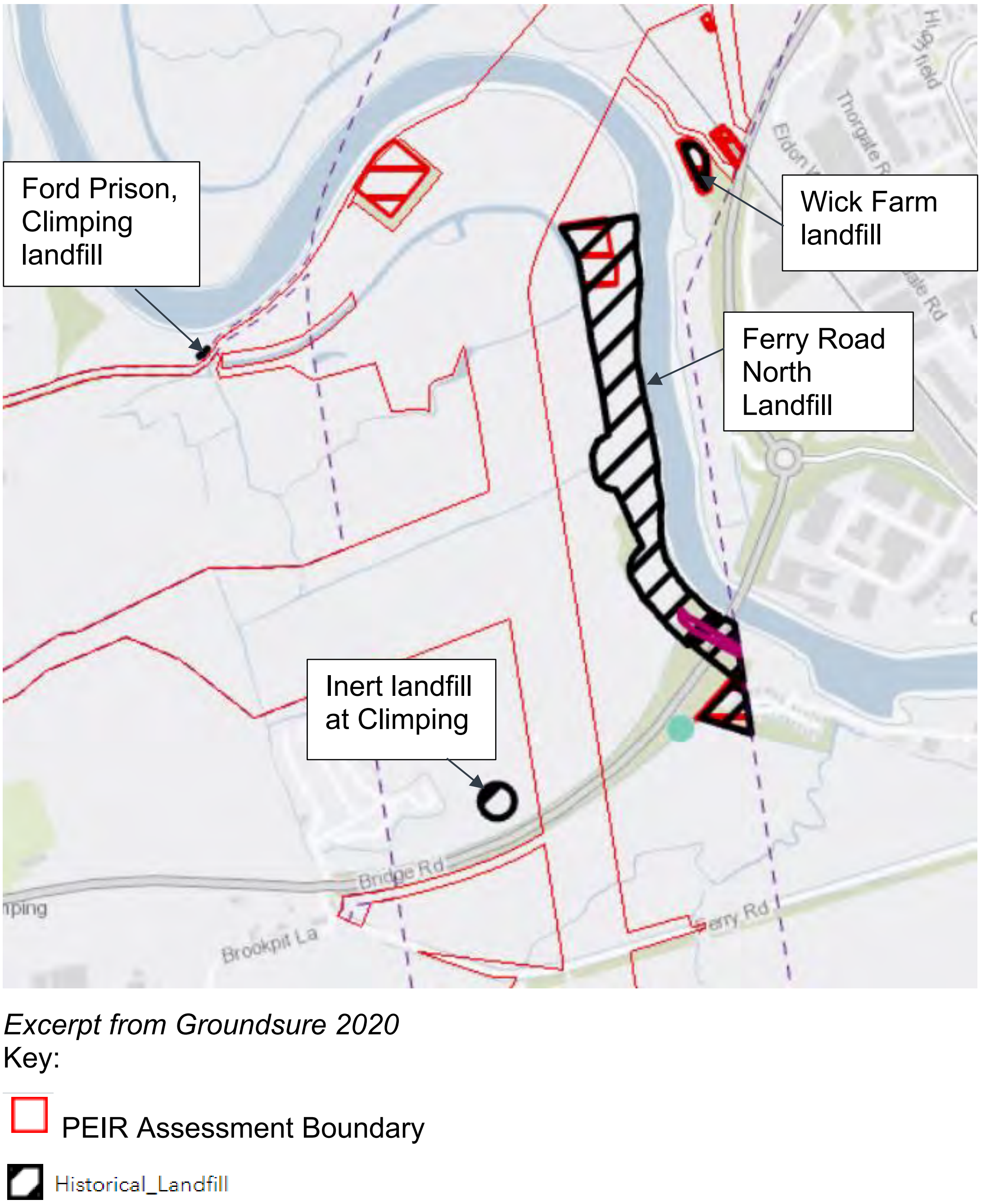
Offsite Historical Landfills – LACRs

4.7.9 Near Angmering, a historical landfill known as Swillage is present centred on NGR TQ 072065. The landfill is indicated to have been licenced to accept inert, commercial and household waste between 1950 and 1965.

4.7.10 Near the village of Findon, a historical landfill known as Long Furlong is present at NGR TQ 110087. The landfill is indicated to have been licenced to accept inert waste in 1976 with waste accepted in 1982.

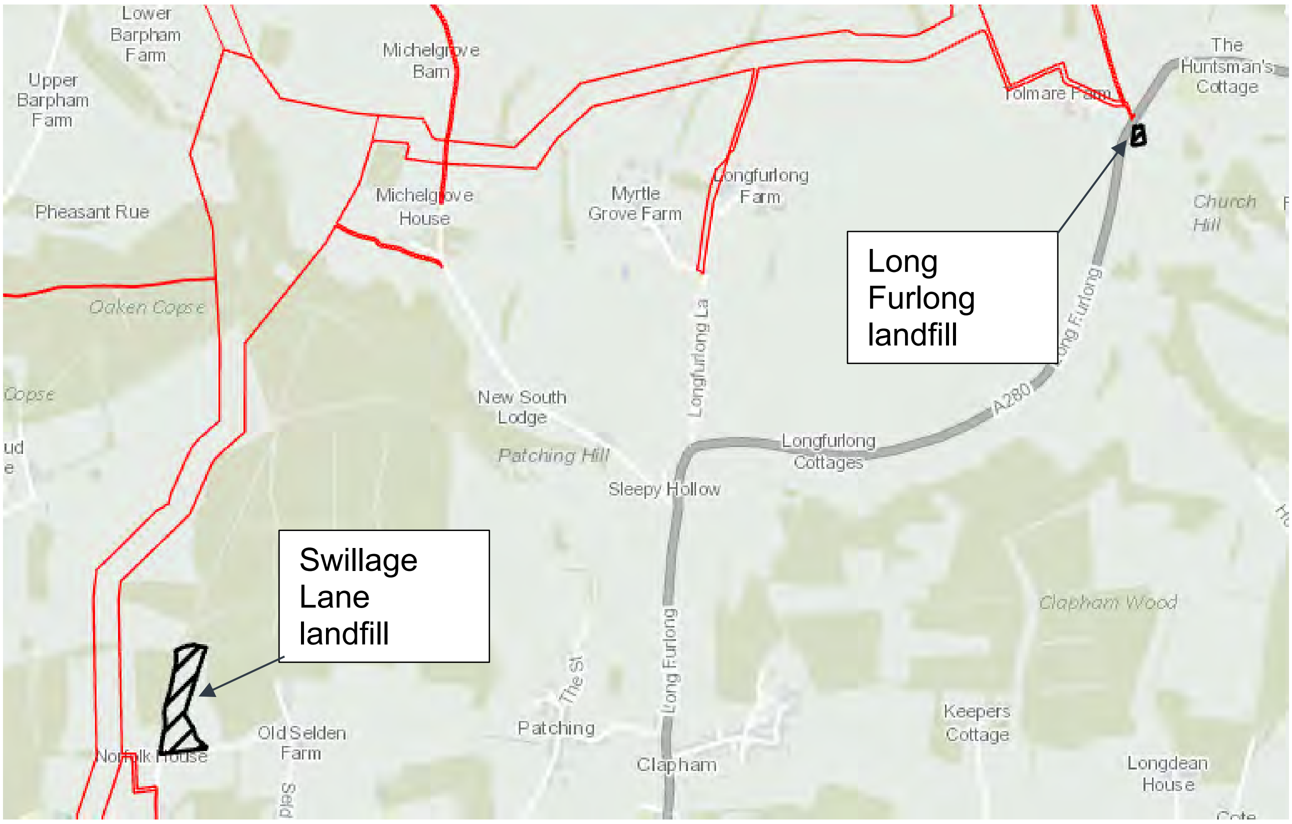
4.7.11 The Swillage Lane and Long Furlong landfills are shown on **Graphic 4-44**.

Graphic 4-43 Historical landfill offsite (Original PEIR Assessment Boundary)



Excerpt from Groundsure 2020

Graphic 4-44 Historical landfill offsite (LACRs)



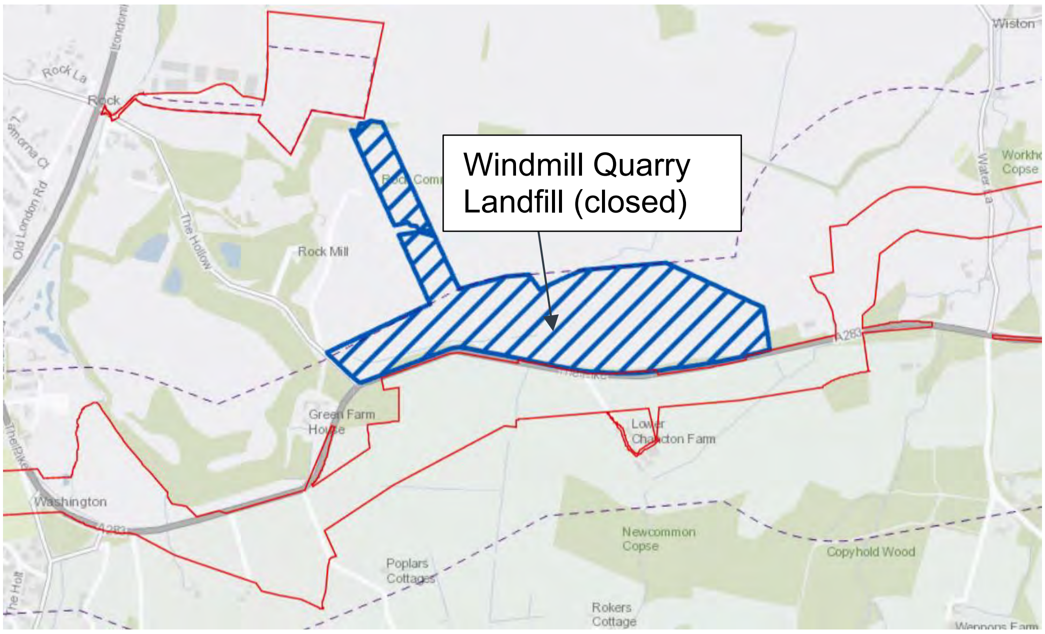
Excerpt from Groundsure 2022

4.8 Authorised Landfills

Original PEIR Assessment

4.8.1 Windmill Quarry Landfill is recorded immediately north of the Site at The Hollow, Storrington, Pullborough, RH20 3DA (NGR TQ 134135). 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, 2021b) 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 4-45 Recent landfill immediately north of the Site



Excerpt from Groundsure 2020

Key:

PEIR Assessment Boundary

Active_or_Recent_Landfill

Graphic 4-46 Aerial view of Windmill Quarry Landfill (restored as fields)

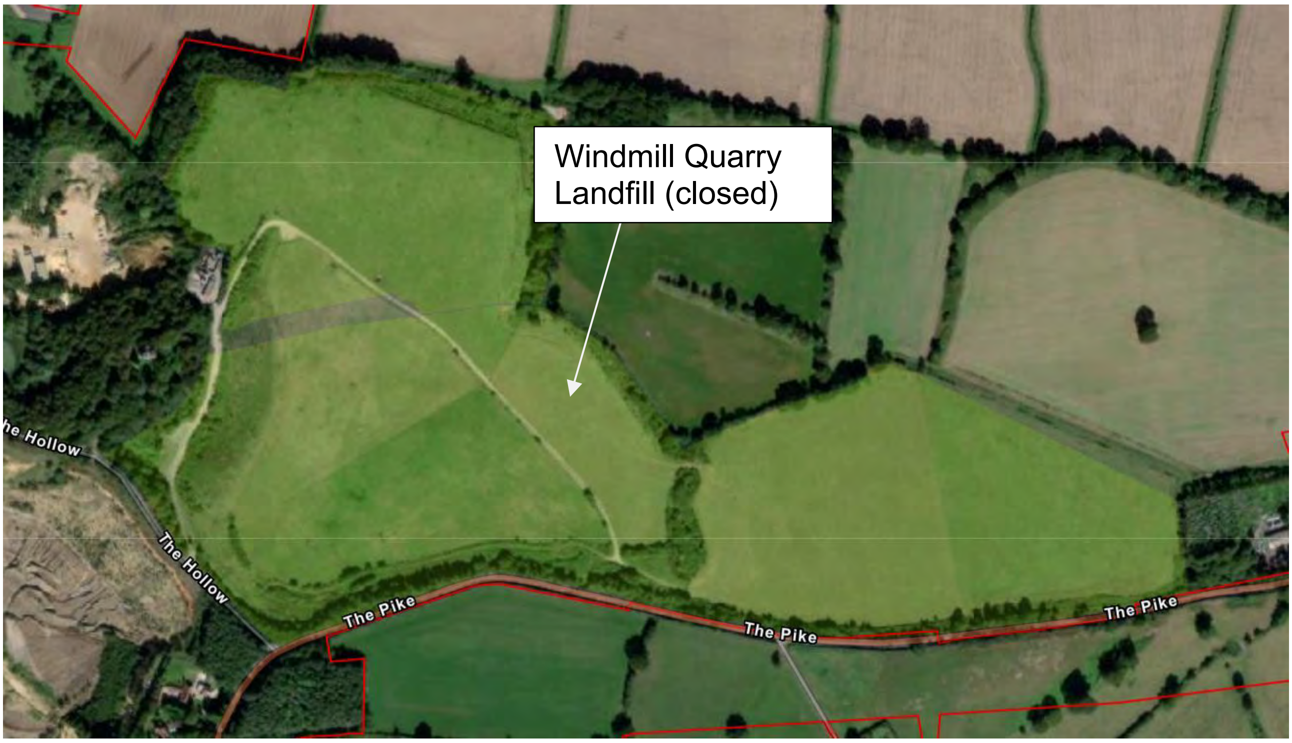


Image © Google Maps

4.8.2 During the October 2021 site visit, it was not possible to gain access onto the restored landfill, however, a visual inspection through the western boundary fence of the landfill area indicated that new trees had been planted across that part of the landfill. Landfill gas/leachate infrastructure was observed to be present however it was not possible to determine if this was active.

LACRs

4.8.3 The Groundsure report (Groundsure, 2020; 2022) shows there are no authorised landfill sites located within or adjacent to the LACRs.

4.9 Other waste management facilities (non-landfill)

Original PEIR Route

4.9.1 A composting facility is shown at Stubbs Copse Wood, which is offsite at Warningcamp (NGR TQ 035058). This is over 100m from the Site boundary and is unlikely to have significantly impacted on land quality at the Site.

4.9.2 North of the A272 road, and approximately 100m northeast of the Site, the Groundsure report (Groundsure, 2020; 2022) records a licensed deposit of waste to land as a recovery operation at Barnfield House (NGR TQ 233228). Given its distance from the Site, this is unlikely to have significantly impacted on land quality at the Site.

4.9.3 A historical waste site is recorded at Delspride, Cowfold (NGR TQ 235218), 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.

4.9.4 The Groundsure report (Groundsure, 2020; 2022) 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.

LACRs

4.9.5 A composting facility at NGR TQ 051055 named as The Vinery, Arundel Road is located approximately 60m west of the site at its nearest point. Due to the distance away and nature of the site it is not expected to have any significant impact on the land quality.

4.9.6 A historical waste site is located approximately 200m north-west of this composting facility (NGR TQ 049056). This is also named as The Vinery and lists the activities as the construction of buildings to house in-vessel composting for green kitchen waste. This includes maturation areas, bio-filters and administration/canteen buildings.

4.9.7 There are a variety of waste storage exemptions across the LACRs primarily for agricultural use such as sludge storage. These recorded exemptions are not considered to be a significant contamination risk and are not considered further.

Potential infilled land

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

4.10 Regulatory records

Part 2A Contaminated Land Register Entries & Notices

4.10.1 The Groundsure report (Groundsure, 2020; 2022) does not identify any Part 2A contaminated land register entries or notices in relation to the Site or within the search buffer.

4.10.2 None of the local authorities contacted as part of the environmental searches indicated that there were Part 2A contaminated land entries or notices within the search buffer.

Pollution prevention and control

4.10.3 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 TQ 027058) 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 TQ 121132), 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

4.10.4 The Groundsure report (Groundsure, 2020 & 2022) 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 TQ 195178) 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 TQ 140135). This is recorded as involving oils and fuel and the impact to land is classed as minor.

LACRs

- a pollution incident involving firefighting runoff in December 2002 with significant air impacts alongside minor land and water impacts (NGR TQ 022047). This is approximately 30m south of the site boundary in Lyminster.

4.11 Industrial land uses

4.11.1 The Groundsure report (Groundsure, 2020; 2022) 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 TQ 007013) on or close to the Site boundary;
- a sewage pumping station located west of Littlehampton on or close to the Site's eastern boundary (NGR TQ 015035).
- an electrical substation located northwest of the Site to the northwest of Littlehampton, which looks to be entirely offsite (NGR TQ 012041);
- a discharge of final (sewage) effluent to land is recorded as being issued in 1987 and revoked in 1997 at NGR TQ 037065);
- an electrical substation located on or close to the southern Site boundary south of Warningcamp (NGR TQ 034055);
- a water pumping station located near Warningcamp at NGR TQ 036059. A further water pumping station is located just to the north of this at NGR TQ 036060;
- two tanks (no detail on type) are identified near Warningcamp at NGR TQ 036061. 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 (NGR TQ 050086) by Norfolk Clump;
- a disused quarry is recorded approximately 10m south of the Site at Rowdell Holt West (NGR TQ 105125), 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 (NGR TQ 146136). 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 (NGR TQ 194178);
- tanks are shown onsite at the access road west of the A281 at St High's Monastery (NGR TQ 211208);

- 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 (NGR TQ 211206);
- the existing National Grid 400kV Bolney substation located adjacent to Wineham Lane North has associated tanks which are shown adjacent to the Site at the southwest corner of the substation. The Groundsure report (Groundsure, 2020; 2022) information indicates the substation dates from 1974; and
- An industrial estate (Oakendene Industrial Estate) is located at Bolney Road/Kent Street. 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. During the site walkover (October 2021), the estate was verified to have light industrial uses including storage of metal and steelwork, a furniture maker, a vehicle repair shop and metal fabrication business. Hydrocarbon and paint odours were noted from some of the units on the industrial estate suggesting the use and storage of these products take place. However, no large-scale above ground storage tanks were observed during the visit.

LACRs

- An electricity substation located approximately 5m east of the site on the corner of Benjamin Gray Drive and Tatlow Chase (NGR TQ 017037). From satellite imagery the substation doesn't appear to encroach on the site boundary;
- A tank (unspecified) located on the corner of Benjamin Gray Drive and Courtwick lane (NGR TQ 017037). The site boundary appears to cross over the tank on the Groundsure report (Groundsure, 2020; 2022) mapping data;
- An electricity substation located on site at NGR TQ 052054. Just south of The Vinery Industrial Estate;
- Unspecified tank (NGR TQ 053053) located on site the tank is not visible on satellite imagery;
- Telecommunications mast inside site boundary at NGR TQ 053054. Located in south-east corner of Vinery Industrial estate on satellite imagery;
- Vinery Industrial Estate (roughly centred on NGR TQ 052056) has numerous industrial land uses including antiques dealers, a kitchen showroom, a small vehicle workshop and garden suppliers;
- A disused pit within Beech Copse (NGR TQ 075083). The pit is not visible on satellite imagery and appears to be mainly covered in vegetation. The Groundsure report (Groundsure, 2020; 2022) indicates the pit was named Beech Copse Chalk Pit and operations at the site have ceased. The Groundsure report (Groundsure, 2020; 2022) doesn't indicate if the pit has been infilled;

- A disused pit at NGR TQ 093089 located just outside the site's southern boundary. The Groundsure report (Groundsure, 2020; 2022) show the pit was a chalk pit first noted on maps in 1896;
- Disused workings (NGR TQ 095091) identified as a former chalk pit first identified on mapping in 1876;
- Disused workings 45m east of the site boundary (NGR TQ 079103). The Groundsure (Groundsure, 2020; 2022) identifies this a Harrow Hill Chalk Pits;
- Slurry beds north-west of Tolmare Farm 40m south of site boundary at NGR TQ 106089 which are visible on satellite imagery;
- A disused lime kiln 40m south of the site to the south-east of Tolmare Farm (NGR TQ 109088);
- A farm silo 20m south-east of site at NGR TQ 104099;
- Electricity substation located 70m east of the site boundary at NGR TQ 109096; and
- Two water pumping stations located near North End at NGR's TQ 116098 and TQ 119098. Neither of these pumping stations are visible on satellite imagery.

Fuel station entries

Original PEIR Assessment Boundary

4.11.2 Two service stations are identified in the Groundsure data (Groundsure, 2020; 2022) close to the Site:

- Crossbush Service Station is located offsite approximately 40m north of the Site at Warningcamp (NGR TQ 027058). 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 TQ 122129). Based on available current aerial photography this area appears to have been redeveloped for housing.

LACRs

- Hammerpot Garage is located approximately 100m south of the site's southern boundary (NGR TQ 066056) and has been present since at least 1970. The site is still in operation.

4.12 Sensitive land uses

Original PEIR Assessment Boundary

4.12.1 The eastern extent of the onsite landfall area at Climping Beach is adjacent to (but not within) the Climping Beach SSSI and the West Beach Local Nature Reserve (LNR) (which overlaps the SSSI). The MAGIC interactive map (Defra, n.d.) shows the SSSI is in a favourable condition. 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).

4.12.2 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 TQ 096123).

LACRs

4.12.3 There are no SSSIs or LNRs associated with the LACR routes.

4.13 Unexploded ordnance (UXO) Desk Study

4.13.1 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 where the risk rises to moderate.

4.13.2 However, large parts of the Site were requisitioned by the military during World War II as part of the South Downs Training Areas and whilst the areas were subject to clearances of Unexploded Ordnance (UXO) following the war, there is the potential for UXO to still be present.

4.13.3 Two items of potential Unexploded Ordnance (UXO) were discovered in October 2021 at the surface of an agricultural field at Angmering Park during non-intrusive archaeological surveys of the Site.

4.13.4 Consequently, a more detailed UXO desk study and risk assessment has been completed by Zetica for the Site (see **Annex C**).

4.13.5 The UXO desk study confirms that the majority of the Site is classified as having a low UXO hazard with an area of moderate to high UXO hazard identified where the onshore cable corridor passes through the former World War II South Downs Training Area between Warningcamp and Washington (M1 on **Graphic 4-47**) and an area of moderate UXO hazard where World War II bombing was identified northwest of Poling (M2 on **Graphic 4-47**).

4.13.6 Based on the above information there is considered to be a low risk of encountering UXO across the majority of the Site, however, in the areas of moderate and high risk, UXO risk mitigation will be required by a specialist UXO contractor prior to excavation or trenchless crossing (HDD).

Graphic 4-47 UXO Hazard Plan

Source: OpenStreetMap *Not to Scale*

Legend						
	Very Low	(light green)	Low	(dark green)	Moderate	(orange)
	High	(red)		Very High	(purple)	

Excerpt from Zetica 2023

4.14 Site walkover

4.14.1 A site walkover of areas of the original PEIR Assessment Boundary was undertaken in October 2021 and a subsequent walkover of areas of the LACRs was undertaken in October 2022.

4.14.2 The purpose of the site walkover was to verify the key information on potential sources of contamination identified in the desk study. As such, the following locations were visited during the walkover:

- Brookbarn Farm historical landfill;
- Crossbush Service Station;
- Rock Common Sand Quarry;
- Windmill Quarry authorised landfill;

- Oakendene Industrial Estate;
- The existing National Grid Bolney substation;
- The Vinery Industrial Estate; and
- Swillage Lane historical landfill.

4.14.3 Photographs taken during the site walkover are included in **Annex D**.

4.14.4 The findings of the site walkover have been included in the relevant desk study sections above and used to support the preliminary risk assessment in the following section.

5. Initial conceptual model and preliminary risk assessment

5.1 Conceptual model

5.1.1 The 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 (Environment Agency, 2020) 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 Farm landfill (two areas) and Old Mead Road Tip.	Yes

No.	Source	Potential Contaminants	Location	Source to be considered further?
2	Authorised 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 information indicates it is possible a cross boundary feature.	Yes
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
4	Electrical Substation by Vineries Industrial Estate	Polychlorinated biphenyl (PCB's), heavy metals	South of Vineries Industrial Estate.	Yes
Offsite sources				
5	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
6	Four historical landfills near Littlehampton	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds	Adjacent to Site (Ford Prison, Climping landfill), between Site and River Arun (Ferry Road North Landfill), northwest of site by Bridge	Yes

No.	Source	Potential Contaminants	Location	Source to be considered further?
		(for example ammonia, nitrate etc.)	Road, and adjacent to Site (Wick Farm landfill).	
7	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.	Yes
8	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
9	Crossbush/ Hammerpot 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
10	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
11	Former petroleum storage facilities associated with vehicle showroom	TPH including BTEX, PAH	Approximately 80m north of Washington.	Yes

No.	Source	Potential Contaminants	Location	Source to be considered further?
12	The Vinery Industrial Estate, includes vehicle repair, quarrying and associated tanks.	Heavy Metals, TPH, PAH, chlorinated solvents.	Adjacent to site north-east of Poling, south of the A27.	Yes
13	Electrical Substation by The Vinery Industrial Estate	PCB's, heavy metals	South of The Vinery Industrial Estate.	Yes
14	Burial Ground	TPH, PAH, ground gas (carbon dioxide and methane) and other organic and inorganic compounds (for example ammonia nitrate etc.)	20m east of site to the south of Pigeonhouse Plantation.	No – Roman age of grounds should have dissipated accumulated gases.
15	Historical landfill at Long Furlong	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	30m south of site boundary to the east of Tolmare Farm.	Yes
16	Historical landfill at Swillage Lane	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and other organic and inorganic compounds (for example ammonia, nitrate etc.)	110m east of the site boundary. Between Norfolk House and Olivers Copse.	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.
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

Receptor	Pathway
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 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 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22).

UXO

5.4.3 UXO are not considered within the risk assessment for contamination as they are considered to be a constraint to redevelopment rather than a land contamination risk issue and would be anticipated to be managed as part of safe working practices by a contractor.

Ecological receptors

5.4.4 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.

5.4.5 Ecological receptors are considered further as part of **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22).

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 E**. 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 the industrial estates at Oakendene (where activities include various vehicle repair, testing and servicing, a service station, a vehicle showroom with petroleum storage, and metal polishing services) and The Vinery (where activities include furniture repair).

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 cut trenching or using trenchless crossing (for example, 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 (for example, 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, which 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 general 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. At the Vinery Industrial Estate, a low to moderate risk has been assessed given the potential for pollutants such as fuels and Per and polyfluoroalkyl substances (PFAS) to have been released from activities including furniture repair. However, it is noted that a land contamination assessment as part of redevelopment of the southern part of the estate in 2012 concluded that risks to groundwater were low.

Surface Water

5.6.13 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 Oakendene substation)

5.6.14 The risks to future property including the cables, joint bays and the onshore substation at Oakendene 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)

5.6.15 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.

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

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	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

[3] 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 D**.

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity][3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								nearest building identified is ~90m from onsite landfill.
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

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								development. There are no nearby properties likely to be affected by gas migration at the identified source areas.
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.

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
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 encountered within the top 20m (BGS, 2021c)
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.

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
15	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.)	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	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 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

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								Windmill Quarry Landfill boundary.
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, which 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, former railway land (includes areas currently in agricultural use)	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[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
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 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	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[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
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 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 – Principal bedrock aquifer / Secondary A bedrock aquifer)	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 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

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								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 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 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

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity][3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								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 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	Heavy metals, TPH, PAH, chlorinated solvents	Current site users (workers, landowners,	Dermal contact, ingestion and inhalation of dusts,	Toxic hazardous to human health, carcinogenic	**Low**	**Moderate/low**	Industrial units are active and subject to current health, safety and environmental

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity][3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
	various vehicle repair, testing and servicing, and metal polishing		members of the public)	vapours, asbestos fibres	**[Medium]**			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, includes various vehicle repair, testing and servicing, and metal polishing	Heavy metals, TPH, PAH, chlorinated solvents	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact, migration and accumulation of vapours	Degradation **[Mild]**	**Low**	**Low**	Some potential for damage to cables or concrete structures in aggressive ground conditions.
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.
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

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								migration through the soil profile or via shallow groundwater migration however the absence of buildings across the majority 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.
48	Source 8-10: Offsite Service Stations and former vehicle garage	TPH including BTEX and PAH	Future site users (workers, landowners,	Dermal contact, ingestion and	Toxic hazardous to human health,	**Low**	**Moderate**	Presence of alluvium in this area means there is potential for contaminants to migrate in

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
	tanks (underground fuel tanks including petrol)		members of the public)	inhalation of dusts, vapours, and gases	carcinogenic, explosion **[Severe]**			soil or as light non-aqueous phase liquid (LNAPL) in shallow groundwater onto the Site. No currently known issues.
49	Source 8-10: Offsite Service Stations 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 Service Stations 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 Service Stations and former vehicle garage tanks (underground fuel tanks including petrol)	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.
52	Source 8-10: Offsite Service Stations 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**	**Moderate/Low**	This area is underlain by London Clay however permeable layers (e.g., Lambeth Group) may be present.
53	Source 12: Offsite The Vinery Industrial Estate, includes vehicle repair, quarrying and associated tanks	Heavy Metals, TPH, PAH, chlorinated solvents, PFAS.	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]**	**Unlikely**	**Moderate/Low**	If not adequately identified and controlled, there may be potential for contaminative materials migrating from the industrial estate to be disturbed, mobilised or mixed with surface soils by the

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								development. Development not directly on industrial estate.
54	Source 12: Offsite The Vinery Industrial Estate, includes vehicle repair, quarrying and associated tanks	Heavy Metals, TPH, PAH, chlorinated solvents, PFAS.	Current property (infrastructure and utilities, agricultural land including crops)	Direct contact, ingestion and inhalation of dusts, vapours and gases	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate/Low**	Area underlain by clay which is likely to prevent any spread of contaminants.
55	Source 12: Offsite The Vinery Industrial Estate, includes vehicle repair, quarrying and associated tanks	Heavy Metals, TPH, PAH, chlorinated solvents, PFAS.	Current site users (workers, land owners, members of the public).	Dermal contact, ingestion and inhalation of dusts, vapours, and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate/Low**	Area underlain by Clay which is likely to prevent the spread of any contaminants.
56	Source 12: Offsite The Vinery Industrial Estate, includes vehicle repair, quarrying and associated tanks	Heavy Metals, TPH, PAH, chlorinated solvents, PFAS.	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact and gas migration / accumulation	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 due to contaminants migrating from the industrial estate. The onshore elements of the Proposed Development are not directly located within the area of the estate.
57	Source 12: Offsite The Vinery Industrial Estate, includes vehicle repair, quarrying and associated tanks	Heavy Metals, TPH, PAH, chlorinated solvents, PFAS.	Current and future controlled water (Groundwater – Secondary A superficial aquifer/Undifferentiated Aquifer)	Leaching and Groundwater Migration	Groundwater Pollution **[Medium]**	**Unlikely**	**Low**	Area underlain by Clay which is likely to prevent the spread of any contaminants. 2012 land contamination assessment assessed risk as low.
58	Source 12: Offsite The Vinery Industrial Estate, includes vehicle repair, quarrying and associated tanks	Heavy Metals, TPH, PAH, chlorinated solvents, PFAS.	Current and future controlled water (Groundwater – Secondary A Bedrock Aquifer)	Leaching and Groundwater Migration	Groundwater Pollution **[Medium]**	**Unlikely**	**Low**	Area underlain by Clay which is likely to prevent the spread of any contaminants. 2012 land contamination assessment assessed risk as low.

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
59	Source 13: Offsite Electric substation located south of the Vinery Industrial Estate	PCB's	Future site users (workers, landowners, and members of the public)	Dermal contact, ingestion and inhalation of dusts, vapours, and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate/Low**	Size of substation unlikely to generate significant source terms. Clay underlying site likely to limit migration into topsoil.
60	Source 13: Offsite Electric substation located south of the Vinery Industrial Estate	PCB's	Future property (onshore elements of the Proposed Development including cables, joint bays and onshore substation)	Direct contact and gas accumulation/migration	Degradation, explosion **[Severe]**	**Unlikely**	**Moderate/Low**	Contaminants unlikely to produce significant amounts of gas to cause damage. Buildings not proposed in area of the substation.
61	Source 13: Offsite Electric substation located south of the Vinery Industrial Estate	PCB's	Current property (infrastructure and utilities, agricultural land including crops)	Direct contact, migration and accumulation of vapours / gases	Degradation, Explosion **[Severe]**	**Unlikely**	**Moderate/Low**	Contaminants unlikely to produce significant amounts of gas to cause damage.
62	Source 15: Offsite Long Furlong historical landfill.	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, and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate/Low**	The site is currently covered with topsoil for an agricultural field which reduces the likelihood of any contamination linkage occurring.
63	Source 15: Offsite Long Furlong historical landfill.	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, vapours, 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 landfill to be disturbed, mobilised or mixed with surface soils by the development. Development not directly on the landfill.
64	Source 15: Offsite Long Furlong historical landfill.	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 vapours / 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 due to contaminants migrating from

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
								the landfill. The onshore elements of the Proposed Development are not directly located within the area of the landfill.
65	Source 15: Offsite Long Furlong historical landfill.	Heavy metals, TPH, PAH, cyanide, pH, ammonia	Current and future Controlled water (Groundwater – Secondary A superficial aquifer)	Leaching and Groundwater Migration	Groundwater Pollution **[Medium]**	**Low**	**Moderate/Low**	Shallow groundwater contamination is possible and could potentially migrate onto the Site. However, limited superficial deposits present.
66	Source 15: Offsite Long Furlong historical landfill.	Heavy metals, TPH, PAH, cyanide, pH and ammonia	Current and future Controlled water (Groundwater – Principal bedrock aquifer / Secondary A bedrock aquifer)	Leaching and Groundwater Migration.	Groundwater Pollution **[Medium]**	**Low Likelihood**	**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 landfill.
67	Source 16: Offsite Swillage Lane historical landfill	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, and gases	Toxic hazardous to human health, carcinogenic, explosion **[Severe]**	**Unlikely**	**Moderate/Low**	The site is currently covered with topsoil for an agricultural field which reduces the likelihood of any contamination linkage occurring.
68	Source 16: Offsite Swillage Lane historical landfill	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, vapours, 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 landfill to be disturbed, mobilised or mixed with surface soils by the development. Development not directly on the landfill.
69	Source 16: Offsite Swillage Lane historical landfill	Heavy metals, TPH, PAH, cyanide, ground gas (including carbon dioxide and methane), pH and inorganic compounds (for example ammonia, nitrate etc.)	Current and future controlled water (Groundwater – Principal Bedrock Aquifer)	Leaching, Groundwater Migration	Groundwater Pollution **[Medium]**	**Low Likelihood**	**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 landfill.

Linkage No.	Potential Source[3]	Potential Pollutant[3]	Potential Receptors[3]	Potential Pathways to Receptors[3]	Associated Hazard [Severity] [3]	Likelihood of Occurrence[3]	Risk/ Significance[3]	Comment
70	Source 16: Offsite Swillage Lane historical landfill	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 vapours / gases	Groundwater Pollution **[Medium]**	**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 due to contaminants migrating from the landfill. The onshore elements of the Proposed Development are not directly located within the area of the landfill.

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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 ground investigation prior to construction and 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.
- 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.

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7. Conclusions and recommendations

7.1 Conclusions

Contamination

7.1.1 The initial conceptual model and preliminary risk assessment has identified a number of potentially significant contaminant linkages representing moderate risks to future property and surface water and groundwater.

7.1.2 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, two industrial estates (which include vehicle repair and metal polishing activities and furniture repair activities) and petroleum storage.

7.1.3 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 / low, and such risks should be subject to future investigation where the onshore elements of the Proposed Development directly interact with the identified sources.

Geohazards

7.1.4 A review of geohazards has identified a number of potential constraints. These are generally in relation to 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.

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

7.2 Recommendations

7.2.1 It is recommended that a better understanding of the site conditions be acquired through targeted intrusive ground investigation either prior to detailed design or prior to construction. The aim of the ground investigation would be to:

- characterise the ground conditions;
- confirm or discount any potential contaminant linkages with respect to potential risks to human health and controlled waters in line with LCRM (Environment Agency, 2020) (and in doing so demonstrate that the land required for the proposed Development is suitable for use in line with the NPPF (MHCLG, 2021)); and

- gather geotechnical data to inform the design of any temporary works and permanent infrastructure and develop parameters for foundation solutions.

7.2.2 Based on the available information for the Site and the preliminary risk assessment, the intrusive ground investigation is recommended to be targeted in the following areas:

- The historical landfills at Brookbarn Farm through which the onshore cable corridor will directly pass;
- The new onshore substation at Oakendene; and,
- The onshore substation extension at the existing National Grid Bolney substation.

7.2.3 Should potentially contaminated material be identified during the construction phase in areas outside of those recommended for prior intrusive ground investigation, this should be managed through an unexpected contamination protocol to be developed prior to construction.

8. Glossary of 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) Application	An application for consent under the Planning Act 2008 to undertake a Nationally Significant Infrastructure Project made to the Planning Inspectorate who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the Proposed Development.
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.
EPA	Environmental Protection Act
Google Earth	An online, aerial photography resource.
GIS	Geographical Information Systems
Horizontal Directional Drill (HDD)	A trenchless crossing engineering technique using a drill steered underground without the requirement for open trenches. This technique is often employed when crossing environmentally sensitive areas, major water courses and highways. This method is able to carry out the underground installation of pipes and cables with minimal surface disruption.
LA PPC	Local Authority Pollution Prevention & Control
LCRM	Land Contamination Risk Management
LNAPL	Light non-aqueous phase liquid

Term (acronym)	Definition
LNR	Local Nature Reserve
MCPA	Methyl Chlorophenoxyacetic Acid
NGR	National Grid Reference
NPPF	National Planning Policy Framework
Nationally Significant Infrastructure Project (NSIP)	Nationally Significant Infrastructure Projects are major infrastructure developments in England and Wales which are consented by DCO. These include proposals for renewable energy projects with an installed capacity greater than 100MW.
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated biphenyl
PFAS	Per- and Poly-fluoroalkyl Sulphonates
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It was developed to support Statutory Consultation and presented the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that was undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
PRA	Preliminary Risk Assessment
Proposed Development	The development that is subject to the application for development consent, as described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).
RED	Rampion Extension Development Limited (the Applicant)
SPZ	Source Protection Zones
SSSI	Site of Special Scientific Interest
TPH	Total Petroleum Hydrocarbons
UXB	Unexploded Bomb
Unexploded Ordnance (UXO)	Unexploded ordnance are explosive weapons (bombs, shells, grenades, land mines, naval mines, etc.) that did not explode when they were deployed and still pose a risk of detonation, potentially many decades after they were used or discarded.

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Annex A
Figures

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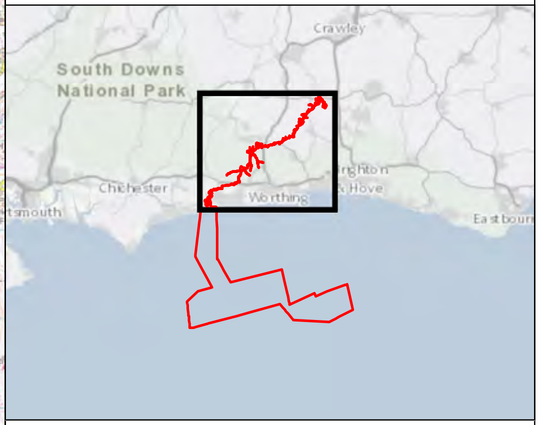
Key

Proposed DCO Order Limits



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

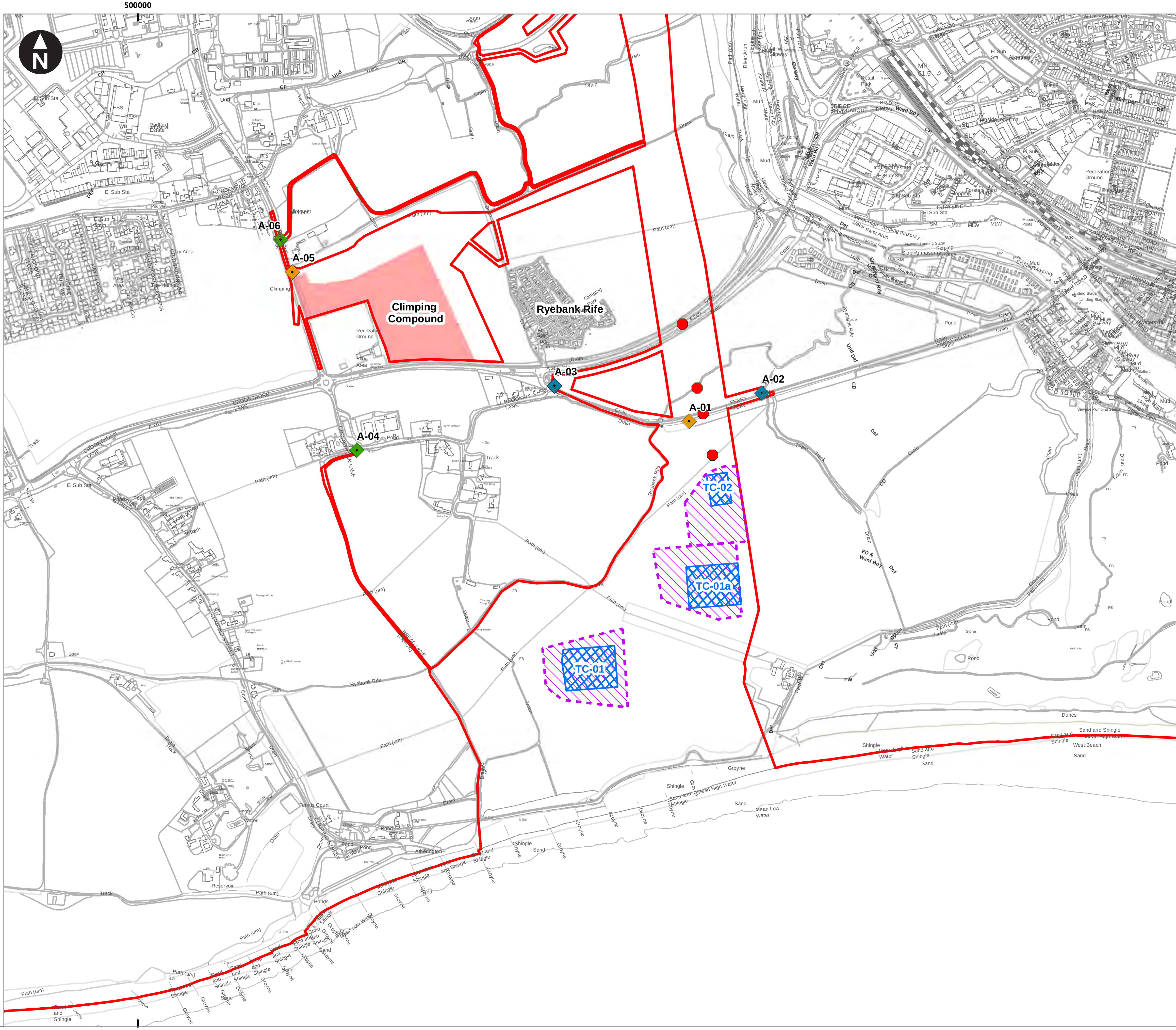
Figure 24.1.1 Site location

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-7819	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

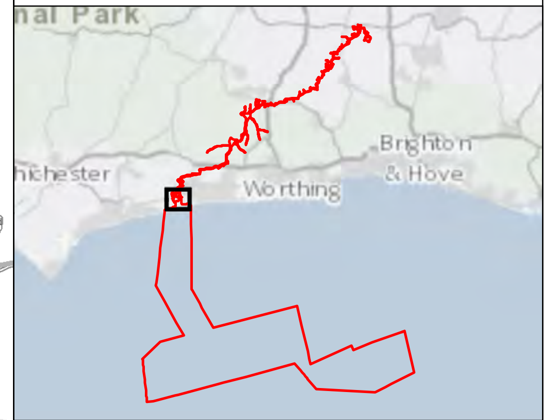
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Temporary construction compound
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction & operational
- Light construction
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

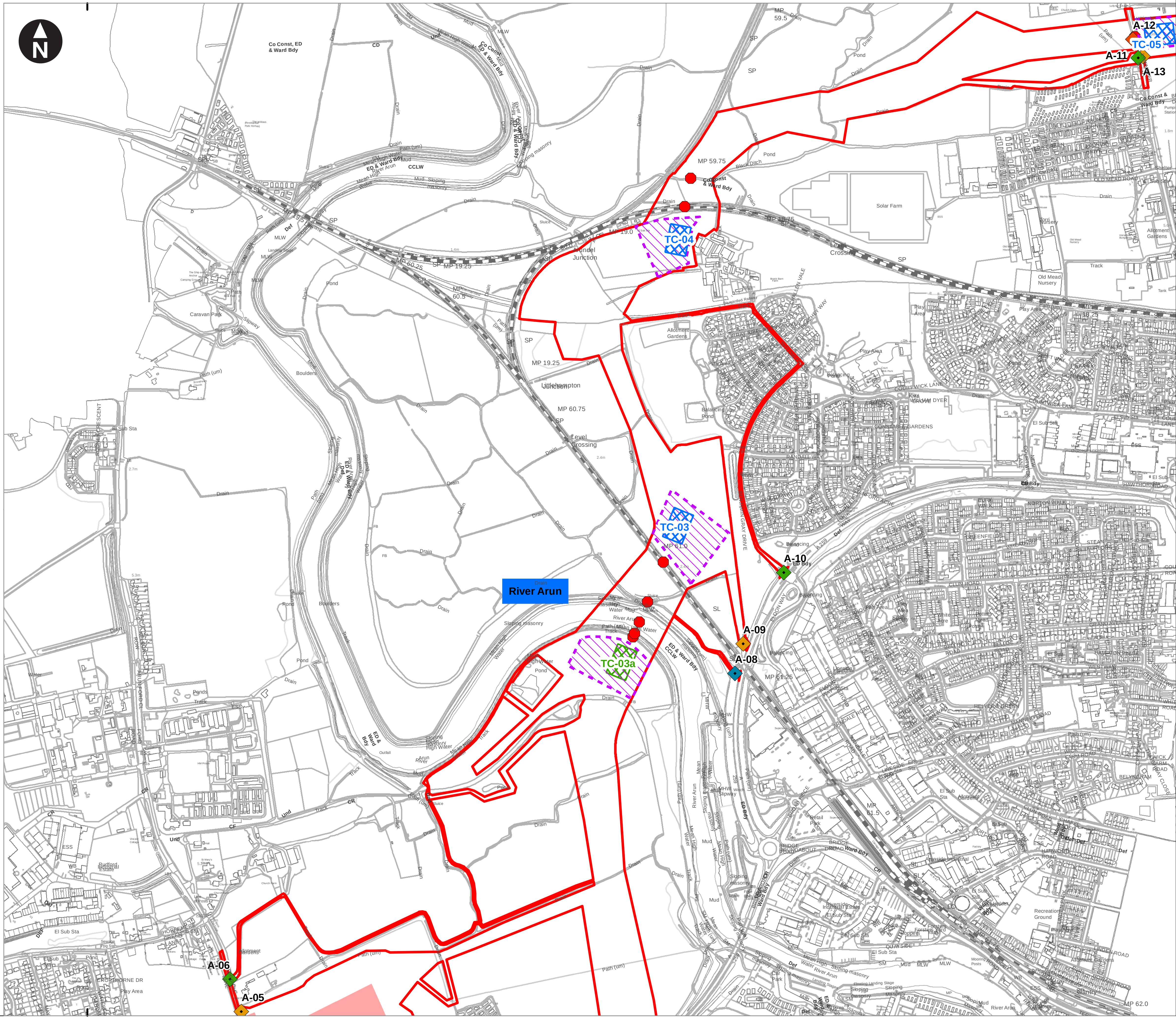
Figure 24.1.2a Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-5157	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	01/08/2023	FINAL



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Key

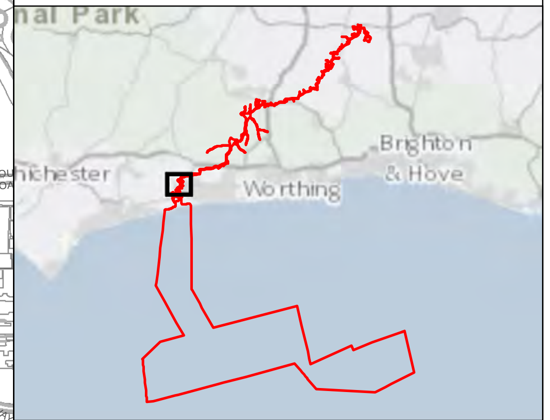
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Temporary construction compound
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Construction & operational
- Light construction
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

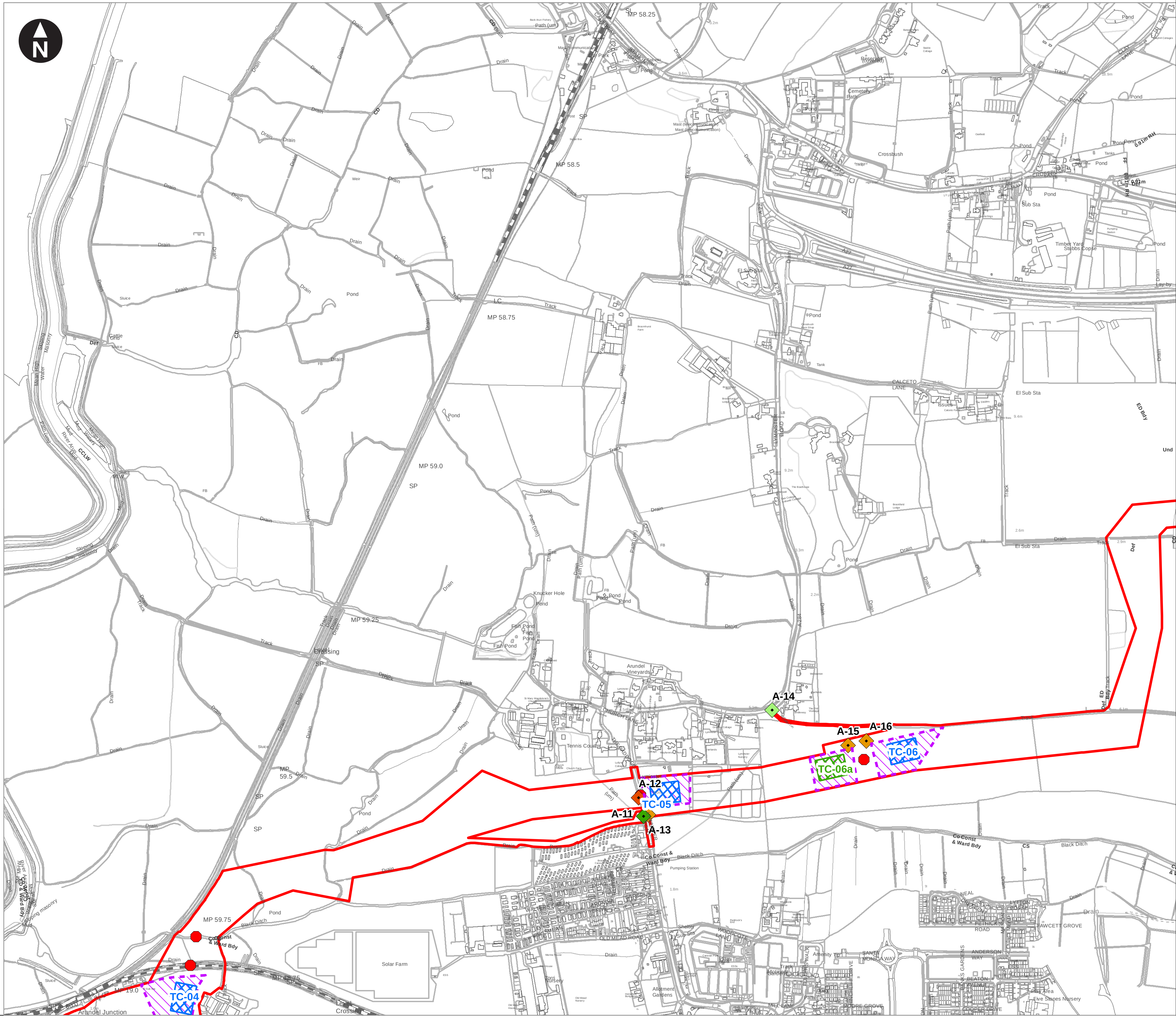
Rampion 2 Offshore Wind Farm

Figure 24.1.2b Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



Key

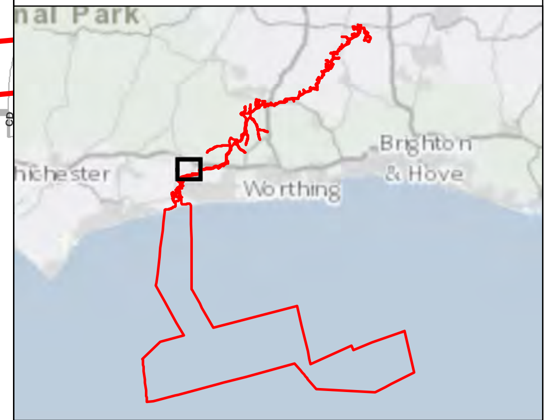
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Construction & operational
- Light construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

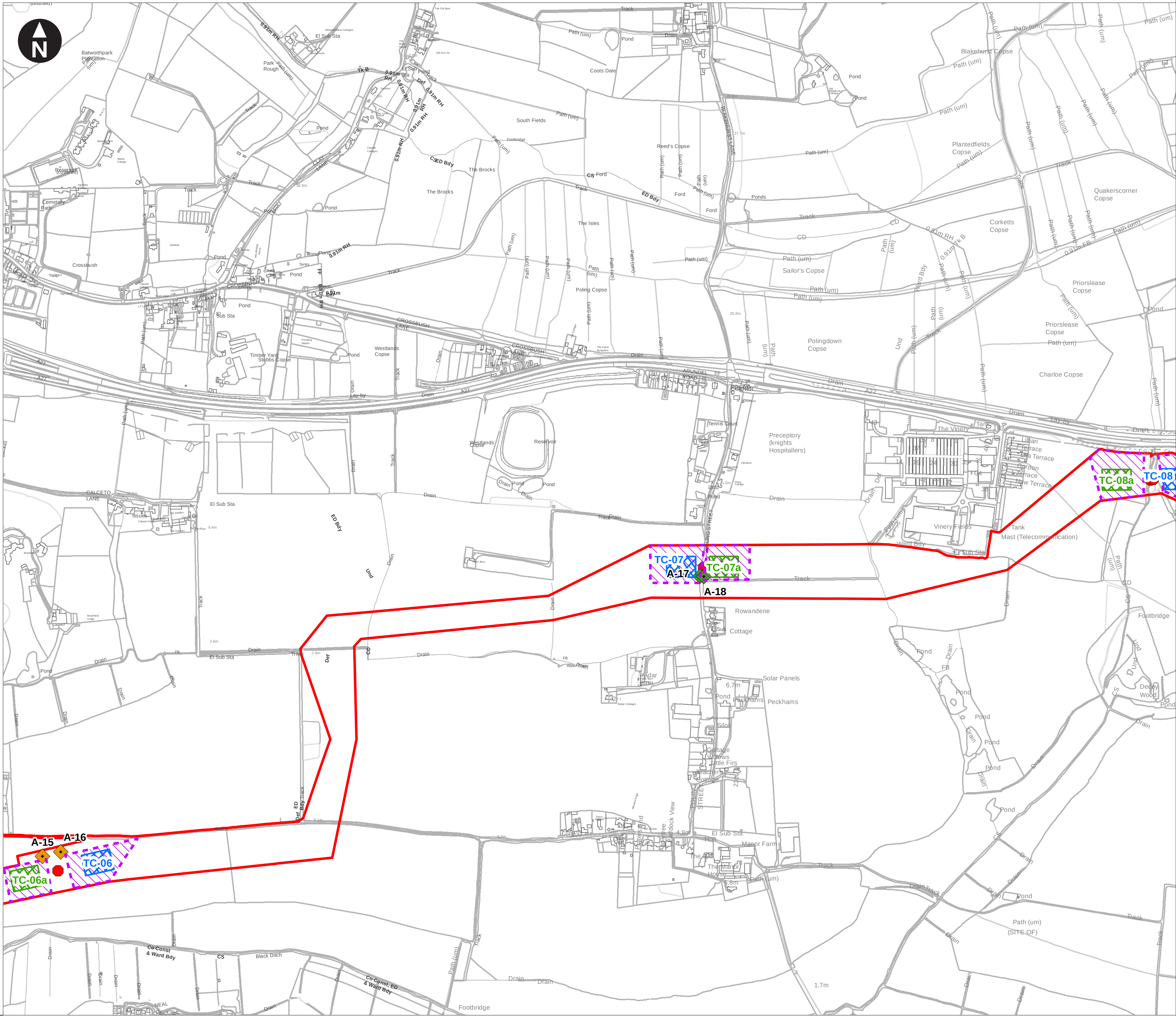
Figure 24.1.2c Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-5157	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	01/08/2023	FINAL



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Key

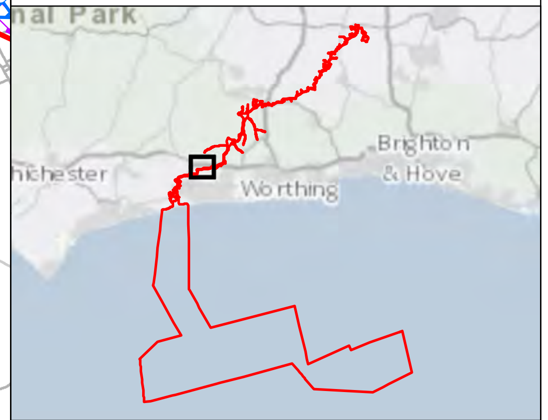
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

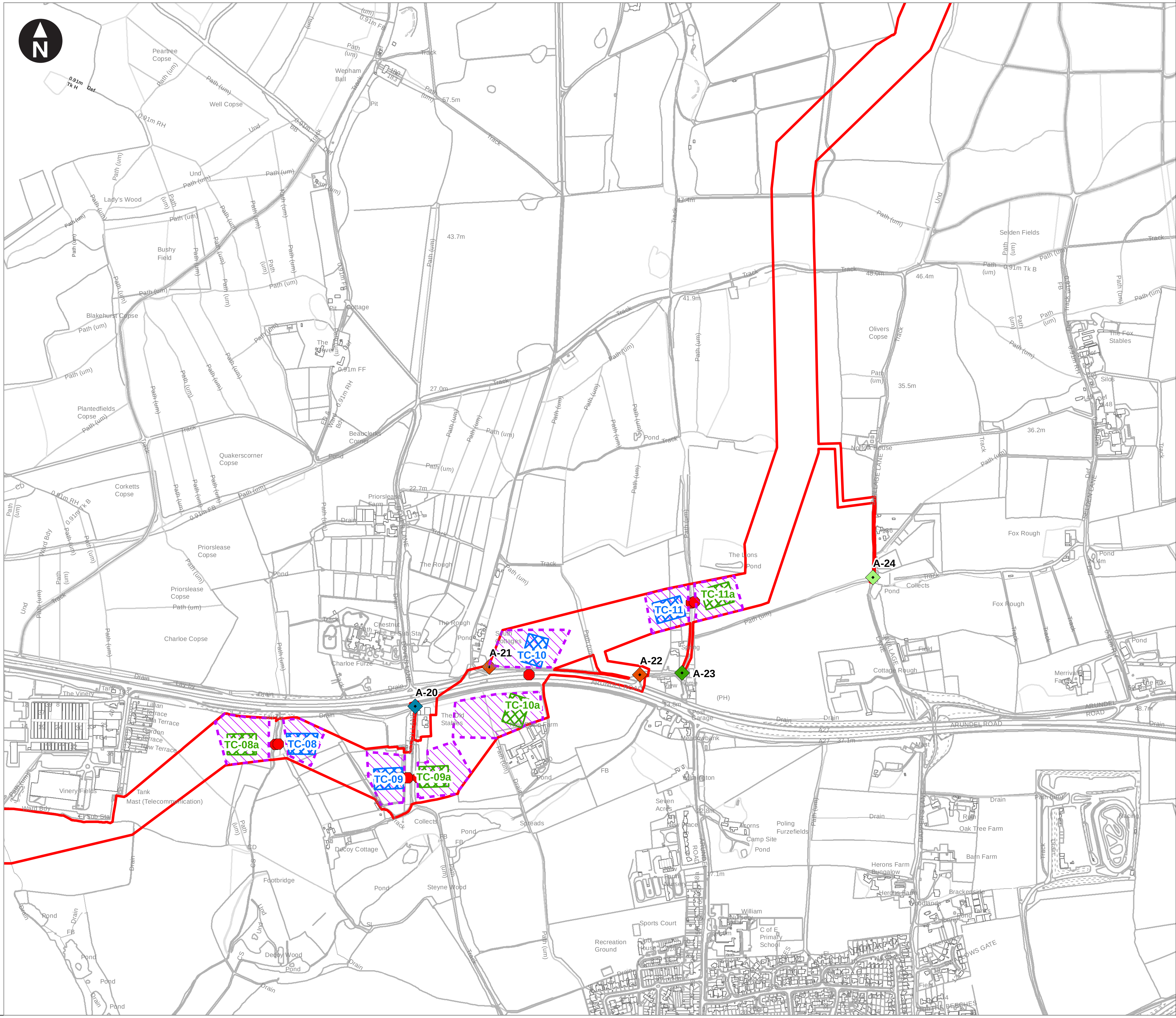
Rampion 2 Offshore Wind Farm

Figure 24.1.2d Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



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Key

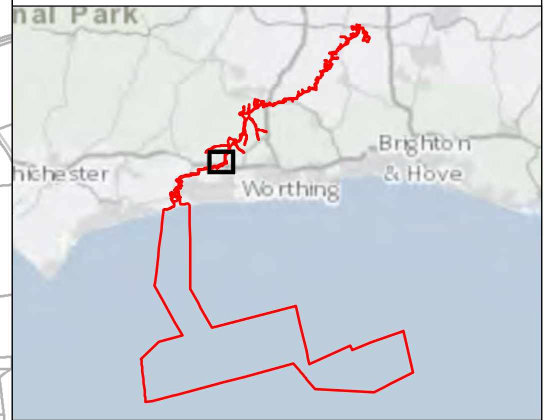
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Light construction
- Light construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

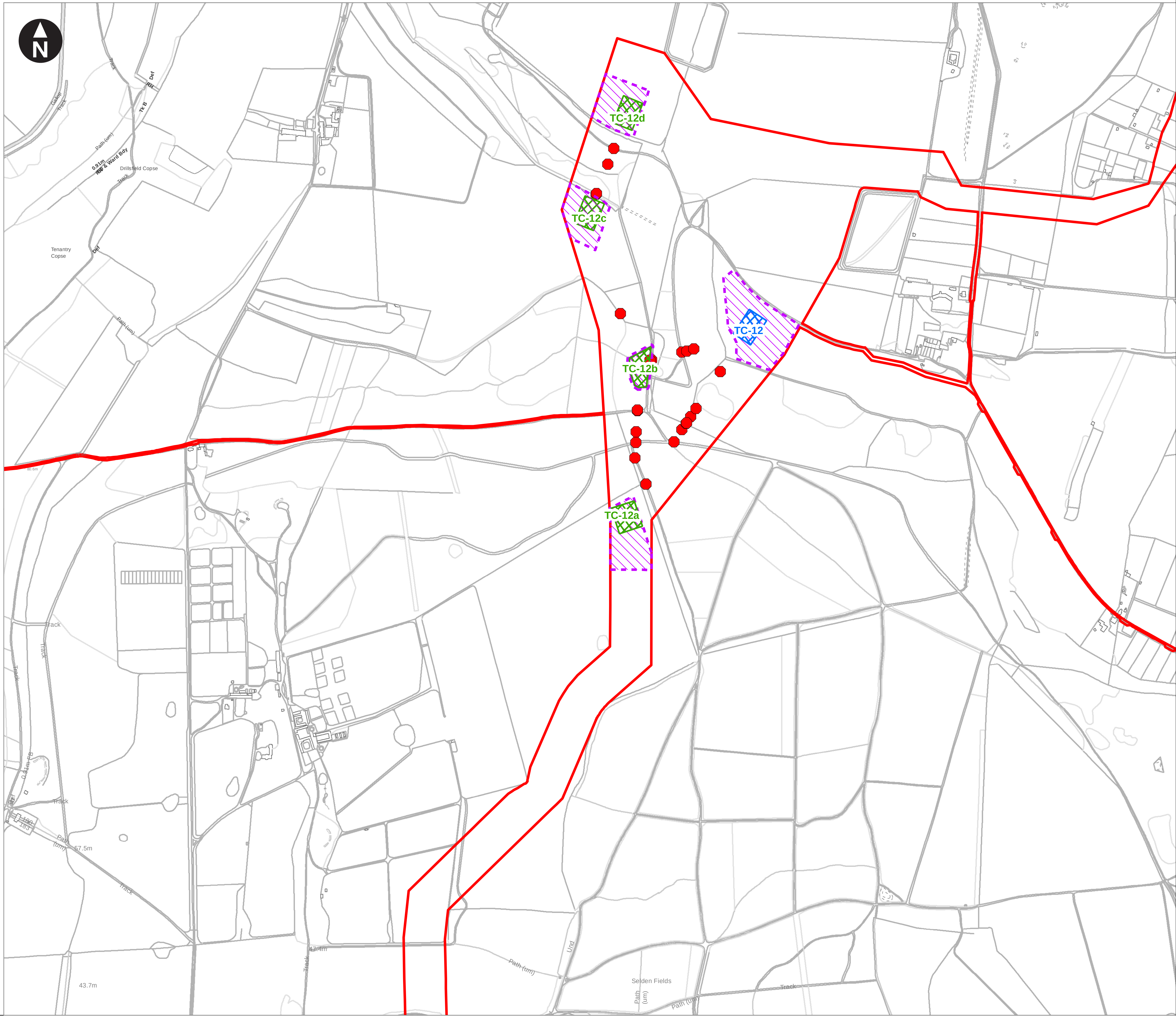
Figure 24.1.2e Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-5157	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	01/08/2023	FINAL

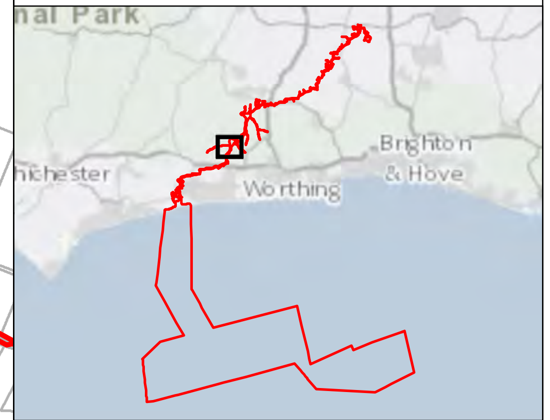


Key

Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

Figure 24.1.2f Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL

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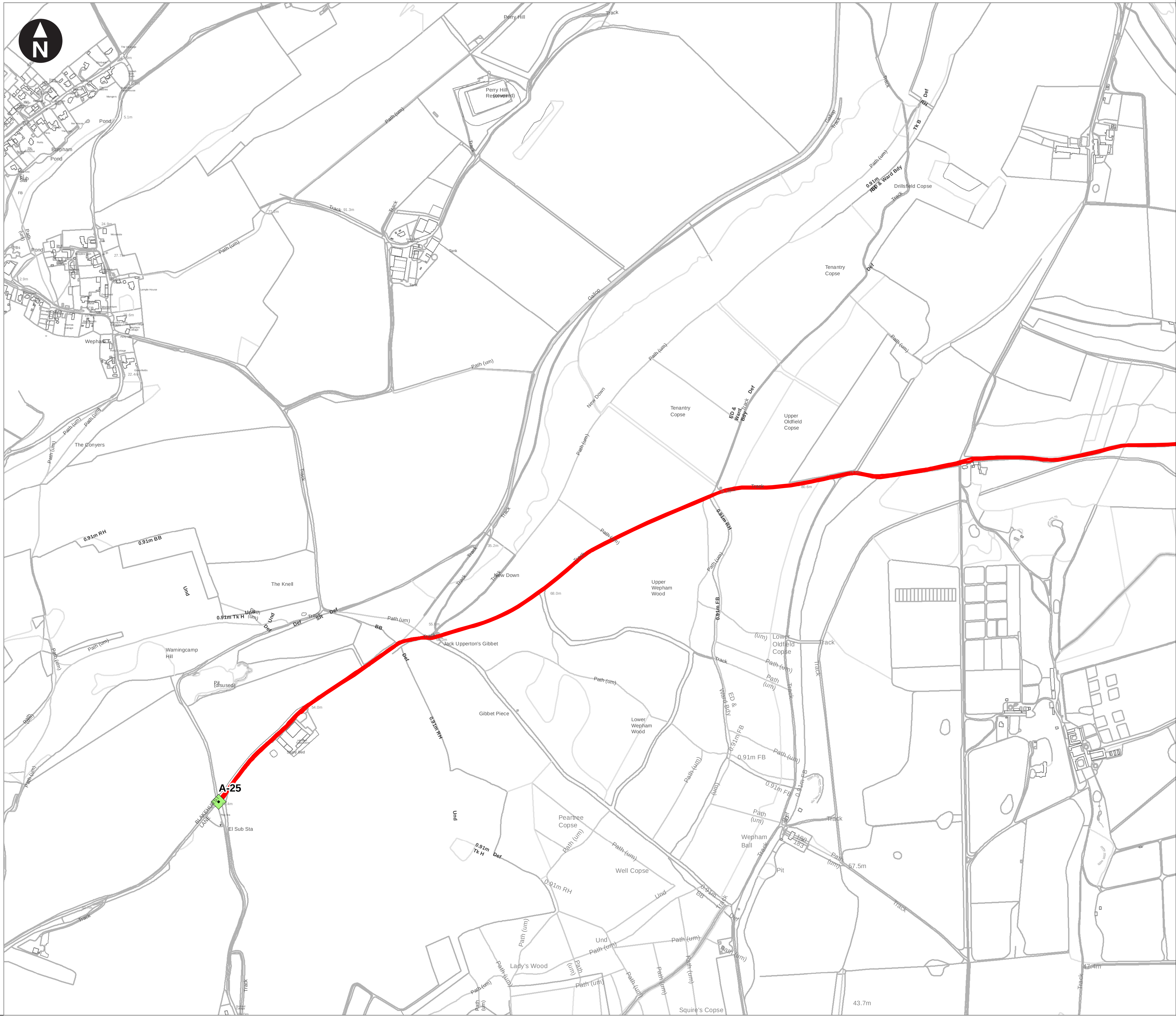


Key

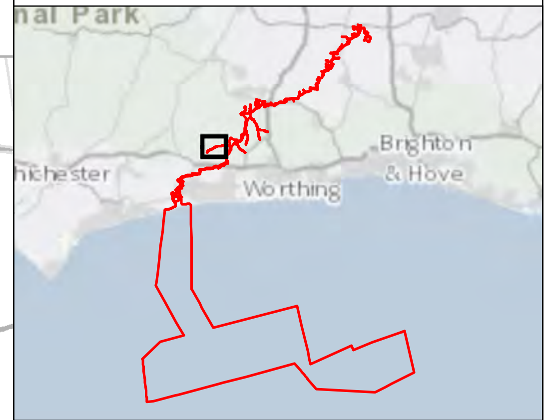
Proposed Development and construction access layout

Proposed DCO Order Limits

Access from public highway

Light construction & operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 24.1.2g Site layout

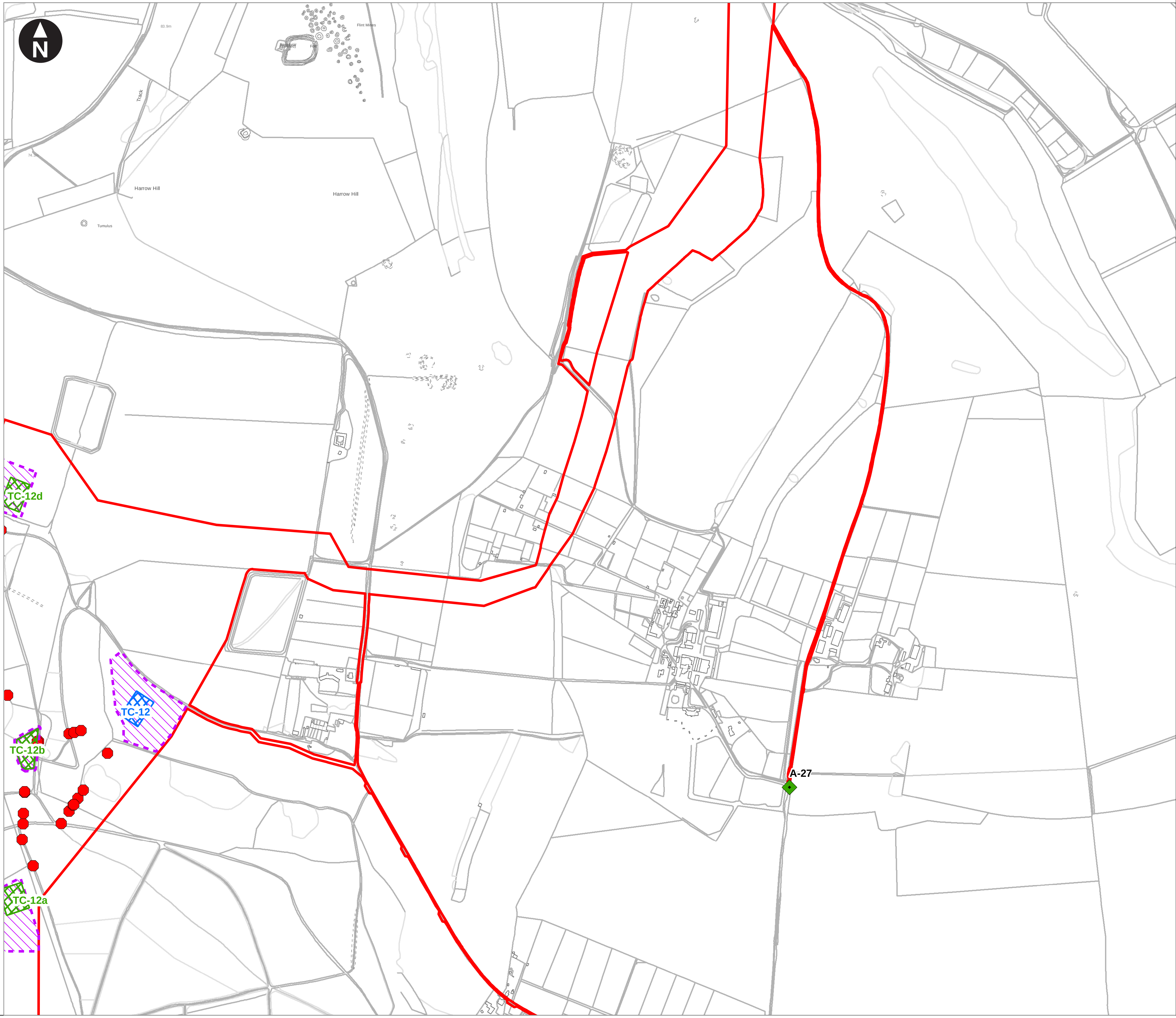
Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-5157	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	01/08/2023	FINAL

