

Rampion 2 Wind Farm Category 6: Environmental Statement Volume 2, Chapter 3: Alternatives (tracked)

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Executive Summary

The Rampion 2 site selection and design evolution process has been a fundamental part of the EIA. It has been an iterative process which has been guided by detailed specialist engineering, environmental assessment and engagement with local stakeholders, regulatory stakeholders and non-governmental organisations. This chapter (**Chapter 3: Alternatives, Volume 2** of the ES (Document Reference: 6.2.3)) describes the reasonable alternatives that were considered during the EIA process.

This design process led to opportunities for the development of environmental measures which have been adopted to reduce the potential for environmental impacts and effects. These have been included directly into the design of Rampion 2 as commitments, and are referred to as 'embedded environmental measures'. A range of embedded environmental measures have been identified and are further discussed in this chapter.

The Environmental Impact Assessment Scoping Report was based on a Scoping Boundary which at that early stage of the project combined the Areas of Search for the offshore and onshore infrastructure associated with Rampion 2. It defined the area within which Rampion 2 and associated infrastructure would be located. The project was then refined post Scoping taking account of the consultation feedback. This resulted in the project boundary which was then presented at the First Statutory Consultation exercise, at which the Preliminary Environmental Information in respect of the project was presented for consultation.

Further design evolution considering alternatives identified since the Scoping and Statutory Consultation Preliminary Environmental Information Report (PEIR) stages has been undertaken. These are summarised in this chapter and were included in the PEIR Supplementary Information Report (SIR) (RED, 2022), Further Supplementary Information Report (FSIR) (RED, 2023a) and the Preliminary Environmental Information (PEI) – Bolney Substation Extension Works (RED, 2023b). Activities have been aimed at ensuring that protecting the environment is central to the design of Rampion 2 from the outset and have included the following activities for the refinement of the project's boundaries whilst having regard to and responding to consultation responses at each stage:

- updating of constraints mapping as new environmental information became available;
- analysis of information collected from EIA surveys;
- identification of technical construction challenges;
- collaborative working with technical environmental specialists and engineers;
- detailed review of land ownership; and
- consultation and engagement with stakeholders.

This process has resulted in the consideration of reasonable alternatives reported in this chapter and the refinement to the final proposed DCO Order Limits



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3. Alternatives

3.1 Introduction

Context

- 3.1.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the ‘Environmental Impact Assessment (EIA) Regulations 2017’) require that the Environmental Statement (ES) submitted with the Application for development consent should include: ‘*a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*’.
- 3.1.2 The ES and the design process for the Proposed Development has taken full consideration of the EIA Regulations 2017 and other relevant policy and legislation, as described in **Chapter 2: Policy and legislative context, Volume 2** of the ES (Document Reference: 6.2.2). A summary of the policy and legislative requirements relating to alternatives is provided in **Table 3-1**.
- 3.1.3 The Government published draft National Policy Statement (NPS) *DRAFT Overarching National Policy Statement for Energy (EN-1)* to *DRAFT National Policy Statement for Electricity Networks Infrastructure (EN5)* for consultation in March 2023 of which EN-1 and *DRAFT National Policy Statement for Renewable Energy Infrastructure (EN-3)* (Department for Energy Security & Net Zero (DESNZ)) 2023a; DESNZ 2023b) are applicable to offshore wind. The 2011 NPSs (Department of Energy and Climate Change (DECC) 2011a; DECC, 2011b) remain in force until the review is approved (designated) and under proposed transitional arrangements the 2023 amendments will only have effect in relation to applications for development consent accepted for examination after designation. However, the draft emerging NPSs can potentially be relevant planning considerations. Therefore, Rampion 2 has kept abreast of the potential changes to the energy NPSs and incorporated any updates where required in the ES. These are included in **Table 3-1**.
- 3.1.4 This chapter describes the reasonable alternatives to the Proposed Development. It presents the design evolution process through scoping, Preliminary Environmental Information Report (PEIR) (RED, 2021), and ES, explains the outcomes of the process which have led to the refinement of the Proposed Development, and explains the environmental and other considerations which have been taken into account.
- 3.1.5 [A change request \[AS-046\] to the DCO Application was accepted by the Examining Authority on 24 July 2024 \[PD-018\]. These changes included minor reductions to the proposed DCO Order Limits \(onshore only\) where adjacent to areas of Ancient Woodland to provide a 25m buffer from these features. Further localised reductions to the extent of Works 9 and 19 were also made, assigning these areas to a class of work with lower impacts from those previously assessed as cable installation. The changes made result in no new or different effects from](#)

those reported in this chapter of the ES. The figures supporting this chapter of the ES have not been updated due to the minor nature of these changes, the final proposed DCO Order Limits and Works areas should be viewed on the **Onshore Works Plans** (Document Reference: 2.2.2 and **[AS-026]**).

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Table 3-1 Summary of policy and legislative context

Policy/Regulation	Requirement
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the ‘EIA Regulations 2017’)	<p>The EIA Regulations 2017 transpose the provisions of the EIA Directive (2014/52/EU, amending 2011/92/EU). These regulations require that the Environmental Statement (ES) submitted with the Application for development consent should include: <i>‘a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment’</i> (regulation 14(2)(d))’</p>
National Policy Statement (NPS) for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a)	<p>Section 4.4 of NPS EN-1 indicates the need to present the main alternatives considered as part of the Proposed Development and to demonstrate consideration of environmental, social and economic effects including, where relevant, technical and commercial feasibility (paragraph 4.4.2).</p> <p>Section 4.5 of NPS EN-1 sets out the principles of good energy infrastructure design. Paragraph 4.5.4 indicates that a project Application should be able to demonstrate how the design process was conducted and how the proposed design evolved. Where multiple design options were considered, the Applicant should set out the reasons for the selection of chosen option. NPS EN-1 also highlights the importance of good design in terms of siting relative to the existing landscape character, landform and vegetation which the Applicant should demonstrate (paragraph 4.5.3).</p> <p>Section 5.9.10 states that: <i>“Nevertheless, the IPC may grant development consent in these areas in exceptional circumstances. The development should be demonstrated to be in the public interest and consideration of such applications should include an assessment of:</i></p> <ul style="list-style-type: none"> • <i>the need for the development, including in terms of national considerations, and the impact of consenting or not consenting it upon the local economy;</i>

Policy/Regulation	Requirement
Draft NPS EN-1 (DESNZ, 2023a)	<ul style="list-style-type: none"> • <i>the cost of, and scope for, developing elsewhere outside the designated area or meeting the need for it in some other way, taking account of the policy on alternatives set out in Section 4.4; and</i> • <i>any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated”</i>
	<p>Section 4.2 of the draft NPS EN-1 (DESNZ, 2023a) reiterates the requirement to present the main alternatives, also noting that “<i>only alternatives that can meet the objectives of the proposed development need to be considered</i>” (paragraph 4.2.21).</p>
	<p>Section 4.6 of the draft NPS EN-1 (DESNZ, 2023a) reiterates the principles of good energy infrastructure design, adding that applicants should consider how “good design” can be applied to a project during the early stages of the project lifecycle (paragraph 4.6.4).</p>
National Policy Statement (NPS) for Renewable Energy (EN-3) (DECC, 2011b)	<p>Section 2.4 of NPS EN-3 indicates that renewable energy proposals should demonstrate good design in relation to landscape and visual amenity whilst also demonstrating how design has evolved to mitigate impacts such as noise and effects on ecology (paragraph 2.4.2).</p>
	<p>NPS EN-3 also addresses the need for flexibility in the Application process for offshore wind NSIPs to allow for situations where full parameters of the project may be unknown at the time of submission (NPS EN-3, paragraph 2.6.43). In such instances, EN-3 recommends the use of the 'Rochdale Envelope' method which allows for the maximum adverse and positive scenario to be assessed in the EIA and a Development Consent Order (DCO) granted on this basis (NPS EN-3, paragraph 2.6.43).</p>
Draft NPS EN-3 (DESNZ, 2023b)	<p>The requirement to demonstrate good design is reiterated in Section 3.5 of the draft NPS EN-3 (DESNZ, 2023b), which states that “<i>proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for co-existence/co-location with other marine uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage.</i>”</p>

Policy/Regulation	Requirement
	<p>Draft NPS EN-3 refers to EN-1 for full details of addressing flexibility but indicates that “applicants should explain in the application which elements of the proposal have yet to be finalised, and the reason why this is the case” (paragraph 3.6.1), and assess the worst case scenario (paragraph 3.6.2) (DESNZ, 2023b).</p>
<p>National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019)</p>	<p>Section 127 of the NPPF sets out the design considerations helping decision-making for developments and indicates that developments:</p> <ul style="list-style-type: none"> a) <i>will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development;</i> b) <i>are visually attractive as a result of good architecture, layout and appropriate and effective landscaping;</i> c) <i>are sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities);</i> d) <i>establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit;</i> e) <i>optimise the potential of the site to accommodate and sustain an appropriate amount and mix of development (including green and other public space) and support local facilities and transport networks; and</i> f) <i>create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.</i> <p>The NPPF recommends early discussions between applicants, the relevant local planning authorities and local community, and consideration of the community’s point of view regarding the design and style of the emerging scheme (paragraph 128).</p>
<p>Design Principles for National Infrastructure</p>	<p>The Proposed Development takes into consideration the Design Principles for National Infrastructure (National Infrastructure Commission, 2020). This guidance identifies four principles to guide the planning and delivery of major infrastructure projects: climate, people, places and value. The National</p>

Policy/Regulation	Requirement
(National Infrastructure Commission, 2020)	Infrastructure Commission’s Design Group developed the principles in consultation with all infrastructure sectors. They are intended to be applied to all economic infrastructure, including digital communications, energy, transport, flood management, water and waste. As a renewable energy development, Rampion 2 follows the four principles of this guidance. Climate, people, places and value are considerations that have informed the design of the onshore and offshore components of the Proposed Development.