 ISO A3 Landscape



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Key

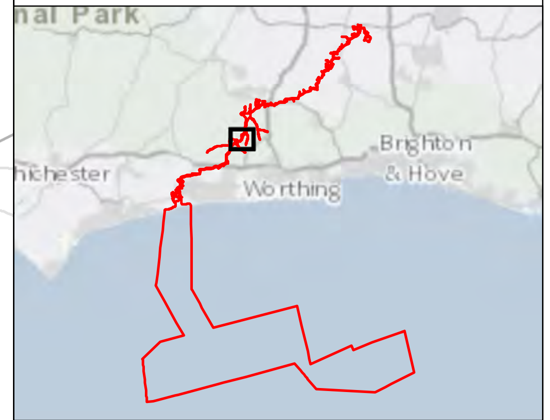
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

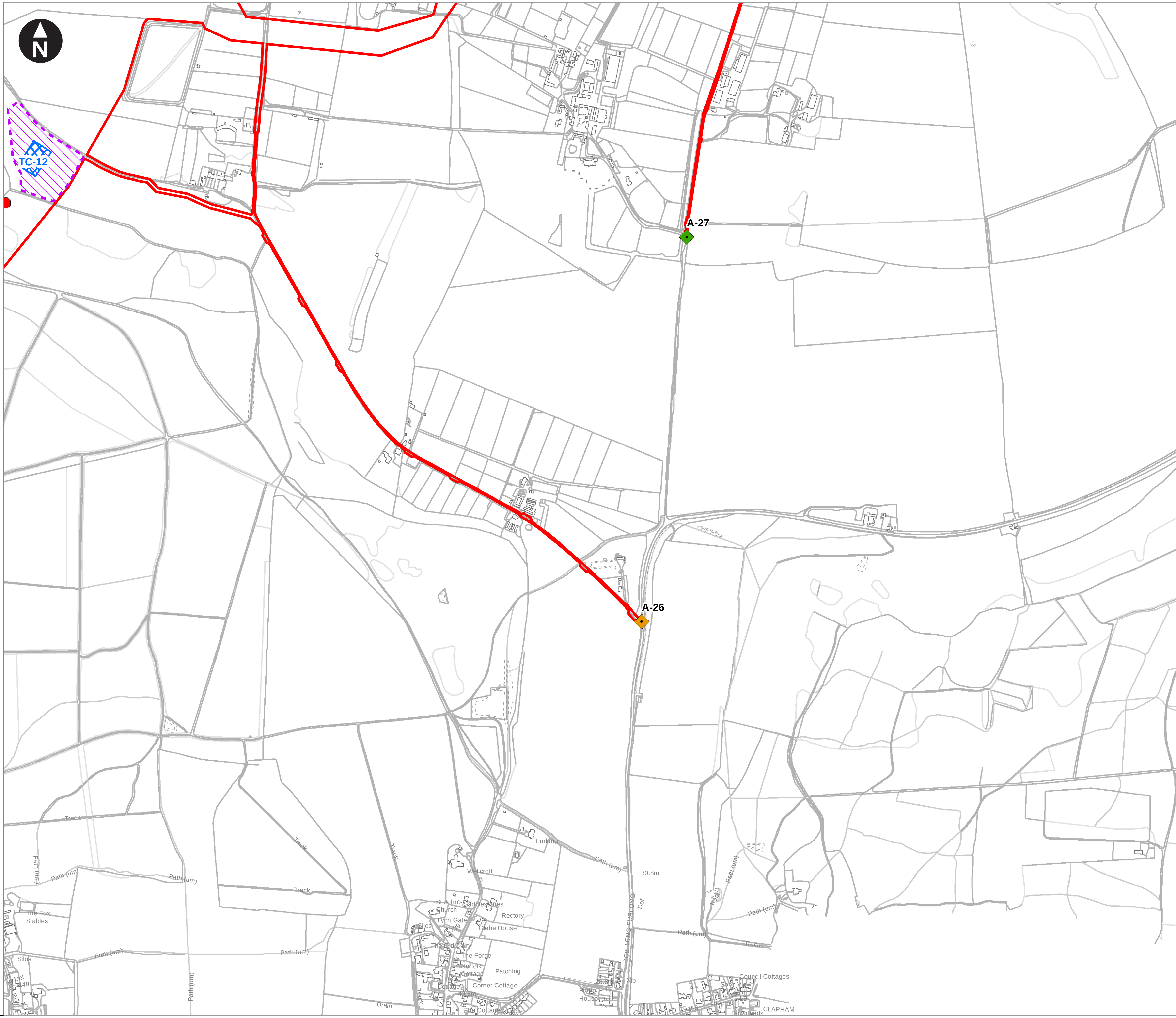
Rampion 2 Offshore Wind Farm

Figure 24.1.2h Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



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Key

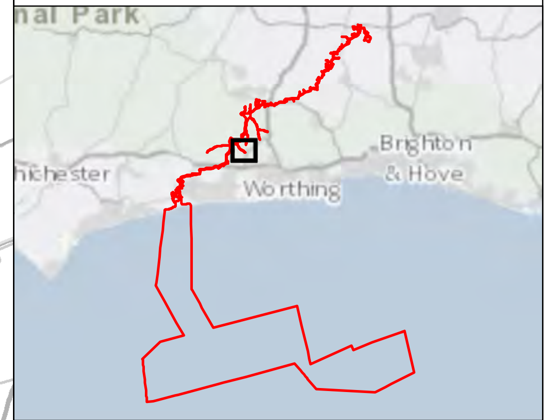
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres
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British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

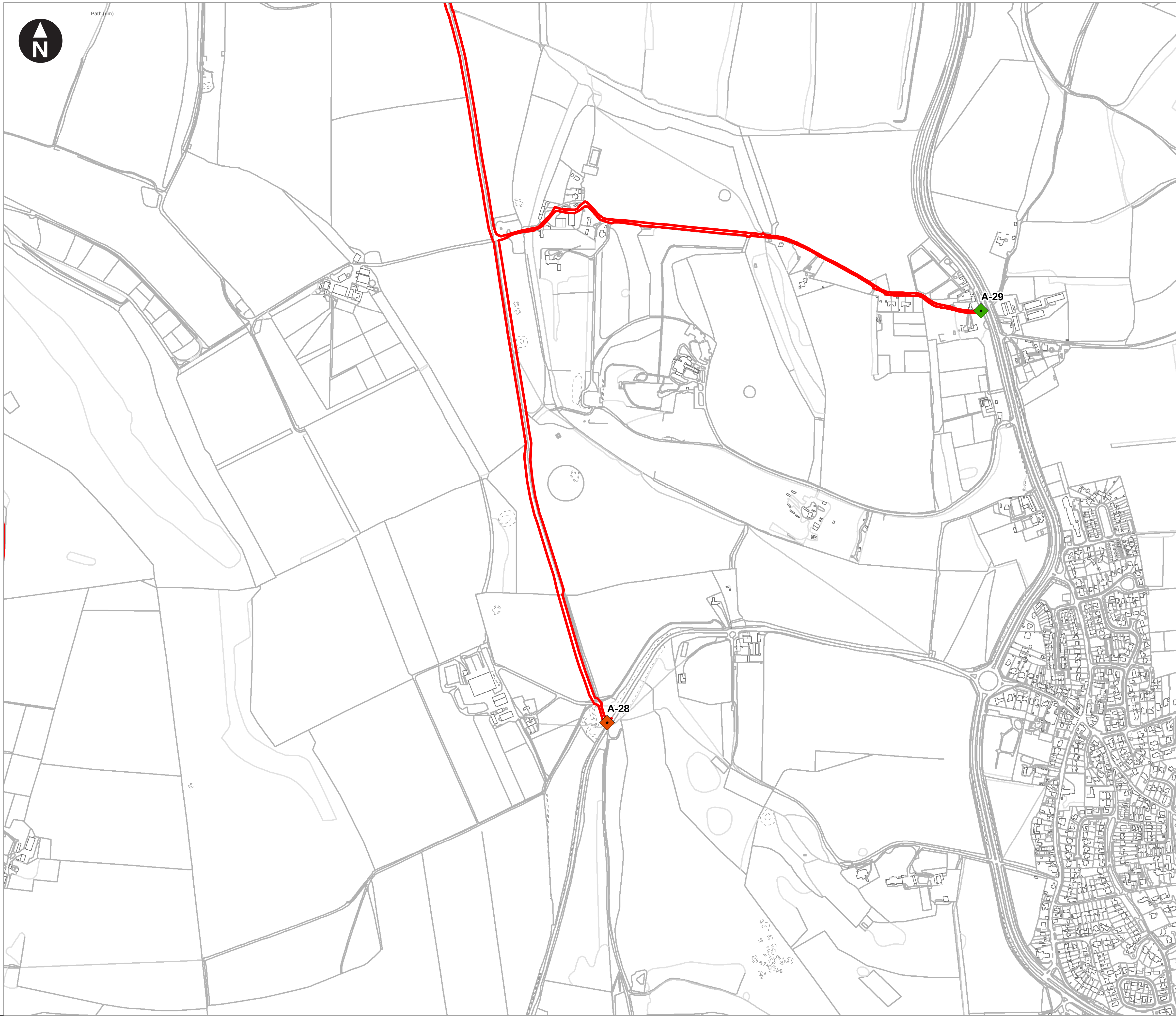
Rampion 2 Offshore Wind Farm

Figure 24.1.2i Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



Key

Proposed Development and construction access layout

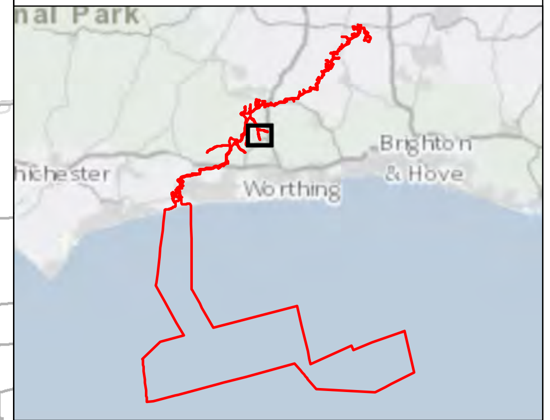
Proposed DCO Order Limits

Access from public highway

Construction

Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

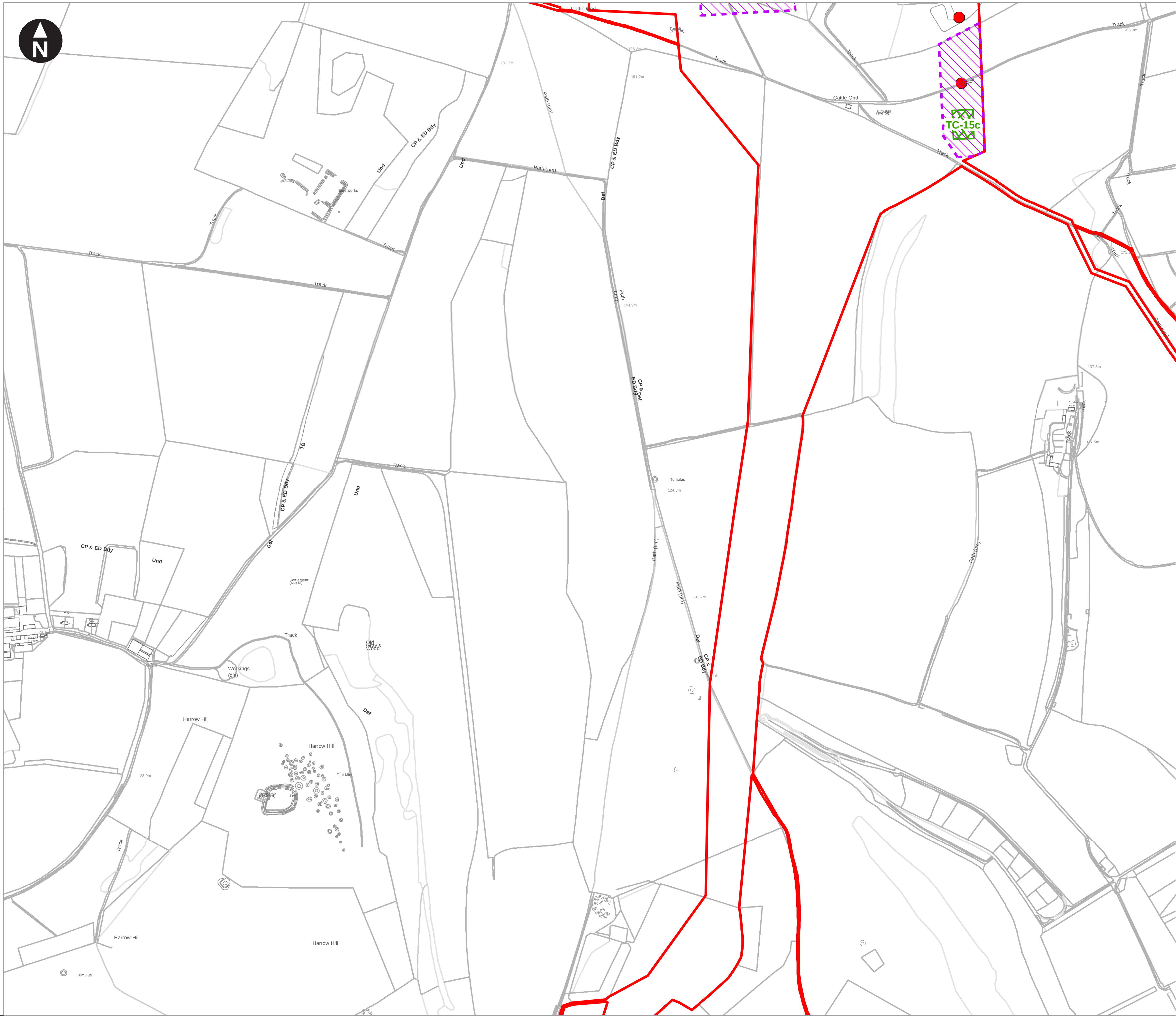
Figure 24.1.2j Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-5157	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	01/08/2023	FINAL



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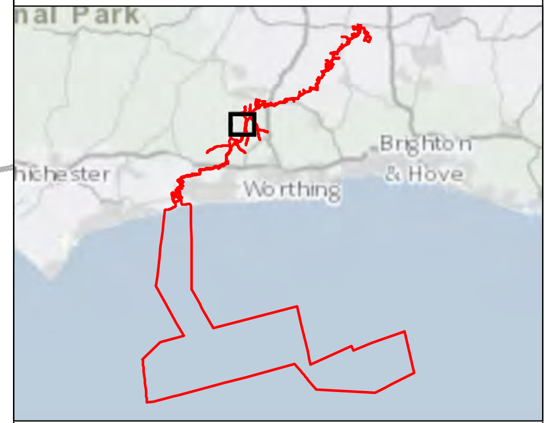
Key

Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

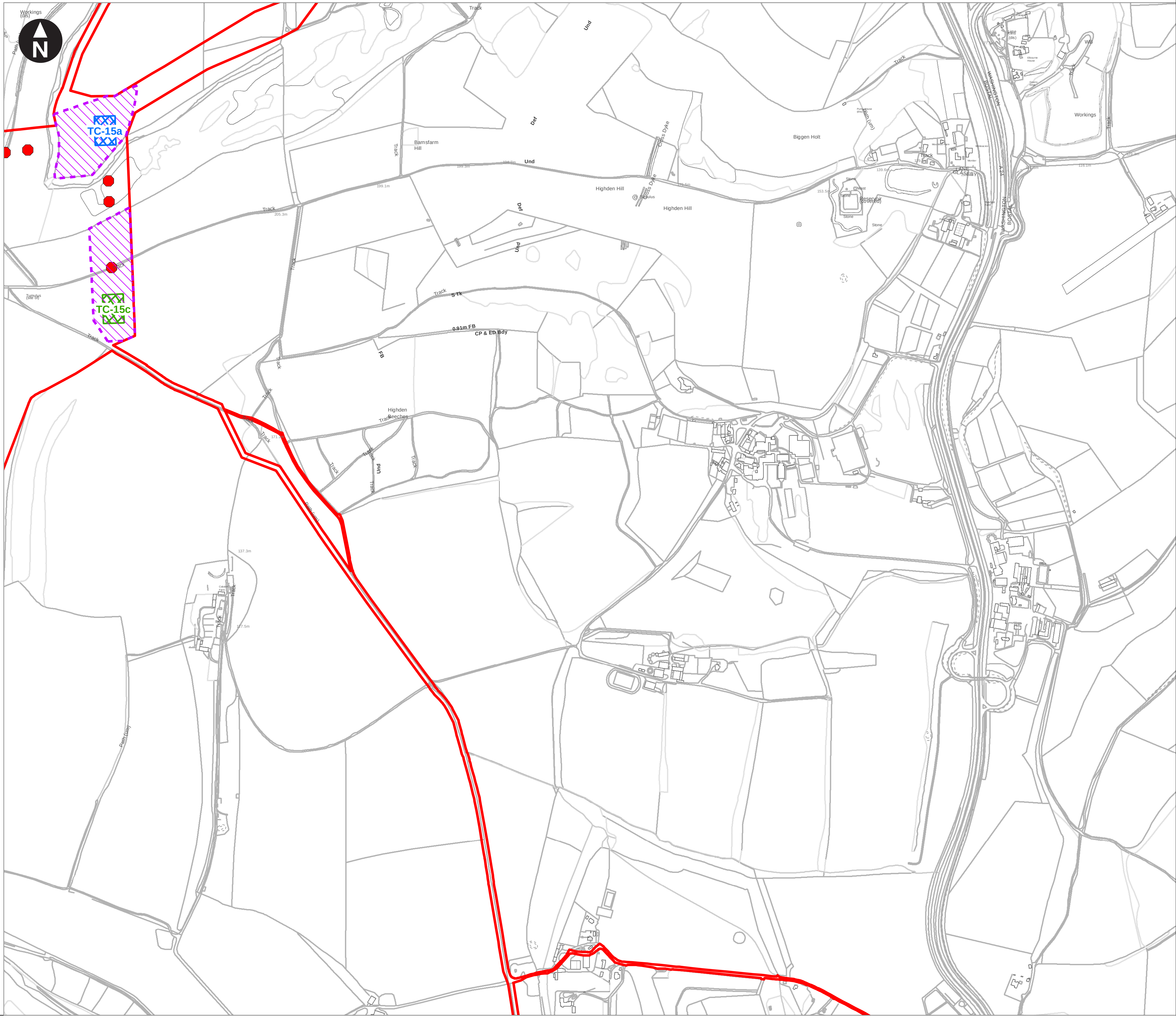
Rampion 2 Offshore Wind Farm

Figure 24.1.2k Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



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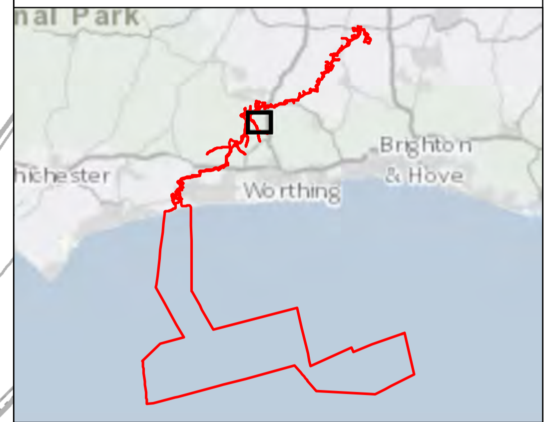
Key

Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres

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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

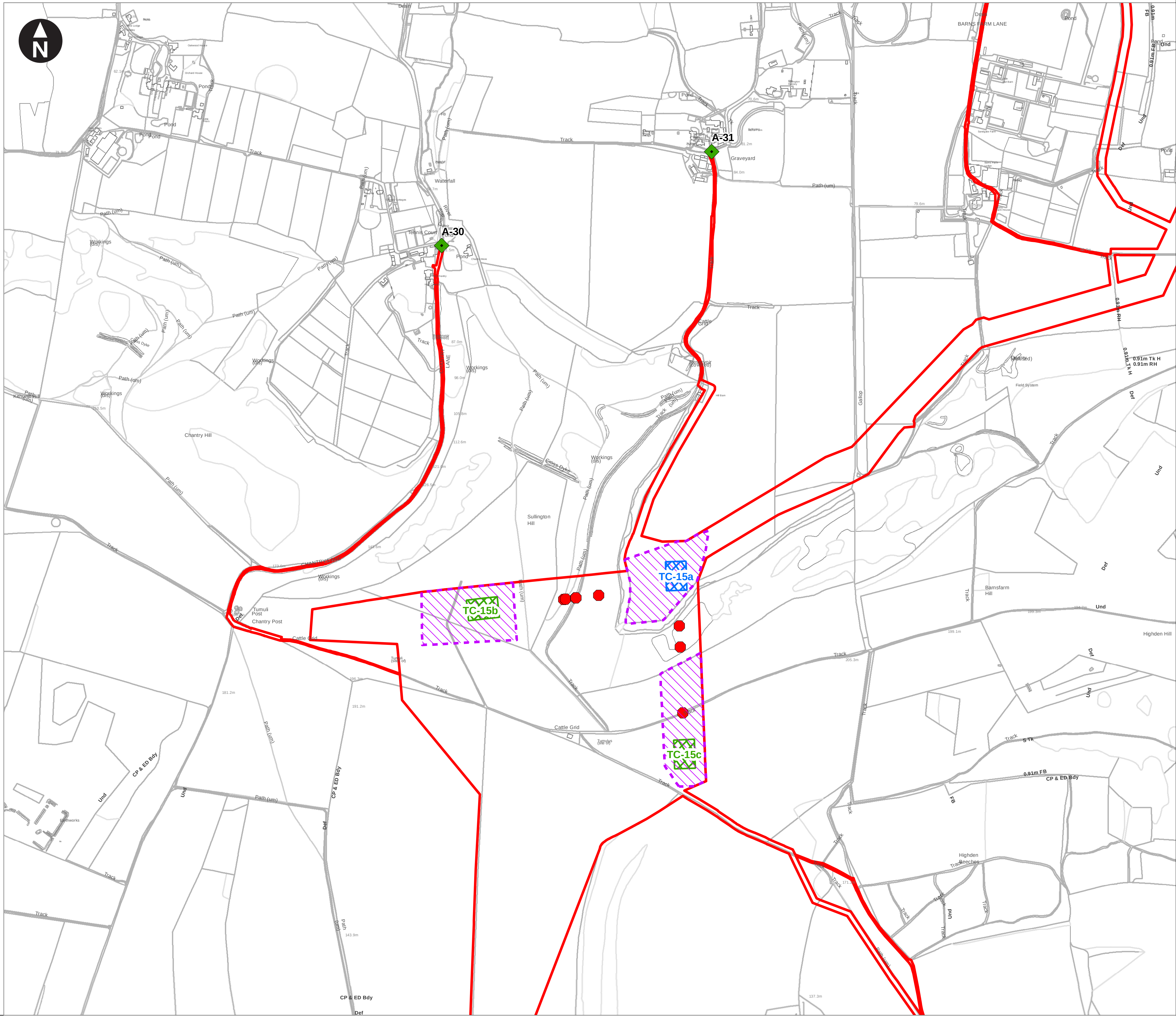
Rampion 2 Offshore Wind Farm

Figure 24.1.2l Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



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Key

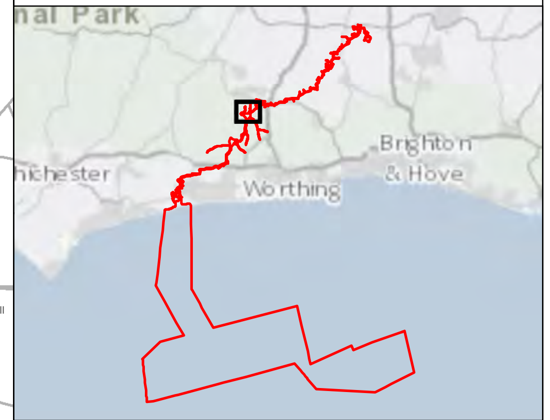
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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British National Grid Transverse Mercator

Rampion Extension Development

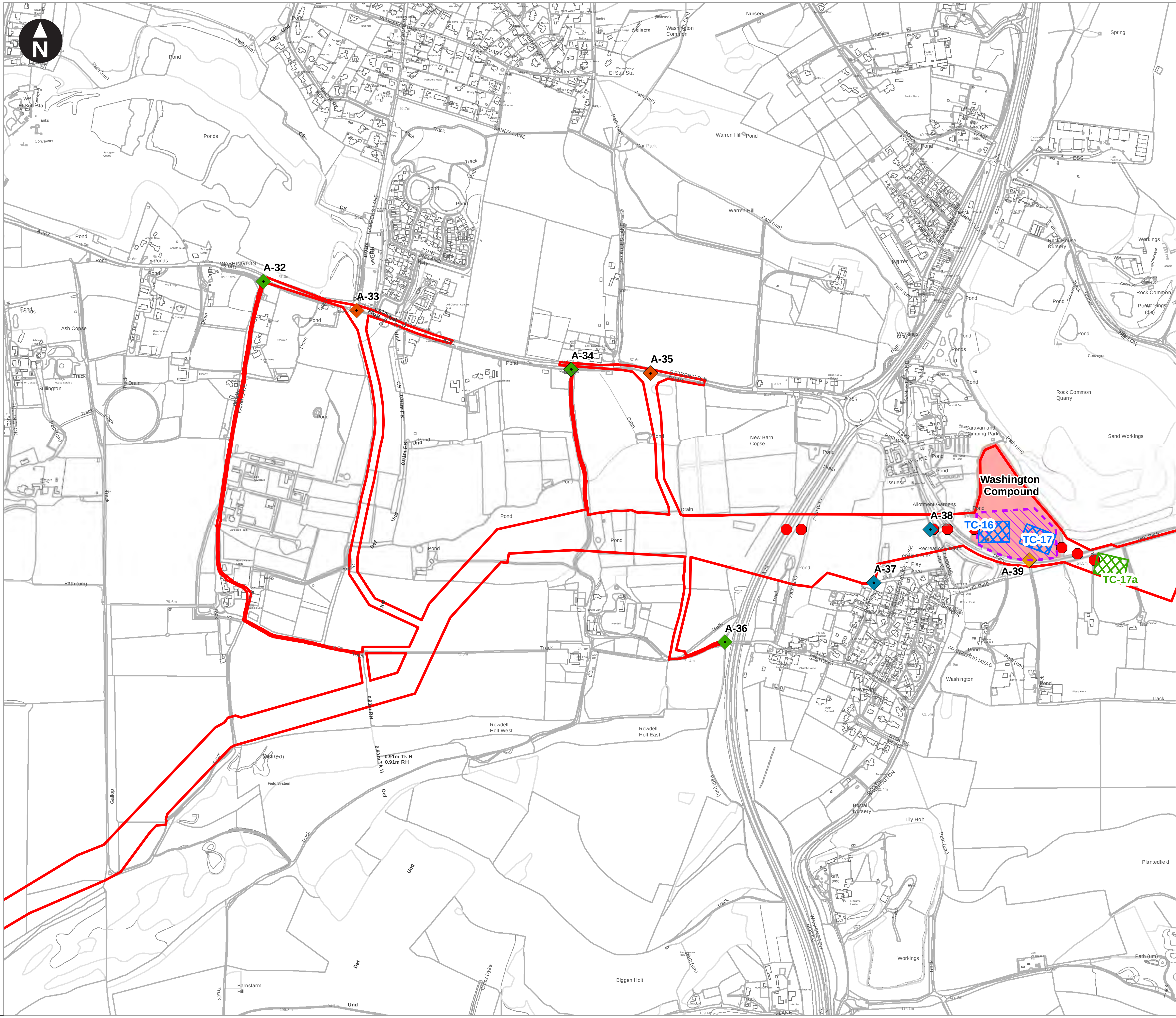
Rampion 2 Offshore Wind Farm

Figure 24.1.2m Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



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Key

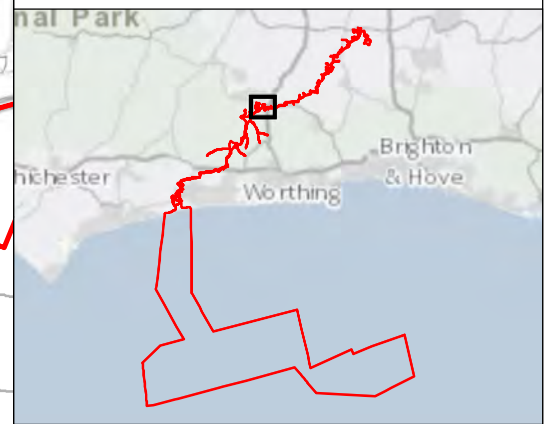
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Temporary construction compound
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Construction & operational
- Light construction
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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

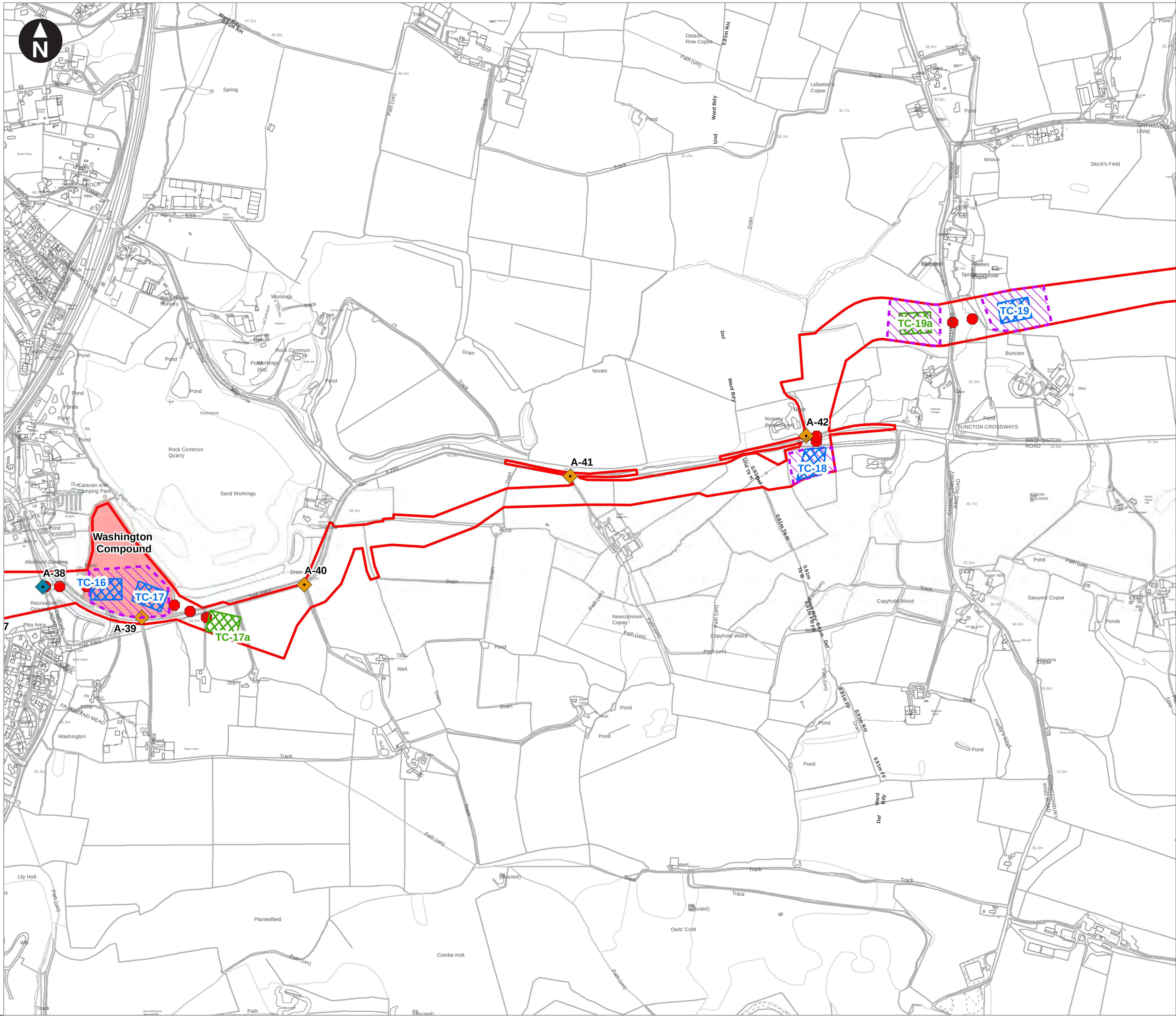
Figure 24.1.2n Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL

 ISO A3 Landscape



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Key

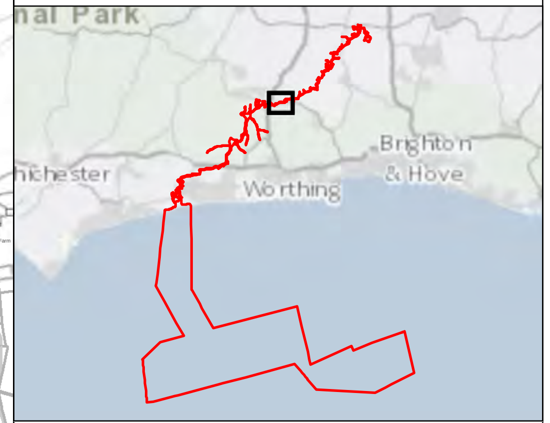
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Temporary construction compound
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction & operational
- Light construction

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres
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1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

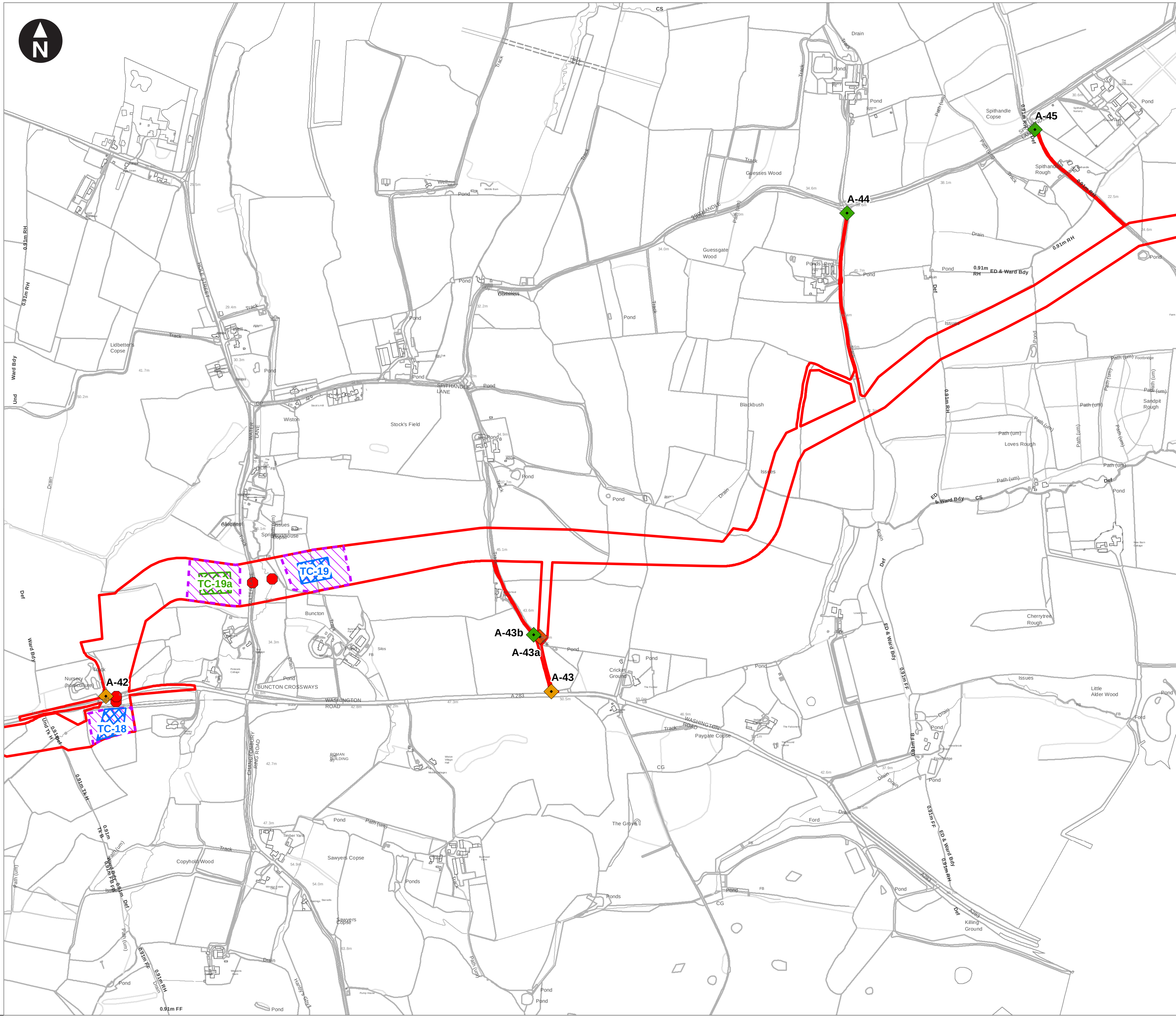
Rampion 2 Offshore Wind Farm

Figure 24.1.2o Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



Key

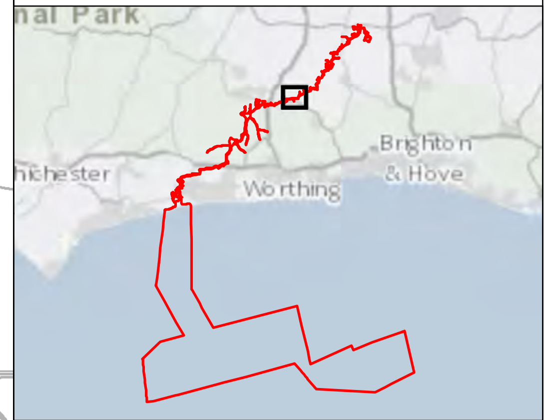
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres

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1:9,000

British National Grid Transverse Mercator

Rampion Extension Development

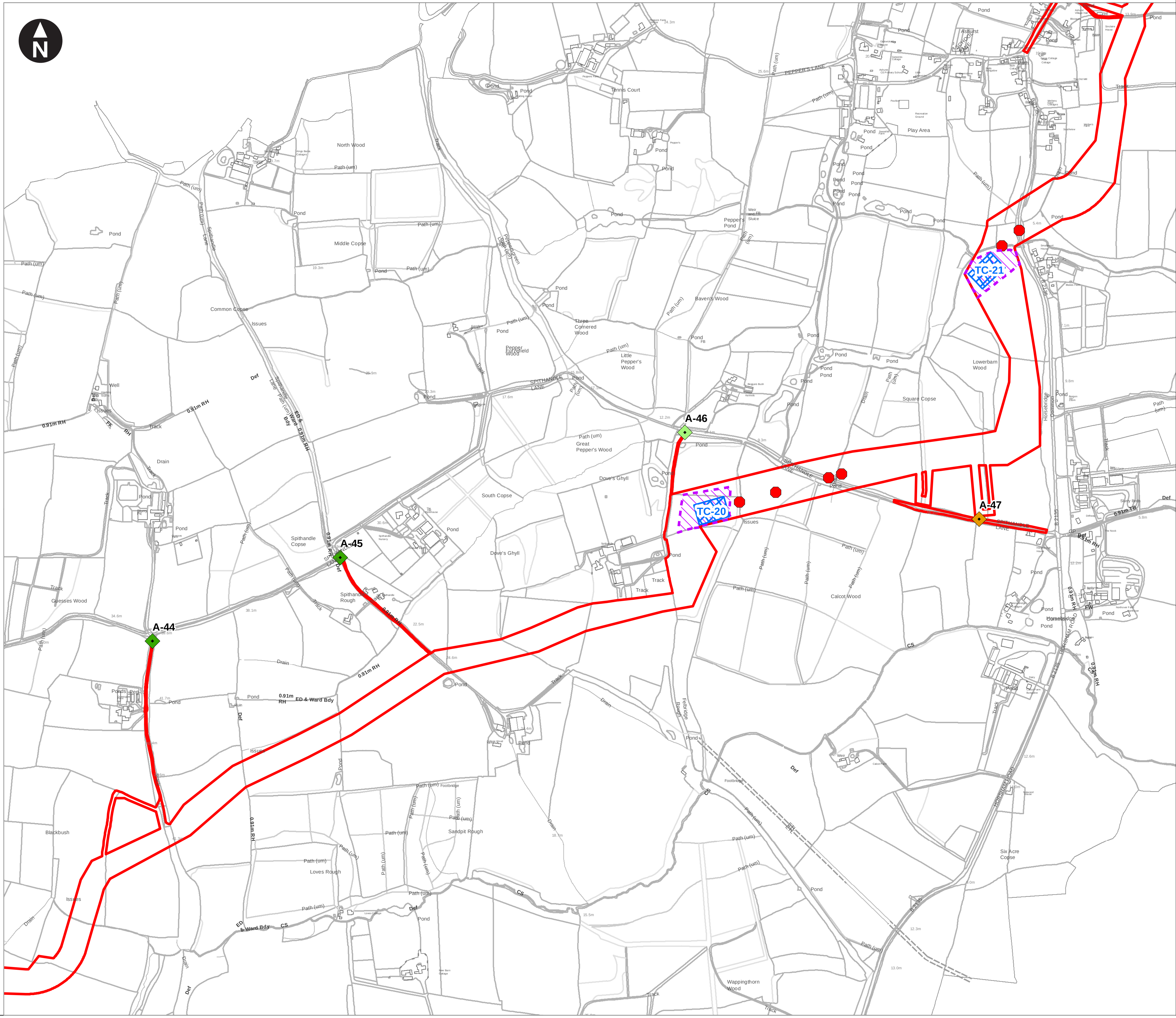
Rampion 2 Offshore Wind Farm

Figure 24.1.2p Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



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Key

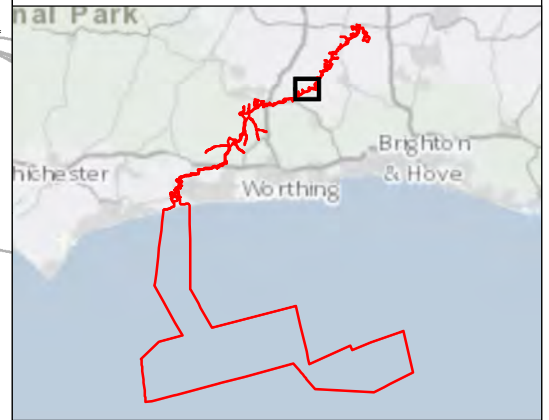
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction & operational
- Light construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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

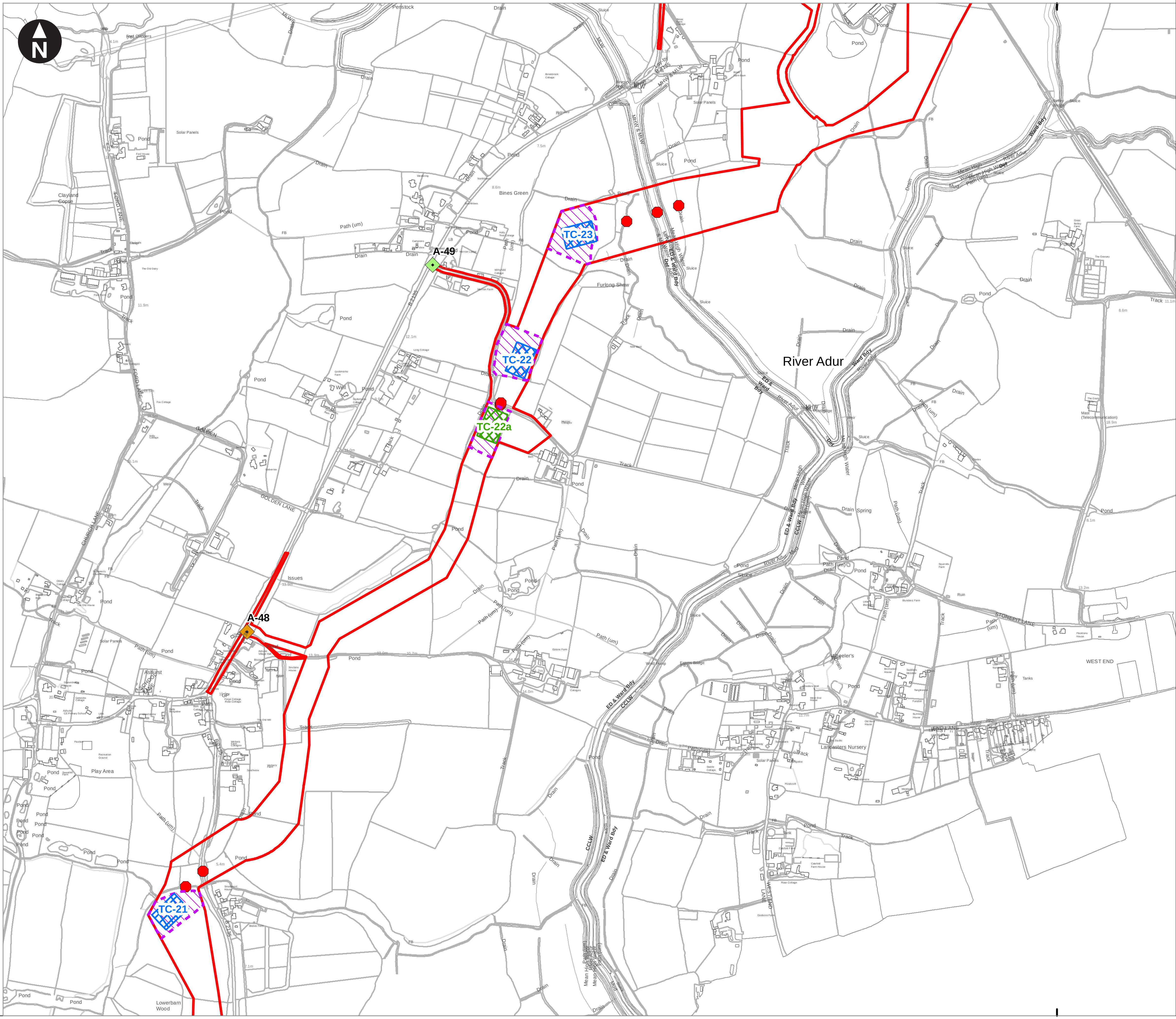
Figure 24.1.2q Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL

 ISO A3 Landscape



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Key

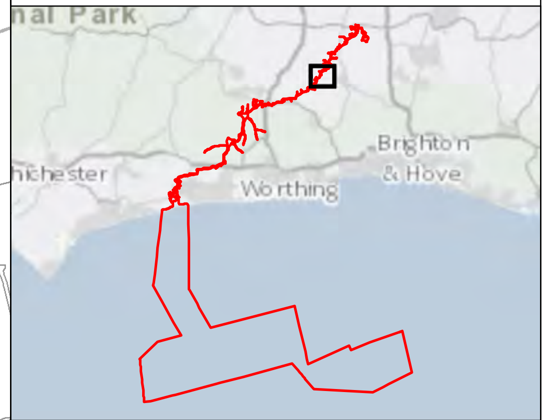
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction & operational
- Light construction & operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



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 24.1.2r Site layout

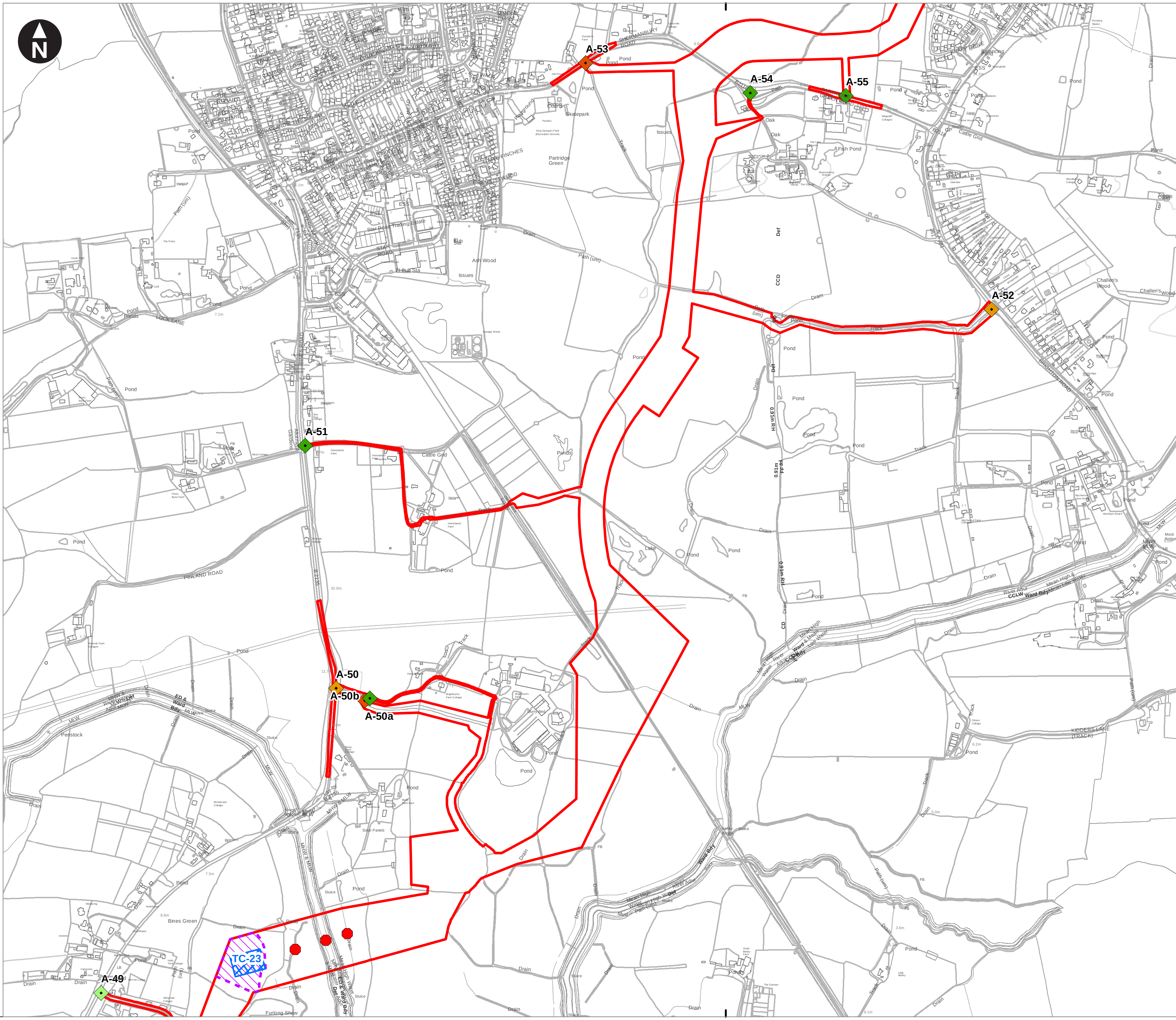
Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-5157	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	01/08/2023	FINAL

 ISO A3 Landscape



Key

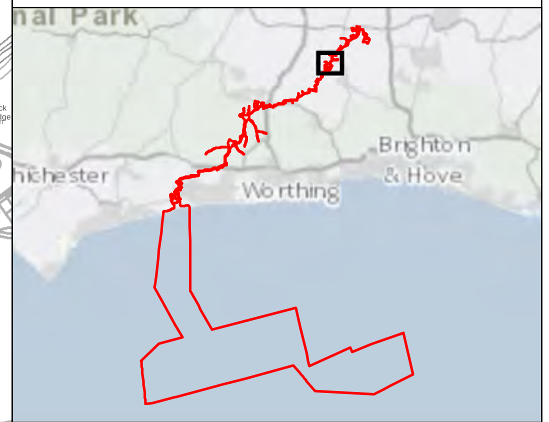
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Construction & operational
- Light construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres
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1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

Figure 24.1.2s Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL

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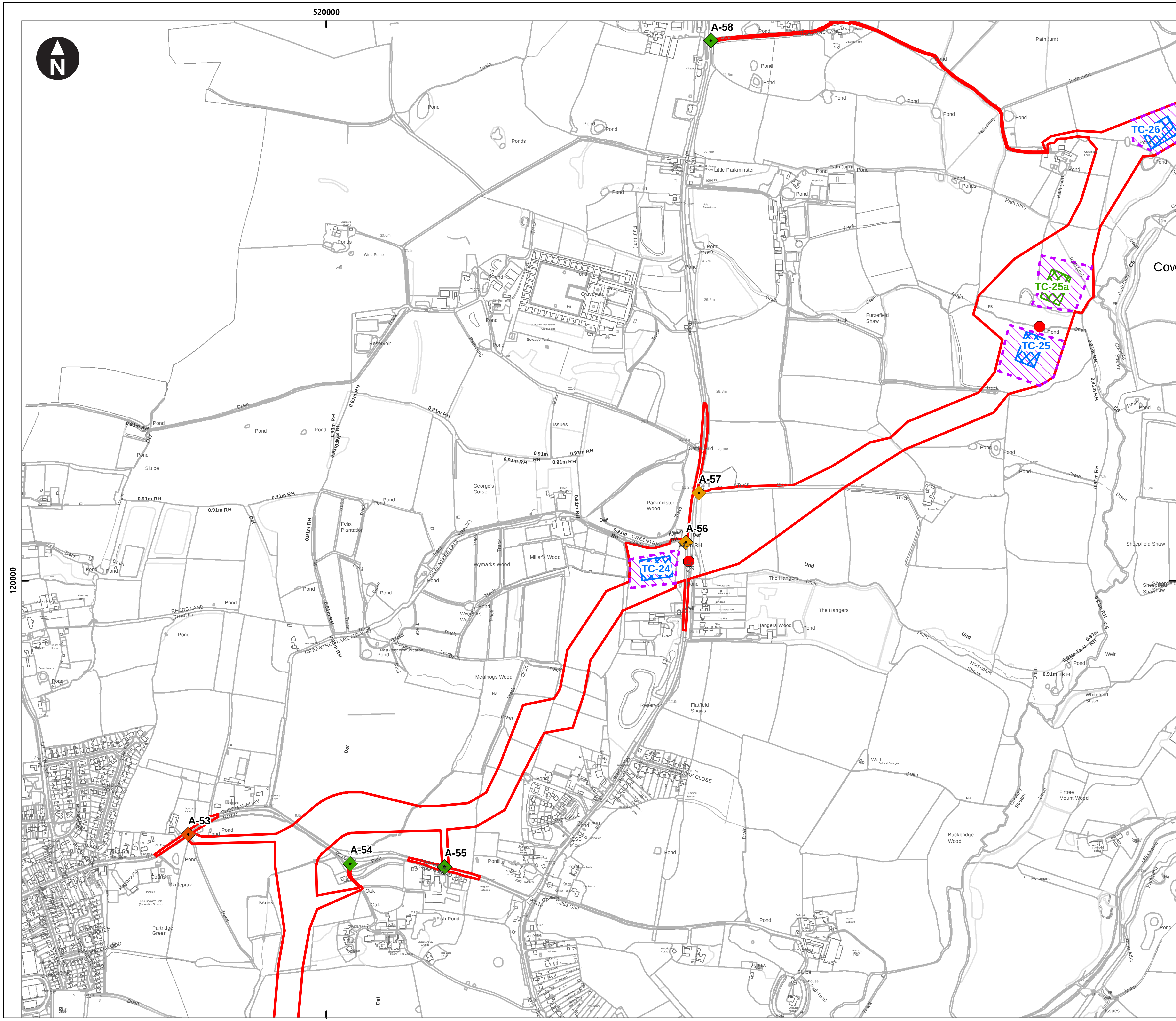


Key

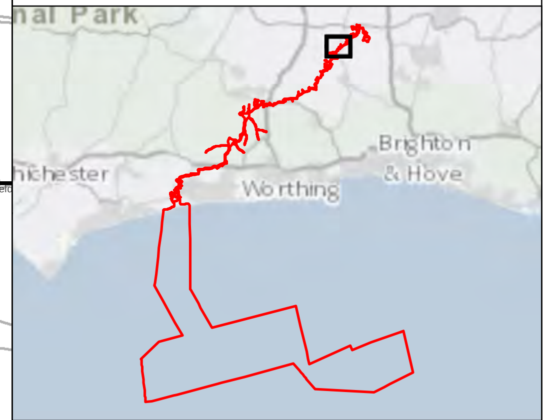
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres
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1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

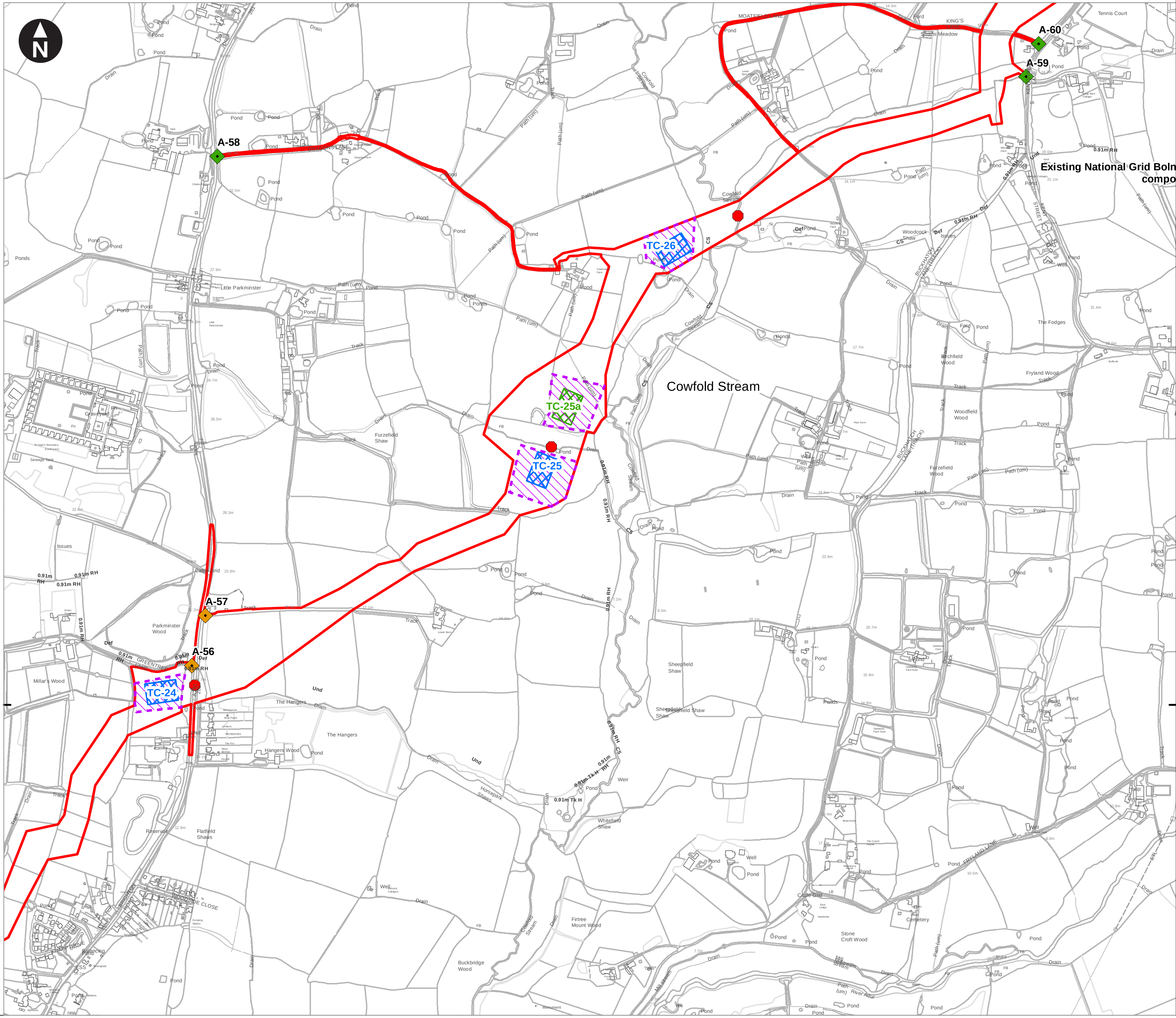
Rampion 2 Offshore Wind Farm

Figure 24.1.2t Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



Key

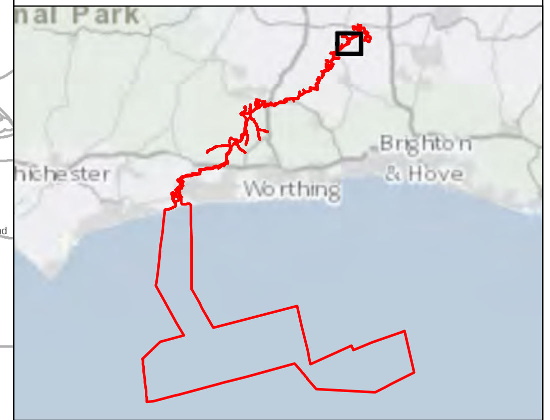
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres
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1:9,000
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

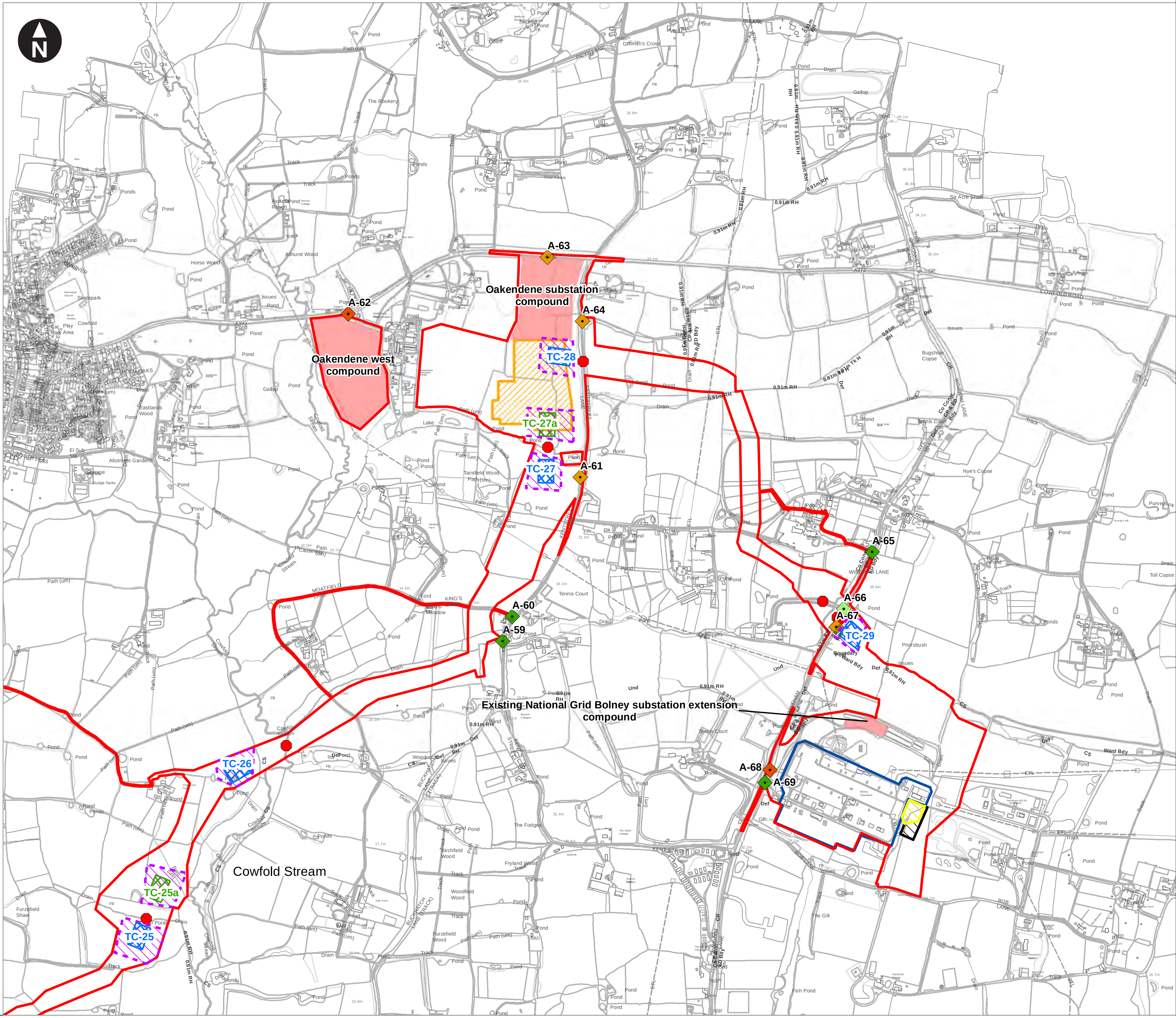
Rampion 2 Offshore Wind Farm

Figure 24.1.2u Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-5157				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



Key

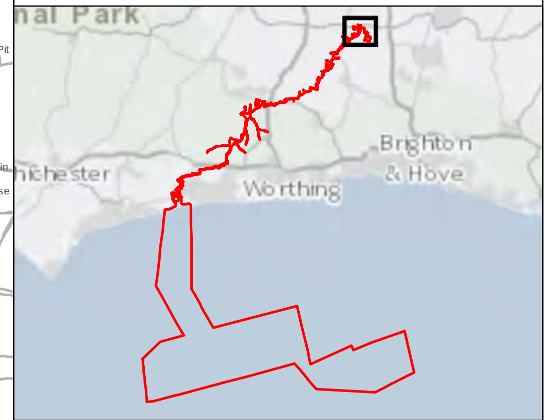
Proposed Development and construction access layout

- Proposed DCO Order Limits
- Onshore substation site
- Existing National Grid Substation
- Bolney Substation extension (GIS)*
- Bolney Substation extension (AIS)*
- Temporary construction compound
- Trenchless Crossing (TC) compounds
- Trenchless Crossing (TC) compound alternatives
- Trenchless Crossing (TC) limits of deviation
- Features crossed via trenchless crossing

Access from public highway

- Construction
- Construction & operational
- Light construction & operational
- Operational

*AIS = Air Insulated Switchgear
*GIS = Gas Insulated Switchgear



Kilometres
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British National Grid Transverse Mercator

Rampion Extension Development

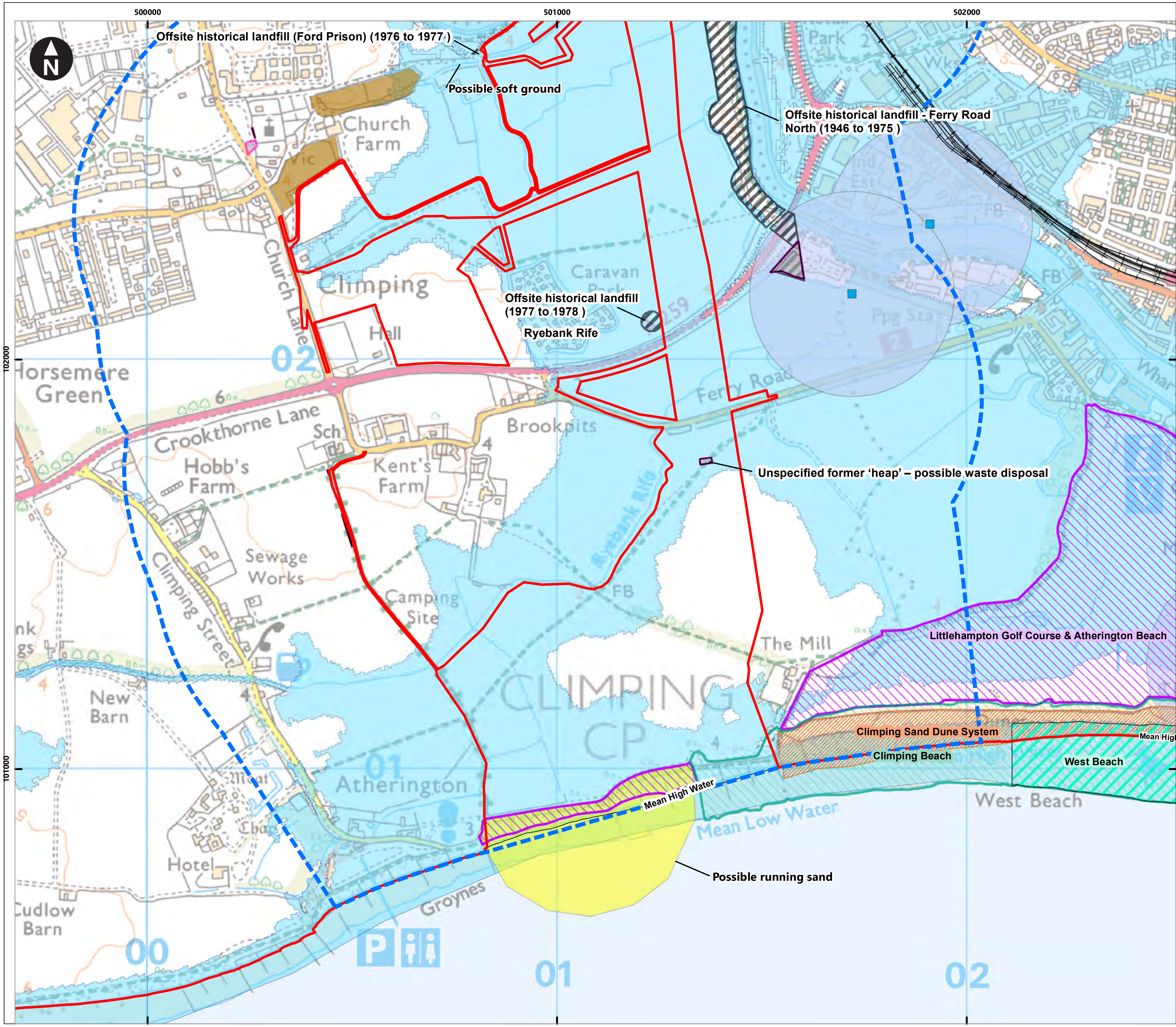
Rampion 2 Offshore Wind Farm

Figure 24.1.2v Site layout

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier: 42285-WSPE-ES-ON-FG-OG-5157				Version: 1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 01/08/2023	Status: FINAL



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Key

- Proposed DCO Order Limits
- Study Area

Environmental setting

- Local Nature Reserve
- Sites of Special Scientific Interest
- Local Geologcal Sites
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Historical Landfill
- Railways
- Licensed Abstractions
- Source protection zones
- Flood zone 2

Superficial Geology (10k)

- Beach And Tidal Flat Deposits (Undifferentiated)

*Map scale is variable between pages, the scale references the main map view only

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

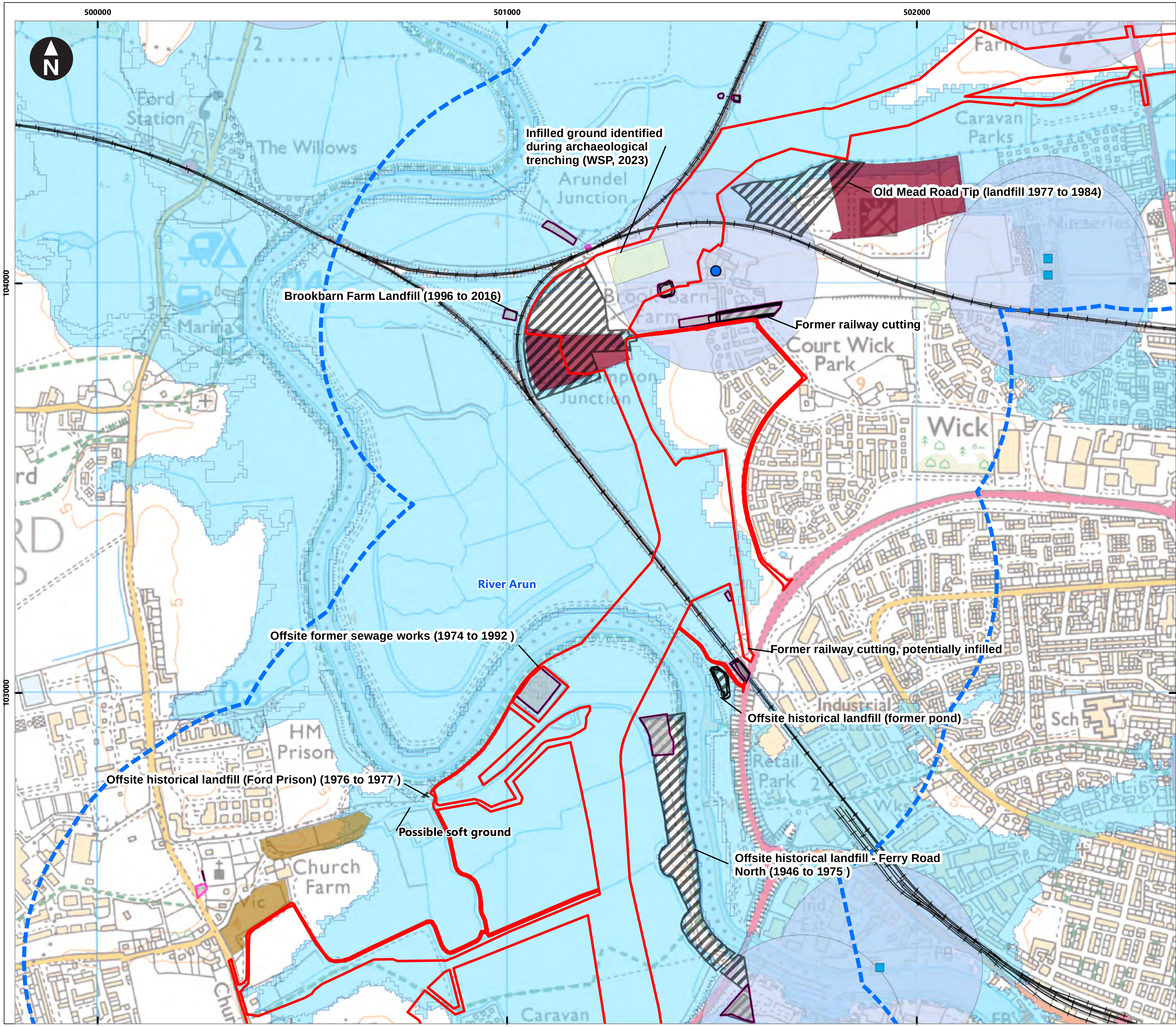
Figure 24.1.3a Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Study Area
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Historical Landfill
- Railways
- Private Water supplies
- Licensed Abstractions
- Source protection zones
- Flood zone 2
- Made Ground (Undivided)
- Infilled Ground