Approach to design evolution

Overview

- 3.1.6 The design evolution process adopted for Rampion 2 is a fundamental element of the EIA. The process is iterative and has led to opportunities for the development of environmental measures which have been embedded directly into the design of Rampion 2 (**Table 3-11**). These are referred to as ‘embedded environmental measures’ (discussed in further detail in **Chapter 5: Approach to the EIA, Volume 2** of the ES (Document Reference: 6.2.5)). The process has involved engagement and consultation, providing opportunities for stakeholders to provide feedback and to understand and influence the design as it progresses. This will continue to develop following the DCO Application through the detailed design process.
- 3.1.7 From the outset the environment has been central to the design of Rampion 2, and this is demonstrated through the development of the **Commitments Register** (Document Reference: 7.22). This was initially presented in the Scoping Report (Rampion Extension Development Limited (RED), 2020), updated in the Statutory Consultation exercises and has been further updated at the ES stage as the design of the Proposed Development has continued to evolve and more information became available. Further details on the **Commitments Register** (Document Reference: 7.22) and a summary of the commitments relevant to alternatives are provided in **Section 3.10: Commitments Register**.
- 3.1.8 Engagement and consultation with stakeholders has been key throughout the process, and this chapter describes where engagement has led to the consideration of alternatives or a change to the design. Other options have been considered but were discounted for reasons including technical, environmental and cost issues. Further details on engagement and consultation are provided in **Section 3.11: Consultation and engagement** and the **Consultation Report** (Document Reference: 5.1).
- 3.1.9 At each stage in the evolution of the Proposed Development, activities were undertaken to consider alternatives and to refine the design both onshore and offshore. This included the following activities, where appropriate:
- updating of constraints mapping as new environmental information became available;
 - analysis of information collected from EIA surveys;
 - identification of technical construction challenges and engineering considerations;
 - collaborative working with technical environmental specialists and engineers;
 - detailed review of land ownership;
 - engagement with stakeholders and landowners; and
 - considering feedback from consultation.

- 3.1.10 The refinements and alternatives considered by RED varied in type and scale, for example, refinements to the boundary in a localised area or alternative locations for the grid connection. Therefore, a range of appraisal methods have been used, chosen based on the levels of risk, scale and complexity involved in the potential change to determine whether a proposed change should be accommodated within the Proposed Development. The methods used are described in **Sections 3.2 to 3.9**. However, two common environmental approaches used were constraints mapping and BRAG appraisal, as described in **paragraph 3.1.16**. Where refinements and alternatives were minor a high-level appraisal was undertaken, focusing only on a smaller number of key environmental aspects. As part of this exercise other parts of the RED Project team including engineering and land interests undertook appraisals to ensure inform decision making was informed from a multi-disciplinary perspective.

Constraints mapping

- 3.1.11 A constraints mapping approach was used in looking at proposed alternatives. A Study Area was identified, and constraints data was gathered in a GIS format, and presented on maps as layers.
- 3.1.12 Using professional judgement, these were described as ‘hard’ or ‘soft’ constraints. ‘Hard’ constraints are those that would directly influence the boundaries of sites/indicative cable routes and are generally avoided, unless suitable mitigation is available. Examples of hard constraints both onshore and offshore are:
- Ramsar sites, Special Protection Areas (SPAs), and other internationally protected sites for biodiversity;
 - historic environment designated sites, such as World Heritage Sites;
 - settlements;
 - existing subsea infrastructure;
 - some land uses such as Ministry of Defence land, quarries (onshore) or disposal areas (offshore); and
 - technical constraints such as gradients over 10 percent, in relation to onshore cable routes.
- 3.1.13 ‘Soft’ constraints would not generally prevent progress when considered in isolation and can often be moderated through mitigation. The consideration of these constraints included the protection afforded by policy in the 2011 NPSs (DECC 2011a; DECC, 2011b), most recently updated in the 2023 draft NPSs (DESNZ 2023a; DESNZ 2023b). This protection has fed into the development of embedded environmental measures for the Proposed Development Examples include:
- landscape and visual designations such as National Parks and Areas of Outstanding Natural Beauty (AONB), and Public Rights of Way (PRoW) including National Trails;
 - some designated sites for biodiversity such as Ancient Woodland and National Nature Reserves;

- land uses such as leisure and recreation; and
- technical constraints such as motorways and railway lines.

- 3.1.14 The constraint layers were combined to create an initial ‘heat map’ (with no individual weighting). This provided an initial indication of the spread and concentration of constraints in the study area, which acted as a visual aid for the assessment.
- 3.1.15 Site visits and workshops were used to review and sense-check all the available information, in order to identify options with the fewest environmental and other constraints, and identify any particular challenges.

BRAG appraisal

- 3.1.16 For the onshore design, where two or more comparable options were being considered, a BRAG (Black, Red, Amber, Green) appraisal approach was used by the multi-disciplinary team including environment, engineering, land interests and cost. Environmental specialists reviewed the different options and defined constraints for each option using the colour coding and rating system shown in **Table 3-2**. The range of environmental specialists involved in the appraisal varied according to the scale, type, and location of the options. The score for each option was added up, which allowed constraints across a number of environmental topics to be compared numerically.

Table 3-2 BRAG appraisal approach for design refinement

1	Low potential for the development to be constrained (green) e.g., option is not located close to sensitivities such as historical assets, priority habitats or settlements and does not directly interact with these constraints.
2	Medium potential for the development to be constrained (amber) e.g., option is located within close proximity to sensitivities such as priority habitat, listed buildings, flood zones or properties, but does not directly interact with these constraints.
3	High potential for the development to be constrained (red) e.g., option directly disturbs sensitivities such as a Local Wildlife Site; flood zone 2; engineering constraints such as side slopes present construction challenges.
4	Very high potential for the development to be constrained (black) e.g., option directly interacts with sensitivities such as flood zone 3, internationally designated sites or construction is unfeasible due to engineering challenges such as steep slopes.

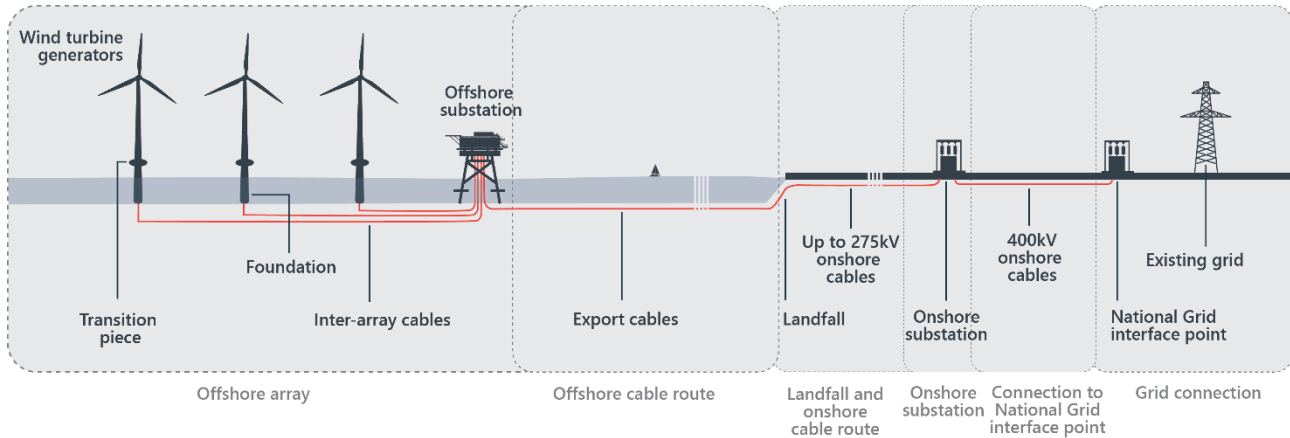
Summary of Proposed Development evolution

- 3.1.17 The Scoping Report (RED, 2020) was based on a Scoping Boundary which at that early stage of the Proposed Development combined the Areas of Search for the offshore and onshore infrastructure associated with Rampion 2. It was defined as the area within which the Proposed Development and associated infrastructure would be located, including the temporary and permanent construction and operational work areas. A summary of the design evolution work and reasonable alternatives considered that led to the development of the Scoping Boundary were

set out in the Scoping Report (RED, 2020), and a summary is provided in this chapter in **Sections 3.2 to Section 3.6**.