*Map scale is variable between pages, the scale references the main map view only

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

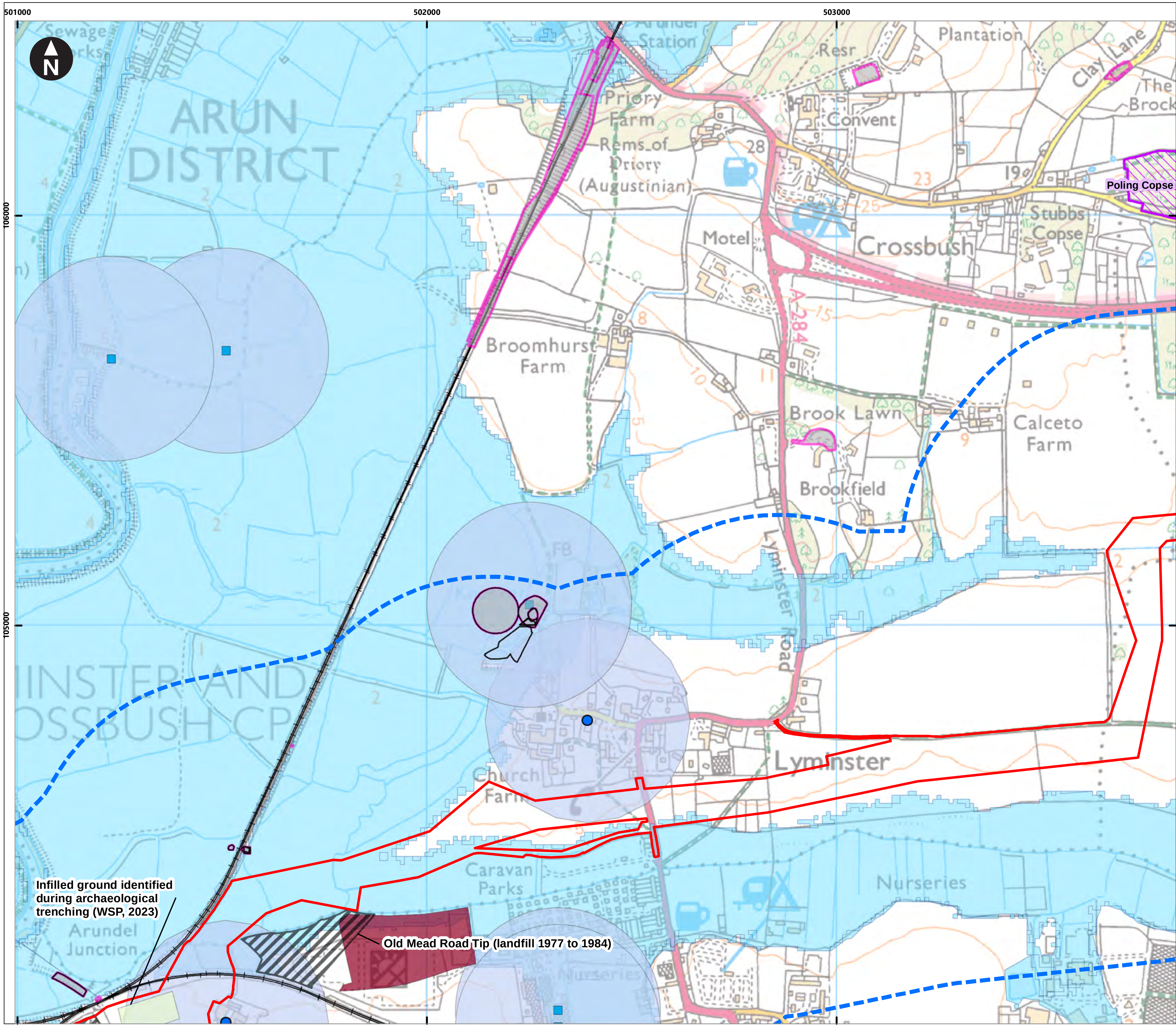
Figure 24.1.3b Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Study Area
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Historical Landfill
- Railways
- Private Water supplies
- Licensed Abstractions
- Source protection zones
- Flood zone 2
- Made Ground (Undivided)
- Infilled Ground

*Map scale is variable between pages, the scale references the main map view only

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 24.1.3c Geo-environmental constraints plan

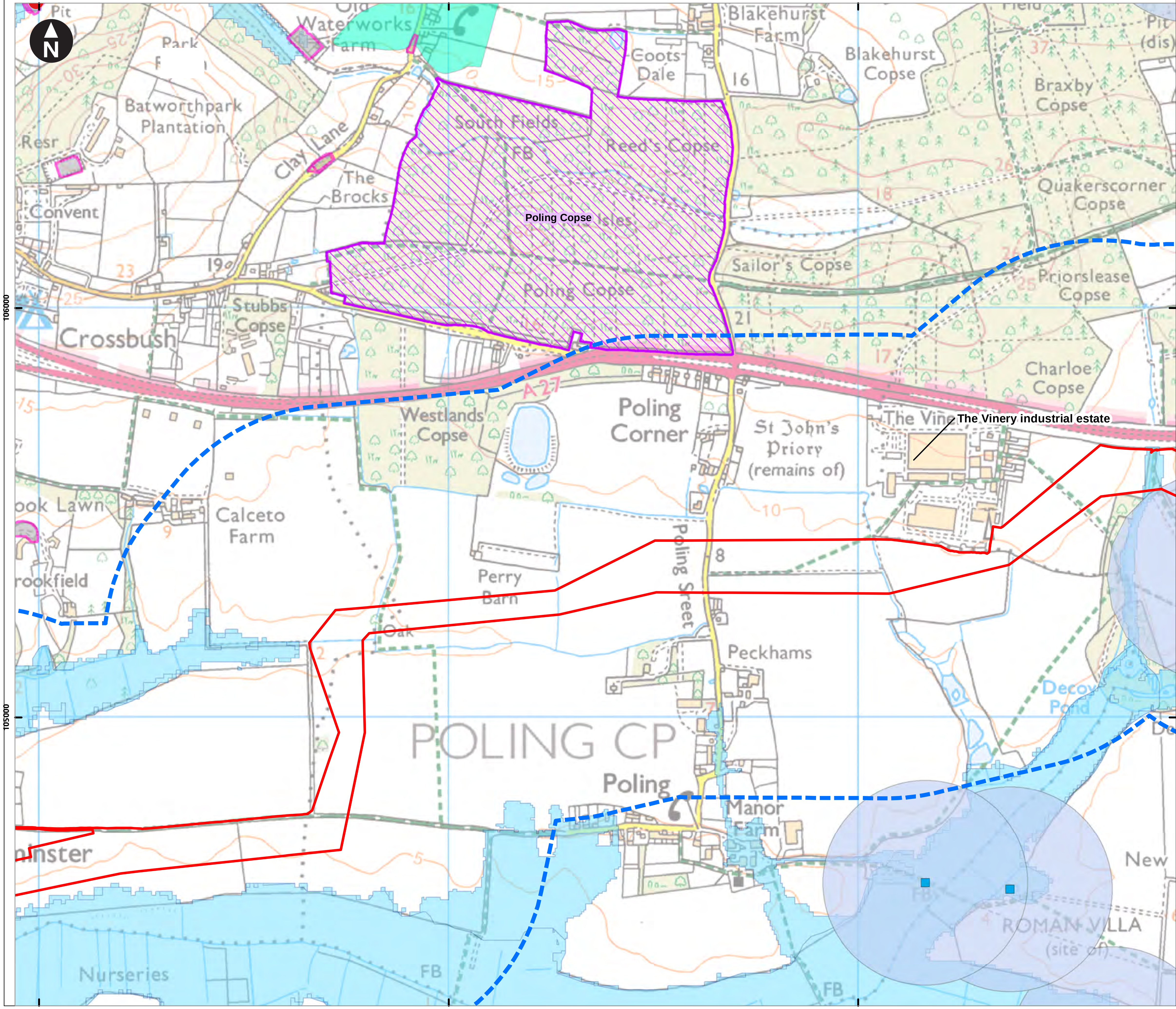
Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL

503000 504000 505000



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Key

- Proposed DCO Order Limits
- Study Area
- Brit Pits
- Local Wildlife Sites
- Historical industrial land uses
- Licensed Abstractions
- Source protection zones
- Flood zone 2

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

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

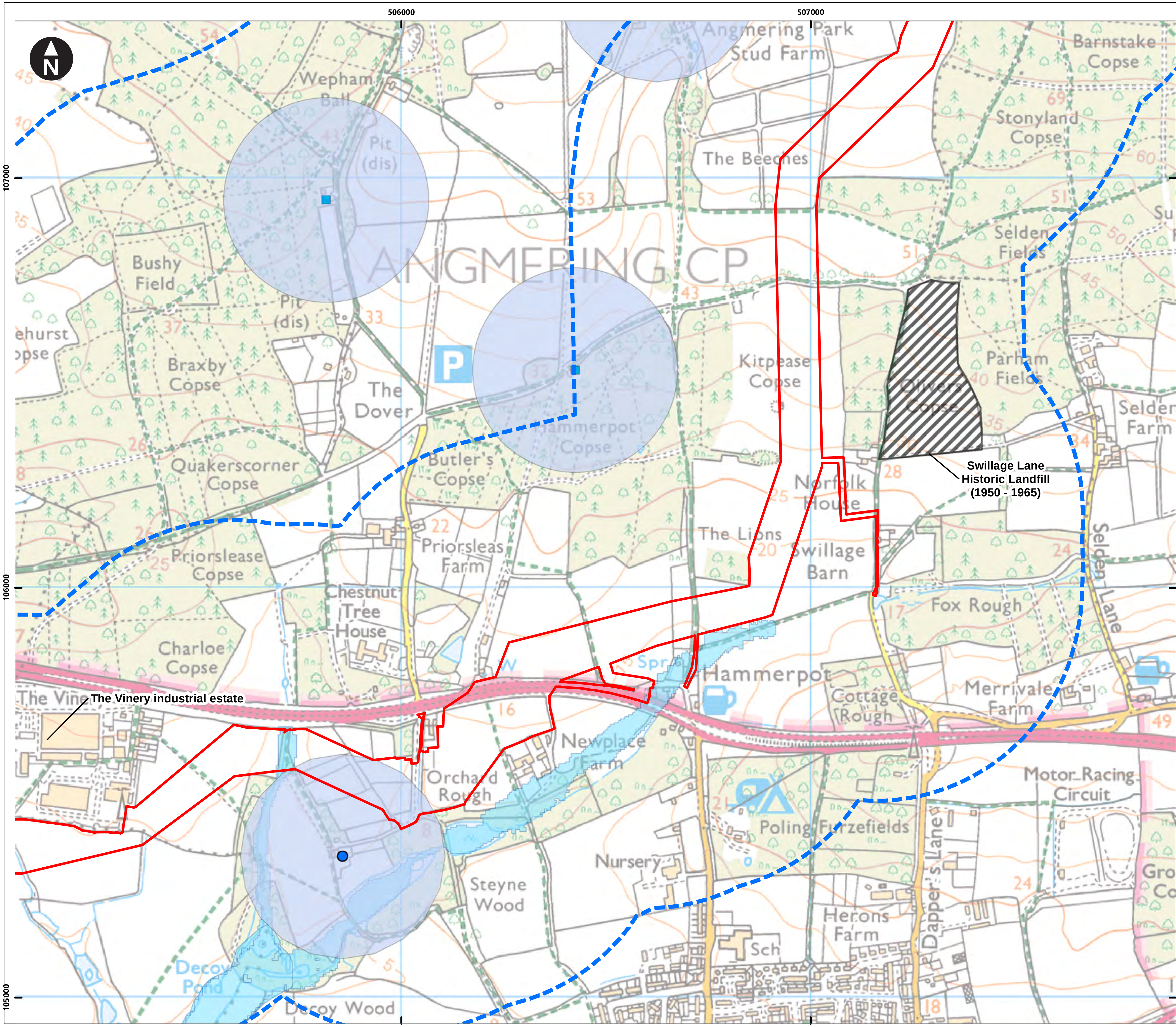
Figure 24.1.3d Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Historical Landfill
- Private Water supplies
- Licensed Abstractions
- Source protection zones
- Flood zone 2

*Map scale is variable between pages, the scale references the main map view only

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 Offshore Wind Farm

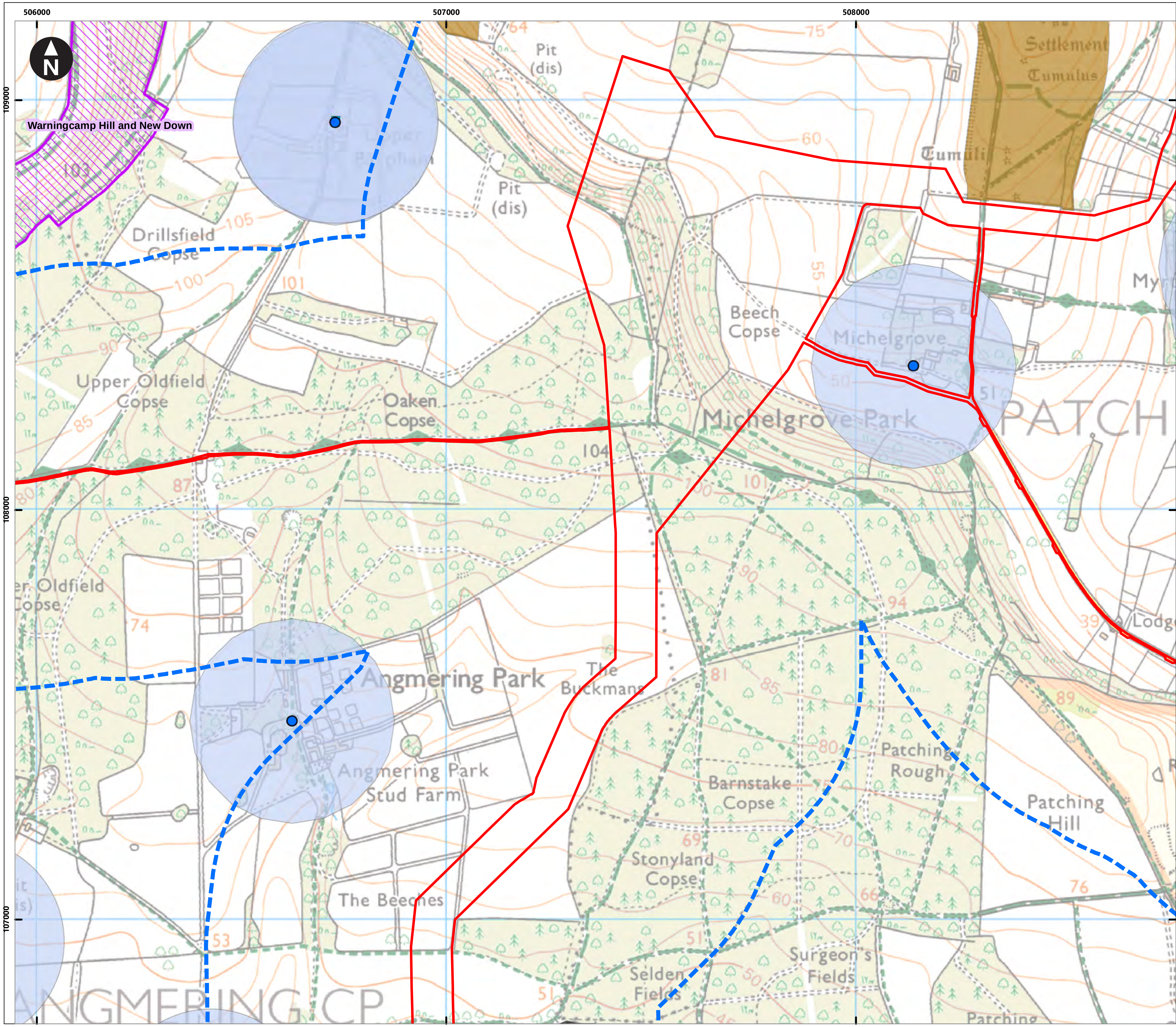
Figure 24.1.3e Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Local Wildlife Sites
- Scheduled Monuments
- Historical Landfill
- Private Water supplies
- Licensed Abstractions
- Source protection zones

*Map scale is variable between pages, the scale references the main map view only

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

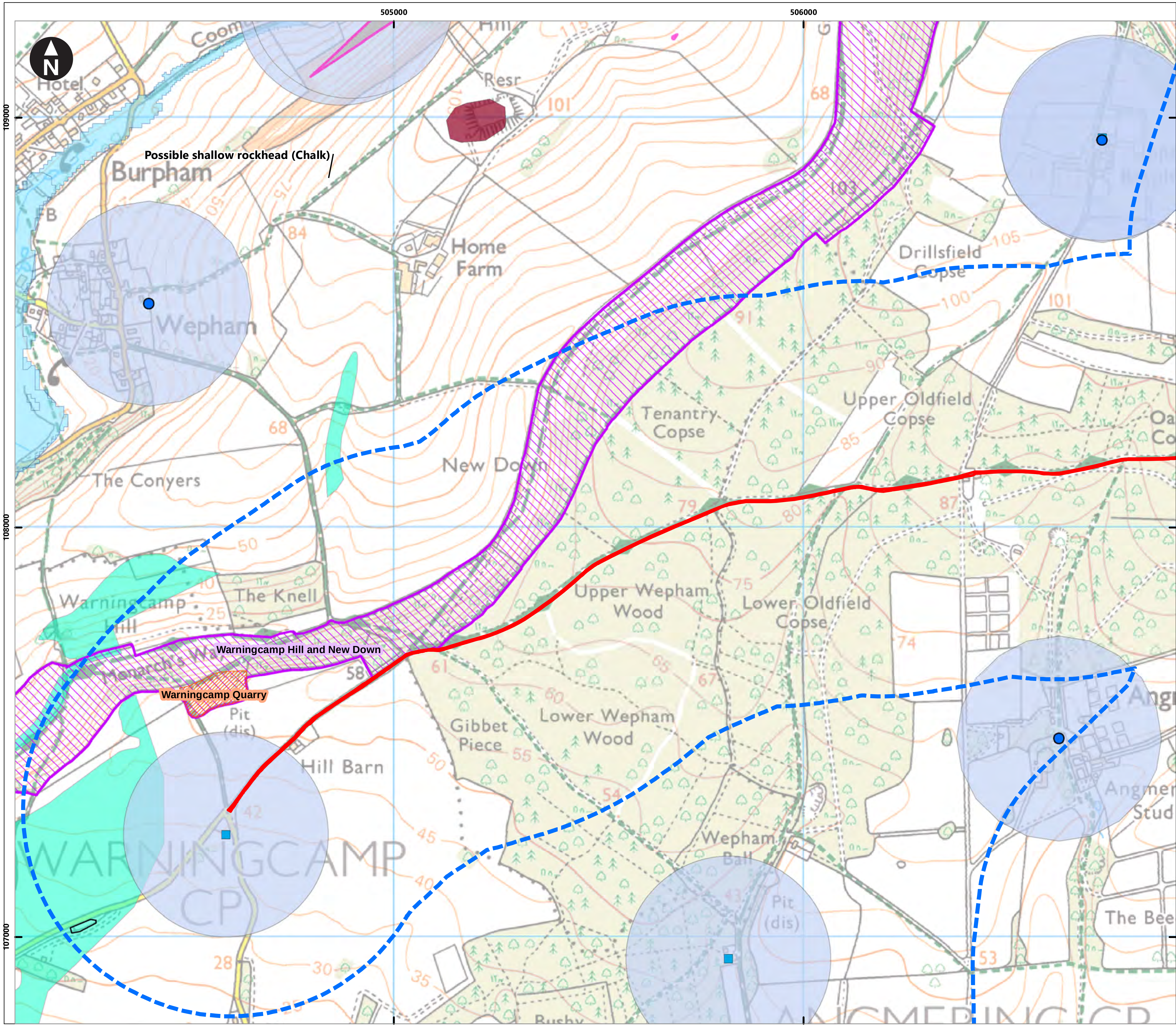
Figure 24.1.3f Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Local Geologcal Sites
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Private Water supplies
- Licensed Abstractions
- Source protection zones
- Flood zone 2
- Made Ground (Undivided)

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

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

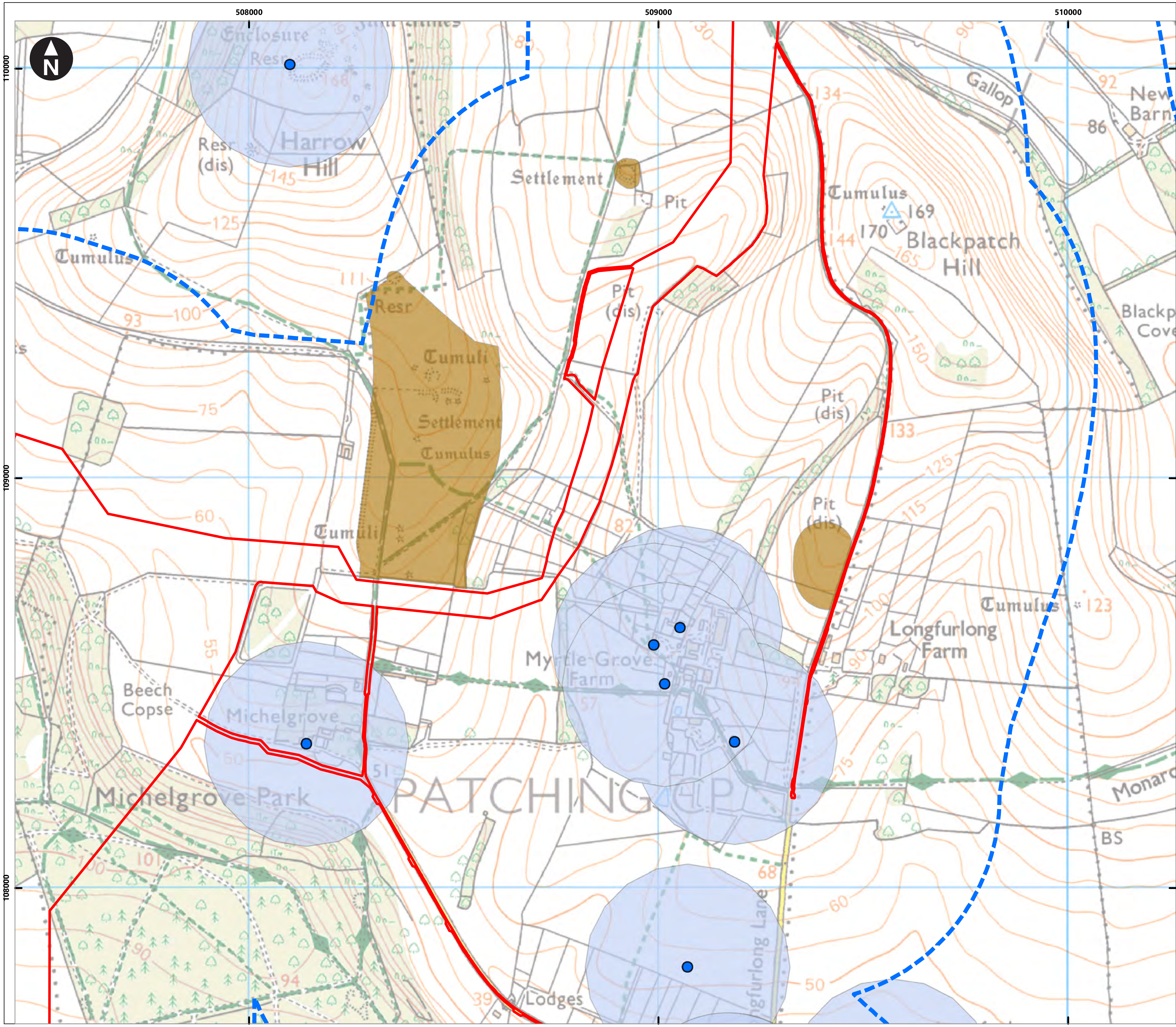
Figure 24.1.3g Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Scheduled Monuments
- Private Water supplies
- Source protection zones

*Map scale is variable between pages, the scale references the main map view only

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

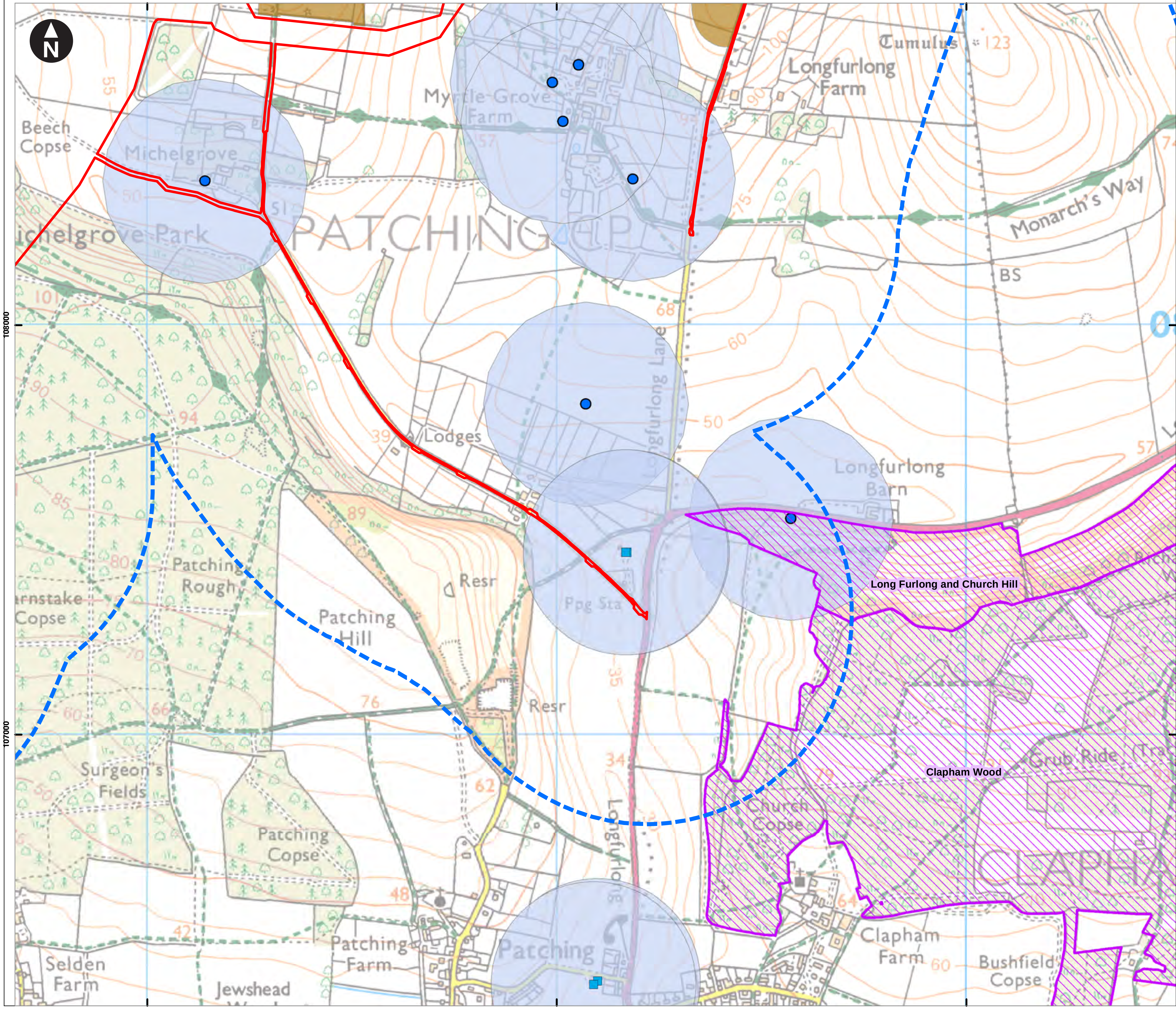
Figure 24.1.3h Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Local Wildlife Sites
- Scheduled Monuments
- Private Water supplies
- Licensed Abstractions
- Source protection zones

*Map scale is variable between pages, the scale references the main map view only

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

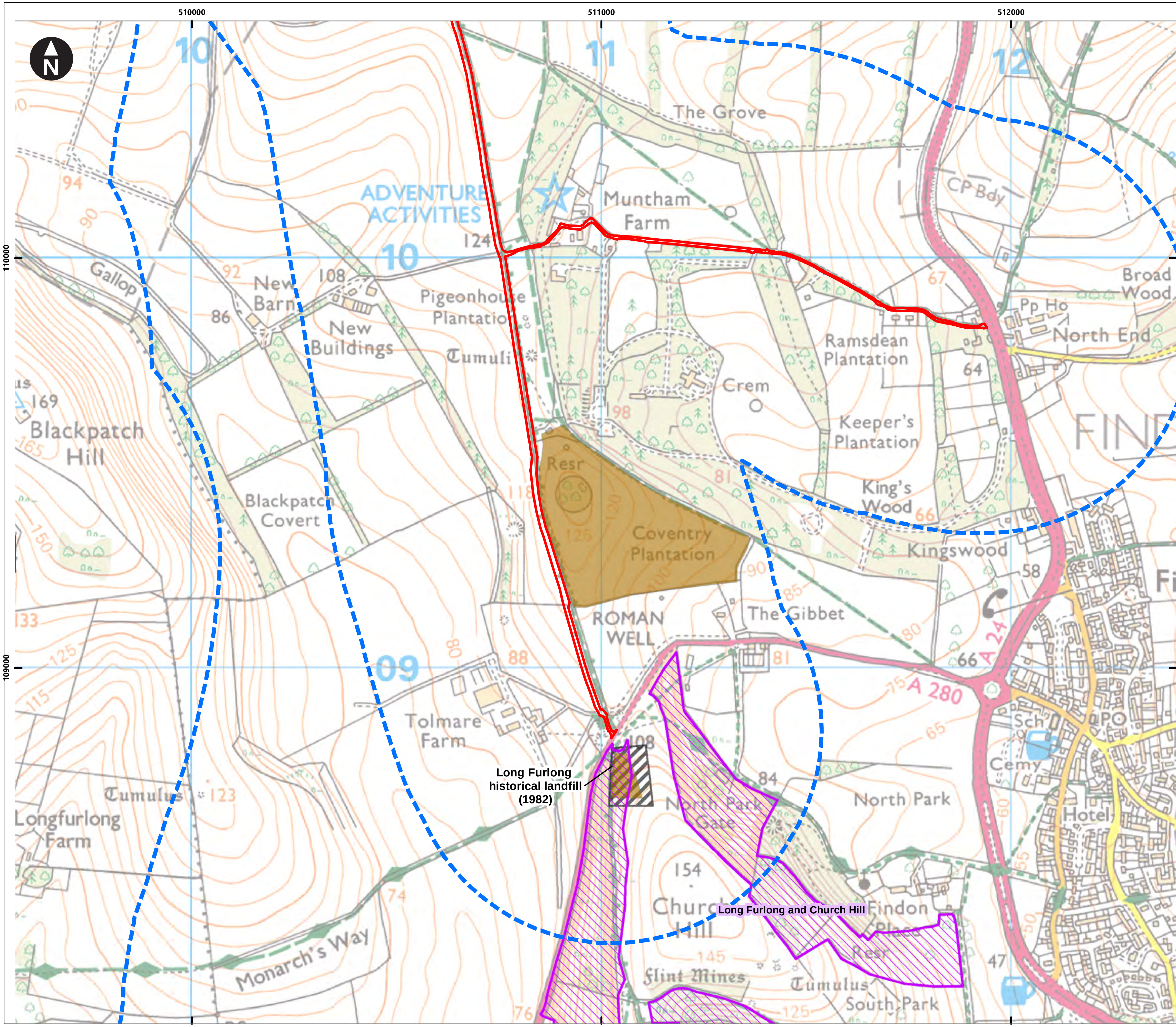
Figure 24.1.3i Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Local Wildlife Sites
- Scheduled Monuments
- Historical Landfill

*Map scale is variable between pages, the scale references the main map view only

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

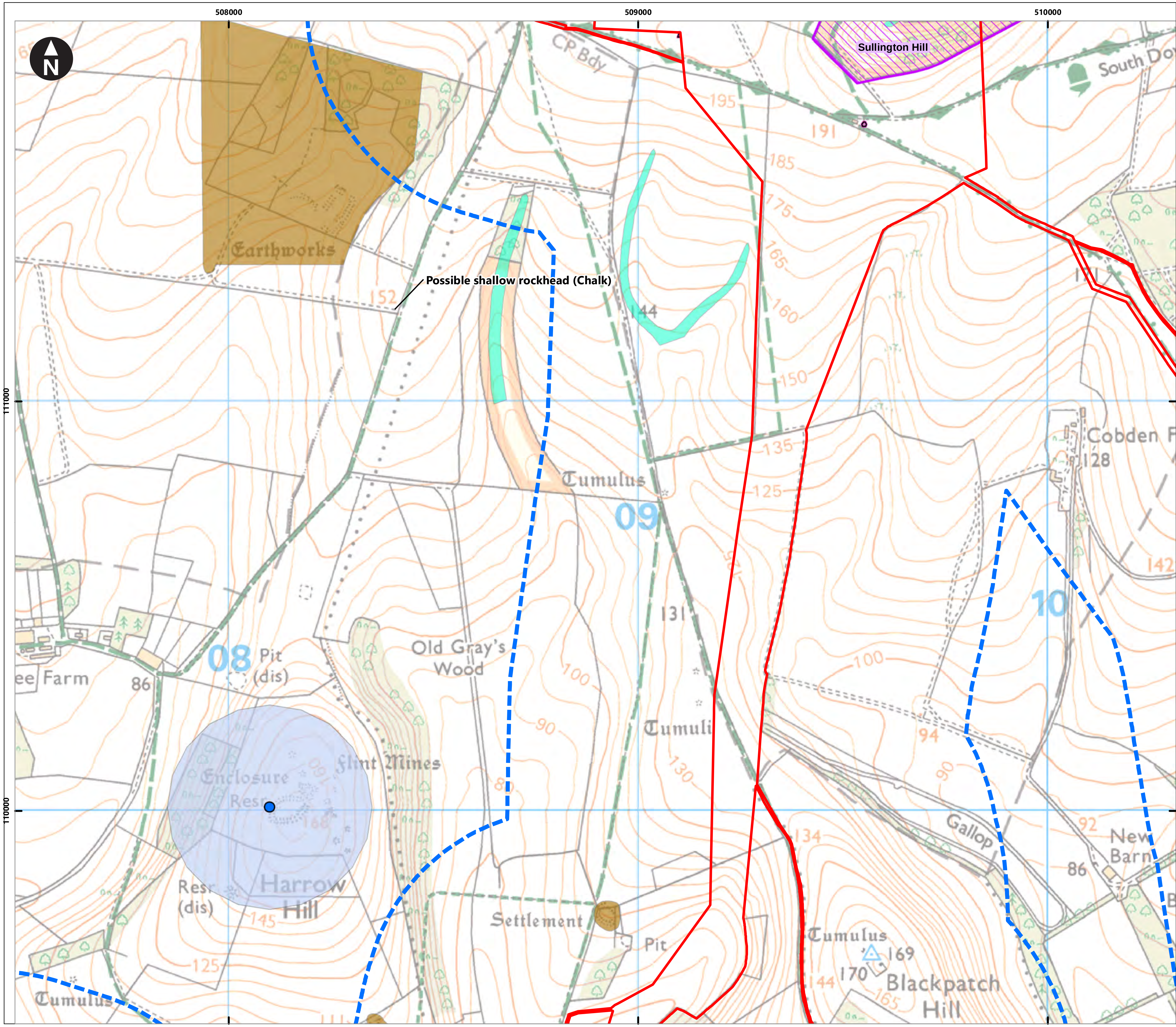
Figure 24.1.3j Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Study Area
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Private Water supplies
- Source protection zones

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

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

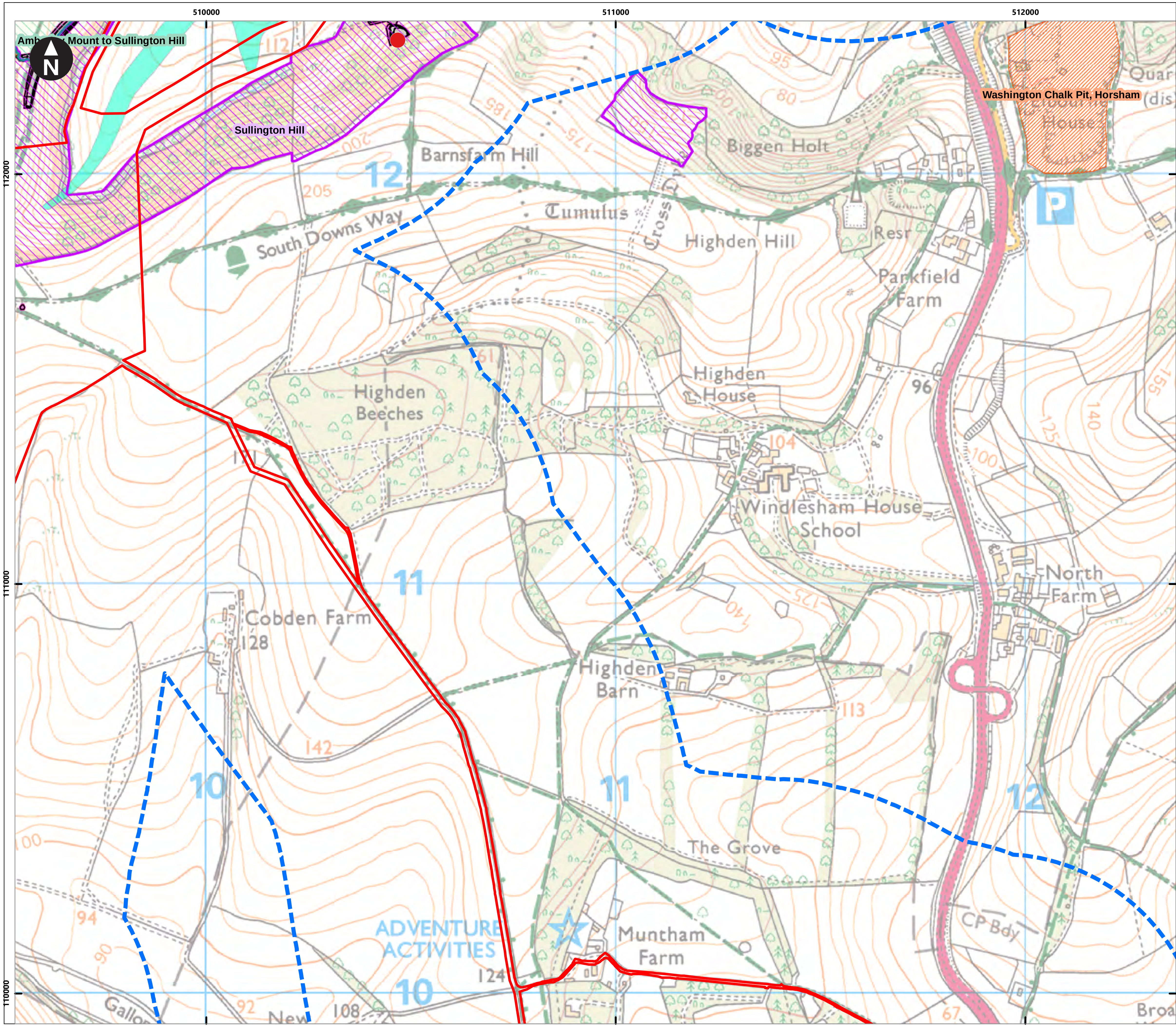
Figure 24.1.3k Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Brit Pits
- Sites of Special Scientific Interest
- Local Geologcal Sites
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

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

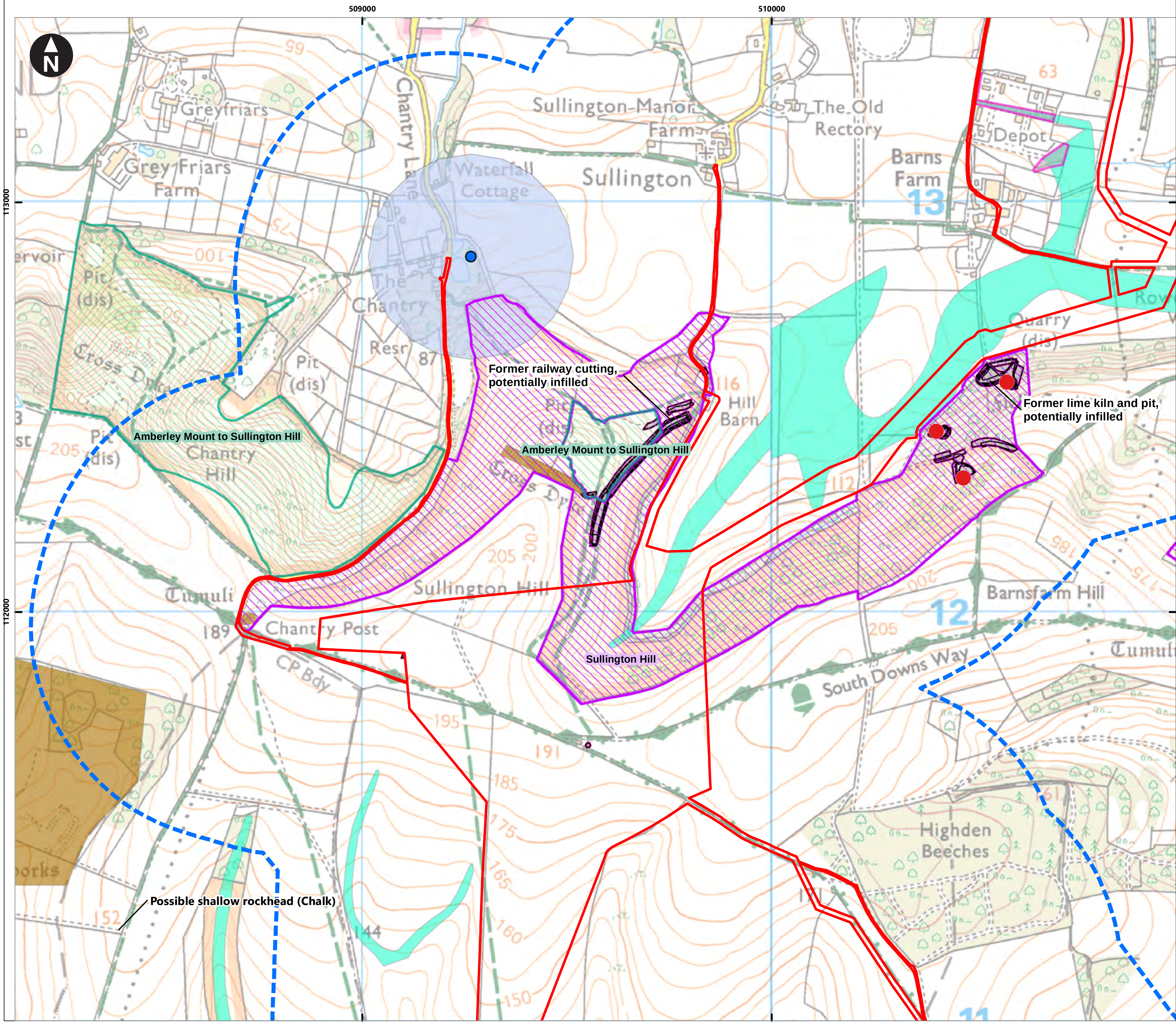
Rampion 2 Offshore Wind Farm

Figure 24.1.3l Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-4414				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 26/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Brit Pits
- Sites of Special Scientific Interest
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Private Water supplies
- Source protection zones

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

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

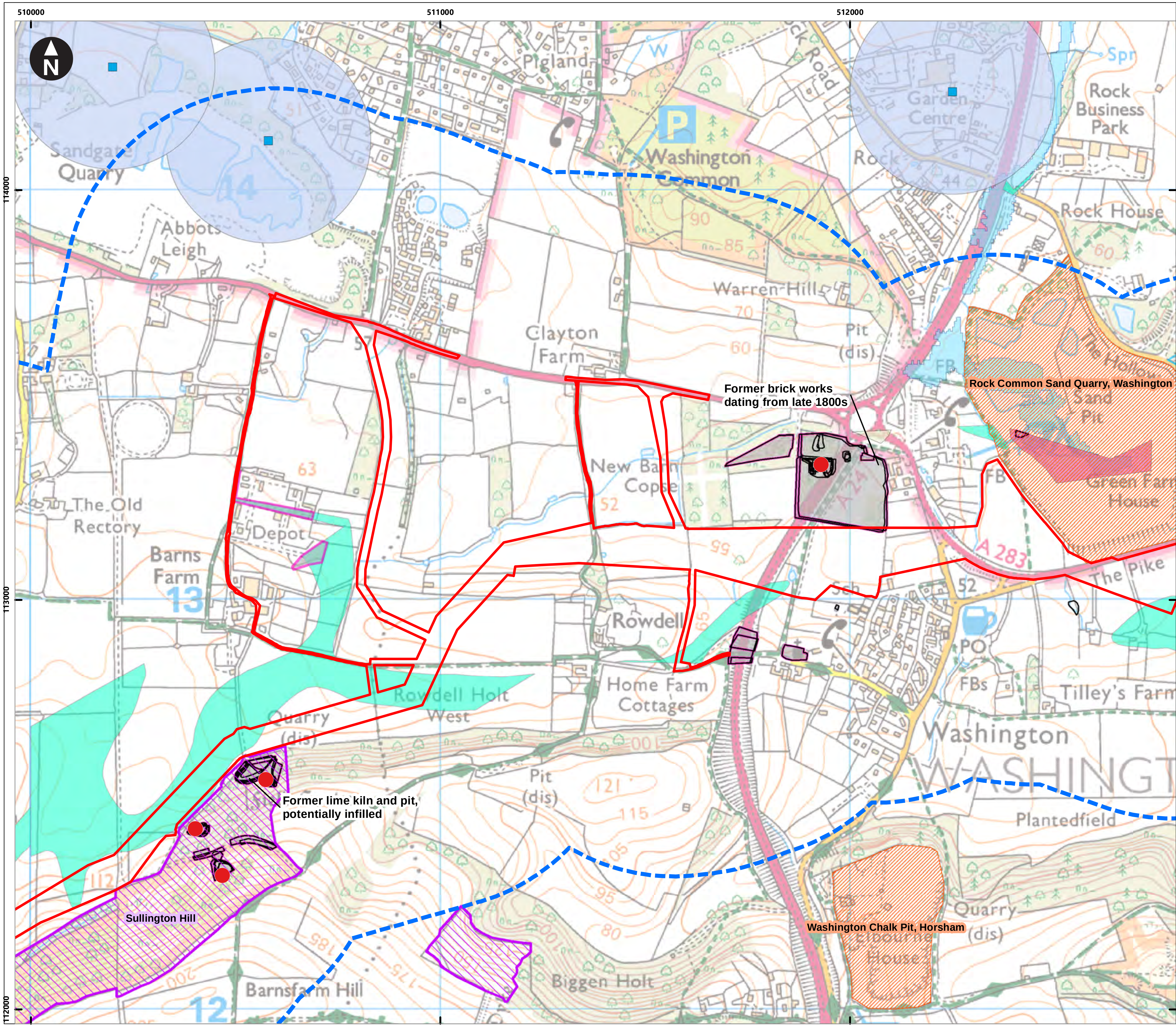
Rampion 2 Offshore Wind Farm

Figure 24.1.3m Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-4414				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 26/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Brit Pits
- Local Geologcal Sites
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Active or recent landfills
- Licensed Abstractions
- Flood zone 2
- Worked Ground (Undivided)
- Infilled Ground

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.05 0.1 0.2 0.3 0.4

1:9,000 *

British National Grid Transverse Mercator

Rampion Extension Development

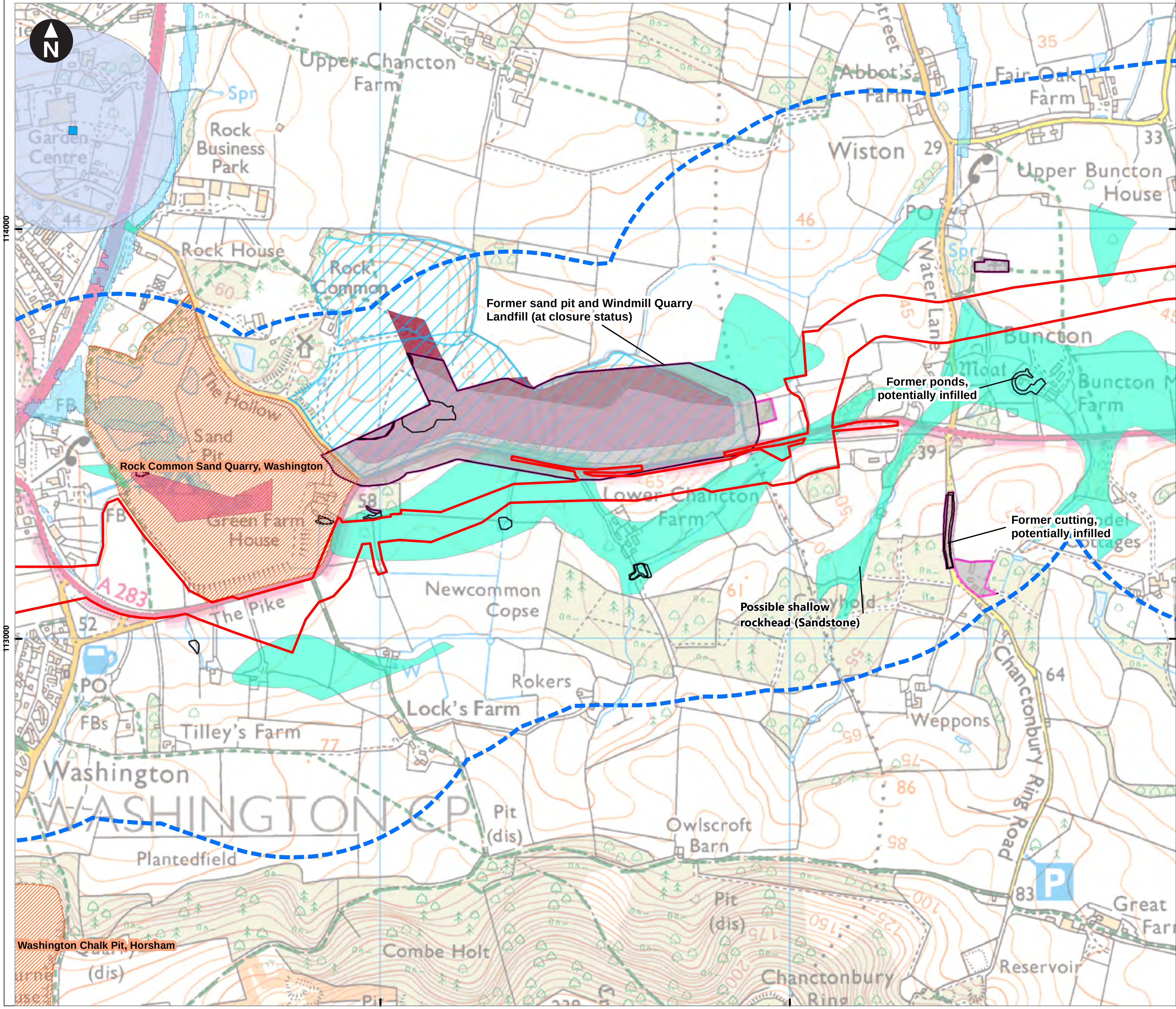
Rampion 2 Offshore Wind Farm

Figure 24.1.3n Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-4414				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 26/07/2023	Status: FINAL



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Key

- Proposed DCO Order Limits
- Study Area
- Local Geologcal Sites
- Surface ground workings
- Historical industrial land uses
- Active or recent landfills
- Licensed Abstractions
- Flood zone 2
- Made Ground (Undivided)
- Worked Ground (Undivided)

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

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

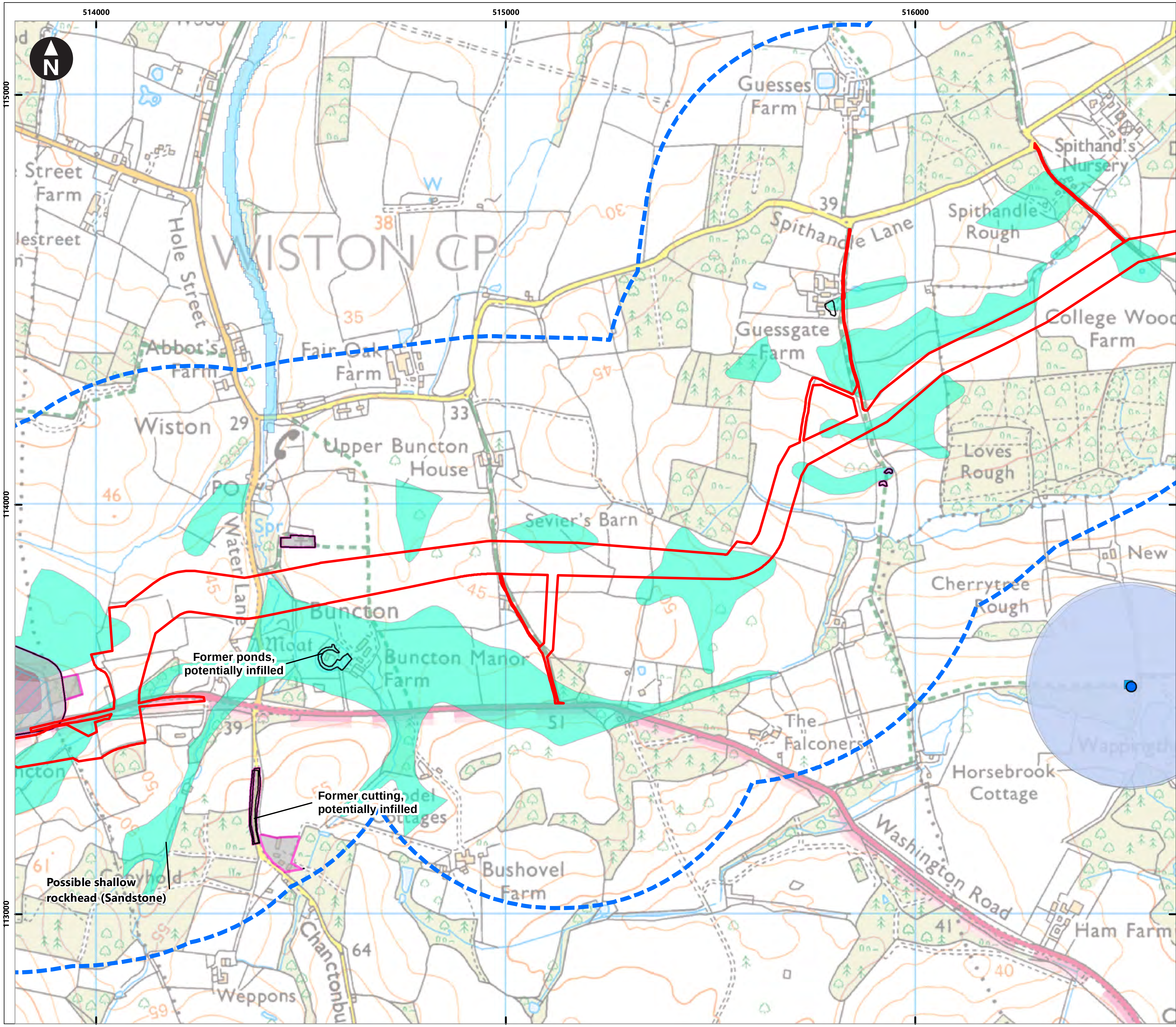
Rampion 2 Offshore Wind Farm

Figure 24.1.3o Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-4414				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 26/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Surface ground workings
- Historical industrial land uses
- Active or recent landfills
- Private Water supplies
- Licensed Abstractions
- Source protection zones
- Flood zone 2
- Made Ground (Undivided)
- Worked Ground (Undivided)

Superficial Geology (10k)

- Head

*Map scale is variable between pages, the scale references the main map view only

Kilometres
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1:9,000 *
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

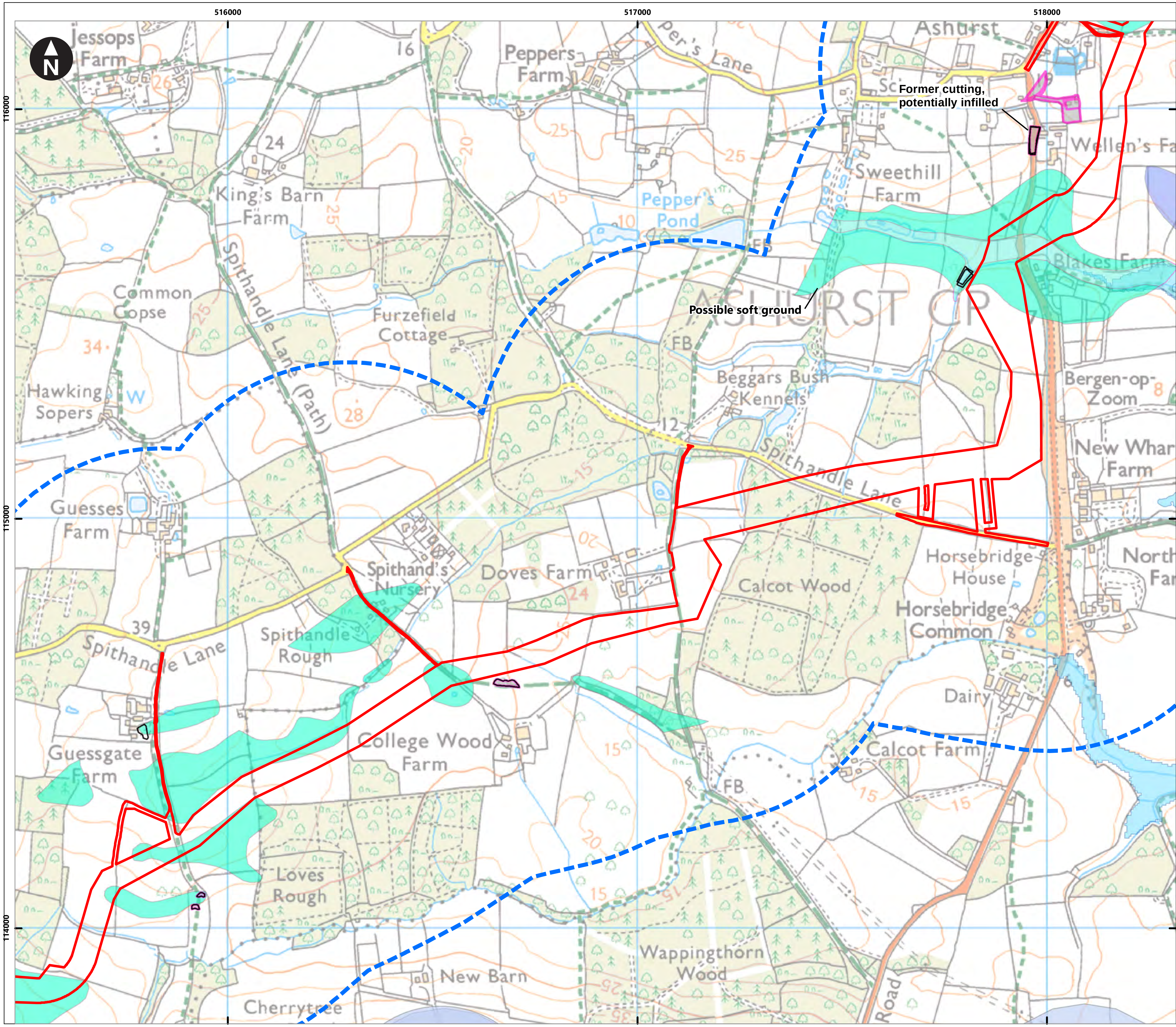
Rampion 2 Offshore Wind Farm

Figure 24.1.3p Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-4414				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 26/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Surface ground workings
- Historical industrial land uses
- Source protection zones
- Flood zone 2

Superficial Geology (10k)

- Alluvium
- Head
- River Terrace Deposits (Adur)

*Map scale is variable between pages, the scale references the main map view only

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

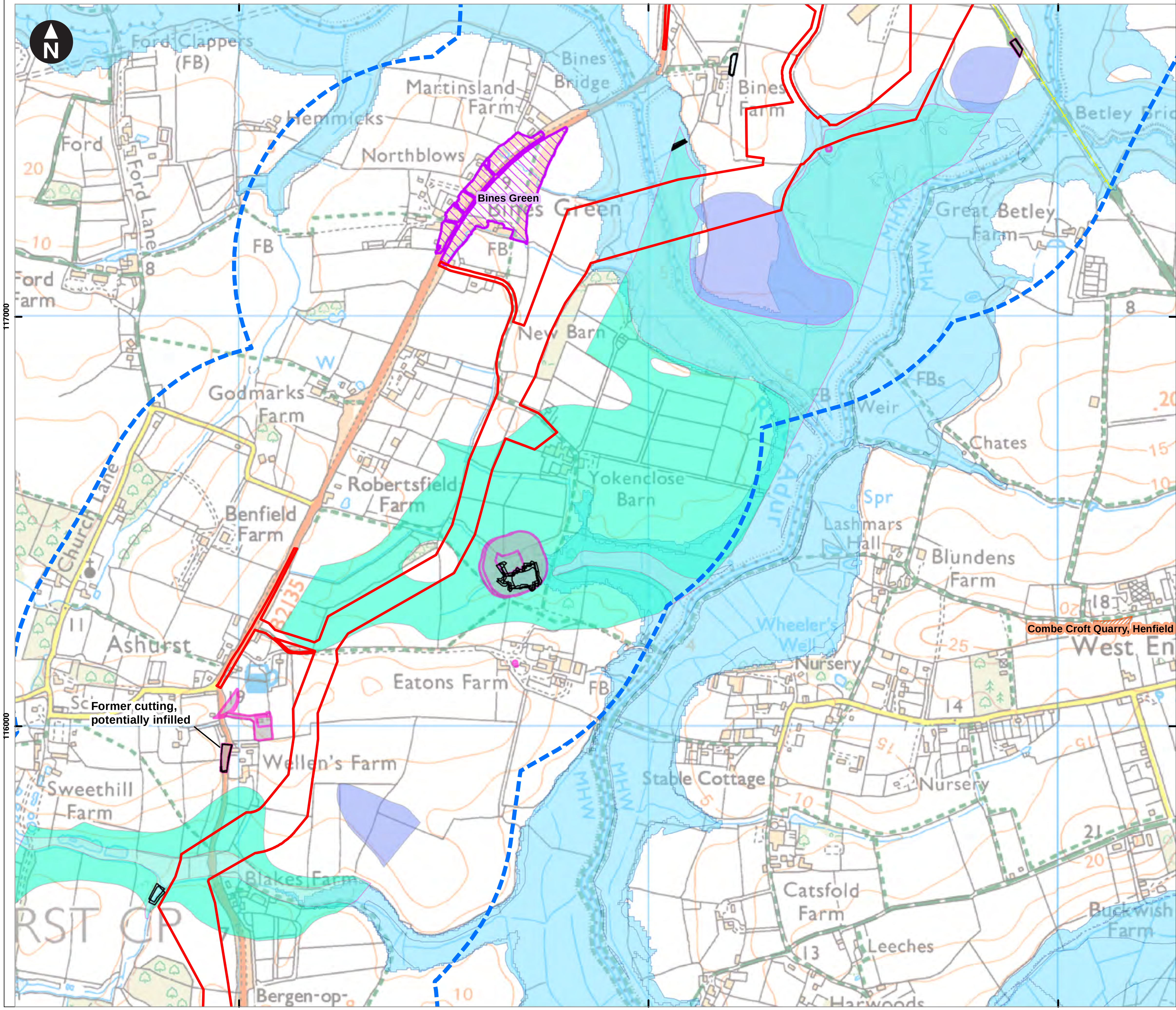
Figure 24.1.3q Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Local Geologcal Sites
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Historical railways
- Flood zone 2

Superficial Geology (10k)

- Alluvium
- Head
- River Terrace Deposits (Adur)

*Map scale is variable between pages, the scale references the main map view only

Kilometres
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1:9,000 *
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

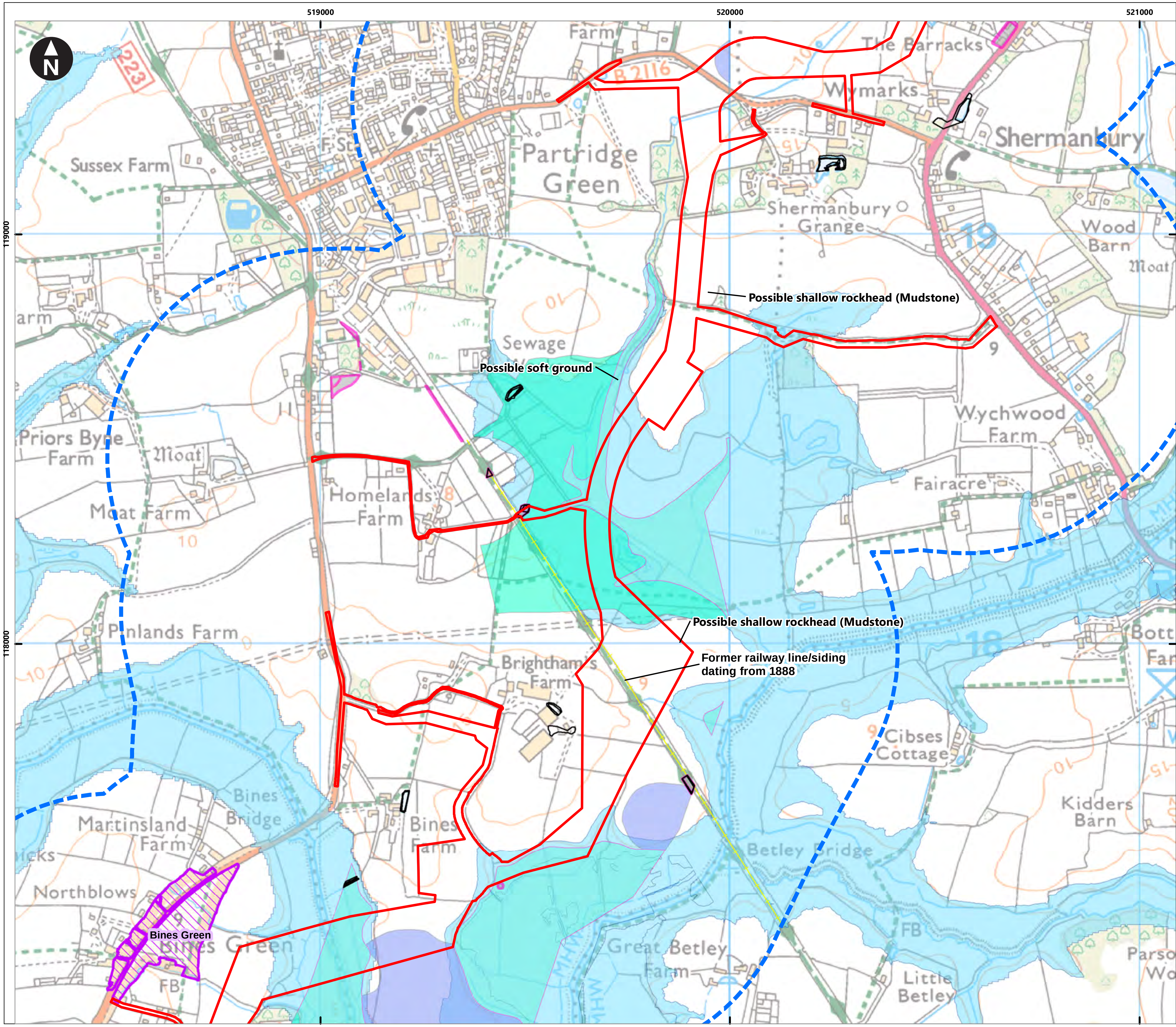
Figure 24.1.3r Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Historical railways
- Flood zone 2

Superficial Geology (10k)

- Alluvium
- Head
- River Terrace Deposits (Adur)

*Map scale is variable between pages, the scale references the main map view only

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 Offshore Wind Farm

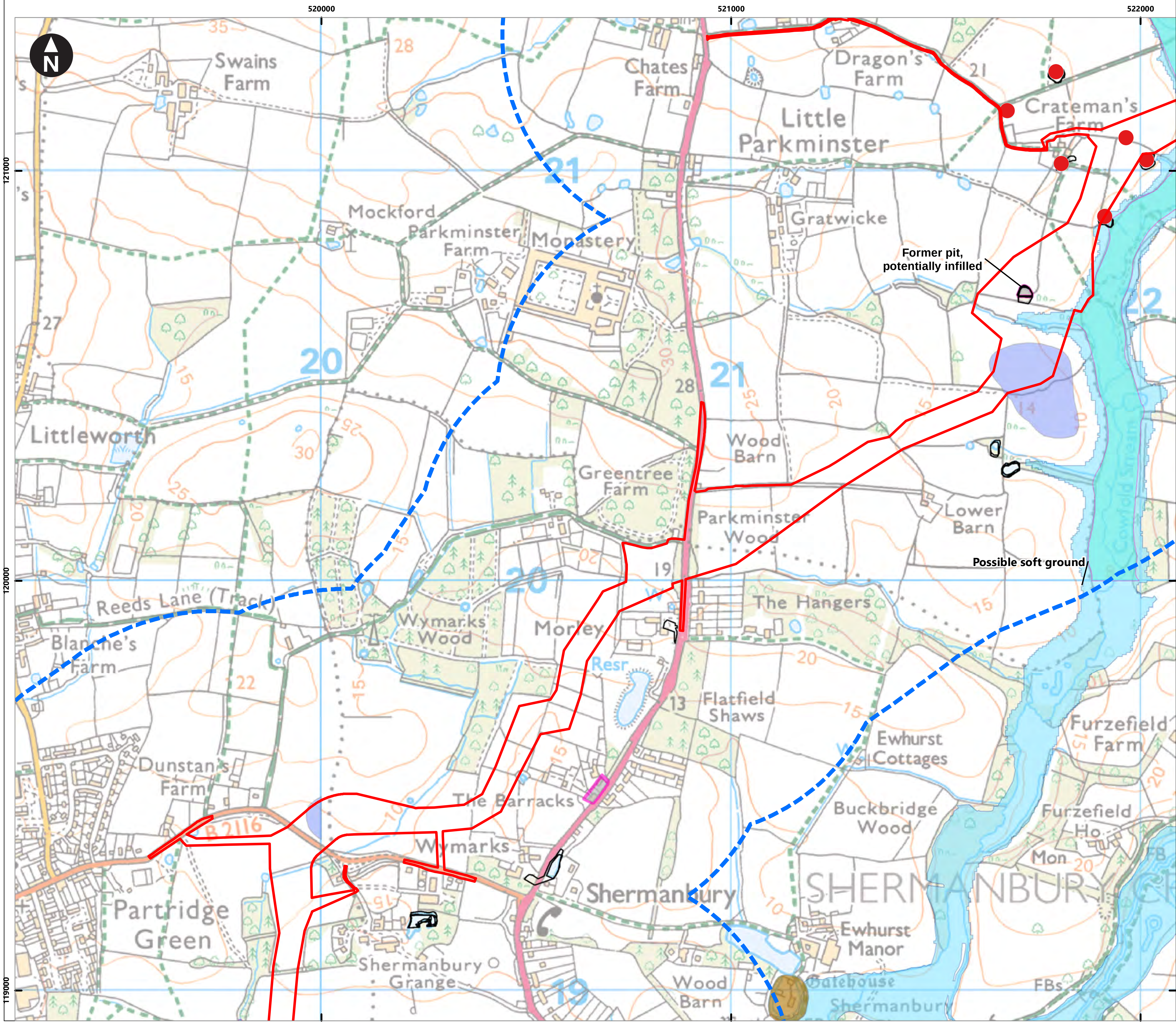
Figure 24.1.3s Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Brit Pits
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Flood zone 2

Superficial Geology (10k)

- Alluvium
- River Terrace Deposits (Adur)

*Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.05 0.1 0.2 0.3 0.4

1:9,000 *

British National Grid Transverse Mercator

Rampion Extension Development

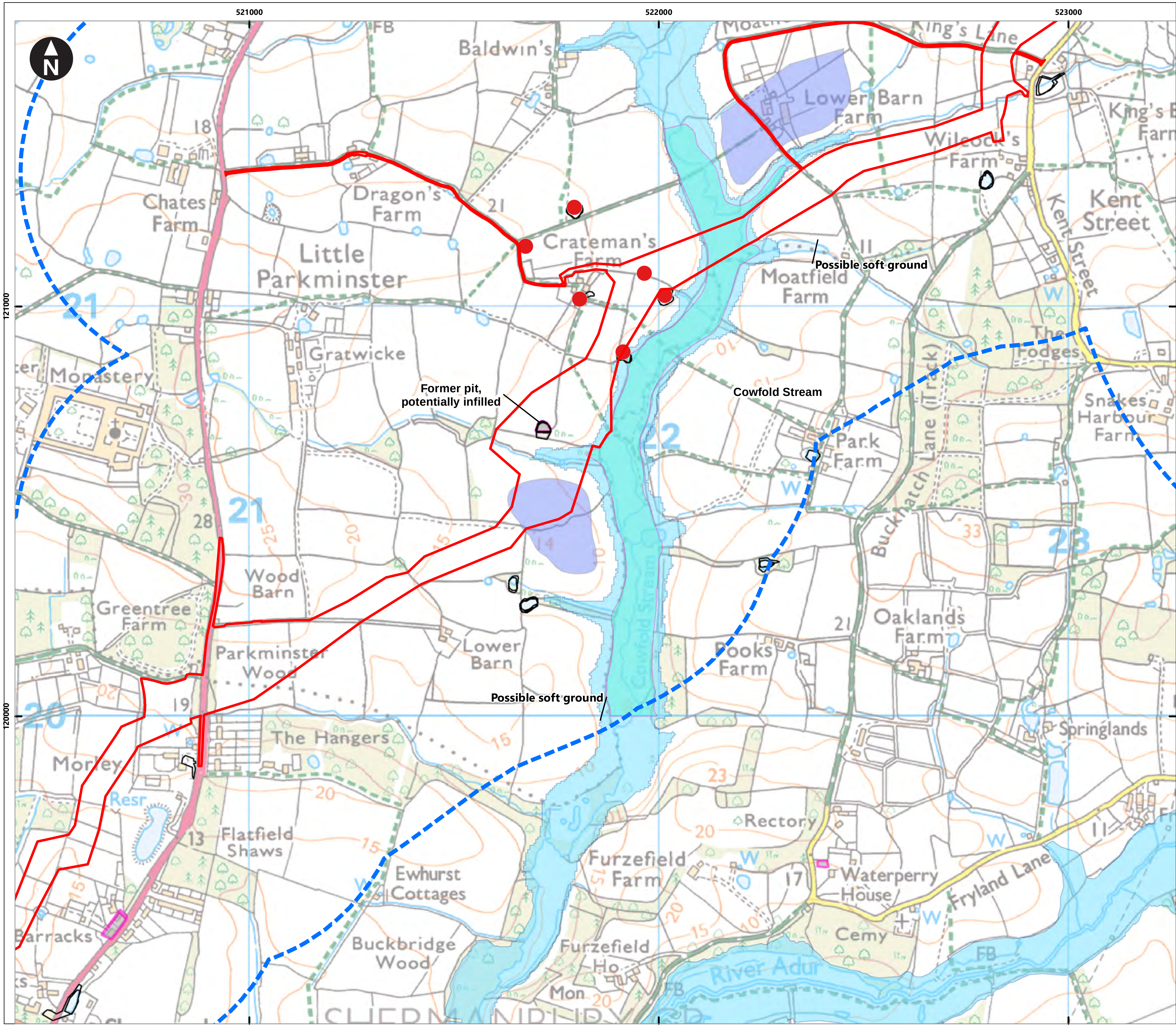
Rampion 2 Offshore Wind Farm

Figure 24.1.3t Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-4414				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 26/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Study Area
- Brit Pits
- Surface ground workings
- Historical industrial land uses
- Flood zone 2

Superficial Geology (10k)

- Alluvium
- River Terrace Deposits (Adur)

*Map scale is variable between pages, the scale references the main map view only

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

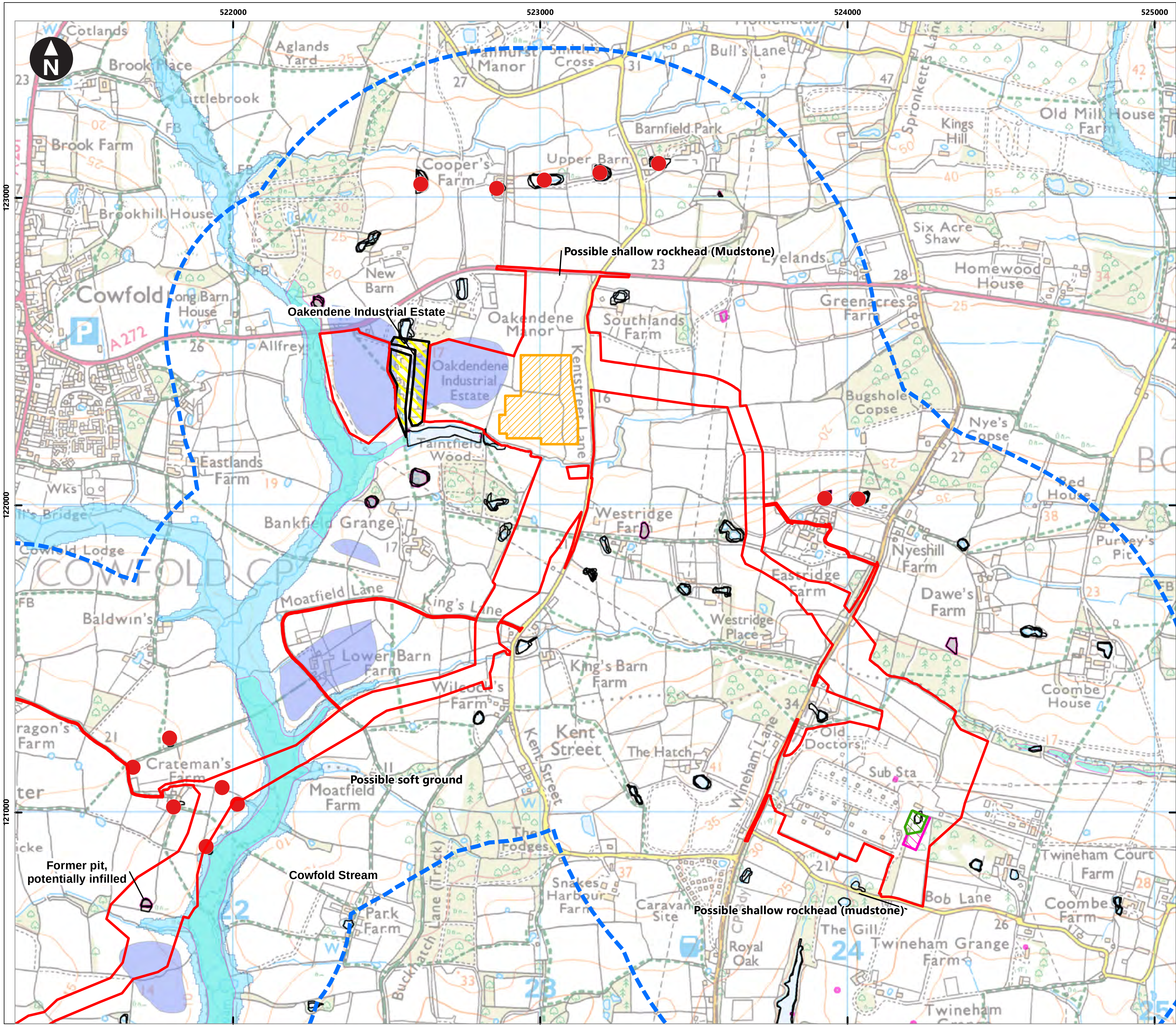
Figure 24.1.3u Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Onshore substation site
- Bolney Substation extension (GIS)
- Bolney Substation extension (AIS)
- Study Area
- Light industrial units with potential for land contamination
- Brit Pits
- Surface ground workings
- Historical industrial land uses
- Flood zone 2

Superficial Geology (10k)

- Alluvium
- River Terrace Deposits (Adur)

*Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.05 0.1 0.2 0.3 0.4

1:12,000*

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 24.1.3v Geo-environmental constraints plan

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-4414	1.0

Company:	Drawn By:	Chk/Apprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	26/07/2023	FINAL

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Annex B
Geo-Environmental Constraints Plan for Discounted Route Options

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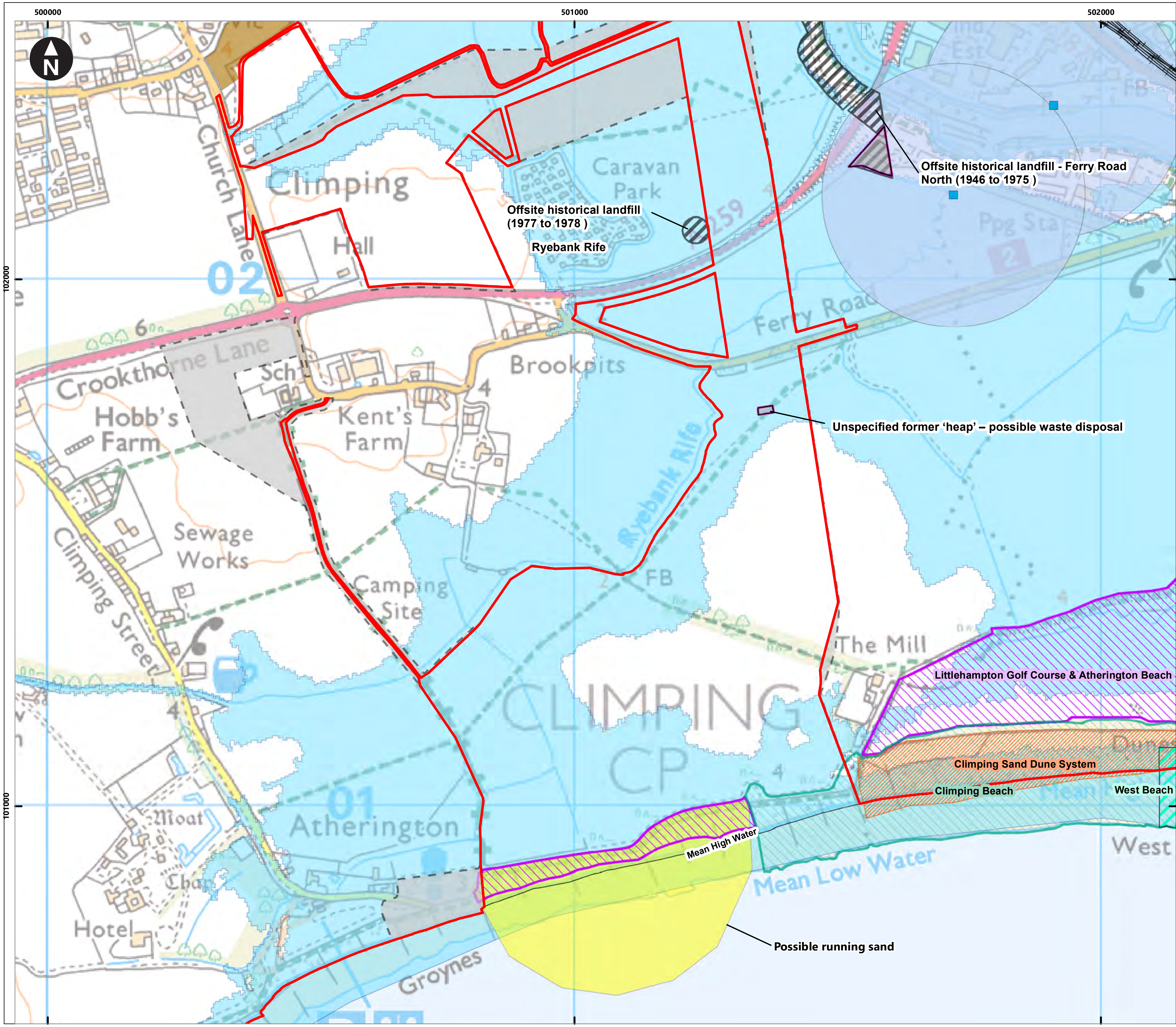


Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1

Environmental setting

- Local Nature Reserve
- Sites of Special Scientific Interest
- Local Geologcal Sites
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Historical Landfill
- Railways
- Licensed Abstractions (including 250m buffer)

Superficial Geology (10k)

- Beach And Tidal Flat Deposits (Undifferentiated)
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

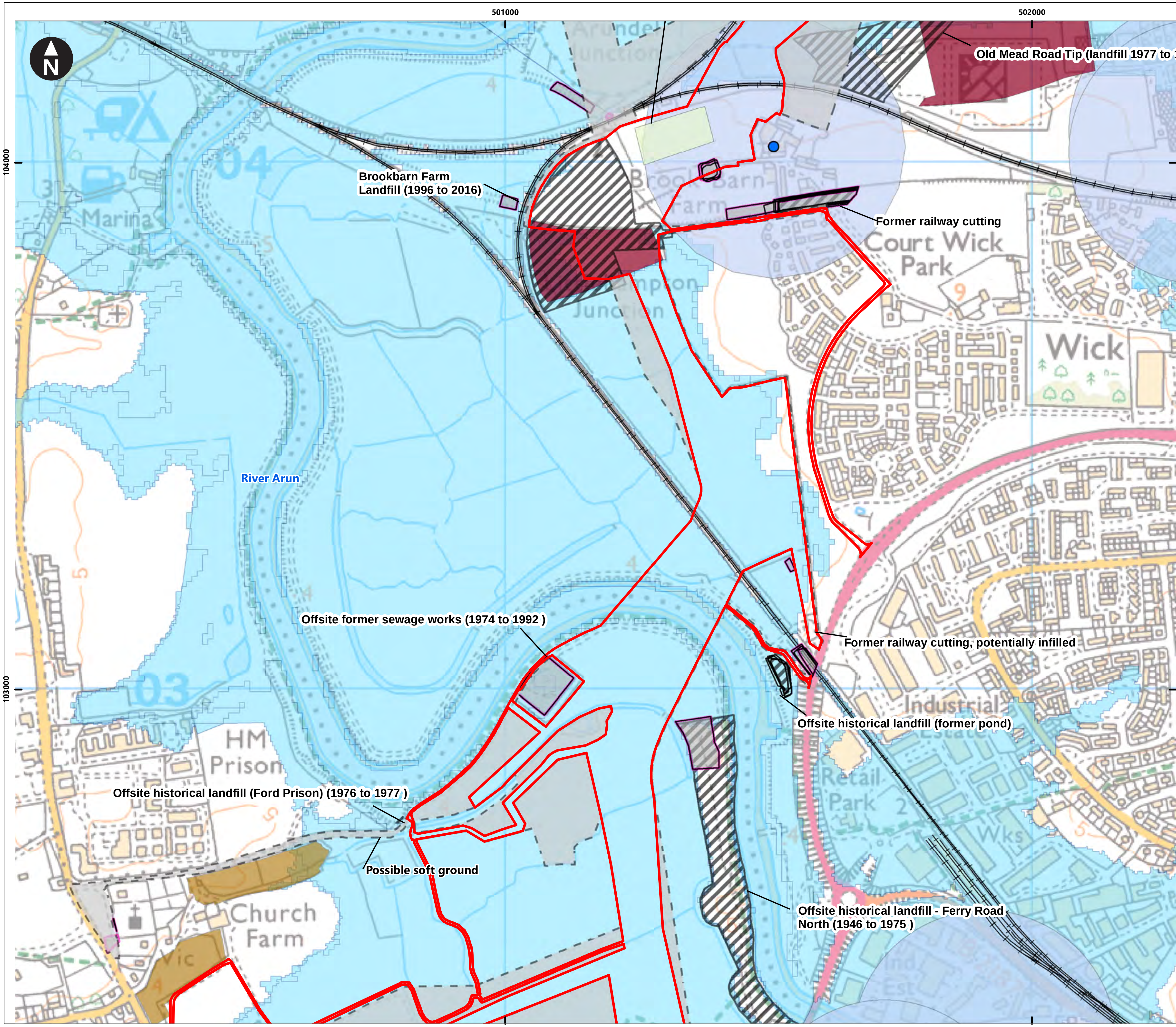
Figure 24.1.4a Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Historical Landfill
- Railways
- Made Ground (Undivided)
- Infilled Ground
- Private water supplies (including 250m buffer)
- Source protection zones
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

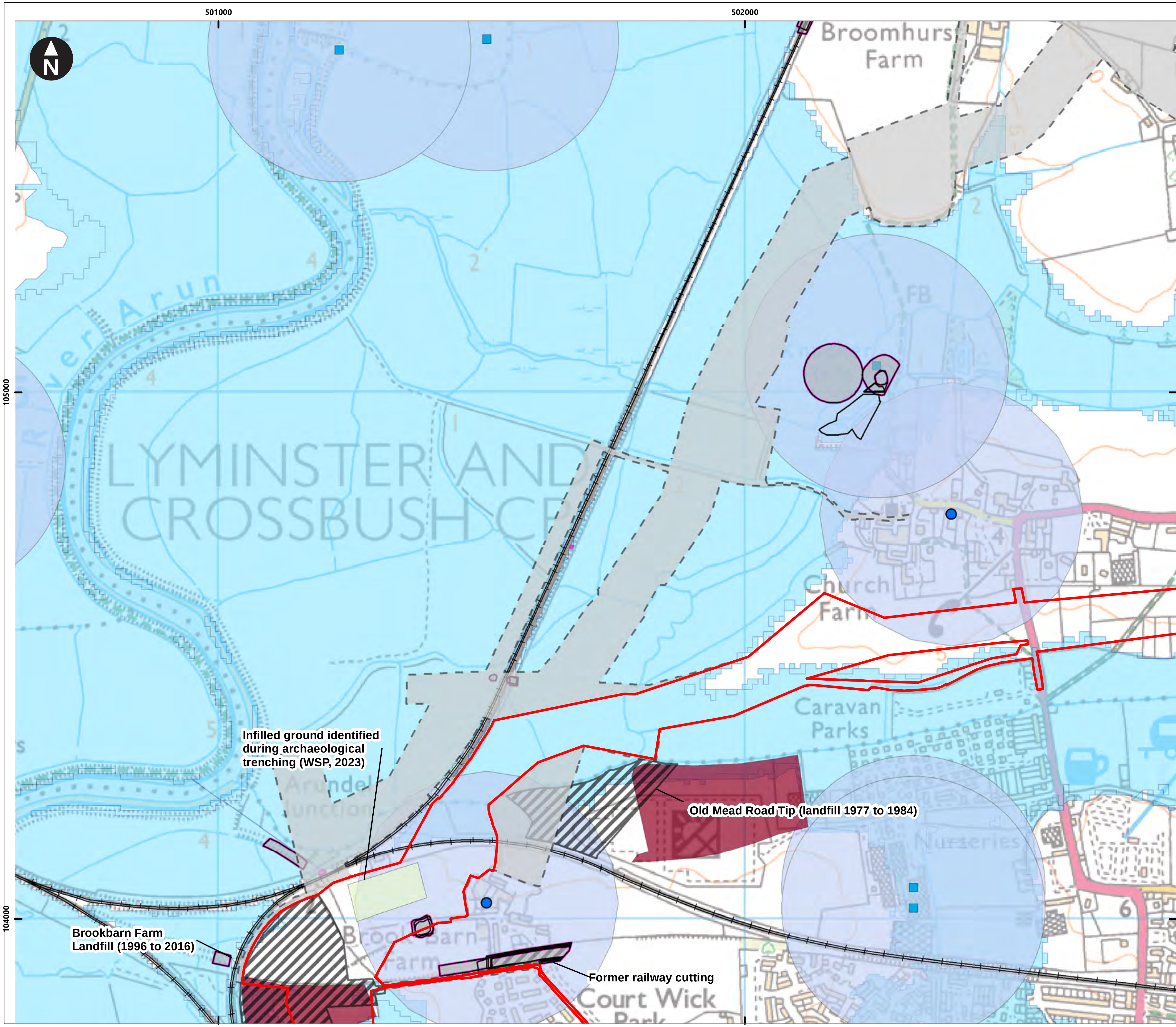
Figure 24.1.4b Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Surface ground workings
- Historical industrial land uses
- Historical Landfill
- Railways
- Made Ground (Undivided)
- Infilled Ground
- Private water supplies (including 250m buffer)
- Licensed Abstractions (including 250m buffer)
- Source protection zones
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Rampion Extension Development

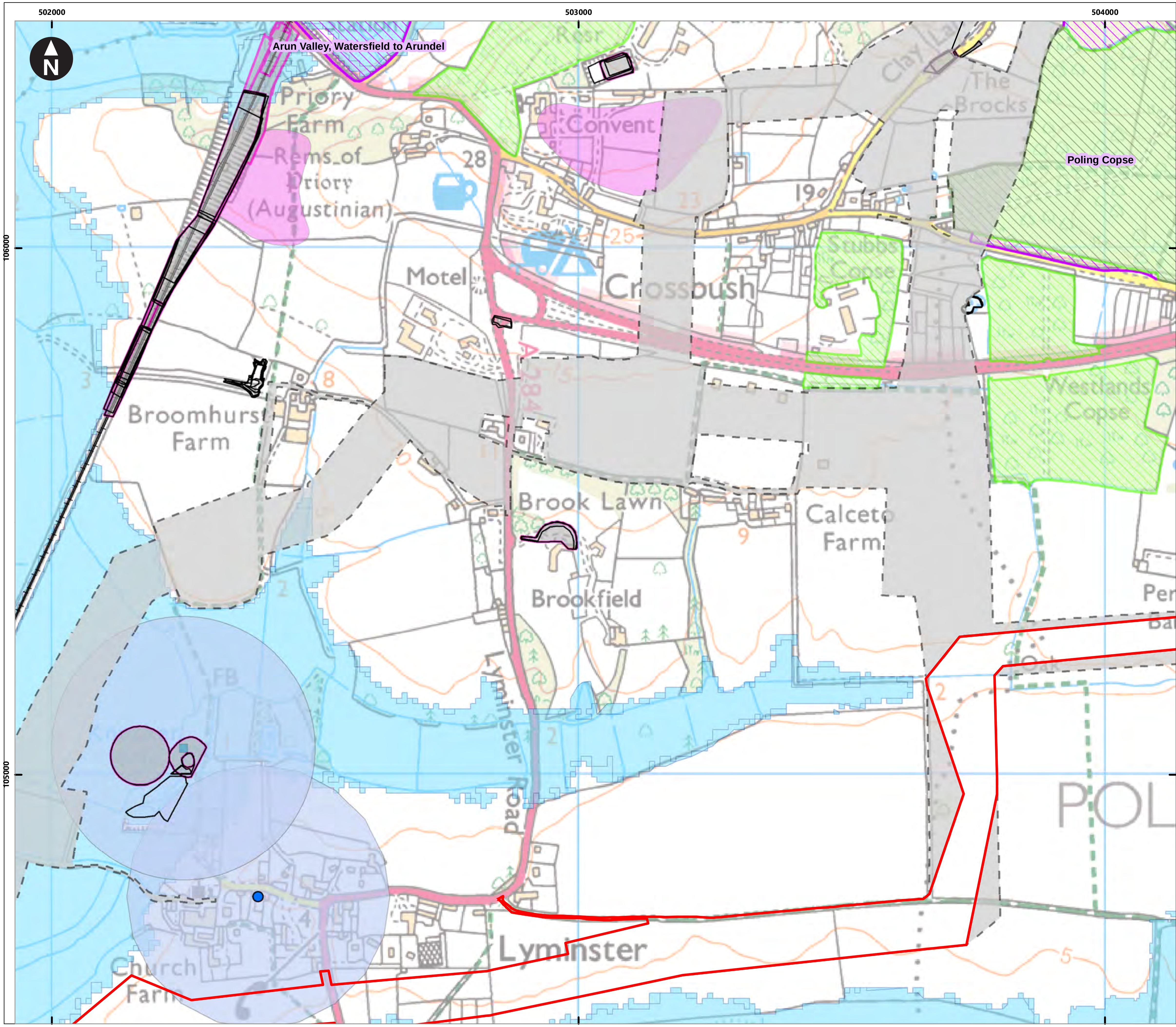
Rampion 2 Offshore Wind Farm

Figure 24.1.4c Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



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Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Railways
- Private water supplies (including 250m buffer)
- Licensed Abstractions (including 250m buffer)
- Source protection zones

Superficial Geology (10k)

- River Terrace Deposits
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

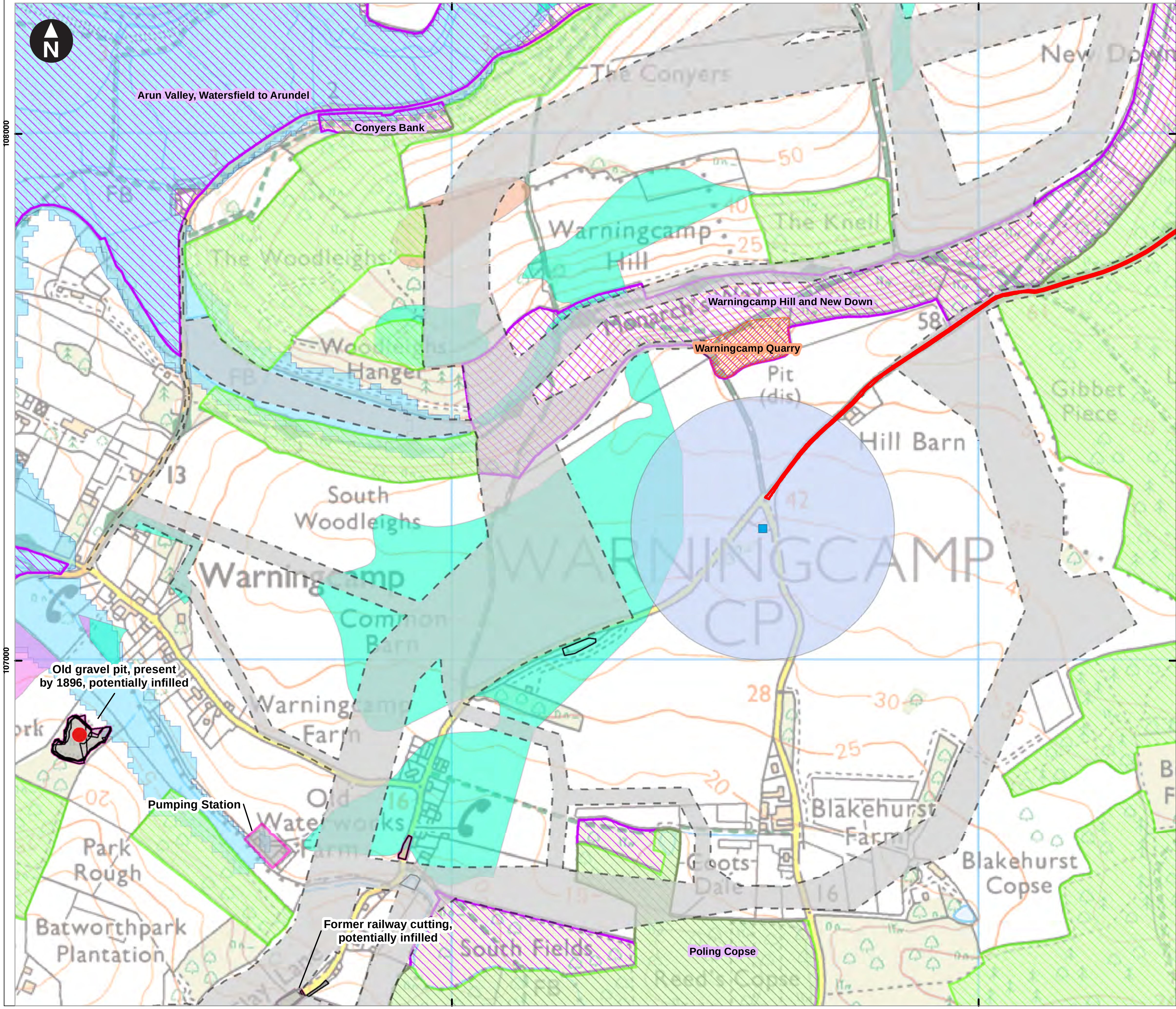
Figure 24.1.4d Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Brit Pits
- Ancient Woodland
- Local Geologcal Sites
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Licensed Abstractions (including 250m buffer)

Superficial Geology (10k)

- Clay-With-Flints Formation
- Head
- River Terrace Deposits
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

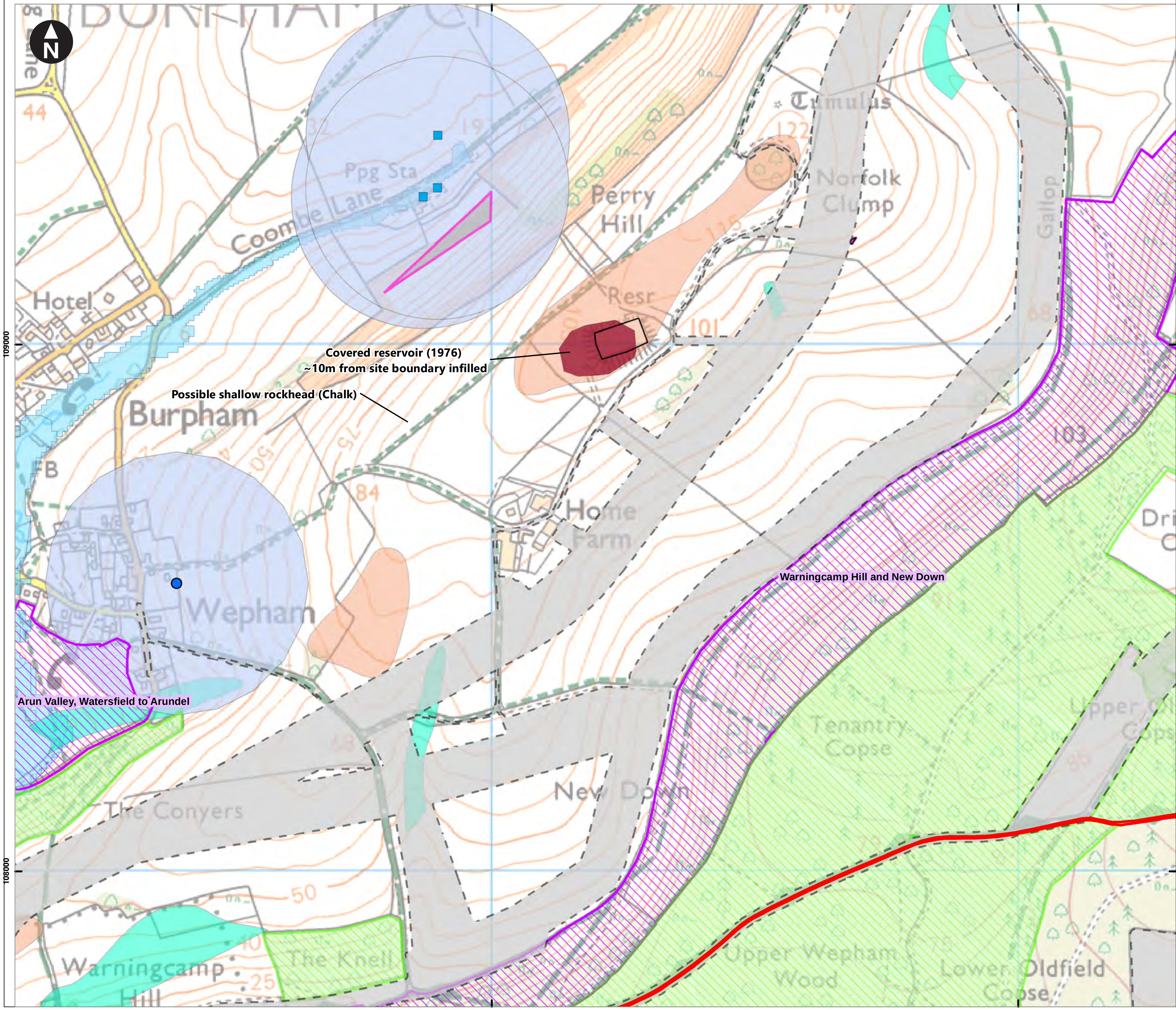
Figure 24.1.4e Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Made Ground (Undivided)
- Private water supplies (including 250m buffer)
- Licensed Abstractions (including 250m buffer)
- Source protection zones

Superficial Geology (10k)

- Clay-With-Flints Formation
- Head
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Wind Farm

Rampion 2 Offshore Wind Farm

Figure 24.1.4f Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL

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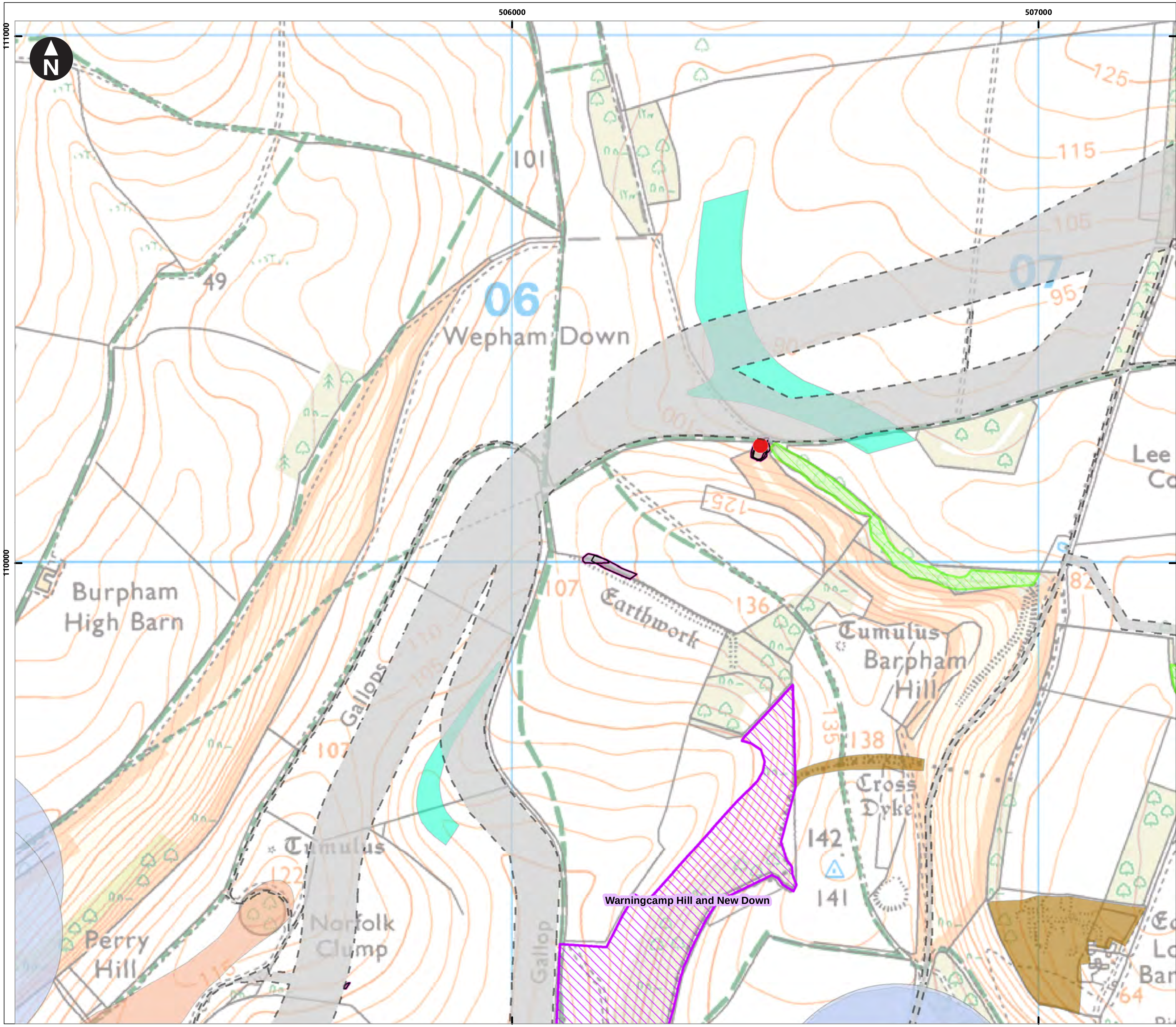


Key

- Discounted route areas not included in the DCO Order Limits*1
- Brit Pits
- Ancient Woodland
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Source protection zones

Superficial Geology (10k)

- Clay-With-Flints Formation
- Head

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres

0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

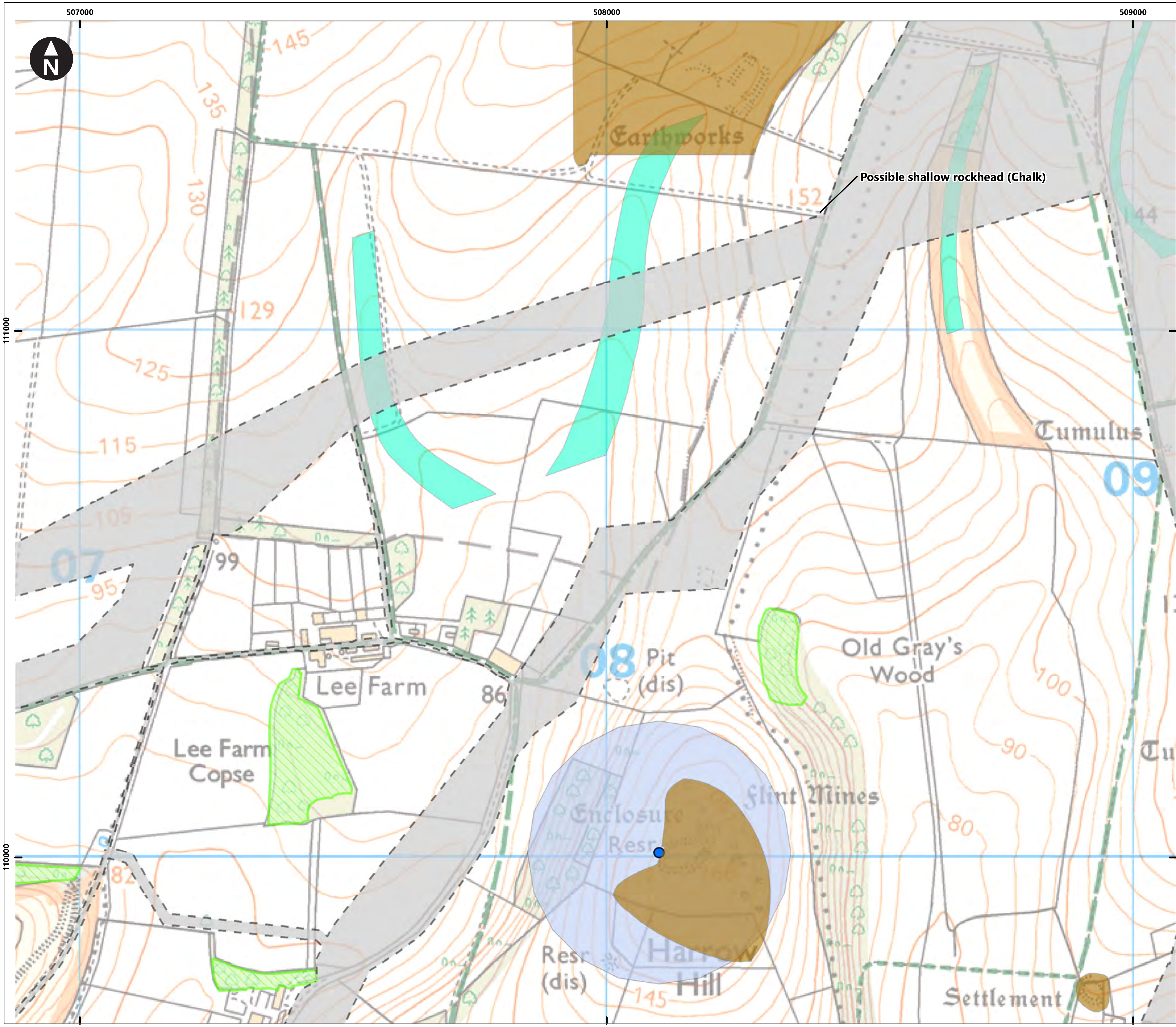
Rampion 2 Offshore Wind Farm

Figure 24.1.4g Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



Key

- Discounted route areas not included in the DCO Order Limits*[1]
- Ancient Woodland
- Scheduled Monuments
- Private water supplies (including 250m buffer)
- Source protection zones

Superficial Geology (10k)

- Head

*[1] Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*[2]Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.03750.075 0.15 0.225 0.3

1:7,000 *[2]

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

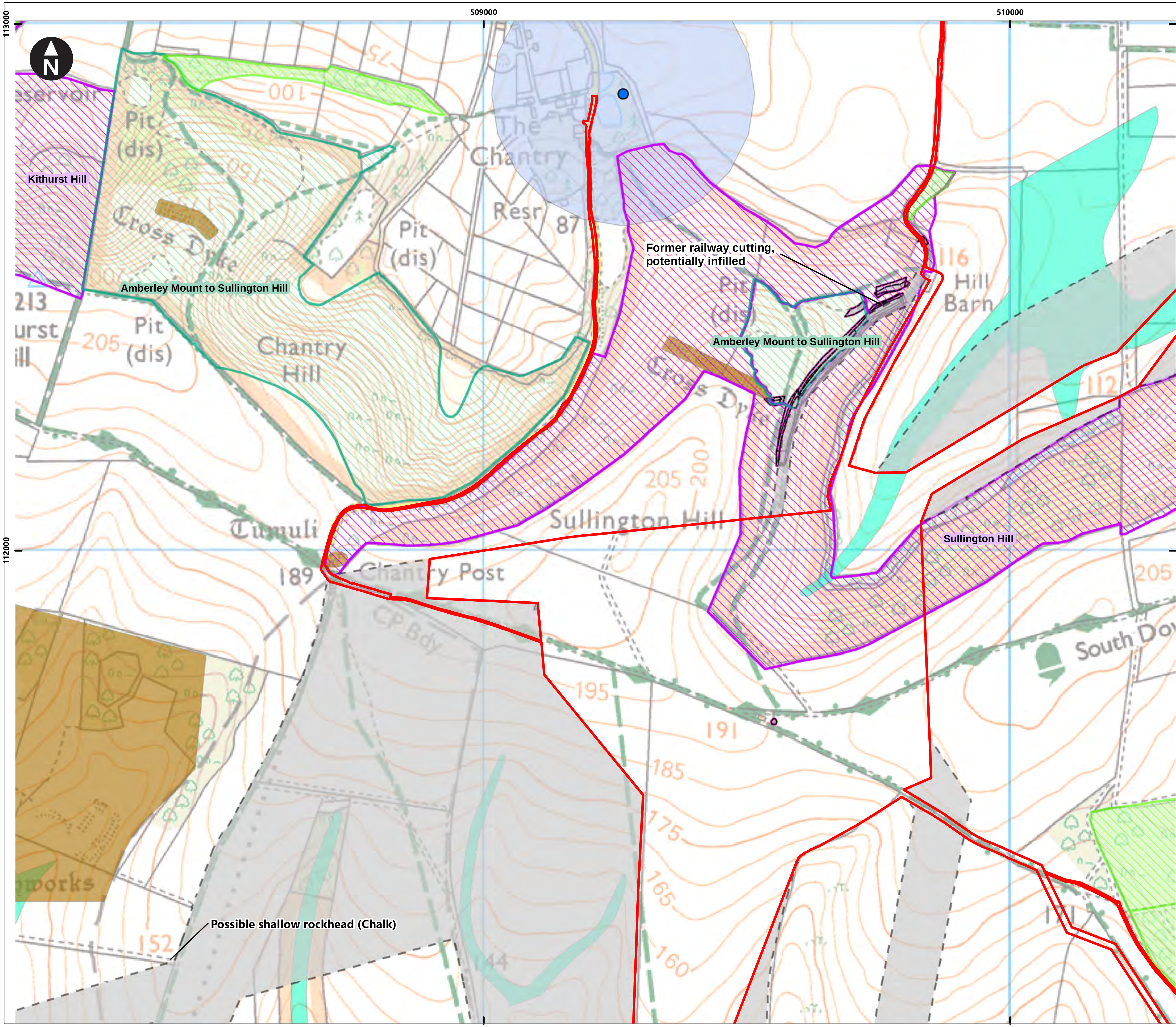
Figure 24.1.4h Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Sites of Special Scientific Interest
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses
- Private water supplies (including 250m buffer)
- Source protection zones

Superficial Geology (10k)

- Head

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

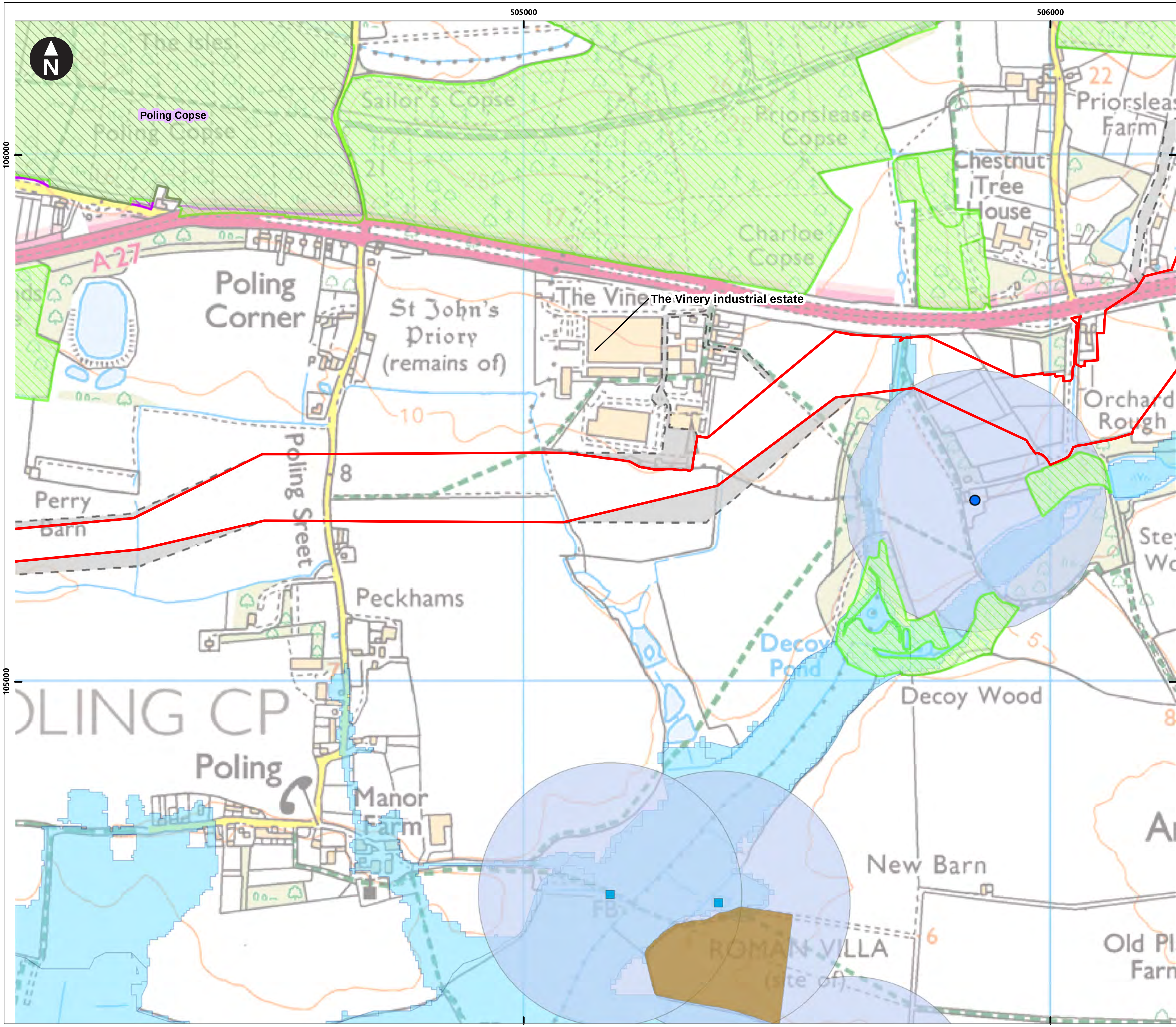
Figure 24.1.4i Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Local Wildlife Sites
- Scheduled Monuments
- Private water supplies (including 250m buffer)
- Licensed Abstractions (including 250m buffer)
- Source protection zones
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

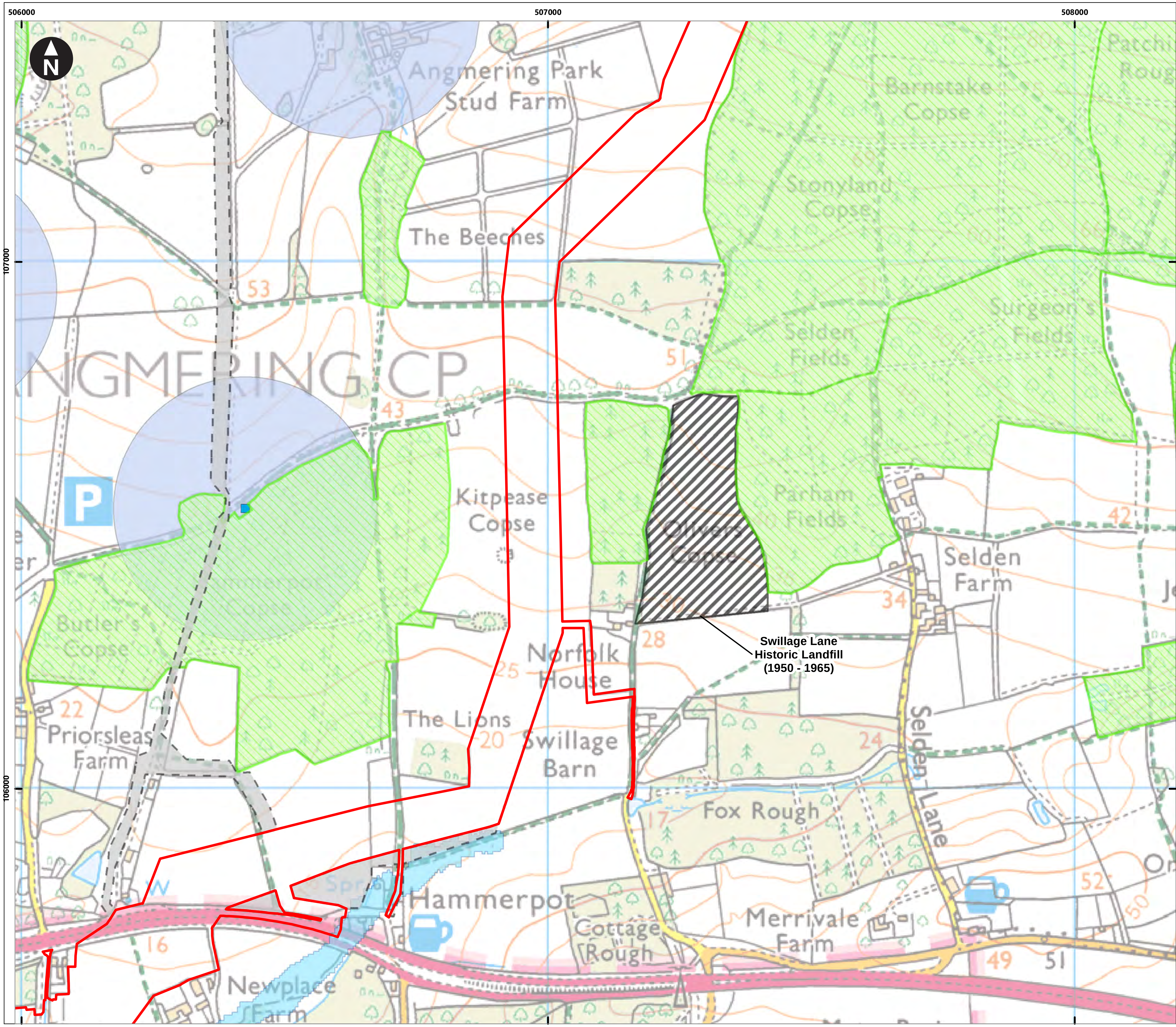
Rampion 2 Offshore Wind Farm

Figure 24.1.4j Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Historical Landfill
- Licensed Abstractions (including 250m buffer)
- Source protection zones
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres

0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

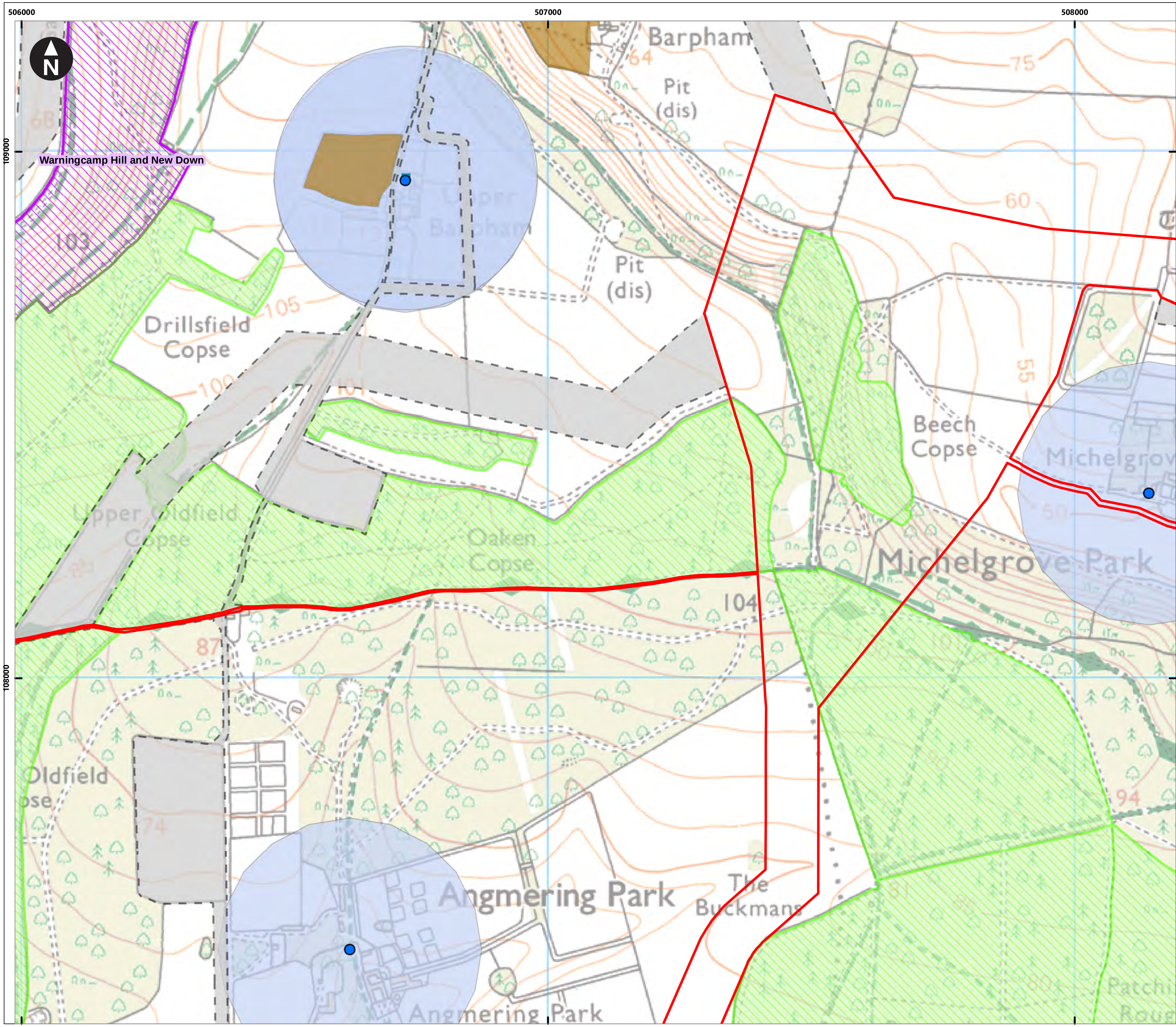
Figure 24.1.4k Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL

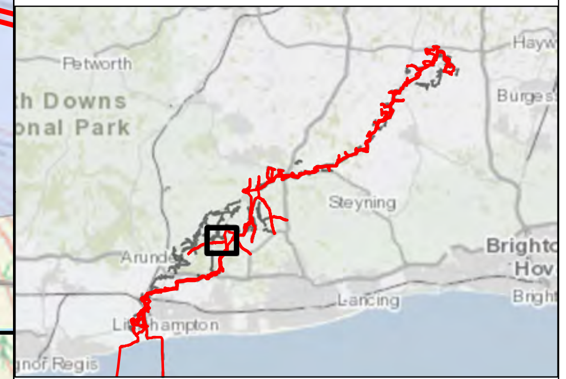


Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Local Wildlife Sites
- Scheduled Monuments
- Private water supplies (including 250m buffer)
- Licensed Abstractions (including 250m buffer)
- Source protection zones

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only



Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

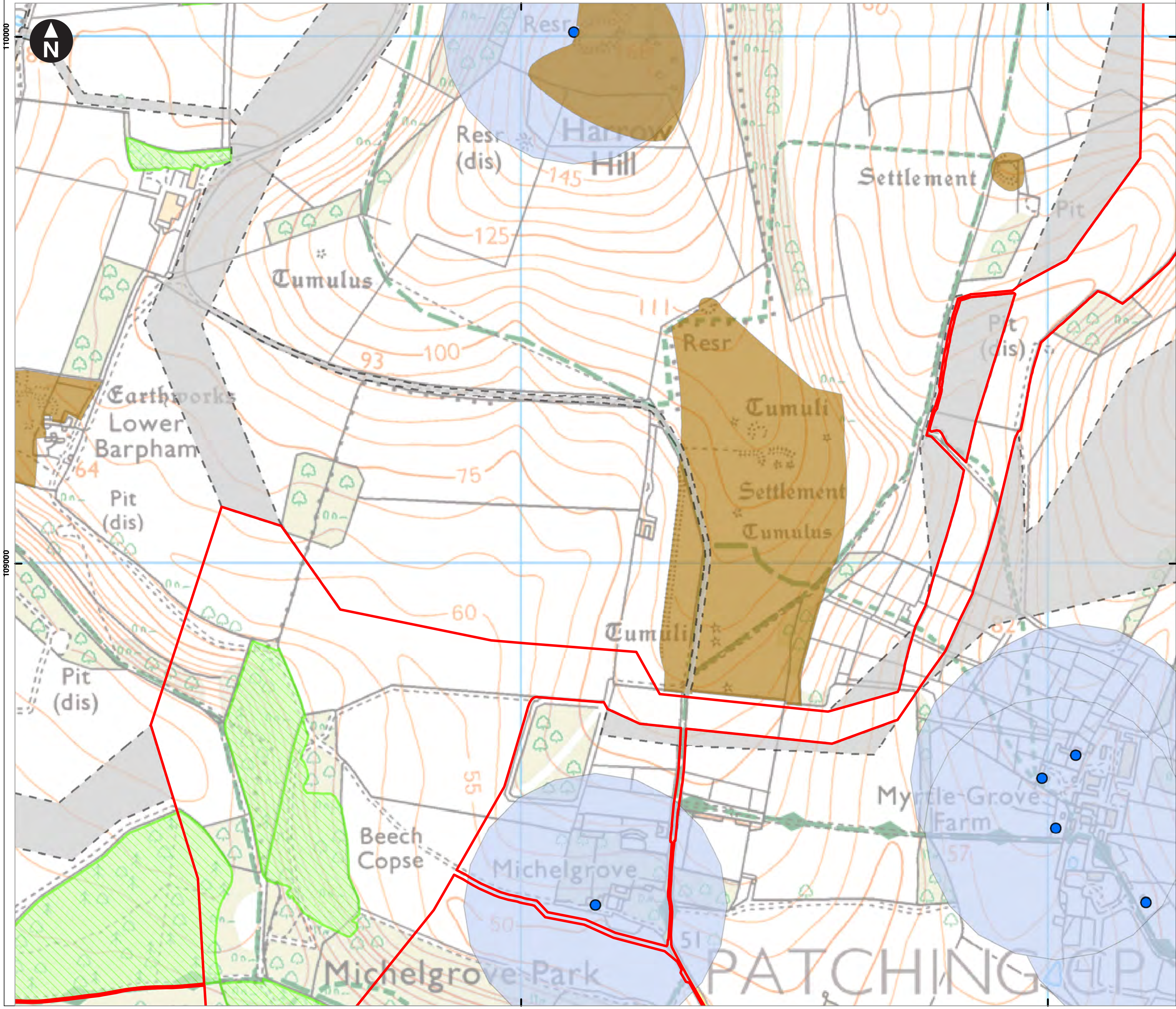
Figure 24.1.4l Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL

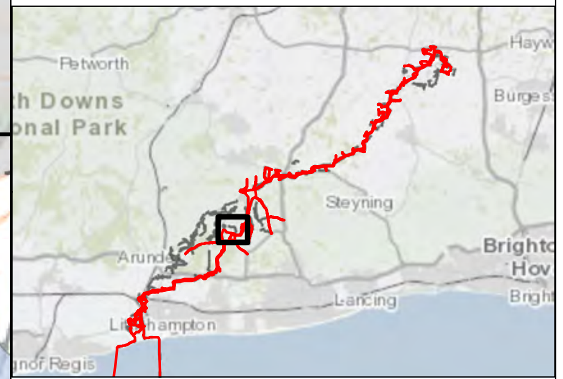


Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Scheduled Monuments
- Private water supplies (including 250m buffer)
- Source protection zones

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only



Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

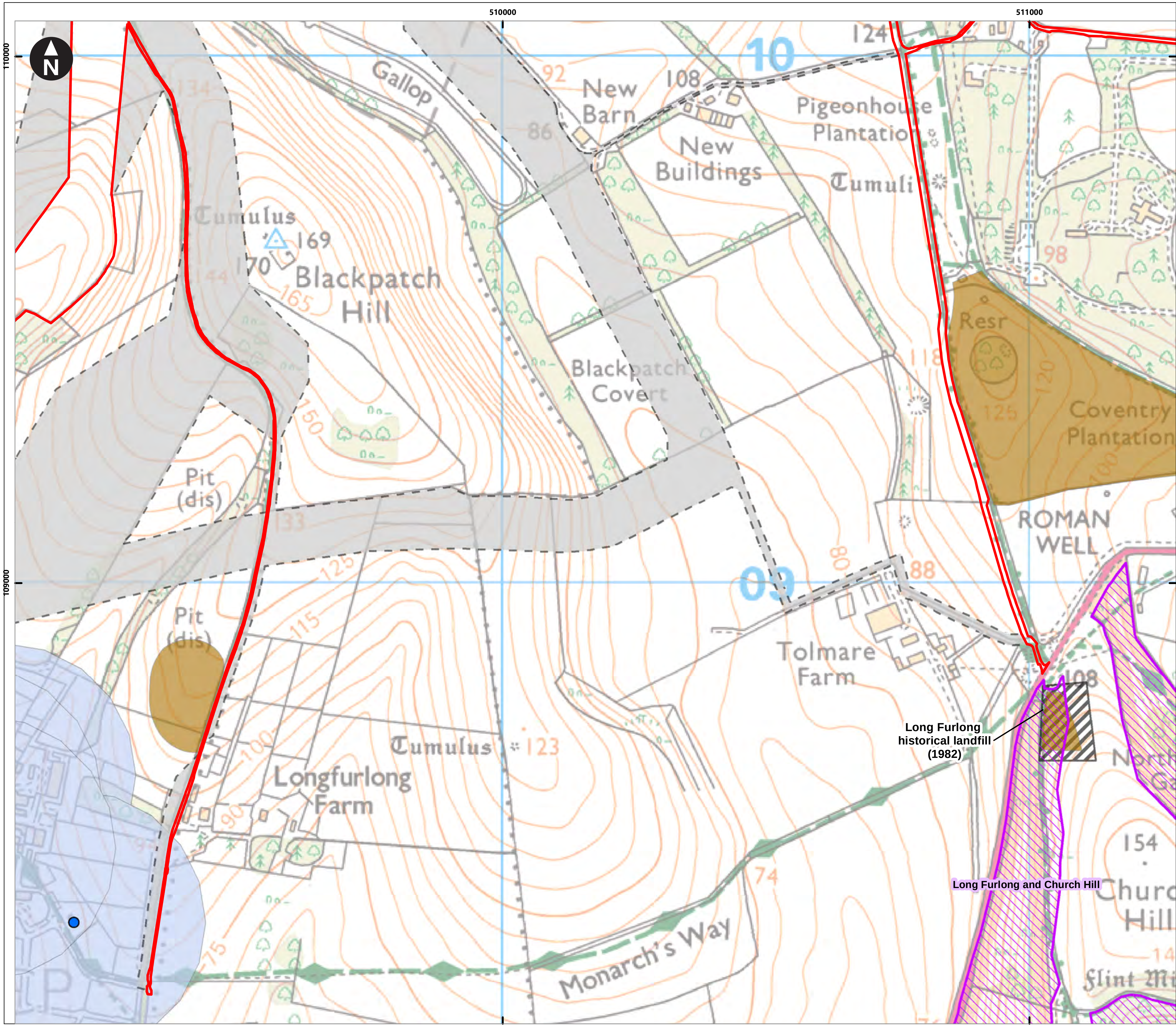
Rampion 2 Offshore Wind Farm

Figure 24.1.4m Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Local Wildlife Sites
- Scheduled Monuments
- Historical Landfill
- Private water supplies (including 250m buffer)
- Source protection zones

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

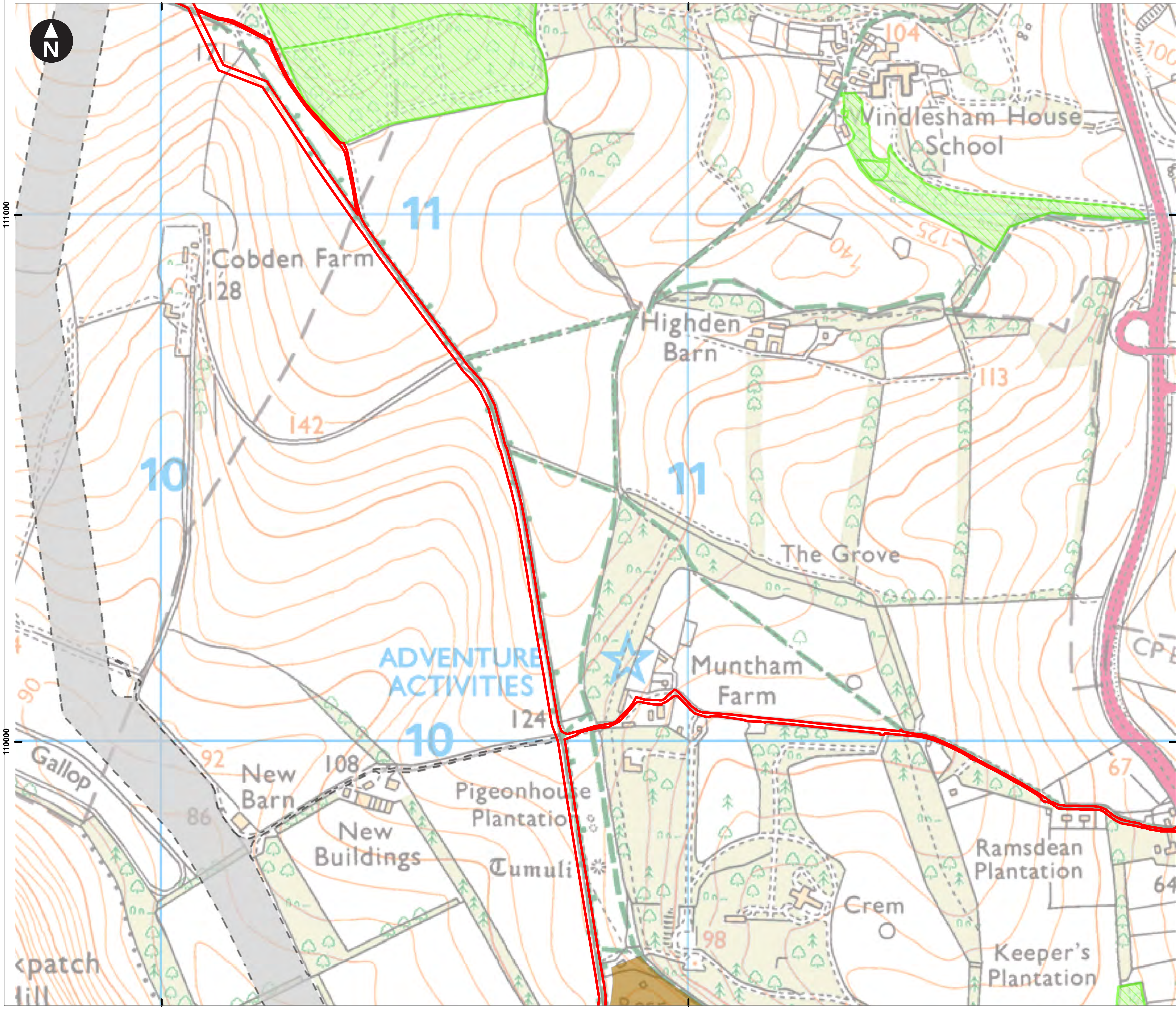
Figure 24.1.4n Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Scheduled Monuments

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

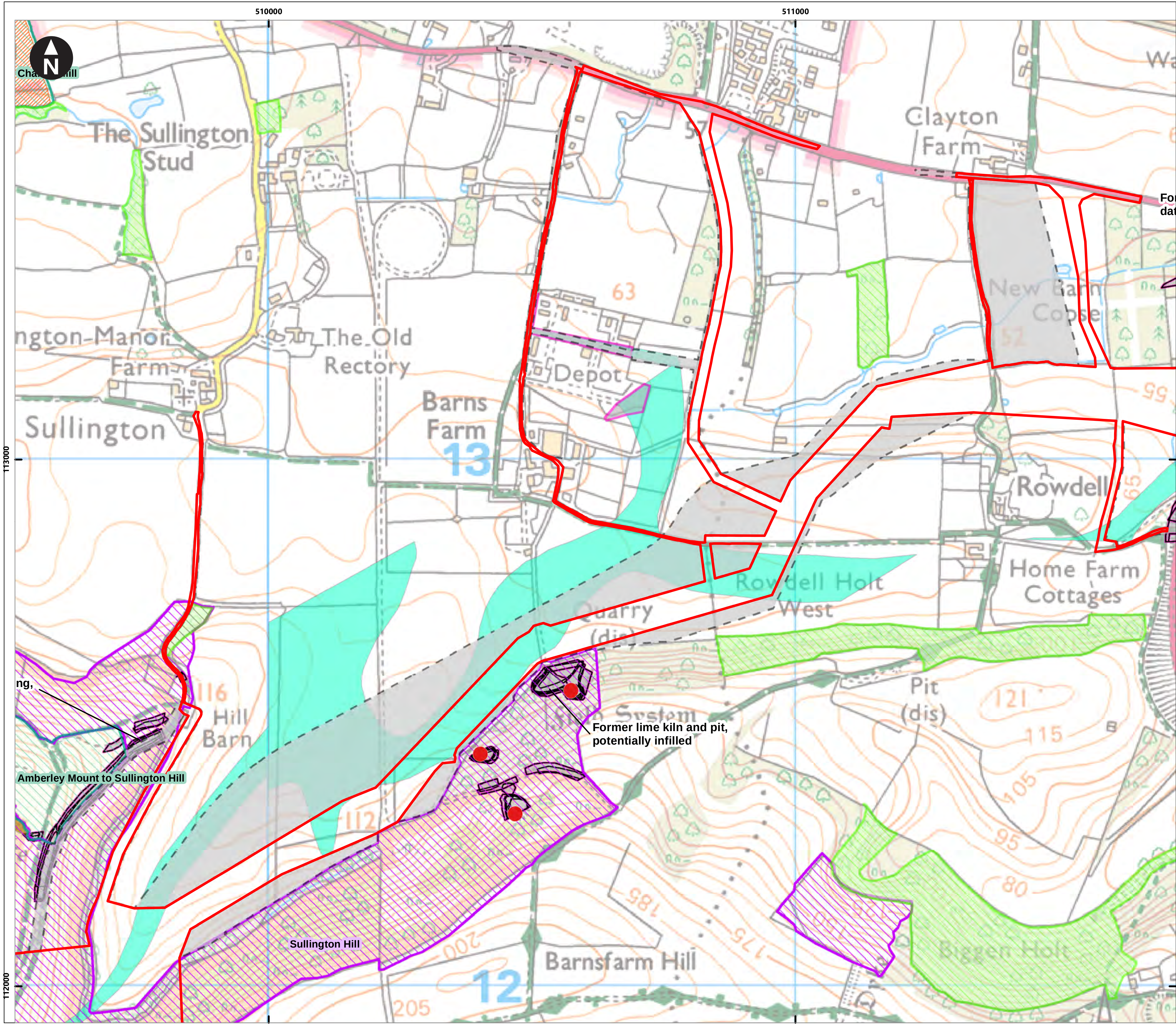
Rampion 2 Offshore Wind Farm

Figure 24.1.4o Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Brit Pits
- Ancient Woodland
- Sites of Special Scientific Interest
- Local Geologcal Sites
- Local Wildlife Sites
- Scheduled Monuments
- Surface ground workings
- Historical industrial land uses

Superficial Geology (10k)