- 3.1.18 Following the Scoping stage, the design was further refined to develop the Proposed Development that was assessed in the PEIR (RED, 2021), which informed the first Statutory Consultation exercise in July 2021 (reopened in February 2022). This process resulted in the reduction in the size of the onshore and offshore Scoping Boundary to the PEIR Assessment Boundary (RED, 2021). Numerous onshore cable routeing options were considered to avoid as many environmental sensitivities as possible, and some alternative options were included in the PEIR (RED, 2021).
- 3.1.19 Following the first Statutory Consultation exercise on the PEIR in July 2021 (and reopened in February 2022), alternatives and modifications were identified for the original PEIR Assessment Boundary (RED, 2021), taking account of consultation responses. Changes to the onshore cable route, are described in full in the following reports which supported three subsequent Statutory Consultation exercises:
- second Statutory Consultation exercise: Preliminary Environmental Information Report - Supplementary Information Report (PEIR SIR), published in October 2022 (RED, 2022);
 - third Statutory Consultation exercise: Preliminary Environmental Information Report – Further Supplementary Information Report (PEIR FSIR), published in February 2023 (RED, 2023a);
 - fourth Statutory Consultation exercise: Preliminary Environmental Information (PEI) – Bolney Substation Extension Works, published in April 2023 (RED, 2023b).
- 3.1.20 Following the Statutory Consultation exercises, the Proposed Development has been refined further both onshore and offshore. Offshore, the PEIR Assessment Boundary (RED, 2021) has been reduced in size and the maximum number of turbines has reduced. Onshore, final onshore cable routes and locations have been identified from the options described in the PEIR (RED, 2021), PEIR SIR (RED, 2022), PEIR FSIR (RED, 2023a), and PEI (RED, 2023b), and the proposed DCO Order Limits have been refined.
- 3.1.21 This chapter describes the alternatives considered at each of these phases, for each of the Proposed Development design evolution elements (as shown in **Graphic 3-1**):
- offshore array;
 - grid connection;
 - landfall;
 - onshore cable route;
 - offshore cable route;
 - new onshore substation;
 - connection to the existing National Grid interface point; and
 - alternative technologies.

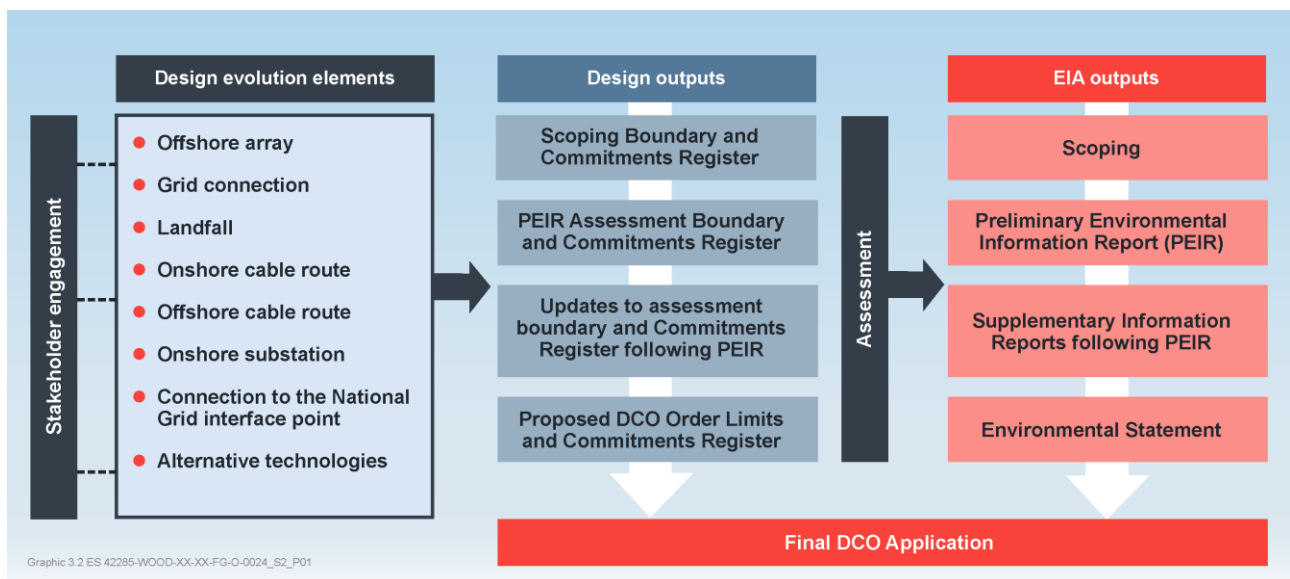
Graphic 3-1 Proposed Development design elements



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3.1.22 The key elements of the design evolution process and how they correspond and link with the stages of the Rampion 2 EIA are illustrated in **Graphic 3-2: Design evolution process**.

Graphic 3-2 Design evolution process



Graphic 3.2 ES 42285-WOOD-XX-XX-FG-O-0024_S2_P01

Structure

3.1.23 The remainder of this chapter is structured as follows:

- **Section 3.2: Offshore array site selection** describes the site selection and refinement process for the offshore Wind Turbine Generator (WTG) array area;
- **Section 3.3: Grid connection identification** describes the site selection process for the grid connection location;

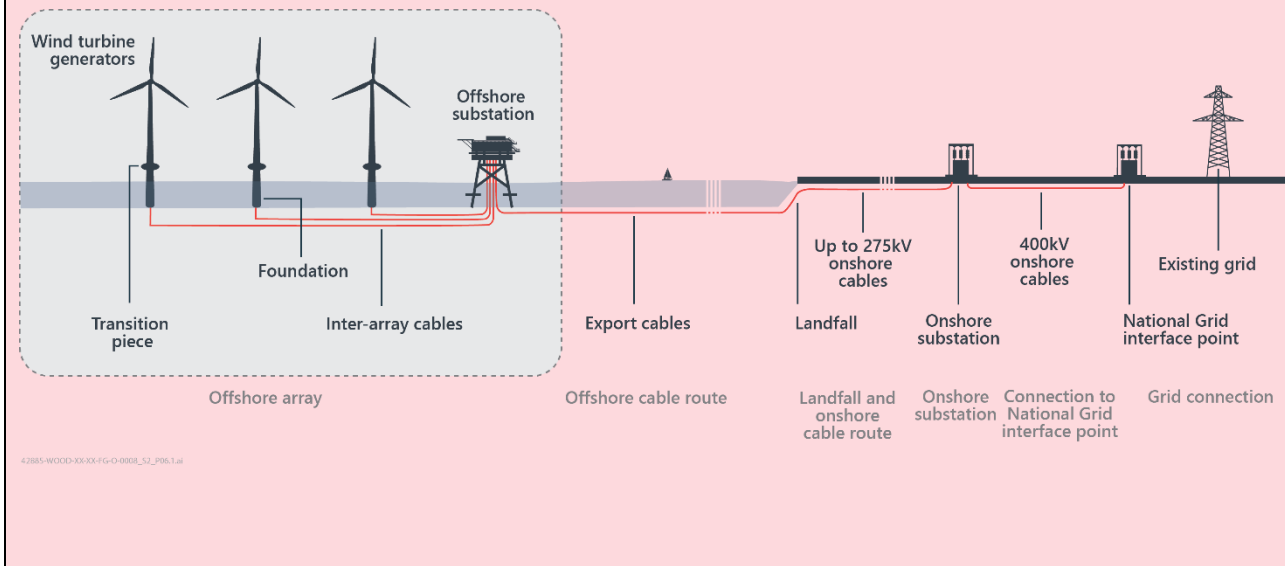
- **Section 3.4: Landfall and onshore cable route identification** describes the site selection process for the landfall location, the onshore cable route corridor, and subsequent refinements to the onshore cable route;
- **Section 3.5: Offshore cable route** describes the site selection process for the offshore cable route corridor and subsequent refinements to the offshore cable route;
- **Section 3.6: New onshore substation identification** describes the site selection process for the new onshore substation location;
- **Section 3.7: Connection to the National Grid interface point** describes the site selection process for the cable route from the new onshore substation to the National Grid interface point;
- **Section 3.8: Alternative technologies** describes other potential technologies and why those rejected have not been selected;
- **Section 3.10: Commitments Register** summarises the commitments made by RED that are applicable to site selection and consideration of alternatives;
- **Section 3.11: Consultation and engagement** sets out the Planning Inspectorate's Scoping Opinion responses, summarises the responses to the Statutory and non-statutory consultation processes that are relevant to the consideration of alternatives, and describes how these have been responded to in this ES;
- **Section 3.12: Glossary of terms and abbreviations;** and
- **Section 3.13: References.**

3.2 Offshore array site selection

This section describes the site selection process for the offshore WTG array area, as identified in **Graphic 3-3**. The offshore array site evolved over the following stages:

- An initial area was identified prior to Scoping.
- Following Scoping, and as constraints were identified, this area was refined and reduced in size to the array area presented at the first Statutory Consultation exercise in July 2021 (and subsequent reopening in February 2022).
- Following the first Statutory Consultation exercise in July 2021, and as further constraints were identified, the area was refined and reduced further to the array area presented in this ES.

Graphic 3-3 Schematic showing offshore array area



Site selection prior to Scoping

- 3.2.1 Rampion Offshore Wind Farm, hereafter referred to as Rampion 1, was developed following The Crown Estate's (TCE) Round 3 offshore wind leasing programme launched in 2008. The Round 3 area within which Rampion 1 was brought forward (Zone 6, in the English Channel) was one of nine Zones identified following a process of national, strategic level planning, and represented a critical component of the UK's response to meeting international and national renewable energy targets and commitments. As part of the wider national strategic initiative, a Strategic Environmental Assessment (SEA) of suitable areas for offshore wind development was conducted by the then DECC, which completed in 2009. Development rights for the zones were not awarded until the completion of the SEA.
- 3.2.2 In 2018, TCE invited the owners of existing Round 3 wind farms to consider potential extensions of those schemes. Rampion Offshore Wind Limited (the owner of Rampion 1) applied to TCE for an extension to Rampion 1 through this wind farm extension leasing process. Following the outcome of TCE's plan-led

Habitats Regulations Assessment (HRA), a new company RED was set up and was awarded the development rights for Rampion 2 in September 2019.