- Head

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

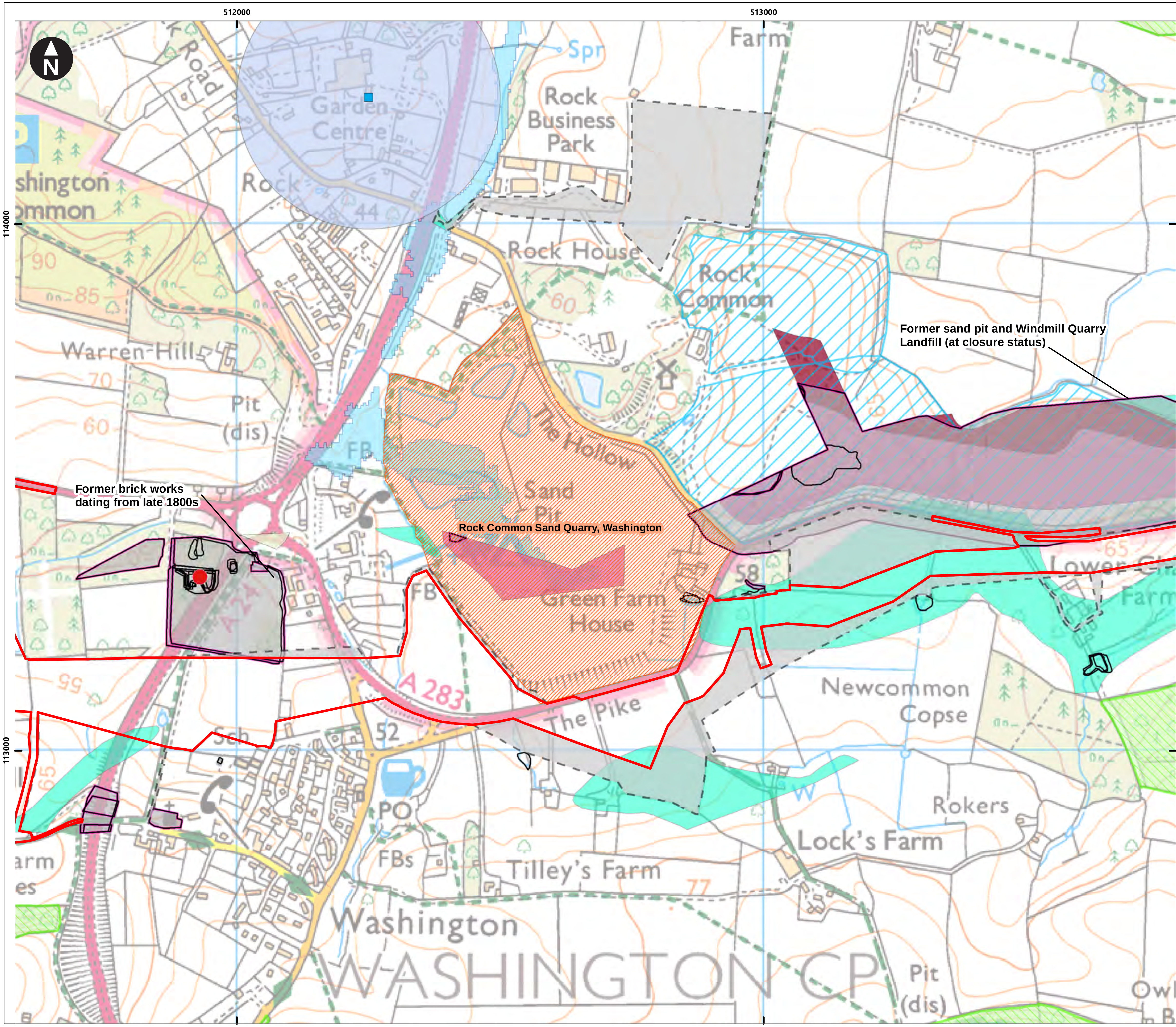
Rampion 2 Offshore Wind Farm

Figure 24.1.4p Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Brit Pits
- Ancient Woodland
- Sites of Special Scientific Interest
- Local Geologcal Sites
- Surface ground workings
- Historical industrial land uses
- Active or recent landfills
- Made Ground (Undivided)
- Worked Ground (Undivided)
- Infilled Ground
- Licensed Abstractions (including 250m buffer)

Superficial Geology (10k)

- Head
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

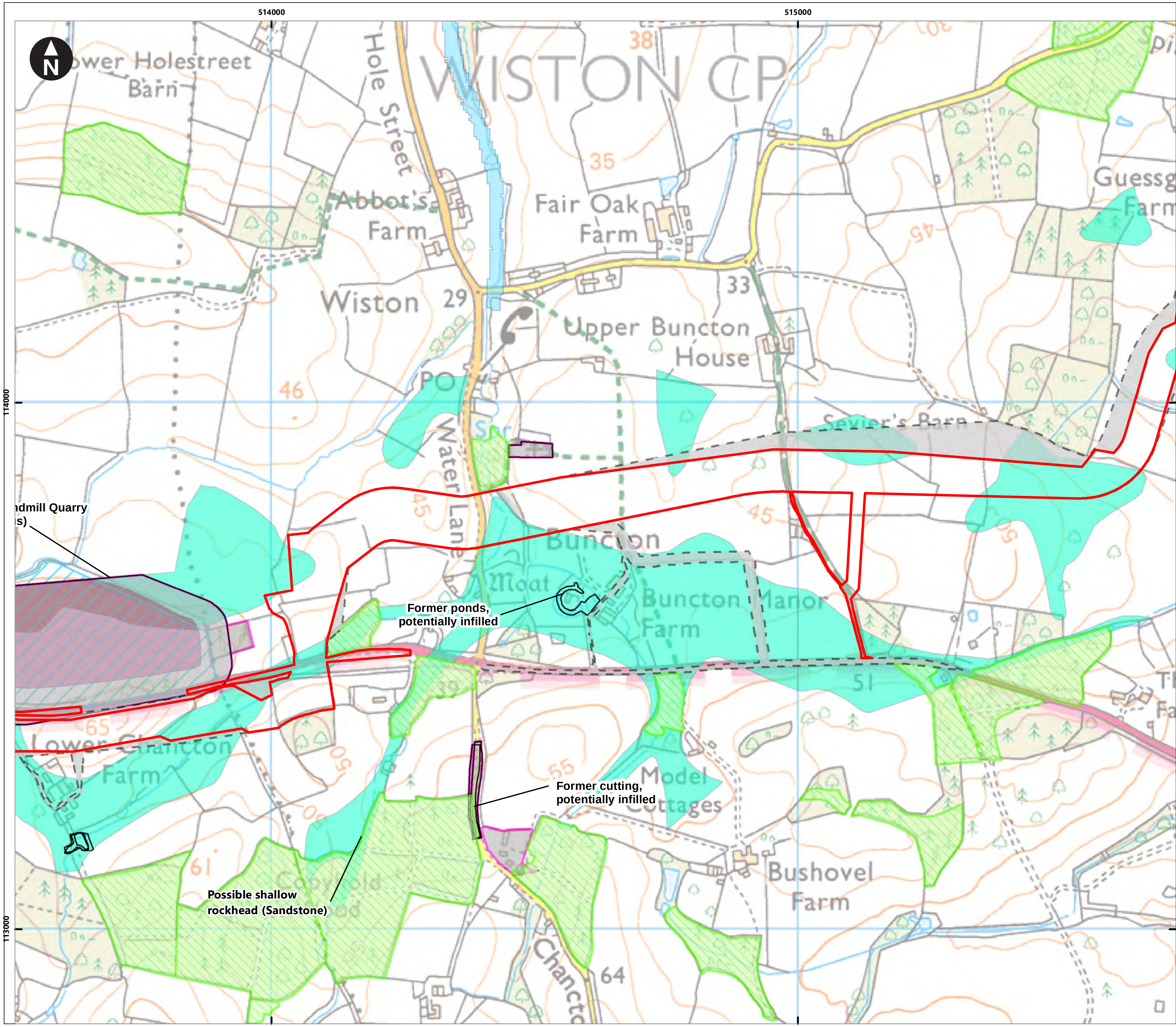
Figure 24.1.4q Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



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Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses
- Active or recent landfills
- Made Ground (Undivided)
- Worked Ground (Undivided)

Superficial Geology (10k)

- Head
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

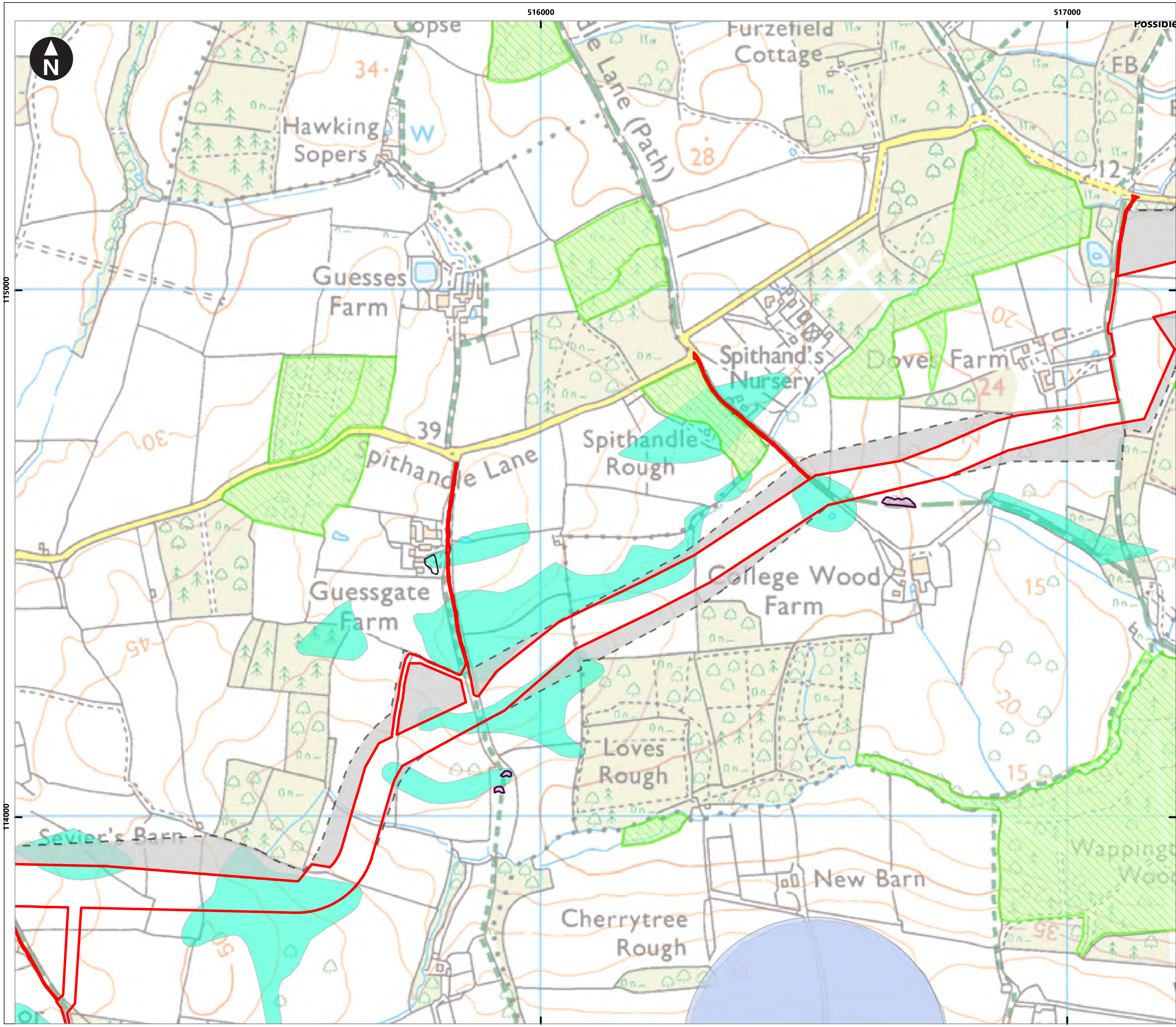
Rampion 2 Offshore Wind Farm

Figure 24.1.4r Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



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Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses
- Source protection zones

Superficial Geology (10k)

- Head

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

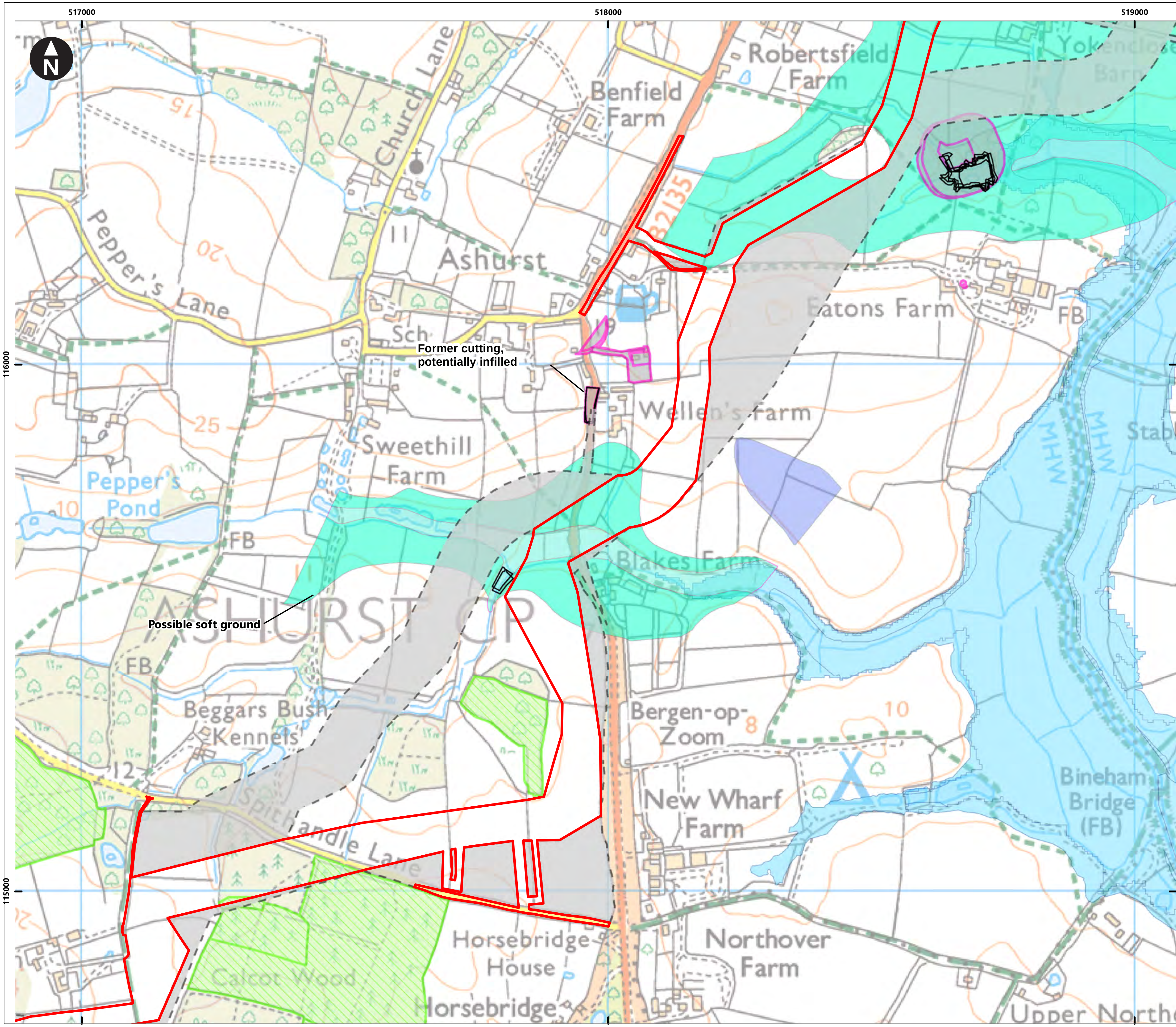
Rampion 2 Offshore Wind Farm

Figure 24.1.4s Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses

Superficial Geology (10k)

- Alluvium
- Head
- River Terrace Deposits (Adur)
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

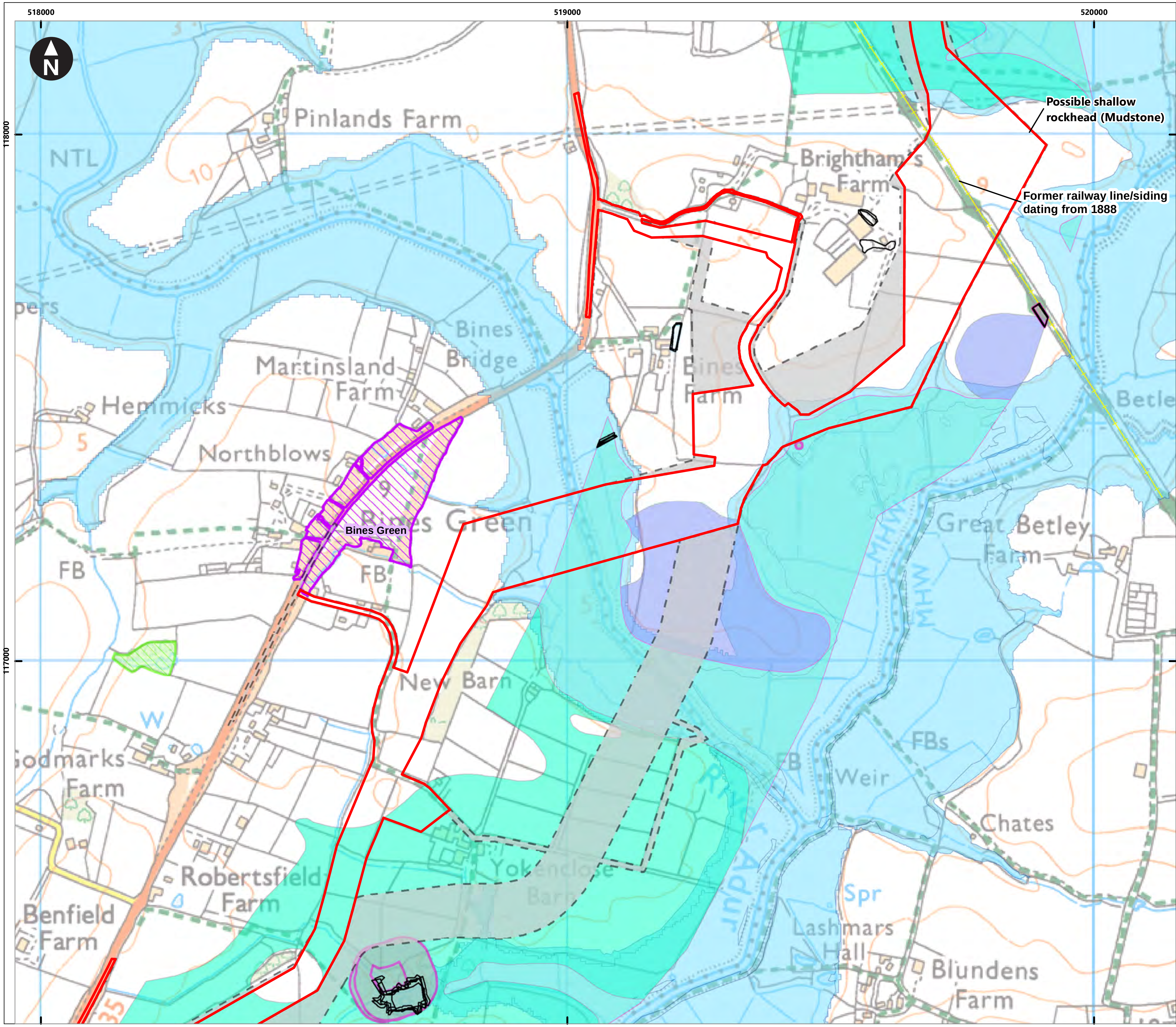
Figure 24.1.4t Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Local Wildlife Sites
- Surface ground workings
- Historical industrial land uses
- Historical railways

Superficial Geology (10k)

- Alluvium
- Head
- River Terrace Deposits (Adur)
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2Map scale is variable between pages, the scale references the main map view only

Kilometres

0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 24.1.4u Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL

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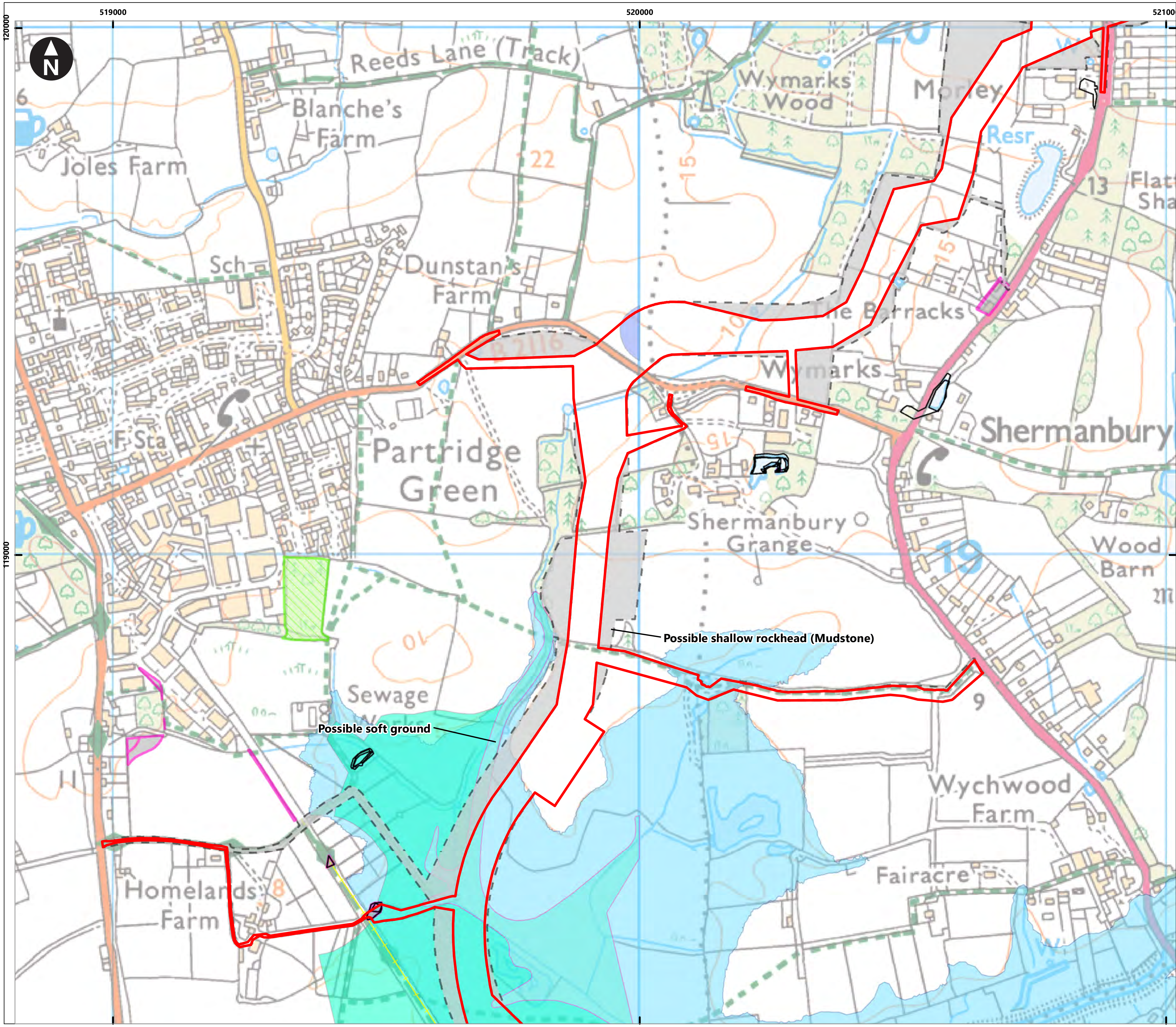
ISO A3 Landscape



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses
- Historical railways

Superficial Geology (10k)

- Alluvium
- Head
- River Terrace Deposits (Adur)
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

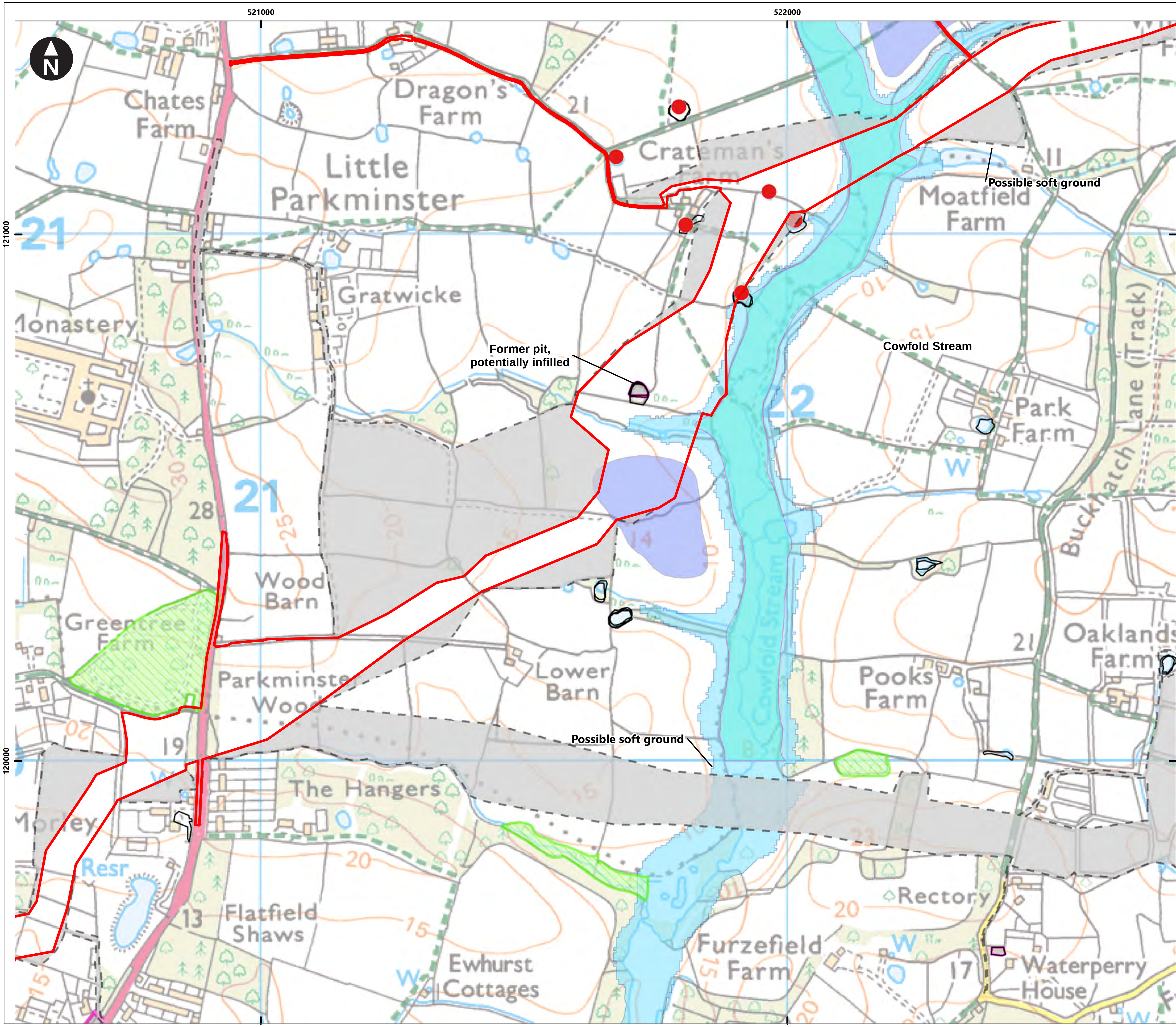
Rampion 2 Offshore Wind Farm

Figure 24.1.4v Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:				Version:
42285-WSPE-ES-ON-FG-OG-2367_v3				1.0
Company: WSP	Drawn By: SUTET	Chk/Aprvd: RAINB	Drawn Date: 27/07/2023	Status: FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Brit Pits
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses

Superficial Geology (10k)

- Alluvium
- River Terrace Deposits (Adur)
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Wind Farm

Rampion 2 Offshore Wind Farm

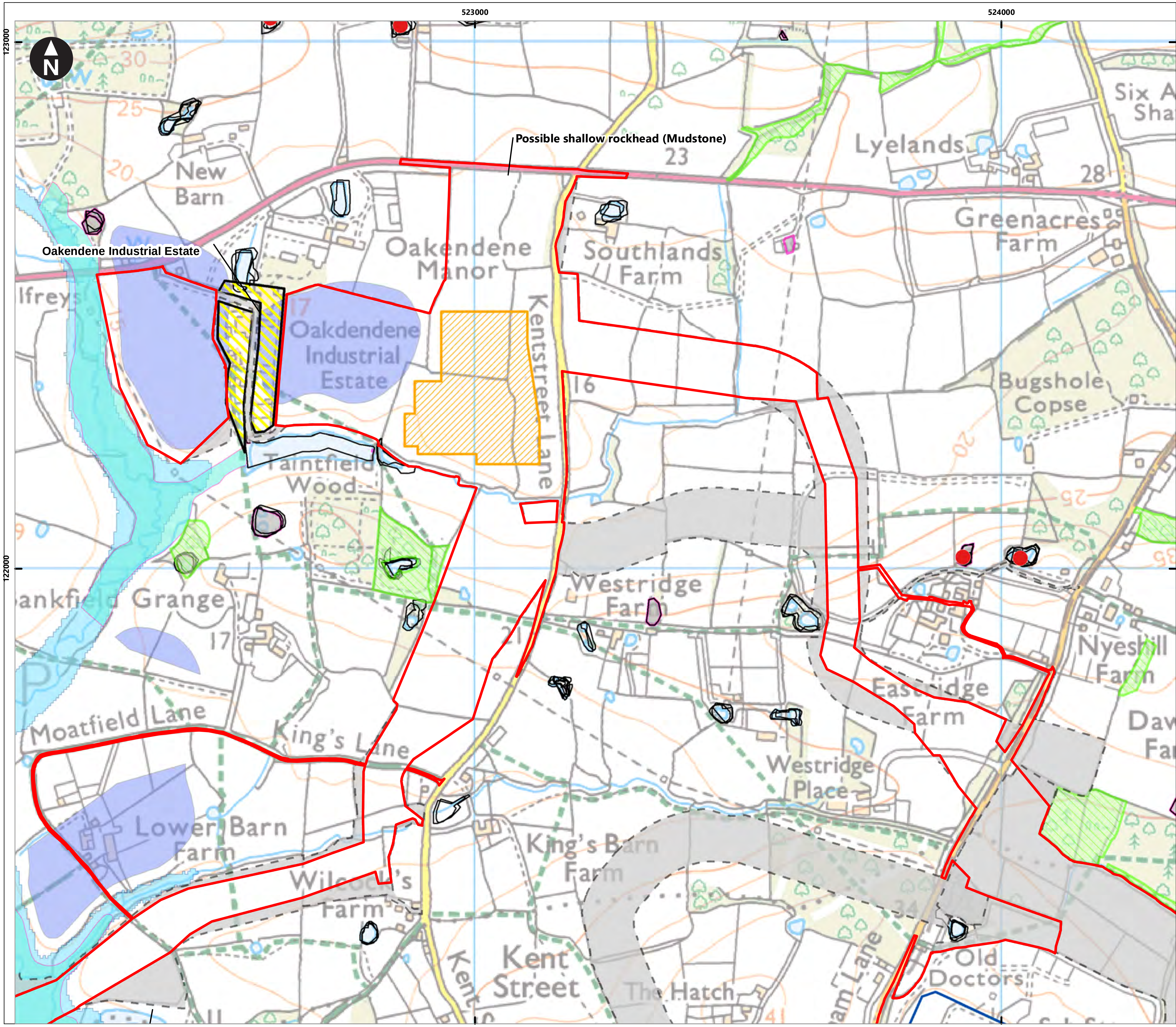
Figure 24.1.4w Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Existing National Grid Substation
- Onshore substation site
- Light industrial units with potential for land contamination
- Brit Pits
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses

Superficial Geology (10k)

- Alluvium
- River Terrace Deposits (Adur)
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

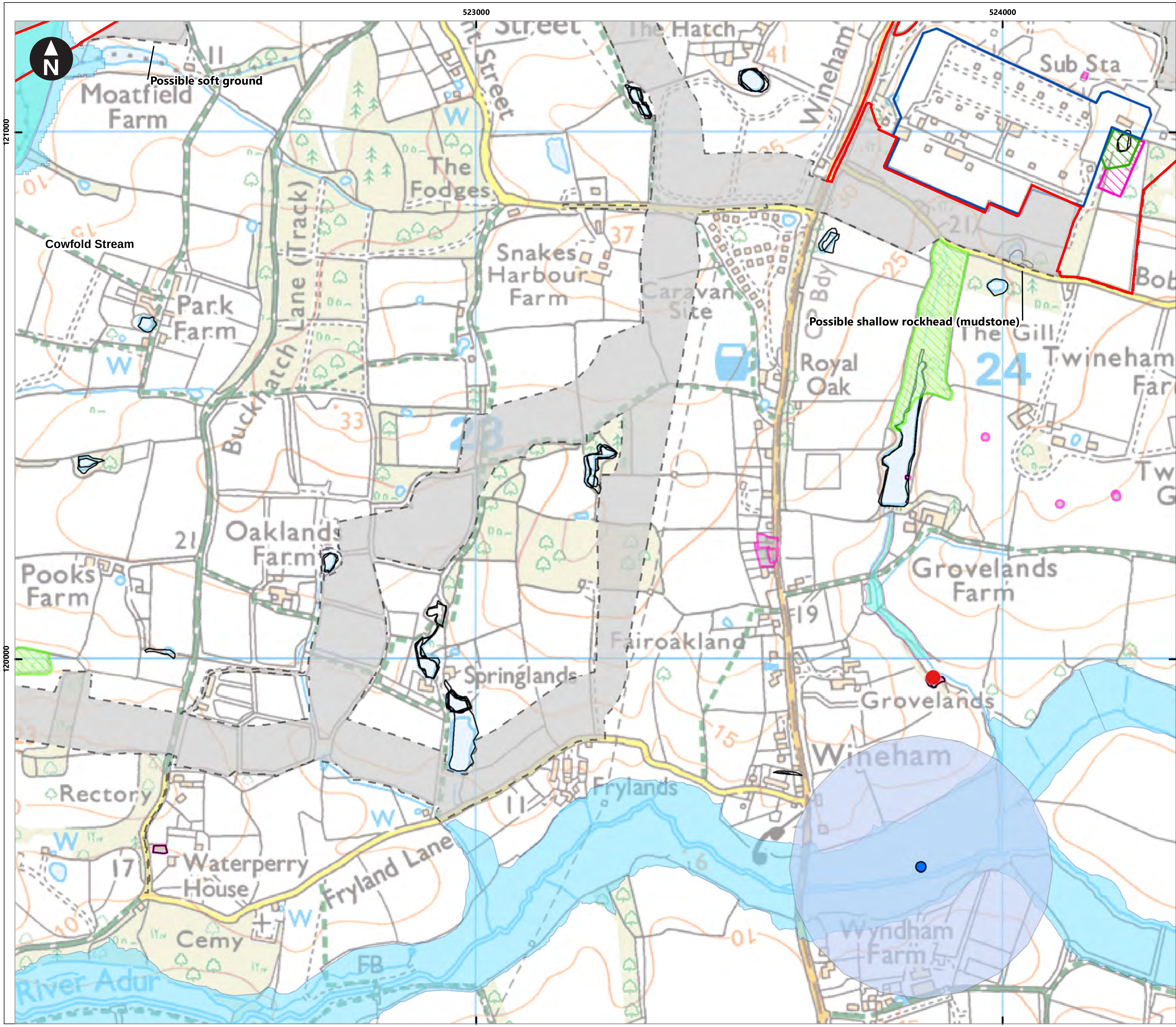
Figure 24.1.4x Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Existing National Grid Substation
- Bolney Substation extension (GIS)
- Bolney Substation extension (AIS)
- Brit Pits
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses
- Private water supplies (including 250m buffer)
- Source protection zones

Superficial Geology (10k)

- Alluvium
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres

0 0.0375 0.075 0.15 0.225 0.3

1:7,000 *2

British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

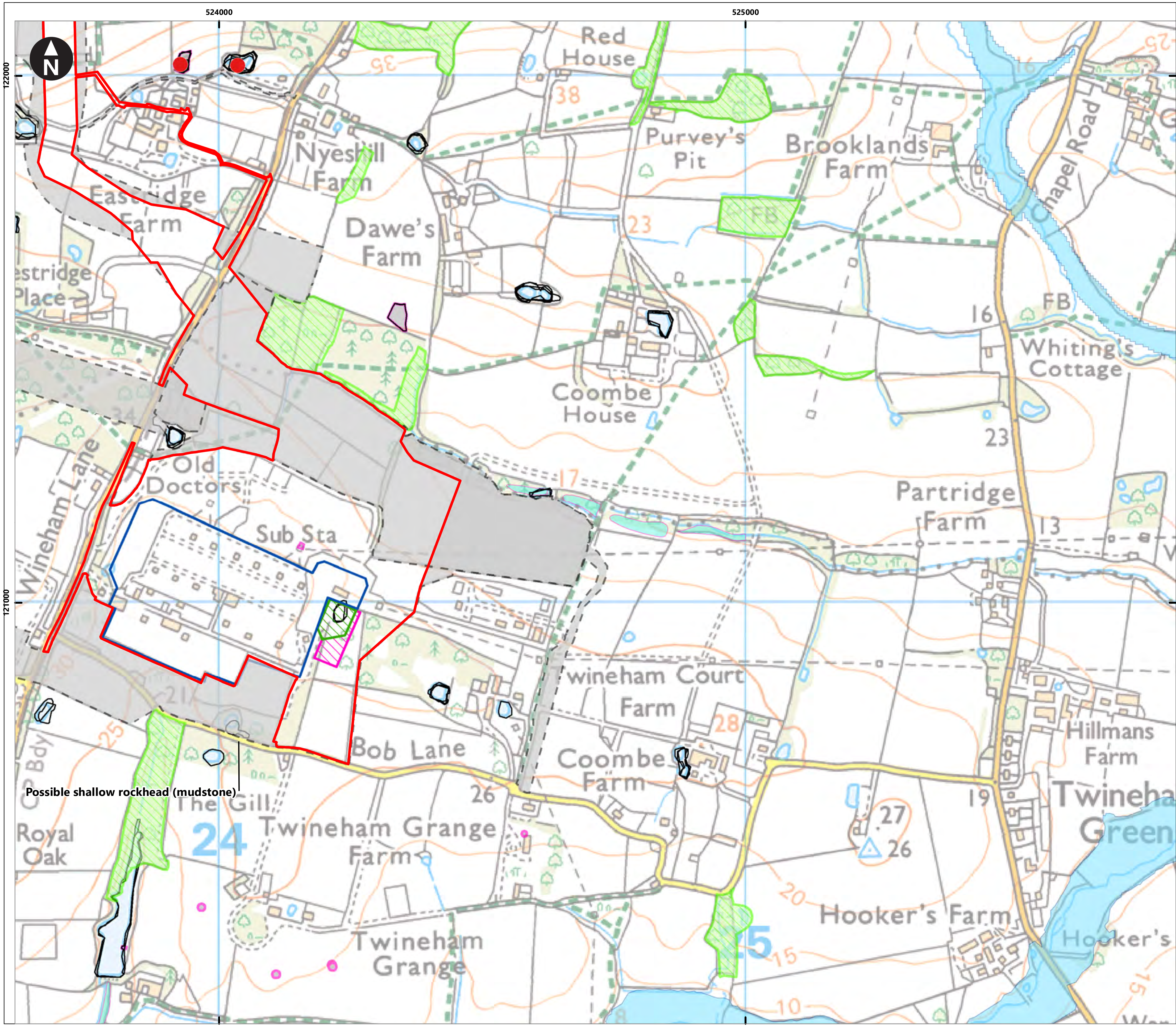
Figure 24.1.4y Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL



Service Layer Credits: Contains OS data © Crown Copyright and database right 2020
© Crown copyright and database rights [2023] Ordnance Survey 0100031673

Key

- Proposed DCO Order Limits
- Discounted route areas not included in the DCO Order Limits*1
- Existing National Grid Substation
- Bolney Substation extension (GIS)
- Bolney Substation extension (AIS)
- Brit Pits
- Ancient Woodland
- Surface ground workings
- Historical industrial land uses

Superficial Geology (10k)

- Alluvium
- Flood zone 2

*1 Discounted following statutory consultation (PEIR, PEIR SIR and PEIR FSIR)

*2 Map scale is variable between pages, the scale references the main map view only

Kilometres
0 0.0375 0.075 0.15 0.225 0.3
1:7,000 *2
British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 WIND FARM

Rampion 2 Offshore Wind Farm

Figure 24.1.4z Summary of ground conditions constraints

Phase 1 Geo-environmental Desk Study

Environmental Statement

System Identifier:	Version:
42285-WSPE-ES-ON-FG-OG-2367_v3	1.0

Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
WSP	SUTET	RAINB	27/07/2023	FINAL

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Annex C
Zetica Unexploded Ordnance Desk Study

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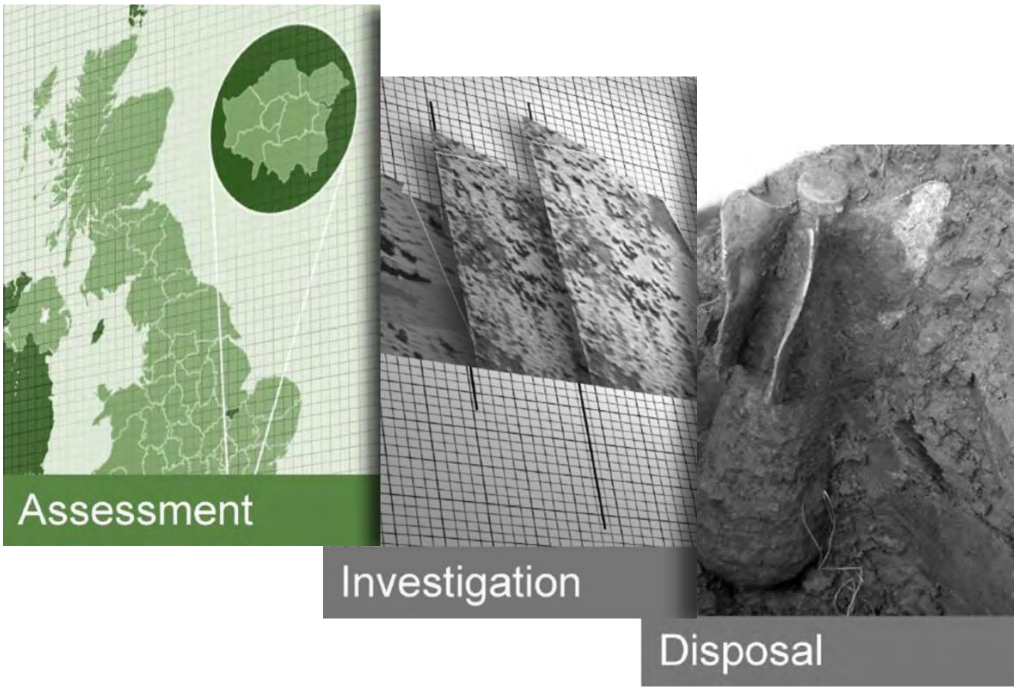
zeticaUXO



Rampion 2 - UXO Desk Study & Risk Assessment

Drafted by [redacted]
Checked by [redacted]
Authorised by [redacted]

Document Title	**UXO Desk Study & Risk Assessment**
Document Ref.	**P9727-23-R1**
Revision	**C**
Project Location	**Rampion 2**
Client	**WSP**
Date	**12th May 2023**

UXO DESK STUDY & RISK ASSESSMENT

EXECUTIVE SUMMARY

Key findings: Potential hazards have been identified from close combat munitions, artillery shells, and air-dropped Unexploded Bombs (UXB) on parts of the Site.

No significant sources of Unexploded Ordnance (UXO) hazard have been identified on the majority of the Site.

Key actions: Non-intrusive surveys and deep UXB detection (if required) are recommended in areas where a significant UXO hazard has been identified.

UXO Hazard Assessment

The following sources of UXO hazard have been identified on the Site:

Military Training Areas (High and M1 hazard zones)

During World War Two (WWII), land on the Site between Wiston (TQ 135133) and Angmering (TQ 069068) was requisitioned as part of the South Downs Training Area (SDTA). This was used extensively for military training involving infantry, artillery, and armoured vehicles.

Significant cratering and scarring of the land associated with the firing of live munitions has been identified on parts of the Site within the SDTA. These areas have been assigned a high UXO hazard level.

Other parts of the Site within the SDTA are assigned a moderate UXO hazard level to account for the possibility of overspill during training exercises.

Anticipated ordnance types on these parts of the Site are close combat munitions (including grenades and mortars), anti-tank and artillery shells, and Small Arms Ammunition (SAA). Most ordnance is likely to be shallow-buried, although the potential for larger artillery shells to be present at greater depth cannot be discounted.

WWII Bombing (M2 hazard zone)

Records have been found indicating that Royal Air Force (RAF) Poling, encroaching on the Site, was heavily bombed during WWII.

It is considered prudent to assign this part of the Site a moderate UXO hazard level to account for the possibility that a UXB fell unnoticed.

Remainder of the Site

No evidence of heavy bombing or other significant sources of UXO hazard have been identified on the remainder of the Site, which is assigned a low UXO hazard level.

It is considered that the UXO hazard level on the Site can be zoned from low to high, as shown in the following Figures, reproduced as Figures 20 – 22 in the main report.

The UXO hazard zone plan of the Site is also given in the accompanying P9727-23-R1-MAP01-C.

The figure below, reproduced as Figure 20 in the main report, is the UXO hazard zone plan of the whole Site.

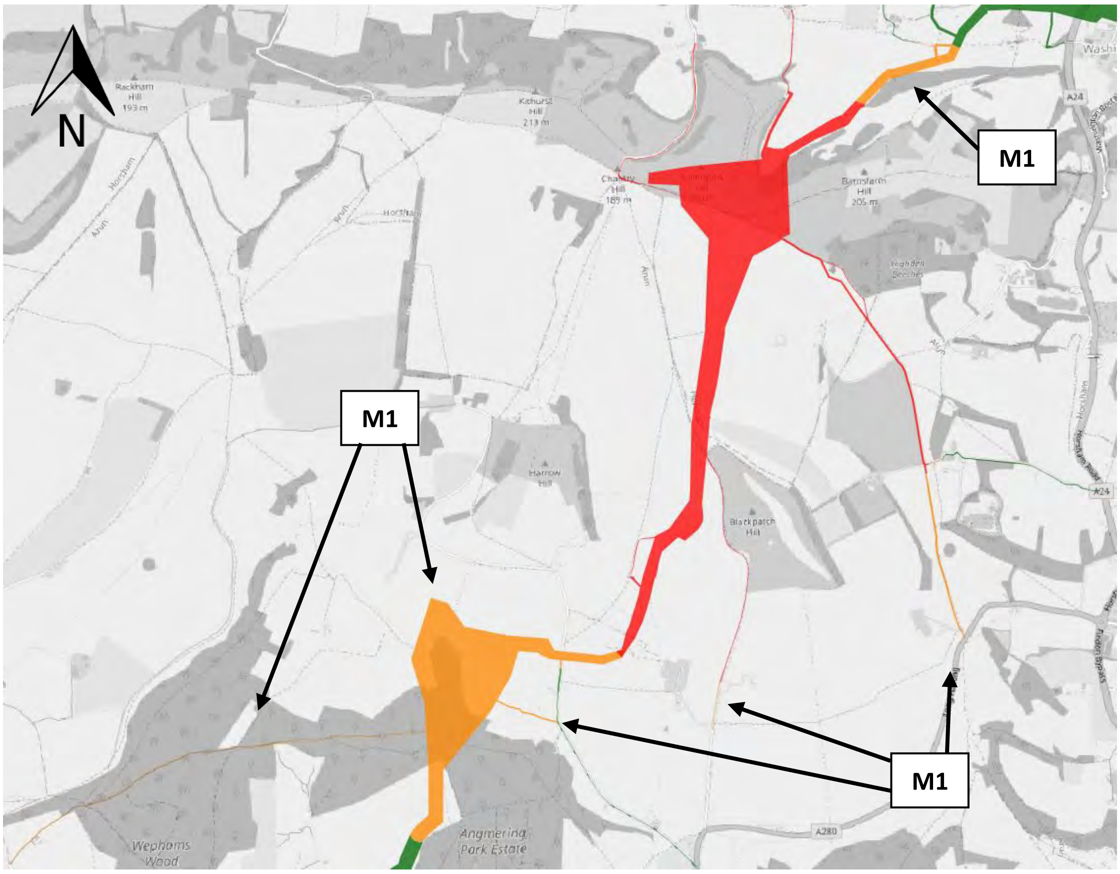
UXO hazard zone plan of the Site

Source: OpenStreetMap *Not to Scale*

Legend	Very Low		Low		Moderate	
	High			Very High		

The figures below, reproduced as Figures 21 and 22 in the main report, are extracts showing the extents of the moderate and high UXO hazard zones on the Site.

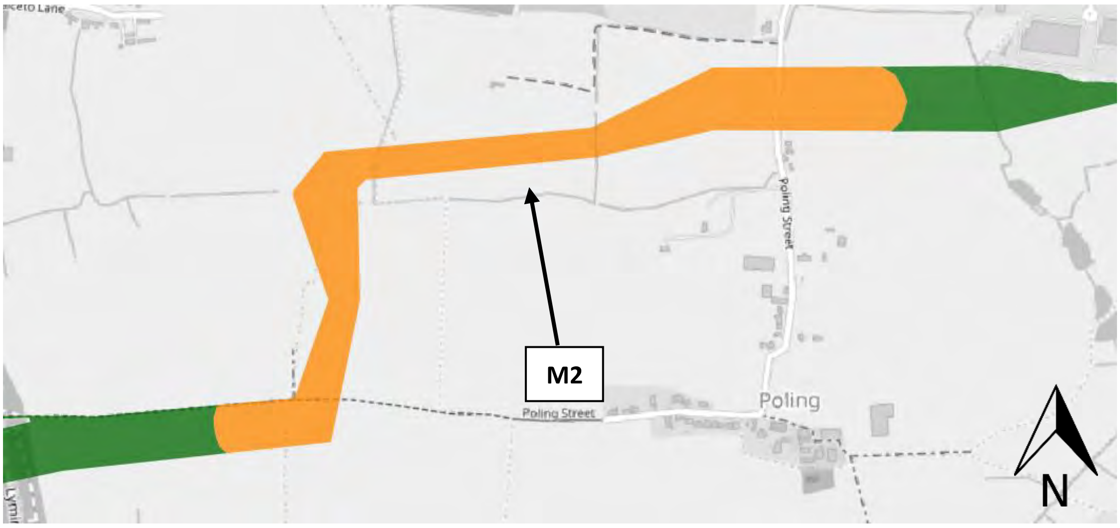
UXO hazard zone plan of the Site (Military Training Areas)



Source: OpenStreetMap Not to Scale

Legend	Very Low	Low	Moderate
	High	Very High	

UXO hazard zone plan of the Site (WWII Bombing)



Source: OpenStreetMap Not to Scale

Legend	Very Low	Low	Moderate
	High	Very High	

It should be noted that whilst ploughing activities may have encountered UXO post-WWII, there is no guarantee that any such items would have been positively identified and appropriately dealt with at the time. There is also the potential for ordnance found post-WWII to have been disposed of in ditches and hedgerows along field boundaries.

The main findings of the report are summarised below.

- No records of bombing on the Site during World War One (WWI) have been found.
- Bombing densities were very low for the majority of the Site during WWII. Heavy raids were recorded on the Site near RAF Poling.
- Estimated average maximum bomb penetration depths for parts of the Site with a potential UXB hazard range from 5.5m to 13.5m.
- During WWII part of the Site was within the SDTA, which was used extensively for military training involving the use of live munitions.
- Post-WWII the SDTA was decommissioned and subjected to Explosive Ordnance Clearance (EOC) clearance operations. Regular UXO finds still occur within the former SDTA.

Data Confidence Level

The findings of this report were based on good corroborative evidence of the military activity and bombing on the Site.

Proposed Works

Works on the Site are associated with a proposed onshore grid connection linking the Rampion 2 Offshore Wind Farm with the Twineham Substation.

Initial works are understood to comprise a ground investigation, including shallow archaeological excavations, agricultural hand pits to approximately 1m below ground level (bgl), boreholes, and trial pits.

At this stage, the main construction works are anticipated to include:

- Landfall cable ducting and trench bay excavation up to 3m bgl.
- Open cut cable trenches along the whole route of between approximately 1m-4m wide and approximately 2m bgl.
- Horizontal Directional Drilling (HDD) under key infrastructure, including bored drill to install ducting with depths up to 25m bgl.
- Temporary roadways and haul roads installed alongside the cable corridor, including topsoil strip where needed.
- Permanent substation construction, including topsoil strip and foundations.

Risk Assessment

The Table below, reproduced as Table 4 in the main report, provides a UXO risk assessment for the proposed works on the Site.

Further details on the methodology for the risk assessment are provided in Section 8.2 of the main report.

UXO risk assessment for the Site

Hazard Zone	Potential UXO Hazard	Anticipated Works	PE	PD	P = PE x PD	Likelihood	Severity	Risk Rating	UXO Risk
High	UXB	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	Close Combat Munitions	Excavations	4	4	16	4	4	16	High
		Boreholes	3	4	12	3	4	12	Moderate
		HDD*	4	4	16	4	4	16	High
	Artillery Shells	Excavations	3	3	9	3	5	15	Moderate
		Boreholes	2	3	6	3	4	12	Moderate
		HDD*	3	3	9	3	5	15	Moderate
	SAA	Excavations	4	1	4	2	2	4	Low
		Boreholes	2	1	2	2	2	4	Low
		HDD*	4	1	4	2	2	4	Low
M1	UXB	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	Close Combat Munitions	Excavations	3	4	12	3	4	12	Moderate
		Boreholes	2	4	8	3	3	9	Moderate
		HDD*	3	4	12	3	4	12	Moderate
	Artillery Shells	Excavations	2	3	6	3	5	15	Moderate
		Boreholes	2	3	6	3	4	12	Moderate
		HDD*	2	3	6	3	5	15	Moderate
	SAA	Excavations	3	1	3	2	2	4	Low
		Boreholes	2	1	2	2	2	4	Low
		HDD*	3	1	3	2	2	4	Low
M2	UXB	Excavations	3	2	6	3	5	15	Moderate
		Boreholes	2	3	6	3	4	12	Moderate
	Close Combat Munitions	Excavations	1	1	1	1	4	4	Low
		Boreholes	1	1	1	1	3	3	Low
	Artillery Shells	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
	SAA	Excavations	1	1	1	1	1	1	Low
		Boreholes	1	1	1	1	1	1	Low
Low	UXB	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	Close Combat Munitions	Excavations	1	1	1	1	4	4	Low
		Boreholes	1	1	1	1	3	3	Low
		HDD	1	1	1	1	3	3	Low
	Artillery Shells	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	SAA	Excavations	1	1	1	1	1	1	Low
		Boreholes	1	1	1	1	1	1	Low
		HDD	1	1	1	1	1	1	Low

PE (Probability of Encounter), PD (Probability of Detonation), P (Overall Probability)

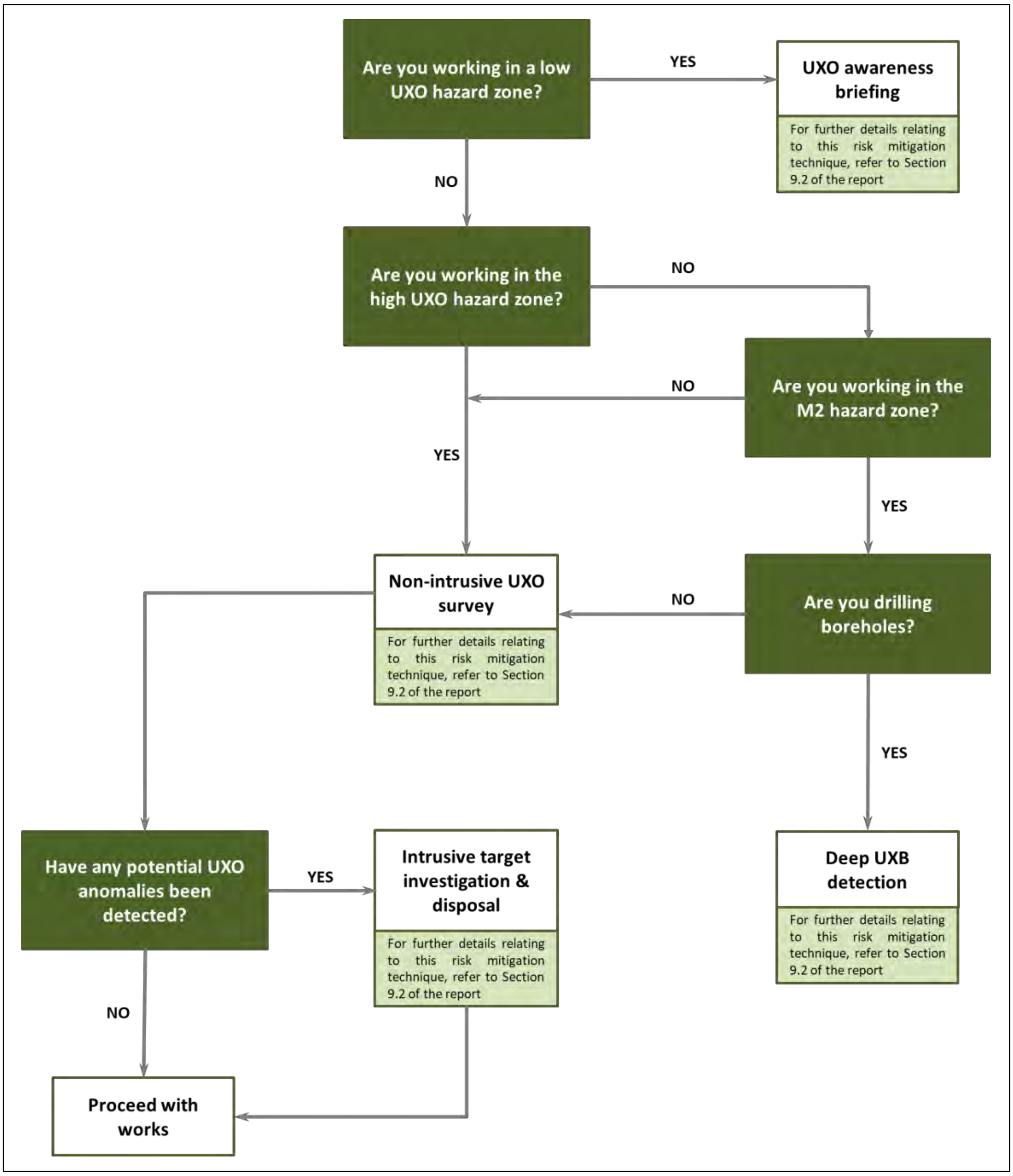
SAA = Small Arms Ammunition; HDD = Horizontal Directional Drilling

***The UXO hazard relates to launch and reception pits only. The main HDD route is anticipated to be deeper than the potential UXO hazard.**

Risk Mitigation Plan

The Figure below, reproduced as Figure 23 in the main report, provides a risk mitigation plan to ensure that the UXO risk for the proposed works is reduced to As Low As Reasonably Practicable (ALARP) for intrusive works.

Recommended risk mitigation plan for the Site



Further details on the recommended risk mitigation techniques are given in Section 9.2 of this report.

The Table below, reproduced as Table 5 in the main report, summarises the UXO risk for proposed works on the Site and recommended techniques to mitigate the risk.

Summary of UXO risk and mitigation recommendations

Proposed Works	UXO Risk	Recommended Mitigation
Site walkovers		**UXO awareness briefing** – Given the military history in the area it is recommended that a formal UXO awareness briefing is provided to staff involved in site walkovers across all hazard zones.
Excavations		**UXO awareness briefing** – as above.
Boreholes		**Proceed with works**
HDD		**Proceed with works**
Excavations	M1 	**Non-intrusive survey** – a non-intrusive geophysical survey should be undertaken to map potential buried UXO. Potential UXO targets can either be avoided or investigated and removed.
Boreholes	M1 	**Non-intrusive survey –** a non-intrusive survey should be undertaken in advance of drilling.
HDD	M1 	**Non-intrusive survey** – a non-intrusive survey should be undertaken at the location of HDD launch and reception pits.
Excavations	M2 	**Non-intrusive survey –** a non-intrusive survey should be undertaken in advance of excavations. If programme or access does not allow, an Explosive Ordnance Clearance (EOC) Engineer can supervise excavation works in this area.
Boreholes	M2 	**Deep UXB detection** – to clear borehole locations of potential UXB, an intrusive magnetometer survey should be undertaken until either the maximum bomb penetration or maximum drilling depth is reached.

Excavations		**Non-intrusive survey** – as above.
Boreholes		**Non-intrusive survey** – as above.
HDD		**Non intrusive survey –** as above.

In summary, it is recommended that staff participating in Site walkovers in all hazard zones receive a UXO awareness briefing.

In advance of intrusive works in the moderate and high UXO hazard zones, it is recommended that a non-intrusive UXO survey is undertaken.

As part of any borehole construction in the M2 hazard zone, we recommend that deep UXB detection is undertaken.

What Do I Do Next?

If you wish to proceed with UXO risk mitigation, Zetica would be happy to assist. Just contact us via phone (01993 886682) or email (uxo@zetica.com) and we can provide a proposal with options and prices.

If you have requirements to identify other buried hazards (such as mapping utilities or obstructions) we can provide these surveys.

If proposed works on the Site change, or additional works are planned, contact Zetica for a re-assessment of the UXO risk and the risk mitigation requirements.

CONTENTS

Figures, Plates & Tables

Accompanying GIS Data

P9727-23-R1-MAP01-C (UXO Desk Study)

ABBREVIATIONS

AA	Anti-Aircraft
AP	Anti-Personnel
AT	Anti-Tank
ALARP	As Low As Reasonably Practicable
ARP	Air Raid Precaution
AXO	Abandoned Explosive Ordnance
BD	Bomb Disposal
BDO	Bomb Disposal Officer
BDU	Bomb Disposal Unit
CMD	Conventional Munitions Disposal
CO	Commanding Officer
CTS	Canadian Training School
DAB	Delayed Action Bomb
DCLG	Department of Communities and Local Government
EO	Explosive Ordnance
EOC	Explosive Ordnance Clearance
EOR	Explosive Ordnance Reconnaissance
ERW	Explosive Remnants of War
ESA	Explosive Substances and Articles
FFA	Field Firing Area
FFE	Free From Explosives
FIU	Fighter Interception Unit
FOO	Forward Observation Officer
FUP	Forming Up Point
GTA	General Training Area
HAA	Heavy Anti-Aircraft
HE	High Explosive
HMP	Her Majesty's Prison
HMS	His Majesty's Ship
HoC	House of Commons
HQ	Headquarters
HSE	Health and Safety Executive
IB	Incendiary Bomb
IED	Improvised Explosive Device
IEDD	Improvised Explosive Device Disposal
JSEODOC	Joint Services EOD Operations Centre
LAA	Light Anti-Aircraft
LCA	Landing Craft Assault
LCT	Landing Craft Tank
MG	Machine Gun
MoD	Ministry of Defence
OB	Oil Bomb
OP	Observation post
ORB	Operational Records Book
PoW	Prisoner of War
PRC	Polish Resettlement Corps
PUCA	Pick Up and Carry Away
RA	Royal Artillery
RAC	Royal Armoured Corps
RAF	Royal Air Force

RFC	Royal Flying Corps
RNAS	Royal Naval Air Station
SA	Small Arms
SAA	Small Arms Ammunition
SDTA	South Downs Training Area
SNCO	Senior Non-Commissioning Officer
SO	Standing Order
TEP	Time Expired Pyrotechnics
UXAA	Unexploded Anti-Aircraft
UXB	Unexploded Bomb
UXIB	Unexploded Incendiary Bomb
UXO	Unexploded Ordnance
WAEC	War Agricultural Executive Committee
WO	War Office
WWI	World War One
WWII	World War Two

UXO DESK STUDY & RISK ASSESSMENT

Please read: Zetica has colour coded each paragraph. Paragraphs with black text on a white background are paragraphs that provide site-specific information or information specifically researched as part of this project.

Boxed paragraphs in a dark green text with a green background are paragraphs providing general information and, where appropriate, links to online resources giving further detail. These are all available at www.zeticauxo.com. If you cannot gain access to these resources, Zetica can forward them on request.

1 INTRODUCTION

1.1 Project Outline

Zetica Ltd was commissioned by WSP to carry out an Unexploded Ordnance (UXO) Desk Study and Risk Assessment for an approximately 34km onshore cable route corridor between Climping and Cowfold, in West Sussex ('the Site').

The aim of this report is to gain a fair and representative view of the UXO hazard for the Site and its immediate surrounding area in accordance with the Construction Industry Research and Information Association (CIRIA) C681 'Unexploded Ordnance (UXO), a Guide for the Construction Industry' and C754 'Assessment and Management of Unexploded Ordnance (UXO) Risk in the Marine Environment'.

Where appropriate, this hazard assessment includes:

- Likelihood of ordnance being present.
- Type of ordnance (size, filling, fuze mechanisms).
- Quantity of ordnance.
- Potential for live ordnance.
- Probable location.
- Ordnance condition.

It should be noted that some military activity providing a source of UXO hazard may not be recorded and therefore there cannot be any guarantee that all UXO hazards affecting the Site have been identified in this report.

1.2 Sources of Information

Zetica Ltd researched the military history of the Site and its surrounding area using a range of information sources. The main sources of information are detailed in the following sections and referenced at the end of this report.

1.2.1 Zetica Ltd Defence Related Site Records

Zetica Ltd's in-house records were consulted, including reference books and archived materials from past work in the region. Relevant documents have been cited within the bibliography of this report.

1.2.2 Zetica Ltd Bombing Density Records and Maps

Reference has been made to the Zetica Ltd bomb risk maps located on Zetica's website (http://zeticauxo.com/downloads-and-resources/risk-maps/)

1.2.3 Ministry of Defence and Government Records

Government departments and units within the Ministry of Defence (MoD) were approached for information of past and present military activity in the area. These included the Department of Communities and Local Government (DCLG) records of abandoned bombs.

1.2.4 Other Historical Records, Maps and Drawings

Numerous reference documents including historical maps, aerial photographs and drawings have been consulted from sources such as the National Archives, the US National Archives & Records Administration (NARA), the Imperial War Museum (IWM), the Royal Air Force (RAF) Museum, Historic England, National Collection of Aerial Photography (NCAP), Sussex Air Catalogue, and the Defence of Britain Project.

The British Geological Survey (BGS) was consulted for borehole information.

1.2.5 Local Authority Records

Information was obtained from West Sussex County Council and East Sussex County Council.

1.2.6 Local Record Offices and Libraries

The West Sussex Records Office, The Keep, and Littlehampton Museum were consulted for records.

1.2.7 Local Historical and Other Groups

Local history groups and archaeological societies were consulted, including the West Sussex Historic Environment Record (HER).

1.3 Data Confidence Level

In general, there is a high level of confidence in the researched information sources used for this report. Exceptions to this are specifically detailed in the text of the report.

2 THE SITE

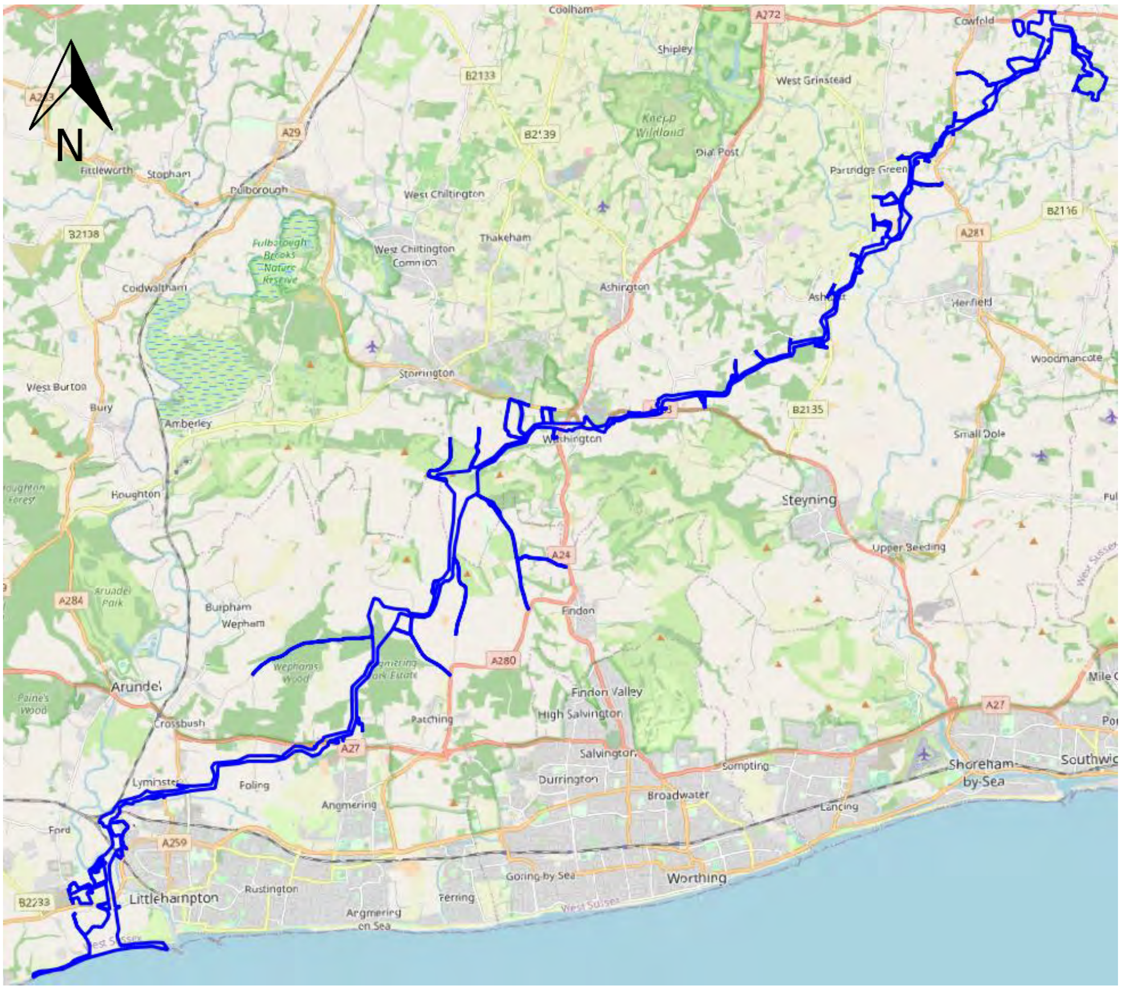
2.1 Site Location

The Site comprises a proposed cable route corridor running from Climping Beach at Ordnance Survey National Grid Reference (OSNGR) TQ 009008 northeast through West Sussex to a substation located at Bolney Road, Cowfold at OSNGR TQ 240210.

The Site predominantly comprises open agricultural land. Parts of the Site are crossed by roads, railways, and rivers, with the coast forming its southern boundary.

Figure 1 is a Site location map and Plate 1 is a recent satellite photograph of the Site.

Figure 1 Site location map



Source: OpenStreetMap *Not to Scale*

Legend	Site boundary

Plate 1 Recent satellite photograph of the Site

Source: Google Earth *Not to Scale*

Legend	Site boundary

3 MILITARY ACTIVITY

The following sections outline the recorded military activity in the vicinity of the Site. The potential UXO hazard from World War One (WWI) and World War Two (WWII) bombing is detailed in Section 4.

Each sub-section provides hyperlinks to further information on potential sources of UXO hazard. These are also available at www.zeticauxo.com. If you cannot gain access to these resources, Zetica can forward them on request.

3.1 South Downs Training Area (SDTA)

For further information on firing ranges and military training areas, and the potential UXO hazards associated with them, see Appendix 2.1 and 2.2. Alternatively, follow the links below:

- Artillery Ranges
- Bombing Ranges
- Military Training Areas
- Small Arms Ranges

In 1942, the SDTA was established on land encompassing the Site between Wiston (TQ 135133) and Angmering (TQ 069068).

Records indicate that the SDTA was intensively used for live-fire training exercises by the Allied forces until the end of WWII.

Further details are provided in the sections below.

3.1.1 Operational History

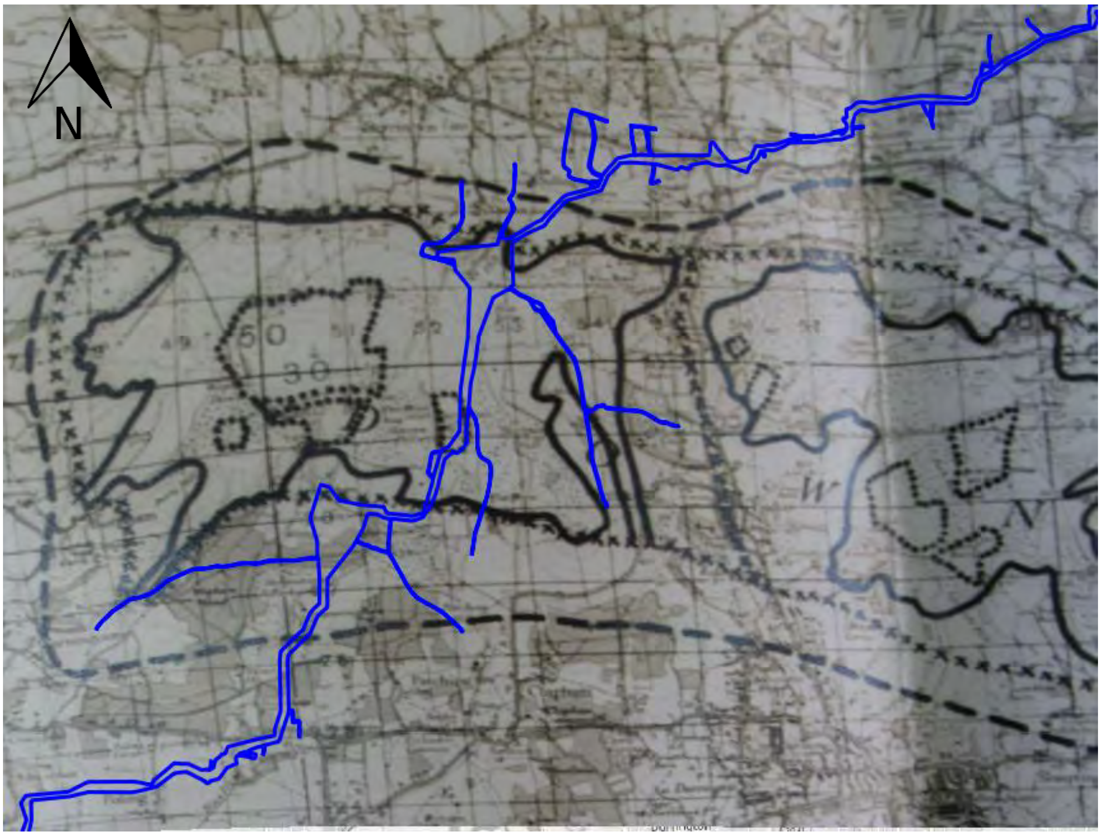
In 1941 the War Office (WO) began planning the establishment of a large-scale military training area for both infantry and armoured units in the South Downs, extending approximately 54km between Warningcamp in the west and Jevington in the east.

Figure 2 is a map of the proposed extents of the SDTA, dating from December 1941. This shows the proposed maximum extents of the SDTA (solid lines) and the limits of infantry movements (dashed black lines).