- 3.2.3 As part of the offshore wind farm site selection process for Rampion 2, detailed assessments and evaluations of potential developable areas were undertaken to ensure the best possible site could be brought forward. This considered the following areas:
- sites in proximity to the existing development under the TCE Extensions Round process;
 - the remaining parts of the TCE Round 3, Zone 6 area which comprises:
 - ▶ residual areas not included within the Rampion 1 Application at the time of TCE Round 3 in 2013; and
 - ▶ the additional areas consented as part of the Rampion 1, but which were not developed as part of the original Rampion 1 scheme.
- 3.2.4 Rampion 1 was designed with a focus on achieving the most efficient and cost-effective development at that time. The completed wind farm occupies approximately 72km² within the total 139km² consented area. Substantial progress has been made in the offshore wind industry in the period since the Rampion 1 design was optimised in 2014. This includes advances in project economics, technology and understanding such as construction approaches, design, and social and environmental effects.
- 3.2.5 A re-evaluation of areas within the wider Zone 6, and the surplus part of the area consented under the Rampion 1 DCO, was therefore carried out to identify areas which may now be suitable for the Rampion 2 proposals. One of TCE criteria for extension projects states that “*The proposed extension must share a boundary with the existing wind farm*” (TCE, 2017).
- 3.2.6 The consideration of environmental parameters and other constraints has been a central theme of site selection (see **paragraphs 3.2.9** and **3.2.10**). The site selection assessments have been supported by detailed consideration of the findings of the original Rampion 1 EIA and its subsequent Examination process, together with the knowledge and understanding gained through the post-consent and construction phases of Rampion 1. All of these have provided additional insight and understanding of the relevant environmental sensitivities and the range of other constraints applicable for the Rampion 2 proposals.
- 3.2.7 Based on an initial assessment of environmental parameters and constraints, an Area of Search was identified as a preliminary offshore boundary of the Rampion 2 offshore wind farm area (illustrated in **Figure 3.1a, Volume 3** of the ES (Document Reference: 6.3.3). This comprised both the seabed area awarded under the TCE extension process and areas within the remainder of the original Round 3 Zone 6 extents. This Area of Search allowed sufficient flexibility to respond to additional constraints that may be identified through the ongoing detailed assessment phases, as well as stakeholder feedback.
- 3.2.8 The Area of Search was then refined to create the Scoping Boundary. This included analysis of engineering, environmental, economic, and consenting risks and was then subject to further feasibility analysis for key areas of concern.

- 3.2.9 Key feasibility concerns for the offshore array area initially included consideration of:
- navigation risk, including the approaches to the Solent and proximity to the Dover Strait Traffic Separation Scheme;
 - landscape / seascape, visual and heritage (by locating the area of search no closer to shore than the existing Rampion 1 development);
 - the biological environment and ecology (including protected sites and designations);
 - socio-economics (including recreational sea users, and commercial interests such as fishing and marine aggregate dredging);
 - ground conditions and bathymetry including water depth; and
 - wind resource and engineering aspects.
- 3.2.10 Existing environmental ‘hard constraints’ were also considered, based on spatial data and an understanding of the likely constraints, including:
- disposal sites;
 - completed, drilled, plugged and abandoned, and suspended oil and gas wells;
 - active subsurface structures;
 - surface structures with helipads;
 - International Maritime Organisation (IMO) shipping routes;
 - consented developments;
 - wrecks;
 - active pipelines; and
 - active cables.
- 3.2.11 The offshore wind farm area of search overlaid with shipping areas and Marine Conservation Zones (MCZs) is illustrated in **Figure 3.1a, Volume 3** of the ES (Document Reference: 6.3.3). Identification of the Scoping Boundary area considered the following factors:
- this area is wholly within that originally considered by the Strategic Environmental Assessment (SEA) in 2008/2009;
 - the northern boundary maintains a minimum 13km distance from shore, as per the existing Rampion 1 development;
 - the eastern boundary extends no further eastwards than the original consented boundary in the Rampion 1 DCO; and
 - the southern and western boundaries were selected following analysis of shipping patterns to avoid the main vessel routes together with avoidance of the Offshore Overfalls Marine Conservation Zone (MCZ) to the southwest and appropriate separation from the Dover Strait Traffic Separation Scheme (TSS) to the southeast.

- 3.2.12 In addition, a marine cable link area to adjoin the two areas at the Rampion 1 south west corner was also added to the Scoping Boundary to enable cabling requirements across the full area. For clarity, no WTGs or offshore substations will be located in the marine cable link area. This area is shown on **Figure 3.1a, Volume 3** of the ES (Document Reference: 6.3.3) and was described in the Scoping Report. RED has continued to commit to retaining corridors where no WTGs or offshore substations are located, and this is shown on the **Offshore Works Plans** (Document Reference: 2.2.1).
- 3.2.13 The outcome of this initial refinement process was the Scoping Boundary as illustrated in **Figure 3.1a, Volume 3** of the ES (Document Reference: 6.3.3). The array area has been further optimised since the Scoping stage, and this is set out below.

Scale of generation

- 3.2.14 There is an urgent need for new renewable energy infrastructure, as expressed in national energy and planning policy (NPS EN-1 (DECC, 2011a) and others). The most recent draft of the Energy National Policy Statement (DESNZ 2023a) described this as a critical national priority (see **Planning Statement** (Document Reference: 5.7) for further information). The starting assumption must be to maximise the potential for renewable energy generation, within the environmental and technical constraints of the site.
- 3.2.15 There are multiple considerations for sizing a project, which principally include:
- The area of likely seabed available;
 - Density of generation; and
 - Likely available grid capacity.
- 3.2.16 In general, the larger the project can be whilst maintaining sufficient turbine spacing, the lower the levelised cost of energy is likely to be. Government policy is also driving for an increasing amount of offshore wind generation, and with this in mind, it makes sense to be able to try to maximise the capacity that can be delivered from site within acceptable environmental bounds.
- 3.2.17 Typically, a generation density of between 5 and 10 MW per km² are used for designing offshore wind farms, balancing the need to space wind turbines in order to be able to capture energy whilst reducing the infrastructure needed to connect the wind turbines together. Assuming a generation density in the middle of this range and applying it to the Scoping Boundary, which covered 320km², the sensible limit to the maximum potential capacity of this area could be considered as around 2,400MW if other constraints were ignored.
- 3.2.18 Typically, as more is understood about an area of search, different parts of it are excluded balancing the desire to maximise the scheme size whilst maintaining what could be concluded as an acceptable impact. For Rampion 1, the original area of search set by the Zone 6 boundary at 271km² was reduced to a consented boundary of 139km² by balancing these needs. Guided by what happened for Rampion 1, a search area attrition parameter of 50 percent was applied to the Scoping Boundary, seeking to estimate reasonably applicable constraints. This led to the project identifying an initial target figure of 1,200MW for the project size.

- 3.2.19 1,200MW was thus estimated as the likely potential capacity of the Rampion 2 site, seeking to maximise generating capacity, within reasonably likely environmental and technical limits. This planning assumption could be used to seek a grid connection, while allowing flexibility for further design work around constraints.

Offshore refinement between Scoping and the first Statutory Consultation exercise

- 3.2.20 The design refinement process delivering the offshore part of the PEIR Assessment Boundary (RED, 2021) was informed by two workshops which brought together technical engineering and environmental specialists.
- Workshop 1: Review of stakeholder engagement feedback received via the Scoping Opinion response (see **Section 3.11**), non-statutory consultation and the first round of Expert Topic Group (ETG) meetings held as part of the Evidence Plan Process (further detailed in **Chapter 1: Introduction, Volume 2** of the ES (Document Reference: 6.2.1)).
 - Workshop 2: Review of potential design layouts for WTGs and grid which informed the minimum spacing.
- 3.2.21 Early stakeholder engagement and the Scoping Opinion (Planning Inspectorate, 2020) highlighted potential concerns regarding ornithology, seascape landscape and visual impacts (SLVIA) and shipping and navigational risk that may be addressed through refinement of the offshore element of the Scoping Boundary.
- 3.2.22 Shipping and navigation issues included the proximity of the boundary to the Dover Strait Traffic Separation Scheme (TSS) which posed a potential navigation safety risk particularly when considered in combination with the proximity to the Inshore Traffic Zone (ITZ). Particular concerns were raised that vessels utilising the TSS may be forced to travel much further west, in order to access the ITZ, with the attraction of Shoreham port to commercial vessel operators therefore being compromised as a result. There were also concerns raised around the displacement of fishing vessels in Shoreham.
- 3.2.23 Concerns were also raised for the potential for the formation of a narrow channel between the western edge of the array and the Owers and Mixon rocks (as noted by the Royal Yachting Association). With limited available sea room for safe navigation and collision avoidance, such a narrow channel may result in increased collision and grounding risks. The Scoping Boundary was therefore refined down here, to allow more space between the array area and the Owers and Mixon rocks.
- 3.2.24 As a result of these concerns the Zone 6 area closest to the TSS (to the east) and fishing grounds near Shoreham, and the Extension Area to the west were reduced for the PEIR Assessment Boundary (RED, 2021). These constraints are shown on **Figure 3.1b, Volume 3** of the ES (Document Reference: 6.3.3) and the reduction in the boundary is illustrated on **Figure 3.2, Volume 3** of the ES (Document Reference: 6.3.3). Shipping and navigation risks are considered in more detail in **Chapter 13: Shipping and navigation, Volume 2** of the ES (Document Reference: 6.2.13).

- 3.2.25 For Rampion 1, SLVIA was a principal issue at Examination, due to the location of the array 13km off the Sussex coast and therefore its exposure to and visibility from settlements along the coast, the South Downs National Park (SDNP) and the Sussex Heritage Coast. Through early engagement it became clear that these issues also apply to Rampion 2. The Rampion 1 Examination Recommendation Report (Planning Inspectorate, 2013) made the following points which are also of relevance to the design of Rampion 2, and were taken into consideration during the refinement of the PEIR Assessment Boundary (RED, 2021):
- the importance of uninterrupted sea views to the character and sensation of space when within Brighton;
 - material visual impact of Rampion 1 on Brighton and the seafront in particular;
 - on balance, the Examining Authority did not consider the effect on seaward views from coastal settlements to outweigh the need for energy infrastructure; and
 - the Examining Authority panel did not consider the likely effect of night-time lighting to be an over intrusive element of the night skyline in relation to SLVIA.
- 3.2.26 Detailed engagement on seascape, landscape and visual impacts was undertaken through the **Evidence Plan** (Document Reference: 7.21), with a series of amendments (reductions) made through the Rampion 2 design evolution process, including reducing the Zone 6 area in the east, to reduce the impact from the Sussex Heritage Coast. The Round 3 Zone 6 area is shown on **Figure 3.1a and Figure 3.1b, Volume 3** of the ES (Document Reference: 6.3.3), and the reduced area included in the PEIR Assessment Boundary (RED, 2021) is illustrated on **Figure 3.2, Volume 3** of the ES (Document Reference: 6.3.3). Layout concepts are explored further in **Chapter 15: Seascape, landscape and visual impact assessment, Volume 2** of the ES (Document Reference: 6.2.15).
- 3.2.27 Finally, it was identified that the Scoping Boundary extended beyond the area covered by the digital aerial ornithological surveys (for which it is best practice to collect site-specific survey data covering the proposed array area plus a 4km buffer). Consequently, the boundary at the eastern end of the original Zone 6 area was refined to ensure that the proposed Rampion 2 array area plus a 4km buffer is entirely within the Area of Search covered by the programme of aerial digital surveys.
- 3.2.28 This offshore design refinement process resulted in the reduction of the Scoping Boundary to the PEIR Assessment Boundary (RED, 2021) as shown in **Figure 3.2, Volume 3** of the ES (Document Reference: 6.3.3).

Offshore refinement since the first Statutory Consultation exercise

- 3.2.29 Further design evolution has occurred since the first Statutory Consultation exercise in July 2021 (reopened in February 2022), which has resulted in the reduction of the PEIR Assessment Boundary (RED, 2021) to the proposed DCO Order Limits (**Figure 3.3, Volume 3** of the ES (Document Reference: 6.3.3)). Reductions in the Offshore Array Areas have been made to address Statutory Consultation from stakeholders and comments expressed during ETG consultation meetings. These highlighted concerns relating to shipping and navigation, and

SLVIA that could be addressed through refinement of the spatial extent of the Offshore Array Areas.

3.2.30 Although the Proposed Development had evolved since Scoping to take account of issues raised relating to shipping and navigation, key concerns received in responses to the first Statutory Consultation exercise were:

- Response from Shoreham Port: Traffic will be cut off from direct access to the Dover Strait TSS resulting in a need for larger vessels to pass west of Rampion 1 and Rampion 2.
- Response from Maritime Coastguard Agency (MCA): For the purposes of Search and Rescue (SAR) and navigational safety, request at least one line of orientation should be maintained between Rampion 1 and the proposed development. Furthermore, two lines of orientation as set out in Marine Guidance Note (MGN) 654 (Marine and Coastguard Agency (MCA), 2021) are preferred within the proposed development unless a sufficient safety case can be presented to the MCA. No further concerns with respect to sea room (navigational squeeze) at the western extent of the PEIR Assessment Boundary (RED, 2021) with previous concerns addressed by the reduction from the Scoping Boundary.
- Response from UK Chamber of Shipping: Navigational safety concerns around the full extent of the PEIR Assessment Boundary (RED, 2021) and in particular the western extent which creates a pinch point with Selsey Bill and effectively cuts off Littlehampton from the south.
- Response from UK Chamber of Shipping: Do not consider there to be any exceptional circumstance in this instance to bypass the Marine Planning Policies in relation to overlap of the red line boundary with the ITZ. Amendment of the red line boundary to avoid the ITZ would reduce the deviation required for vessels accessing Shoreham and the Dover Strait TSS.

3.2.31 In response to these concerns, the layout of the Offshore Array Area has been amended to introduce two wind farm separation areas where no WTGs or offshore substations will be built:

- An area to the west of Rampion 1, which is designated a Helicopter Refuge Area (HeRA), as well as mitigating visual impacts by providing separation between Rampion 2 structures and the built Rampion 1 turbines and serving as a navigation corridor, which provides an alternative option for access to/from Shoreham Port for commercial vessels and fishing vessels (particularly in the winter months.)
- An area to the south of Rampion 1, which was introduced to mitigate visual impacts by separating the Rampion 2 array area from the built Rampion 1 turbines. This will also be compliant for use as a HeRA at 1nm width, but it has not been designated solely for this purpose.

3.2.32 These wind farm separation areas are shown on the DCO Works Plans, which define (and therefore secure) the extent of the array areas where WTGs and offshore substations can, or indeed cannot, be constructed.

- 3.2.33 The proposed DCO Order Limits have also been refined further in the east in response to SLVIA concerns, as set out below in **paragraphs 3.2.35 - 3.2.44**. This also addresses the concerns raised around cutting off direct access to the Dover Strait TSS, removes the overlap with the ITZ, and brings the proposed DCO Order Limits in line with the existing Rampion 1 development to allow more direct access to Shoreham.
- 3.2.34 In addition to these changes, the proposed DCO Order Limits have been further reduced at the western extent of the Offshore Array Area, to address concerns of navigational squeeze with Selsey Bill.
- 3.2.35 In regard to SLVIA, the key Statutory Consultation feedback related to the scale of the Proposed Development located within both the Extension Area and Zone 6 Area, to the east and west of the existing Rampion 1 wind farm, and its resulting adverse effects on offshore views from the coastline and the seascape setting of nationally designated landscapes including the South Downs National Park (SDNP).
- 3.2.36 SLVIA topic specific design principles were proposed by Natural England in its Statutory Consultation feedback with the aim of reducing the magnitude of effects of the Proposed Development on the SDNP and its coastline within the Sussex Heritage Coast. Natural England recommended that the following design principles are adopted by Rampion 2:
- *There should be no turbines constructed within [the remaining parts of] Zone 6.*
 - *Reducing the combined horizontal extent (lateral spread) of turbines associated with a visually combined R1 and R2 scheme, or –*
 - *There should be perceptible separation distance (from all land-based viewpoints) between the existing R1 OWF and the new R2 array by concentrating development in the western end of the Rampion Extension area. The distance should be sufficient that a clear distinction can be made between the two arrays, in order that they are perceived as separate objects in the seascape when viewed from the shore and from within the SDNP.*
 - *Clear lines of sight should be left between the arrays (R1 and R2), so that open views to the horizon are maintained when viewed from shore and from within the SDNP.*
 - *The design of the new array should aim to balance the two arrays as far as practicable in terms of apparent turbine size and spacing, taking advantage of the effects of perspective to reduce any apparent difference in size between turbines’.*
- 3.2.37 The South Downs National Park Authority (SDNPA) also recommended the following in its formal consultation feedback with regards to the Proposed Development design:
- *‘Turbines should not exceed 225m to blade tip in height.*
 - *Clear separation between Rampion 1 and 2 to minimise the horizontal extent.*
 - *Turbine layout is designed in coherent blocks.*

- *Full north to south extent of the extension area should be utilised to maximise the size of east/west gaps between the arrays*.