The black crosses represent the areas originally requested by the Royal Armoured Corps (RAC) for training, which had been rejected in favour of the area outlined by the solid black line. This represents the live-fire area. It should be noted that areas outside this line could be used temporarily during large-scale exercises.

The dotted black line represents islands that were to be excluded from requisition.

Figure 2 Map of the proposed extents of the SDTA, December 1941



Source: National Archives *Not to Scale*

Legend	Site boundary	SDTA boundary	Requisitioned for training
	Requested by RAC **XXX**	Excluded from requistion ••••••••••	

The proposal underwent several reviews before a final agreement was reached by all parties in March 1942.

The designated area was requisitioned under Section 51 of the Defence Regulations, which allowed for intensive and continuous all arms training, with live ammunition. It also granted unrestricted movement to armoured units.

The original SDTA boundary (identified by the dashed black line in Figure 2) was subject to Section 52 of the Defence Regulations meaning that these areas could be used for military training for short durations.

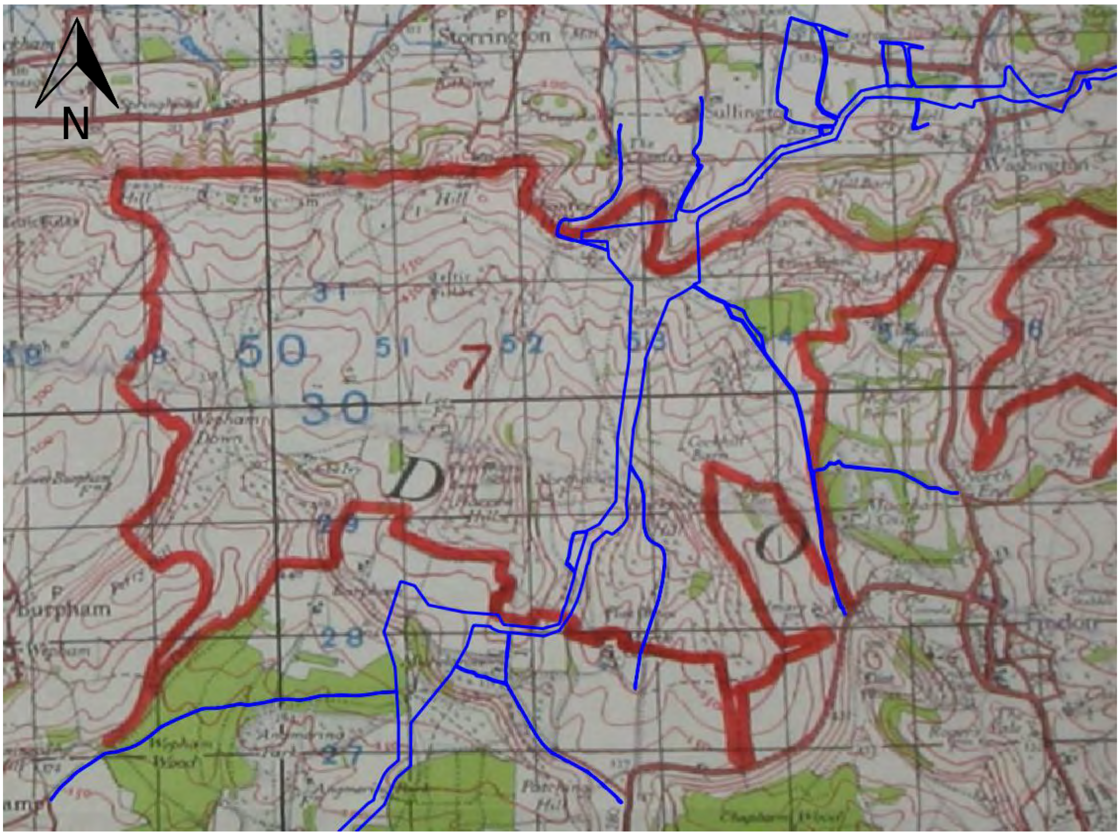
Records indicate that these boundary areas were primarily used for dry training and infantry manoeuvres, although armoured units could use it for specific exercises. It should be noted that land designated for dry training during WWII was sometimes used for live fire practice.

It should also be noted that land outside the SDTA boundary could also be requisitioned under Section 52, subject to an approval process.

The SDTA was divided into 8No. Blocks where live fire was permitted. The part of the SDTA encompassing the Site was designated as Block No. 7 and is shown in Figure 3, a map of the SDTA, dating from 1942.

The shaded red area indicates the area officially designated for live-fire training under Section 51.

Figure 3 Map of Block No. 7 of the SDTA, 1942



Source: The National Archives *Not to Scale*

Legend	Site boundary	Block No. 7

Records indicate that Block No. 7 was a designated Field Firing Area (FFA) and was used extensively by troops of the Canadian 1st Army. From 1942 ranges were established on and within the vicinity of the Site (see Section 3.1.2 below).

Throughout 1943 and 1944, several exercises involving the use of live ammunition took place on and in the vicinity of the Site, particularly during the build up to Operation Overlord and the Allied invasion of Europe. These exercises are described in more detail in Section 3.1.2.

The SDTA continued to be used for military training until the end of the war.

By October 1945 records indicate that the SDTA was no longer required for military exercises. The various ranges and training establishments associated with the SDTA were subsequently decommissioned.

The SDTA was subject to Explosive Ordnance Clearance (EOC) operations, including Block No. 7, prior to its derequisition and restoration to former landowners (see Section 3.1.8). Records indicate that the process of derequisition on Block No. 7 lasted for several years and was not completed until the 1950s.

3.1.2 Training on the SDTA

Standing Orders (SOs) were given to ensure that, where possible, fire was directed from the peripheries of the Blocks towards targets located in their centre. When physical targets were not in use, alternative targets were established in valleys and hollows to ensure firing was directed into the sides of hills and slopes (see Section 3.1.5).

Records indicate that as well as firing within the SDTA, artillery firing points could be established outside Block No. 7 during some exercises. This was subject to approval by Headquarters (HQ) Sussex and Surrey District.

Officer's and Senior Non-Commissioned Officer's (SNCOs) were appointed as safety officials to ensure that weapons were directed at a safe elevation and in a safe direction.

When ordnance fell outside the SDTA the Commanding Officer (CO) of the unit firing was responsible for investigating and taking the appropriate action. They were required to report the incident to HQ Royal Artillery (RA) Eastern Command.

Table 1 provides a summary of ordnance permitted on the SDTA as outlined in the SOs issued in February 1945 for Blocks 3-8.

Table 1 Training categories and ordnance permitted on the SDTA

Training Category	Ordnance
Artillery & Armoured	25-pounder (pdr) gun
	75mm pack howitzer
	75mm field gun
	3.7-inch (") pack howitzer
	4.5" gun
	5.5" gun
	155mm gun
	7.92mm Besa MG (mounted to armour)
Infantry	SA up to .303 ammunition and side arms
	Machine carbines
	2",3", and 4.2" mortars
	Grenades
	Projector, Infantry, Anti-Tank (PIAT) Weapon

It is likely that other types of ordnance not listed in Table 1 was used on the SDTA. Training with different ordnance required permission from Eastern Command prior to its use on the SDTA.

In addition to live ammunition, practice munitions such as blank SAA, practice grenades and shells, pyrotechnics, and flares were used.

3.1.3 Designated Ranges and Training Areas on Block No. 7

The nearest designated ranges to the Site are described below.

Sullington Small Arms Range

By 1943 1No. Small Arms (SA) range had been established on the Site at Sullington (TQ 106132). It would have been used for marksmanship and SA weapons training.

The range was laid out to approximately 525m, with firing points established at approximately 100m intervals. Firing was directed in a south-westerly direction towards the Site.

Plate 2 is an aerial photograph dated the 16th August 1943, showing the Sullington Range. This shows the target area encroaching onto the Site at TQ 097121.

Plate 2 Aerial photograph of Sullington SA Range, 16th August 1943

Source: NCAP *Not to Scale*

Legend	Site boundary	Sullington Range	Targets

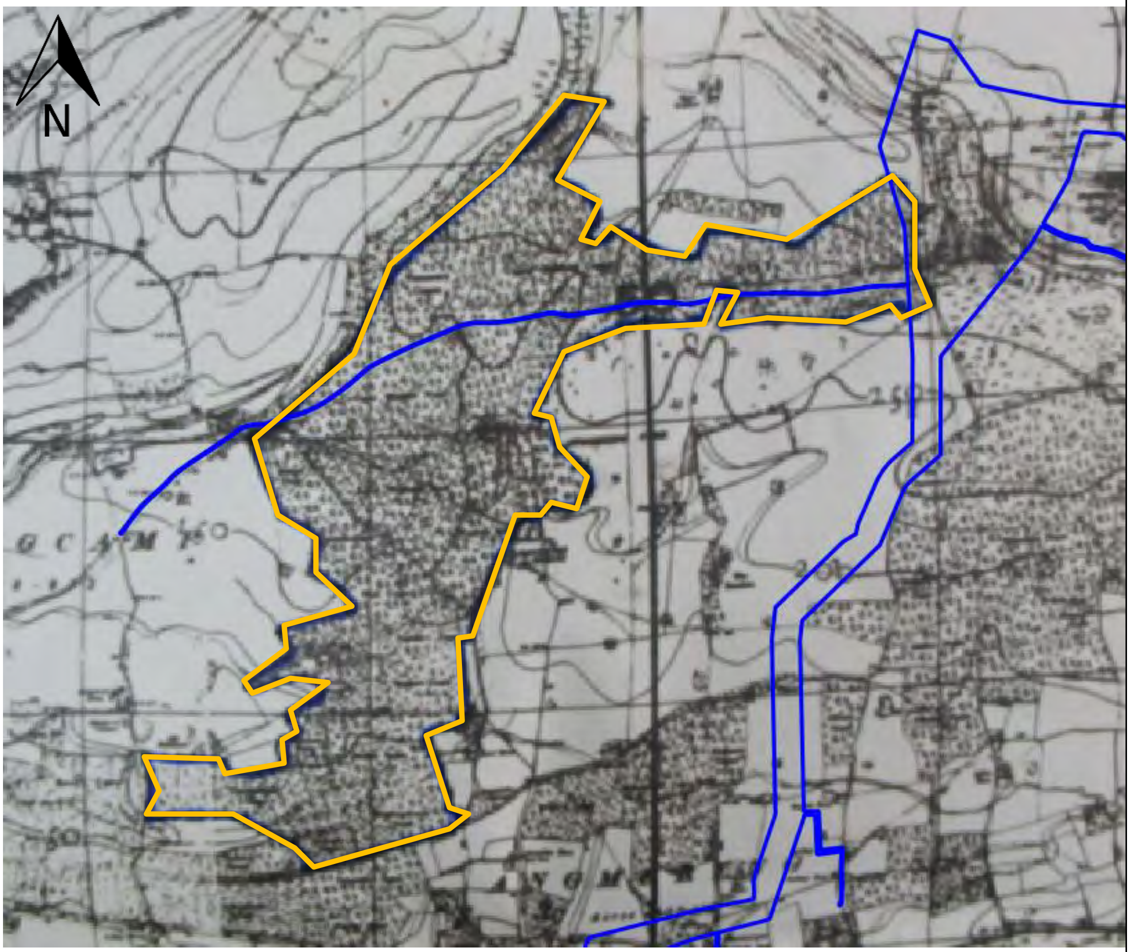
Wepham Woods General Training Area (GTA)

In February 1944 Wepham Woods, encroaching on the southern part of the Site, was requisitioned under Section 52 to establish a GTA for infantry units.

Given the dense nature of the woodland it is considered unlikely any mortar or artillery training took place within the GTA.

Figure 4 is a plan of Wepham Woods GTA, dated the 23rd February 1944.

Figure 4 Plan of Wepham Woods GTA, 23rd February 1944



Source: The National Archives *Not to Scale*

Legend	Site boundary	Wepham Woods GTA

Designated ranges and training areas on Block No. 7 are shown on Plate 3, an aerial photograph dated the 16th August 1943. Interpreted training features are outlined.

Widespread disturbed ground across the area is indicative of training involving infantry and armoured vehicles.

Plate 3 Aerial photograph of ranges and training areas of Block No. 7, 16th August 1943

Source: NCAP *Not to Scale*

Legend	Site boundary	SA Range	Highden Hill Range
	Block No. 7	Sullington Hill	Flamethrower Ranges

Highden Hill Range

By 1943 1No. range had been established at Highden Hill, within approximately 0.2km northeast of the Site. It was used for infantry and petroleum warfare courses run by No. 5 (Battle) Wing CTS, whose HQ was located at Windlesham House School, approximately 1km east of the Site.

Firing on the Highden Hill Range was undertaken by units equipped with 2”, 3” and 4.2” mortars, white phosphorous smoke grenades, 4lb Incendiary Bombs (IBs), and coloured smoke.

In addition, 2No. flamethrower ranges were established at the western and eastern ends of the ranges.

Anecdotal evidence suggests that military equipment may have been buried in the immediate vicinity of Windlesham House when the military departed.

3.1.4 Military Exercises on Block No. 7

From 1942 several live-fire exercises were conducted on Block No. 7. These exercises involved infantry and armoured units, supported by artillery units. Field-firing exercises were permitted on the SDTA at day and night, involving the use of blank and live ammunition.

Records indicate that exercises could begin with ‘dry training’ involving blank ammunition and pyrotechnics before culminating in live-fire exercise.

Munitions would have been stored in designated depots before distribution to individual units. Smaller quantities were also stored temporarily in farm buildings or other convenient locations for distribution by units over the course of a long exercise.

Field-firing exercises on the SDTA were dynamic with troops covering large distances of the training area as part of the exercise. The training was designed to be progressive, with troops initially practicing in smaller formations (e.g. platoon level), before moving to more complex simulated engagements involving larger formations.

Evidence of the scale of training on Block No. 7 of the SDTA is illustrated by the following 4No. example exercises.

Example 1: No. 5 (Battle) Wing CTS exercise

On the 16th July 1943 an exercise was conducted by No. 5 Wing CTS on Block No. 7 involving infantry, artillery, and armoured units.

Records indicate that the exercise began with troops from No. 5 (Battle) and No. 6 (Chemical Warfare) Wing CTS stationed at Lee Farm (TQ 074104), approximately 1.3km north of the Site. No. 6 Wing CTS were equipped with 3No. Ronson flamethrowers, which were mounted to the flamethrower variant of the Universal Carrier, Wasp Mk IIC.

Artillery support for the exercise was provided by guns positioned at Chanctonbury Ring (TQ 139120), within approximately 1.3km south of the Site. An artillery Forward Observation Officer (FOO) was deployed with the attacking troops to call in artillery fire during the exercise.

3No. carrier sections of mechanised infantry were supported by 5No. troops of Ram tanks, 3No. Ronson flamethrowers, and 3No. mortar teams equipped with 3” mortars. A company of infantry was also held in reserve.

Prior to the ground assault, artillery and mortar fire was directed onto the objectives which comprised ‘enemy’ defences, including slit trenches. There were 12No. mortar teams equipped with 4.2” mortars firing High Explosive (HE) rounds, and 12No. mortar teams equipped with 3” mortars firing smoke rounds.

Records indicate that smoke rounds with white phosphorous fill were deployed during the exercise.

The mechanised infantry and armoured vehicles moved forward to attack their objectives, and on reaching them the infantry used grenades to clear out slit trenches.

Example 2: Exercise Hammer

In the first week of August 1943, Exercise ‘Hammer’ took place on Block No. 7. The exercise involved Canadian infantry and armoured units, including the 27th Canadian Armoured Regiment.

Records indicate that several simulated attacks were made by the infantry, who were armed with Bren machine guns, and armoured units firing live ammunition.

On the 7th August, troops repeated the exercise as a demonstration to senior commanders in the area of Harrow Hill, within approximately 0.5km northwest of the Site (TQ 081100).

Example 3: Exercise Eve I

In August 1943, as part of Exercise ‘Eve I’, Canadian armoured units established a defensive ‘Harbour Area’ on Wepham Down, within approximately 0.2km southwest of the Site.

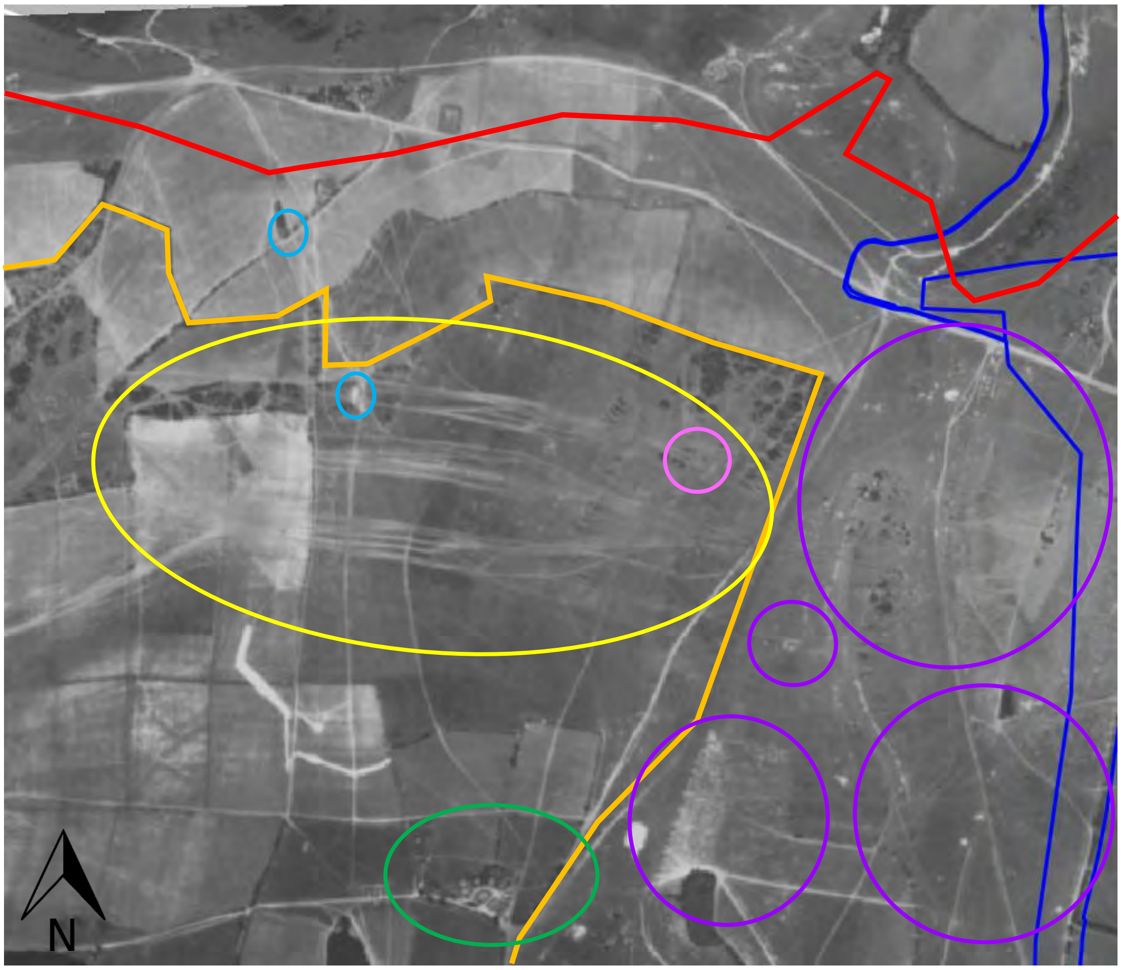
A harbour area is established to protect a unit during an extended halt. Sentry positions are established to provide early warning of enemy attack. Activities in a harbour area include resupply of ammunition and other supplies, as well as unit and personal administration.

On the night of the 16th August armoured units, including tanks, moved out from the harbour area on Wepham Down to a Forming Up Point (FUP) for a daylight attack.

Plate 4 is an aerial photograph dated the 16th August 1943. Evidence of military training in the area, indicated by disturbed ground and cratering, are shown. Vehicle tracks have also been highlighted across a wide area, within approximately 0.6km southwest of the Site.

2No. known target locations, approximately 1.2km and 1.4km west of the Site respectively, consist of a pillbox and a redundant Churchill Tank (see Section 3.1.5).

Plate 4 Aerial photograph, 16th August 1943



Source: NCAP *Not to Scale*

Legend	Site boundary	Wepham Downs	Lee Farm
	Block No. 7	Vehicle tracks	Possible craters
	Target locations	Areas of potential military activity	

Example 5: Joint exercise on Wepham Downs

On the 14th April 1944 a joint exercise involving the Canadian 27th Armoured Regiment and infantry of the North Nova Scotia Highlanders took place at Wepham Downs, within approximately 0.2km southwest of the Site. Several targets were attacked in the vicinity of Wepham Downs as part of this exercise.

Plate 5 is a photograph dated the 14th April 1944. It shows infantry from the North Nova Scotia Highlanders alongside Sherman tanks of the 27th Armoured Regiment during this joint exercise.

Plate 5 Photograph showing joint training between the North Nova Scotia Highlanders and the 27th Canadian Armoured Regiment at Wepham Downs, 14th April 1944

Source: Stacey

3.1.5 Identified Target Areas and Firing Points

Block No. 7 was an FFA, meaning live firing could take place without constraints or designated firing butts. The intention was to create a 'natural' training environment, where training exercises could develop in a realistic fashion.

Several target areas and firing points associated with the SDTA have been identified on and in the vicinity of the Site.

The remains of 5No. pillboxes on Block No. 7 have been identified as potential targets used during training. The closest was approximately 0.4km east of the Site at TQ 102119 (see Figure 5 below).

In addition, a redundant Churchill Tank was positioned on Block No. 7 (TQ 072120) as a firing target for troops, approximately 1.4km northwest of the Site (see Plate 4). This was removed from the South Downs in 2019.

Both the pillboxes and the Churchill Tank showed evidence of heavy shelling and bullet holes, indicating that they had been fired upon.

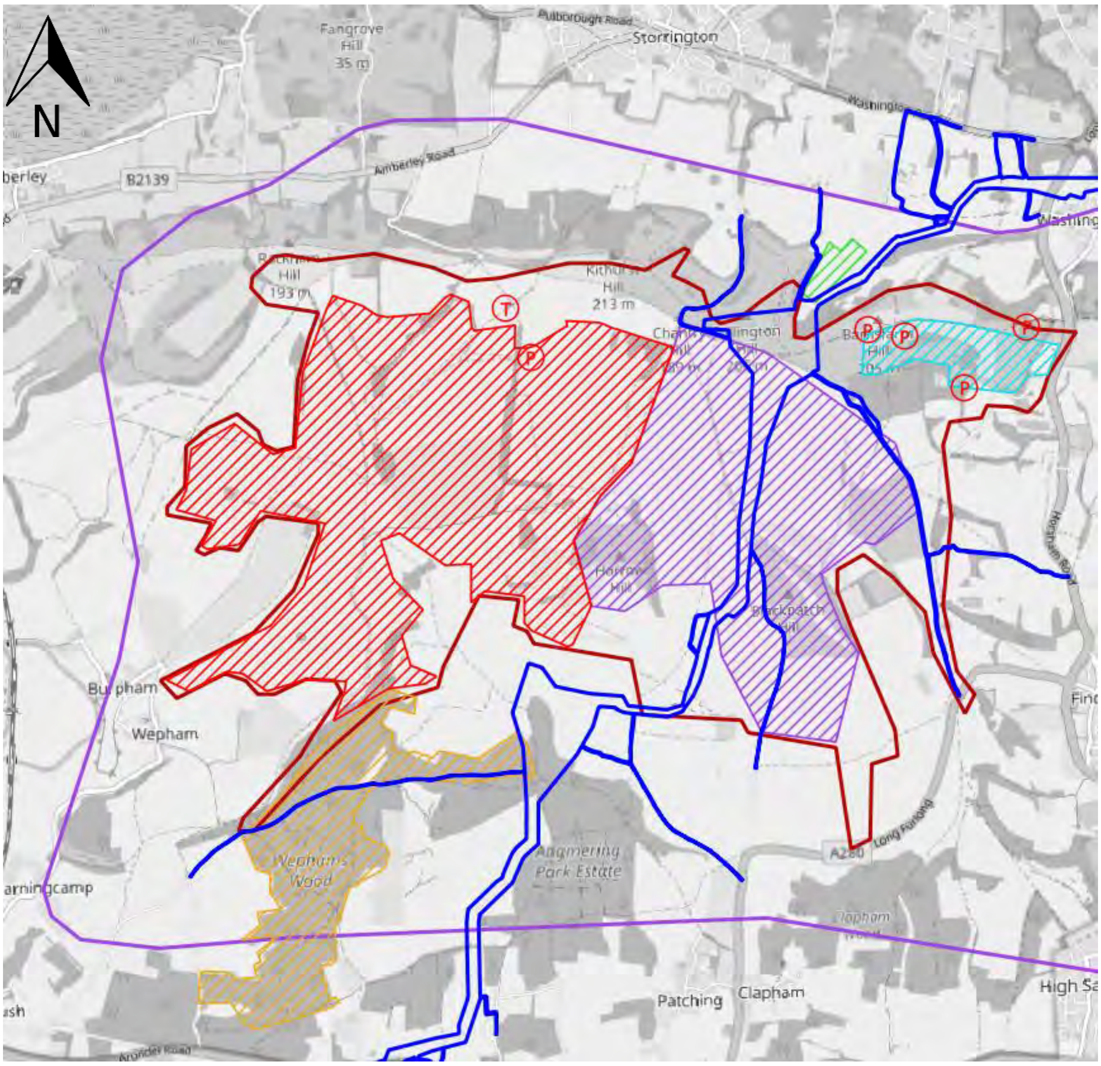
Slit trenches and similar defences were constructed on the SDTA as potential targets and firing points. Many of these positions were removed and filled in by the Mechanical Equipment Company after WWII.

When physical targets were not in use, alternative targets were established in valleys and hollows to ensure firing was directed into the sides of hills and slopes.

Simulated ‘Enemy’ positions were relocated as required and it is considered likely that additional firing positions and target areas were established across the SDTA on an ad hoc basis, potentially on the Site.

Figure 5 is a map of Block No. 7 showing identified potential target locations and training areas, including those identified on historical aerial photography.

Figure 5 Map of Block No. 7 showing identified target locations and training areas



Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	Block No. 7	SDTA boundary
	Pillboxes (P)	Churchill Tank (T)	Wepham Downs
	Wepham Woods GTA	SA Range	Highden Hill Range
	Areas of potential military activitiy identified on aerial photography		

3.1.6 Historical Aerial Photography Review

A review of aerial photography dating from 1945 and 1946 has corroborated the history of military training on the SDTA discussed above.

A selection of annotated aerial photography is provided below, covering the parts of the Site associated with the SDTA. Military features and evidence of training exercises, denoted by disturbed ground, have been highlighted.

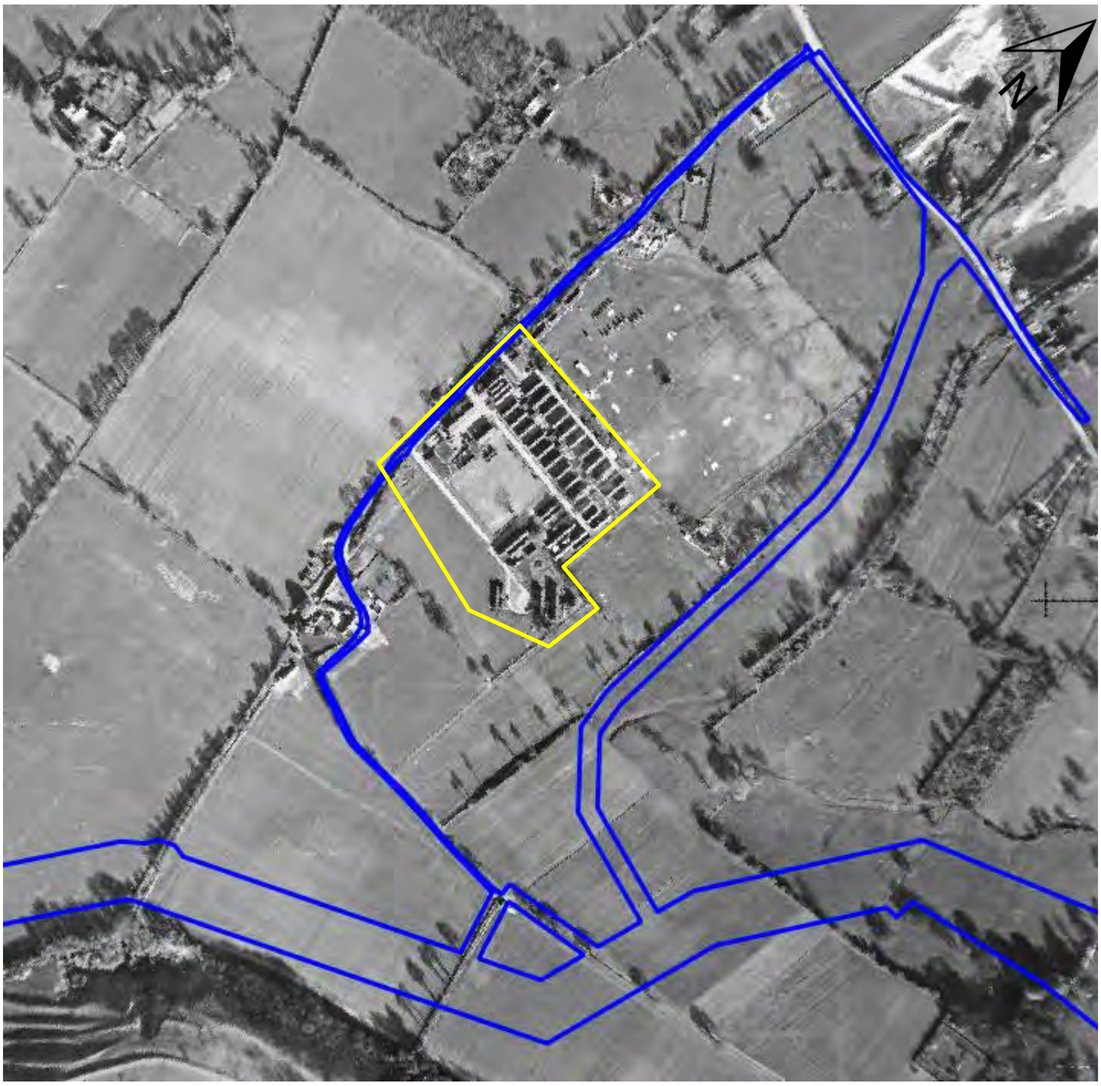
In this context 'disturbed ground' is defined as an area devoid of vegetation, likely to have resulted from human activity rather than natural processes.

These photographs demonstrate the focus of live-fire exercises within Block 7 and the 'fade-out' of significant training towards the perimeters of the SDTA.

Plate 6 is an aerial photograph, dated the 3rd April 1945, centred on TQ 107131, showing the northern boundary of the SDTA. No visible signs of intense training have been identified on or in the immediate vicinity of the Site.

Barns Farm Camp can be seen encroaching on the Site (see Section 3.7).

Plate 6 Aerial photograph of Sullington, 3rd April 1945



Source: Historic England *Not to Scale*

Legend	Site boundary	Barns Farm Camp

Plate 7 is an aerial photograph, dated the 3rd April 1945, centred on TQ 097127. Cratering and trenches can be seen on Sullington Hill.

Sullington SA range can also be seen encroaching on the Site.

Plate 7 Aerial photograph of Sullington Hill (north), 3rd April 1945

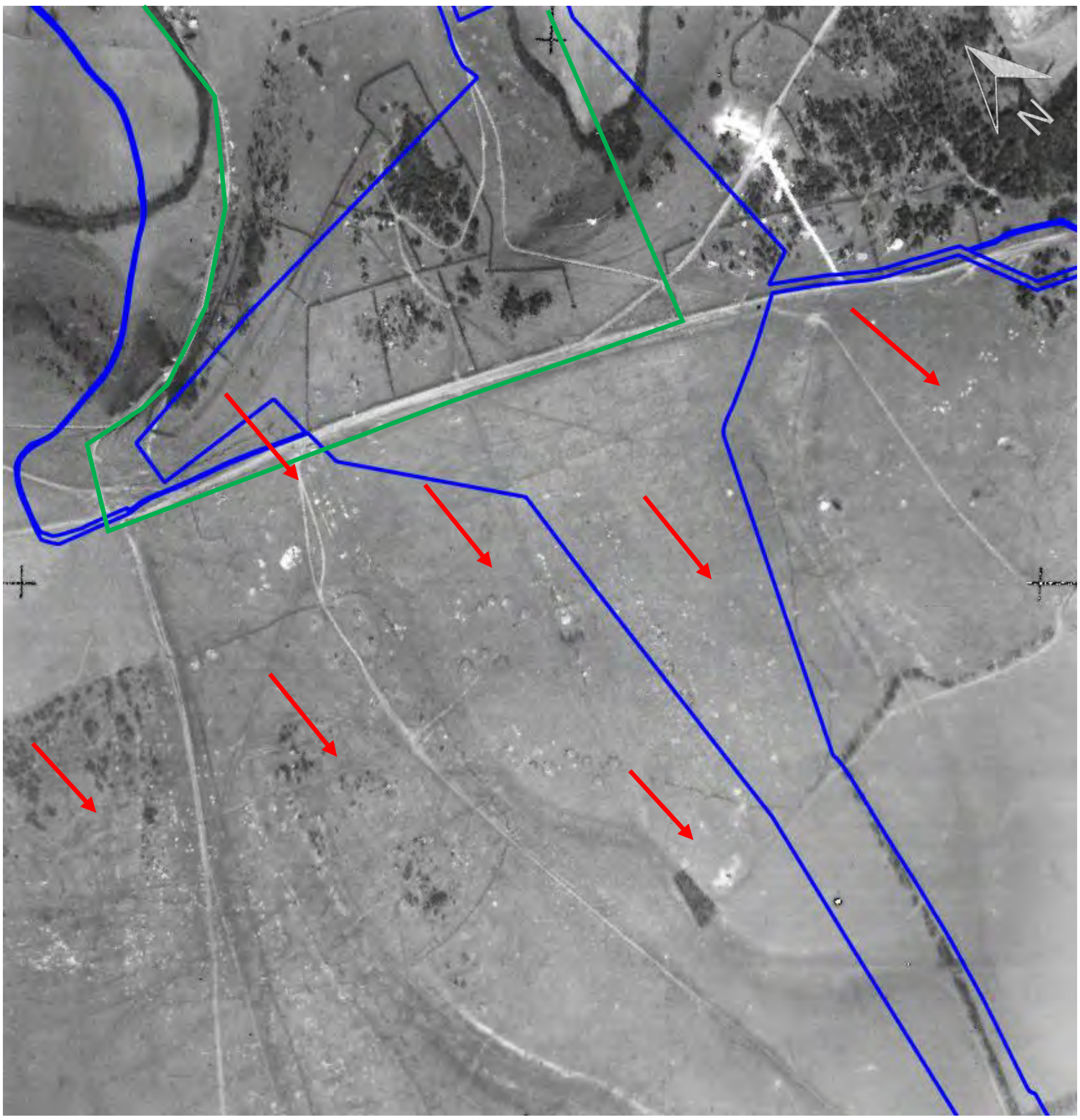
Source: Historic England *Not to Scale*

Legend	Site boundary	Sullington Hill	Sullington SA Range
	Cratering associated with military activity		

Plate 8 is an aerial photograph, dated the 3rd March 1945, centred on TQ 093113.

It shows significant cratering and disturbed ground on and in the immediate vicinity of the Site indicative of extensive live-fire training.

Plate 8 Aerial photograph of Sullington Hill (south), 3rd March 1945



Source: Historic England *Not to Scale*

Legend	Site boundary		Sullington Hill	
	Cratering associated with military activity			

Plate 9 is an aerial photograph, dated the 17th May 1945, centred on TQ 102099.

It shows significant cratering and disturbed ground on and in the immediate vicinity of the Site indicative of extensive live-fire training.

This also shows 1No. field located on the bottom left of the photograph which has no obvious signs of training and likely remained in agricultural use.

The Muntham Estate camp (see Section 3.7) has also been identified.

Plate 9 Aerial photograph of Blackpatch Hill, 17th May 1945

Source: Historic England *Not to Scale*

Legend	Site boundary	Muntham Estate
	Cratering associated with military activity	

Plate 10 is an aerial photograph, dated the 17th May 1946, centred on TQ 061080.

It shows less cratering and obvious signs of military activity towards the southwestern boundary of the SDTA.

Plate 10 Aerial photograph of Wepham Wood, 17th May 1946

Source: Historic England *Not to Scale*

Legend	Site boundary	Cratering associated with military activity

3.1.7 Munitions Disposal

Given the extent and intensity of training activities conducted on the SDTA, there would have been procedures and facilities for the disposal of excess or faulty munitions. It is likely that official disposal areas and facilities were moved when required.

In the first instance, the unit training would have been responsible for reporting and disposing of excess or faulty munitions.

SOs issued in February 1945 indicate that Block No. 7 of the SDTA was closed to training on Sundays, for 'repair and maintenance'. This would have offered an opportunity to dispose of any obviously identifiable UXO.

It is likely that UXO was disposed of in situ, or on a remote part of the SDTA, with SAA disposed of by burning in small pits.

After WWII, when parts of the former SDTA were under cultivation, large amounts of surplus ammunition were unearthed by agricultural works. This resulted in substantial caches of UXO forming on parts of the SDTA before they could be disposed of by Explosive Ordnance Disposal (EOD) units (see Plate 11).

3.1.8 Post-War EOC Operations

At the end of WWII, the SDTA was subject to Explosive Ordnance Clearance (EOC) operations to try and clear the area of remnant UXO prior to re-requisition. Documentary evidence indicates that Block No. 7 was one of the last to be cleared.

Records from 1945 indicate that initial clearance efforts were slow, and there was some concern at the lack of resources available to carry out the EOC operations on the SDTA.

By September 1946, a small number of Polish troops were working on Block No. 7 undertaking EOC operations.

Plate 11 is a photograph featured in an issue of *The Farmers Weekly*, dated the 6th September 1946. This shows ammunition brought to the surface during ploughing by the War Agricultural Executive Committee (WAEC).

Plate 11 Photograph of ammunition ploughed up on the South Downs, 6th September 1946

Source: National Archives

By November 1946, Block No. 7 was considered to have been cleared of all 'visible' UXO.

By October 1947, some of the land on Block No. 7 was being cultivated by the WAEC. Records indicate that by this time, WAEC workers had encountered approximately 396No. unexploded missiles during cultivation of the SDTA.

In 1949 and 1951, concerns were raised in the House of Commons (HoC) about the continued discovery of UXO on the South Downs and a shortage on labour to carry out further clearance operations.

The Secretary of State for War acknowledged that limited resources, manpower and poor ground conditions had significantly impacted the clearance operations.

Records indicate that the process of de-requisition and return of land to former owners continued well into the 1950s.

All derequisitioned land had to be subjected to some level of EOC before it could be handed back to its former owner. Notices of surrender indicate that this usually consisted of an area search by visual means.

When land was released back to its original owners, there were warnings that UXO could still be present and that any encounters should be reported to the police or nearest military HQ.

Potential UXO Hazard

There is an elevated potential for encountering UXO across the part of the Site requisitioned for the SDTA during WWII. The scale of the training exercises and the limitations of the post-WWII EOC operations mean that UXO will remain on this part of the Site, as evidenced by recent finds.

Ordnance is likely to be concentrated in the areas of intense military training identified above, although overspill is likely to have occurred in the surrounding fields. The parts of the Site within the STDA which comprised concrete roadway are considered unlikely to have been significantly impacted by military training.

Anticipated ordnance includes grenades, mortars, anti-tank shells and SAA at shallow depths. The potential for encountering artillery shells at greater depths cannot be discounted.

3.2 Other Military Ranges & Training Areas

3.2.1 Exercise Fabius

In May 1944 Exercise Fabius was undertaken on various British beaches. This included Climping Beach, encroaching onto the Site. The exercise comprised amphibious beach landings designed to familiarise Allied troops with their objectives ahead of the D-Day landings the following month.

Records indicate that the 3rd British Infantry Division, supporting units from the 27th and 79th Armoured Brigade, were instructed to land on Climping Beach.

Troops began from positions on a fleet of ships anchored in the Solent from which they could disembark and travel to Climping Beach on smaller craft known as Landing Craft Assault (LCA). The LCAs were armed with Bren MGs containing .303 and tracer bullet rounds.

Landing Craft Tanks (LCTs) were also involved and could carry 4No. tanks or other armoured vehicles. These would be sent ahead of the infantry to clear mines and lay bridges over trenches or craters.

Prior to the exercise, a field of 10No. dummy mines with dummy snag lines had been laid in the foreshore at Climping and a zone of obstacles had been laid in the centre of 'Red Beach' (TQ 001004) to be cleared by specialist units.

After the mines were cleared, the LCAs delivered the infantry units onto the shore. The units made their way up the beach towards various objectives around Littlehampton.

Plate 12 is a photograph of Exercise Fabius taking place on Climping beach, dating from May 1944.

Plate 12 Photograph of Exercise Fabius on Climping Beach, May 1944

Source: D-Day West Sussex

Potential UXO Hazard

No records have been found to indicate that live munitions were used during Exercise Fabius.

The supporting LCAs were equipped with Bren MGs and it is possible that they fired in the direction of Climping Beach to simulate covering fire. This may have resulted in SAA being expended on and in the vicinity of the Site.

It is also likely that infantry units were equipped with SAA which could have been dropped on the Site.

SAA is not considered to provide a significant source of UXO hazard (see Appendix 1).

Exercise Fabius is not considered to provide a significant source of UXO hazard to the Site.

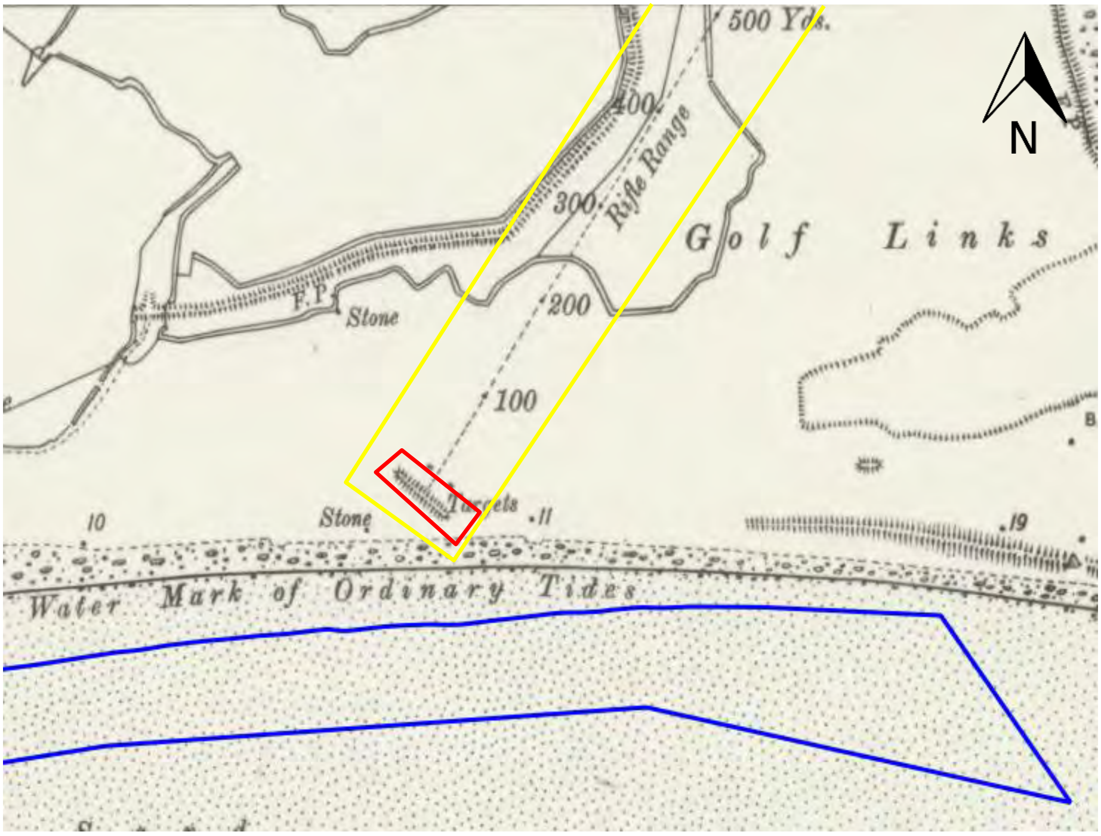
3.2.2 Littlehampton Rifle Range

By 1899, 1No. 800-yard (yd) rifle range had been established on Littlehampton Golf Course, within approximately 0.1km north of the Site.

The targets (TQ 020011) were located within approximately 0.1km north of the Site, and the direction of fire was oriented northeast to southwest, towards the Site.

Figure 6 is an historical map dating from 1912 showing the rifle range in relation to the Site.

Figure 6 Historical map showing Littlehampton Rifle Range, 1912



Source: © Crown Copyright 2023 Reproduced by permission of Ordnance Survey *Not to Scale*

Legend	Site boundary (blue line)	Rifle range (yellow line)	Rifle range targets (red line)

During WWI the rifle range continued to operate.

By 1932 the rifle range had fallen into disuse and been dismantled.

Littlehampton Rifle Range is not considered to provide a significant source of UXO hazard to the Site.

3.3 Military Airfields

For further information on military airfields, and the potential UXO hazards associated with them, see Appendix 2.3. Alternatively, follow the link below:

- Military Airfields

Between 1917 and 1958 Royal Air Force (RAF) Ford was located approximately 0.1km north of the Site.

A brief operational history of the airfield is provided below.

3.3.1 Operational History of RFC/RAF/RNAS Ford

In 1917, Royal Flying Corps (RFC) Ford (SU 994028) was established on land approximately 0.1km north of the Site. The nearest part of the airfield to the Site was the accommodation area.

RAF Ford operated as a training base and was used by American pilots on route to France. The airfield was partially closed prior to the end of WWI and the accommodation blocks were used to house German Prisoners of War (PoWs) until just after the end of WWI.

From 1918, the airfield was renamed RAF Ford and was used by trainee American military pilots of the Night Bombardment Training School until 1920. This unit was training on the Handley Page 0/400 bomber aircraft, which were also assembled at RAF Ford.

From 1919 the airfield was used as an RAF Flying School and a demobilisation base, which was closed in 1920. The airfield was decommissioned, and the land partially returned to agriculture.

In 1930 the airfield was purchased by the Sussex Aero Club and re-opened for civilian use. It was also used as a developmental research station, carrying out some of the earliest experiments on air-to-air refuelling.

In 1937 Ford Airfield was purchased by the Air Ministry and in early 1938 was allocated to the Fleet Air Arm (FAA) as a Royal Naval Air Station (RNAS) for training. In late 1938 the airfield re-opened as a School of Naval Co-Operation and was commissioned as His Majesty's Ship (HMS) Peregrine, part of No. 1 Observer School.

At the start of WWII, the airfield was occupied by the Royal Navy School of Photography and operated with a grass landing ground and only partial perimeter track.

Following a heavy air raid on the 18th August 1940 (see Section 4.2) much of the airfield was destroyed and it was closed for reconstruction. HMS Peregrine was handed over to the RAF on the 1st October 1940.

Plate 13 is an aerial photograph dated the 7th October 1940. It shows the early layout of RAF/RNAS Ford.

Plate 13 Aerial photograph of HMS Peregrine (RAF Ford), 7th October 1940

Source: NARA

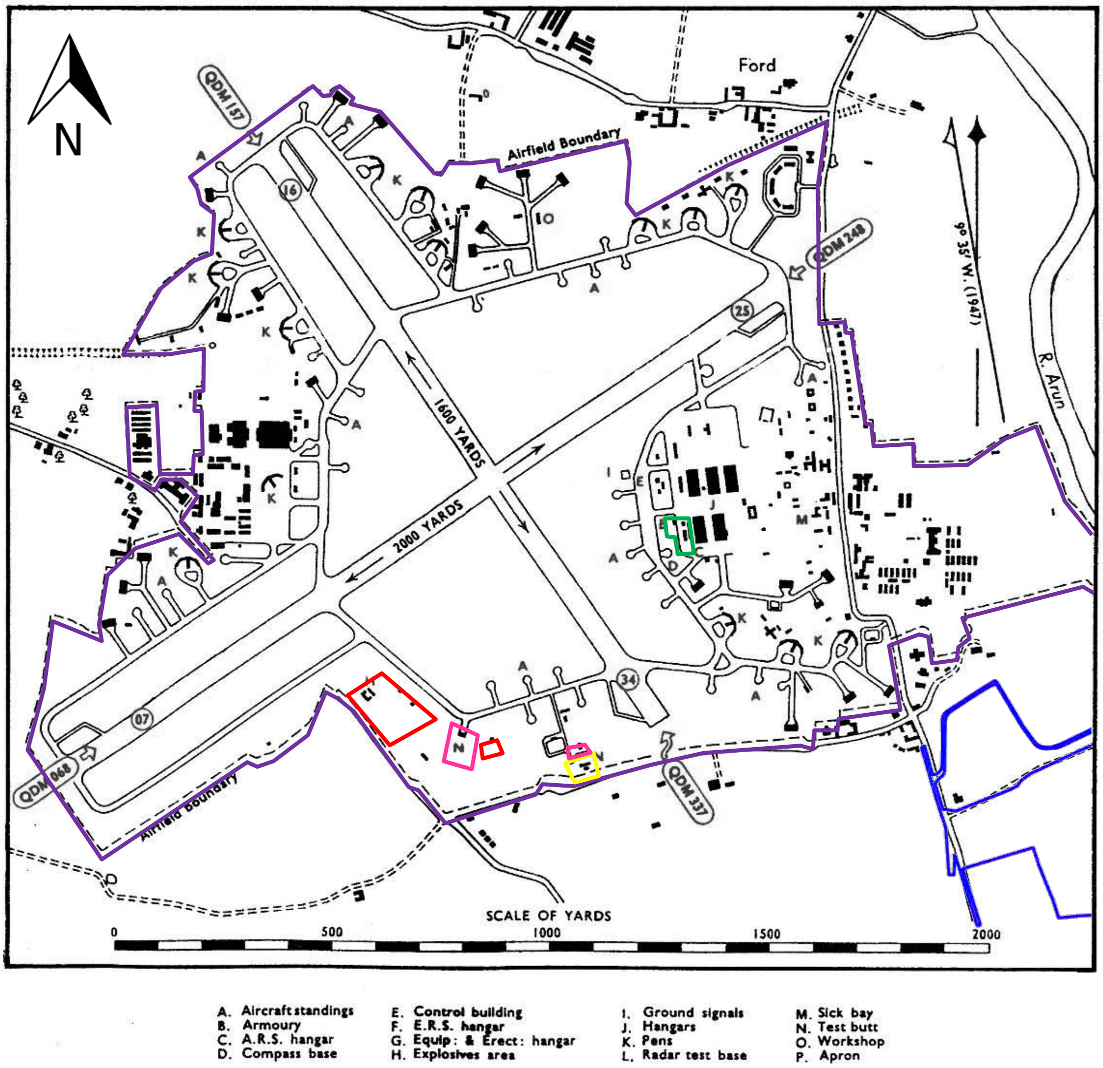
Legend	Site boundary	Airfield boundary

The airfield was temporarily repaired and reopened, operating with 1No. squadron using grass runways.

In October 1941 it was closed again and redeveloped with the addition of 2No. long concrete runways and new hangars. RAF Ford reopened in May 1942 as a fighter airfield operating 2No. squadrons in a night-fighter defence role.

Figure 7 is a 1948 plan of RAF Ford. Several features of the airfield have been identified.

Figure 7 Plan of RAF Ford, 1948



Source: Royal Navy Archives *Not to Scale*

Legend			
	Site boundary	Airfield boundary	Bomb stores
	Rifle range	Test butts	Armouries

The Fighter Interception Unit (FIU) later moved to RAF Ford and in the preparations for D-Day, RAF Ford was identified as a support airfield. Operational units were moved in to support the landings and attack the targets in the vicinity of landing sites.

With the advent of D-Day a wide range of RAF squadrons were present at RAF Ford, operating fighter and bomber aircraft, as well as many American fighter units.

Once D-Day was underway RAF Ford was used by RAF Transport Command aircraft delivering supplies and returning with wounded troops.

With the increased bombing campaign against Germany, the airfield became used as a diversionary airfield for bomber aircraft returning with damage or fuel problems. Records indicate that 1,679No. aircraft used RAF Ford as an emergency landing ground.

At the end of WWII RAF Ford was used for repatriation of ex-PoWs.

After WWII, the airfield was handed back to the Royal Navy and its name reverted to HMS Peregrine. Its main role was to act as a training base, but flying operations were still carried out.

Between 1950 and 1958 RNAS Ford operated a wide range of both propeller and jet aircraft in a variety of different roles. The airfield also catered for rotary-winged aircraft and their marine-modified equivalents.

The airfield was closed to flying in September 1958 and in 1963 the former technical area was sold and converted into Her Majesty's Prison (HMP) HMP Ford.

The remainder of the airfield was decommissioned during 1980 and then sold.

3.3.2 Military Activities at RFC/RAF/RNAS Ford/HMS Peregrine

The following Sections describe the main parts of the airfield likely to provide a source of UXO hazard to the Site.

Pipe Mines

Records indicate that pipe mines were laid across the runways at RAF Ford as part of the airfield's anti-invasion defences, within approximately 0.2km west of the Site.

An entry in the Operational Record Book (ORB) for RAF Ford indicates that Canadian Pipe Mine laying commenced on the 27th October 1941, after the improvements to the airfield runways and perimeter tracks were completed.

A second entry, on the 1st December 1941, indicates that by this time all the mines had been installed and loaded with explosives.

Figure 8 is a plan of the laid-out minefield under the landing area of the airfield, dating from 1941. This indicates that there were no pipe mines laid outside of the airfield boundary.

Figure 8 Plan of WWII pipe mines laid at RAF Ford, 1941

Source: Royal Air Force Museum *Not to Scale*

Legend	Airfield boundary

Typically, it was accepted practice to remove pipe mines once the threat of invasion had passed, although no mine clearance records have been found for RAF Ford.

There are examples from other airfields where pipe mines have been found even though records indicate that they were cleared.

Whilst there may be remnants of the pipe mines at RAF Ford, the records show that the part of the airfield encroaching on the Site formed part of the accommodation area that was not mined.

Pipe mines are not considered to provide a source of UXO hazard to the Site.

Bomb and Munitions Stores

During WWII, RAF Ford was equipped with bomb stores which were located on the southwest side of the main runway, off the perimeter track, approximately 1.1km west of the Site (see Figure 7). An IB store was located to the south of the southern perimeter track, approximately 0.9km west of the Site.

RAF Ford also had several armouries, which were typically used to store small arms and disassembled aircraft guns.

By 1948, there were 2No. armouries indicated on the airfield plan. The nearest were located in the Technical Area, approximately 0.8km northwest of the Site (see Figure 7).

Bomb and munition stores are not considered to provide a source of UXO hazard to the Site.

Test Butts

Facilities for testing aircraft guns, including machine guns and cannons, were established on the southern side of RAF Ford, approximately 0.6km west of the Site (see Figure 7).

The direction of fire was north to south, away from the Site.

These facilities were demolished and removed when the airfield closed.

Test butts are not considered to provide a source of UXO hazard to the Site.

Small Arms Ranges

1No. 25yd rifle range was located on the airfield perimeter on the southern side of RAF Ford, approximately 0.6km west of the Site (see Figure 7).

This range was used for regular firing practice to back up the ground defence training.

The range was demolished and removed when the airfield was closed.

Small arms ranges are not considered to provide a source of UXO hazard to the Site.

Airfield Defences

At the start of WWII the anti-aircraft defences at RAF Ford comprised 6No. Lewis machine guns mounted on vehicles to protect the airfield.

After reconstruction, records indicate that both 40mm Bofors guns and 2mm Hispano cannons were installed in gun emplacements around the airfield.

1No. Heavy Anti-Aircraft (HAA) battery, approximately 1.1km northwest of the Site, was established on the northeast perimeter of the airfield.

These defences were likely supported by machine guns that could be elevated for AA duties.

The local Home Guard, the 6th Sussex (Arundel) Battalion, participated in exercises to test the airfield defences.

Airfield defences are not considered to provide a source of UXO hazard to the Site.

Munitions Disposal Areas

No records of munitions disposal taking place at RAF Ford have been found, although it is possible that there would have been facilities at the airfield for the disposal of aircraft ammunition and pyrotechnics during and after WWII.

It is unlikely that disposal would have occurred in the immediate vicinity of the Site, which was outside the airfield boundary and in the vicinity of the accommodation areas.

Munitions disposal areas are not considered to provide a source of UXO hazard to the Site.

Aircraft Breaking

No records of aircraft breaking activities at RAF Ford have been found.

Bombing Range

No records of any bombing ranges at RAF Ford have been found.

3.4 Aircraft Crashes

For further information on military aircraft crashes, and the potential UXO hazards associated with them, follow the link below:

- Aircraft Crashes

The nearest recorded aircraft crashes to the Site are described below.

Appendix 5 provides further details of recorded aircraft crashes in the immediate vicinity of the Site.

26th August 1940

1No. Heinkel III bomber aircraft crashed on open ground near Courtwick Farm, approximately 0.1km east of the Site.

5th May 1941

1No. Supermarine Spitfire IIa (P7753) fighter aircraft crashed in a field at Priors Lea, north of the main railway, at Littlehampton, approximately 0.1km southeast of the Site.

16th September 1941

1No. Supermarine Spitfire Ia (W3374) fighter aircraft crashed, during a training flight, on the beach south of the Littlehampton Golf Course, on the Site (TQ 020009).

13th May 1943

1No. Typhoon (XMX R.9891) bomber aircraft crashed upon returning from a mission, in a field east of Arundel railway junction, on the Site (TQ 018043).

10th November 1943

1No. Typhoon (JP544) bomber aircraft crashed on open ground southwest of St Mary Magdalene's Church, Lyminster, on the Site (TQ 020045). Records indicate that it was armed with 2No. 500lb HE bombs, 1No. of which exploded onboard the aircraft causing the crash. The other was removed from the wreckage as an Unexploded Bomb (UXB).

5th January 1944

1No. Supermarine Spitfire (MJ152) fighter aircraft crashed on a field north of Toll Bridge, Littlehampton, within approximately 0.1km east of the Site.

31st January 1944

1No. de Havilland Mosquito (V1, 951) multirole aircraft crashed on a field near Priors Lease, approximately 0.3km northwest of the Site.

Records indicate that it was armed with 4No. 500lb HE bombs, 3No. of which were removed from the wreckage as an UXBs.

The 4th HE bomb was not located, and assumed to have been buried along with the engine of the aircraft. It is considered this would have been removed along with the aircraft wreckage.

It cannot be totally discounted that the UXB was jettisoned before the aircraft crashed, within the vicinity of the Site.

1st August 1944

1No. North American P-51 Mustang crashed on fields near Burpham, on the Site (TQ 078086)

Potential UXO Hazard

No records have been found to indicate that the above crashes had bombs aboard the aircraft that remain unaccounted for on the Site.

There is also no positive evidence that any wreckage from these crashes remains on the Site.

Some of the above crashes may have resulted in the scatter of SAA and cannon shells from aircraft guns over a wide area, including on the Site.

SAA is not considered to provide a significant UXO hazard (see Appendix 1).

Aircraft crashes are not considered to provide a significant source of UXO hazard to the Site.

3.5 Defences

For further information on military defences, and the potential UXO hazards associated with them, follow the links below:

- Anti-Aircraft Guns
- Anti-Invasion Defences
- Barrage Balloons
- Bombing Decoys
- Home Guard
- Mined Locations
- Mortar & Gun Emplacements
- Pillboxes

In addition to defences associated with RAF Ford (see Section 3.3.2), several military defences have been identified on and in close proximity to the Site.

3.5.1 Anti-Aircraft Guns

Records indicate that during WWI there were no AA gun batteries within 10km of the Site. The nearest was located in Newhaven (TQ 448001), approximately 29.1km southeast of the Site.

Records indicate that during WWII there were at least 10No. HAA and Light AA (LAA) batteries within 10km of the Site.

In 1940, 1No. HAA battery was located northeast of Atherington (TQ 009013), on the Site. Its armament is unknown.

In 1942 1No. HAA battery was located at Atherington (TQ 007008), adjacent to the Site. Its armament is unknown.

An additional 6No. HAA batteries were moved within 10km of the Site as part of Operation Diver. The nearest was located at Hayward Heath (TQ 325237), approximately 8.2km northeast of the Site. It was armed with 4No. 40mm guns.

The nearest recorded WWII AA shell incident to the Site is described below.

March 1944

1No. AA shell fell on Angmering Park, approximately 0.2km west of the Site. This was recorded as an Unexploded AA (UXAA) shell.

Potential UXO Hazard

Given the number of HAA gun batteries in the surrounding area during WWII, the potential for an UXAA shell to have fallen on the Site unnoticed cannot be discounted. As with any similar rural area, this provides a background risk to intrusive works.

The HAA batteries on and adjacent to the Site would have had ammunition lockers and temporary shell stores. Whilst the potential for localised munitions disposal cannot be totally discounted, it was typical for these munitions stores to have been removed once the operations of the battery ceased.

3.5.2 Mined Locations

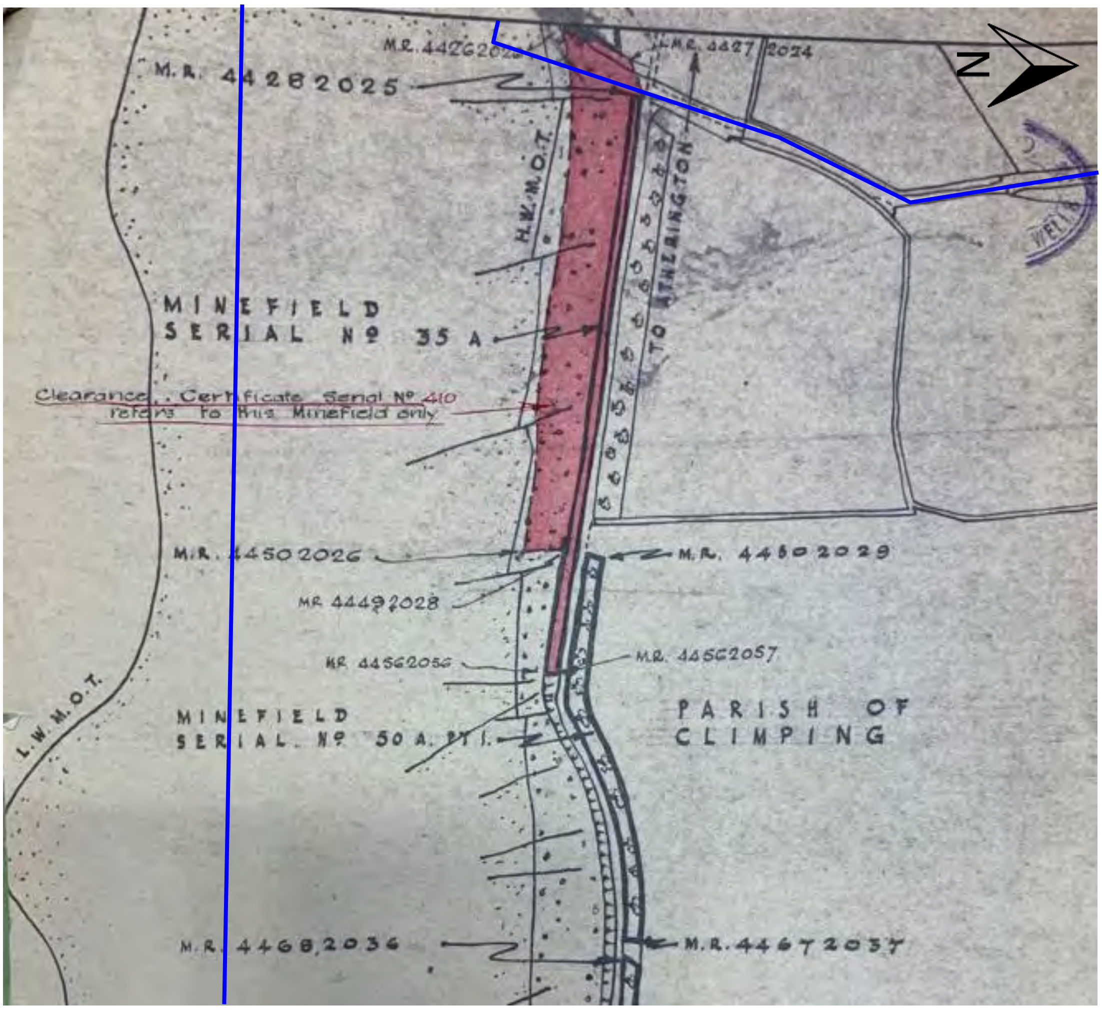
Minefields were laid on beaches and other coastal areas deemed vulnerable to invasion and were often protected by barbed wire installations and anti-tank blocks.

Between the 14th August and the 11th September 1940 approximately 694No. mushroom mines were laid on the Climping and Littlehampton seafront, encroaching onto part of the Site (between TQ 008008 and TQ 015010).

Records indicate that the clearance of West Sussex beach minefields began on the 28th May 1944, when the threat of invasion had passed.

Figure 9 is an extract from a minefield clearance plan for minefield Serial No. 35A, on the Site (TQ 009008), dated the 24th April 1945. The cleared minefield is highlighted in red.

Figure 9 Extract from minefield clearance plan for Serial No. 35A, 24th April 1945



Source: West Sussex Record Office *Not to Scale*

Legend	Site boundary	Cleared minefield

Records indicate that by the 4th July 1945 all the minefields on and in the vicinity of the Site were subject to clearance activities, and were declared safe by the Chief Engineer of the South Eastern Command.

Potential UXO Hazard

Records indicate that the minefields on the Site were cleared using the pre-war installation plans.

For defended coastal areas, it is known that many mines were moved from their original positions by tidal currents or by accidental detonations and there is a possibility that some may remain undetected.

Subsequent beach replenishment and coastal defence improvements have not uncovered any remnant anti-invasion mines in the vicinity of the Site, suggesting that the probability of encounter is low.

3.5.3 Gun Emplacements

By 1940, 3No. gun emplacements had been established at Bines Green (TQ 191176, TQ 198176, and TQ 189176), approximately 30m south, 0.1km southeast, and 0.2km southwest respectively from the Site.

Additionally, 1No. gun emplacement was established near Ford (TQ 008041) approximately 0.3km west-northwest of the Site.

They were established to protect road and railway crossings of the River Adur and were armed with 25-pdr guns. The gun emplacements had small munitions caches.

Whilst such caches were typically removed at the end of WWII, the potential for localised disposal of ammunition around the gun emplacements cannot be totally discounted.

3.6 Explosives Factories, Munitions Depots and Disposal Areas

For further information on explosives factories, munitions depots and disposal areas, and the potential UXO hazards associated with them, follow the links below:

- Explosives Factories
- Munitions Depots
- Munitions Disposal Areas

Munitions stores and disposal areas associated with the SDTA and RAF Ford are addressed in Sections 3.1 and 3.3 respectively.

Otherwise, no explosives factories, munitions depots or disposal areas have been identified on or in close proximity to the Site.

3.7 Other Military Establishments

Several other military establishments have been identified on and in close proximity to the Site.

3.7.1 Military Camps

Barns Farm Camp

By 1943, Barns Farm Camp (TQ 106132) had been established on land encroaching onto the Site. It comprised several Nissen huts which accommodated British and Canadian troops who were training on the SDTA.

Plate 14 is an aerial photograph dated the 16th August 1943 showing Barns Farm Camp encroaching on the Site.

Plate 14 Aerial photograph showing Barns Farm Camp, 16th August 1943

Source: NCAP *Not to Scale*

Legend	Site boundary	Barns Farm Camp

In November 1946 No. 5 (Polish) Field Hospital moved to Barns Farm Camp. In 1948 the hospital was renamed the Polish Resettlement Corps (PRC) General Hospital – Storrington. It continued to operate until the PRC disbanded in the 1950s. Most of the Nissen huts were removed and any remaining have been converted for storage.

Munthem Estate Camp

By 1943, Muntham Estate (TQ 111099), on the eastern part of the Site, was requestioned for use as a temporary camp for troops training on the STDA, including the Queen's Own Rifles of Canada.

Plate 15 is an aerial photograph dated the 16th August 1943 showing Muntham Estate camp encroaching on the Site.

Plate 15 Aerial photograph showing Muntham Estate Camp, 16th August 1943

Source: NCAP *Not to Scale*

Legend	Site boundary	Muntham Estate Camp

Post-WWII the estate was sold and demolished, with the house being redeveloped into Worthing Crematorium.

Sandgate House and Park Camp

By 1943, Sandgate House (TQ 101140), approximately 0.4km northwest of the Site, had been requisitioned for use as the HQ of the Chemical Warfare Wing of the Canadian Battle School. Several Nissen huts were established in the surrounding parklands as accommodation, within approximately 0.2km northwest of the Site.

Post-WWII Sandgate House was sold and demolished, and the former estate turned into Sandgate Park Quarry.

Potts Farm Army Camp

By 1944, Potts Farm Army Camp (TQ 227205) had been established on land approximately 0.4km west-southwest of the Site. It was likely used as a temporary accommodation camp for troops moving through West Sussex in preparation for the D-Day Landings.

By 1946 the camp had been removed, and the land returned to agriculture.

Potential UXO Hazard

There is no evidence that munitions were stored or disposed of at the military camps located on or in close proximity to the Site.

It is likely that personnel based at the camps were issued with SAA which may have been spilled/discarded locally.

SAA is not considered to provide a significant UXO hazard (see Appendix 1)

Military camps are not considered to provide a significant source of UXO hazard to the Site.

3.7.2 RAF Poling Chain Home Radar Station

In April 1938, RAF Poling (TQ 043051) was established as a Chain Home Radar Station, encroaching on the southern part of the Site. During WWII the station provided early warning of approaching Luftwaffe aircraft for the south coast.

Associated accommodation and a guard house were established to the east of the transmitter masts, within approximately 0.1km south of the Site.

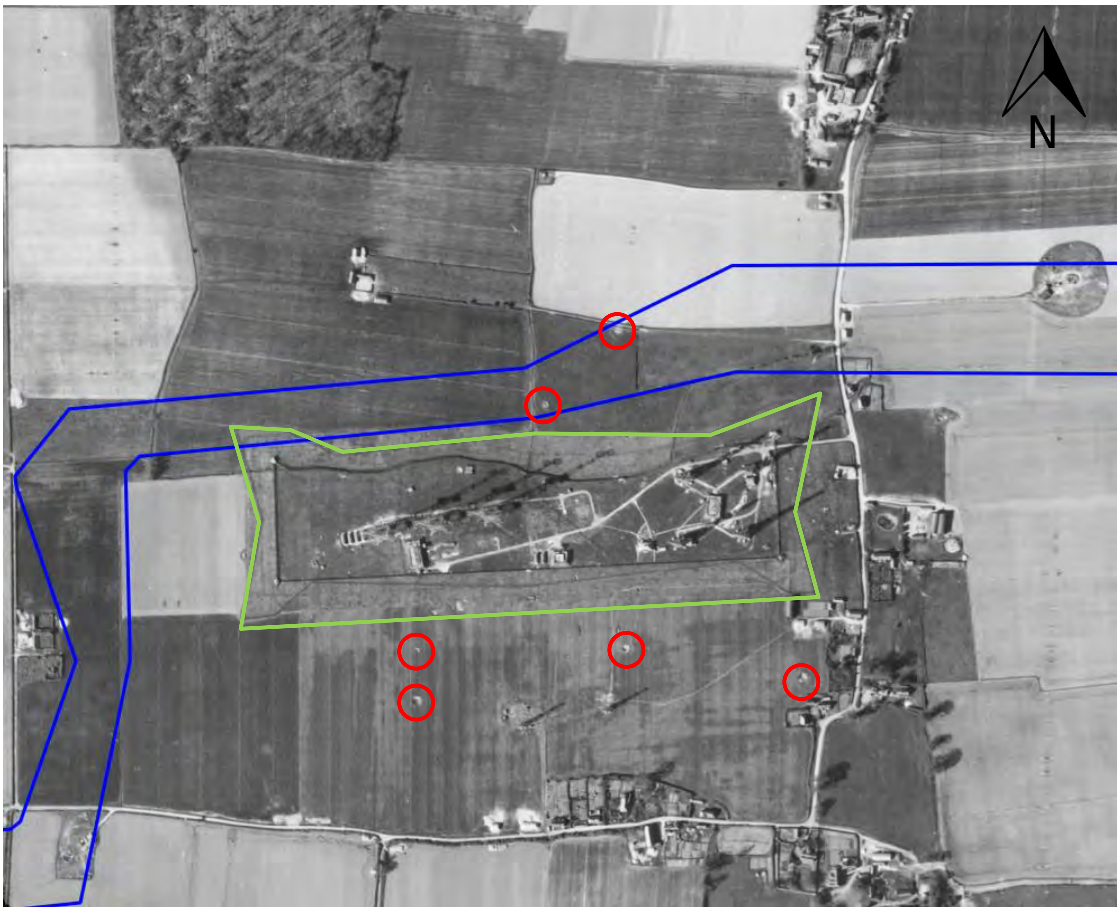
1No. pillbox (TQ 040046) was situated in the vicinity of RAF Poling for its defence, approximately 0.3km east of the Site.

Records also indicate that from 1940 LAAs were moved into defensive positions around RAF Poling. No records have been found to indicate that these were established on the Site.

Plate 16 is an aerial photograph dated the 22nd April 1944 showing RAF Poling encroaching on the Site.

Some potential bomb damage and cratering has been identified in the vicinity of RAF Poling (see Section 4.2).

Plate 16 Aerial photograph showing RAF Poling, 22nd April 1944



Source: NCAP *Not to Scale*

Legend	Site boundary	RAF Poling	Possible bomb damage

Post-WWII RAF Poling was maintained as part of the Rotor Radar Programme. By the 1970s the station was closed, and the masts were removed, with the former radar station being given over to agricultural use.

RAF Poling is not considered to provide a source of UXO hazard to the Site.

3.7.3 Littlehampton Fort

In 1854 Littlehampton Fort (TQ 027011) was established approximately 0.2km northeast of the Site. It was designated for the protection of the River Arun and Littlehampton Harbour. It was armed with 3No. 68-pdr and 2No. 32-pdr cannons.