- 3.2.38 Concerns were raised by SDNPA with regard to development in the Zone 6 Area located to the east of Rampion 1, which formed part of the original Rampion 1 consented development area and included a Structures Exclusion Zone (SEZ). This SEZ was applied to mitigate the impact of Rampion 1 on the SDNP and Sussex Heritage Coast by increasing its distance away from these receptors and reducing the horizontal spread, decreasing the extent to which the Rampion 1 wind farm would be visible in views out to sea.
- 3.2.39 Feedback also noted that offshore wind farm development to the west of Rampion 1 has the potential to further adversely affect the seascape setting of the SDNP and that a curtaining effect will be created, thereby reducing the extent of open views from the shore to the horizon.
- 3.2.40 RED has had regard to these comments and the statutory purpose of the SDNP designation, and as a result, the Zone 6 Area (to the east) and the Extension Area (to the west) have been reduced from the PEIR Assessment Boundary (RED, 2021). The reduced area forms the Offshore Array for Rampion 2, as shown on **Figure 3.3, Volume 3** of the ES (Document Reference: 6.3.3).
- 3.2.41 Further consultation undertaken included Hazard Workshops for shipping and navigation stakeholders, at which concerns were raised about the potential for ship allision with Rampion 2 infrastructure (WTGS and substations), should vessels lose power. As a result, and in discussion with the marine aggregate dredging companies with Licences in proximity to the Proposed Development, a buffer area within the offshore Array Area was agreed within which no WTG or offshore substations will be installed. This buffer area extends 1nm from the edge of the Licence areas along the tidal axis and 0.5nm across tide.
- 3.2.42 **Chapter 15: Seascape, landscape and visual impact assessment, Volume 2** of the ES (Document Reference: 6.2.15) sets out the design principles that have been applied to the design of Rampion 2 particularly in regard to the spatial extent of the Offshore Array Area, and the seascape, landscape and visual rationale for selection of the Proposed Development design envelope for the Offshore Array Area.
- 3.2.43 The reasons for the final choice of Proposed Development design and boundary are multi-disciplinary, as set out in the sections above and summarised below in **Table 3-3**. The final design brought forward for Application has addressed multiple environmental and technical constraints in addition to other factors such as commercial viability modelling, technical engineering constraints and providing flexibility/resilience for future turbines. The design of the Proposed Development and associated boundary will continue to develop following the submission of the DCO Application through the detailed design process.

Summary

- 3.2.44 The evolution of the Offshore Array Area and the reasons for refinements are summarised in **Table 3-3**. The chosen Offshore Array Area is described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

Table 3-3 Summary of alternatives considered

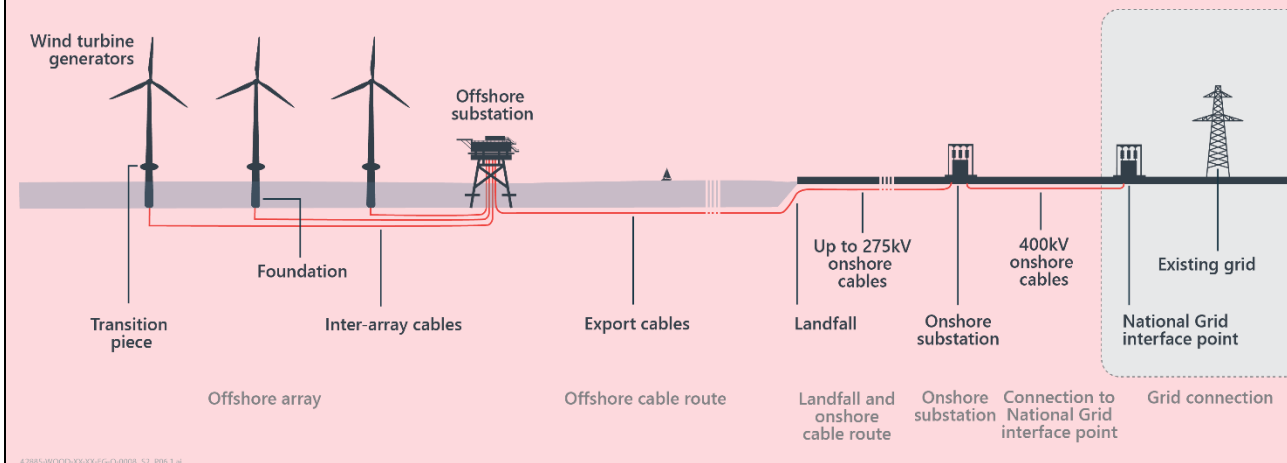
Location	Constraint	Refinement	Project stage
‘Round 6’ array area	Limits of ornithology survey area Fishing, shipping and navigation, and visual issues	Area reduced at the eastern end of the array area.	Area reduced before the first Statutory Consultation exercise in July 2021.
‘Extension’ area	Shipping and navigation, and visual issues	Area reduced at the western end of the array area.	Area reduced before the first Statutory Consultation exercise in July 2021.
Eastern part of Offshore Array Area (previously ‘Round 6’ array area)	Shipping and navigation, and visual issues	Area further reduced at the eastern end of the array area	Area reduced following the first Statutory Consultation exercise in July 2021.
Western part of Offshore Array Area (previously ‘Extension’ area)	Visual issues	Area further reduced at the western end of the array area	Area reduced following the first Statutory Consultation exercise in July 2021.
Offshore array area	Provision of HeRA, Visual issues, and shipping and navigation issues.	Implementation of separation zones between Rampion 2 and adjacent Rampion 1 array	Changes made following the first Statutory Consultation exercise in July 2021.
Offshore array area	Other Marine Users (Marine Aggregates Dredging Companies)	Implementation of a buffer between aggregate Licence areas and offshore structures within the array area	Changes made following the first Statutory Consultation exercise in July 2021 (at Hazard Workshop September 2022).

3.3 Grid connection identification

This section describes the process of identifying the grid connection location where the Proposed Development would connect to the Electricity Transmission System, as shown in **Graphic 3-4**. The grid connection location was selected from a number of options over the following stages:

- Six potential grid connection locations were identified before Scoping.
- A grid connection options appraisal process was carried out in parallel with site selection activities for the landfall and onshore cable corridor which considered a number of potential grid connection points (see **Section 3.4**).
- One grid connection location was presented at Scoping.

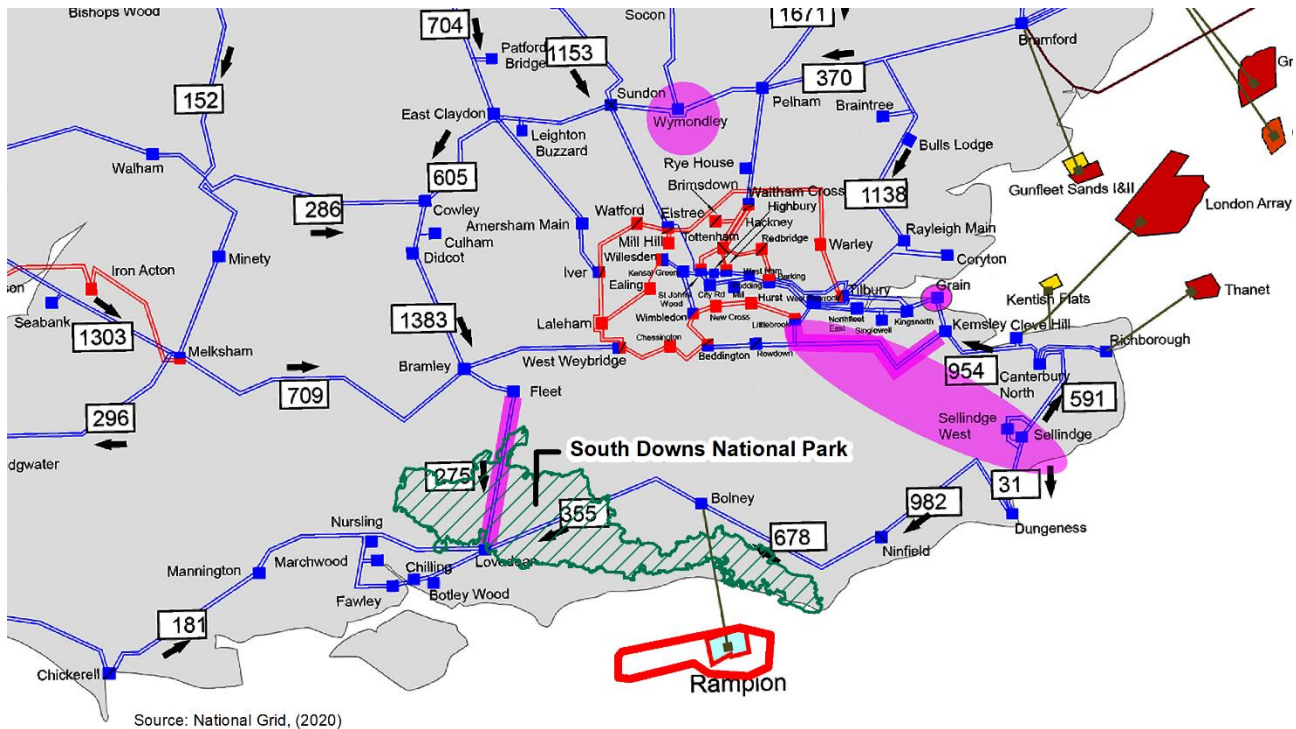
Graphic 3-4 Schematic showing grid connection location



Identification of grid connection options and National Grid’s grid connection feasibility study

- 3.3.1 Whilst both transmission and distribution connection points were initially identified, it was confirmed prior to the Scoping stage that any economically viable project would exceed the capacity that could be connected into the distribution system. This is due to a number of factors including electrical capacity, system stability and regulatory requirements. This was reflected in a Grid Connection Agreement with National Grid for 1,200MW, which confirmed that Rampion 2 must connect into the transmission system.
- 3.3.2 **Graphic 3-5** shows that the 400kV transmission line in Southeast England runs west to east through Hampshire, Sussex, and Kent, with a number of key locations on the system at which generators can connect.

Graphic 3-5 Electricity Transmission System in Southeast England (based on National Grid, 2020)



3.3.3 An electrical connection feasibility study was conducted by National Grid at RED’s request, entitled ‘Feasibility Study for the connection of up to 1,200MW of Rampion Extension Project’ (dated July 2020). The study also established the electrical capacity (megawatts) likely to be available on the transmission system on the desired project timescales, and identified what localised and wider system upgrades would be needed for each of the substations considered.

3.3.4 National Grid’s study concluded that up to 1,200MW would be available on this part of the transmission system for a project coming onstream after 2027. The study also identified the following factors that are relevant to a connection point:

- Bolney and Fawley each would be capable of accommodating 1,200MW of generation;
- Lovedean and Chilling both had capacity limits, of 800MW and 700MW respectively, so either of these options would require a significant scaling back of the proposed output of Rampion 2 which would affect viability;
- there were concerns about available physical space at Lovedean for the necessary new equipment should the planned Aquind Interconnector between England and France gain consent and connect into the substation; and
- a potential connection point at Little Horsted, capable of accommodating 1,200MW, was at a very a preliminary stage of development, both in technical, business case and consent terms.

3.3.5 National Grid’s Connections Infrastructure Option Notice (CION) process followed this feasibility study, and this proposed the grid connection point at Bolney, as described in **paragraphs 3.3.26 to 3.3.30**.

Appraisal of grid connection options

Overview

- 3.3.6 In parallel with National Grid's feasibility study, RED carried out an appraisal of various grid connection options. The options considered were:
- the three options closest to Rampion 2 (Bolney, Lovedean and Ninfield);
 - two further options which could avoid cabling in the South Downs National Park (SDNP) (Fawley and Chilling); and
 - a potential new onshore substation site to be located between Bolney and Ninfield (Little Horsted).
- 3.3.7 Despite being closer to Rampion 2 than Chilling and Fawley, Botley Wood (shown on **Graphic 3-5**) was not considered due to its location within woodland, with insufficient space to be extended. The next transmission connection point to the east of Ninfield is Dungeness. This was not considered as a potential connection point for Rampion 2 due to the distance from the Array Area and technical challenges from the ongoing decommissioning of the nuclear power station at this site.

Bolney

- 3.3.8 As with Lovedean and Little Horsted, a connection into Bolney would involve crossing the SDNP.
- 3.3.9 The Bolney option was taken forward for consideration in RED's appraisal of landfall and onshore cable route options (see **Section 3.4**), in parallel to National Grid's CION process described in **paragraphs 3.3.26 to 3.3.30**. It is also further discussed in **Paragraph 3.4.23**.

Lovedean

- 3.3.10 As with Bolney and Little Horsted, a connection into Lovedean would involve crossing the SDNP.
- 3.3.11 The Lovedean option was taken forward for consideration in RED's appraisal of landfall and onshore cable route options (see **Section 3.4**), in parallel to National Grid's CION process described in **paragraphs 3.3.26 to 3.3.30**. It is also further discussed in **Paragraph 3.4.19**.

Ninfield

- 3.3.12 Ninfield was discounted as being not economically viable when assessed for Rampion 1. This option and why it had been discounted, was presented in the *Rampion Offshore Windfarm ES Section 3 – Alternatives* (E.ON Climate and Renewables, 2012). The reasons for discounting it remain applicable to Rampion 2.

- 3.3.13 Compared to the selected Climping to Bolney corridor, the additional capital cost required for Rampion 2 to connect to Ninfield was estimated to be £302m, as it would require a longer marine cable.
- 3.3.14 In addition to prohibitive additional costs of a significantly longer marine cable, there were a number of other issues which supported a decision to discount this site. These included shipping, steep cliffs, and ecological constraints such as the Pevensey Levels Sites of Special Scientific Interest (SSSI) which the onshore cable route would have to cross. Depending on the landfall location, Ninfield may also require cabling through the SDNP.

Fawley and Chilling

- 3.3.15 Locations at Fawley and Chilling were specifically considered as options for achieving grid connection at this stage. This was in recognition of the sensitivity and importance of the SDNP given that the choice of grid connection location would fundamentally influence if, and to what extent, new onshore infrastructure may cross the SDNP. These are both in Hampshire and are located in the order of 80km west of Bolney, on the west and east banks of Southampton Water respectively.
- 3.3.16 Although these options are substantially further away from the offshore wind farm Area of Search than Bolney, Lovedean and Ninfield, they were considered as they would require very minimal onshore infrastructure and would avoid need for any cabling through the National Park.
- 3.3.17 RED carried out an evaluation of likely costs and risks associated with the Fawley and Chilling options. The following key aspects were identified.
- Fawley and Chilling would both require four marine export cable circuits being laid over a distance of at least 55km from the most westerly possible extent of the offshore wind farm Area of Search, most likely even further from the actual wind farm proposal ultimately defined within the Area of Search.
 - Export cables of at least 55km would have a higher risk level of unforeseen seabed issues and general construction risk, when compared the length that would be required to connect to Bolney, Lovedean, or Ninfield.
 - The site preparation for four cable circuits totalling over 240km, spaced sufficiently apart would entail significant preparation activities and costs for boulder and unexploded ordnance (UXO) clearance (particularly important in this area due to historic UXO levels in and around Southampton and Portsmouth).
 - Both the Fawley and Chilling options have significant issues with shipping and navigation through the Solent and Southampton Water, which experience very high levels of shipping and other marine traffic. In the case of Fawley, this would require four separate marine cabling installation operations across the full width of the very busy shipping lanes in Southampton Water.
 - The cross-sea route towards Fawley or Chilling also crosses the main shipping route in and out of Portsmouth. All of these factors would significantly constrain the operational logistics of how and when the cable installation work could be

undertaken, with such restrictions typically adding significantly to the construction cost.

- In terms of local environmental constraints, there are number of nature conservation site designations along the coastline of Southampton Water, both marine and land-based. Chilling, although located at the coast, has a challenge of shallow and silted inshore approaches which would further complicate construction activities and add significant cost to the installation of cabling into this landfall.

- 3.3.18 An assessment of the likely costs to install marine cables was made, taking into account the logistical constraints due to high volume of shipping which would mean an extended timeframe to complete the works. The options appraisal showed that the additional costs of using either of these options would render the overall Proposed Development not economically viable.
- 3.3.19 For the Chilling option, the additional capital cost required was estimated to be £129m, compared to the selected Climping to Bolney corridor. This additional cost, together with Chilling being constrained to 700MW, would render the overall Proposed Development not economically viable.
- 3.3.20 For the Fawley option, the additional capital cost compared to the selected Climping to Bolney corridor was estimated to be £216m. Although Fawley could accommodate the full proposed 1,200MW output, as with Chilling this additional cost would be prohibitive and render the overall Proposed Development not economically viable.

Little Horsted

- 3.3.21 During the early development process, the possibility arose of a future new connection location in this part of the 400kV transmission system. While it is included in the CION, National Grid was still at an early stage of planning for a new substation known as Little Horsted, to be located between Bolney and Ninfield. As with Bolney and Lovedean, a connection into Little Horsted would involve crossing the SDNP. As Little Horsted was at a very a preliminary stage of development, both in technical, business case and consent terms, it could therefore only be regarded as a speculative future possible substation. Little Horsted is discussed further in **Paragraph 3.4.21**.

Summary

- 3.3.22 In terms of the justification of exceptional circumstances for developing within the SDNP, the grid connection options that would avoid the SDNP were considered but assessed as not being economically viable, and do not present a viable alternative to development taking place within the SDNP.
- 3.3.23 It is recognised that economic drivers should not be the sole factor in deciding which option should be pursued. However, in this case the Fawley and Chilling options which would not require crossing of the SDNP (and additionally in relation to Ninfield), the options are not economically viable by a very significant margin, which would effectively end the prospects for the development of Rampion 2.
- 3.3.24 This process left three options for the grid connection location: Bolney, Lovedean, and Little Horsted. Little Horsted having the caveat of development

uncertainty/timing due to preliminary nature of development, both in technical, business case and consent terms which made it a speculative option at the time of assessment, and Lovedean known to have restricted capacity. All reasonable onshore cable routes from a landfall location close to the offshore Area of Search would involve crossing the SDNP for these three options.

- 3.3.25 The three options (Bolney, Lovedean and Little Horsted) were considered in RED's appraisal of landfall and onshore cable route options (see **Section 3.4**), in parallel to National Grid's CION process described in **paragraphs 3.3.26 to 3.3.30**

National Grid Connections Infrastructure Option Notice (CION) process

- 3.3.26 The CION is undertaken collaboratively between NGENSO, the Transmission Owner (National Grid) and the developer (RED), to:
- provide a joint process to centrally record decisions and design rationale from the technical, commercial, regulatory, environmental, and socio-economic aspects of a project as it progresses;
 - document the clear reasoning why a specific design option has been chosen; and
 - provide visibility of the decision making process and to record the underlying assumptions.
- 3.3.27 The CION process focussed on the technical and system capacity for new connections to the transmission network. This process happens in parallel with the developers' own feasibility, deliverability and environmental impact assessments. In the event of conflicting recommendations, the project parameters would need to be modified, until a viable conclusion is reached.
- 3.3.28 The CION report was informed by a connection feasibility study undertaken by NGET (see **paragraph 3.3.3**). This found that the available capacity by 2029 would be:
- 1,200MW at Bolney;
 - 1,200MW at Little Horsted;
 - 1,200MW at Fawley;
 - 800MW at Lovedean; and
 - 700MW at Chilling.
- 3.3.29 The CION report further considered the potential for expansion at the sites studied, finding that connections would not be physically possible at Chilling and Lovedean. The substations taken forward for further assessment were:
- Bolney;
 - Little Horsted; and
 - Fawley.