By 1873, the fort had been declared inadequate to provide proper defence to the river mouth and harbour.

The final known use for Littlehampton Fort was to accommodate troops using the nearby Littlehampton rifle range (see Section 3.2.2).

In 1891 the guns were removed, and the fort was dismantled.

Littlehampton Fort is not considered to provide a source of UXO hazard to the Site.

4 BOMBING

4.1 WWI Bombing

For further information on WWI bombing in the UK, and the potential UXO hazard associated with it, see Appendix 2.6. Alternatively, use the following link.

- WWI Bombing

No records have been found indicating that the Site was bombed during WWI.

The nearest recorded bombing incident took place at Guildford, approximately 34km northwest of the Site, on the 13th October 1915.

4.2 WWII Bombing

For further information on WWII bombing in the UK, and the potential UXO hazard associated with it, see Appendix 2.7. Alternatively, use the following link.

- WWII Bombing

Records indicate that parts of the Site were bombed during WWII. Further details on bombing in the vicinity of the Site are given in the following sections.

4.2.1 Bombing in West Sussex

From prior to the declaration of war in 1939, Britain was subjected to reconnaissance flights by the Luftwaffe which was building up a photographic record of potential targets.

Military airfields and RAF radar stations in the region were heavily bombed given their role in defending the South Coast. RAF Ford and RAF Poling were both raided on several occasions during WWII. Records for the raids and the type of bombs used on many of the region's military targets were suppressed until after WWII and consequently may not appear in civilian records.

This area of Sussex was also subjected to some 'tip and run' bombing raids, particularly using fighter bomber aircraft, and aircraft jettisoning bombs either before reaching their intended target or on their return flights from strategically important targets such as London and the industrial Midlands.

Apart from the first raids which were launched against the airfields, many raids were typically carried out by small numbers of aircraft or lone raiders. The bombing densities in rural West Sussex were lower than for many other regions in the country.

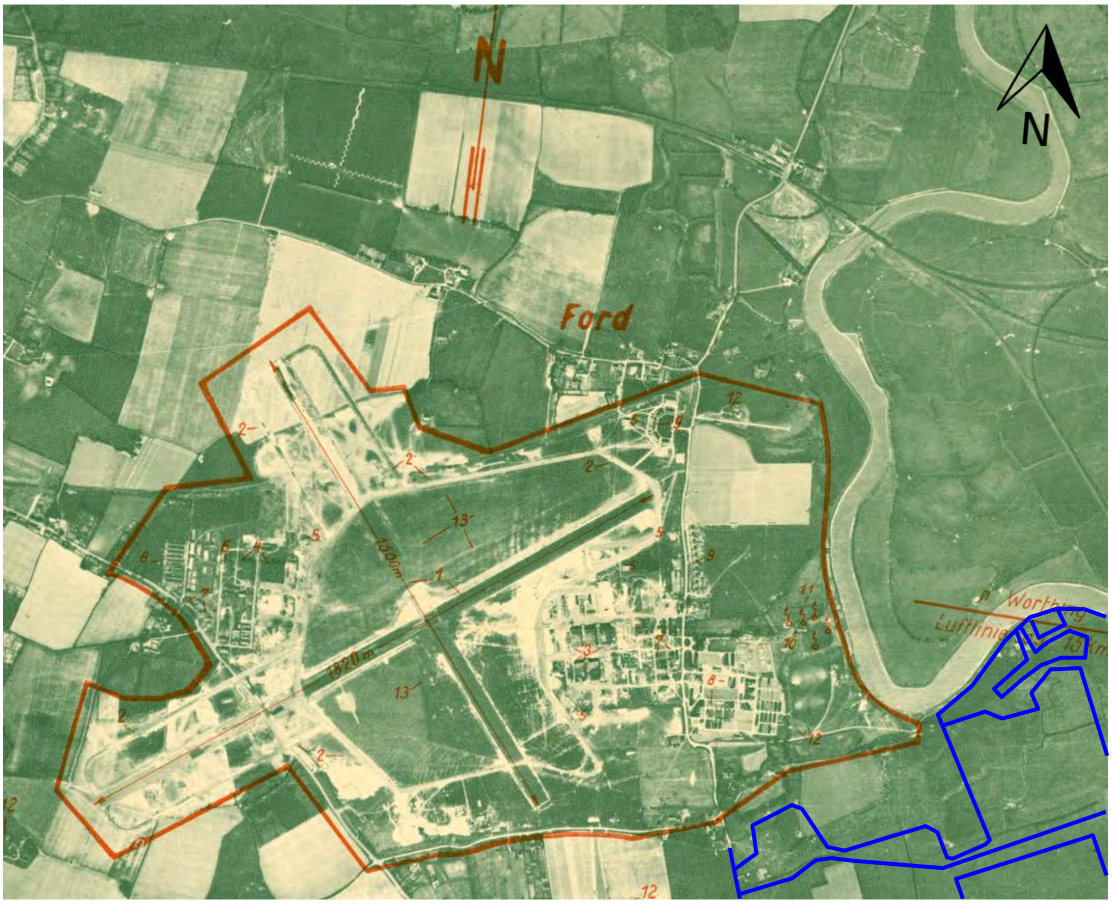
4.2.2 Strategic Targets

The Site passed through predominantly rural areas which contained few potential strategic targets.

The main targets in the area were located around the southern part of the Site and included RAF Ford, RAF Poling, and Littlehampton Harbour.

Plate 17 is a Luftwaffe target photograph of RAF Ford (target GB10 83) dated the 14th April 1942. This shows the enlarged airfield with the runways highlighted (Target A).

Plate 17 Luftwaffe target photograph of RAF Ford, 14th April 1942



Source: NARA *Not to Scale*

Legend	Site boundary

4.2.3 Bombing Densities and Incidents

Table 2 gives details of the overall bombing statistics recorded for the Local Authority Districts of the Site. These were categorised as Rural Districts (RD), Urban Districts (UD), Municipal or Metropolitan Boroughs (MB) and County Boroughs (CB). WWII bomb density levels are defined below:

<5 bombs per 405ha is a Very Low regional bombing density.

5-15 bombs per 405ha is Low.

15-50 bombs per 405ha is Moderate.

50-250 bombs per 405ha is High.

>250 bombs per 405ha is Very High.

Table 2 Bombing statistics

Area	Bombs Recorded				
	High Explosive	Parachute Mines	Other	Total	Bombs per 405ha (1000 acres)
Littlehampton UD	83	1	4	88	34.3
Chichester RD	1,154	38	29	1,221	11.9
Cuckfield RD	582	0	52	634	8.5
Horsham RD	410	0	29	439	5.8
Worthing RD	123	0	1	124	4.2
Chanctonbury RD	169	1	1	171	3.0

Note that Table 2 excludes the figures for Flying Bombs (V1s) and IBs. Discrepancies between this list and other records, such as bomb clearance records, demonstrate that this data is likely to under-represent actual bombing.

Details of the nearest recorded bombing incidents to the Site are given in the following section. Appendix 6 provides further details of recorded bombing incidents in the immediate vicinity of the Site.

14th August 1940

12No. HE bombs fell on Littlehampton Golf Course and the surrounding fields, within approximately 0.3km northeast of the Site.

18th August 1940

RAF Poling, encroaching on the southern part of the Site, was heavily attacked by a formation of by a formation of 28No. Junkers Ju87 and 24No. Junkers Ju88 dive bomber aircraft. At least 87No. HE bombs fell across the radar station, with 47No. of these falling within the compound of RAF Polling.

Records indicate several of these were recorded as UXBs.

Plate 18 is an aerial photograph dated the 23rd September 1940. Significant bomb has been identified on the Site, with several craters on and adjacent to parts of the Site near RAF Poling, likely as a result of this heavy raid.

Plate 18 Aerial photograph, 23rd September 1940

Source: NCAP *Not to Scale*

Legend	Site boundary	Possible bomb damage

HMS Peregrine (RAF Ford), within approximately 0.1km north of the Site, was heavily attacked by a formation of 28No. Junkers Ju87 dive bomber aircraft. At least 70No. 250kg and 500kg HE bombs fell across the airfield and on the technical area.

Considerable damage was caused to all the facilities and the airfield was effectively destroyed. Plate 19 illustrates some of the damage caused to the airfield property.

Plate 19 Photograph of HMS Peregrine after the air raid of the 18th August 1940

Source: Yapton History

Luftwaffe reconnaissance photography dated the 10th January 1941 identifies several craters within 0.2km of the Site near RAF Ford, likely as a result of this heavy raid.

Plate 20 shows 3No. craters within approximately 0.2km south and southwest of the Site, indicated by the white circle. No cratering has been identified on the Site.

Plate 20 Luftwaffe reconnaissance photograph of RAF Ford, 10th January 1941

Source: NARA *Not to Scale*

Legend	Site boundary

Plate 21 shows several craters approximately 0.2km and 0.4km north of the Site, identified by the white circles. No cratering has been identified on the Site.

Plate 21 Luftwaffe reconnaissance photograph of RAF Ford, 10th January 1941

Source: NARA

Not to Scale

Legend	Site boundary

9th September 1940

2No. HE bombs fell on open ground south of Crookthorn Lane, Climping, approximately 0.1km southwest of the Site. These were recorded as UXBs.

29th September 1940

3No. HE bombs fell on Blackpatch Hill, on and within approximately 0.1km northeast and southwest of the Site.

4th October 1940

1No. HE bomb fell on Dragons Farm, Dragons Lane, approximately 0.1km southeast of the Site. This was recorded as UXB.

5th October 1940

1No. HE bomb fell on open ground near Sweet Mill Farm, Ashurst, on the Site (TQ 180157). This was recorded as UXB.

1No. HE bomb fell on open ground at Blakes Farm, approximately 0.1km east of the Site.

10th October 1940

4No. HE bombs fell on open ground at Muntham Court, approximately 0.1km west of the Site.

28th November 1940

Several IBs fell on open ground near Lyminster Road, Lyminster, on the Site (TQ 028046).

19th December 1940

9No. HE bombs fell on open ground of Muntham Estate, Findon, on the Site (TQ 111100).

27th April 1942

3No. HE bombs fell on RAF Poling, approximately 0.1km south of the Site.

27th September 1943

1No. 1,000lb British HE bomb that had fallen from a damaged aircraft attempting to land at RAF Ford was found on the airfield and was removed by a disposal team the same day.

10th November 1943

1No. HE bomb fell on the Brighton-Portsmouth railway line, approximately 0.1km north-northwest of the Site.

Date Unspecified

2No. HE bombs fell on fields south and east of Brookpit Lane, approximately 0.1km south of the Site.

It should be noted that during WWII, many UXB were mapped and subsequently removed as and when conditions and demands on Bomb Disposal teams allowed. Their removal was not always accurately recorded and sometimes records were later destroyed. In practice, most UXB were probably removed and only a much smaller number were actually registered as officially abandoned bombs.

Figures 10 to 15 are maps showing the approximate location of recorded bomb impacts in the immediate vicinity of the Site. IBs shown are indicative of larger numbers of similar devices that fell within the given area.

The maps have been compiled from a number of different sources, including air raid incident reports, historical aerial photographs and bomb census maps.

The bomb maps are also given in the accompanying P9727-23-R1-MAP01-C.

Figure 10 is a compiled bomb map for the vicinity of the Site between Shermanbury and Cowfold. It demonstrates the very low bombing density across this part of the Site.

Figure 10 Compiled bomb impact map for the vicinity of the Site (Shermanbury to Cowfold)

Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	HE bomb	UXB

Plate 22 is an aerial photograph, dated the 16th August 1946, showing the Site at Partridge Green. No damage or cratering has been identified on the Site.

Some possible bomb damage has been identified to the southwest of the Site.

Plate 22 Aerial photograph of Partridge Green, 16th August 1946

Source: Historic England *Not to Scale*

Legend	Site boundary	Possible bomb damage

Figure 11 is a compiled bomb map for the vicinity of the Site between Wiston to Ashurst. It demonstrates the very low bombing density across this part of the Site.

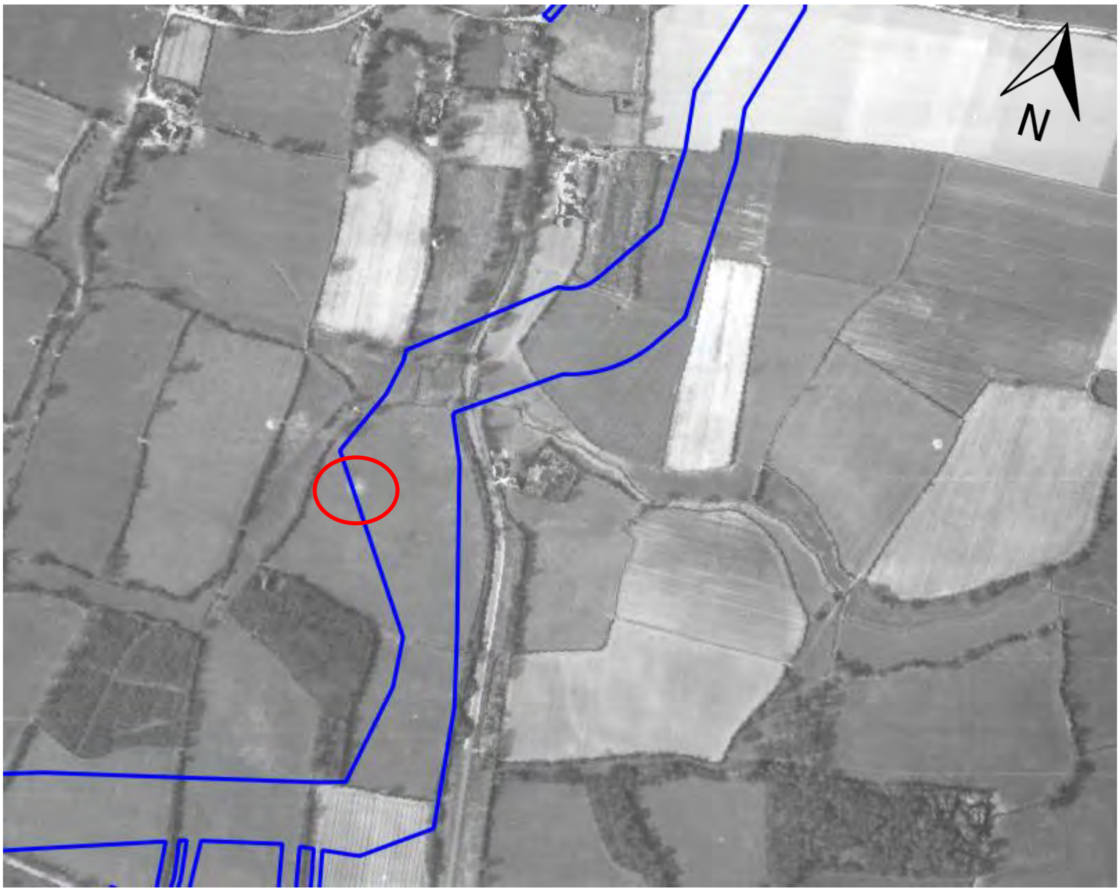
Figure 11 Compiled bomb impact map for the vicinity of the Site (Wiston to Ashurst)

Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	HE bomb	IBs	UXB	OB

Plate 23 is an aerial photograph, dated the 16th April 1946, showing the Site at Ashurst. Some bomb damage has been identified on the Site.

Plate 23 Aerial photograph of Ashurst, 16th April 1946

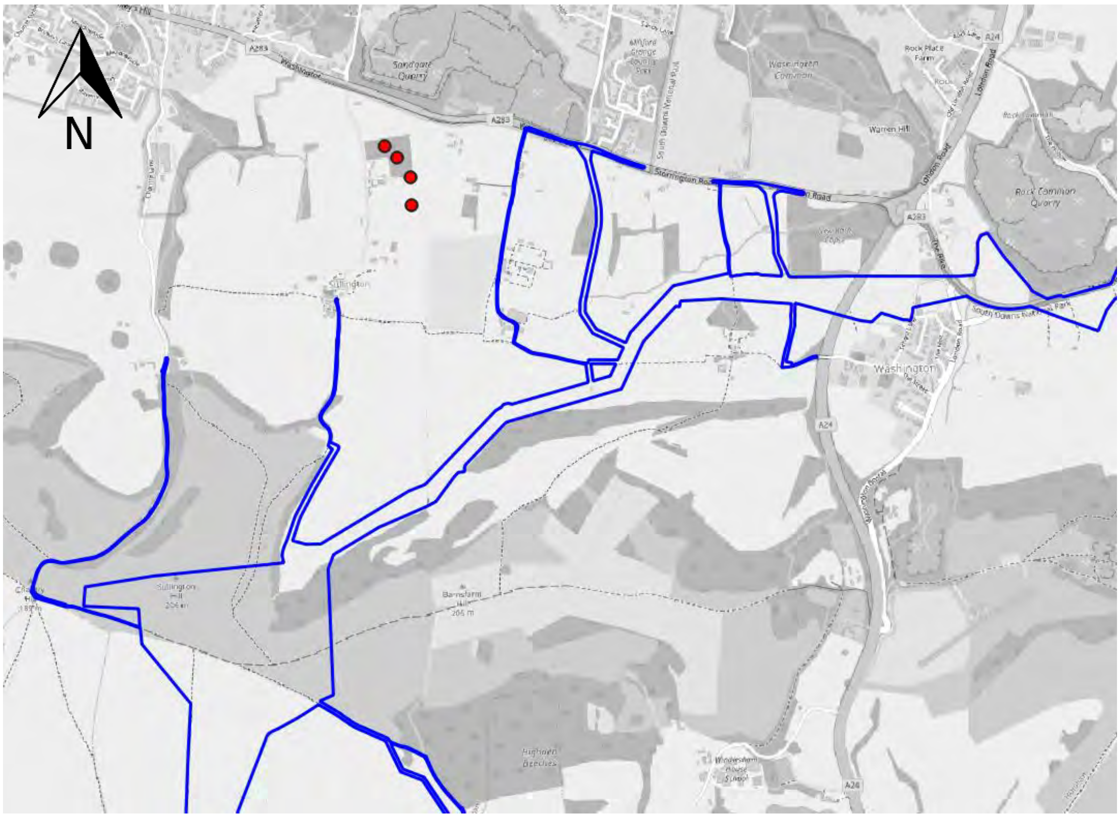


Source: Historic England *Not to Scale*

Legend	Site boundary	Possible bomb damage

Figure 12 is a compiled bomb map for the vicinity of the Site between Washington to Sullington. It demonstrates the very low bombing density across this part of the Site.

Figure 12 Compiled bomb impact map for the vicinity of the Site (Washington to Sullington)



Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	HE bomb

Figure 13 is a compiled bomb map for the vicinity of the Site between Sullington to Blackpatch Hill. It demonstrates the very low bombing density across this part of the Site.

Figure 13 Compiled bomb impact map for the vicinity of the Site (Sullington to Blackpatch Hill)

Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	HE bomb	UXB	IBs

Plate 24 is an aerial photograph, dated the 17th May 1945, showing the Site at Muntham Estate. Some potential cratering has been identified adjacent to the Site.

Cratering related to the activities of the SDTA can also be seen in the immediate vicinity of the Site.

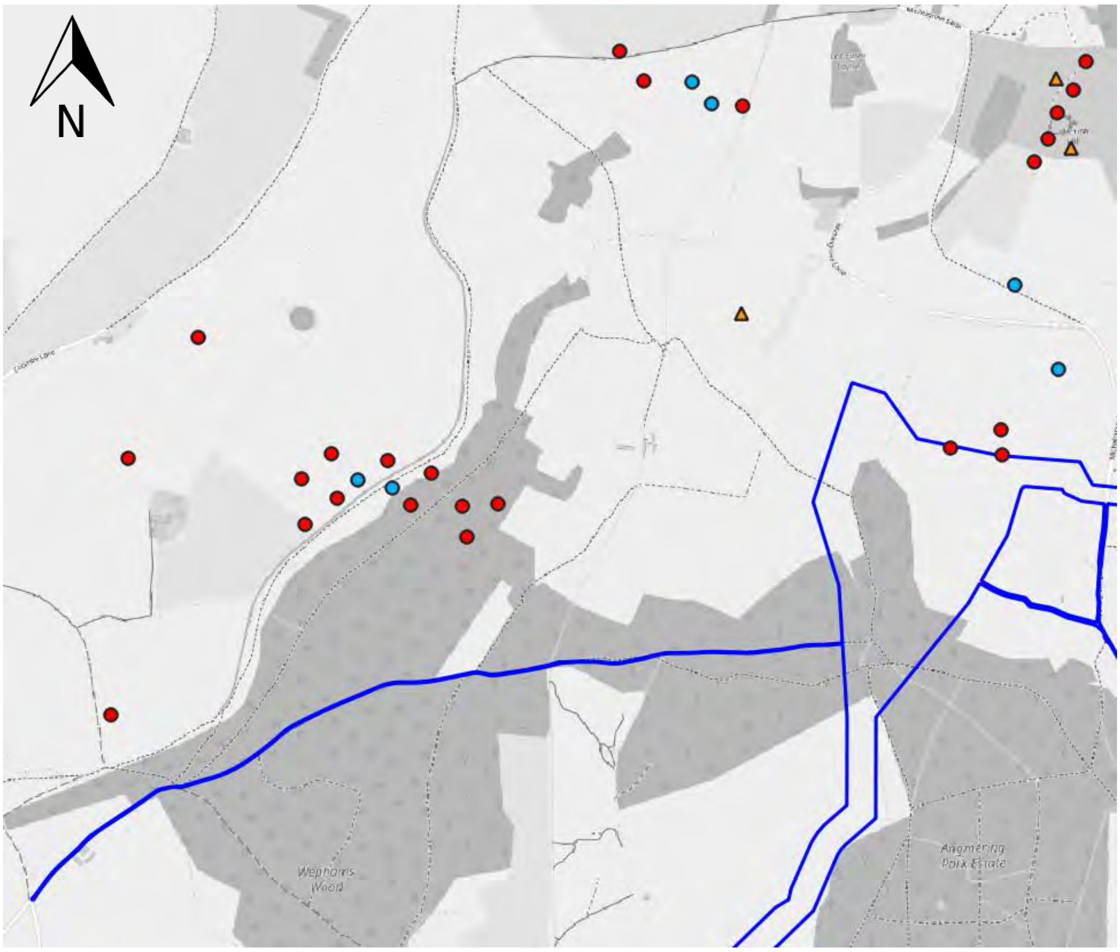
Plate 24 Aerial photograph of Muntham Estate, 17th May 1945

Source: Historic England *Not to Scale*

Legend	Site boundary	Possible bomb damage	SDTA activities

Figure 14 is a compiled bomb map for the vicinity of the Site between Harrow Hill to Wepham Wood. It demonstrates the generally low bombing density in the area, with some elevated bombing around the military facilities of the SDTA.

Figure 14 Compiled bomb impact map for the vicinity of the Site (Harrow Hill to Wepham Wood)

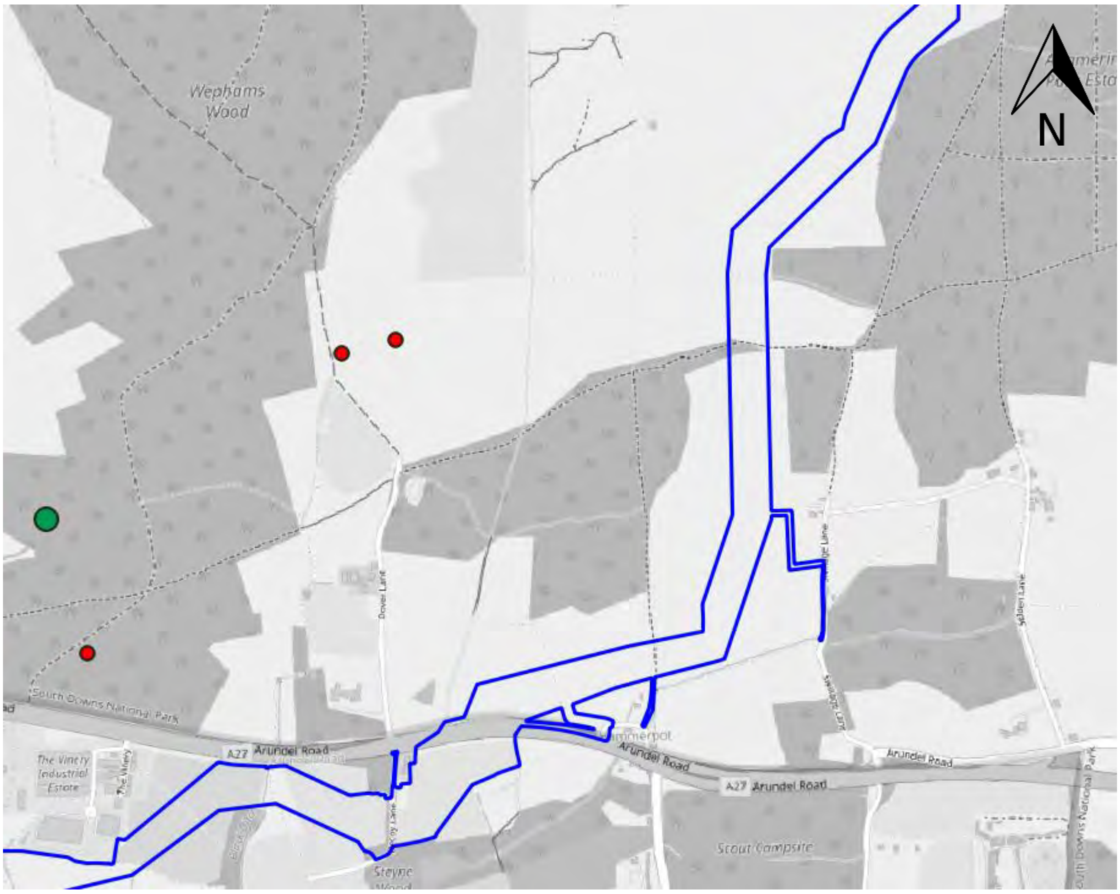


Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	HE bomb	UXB	IBs

Figure 15 is a compiled bomb map for the vicinity of the Site for the vicinity of the Site at Angmering Park Estate. It demonstrates the generally low bombing density in the area.

Figure 15 Compiled bomb impact map for the vicinity of the Site (Angmering Park Estate)

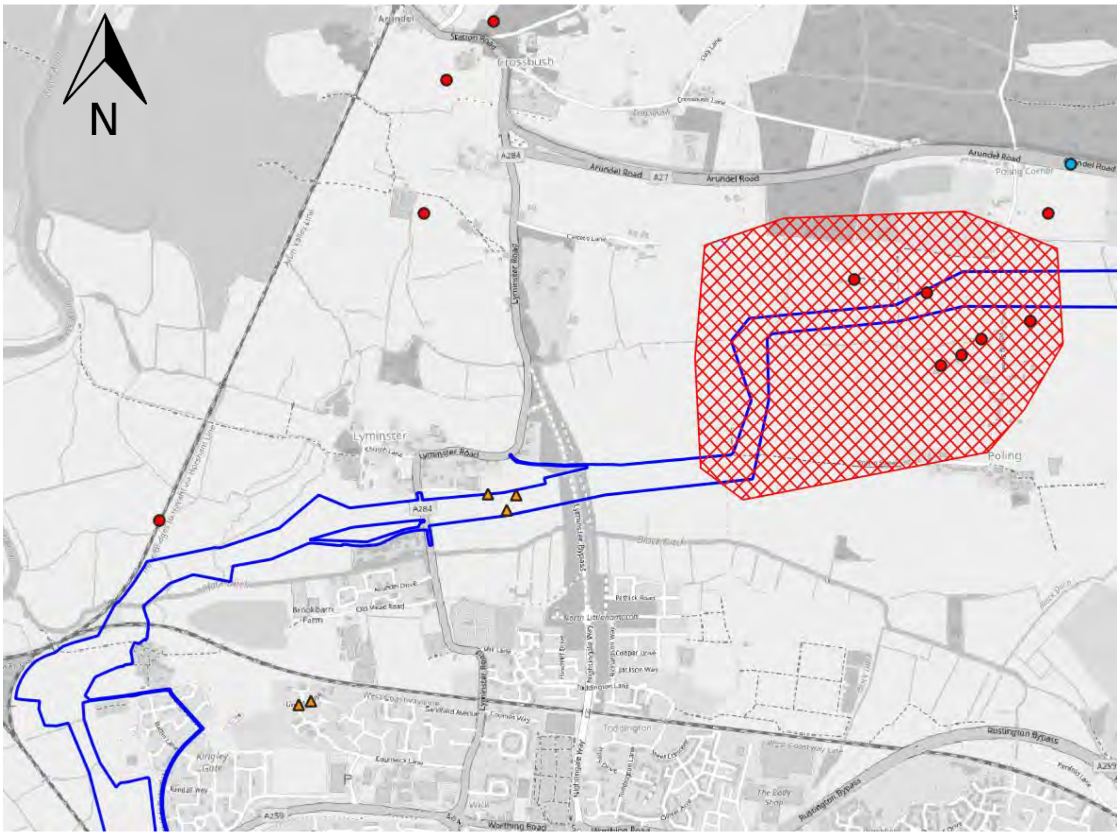


Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	HE bomb	V1

Figure 16 is a compiled bomb map for the vicinity of the Site at Lyminster. This demonstrates the elevated bombing density around RAF Poling.

Figure 16 Compiled bomb impact map for the vicinity of the Site (Lyminster)



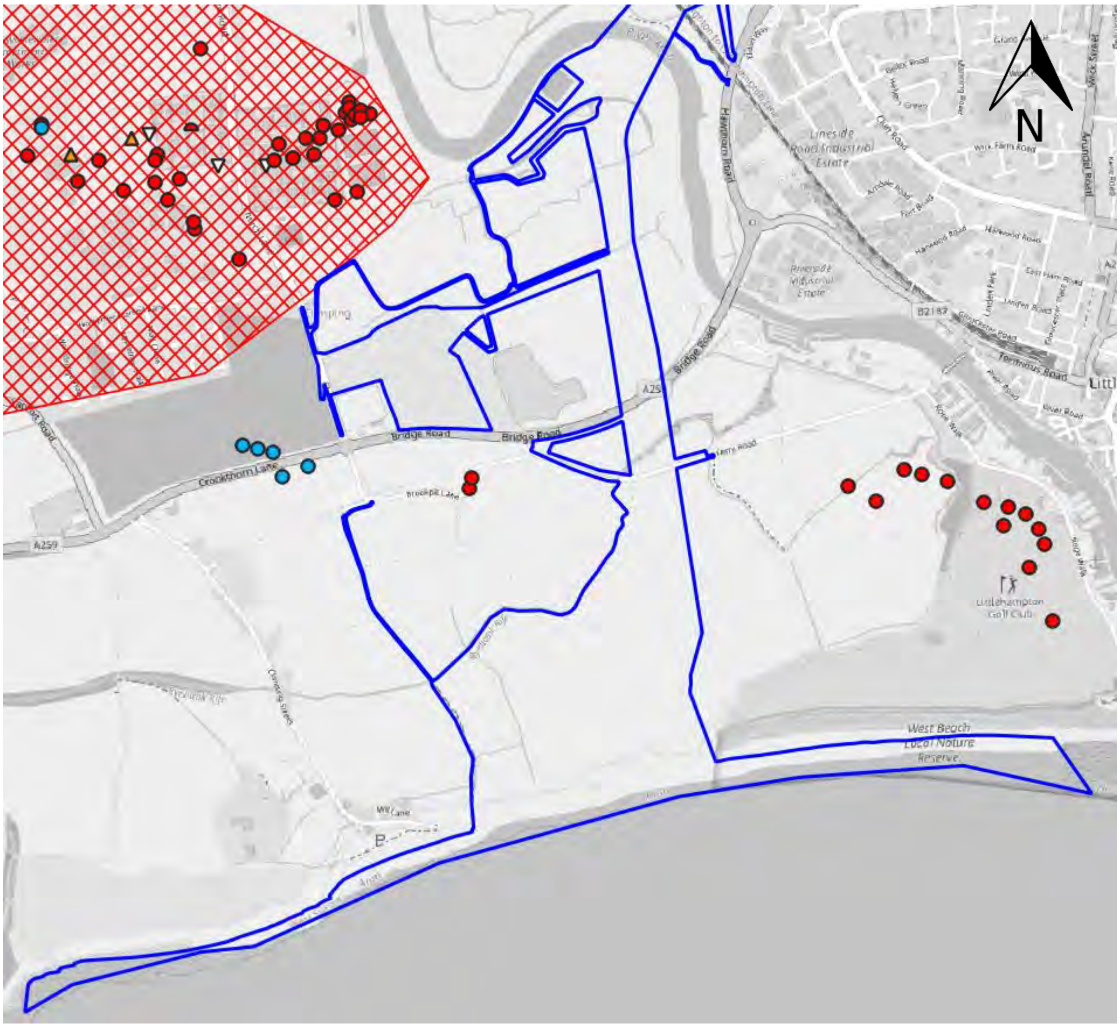
Source: OpenStreetMap *Not to Scale*

Legend			
	Site boundary	Area of at least 87No. HE bombs	
	HE bomb	UXB	IBs

Several craters have been identified on and in close proximity to the Site in the vicinity of RAF Poling (see Plates 16 and 18).

Figure 17 is a compiled bomb map for the vicinity of the Site at Littlehampton. This demonstrates the elevated bombing density around RAF Ford.

Figure 17 Compiled bomb impact map for the vicinity of the Site (Littlehampton)



Source: OpenStreetMap *Not to Scale*

Legend	Site boundary	HE bomb	UXB	IBs
	AP	Strafing	Area of at least 70No. HE bombs	

Several craters have been identified in close proximity to the Site in the vicinity of RAF Ford (see Plates 20 and 21).

Potential UXO Hazard

RAF Poling

There is evidence of heavy bombing occurring in the immediate vicinity of the Site at RAF Poling during the early part of WWII. More than 87No. HE bombs fell on and around the radar station and many impacts were not accurately recorded.

It is considered that there is an elevated potential for encountering UXB on the Site in the vicinity of the former RAF Poling.

RAF Ford

There is evidence of heavy bombing occurring at RAF Ford during the early part of WWII. More than 70No. HE bombs fell on and around the airfield.

No cratering associated with bombing at RAF Ford has been identified on or adjacent to the Site on historical aerial photography. It is considered that there is a low possibility of encountering UXB on the parts of the Site near RAF Ford.

Remainder of Site

For the majority of the Site, the WWII bombing density was very low with no heavy air raids recorded.

Whilst there is always the possibility that an aircraft jettisoned a UXB over a rural area without being observed, this forms part of the low background risk typical of any similar site in the UK.

4.2.4 Geology and Bomb Penetration Depths

It is important to consider the geological materials present at the time that a bomb was dropped in order to establish its maximum penetration depth.

(BGS) 1:50,000 Sheets 317 & 332 Chichester and Bognor (Solid and Drift), 318 & 333 Brighton and Worthing (Bedrock and Superficial), 302 Horsham (Solid and Drift), and BGS borehole records from on and near the Site were consulted to get an indicative overview of the Site geology.

The WWII geology of the M2 hazard zone of the Site is understood to consist of clay, silt, sand, and gravel raised marine deposits, overlying the Lewes Nodular, Seaford, Newhaven, Culver, and Portsdown Chalk Formation, and clay, silt, and sand of the Lambeth Group.

Table 3 provide an estimate of average maximum bomb penetration depths for M2 hazard zones of the Site assuming WWII ground conditions of 0.5m of topsoil, over 15m of firm clay, overlying more than 20m of chalk.

Table 3 Estimated average maximum bomb penetration depths (M2 hazard zone)

Estimated average bomb penetration depths for anticipated geology (M2 hazard zone)		
Bomb Weight	50kg	5.5m
	250kg	8.5m
	500kg	13.5m

These calculations can be refined on receipt of Site-specific information.

The estimated bomb penetration depths given in Table 3 are from the WWII ground level and are based on the following assumptions:

a) High level release of the bomb resulting in an impact velocity of 260m/s (>5,000m altitude).

b) A strike angle of 10 to 15 degrees to the vertical.

c) That the bomb is stable, both in flight and on penetration.

d) That no retarding units are fitted to the bomb.

e) That the soil type is homogenous.

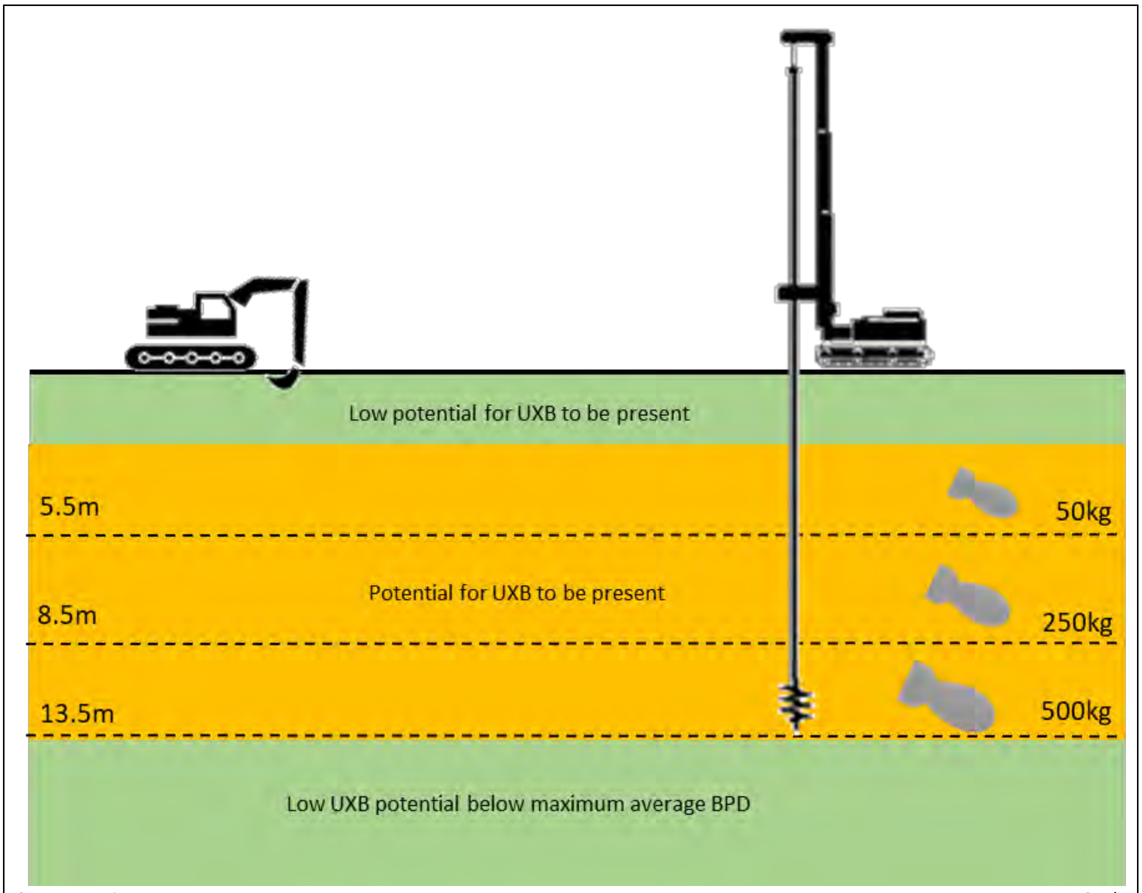
A high altitude release of a bomb will result in ground entry at between 10° and 15° to the vertical with the bomb travelling on this trajectory until momentum is nearly lost. The bomb will then turn abruptly to the horizontal before coming to rest. The distance between the centre of the entry hole and the centre of the bomb at rest is known as the ‘offset’. A marked lateral movement from the original line of entry is common.

Low-level attacks may have an impact angle of 45° or more, which will frequently lead to a much greater amount of offset movement during soil penetration.

The average offset is one third of the penetration depth, i.e. an offset of 2m may be expected for a 50kg bomb in dry silts and clays. If hard standings or Made Ground were present during WWII, bomb penetration depths would have been significantly reduced but offset distances may have been up to four times greater.

Figure 18 demonstrates the potential burial setting for a UXB in the M2 hazard zone of the Site, based on the anticipated ground conditions and average maximum bomb penetration depth.

Figure 18 Potential burial setting of UXB for the M2 hazard zone on the Site



Source: Zetica *Not to Scale*

5 UXO IN THE MARINE ENVIRONMENT

Both wartime and peace time military and naval activities provide numerous sources of UXO within the marine environment. The principal sources of UXO hazards are from ordnance disposal at sea, WWII aerial laid mines, mines laid as beach defences, crashed aircraft and wrecks containing ordnance.

Clearance certification for UXO within a marine environment may be valid only for a limited period as storms, tides and general current movement can cause UXO to migrate into an area that may have been cleared of UXO only hours before. This also makes it very difficult to accurately predict where UXO may be found.

UXO is most likely to be concentrated on and immediately around the principal sources of the UXO hazard. These are typically ordnance disposal sites at sea, WWII mines, marine ranges and wrecks containing ordnance.

5.1 Marine Mines

For further information on marine mines, and the potential UXO hazards associated with them, see Appendix 2.5.

Records indicate that during WWI and WWII British minefields were laid along the West Sussex coast.

During WWII, the Luftwaffe and the Kriegsmarine undertook mining operations in the English Channel to disrupt the movements of the Royal Navy and supply convoys, as evidenced by the incident described below.

11th April 1943

SS Frode, an armed merchant ship, sunk after striking a mine between Littlehampton and Shoreham, within approximately 5km southeast of the Site.

Potential UXO Hazard

Efforts were made to clear known minefields at the end of WWII, although many mines had become detached from their tethers during the course of the war.

Given their buoyancy, the possibility of a marine mine floating onto the coastal part of the Site, whilst unlikely, cannot be discounted (see Section 6.2).

5.2 Wrecks and Aircraft Crashes

No records have been found to indicate that wrecks which may contain UXO are located in the vicinity of the Site.

Records indicate several aircraft crashes took place off the coast of Littlehampton, all more than approximately 1km from the Site.

Further details of aircraft crashes in the vicinity of the Site are given in Section 3.4.

Potential UXO Hazard

Wrecks and aircraft crashes are not considered to provide a significant source of UXO hazard to the Site.

5.3 Munitions Disposal at Sea

No records have been found indicating that offshore munitions disposal has occurred on or in close proximity to the Site.

5.4 Offshore Ranges

No offshore firing ranges have been identified on or in close proximity to the Site.

5.5 UXO Migration in the Marine Environment

The factors controlling UXO migration in the marine environment surrounding the Site are discussed below.

Tidal Currents

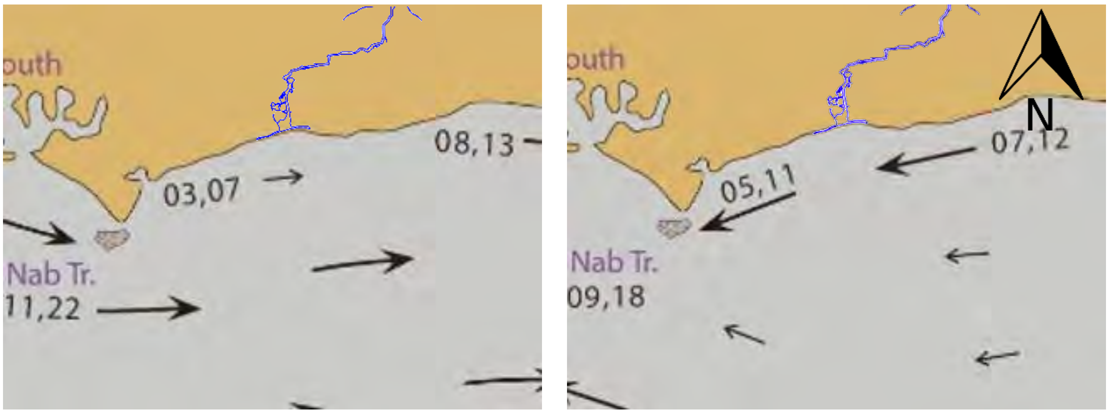
Littlehampton West Beach and Climping Beach are part of a tidal system of the English Channel.

Tidal currents offshore around Climping are directed east on the flood tide and west-southwest on the ebb tide.

Tidal current velocities in the coastal area reach approximately 1.1 knots (0.6ms^{-1}) on a mean spring tide and 0.5 knots (0.3ms^{-1}) for a mean neap tide off Littlehampton and Climping.

Typical tidal streams for flood and ebb flows are shown in Figure 19.

Figure 19 Typical tidal streams for flood and ebb flows



Flood *Ebb*

Source: Tidal Stream Atlas *Not to Scale*

Legend	Site location ———

Wave Action

The mean significant wave height for the Littlehampton offshore area measures approximately 1.8m.

Between Middleton and Littlehampton the waves usually hit the shore at a western or southwestern angle, resulting in a longshore drift transporting material eastward, toward the mouth of the River Arun.

Sediment Pathways

The marine part of the Site comprises shallow water. The bed comprises mainly shingle and sand.

The sedimentation at Littlehampton West Beach and Climping Beach substantially wave-induced, with tidal currents being insufficiently strong to move coarser sands and gravels independently, except at estuary mouths. The transport of sediment onto the Site is most likely to occur due to longshore drift from the west, although wooden and rock groynes along the foreshore inhibit sediment drift rates.

Throughout the 20th century Climping Beach has gained volume due to the efficiency of the West Pier at the mouth of the River Arun trapping sediment moving in an easterly directed longshore transport.

Since 1993, Climping Beach has been subjected to beach renourishment of between 12,300m^3 to 53,961m^3, and beach recycling from Littlehampton West Beach, of averagely 23,000m^3 per year.

Littlehampton West Beach has similarly gained volume due to trapping sediment at the mouth of the River Arun but has undergone regular removal of excess sediment to assist beach recycling at Climping and to compensate for net downdrift losses further along the coastline.

Dredging

No records of dredging on the Site have been found. Given that much of Littlehampton West Beach and Climping Beach are Sites of Special Scientific Interest (SSSI) dredging has been avoided.

Small amounts of dredging have been undertaken at Littlehampton Harbour and Shoreham Harbour, approximately 0.4km and 21.3km east of the Site respectively. Records indicate this dredged material was used for beach recharge and replenishment for beaches downdrift, eastwards of the Site.

Potential for Marine UXO Migration

Given the tidal currents, wave action and pattern of sediment movement in the vicinity of the Site, it is considered that the largest UXO, such as air-dropped UXB , too heavy for the waves and near shore currents to move, are unlikely to be transported far but rather would be exposed by scour around them and then be left proud of the sediments.

Buoyant and semi-buoyant UXO (as may be the case with some marine mines or degrading ordnance), UXO with neutral buoyancy and smaller, lighter but non-buoyant items of UXO (such as SAA) could move by rolling as bed load particles or perhaps by saltation during flow tides when the currents are acting in concert.

Considering the above, the possibility of UXO migrating onto the Site due to processes such as longshore drift, tidal currents, and storm events cannot be discounted.

Given the low number of UXO finds on the Site in recent years (see Section 6.2) it is considered that this forms part of the low background risk of encountering UXO on any similar site in the UK.

6 EXPLOSIVE ORDNANCE CLEARANCE ACTIVITIES

Official UK bombing statistics have been compiled from both British and German sources. There were differences in the way the figures were originally reported and collated which has led to discrepancies in the summary data.

Based on data from 1939 to 1945, War Office statistics indicate that 200,195No. HE bombs exploded within Great Britain. Additionally, 25,195No. HE bombs (representing 11%) were recorded as UXBs. However, records from the Royal Engineers who were responsible for bomb disposal at the time indicate that as of 27th February 1946 upwards of 45,000No. UXBs were disposed of.

On average 8.5% of UXBs later self-exploded. In some cases the bombs had delayed action fuzes or were never intended to explode, their purpose being to cause inconvenience and fear. Given the discrepancy in records and the fact that UXBs are still being found unexpectedly, it is clear that the original figures are understated and provide only an approximation of the number of potential UXBs in the UK.

War Office statistics also show that between October 1940 and May 1941 most of the UXBs (93%) were either 50kg or 250kg. It should be noted that details of the recovery and the size of the UXB were not always accurately reported.

The larger WWII UXBs are often difficult to recover due to both penetration depths and the presence of two or more fuzes, combined with more sensitive fillings of explosive mixtures including Amatol and Trialen.

6.1 Abandoned Bombs

For further information on abandoned bombs, and the potential UXO hazard associated with them, follow the link below:

- Abandoned Bombs

No records have been found indicating that any officially abandoned bombs are located on the Site.

6.2 EOC Tasks

Records held by Zetica Ltd show that the following post-WWII EOC tasks have taken place in the vicinity of the Site.

Post 1945

The SDTA was subject to EOC operations, including Block No. 7, prior to its derequisition and restoration to former landowners.

29th September 2000

1No. UXB was found discovered in the woods near Worthing Crematorium, Findon, approximately 0.3km south of the Site

4th August 2005

1No. item of UXO was found on the beach south of Littlehampton Golf Course, on the Site (TQ 025010). It was destroyed in a controlled explosion by the minehunter vessel HMS Quorn.

18th May 2010

1No. unexploded mortar was found on the banks of the River Arun, within approximately 0.1km east of the Site. It was removed.

2nd February 2012

1No. WWII marine mine primer was discovered on the beach in front of Harbourfront Amusement Park, Littlehampton, approximately 0.4km northeast of the Site. It was removed the same day.

4th December 2018

1No. unexploded shell was discovered in the River Arun, near Littlehampton Harbour, within approximately 0.5km northeast of the Site. It was removed by EOD officers and disposed of.

27th September 2021

Several items of UXO were encountered by the Client's survey team at Angmering Park (TQ 074108), within the former Block No.7 training area, approximately 0.8km west of the Site. They were removed safely.

7 UXO HAZARD ASSESSMENT

7.1 UXO Hazard Level

The definitions for the levels of UXO hazard are provided below.

Definitions of UXO Hazard Level for a Site	
Hazard Level	**Definition**
Very Low	There is positive evidence that UXO is not present, e.g. through physical constraints or removal.
Low	There is no positive evidence that UXO is present, but its occurrence cannot be totally discounted.
Moderate	There is positive evidence that ordnance was present or that other uncharted ordnance may be present as UXO.
High	There is positive evidence that UXO is present.
Very High	As high, but requires immediate or special attention due to the potential hazard.

The following sources of UXO hazard have been identified on the Site:

Military Training Areas (High and M1 hazard zones)

During WWII, land on the Site between Wiston (TQ 135133) and Angmering (TQ 069068) was requisitioned as part of the SDTA. This was used extensively for military training involving infantry, artillery and armoured vehicles.

Significant cratering and scarring of the land associated with the firing of live munitions has been identified on parts of the Site within the SDTA. These areas have been assigned a high UXO hazard level.

Other parts of the Site within the SDTA are assigned a moderate UXO hazard level to account for the possibility of overspill during training exercises.

Anticipated ordnance types on these parts of the Site are close combat munitions (including grenades and mortars), anti-tank and artillery shells, and SAA. Most ordnance is likely to be shallow-buried, although the potential for larger artillery shells to be present at greater depth cannot be discounted.

WWII Bombing (M2 hazard zone)

Records have been found indicating that RAF Poling, encroaching on the Site, was heavily bombed during WWII.

It is considered prudent to assign this part of the Site a moderate UXO hazard level to account for the possibility that a UXB fell unnoticed.

Remainder of the Site

No evidence of heavy bombing or other significant sources of UXO hazard have been identified on the remainder of the Site, which is assigned a low UXO hazard level.

It is considered that the UXO hazard level on the Site can be zoned from low to high, as shown in Figures 20 – 22.

The UXO hazard zone plan of the Site is also given in the accompanying P9727-23-R1-MAP01-C.

Figure 20 is the UXO hazard zone plan of the whole Site.

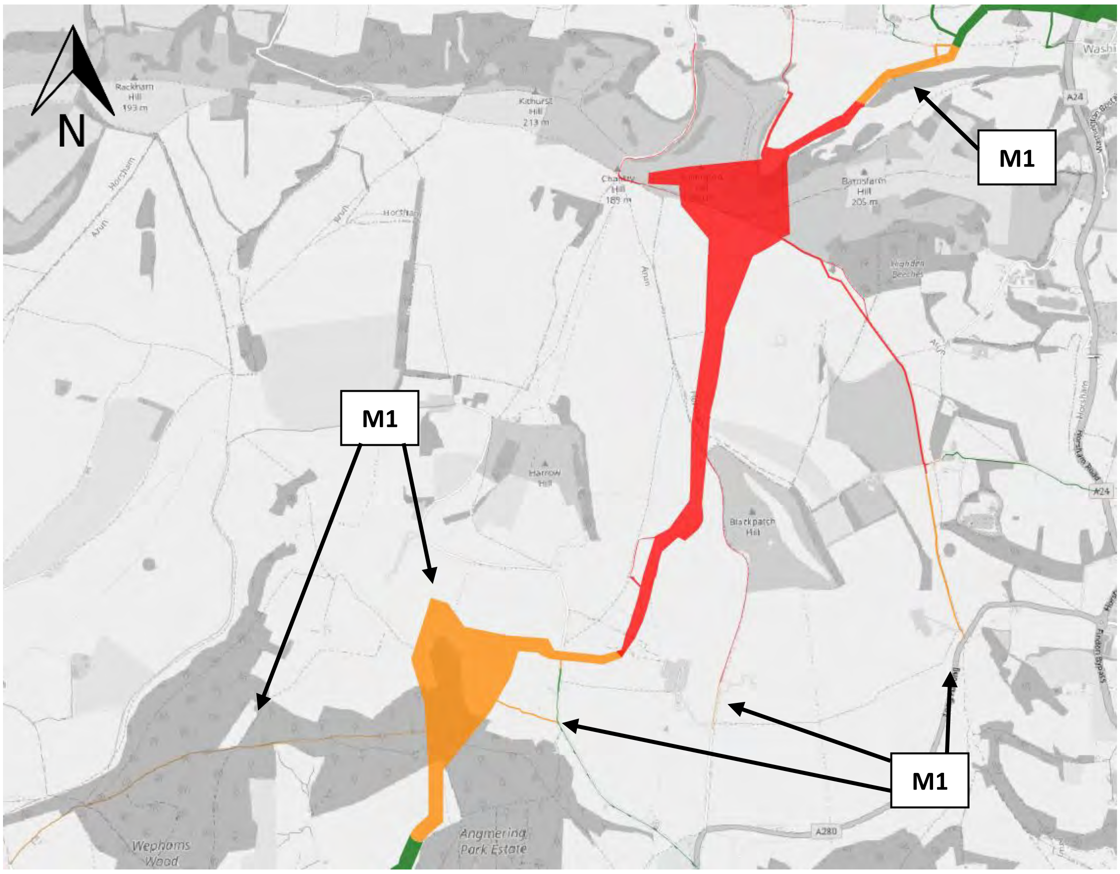
Figure 20 UXO hazard zone plan of the Site

Source: OpenStreetMap *Not to Scale*

Legend	Very Low		Low		Moderate	
	High			Very High		

Figures 21 and 22 are extracts showing the extents of the moderate and high UXO hazard zones on the Site.

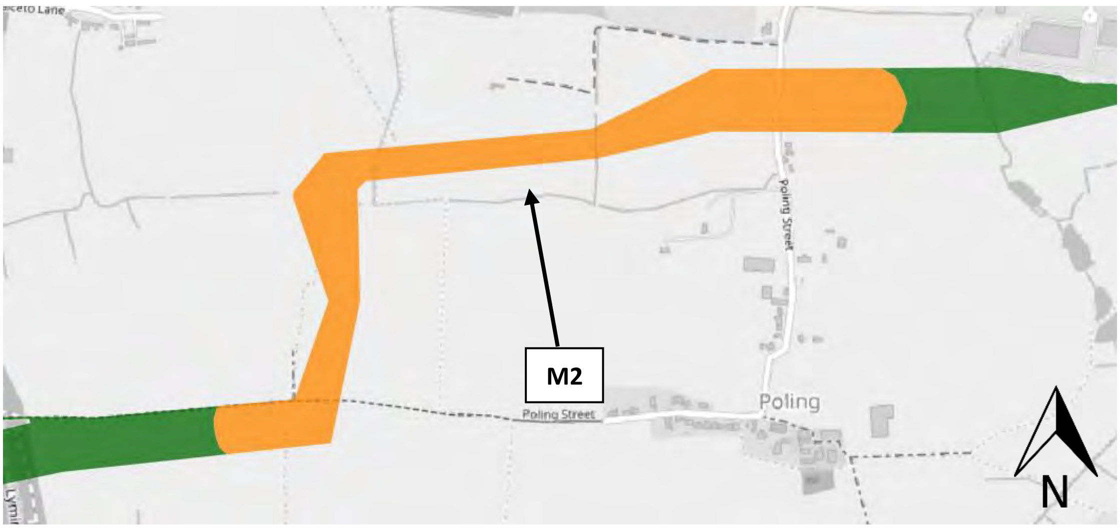
Figure 21 UXO hazard zone plan of the Site (Military Training Areas)



Source: *OpenStreetMap* *Not to Scale*

Legend						
	Very Low		Low		Moderate	
	High			Very High		

Figure 22 UXO hazard zone plan of the Site (WWII Bombing)



Source: *OpenStreetMap* *Not to Scale*

Legend						
	Very Low		Low		Moderate	
	High			Very High		

It should be noted that whilst ploughing activities may have encountered UXO post-WWII, there is no guarantee that any such items would have been positively identified and appropriately dealt with at the time. There is also the potential for ordnance found post-WWII to have been disposed of in ditches and hedgerows along field boundaries.

8 UXO RISK ASSESSMENT

8.1 Proposed Works

Works on the Site are associated with a proposed onshore grid connection linking the Rampion 2 Offshore Wind Farm with the Twineham Substation.

Initial works are understood to comprise a ground investigation, including shallow archaeological excavations, agricultural hand pits to approximately 1m below ground level (bgl), boreholes, and trial pits.

At this stage, the main construction works are anticipated to include:

- Landfall cable ducting and trench bay excavation up to 3m bgl.
- Open cut cable trenches along the whole route of between approximately 1m-4m wide and approximately 2m bgl.
- Horizontal Directional Drilling (HDD) under key infrastructure, including bored drill to install ducting with depths up to 25m bgl.
- Temporary roadways and haul roads installed alongside the cable corridor, including topsoil strip where needed.
- Permanent substation construction, including topsoil strip and foundations.

8.2 Risk Assessment Methodology

A UXO risk assessment has been undertaken for the proposed works, taking into consideration the identified UXO hazard.

Firstly, the probability of encountering UXO (PE) has been considered and rated for the different construction techniques, as detailed below.

Probability of Encounter (PE)	Rating
Frequent, highly likely, almost certain.	5
Probable, more likely to happen than not.	4
Occasional, increased chance or probability.	3
Remote, unlikely to happen but could.	2
Improbable, highly unlikely.	1
Impossible	0

Secondly, the probability of detonating a UXO (PD) has been considered and rated for the different construction techniques, as detailed below.

Probability of Detonation (PD)	Rating
Frequent, highly likely, almost certain.	5
Probable, more likely to happen than not.	4
Occasional, increased chance or probability.	3
Remote, unlikely to happen but could.	2
Improbable, highly unlikely.	1
Impossible	0

Next, the probability of encountering and detonating the UXO (PE x PD) have been used to generate an overall likelihood rating (P).

P = PE x PD	LIKELIHOOD of Encounter and Detonation	Rating
21 to 25	Frequent, highly likely, almost certain.	5
16 to 20	Probable, more likely to happen than not.	4
6 to 15	Occasional, increased chance or probability.	3
2 to 5	Remote, unlikely to happen but could.	2
1	Improbable, highly unlikely.	1
0	Impossible	0
P ranges from 25, a certainty of UXO being encountered and detonated on the Site by engineering activity, to 0, a certainty that UXO does not occur on the Site and will not be detonated by engineering activity.		

The likelihood of encountering and detonating UXO during site works is multiplied by the severity of such an event occurring (P x S), in order to provide a risk level using the following matrix.

Severity (S)	Rating
Multiple fatalities	5
Major injury, long term health issues, single fatality.	4
Minor injury, short term health issues, no fatalities.	3
First aid case but no lost time or ill health.	2
Minor injuries, no first aid.	1
No injuries.	0

UXO Risk Matrix							
	SEVERITY (S)						
LIKELIHOOD (P)		5	4	3	2	1	0
	5	25	20	15	10	5	0
	4	20	16	12	8	4	0
	3	15	12	9	6	3	0
	2	10	8	6	4	2	0
	1	5	4	3	2	1	0
	0	0	0	0	0	0	0

8.3 UXO Risk Level

The UXO risk assessment for proposed works on the Site is given in Table 4.

Table 4 UXO risk assessment for the Site

Hazard Zone	Potential UXO Hazard	Anticipated Works	PE	PD	P = PE x PD	Likelihood	Severity	Risk Rating	UXO Risk
High	UXB	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	Close Combat Munitions	Excavations	4	4	16	4	4	16	High
		Boreholes	3	4	12	3	4	12	Moderate
		HDD*	4	4	16	4	4	16	High
	Artillery Shells	Excavations	3	3	9	3	5	15	Moderate
		Boreholes	2	3	6	3	4	12	Moderate
		HDD*	3	3	9	3	5	15	Moderate
	SAA	Excavations	4	1	4	2	2	4	Low
		Boreholes	2	1	2	2	2	4	Low
		HDD*	4	1	4	2	2	4	Low
M1	UXB	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	Close Combat Munitions	Excavations	3	4	12	3	4	12	Moderate
		Boreholes	2	4	8	3	3	9	Moderate
		HDD*	3	4	12	3	4	12	Moderate
	Artillery Shells	Excavations	2	3	6	3	5	15	Moderate
		Boreholes	2	3	6	3	4	12	Moderate
		HDD*	2	3	6	3	5	15	Moderate
	SAA	Excavations	3	1	3	2	2	4	Low
		Boreholes	2	1	2	2	2	4	Low
		HDD*	3	1	3	2	2	4	Low
M2	UXB	Excavations	3	2	6	3	5	15	Moderate
		Boreholes	2	3	6	3	4	12	Moderate
	Close Combat Munitions	Excavations	1	1	1	1	4	4	Low
		Boreholes	1	1	1	1	3	3	Low
	Artillery Shells	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
	SAA	Excavations	1	1	1	1	1	1	Low
		Boreholes	1	1	1	1	1	1	Low
Low	UXB	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	Close Combat Munitions	Excavations	1	1	1	1	4	4	Low
		Boreholes	1	1	1	1	3	3	Low
		HDD	1	1	1	1	3	3	Low
	Artillery Shells	Excavations	1	1	1	1	5	5	Low
		Boreholes	1	1	1	1	4	4	Low
		HDD	1	1	1	1	4	4	Low
	SAA	Excavations	1	1	1	1	1	1	Low
		Boreholes	1	1	1	1	1	1	Low
		HDD	1	1	1	1	1	1	Low

PE (Probability of Encounter), PD (Probability of Detonation), P (Overall Probability)

SAA = Small Arms Ammunition; HDD = Horizontal Directional Drilling

***The UXO hazard relates to launch and reception pits only. The main HDD route is anticipated to be deeper than the potential UXO hazard.**

9 RISK MITIGATION PLAN

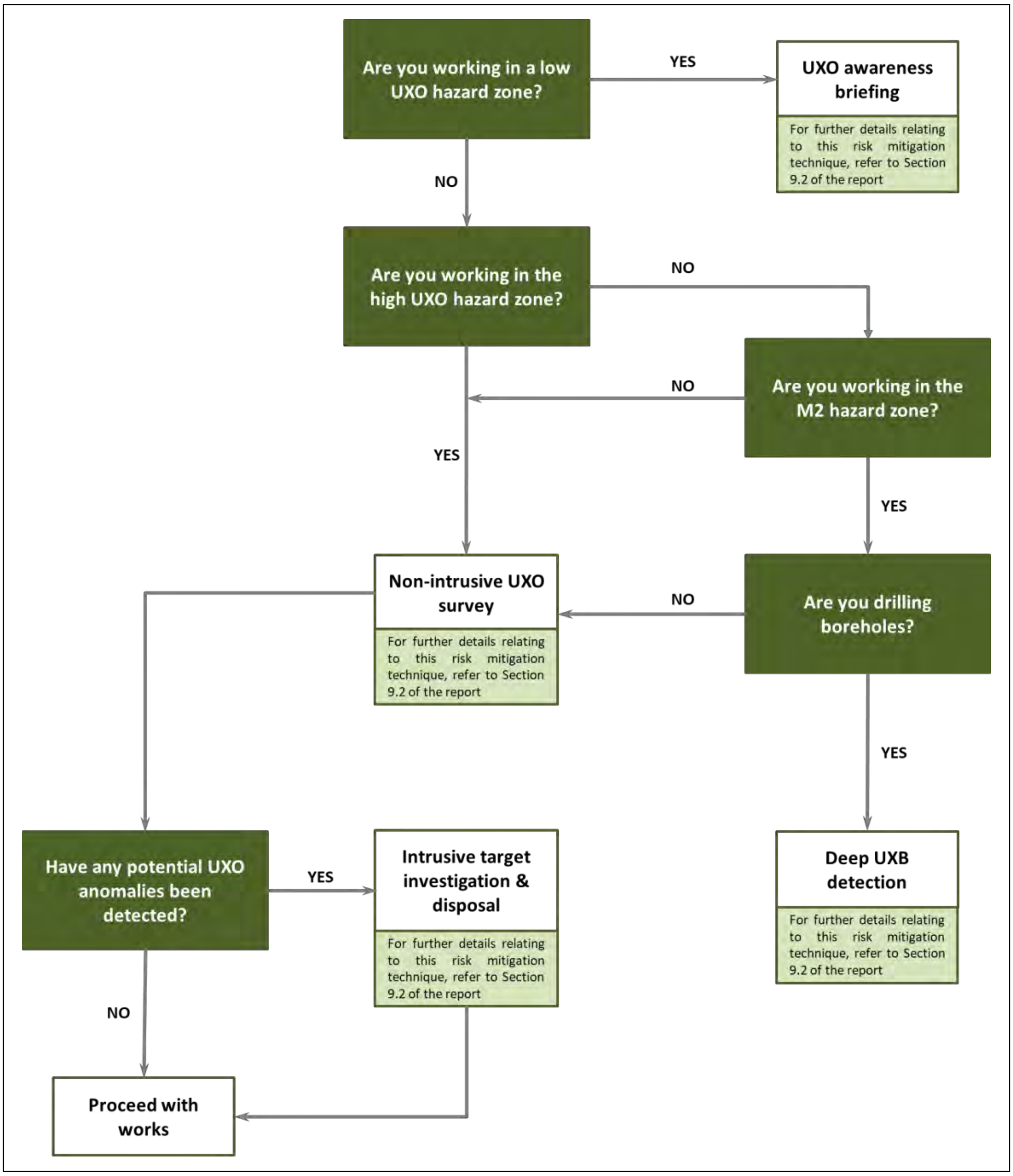
Key findings: Potential hazards have been identified from close combat munitions, artillery shells, and air-dropped UXB on parts of the Site.

No significant sources of UXO hazard have been identified on the majority of the Site.

Key actions: Non-intrusive surveys and deep UXB detection (if required) are recommended in areas where a significant UXO hazard has been identified.

Figure 23 outlines the recommended steps to reduce the UXO risk to ALARP for intrusive works.

Figure 23 Recommended risk mitigation plan for the Site



9.1 UXO Risk Summary

Table 5 summarises the most appropriate risk mitigation recommendations for the proposed works on the Site.

Table 5 Summary of UXO risk and mitigation recommendations

Proposed Works	UXO Risk	Recommended Mitigation
Site walkovers		**UXO awareness briefing** – Given the military history in the area it is recommended that a formal UXO awareness briefing is provided to staff involved in site walkovers across all hazard zones.
Excavations		**UXO awareness briefing** – as above.
Boreholes		**Proceed with works**
HDD		**Proceed with works**
Excavations	M1	**Non-intrusive survey –** a non-intrusive geophysical survey should be undertaken to map potential buried UXO. Potential UXO targets can either be avoided or investigated and removed.
Boreholes	M1	**Non-intrusive survey –** a non-intrusive survey should be undertaken in advance of drilling.
HDD	M1	**Non-intrusive survey** – a non-intrusive survey should be undertaken at the location of HDD launch and reception pits.
Excavations	M2	**Non-intrusive survey –** a non-intrusive survey should be undertaken in advance of excavations. If programme or access does not allow, an Explosive Ordnance Clearance (EOC) Engineer can supervise excavation works in this area.
Boreholes	M2	**Deep UXB detection –** to clear borehole locations of potential UXB, an intrusive magnetometer survey should be undertaken until either the maximum bomb penetration or maximum drilling depth is reached.

Excavations		**Non-intrusive survey** – as above.
Boreholes		**Non-intrusive survey** – as above.
HDD		**Non intrusive survey –** as above.

In summary, it is recommended that staff participating in Site walkovers in all hazard zones receive a UXO awareness briefing.

In advance of intrusive works in the moderate and high UXO hazard zones, it is recommended that a non-intrusive UXO survey is undertaken.

As part of any borehole construction in the M2 hazard zone, we recommend that deep UXB detection is undertaken.

9.2 Risk Mitigation Techniques

The section below provides further details of the recommended techniques for mitigating the UXO risk on the Site.

9.2.1 Non-intrusive UXO survey

To proactively mitigate the risk prior to intrusive works, it is recommended that a non-intrusive UXO survey is undertaken to map potential shallow-buried UXO in the moderate and high UXO hazard zones.

The primary technique should be a magnetometer survey to detect ferrous ordnance such as grenades, mortars, artillery shells and air-dropped UXB. An electromagnetic survey technique may help further characterise potential areas of military training, including munitions disposal areas.

Analysis of the survey data should be undertaken in the office by a suitably trained and qualified geophysics specialist to determine the limits of detection and enable effective target selection. From this, a priority ranking can be established for those targets most likely to be UXO.

Potential UXO targets can be avoided (where practical) or investigated and removed by an EOC team. Any hazardous UXO uncovered will be rendered safe in an Explosive Ordnance Disposal (EOD) operation.

It should be noted that a repeat survey may be required where the measured UXO detection depth is less than the likely maximum burial depth of the anticipated ordnance. This would require the initial layer of soil to be removed (after target investigation) and the survey repeated. The requirement for a repeat survey would be reviewed after the initial survey phase.

It is also important to note that where it is proposed to remove hedgerows, these should first be searched and surveyed, where practical, to account for UXO being disposed of in such locations.

Further details on an appropriate survey design can be provided on request.

9.2.2 EOC Engineer Support

Where time or access does not allow a geophysical survey to be undertaken in the M2 hazard zones, an EOC Engineer can attend site and provide support during intrusive works.

The EOC engineer will carry out a visual and instrument search at the locations of intrusive works and supervise any excavation. They will make an assessment on any suspect items uncovered and classify them as potential UXO or other material.

If hazardous UXO is uncovered, the EOC engineer will mobilise an EOD team to render the item safe.

9.2.3 Deep UXB Detection

To clear borehole locations of potential UXB in the M2 hazard zones, an intrusive magnetometer survey should be undertaken.

The survey should be carried out to either the maximum bomb penetration depth or maximum drilling depth, whichever is shallower.

A MagDrill system is recommended, which is suitable for working with ground investigation drillers.

It allows a magnetometer to be lowered into the borehole to ensure the route is clear of potential UXB.

Typical radius of detection should be assumed as approximately 1.0m for a 50kg UXB until site conditions are confirmed.

Assuming no objects comparable to the UXB detection range are identified, then the borehole or pile position can be considered clear of UXB.

If any ferrous anomalies are identified at the borehole position, then it may need to be relocated or the anomaly investigated.

It should be noted that in Made Ground or close to buried/adjacent structures, effective UXB detection is compromised due to geophysical noise.

A clearance report should be issued on completion of the site works.

9.2.4 UXO Awareness Briefing

Typically ~1hour in duration, these briefings will be expected to provide site workers with:

- Background to the potential UXO hazards that could be encountered.
- Awareness of how the UXO hazard could present a risk.
- Knowledge of what to do if a suspect item is encountered.

The briefing is to be provided along with back-up materials such as UXO awareness posters, emergency contact numbers and other background information to assist site workers in becoming familiar with what potential UXO can look like.

The materials can also be used by key staff to pass on the relevant points of the induction to others who visit or work on the Site.

By providing the UXO awareness briefing, it ensures that in the unlikely event that UXO is encountered:

- All site staff take appropriate action.
- A support mechanism and points of contact are established.
- The likelihood of harm to people or property is reduced.
- Significant delays to site work are prevented.

9.3 What Do I Do Next?

If you wish to proceed with UXO risk mitigation, Zetica would be happy to assist. Just contact us via phone (01993 886682) or email (uxo@zetica.com) and we can provide a proposal with options and prices.

If you have requirements to identify other buried hazards (such as mapping utilities or obstructions) we can provide these surveys.

If proposed works on the Site change, or additional works are planned, contact Zetica for a re-assessment of the UXO risk and the risk mitigation requirements.

APPENDICES

Appendix 1 Anticipated Ordnance Types

The most likely ordnance types to be encountered on the Site are detailed below. For a more comprehensive set of ordnance data sheets, see http://zeticauxo.com/downloads-and-resources/ordnance-data-sheets/.

Information Data Sheet

Category Small Arms Ammunition

Type Various

Description

Small Arms Ammunition (SAA) is one of the more recognisable categories of ordnance which is primarily designed for anti-personnel use. SAA include items such as bullets, generally up to a calibre (diameter) of 20mm.

Generally small arms ordnance has a relatively low risk as UXO, although the larger calibre categories may have the same detonation risk as larger high explosive ordnance.

SAA is often associated with discarded ammunition boxes around firing practice ranges and training areas and is often found scattered across former military airfields as a result of aircraft crashes and localised disposal

Information Data Sheet

Category Small Arms Ammunition (Blanks)
Type Various

Description Small Arms Ammunition (SAA) is one of the more recognisable categories of ordnance which is primarily designed for anti-personnel use. SAA include items such as bullets, generally up to a calibre (diameter) of 20mm.

Blank ammunition differs from standard SAA in that it has no projectile component. Instead, the tip of the cartridge generally comprises crimped metal or a paper disc intend to be blown out when fired.

This allows weapons training to be conducted without the need for a dedicated firing range, as firearms can be discharged as normal using blank ammunition but will not launch any projectile.

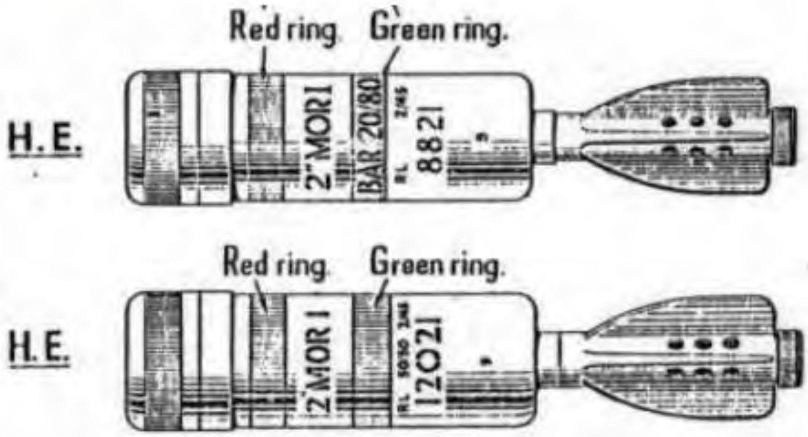
Despite the lack of any potential HE or incendiary components, blank ammunition still contains propellant that can deflagrate and cause injury if handled incorrectly.

Live Round (Projectile)

Blank Round (No Projectile)

Information Data Sheet

Category Mortar (British)
Type 2-Inch Mortar Bomb



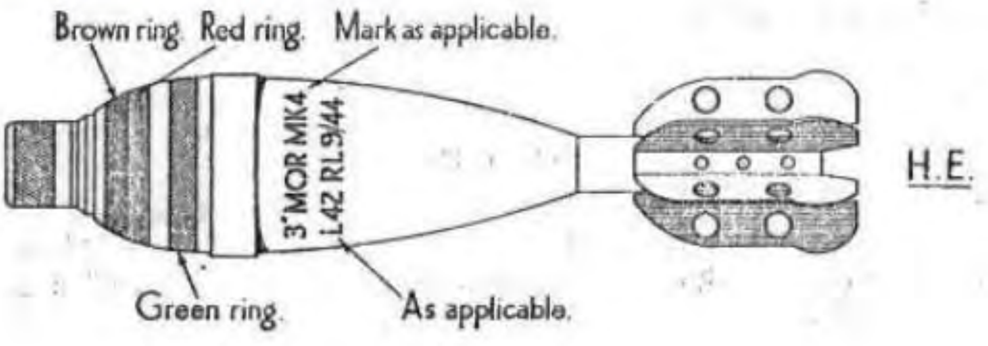
Variants	14	**Length**	11.4" x 2"
Weight	2.5lbs	**Firing Mechanism**	Trip (small trigger)
Calibre	50.8mm (2.0 inches)	**Rate of Fire**	8 rounds per minute

Description Pear-shaped steel body with 6 or 8 vanes. Originally painted buff yellow or dark grey. Filled with cast TNT, granular TNT or powdered Amatol. Also smoke, illumination and practice versions.

Function Small enough to be carried by one man, with a range limited to 500 yards, the 2" mortar was used in an anti-personnel role.

Information Data Sheet

Category Mortar (British)
Type 3-Inch Mortar Bomb



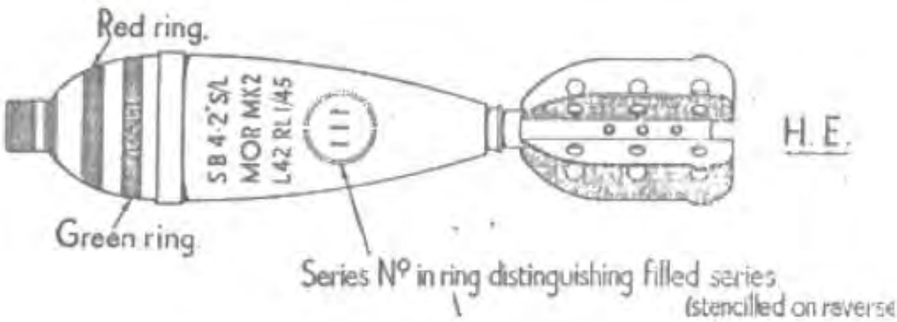
Variants	2	**Dimensions**	19.3" x 3"
Weight	10lbs	**Firing Mechanism**	Trip (small trigger)
Calibre	76.2mm (3.0 inches)	**Rate of Fire**	12 rounds per minute

Description Pear-shaped steel body with vaned tail fin for stability in flight. Typically filled with high explosive or white phosphorus, the latter dispersing on detonation.

Function Range of up to 1,600 yards, the 3" mortar was used in an anti-personnel role.

Information Data Sheet

Category Mortar (British)
Type 4.2-Inch Mortar Bomb



Weight 9.1kg (20lbs)

Firing Mechanism Trip (small trigger)

Calibre 106.7mm (4.2 inches)

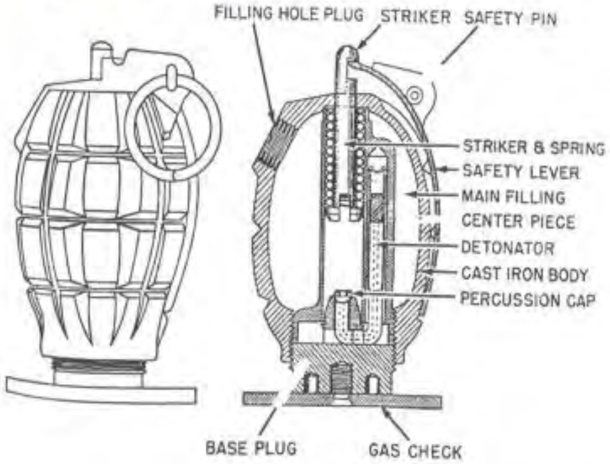
Rate of Fire 20 rounds per minute

Description Pear-shaped steel body with vaned tail fin for stability in flight. Filling of high explosive, white phosphorus, smoke or chemicals.

Function Heavy mortar used in anti-personnel and anti-tank role.

Information Data Sheet

Category Grenades (British)
Type No. 36 Hand Grenade ('Mills Bomb')



Variants	-	**Dimensions**	101.6mm x 61mm (4" x 2.4")
Weight	2 lbs	**Delay**	4 seconds
Filling	Baratol	**Material**	Cast Iron

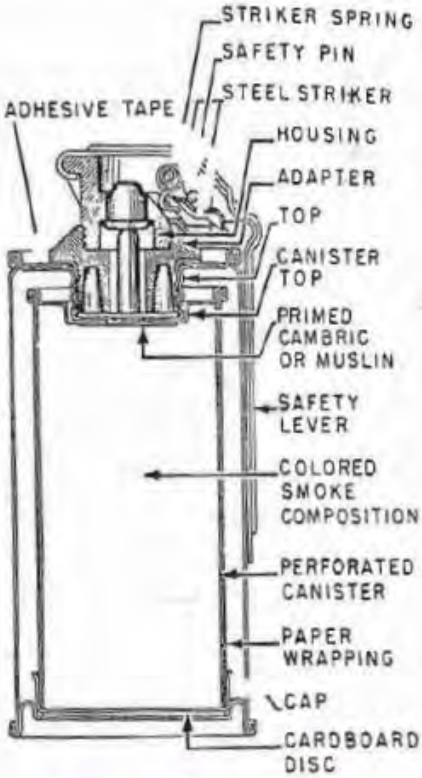
Description Lemon-shaped, cast-iron body filled with high explosive. Three holes in the body; one in the base for priming, one near the top for filling; one on the top holding striker.

Function Used as a defence against enemy personnel.

Information Data Sheet

Category Grenades (British)
Type Smoke Hand Grenade

Variants	Numerous
Body Dimensions	66mm x 114.3mm (2.6" x 4.5")
Weight	2lbs
Delay	4 seconds
Filling	Smoke (various colours)
Composition	Tin plate
Description	Green, cylindrical in shape with a perforated canister for emitting smoke.
Function	Used as signalling devices and for training purposes.



Information Data Sheet

Category Grenades (British)

Type No. 69 Hand Grenade

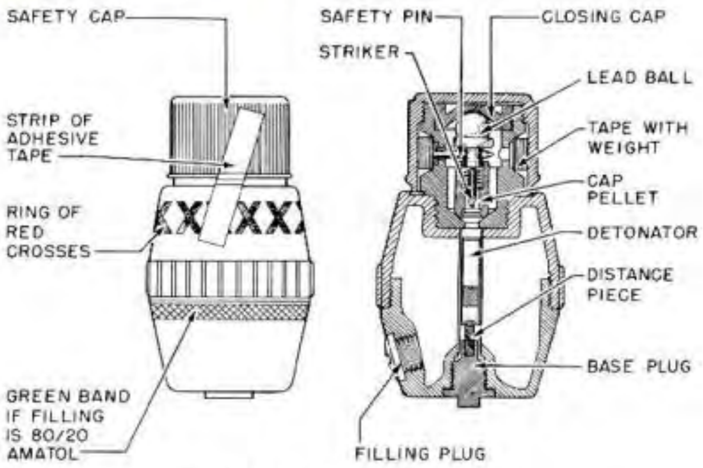


Figure 233—A./P. Hand Grenade No. 69 Mk I

Variants	-	**Dimensions**	139.7mm x 76.2mm (5.5" x 3")
Weight	0.8lb	**Fuze**	No. 247
Filling	3¼ oz Amatol, Baratol or Lyddite	**Material**	Bakelite

Description Two-piece body, threading together in the middle. There are a filling hole and plug and a priming hole and plug in the base section. A detonator well runs lengthwise through the filling.

Function Light, impact-firing grenade used for offensive action.

Information Data Sheet

Category Projectiles (British)

Type Projector, Infantry, Anti-Tank (PIAT) Projectile

Variants -

Body Dimensions 380mm x 89mm (15" x 3.5")

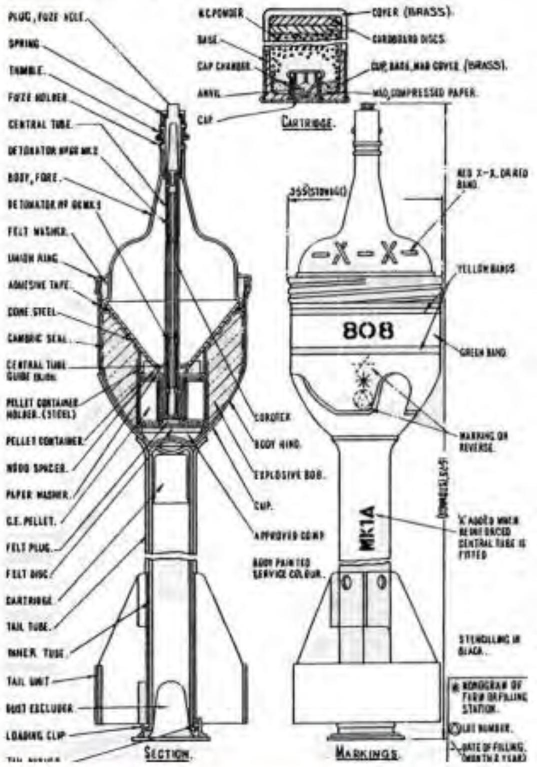
Weight 2.5lbs

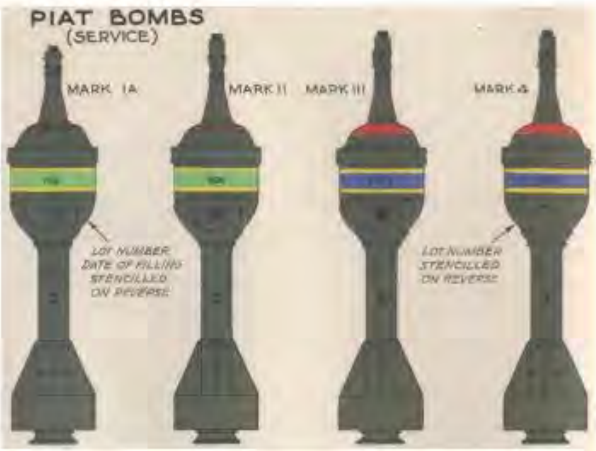
Fuze Impact fuze

Composition Steel

Description Steel cylindrical body beneath fuze chamber with drum tail unit and guide ring at base. Fin-stabilised tail.

Function Used by the infantry as an anti-tank weapon and house breaker, with a maximum range of fire of 350yds. Also used extensively for training. High explosive, phosphorus and smoke fillings.





Information Data Sheet

Category Projectiles
Type Tank Ammunition


Loading 75mm shells into a British Churchill tank

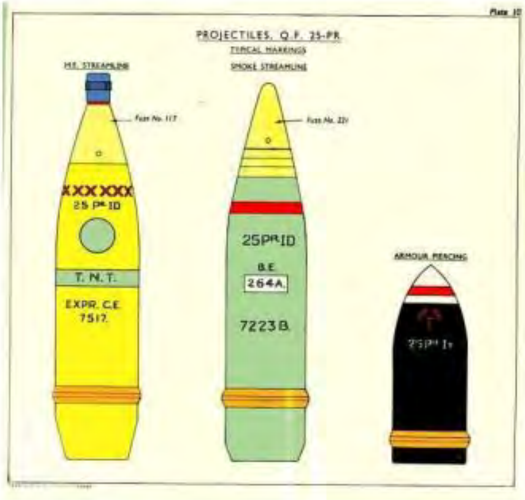
US Sherman 75mm tank shell


Description Wide variety of tank shells and fillings in use during WWII, but mostly 75mm projectiles in US and British tanks.

Information Data Sheet

Category Projectiles (British)
Type 25-Pounder Shell

Variants	High Explosive Anti-Tank Smoke
Body Dimensions	88mm x 292mm
Weight	25lbs (11.5kg)
Fuze	Percussion fuze
Function	The Quick Fire (QF) 25-pounder became the standard British field gun and howitzer during WWII. It was highly mobile and remained in use into the 1960s



Information Data Sheet

Category Anti-Tank Mine
Type British Anti-tank mine E.P. Mk V (Mk 5)

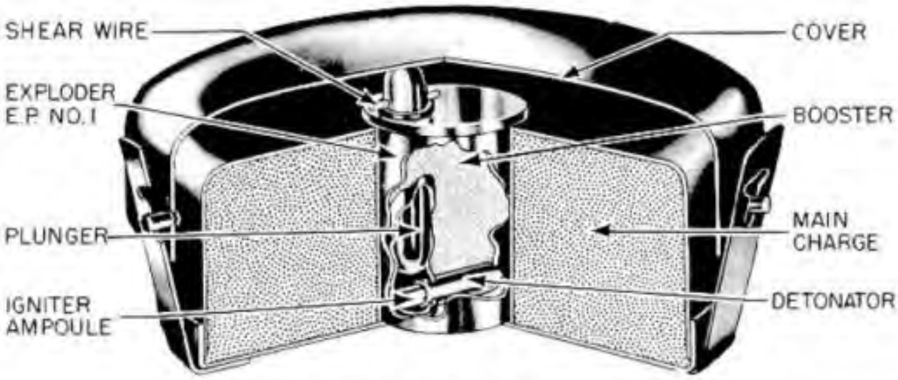


Figure 258—A./T. Mine E.P. Mk V

Body Dimensions	203.2mm x 63.5mm (8" x 2.5")	**Pressure Required**	115 – 160kg
Weight	3.6kg	**Fuze**	Exploder E.P. No. 1 or No. 2
Filling	TNT	**Material**	Sheet metal

Description Cylindrical, metal-cased British anti-tank blast mine

Function Defence against armoured cars, tanks, and other vehicles. Could also break the tracks of light or medium tanks and disable vehicles.

Information Data Sheet

Category Mine (British)
Type Mark XVII; Moored Contact Mine

Variants 1

Body Dimensions 1,020mm x 1,220mm

Weight 105-225kg (320-500lbs)

Fuze Contact

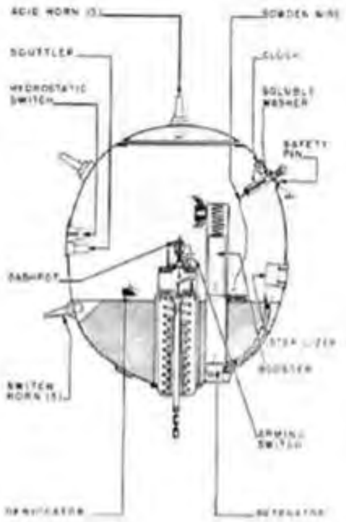
Composition Steel

Description Spherical in shape and typically painted black with a coloured band around the lower section. Could be equipped with up to 11 switch horns, protruding from the body at all angles. Top and bottom have fixtures for a detonator and mooring chain respectively.

Function

The MK XVII was the most commonly used British naval main, and could be moored in waters up to 915m depth.

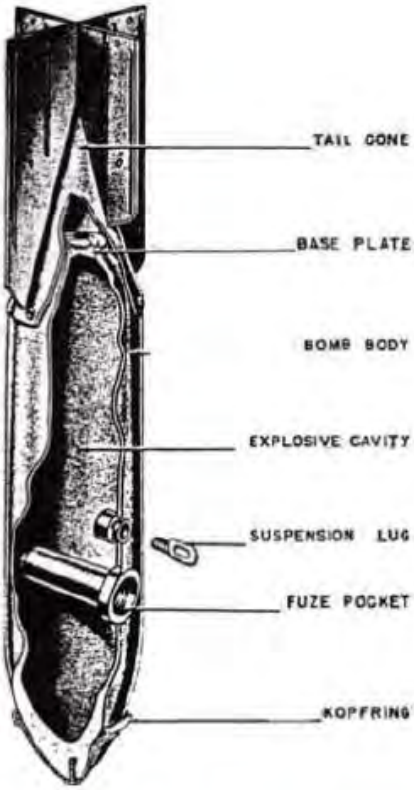
It was a moored contact mine which was frequently used in defensive minefields within UK territorial waters.



Information Data Sheet

Category Bomb (Luftwaffe)
Type Sprengbombe-Cylindrisch (SC) 50kg

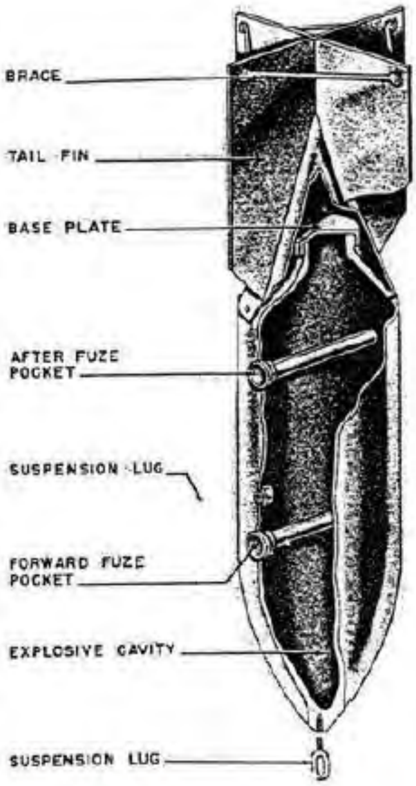
Variants	8
Body Dimensions	762 x 200mm (30" x 7.9")
Weight	55kg (122lbs)
Charge Weight	25kg (54lbs)
Fuze	Single electric impact fuze. Some have short time delay
Composition	Sheet steel
Description	Thick nose welded to a steel body. Nose may be attached to Kopfring (a triangular section steel ring) or spike. Suspension bolt in eye/body and sheet metal tail attached to body with rivets/screws. Originally painted green-grey with a yellow stripe on the tail. Cast TNT, Amatol or Trialen filling.
Function	Designed to maximise shock waves through air, water and earth and for general demolition. Used against easily damageable targets, including roads, aircraft hangars, rolling stock and small buildings. Spike bombs/ 'Stabo' (SC 50 with spikes attached to nose) were used against rail lines and country roads, with Kopfring used against naval targets.



Information Data Sheet

Category Bomb
Type Sprengbombe-Cylindrisch (SC) 250kg

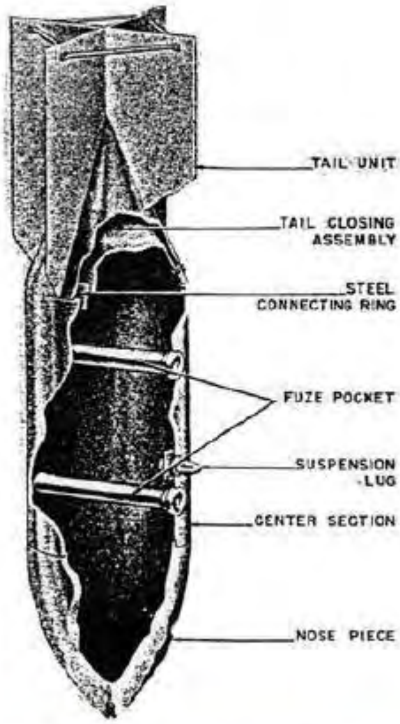
Variants	8
Body Dimensions	1194mm x 368mm (47" x 14.5")
Weight	249-264 kg (548-582lbs)
Charge Weight	130-145 kg (287-320lbs)
Fuze	Electric impact fuze/electric clockwork time fuse & electric anti-disturbance fuze
Composition	Sheet steel with stays
Description	Thick nose welded to steel body. Nose may be attached to Kopfring (triangular section steel ring) or spike. Sheet metal tail attached to body with rivets/ screws. Suspension eye bolt in the nose/body. Originally painted green-grey with a yellow stripe on the tail. TNT; amatol; TNT and aluminium powder, naphthalene, ammonium nitrate and wax/ wood meal filling.
Function	Designed to maximise shock waves through air, water and earth and general demolition. Used against railway installations, large buildings, ammunition depots and below-ground installations (to 8m). Spike bombs/ 'Stabo' (SC 50 with spikes attached to nose) used against rail lines and country roads.



Information Data Sheet

Category Bomb
Type Sprengbombe-Cylindrisch (SC) 500kg

Variants	-
Body Dimensions	1414–1486mm x 470mm (55.7-58.5" x 18.5")
Weight	500kg (1,100lbs)
Charge Weight	220kg (484lbs)
Fuze	Electric impact fuze/electric clockwork time fuse & electric anti-disturbance fuze.
Composition	Sheet steel with stays or drum
Description	Thick nose welded to steel body. Nose may be attached to Kopfring (triangular section steel ring). Tail either steel sheet or drum-shaped. Suspension band. Originally painted green-grey/ buff (some later versions sky blue) with yellow stripe on tail. Filled with amatol, TNT or trialen.
Function	Designed to maximise shock waves through air, water and earth and for general demolition. Used against railway property, large buildings, shipping and below-ground installations.



Information Data Sheet

Category Projectile

Type 3.7" Anti-Aircraft Shell

Variants 6

Body Dimensions 94mm x 360mm (3.7 x 14.7")

Weight 12.7kg (28lb)

Fuze Mechanical time fuze

Composition Cast steel

Description Brass cartridge case. Square-based shell with tapered nose, filled with Amatol, TNT or RDX/TNT. MK6 had forward centring bands and a wider driving band.

Function Used as a defence against enemy aircraft, fired from fixed batteries and mobile mountings. Could fire approximately 20 rounds per minute with a maximum ceiling of 41,000ft and horizontal range of 20,600 yards.

Information Data Sheet

Category Projectile
Type 4.5" Shell (Mark II – Anti-Aircraft)

Variants -

Body Dimensions 114mm x 566mm (4.5" x 21.9")

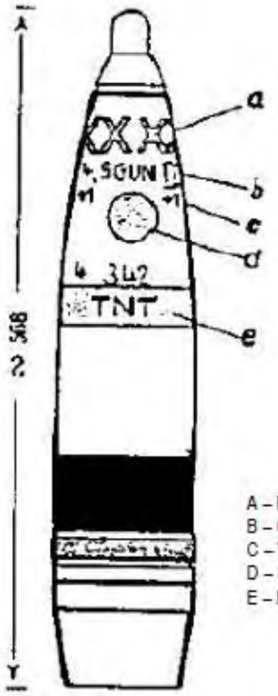
Weight 24.9kg (55lb)

Fuze Mechanical time fuze

Composition Cast steel

Description Square-based, tapered-nosed shell filled with TNT or Amatol. Steel casing, rotating band of either copper or gilding metal located 3.5" in front of the base end with single groove.

Function Used as field artillery and adapted for use in anti-aircraft defence from fixed batteries. Rate of fire of 8 rounds per minute, maximum ceiling of 44,000ft and horizontal range of 22,800 yards.



A – Missile Identification
B – Gun and Bullet Type
C – Weight
D – Smoke pot
E – Explosives Ring

Appendix 2 Sources of UXO Hazard

The sections below provide background information on the most likely sources of UXO hazard affecting the Site. For a more comprehensive set of UXO information sheets, see http://zeticauxo.com/downloads-and-resources/uxo-information-sheets/.

Appendix 2.1 Military Training Areas

In September 1939, the area of land occupied by the army for all purposes, including training, was 235,000 acres. By February 1944, this had risen to 9,800,000 acres for training alone. Land was required for infantry and tank training, for beach assault, and for weapon practice.

Coastal sites involved not only use of the land but also the seabed designated by navigational exclusion zones. Where the land was selected, often requiring the civilian population to leave, camps for the incoming troops had then to be built.

Official training areas tend to have clearly delineated boundaries within which training is to take place. During wartime, however, many areas of open fields and woodland were requisitioned under Defence Regulation 52 by military units stationed in the area. Training in these areas was often not subject to any official rules and regulations, or detailed records.

Some training areas had associated firing ranges and others had provisions for armoured vehicle and tank training. In addition to the surrounding camps, the training areas required firing points, stop butts and observation and range control bunkers.

In the build-up to D-Day, marshalling areas for British and American troops were established in park and woodland near to the coast and these areas were commonly used for training exercises using live munitions.

The types of UXO that could be present at former military training areas varies depending on their operational history. Ordnance used during exercises ranged from small arms ammunition to grenades, defensive mines, mortars and shells, and unconventional weapons such as flamethrowers.

'Dry' training areas will have primarily used blank ammunition, although even these are likely to have used live munitions at some stage.

Appendix 2.2 Small Arms Ranges

Small arms ranges (such as rifle ranges) can provide a source of UXO, explosive and metallic contamination, depending on their operational history and length of use.

Rifle ranges were a common feature in the open countryside during the 19th century, with local volunteer and militia forces using them extensively for practice.

By the beginning of the 20th century, many of the rifle ranges had fallen into disuse, although some were retained for training purposes by the regular army.

Small arms ranges vary considerably in length, from 25yd machine gun ranges (typically found at airfields, barracks and in urban areas) to 1,000yd shooting galleries. On the larger ranges, medium-calibre and close combat munitions, such as grenades and mortars, were occasionally used, particularly during wartime.

Most of the larger small arms ranges still in use are under MoD control and access is carefully managed. They often have extensive danger areas within which live firing may occur.

Generally, small arms ammunition does not provide a significant UXO hazard and, whilst some live ammunition is likely to be found at former small arms ranges, it does not typically have a high explosive charge.

It should be noted that some larger calibre smalls arms ammunition does have high explosive filling and, at airfield sites, machine gun ranges were used to test cannon shells in addition to small arms. The possibility that some of the larger rifle ranges were used for close combat practice, using grenades and mortars, can also not be discounted.

A significant hazard arising from small arms ranges is metallic contamination associated with spent ammunition. This contamination is usually from lead, although antimony and zinc may also be present. These substances are potentially toxic to humans and the environment.

Appendix 2.3 Military Airfields

During WWII, there was an urgent need for an increasing number of military airfields in the UK. This requirement grew further as the war progressed, particularly after the arrival of American troops in 1942. Airfields were constructed for a variety of purposes, including training, as fighter and bomber stations, and for maintenance units (MUs).

Many former airfield sites have not been significantly redeveloped in the post-WWII period. As such, a number of potential sources of UXO relating to former airfield activity still remain. The types of UXO that may be present depends on the operational history of the airfield. Almost all military airfields had a similar set of features to include ordnance storage and disposal areas, alongside offensive and defensive weapons.

Pipe Mines: Pipe mines were laid beneath critical infrastructure such as runways and designed to be detonated in the event of an invasion to prevent enemy use of the airfield. Airfields that were most likely to have been equipped with pipe mines were those considered vulnerable to invasion, particularly along the South and East Coast. Airfields further inland, and those built after the main threat of German invasion had passed, are unlikely to have had pipe mines installed.

Whilst the majority of the pipe mines at airfields were removed at the end of WWII, it is known that some were left in situ or were not detected during post-WWII clearance operations. Pipes mines are periodically found during development at former airfields.

Bomb and Munitions Stores: These were typically constructed in a remote area of an airfield, linked to the perimeter track by a service road. Bomb stores often contained a combination of both practice and live ordnance, in addition to components such as fuzes, detonators and gaines.

Munitions stores also often held close combat ordnance (such as grenades and mortars) and small arms ammunition for airfield defence.

Whilst the bomb stores at airfields were typically subjected to ordnance clearance operations during decommissioning, the sophistication and thoroughness of the clearance was often insufficient to ensure confidence that most of the potential UXO were removed. Incidents of ordnance burial and the accidental spillage of smaller munitions components in the vicinity of the bomb stores is known to have occurred, although such disposal usually occurred in designated areas away from the storage area.

Machine Gun Test Butts: On an airfield, the butts were a designated area where aircraft tested their guns. The butts were often located at the end of access runways or dispersals and incorporated a mound of Made Ground, sand or soil into which firing took place. Whilst machine gun rounds were typically tested at the butts, some aircraft fired cannon shells into the butts.

Small Arms Ranges: Small arms ranges (such as rifle ranges) and close combat ranges (such as mortar and grenade ranges) were provided for training the troops involved in ground defence of the airfield. (See the small arms ranges information sheet for further information on these sites).

Munitions Disposal Areas: For any operational military airfield, using an ordnance disposal facility is required. During wartime, this typically took the form of a burning or burial pit and commonly took place in areas around the perimeter of an airfield, away from aircraft operations and buildings.

The most likely disposal operations at airfields during WWII involved the burial or burning of aircraft ammunition and close combat munitions related to airfield defence. Larger munitions, such as bombs, were usually returned to regional ordnance depots, for reuse or for disposal. It is known, however, that the buried disposal of HE bombs occurred at some airfields and UXBs relating to such practices are occasionally found.

Aircraft Breaking: Specialist Maintenance Units (MU) were responsible for the modification, maintenance and repair of damaged aircraft. Those aircraft considered beyond all repair were stripped of useful and salvageable parts and disposed of in a pit or 'aircraft graveyard', usually in areas around the perimeter of an airfield. Waste from aircraft disposal should be considered hazardous. It contains a range of conventional contaminants and potentially radioactive materials (such as radium from luminescent dials).

Appendix 2.4 Mined Locations

Minefields were laid along the coast, in estuaries and along the banks of major rivers to deter infantry invasion. They were often surrounded by barbed wire entanglements to obstruct amphibious landings.

Hardened defensive positions, such as roadblocks and pillboxes, were often surrounded by anti-tank mines for further protection. These were usually buried in shallow sockets in an attempt to make them indistinguishable from the road layout.

Strategic points such as bridges and gaps in cliffs were often filled with explosives so that they could be destroyed in the event of an enemy invasion. Canadian pipe mines, filled with nitroglycerine, were also laid under some airfield runways to prevent their use by the enemy if captured.

A wide variety of mines have been used on the land area of the UK. These can typically be separated into anti-tank and anti-personnel mines.

Most of the mined beaches and other land areas in the UK have been cleared by the MoD. Occasionally, wave action or activities such as bombing caused mines to become displaced and these may have been missed during past clearance activities. Therefore beaches that are known to have been mined need to be treated with respect.

Remnant mines are also sometimes found in the foundations of bridges and other infrastructure which has remained undisturbed since wartime.

More rarely, sea mines are washed up on beaches and shorelines along estuaries (see information sheet on marine mines).

Appendix 2.5 Marine Mines

Marine mines have been used in some form since at least the 17th century, when gunpowder-filled kegs were deployed as a primitive naval weapon. Designs gradually improved until the 19th century when marine mines became widely used for coastal defence.

During WWI, approximately 128,000No. mines were laid in the sea around the coast of the UK. At the beginning of WWII, the Admiralty ordered the laying of further extensive minefields around the coast of England. This included both defensive mines on beaches in order to prevent enemy landings, as well as approximately 100,000No. marine mines laid at sea to destroy enemy ships. Some of these were buoyant and others were deployed by anchoring them to the seabed.

By WWII, marine mines typically carried 100 to 500lbs (50 to 250kg) of explosive. The initiating mechanisms in these mines have often deteriorated but the explosive charges will not have significantly altered unless the mine has split and the explosives have migrated and dispersed in the marine environment.

German aircraft also dropped thousands of magnetic mines into shipping lanes and estuaries. Many of these were removed by British minesweepers, although outside the major shipping lanes the requirement for disposal would have been reduced.

It is generally accepted that less than 30% of the total number of marine mines laid during WWII were recovered due to migration from their initial locations in tidal currents. The recovery rate for anchored submerged mines is likely to be higher but accurate records regarding the clearance of these minefields is not readily available.

As a result there is a possibility that some remain in the marine environment and a mine can be washed up on a beach or found drifting in the water around any part of the UK's coastline.

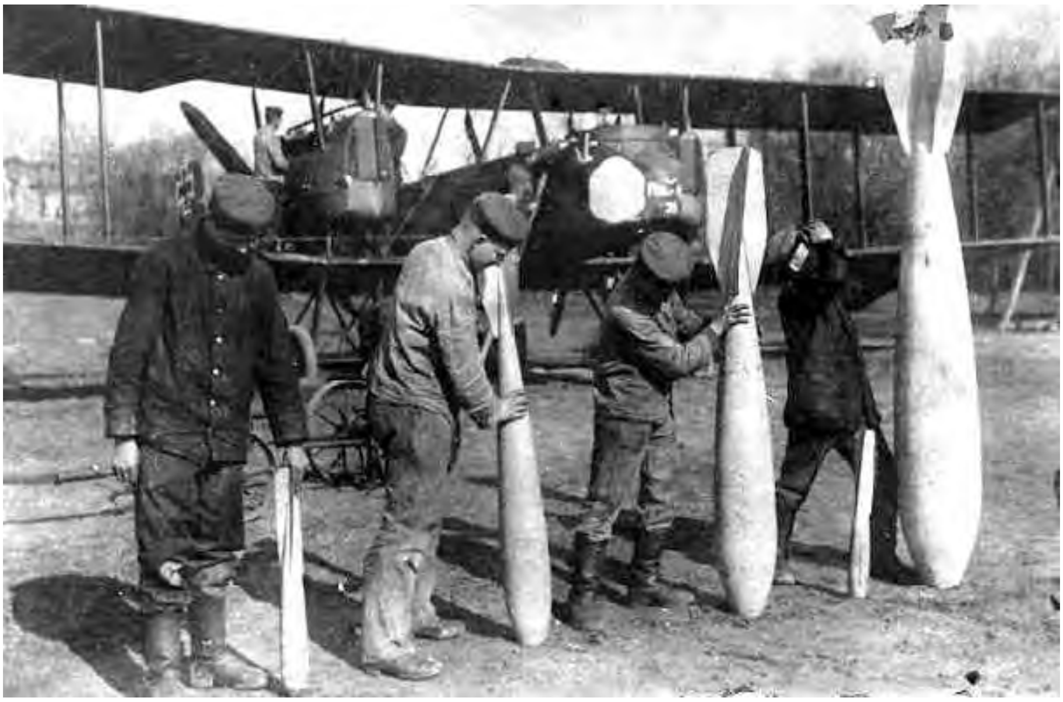
Appendix 2.6 WWI Bombing

It is not generally realised that during World War One (WWI) significant bombing took place across some areas of the UK. An estimated 9,000No. German bombs were dropped on Britain during the course of 51No. airship and 52No. aircraft raids. It was the first time that strategic aerial bombardment had been used. More than 1,400No. people were killed during these raids.

Most air raids were carried out on London and Southeast England. Areas along the East Coast were also targeted regularly due to their proximity to the European continent. Bombing raids further inland were rare and West England and Wales were out of reach for German aircraft of the time.

Aerial bombing during WWI initially relied on visual aiming, with bombsights not developed until later in the war. The inaccuracy inherent in this method meant that bombs often fell some way from their intended targets.

The first recorded raid against England occurred on the 21st December 1914 when 2No. high explosive bombs fell near the Admiralty Pier at Dover. Zeppelin raids intensified during 1915 and 1916, with aircraft raids becoming more frequent after 1917. The last raid of WWI took place on the 19th May 1918, when 38 Gotha and 3 Giant aircraft bombed London and surrounding districts, dropping a total of more than 2,500lbs of bombs.



The potential of coming across an Unexploded Bomb (UXB) from WWI is far less likely than a WWII UXB given the lower bombing densities during raids in the Great War.

Some areas which were subjected to sustained bombing raids, such as parts of London and coastal towns, recorded a higher number of UXB. In these areas, where there has been no significant development for the last century, the potential of a UXB remaining from WWI cannot be totally discounted.

Appendix 2.7 WWII Bombing

Bombing raids began in the summer of 1940 and continued until the end of WWII. Bombing densities generally increased towards major cities or strategic targets such as docks, harbours, industrial premises, power stations and airfields. In addition to London, industrial cities and ports, including Birmingham, Coventry, Southampton, Liverpool, Hull and Glasgow, were heavily targeted, as well as seaside towns such as Eastbourne and cathedral cities such as Canterbury.

The German bombing campaign saw the extensive use of both High Explosive (HE) bombs and Incendiary Bombs (IBs). The most common HE bombs were the 50kg and 250kg bombs, although 500kg were also used to a lesser extent. More rarely 1,000kg, 1,400kg and 1,800kg bombs were dropped.

The HE bombs tended to contain about half of their weight in explosives and were fitted with one or sometimes two fuzes. Not all HE bombs were intended to explode on impact. Some contained timing mechanisms where detonation could occur more than 70 hours after impact.

Incendiary devices ranged from small 1kg thermite filled, magnesium bodied Incendiary Bombs (IBs) to a 250kg 'Oil Bomb' (OB) and a 500kg 'C300' IB. In some cases the IBs were fitted with a bursting charge. This exploded after the bomb had been alight for a few minutes causing burning debris to be scattered over a greater area. The C300 bombs were similar in appearance to 500kg HE bombs, although their design was sufficiently different to warrant a specially trained unit of the Royal Engineers to deal with their disposal.

Anti-Personnel (AP) bombs and Parachute Mines (PMs) were also deployed. 2No. types of anti-personnel bombs were in common use, the 2kg and the 12kg bomb. The 2kg bomb could inflict injury across an area up to 150m away from the impact. PMs (which were up to 4m in length) could be detonated either magnetically or by noise/vibration.

Anti-shipping parachute mines were commonly dropped over navigable rivers, dockland areas and coastlines. The Royal Navy was responsible for ensuring that the bombs were made safe. Removal and disposal was still the responsibility of the Bomb Disposal Unit of the Royal Engineers.

In 1944, the Germans introduced new weapons; the V1, a 'flying bomb' and guided missile, and the V2, a ballistic missile rocket that travelled at such speed that no one could see or hear its approach. London was the main target for these attacks.

WWII bomb targeting was inaccurate, especially in the first year of the war. A typical bomb load of 50kg HE bombs mixed with IBs which was aimed at a specific location might not just miss the intended target but fall some considerable distance away.

It is understood that the local Civil Defence authorities in urban areas had a comprehensive system for reporting bomb incidents and dealing with any Unexploded Bombs (UXB) or other UXO. In more rural areas, fewer bombing raids occurred. It is known that Air Raid Precaution (ARP) records under-represent the number and frequency of bombs falling in rural and coastal areas. Bombs were either released over targets or as part of 'tip and run' raids where bomber crews would drop their bombs to avoid anti-aircraft fire or Allied fighter aircraft on the route to and from other strategic targets. Bombs dropped as a result of poor targeting or 'tip and run' raids on rural and coastal areas often went unrecorded or entered as 'fell in open country' or 'fell in the sea'. The Luftwaffe are thought to have dropped approximately 75,000 tons of bombs on Britain throughout the Second World War and an estimated 11% of all bombs dropped during the war failed to detonate.

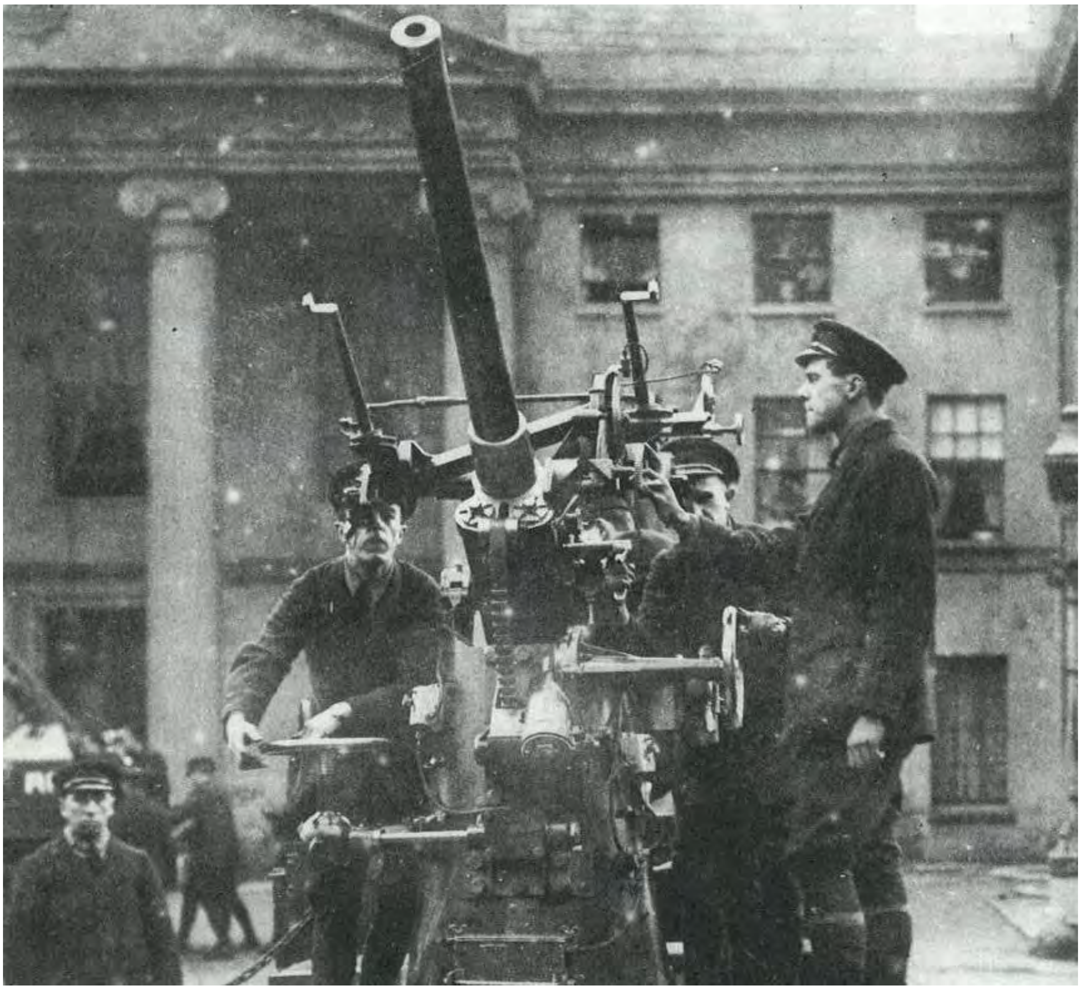
The potential for a UXB hazard to exist on a site depends on a variety of factors. Were there strategic targets in the surrounding area? Was the site bombed? Could a UXB impact have been missed? Even in rural areas, the potential for UXB cannot be totally discounted and therefore it is essential that detailed local bombing records are obtained when assessing the UXB hazard on any site.

Appendix 2.8 Anti-Aircraft Guns

As aerial bombardment first began during WWI, Anti-Aircraft (AA) gun batteries were established were gradually established throughout much of England to counter German bombing raids. By June 1916, there were approximately 271No. AA guns and 258No. searchlight installations defending London alone.

Common AA defences during WWI included 3-inch, 75 millimetre, 6-pounder and 1-pounder guns. Many of these guns were mobile, being mounted on lorry chassis. They were driven about following the course of an airship and fired from any area of open land.

During WWI, Unexploded AA (UXAA) shells, could land up to 13km from the firing point, although more typically fell within 10km.



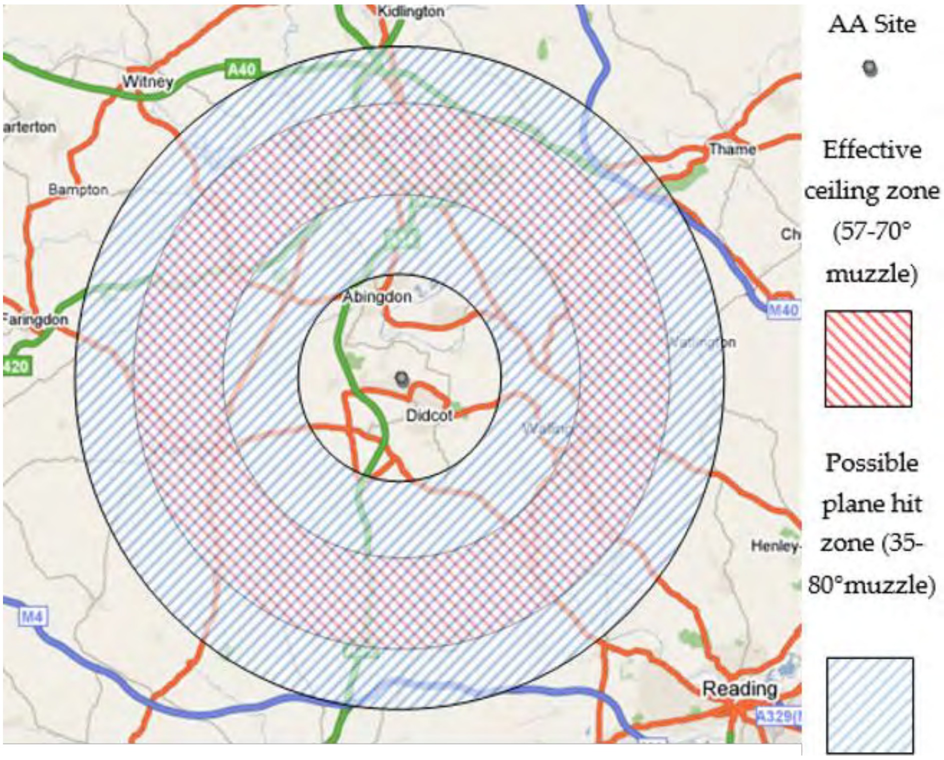
AA gun batteries were used extensively during WWII to counter the threat posed by enemy aircraft. In many instances, AA shells caused damage to Allied territory and in some areas caused significant numbers of civilian fatalities.

During WWII, AA shells could land up to 27km from the firing point, although more typically fell within 15km. These could be distributed over a wide area.

3No. types of AA batteries existed:

- **Heavy Anti-Aircraft (HAA)** batteries of large guns (typically 3.7”, 4.5” and 5.25” calibre) designed to engage high flying bomber aircraft. These tended to be relatively permanent gun emplacements.
- **Light Anti-Aircraft (LAA)** weaponry, designed to counter low flying aircraft. These were often mobile and were moved periodically to new locations around strategic targets such as airfields. They typically fired 40mm shells and machine gun ammunition.
- **Rocket batteries (ZAA)** firing 3” or 3.7” AA rockets with a maximum altitude of 5,800m and a ground range of 9km were typically permanent emplacements.

Unexploded AA (UXAA) shells were a common occurrence during WWII. As the figure below demonstrates, shells were unlikely to fall in the immediate vicinity of a gun battery but in the surrounding area. This would be dependent upon the angle of fire and the flight height of the attacking aircraft.



AA batteries were deliberately targeted by the Luftwaffe and therefore areas surrounding a gun battery may have a greater risk of UXB being present.

Munitions stores were also established around AA batteries. These stored the shells for the batteries and small arms ammunition for troops manning the position. Such stores were typically removed at the end of WWII, although some disposal may have occurred in the immediate vicinity of the gun battery.

Appendix 3 Recent UXO Finds

UXO finds in the UK are a regular occurrence, although they almost never result in an accidental detonation.

It is still important to note that explosives rarely lose effectiveness with age. In some instances, mechanisms such as fuzes and gaines can become more sensitive and more prone to detonation, regardless of whether the device has been submersed in water or embedded in silt, clay or similar materials.

The effects of an accidental UXO detonation are usually extremely fast, often catastrophic and invariably traumatic to any personnel involved. Such occurrences are largely restricted to current theatres of war and overseas minefields, with occasional events in mainland Europe.

Zetica, and other commercial EOD companies, uncover and make safe thousands of items of UXO each year, though details are rarely made public knowledge.

Publicly-recorded discoveries do also occur regularly, as demonstrated by the list of recent significant UXO finds in the UK below. To keep up to date with the latest UXO finds, visit http://zeticauxo.com/news/.

On the 3rd February 2020, a 500kg German UXB was found on a building site in Soho, London. It was removed by an EOD team.

On the 18th April 2020, a 500lb British UXB was discovered by a farmer near Drayton in Oxfordshire. The area had been used as an RAF practice bombing range during WWII and after an in-situ disposal was completed the item was found to have contained no explosives.

On the 4th May 2020, an UXB was discovered by builders at Kings Hill on the former RAF West Malling airfield, the fourth found since 2017. It was destroyed in a controlled explosion.

On the 1st December 2020, a research vessel discovered an unexploded marine mine containing 350kg of explosives in Wemyss Bay in the Firth of Clyde. RN divers investigated the item and destroyed it.

On the 4th February, 2No. anti-tank mines were discovered on Slapton Sands in Devon. They had been uncovered by recent storms and were destroyed.

On the 26th February 2021, a 1,000kg German “Hermann” UXB was discovered by builders at Exeter University campus (see plate below). It was investigated and detonated in-situ following the evacuation of nearby properties and University halls of residence.

On the 29th March 2021, 1No. 250lb UXB was discovered on the seabed near Hinkley Point C harbour, Bristol. A maritime exclusion was imposed while the item was investigated and then destroyed in a controlled explosion.

On the 10th May 2021, 1No. Anti-Aircraft shell dating from WWII was found by a member of the public in Horsham, Surrey. It was destroyed in-situ by a bomb disposal unit.

On the 17th May 2021, 1No. Sea Wolf missile was brought onboard a fishing vessel near Brixham in Devon. A Royal Navy EOC team destroyed the missile in a controlled explosion.

On the 1st June 2021, a cache of approximaetly 100No. hand grenades dating from WWII were found in a Nottinghamshire forest, a possible relic from nearby wartime camps. They were destroyed.

On the 23rd July 2021, 1No. 18lb artillery shell dating from WWI was discovered in a private garden in Bloxham, Oxfordshire. It was transported to a nearby field where it was destroyed in a controlled explosion.

On the 24th July 2021, 1No. 500lb British UXB was uncovered during construction works in Goole, East Yorkshire. Reports indicated that the UXB had been jettisoned by a Lancaster bomber aircraft prior to crashing nearby in WWII. The item was investigated and destroyed.

On the 18th August 2021, 1No. UXB was found by construction workers on a Site in Earl Sterndale, Derbyshire. Upon inspection the UXB was deemed to be dangerous and a controlled detonation was undertaken.

On the 10th September 2021, EOD teams destroyed 25No. mortars which had been washed up onto beaches around Nairn and Ardersier in Morayshire. These beaches had been used during WWII for training prior to the D-Day landings in Normandy.

On the 18th October, 1No. 18.5lb artillery shell was discovered during the clearing-out of a farmyard barn near Aberfeldy in Perthshire. The shell dated from WWI and was removed.

On the 12th November 2021, 1No. unexploded artillery shell was found on a housing development site in Wrexham, Wales. It was detroyed in controled explosion.

On the 15th December 2021, approximately 200No. artillery shells were discovered at a construction site located within the former Royal Ordnance Factory at Swynnerton in Staffordshire. The shells were removed and destroyed.

On the 15th December 2021, 1No. apparent UXB was snagged by a fishing trawler off the Norfolk Coast and then detonated, causing significant damage to the vessel. Upon further investigation, it was concluded that the UXB had been dropped in the water during WWII.

On the 2nd January 2022, 1No. heavily deteriorated 105mm artillery shell was discovered by dogwalkers on a beach in Cumbria. This may have originated on one of the several offshore ranges which have been operational along the nearby coastline since WWII.

Between the 24th and 27th January 2022, 5No. empty artillery shells were uncovered at a construction site in Manchester. These were likely linked to a shell-production factory which had been active on the site during WWII.

On the 17th February 2022, 1No. WWI-era Mk1 Mills hand grenade was found in the River Frome in Dorset by magnet fishermen. This was the third grenade to be pulled from the same stretch of the river over the past year. It was inspected by local police and destroyed.

Appendix 4 Glossary and Definitions

Abandoned Explosive Ordnance (AXO)	Abandoned Explosive Ordnance is explosive ordnance that has not been used during an armed conflict, that has been left behind or disposed of by a party to an armed conflict, and which is no longer under control of that party. Abandoned explosive ordnance may or may not have been primed, fuzed, armed or otherwise prepared for use.
Close Combat Munitions	Items of ordnance thrown, propelled or placed during land warfare, to include grenades, mortars, projectiles, rockets and land mines.
Demil	Derived from the term 'Demilitarisation', it refers to the break down and the recycling or disposal of ordnance components.
Detonation	The high-speed chemical breakdown of an energetic material producing heat, pressure, flame and a shock wave.
Device	This term is used for any component, sub-assembly or completed ordnance, which may or may not have an explosive risk. It can apply to detonators, primers, gaines, fuzes, shells or bombs.
Explosive	The term explosive refers to compounds forming energetic materials that under certain conditions chemically react, rapidly producing gas, heat and pressure. Obviously, these are extremely dangerous and should only be handled by qualified professionals.
Explosive Ordnance (EO)	Explosive Ordnance is all munitions containing explosives, nuclear fission or fusion materials and biological and chemical agents. This includes bombs and warheads, guided and ballistic missiles, artillery, mortar, rocket, small arms ammunition, mines, torpedoes, depth charges, pyrotechnics, cluster bombs & dispensers, cartridge & propellant actuated devices, electro-explosive devices, clandestine & improvised explosive devices, and all similar or related items or components explosive in nature.
Explosive Ordnance Clearance (EOC)	Explosive Ordnance Clearance is a term used to describe the operation of ordnance detection, investigation, identification and removal, with EOD being a separate operation.
Explosive Ordnance Disposal (EOD)	Explosive Ordnance Disposal is the detection, identification, on-site evaluation, rendering safe, recovery and final disposal of unexploded explosive ordnance.
Explosive Ordnance Reconnaissance (EOR)	Explosive Ordnance Reconnaissance is the detection, identification and on-site evaluation of unexploded explosive ordnance before Explosive Ordnance Disposal.
Explosive Remnants of War (ERW)	Explosive Remnants of War are Unexploded Ordnance (UXO) and Abandoned Explosive Ordnance (AXO), excluding landmines.

Explosive Substances and Articles (ESA)	Explosive substances are solid or liquid substances (or a mixture of substances), which are either: • capable by chemical reaction in itself of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. • designed to produce an effect by heat, light, sound, gas or smoke, or a combination of these as a result of a non-detonative, self-sustaining, exothermic reaction. Explosive article is an article containing one or more explosive substances.
Fuze	A fuze is the part of an explosive device that initiates the main explosive charge to function. In common usage, the word fuze is used indiscriminately, but when being specific (and in particular in a military context), fuze is used to mean a more complicated device, such as a device within military ordnance.
Gaine	Small explosive charge that is sometimes placed between the detonator and the main charge to ensure ignition.
Geophysical survey	A geophysical survey is essentially a range of methods that can be used to detect objects or identify ground conditions without the need for intrusive methods (such as excavation or drilling). This is particularly suited to ordnance as disturbance of ordnance items is to be avoided where ever possible.
Gold line	This is the estimated limit of blast damage from an explosive storage magazine. It usually means that development within this zone is restricted.
High Explosive	Secondary explosives (commonly known as High Explosives (HE)) make up the main charge or filling of an ordnance device. They are usually less sensitive than primary explosives. Examples of secondary explosives are: Nitro glycerine (NG), Trinitrotoluene (TNT), AMATOL (Ammonia nitrate + TNT), Gunpowder (GP), and Cyclotrimethylenetrinitramine (RDX).
Munition	Munition is the complete device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological or chemical material for use in military operations, including demolitions. This includes those munitions that have been suitably modified for use in training, ceremonial or non-operational purposes. These fall into three distinct categories:- • inert - contain no explosives whatsoever. • live - contain explosives and have not been fired. • blind - have fired but failed to function as intended.

Operation Overlord	The codename given to the Allied operation to invade Nazi Germany occupied Western Europe in 1944. Conceived in 1943, the operation consisted of a bombing campaign to weaken transport links, followed by large-scale amphibious landings, commonly known as the D-Day Landings.
Primary Explosive	Primary explosives are usually extremely sensitive to friction, heat, and pressure. These are used to initiate less sensitive explosives. Examples of primary explosives are: Lead Azide, Lead Styphnate, and Mercury Fulminate. Primary explosive are commonly found in detonators.
Propellants	Propellants provide ordnance with the ability to travel in a controlled manner and deliver the ordnance to a predetermined target. Propellants burn rapidly producing gas, pressure and flame. Although usually in solid form they can be produced in liquid form. Examples of propellants are: Ballistite often found in a flake form and Cordite used in small arms ammunition.
Pyrotechnic	A pyrotechnic is an explosive article or substance designed to produce an effect by heat, light, sound, gas or smoke, or a combination of any of these, as a result of non-detonative, self-sustaining, exothermic chemical reactions.
Small Arms Ammunition (SAA)	SAA includes projectiles around 12mm or less in calibre and no longer than approximately 100mm. They are fired from a variety of weapons, including rifles, pistols, shotguns and machine guns.
Unexploded Anti-Aircraft (UXAA) Shell	UXAA shells are army ordnance commonly containing HE, though they can also contain pyrotechnic compounds that produce smoke. Most commonly, these were 3.7” and 4.5” HE shells, although they ranged from 2” to 5.25” calibre.
Unexploded Bomb (UXB)	UXB is a common term for unexploded air-dropped munitions.
Unexploded Ordnance (UXO)	UXO is explosive ordnance that has been either primed, fuzed, armed or prepared for use and has been subsequently fired, dropped, launched, projected or placed in such a manner as to present a hazard to operations, persons or objects and remains unexploded either by malfunction or design.
V1	The Vergeltungswaffe-1, V-1, also designated Fieseler Fi 103/FZG-76, known colloquially in English as the Flying Bomb, Buzz Bomb or Doodlebug, was the first guided missile used in WWII and the forerunner of today's cruise missile.
V2	The Vergeltungswaffe 2 (V-2) (‘Reprisal Weapon 2’) was the first ballistic missile. It was used by the German Army primarily against Belgian and British targets during the later stages of WWII. The V-2 was the first man-made object launched into space, during test flights that reached an altitude of 189km (117 miles) in 1944.

Appendix 5 Aircraft Crashes

26th August 1940

1No. Heinkel III bomber aircraft crashed on open ground near Courtwick Farm, approximately 0.1km east of the Site.

4th September 1940

1No. Messerchmitt Bf100 (3101) fighter aircraft crashed on open ground near Blackpatch Hill, approximately 0.3km east of the Site.

23rd January 1941

1No. Junkers Ju 88A-5 (7103) bomber aircraft crashed on Parsons Farm, Poling, approximately 0.5km southeast of the Site.

5th May 1941

1No. Supermarine Spitfire IIa (P7753) fighter aircraft crashed in a field at Priors Lea, north of the main railway, at Littlehampton, approximately 0.1km southeast of the Site.

4th June 1941

1No. Supermarine Spitfire fighter aircraft crashed on fields near Tolme Farm, approximately 0.3km south of the Site.

9th July 1941

1No. Douglas A-20 Havoc night-fighter aircraft crashed in a field above the cliffs at Climping, approximately 0.3km west of the Site.

28th July 1941

1No. Junkers 88 bomber aircraft crashed on the corner of Lock Lane and Bines Road, approximately 0.3km northwest of the Site.

16th September 1941

1No. Supermarine Spitfire Ia (W3374) fighter aircraft crashed, during a training flight, on the beach south of the Littlehampton Golf Course, on the Site (TQ 020009).

20th September 1942

1No. Armstrong Whitworth Whitley bomber aircraft crashed on Sullington Hill, approximately 0.2km west of the Site.

25th October 1942

1No. Bristol Beaufighter I fighter aircraft crashed in a field east of the River Arun, short of RAF Ford, approximately 0.3km west of the Site.

13th May 1943

1No. Typhoon (XMX R.9891) bomber aircraft crashed upon returning from a mission, in a field east of Arundel railway junction, on the Site (TQ 018043).

10th November 1943

1No. Typhoon (JP544) bomber aircraft crashed on open ground southwest of St Mary Magdalene's Church, Lyminster, on the Site (TQ 020045). Records indicate that it was armed with 2No. 500lb High Explosive (HE) bombs, 1No. of which exploded onboard the aircraft causing the crash. The other was removed from the wreckage as an Unexploded Bomb (UXB).

19th November 1943

1No. Handley Page Halifax (JD473) bomber aircraft crashed in a field between the east bank of River Arun and West Coastway railway line, approximately 0.2km west of the Site.

21st November 1943

1No. De Havilland Mosquito NF XIII (HJ242/B) fighter aircraft crashed on open ground north of Lyminster, approximately 0.3km north of the Site.

5th January 1944

1No. Supermarine Spitfire (MJ152) fighter aircraft crashed on a field north of Toll Bridge, Littlehampton, within approximately 0.1km east of the Site.

31st January 1944

1No. de Havilland Mosquito (V1, 951) multirole aircraft crashed on a field near Priors Lease, approximately 0.3km northwest of the Site.

Records indicate that it was armed with 4No. 500lb HE bombs, 3No. of which were removed from the wreckage as an UXBs.

The 4th HE bomb was not located, and assumed to have been buried along with the engine of the aircraft. It is considered this would have been removed along with the aircraft wreckage.

It cannot be totally discounted that the UXB was jettisoned before the aircraft crashed, within the vicinity of the Site.

26th April 1944

1No. Supermarine Spitfire fighter aircraft crashed on open ground near Lower Chancton Farm, Washington, approximately 0.2km south of the Site.

2nd May 1944

1No. Supermarine Spitfire fighter aircraft crashed on Sullington Hill, approximately 0.4km west of the Site.

11th June 1944

1No. Supermarine Spitfire fighter aircraft crashed at Barns Hill Farm, approximately 0.5km southeast of the Site.

1st August 1944

1No. North American P-51 Mustang crashed on fields near Burpham, on the Site (TQ 078086).

7th August 1944

1No. Boeing B-17 Flying Fortress (No. 22102989) heavy bomber aircraft crashed in garden of Langford House, Climping, approximately 0.5km west of the Site.

13th December 1945

1No. De Havilland Mosquito NF XIII (R9228) crashed on the bank of the River Arun, east of the Arundel Junction, approximately 0.3km northwest of the Site.

Appendix 6 WWII Bombing Incident List

14th August 1940

12No. HE bombs fell on Littlehampton Golf Course and the surrounding fields, within approximately 0.3km northeast of the Site.

18th August 1940

RAF Poling, encroaching on the southern part of the Site, was heavily attacked by a formation of by a formation of 28No. Junkers Ju87 and 24No. Junkers Ju88 dive bomber aircraft. At least 87No. HE bombs fell across the radar station, with 47No. of these falling within the compound of RAF Polling.

Records indicate several of these were recorded as UXBs.

HMS Peregrine (RAF Ford), within approximately 0.1km north of the Site, was heavily attacked by a formation of 28No. Junkers Ju87 dive bomber aircraft. At least 70No. 250kg and 500kg HE bombs fell across the airfield and on the technical area.

Considerable damage was caused to all the facilities and the airfield was effectively destroyed.

Luftwaffe reconnaissance photography dated the 10th January 1941 identifies several craters within 0.2km of the Site near RAF Ford, likely as a result of this heavy raid.

9th September 1940

2No. HE bombs fell on open ground south of Crookthorn Lane, Climping, approximately 0.1km southwest of the Site. These were recorded as UXBs.

16th September 1940

4No. HE bombs fell on Burpham village, within approximately 1.4km west-southwest of the Site.

25th September 1940

3No. HE bombs fell on the south side of Saint Hugh's Charter House, Cowfold, approximately 0.3km northwest of the Site. 1No. of these was recorded as UXB.

27th September 1940

1No. HE bomb fell on Fairoak Farm, Wiston, approximately 0.3km north of the Site.

29th September 1940

3No. HE bombs fell on Blackpatch Hill, on and within approximately 0.1km northeast and southwest of the Site.

4th October 1940

1No. HE bomb fell on Dragons Farm, Dragons Lane, approximately 0.1km southeast of the Site. This was recorded as UXB.

5th October 1940

1No. HE bomb fell on open ground near Sweet Mill Farm, Ashurst, on the Site (TQ 180157). This was recorded as UXB.

1No. HE bomb fell on open ground at Blakes Farm, approximately 0.1km east of the Site.

2No. Oil Bombs (OBs) fell on Eaton Farm, Ashurst, approximately 0.2km southeast of the Site.

Several IBs fell across RAF Ford, approximately 0.7km northwest of the Site.

8th October 1940

3No. HE bombs fell on a field on the north side of the A259 at Climping, approximately 0.2km west-southwest of the Site. These were recorded as UXBs and removed on the 9th October.

15No. HE bombs fell across the northern dispersals of RAF Ford, within approximately 0.8km northwest of the Site. 2No. of these were reported as UXBs and removed on the 9th October.

10th October 1940

4No. HE bombs fell on open ground at Muntham Court, approximately 0.1km west of the Site.

2No. HE bombs fell on open ground south of Frylands Farm, Wineham, approximately 1.3km southwest of the Site. 1No. of these was recorded as UXB.

18th October 1940

5No. HE bombs fell on fields near Coombe Ivy, Burpham, approximately 1.2km northwest of the Site. 2No. of these were recorded as UXBs.

4th November 1940

Several IBs fell on open ground near Findon, within approximately 0.2km northeast of the Site.

1No. HE bombs fell on open ground near Findon, approximately 0.2km east of the Site.

4No. HE bombs fell in a north-south line along the hangars at RAF Ford, approximately 0.5km northwest of the Site.

8th November 1940

12No. HE bombs fell on the South Downs east of Burpham, approximately 0.6km north of the Site. 2No. of these were recorded as UXBs.

14th November 1940

50No. IBs fell on open ground near Field Guest Gate Farm, Wiston, within approximately 0.4km southeast of the Site.

4No. HE bombs fell on waste ground south of the hangars at RAF Ford, approximately 0.4km northwest of the Site.

22nd November 1940

4No. HE bombs fell on Ash Cope wood, Sullington, approximately 0.4km west of the Site.

25th November 1940

1No. HE bomb fell on open ground near Broomhurst Farm, Lyminster, approximately 0.9km northwest of the Site.

28th November 1940

Several IBs fell on open ground near Lyminster Road, Lyminster, on the Site (TQ 028046).

29th November 1940

1No. HE bomb fell on open ground, Station Road, approximately 1.4km north of the Site.

4th December 1940

14No. HE bombs and several Anti-Personnel (AP) bombs fell on the football ground area at RAF Ford, approximately 0.3km northwest of the Site.

9th December 1940

1No. HE bomb fell on open ground near College Wood Farm, approximately 0.2km south-southeast of the Site.

12th December 1940

8No. HE bombs and several IBs fell on open ground between Harrow Hill, approximately 0.9km northwest of Site, and Angmering Park Estate, on the Site (TQ 079088). 3No. of these were recorded as UXBs.

19th December 1940

9No. HE bombs fell on open ground of Muntham Estate, Findon, on the Site (TQ 111100).

21st December 1940

Several IBs fell on open ground northwest of Cowfold, approximately 1.8km west-northwest of the Site.

10th January 1941

2No. HE bombs fell on the eastern part of RAF Ford, approximately 0.2km north-northwest of the Site.

3No. HE bombs fell on open ground east of the accommodation at RAF Ford, approximately 0.4km west-northwest of the Site.

12th January 1941

1No. IB fell on open ground near Burpham, approximately 0.5km west-northwest of the Site.

8th April 1941

4No. HE bombs fell in a southeast to northwest line across the landing area of RAF Ford, approximately 0.8km west-northwest of the Site.

9th April 1941

1No. HE bomb fell on Littlehampton Golf Course, approximately 0.3km north of the Site.

Several IBs fell on fields of Courtwick Farm, Wick, approximately 0.4km east-northeast of the Site.

12th May 1941

12No. HE bombs fell southeast to northwest across RAF Ford, between approximately 0.2km northwest and 0.9km northwest of the Site.

29th May 1941

1No. HE bomb fell on the guest house of St Hugh's Monastery Charterhouse, approximately 0.2km north-northwest of the Site.

4th September 1941

1No. HE bomb fell on a field at Northwood Farm, Climping, approximately 1.9km west of the Site.

27th April 1942

3No. HE bombs fell on RAF Poling, approximately 0.1km south of the Site.

8th March 1943

1No. HE bomb fell on fields south of Burpham village, approximately 0.3km northwest of Site.

3No. HE bombs fell off Worthing Road, Poling, approximately 0.2km north of the Site. 1No. of these was recorded as UXB.

1No. HE bombs fell on open ground north of The Causeway, approximately 1.4km northwest of the Site.

1No. HE bombs fell on open ground north of The Burh, Brupham, approximately 1.4km northwest of the Site.

27th September 1943

1No. 1,000lb British HE bomb that had fallen from a damaged aircraft attempting to land at RAF Ford was found on the airfield and was removed by a disposal team the same day.

10th November 1943

1No. HE bomb fell on the Brighton-Portsmouth railway line, approximately 0.1km north-northwest of the Site.

24th February 1944

2No. HE bomb fell on a field at Perry Hill, Burpham, approximately 1.1km northwest of the Site.

14th April 1944

2No. 250kg HE bombs fell on open ground near Poling Corner, approximately 0.9km west of the Site.

20th July 1944

1No. V1 fell on Pooling Woods, Warningcamp, approximately 0.8km northwest of the Site.

Date Unspecified

2No. HE bombs fell on fields south and east of Brookpit Lane, approximately 0.1km south of the Site.

5No. 1,000-pound (lb) British bombs were jettisoned in a field east of the River Arun riverbank, approximately 1.1km north-northwest of the Site. These were recorded as UXBs.

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Annex D
Site Walkover Photographs

Photo 1 – Panorama looking east across the Brookbarn Farm historical landfill towards the adjacent residential housing.

Photo 2 – View south along the onshore cable corridor across the Brookbarn Farm historical landfill

Photo 3 – Entrance to the Crossbush Service Station taken from where the onshore cable corridor crosses the A284

Photo 4 – Crossbush Service Station taken from the entrance sign in Photo 3. The fuel forecourt is visible in the background under the canopy.

Photo 5 – Panorama looking southwest across Rock Common Sand Quarry.

Photo 6 – View east of the western side of Windmill Quarry authorised landfill showing newly planted trees as part of the site restoration.

Photo 7 – Gas/leachate infrastructure observed in the side slope of the Windmill Quarry authorised landfill. It is unclear if this infrastructure is active.

Photo 8 – View east along the A283. Windmill Quarry authorised landfill is off to the left of the road/photo and the onshore cable corridor will be off to the right of the road/photo.

Photo 9 – View north along the eastern side of the Oakendene Industrial Estate showing outside metal and materials storage. The buildings in the rear of the photo house light industrial uses including vehicle repair, metal fabrication and furniture makers.

Photo 10 – Agricultural fields adjacent to the east of the Oakendene Industrial Estate which is behind the trees to the left of the photo.

Photo 11 – View south across the existing National Grid Bolney substation (400kV)

Photo 12 – View northeast across the location of the Swillage Lane historical landfill.

Photo 13 – View southwest of the southernmost part of the Vinery Industrial Estate

Photo 14 – List of businesses (October 2022) located at the Vinery Industrial Estate

Photo 15 – View east of agricultural fields to the south of the Vinery Industrial Estate. The southernmost building of the estate shown in Photo 13 is to the left of the photo.

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Annex E
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 potential for a pathway to be realised between them.

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 Source Pathway Receptor (SPR) Linkage being realised is presented in **Table E-1**.

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

Classification	Definition	Examples
High Likelihood	There is a contaminant 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 of ground where direct contact is possible. b) Ground/groundwater contamination could be present from chemical works, containing a number of Underground Storage Tanks (USTs).
Likely	There is a contaminant 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 where direct contact is possible, or the top 0.5m of ground where direct contact is not possible. b) Ground/groundwater contamination could be present from an industrial site containing an Underground Storage Tank

Classification	Definition	Examples
		(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.
Low Likelihood	There is a contaminant 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 where direct contact is possible, or 0.5-1.0m of ground where direct contact is not possible. 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.
Unlikely	There is a contaminant 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 years old containing a double skinned Underground Storage Tank (UST) with annual integrity testing results available.

"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 E-2**.

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

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Notes/Examples
Severe	Highly elevated concentration which is **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 the *Contaminated Land Statutory Guidance* (Defra, 2012) as death, life threatening diseases (for example, cancers), other diseases likely to have serious impacts on health, serious injury, birth defects, and impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site.

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Notes/Examples
					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).
Medium	Elevated concentrations which **could** result in “significant harm” to human health as defined by the EPA 1990, Part 2A if	Equivalent to Environment Agency Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant	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.	Exposure could lead to acute or chronic health effects which are significant as defined in the *Contaminated Land Statutory Guidance* (Defra, 2012).

Classification	Human Health	Controlled Water	Ecology	Property Structures/ Crops and animals	Notes/Examples
	exposure occurs.	damage to agriculture or commerce.			Damage to building rendering it unsafe to occupy, for example, 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 including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce.	Minor or short-lived damage to aquatic or other ecosystems, which **is unlikely** to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (for example, mild skin rash). Surface spalling of concrete.
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.

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

Table E-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 E-4.**

Table E-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.
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.

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Rampion 2
WIND FARM