- 3.3.30 Following further assessment, Bolney was found to best meet the ESO's obligation to provide an economic and efficient connection, due to the lower constraint and construction costs.

Summary

- 3.3.31 The site selection process for the grid connection is summarised in **Table 3-4**. The chosen grid connection is described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

Table 3-4 Summary of grid connection alternatives initially considered

Alternative considered	Location	Description
Bolney	Mid Sussex, where the existing Rampion Offshore Wind Farm connects into the grid	Considered as part of onshore cable route options described in Section 3.4 and chosen as grid connection location prior to Scoping.
Lovedean	Hampshire, approximately 64.8km west of Bolney	Considered as part of onshore cable route options described in Section 3.4 but discounted prior to Scoping.
Ninfield	East Sussex, approximately 51.4km east of Bolney	Requires crossing of SDNP. Prohibitive additional costs of a significantly longer marine cable Other issues include shipping, steep cliffs and ecological constraints including the Pevensey Levels SSSI. Discounted prior to constraints mapping described in Section 3.4 .
Chilling	Hampshire, approximately 80km west of Bolney, on the east bank of Southampton Water	Additional costs would be prohibitive and render the overall Proposed Development not economically viable. Capacity limit of 700MW. Discounted prior to constraints mapping described in Section 3.4 .
Fawley	Hampshire, approximately 80km west of Bolney, on the west bank of Southampton Water	Additional costs would be prohibitive and render the overall Proposed Development not economically viable. Discounted prior to constraints mapping described in Section 3.4 .

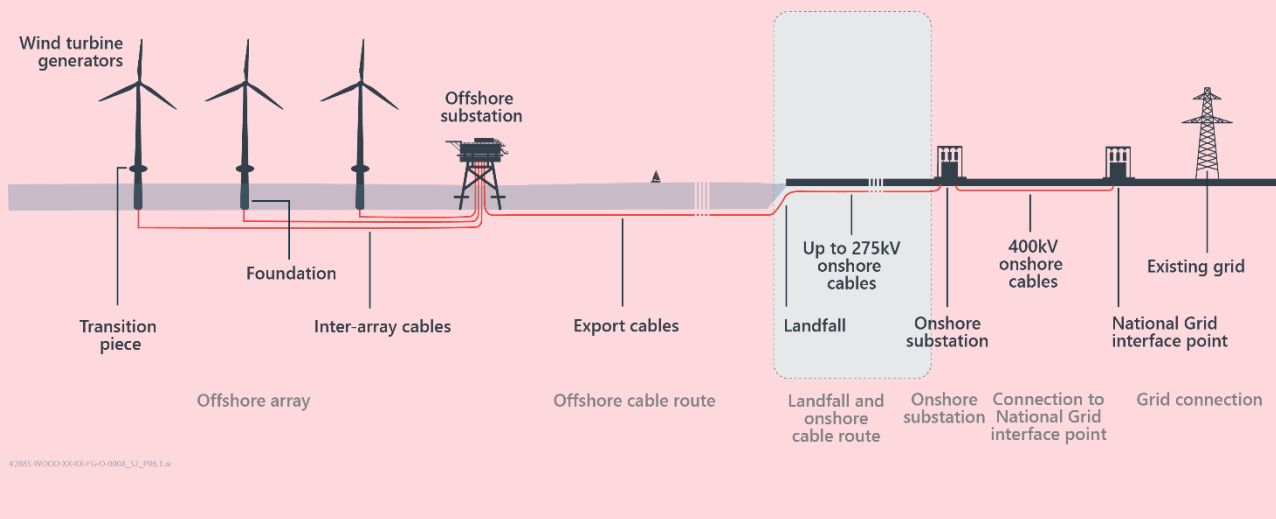
Alternative considered	Location	Description
Little Horsted	East Sussex, between Bolney and Ninfield.	Considered as part of onshore cable route options described in Section 3.4 but discounted prior to Scoping.

3.4 Landfall and onshore cable route

This section describes the process of identifying the landfall location and the refinements to the onshore cable route, as shown in **Graphic 3-6**.

- Six potential landfall locations and three potential grid connection locations were identified prior to Scoping.
- A constraints mapping process was carried out, which selected one corridor from landfall to grid connection. This was presented at Scoping. This constraints mapping process started in parallel with the site selection process for the grid connection (see **Section 3.3**), hence a range of National Grid interface point options were considered.
- Following Scoping, onshore cable route refinements were considered at nine locations along the onshore cable route, and options were selected at seven of these locations. The onshore cable route presented at the first Statutory Consultation exercise in July 2021 (subsequently reopened in February 2022) included two locations where options were still being considered (near Warningcamp and the onshore substation location).
- Following the first Statutory Consultation exercise in July 2021 (reopened in February 2022), three further targeted Statutory Consultation exercises were carried out in October 2022, February 2023, and May 2023 respectively. These considered a series of onshore cable route refinements, which informed the proposed DCO Order Limits.

Graphic 3-6 Schematic showing grid connection location



Site selection prior to Scoping

Approach

- 3.4.1 An options appraisal was undertaken of combinations of landfall and cable corridor options to reach the three grid connection options that remained at this point (Bolney, Lovedean and Little Horsted).
- 3.4.2 A constraints mapping approach was used to assess the environmental, consenting, and technical constraints associated with each option. The Study Area covered the onshore (landward of Mean Low Water Springs (MLWS)) area to the National Grid interface point options plus 30km. Constraints data were gathered in a GIS format and presented on maps as layers.
- 3.4.3 Using professional judgement, these were described as 'hard' or 'soft' constraints. 'Hard' constraints are those that would directly influence the boundaries of sites/indicative cable routes, and are generally avoided unless suitable mitigation is available. Examples of hard constraints are:
- Ramsar sites, SPAs, and other internationally protected sites for biodiversity;
 - historic environment designated sites, such as World Heritage Sites and Conservation Areas;
 - settlements;
 - some land uses such as quarries and Ministry of Defence land; and
 - technical constraints such as gradients over 10 percent.
- 3.4.4 'Soft' constraints would not generally prevent progress when considered in isolation and can often be moderated through mitigation. The consideration of these constraints included the protection afforded by policy in the 2011 NPSs (DECC 2011a; DECC, 2011b), most recently updated in the 2023 draft NPSs (DESNZ 2023a; DESNZ 2023b). This protection has fed into the development of embedded environmental measures for the Proposed Development. Examples of these constraints include:
- landscape and visual designations such as National Parks and AONB, and PRoW including National Trails;
 - some designated sites for biodiversity such as Ancient Woodland and National Nature Reserves;
 - land uses such as leisure and recreation; and
 - technical constraints such as motorways and railway lines.
- 3.4.5 The constraint layers were combined to create an initial 'heat map' (with no individual weighting). This provided an initial indication of the spread and concentration of constraints in the study area, which acted as a visual aid for the assessment.
- 3.4.6 Site visits were used to ground-truth the constraints analysis, and a workshop was held for technical specialists to review and sense-check all the available

information. The aim of this workshop was to further consider the landfall, cable route and substation locations. Professional judgement was used to establish those considered to be most technically viable and which have the fewest environmental/consenting constraints, and identify pinch-points. The sections below describe the outcomes of this exercise.

- 3.4.7 At this stage, a 50m onshore temporary construction corridor was considered to be required for the majority of the onshore cable route.

Landfall identification

- 3.4.8 In addition to considering the landfall used for the existing Rampion 1 development at Brooklands Park, East Worthing, five additional landfall options were identified, giving a total of six landfall options which were assessed (see **Table 3-5**)¹. These comprise:

- Brooklands: as per existing Rampion 1 development landfall;
- Climping: the next nearest landfall option west of Brooklands;
- Church Norton: lying east of the headland of Selsey Bill;
- Bracklesham: lying west of the headland of Selsey Bill;
- East Wittering: most westerly option, lying west of the headland of Selsey Bill; and
- Tide Mills: next landfall option east of Brooklands.

- 3.4.9 The Sussex coastline is heavily developed, in particular the central conurbation extending from Worthing in the west, through Lancing, Shoreham, Portslade, Hove and Brighton in the east. To the east of Brighton vertical cliffs rise providing a significant barrier to available landing points until east of Newhaven.

- 3.4.10 This led to all but one of the landfall options falling outside of this central conurbation area. There had been other options within this area that were considered but discounted for the Rampion 1 project. These would also be unsuitable for this Proposed Development (Rampion 1 ES Section 3.4 Landfall Selection Process, E.ON Climate and Renewables, 2012). The options discounted by Rampion 1 were:

- Shoreham (Widewater Lagoon);
- Shoreham (Norfolk Bridge);
- Bexhill West (Cooden); and
- Ninfield / Bexhill East (Glyne Gap).

- 3.4.11 The criteria for a suitable landfall includes sufficient physical space onshore, for the onshore cabling, transition joint bays, and Horizontal Directional Drilling (HDD)

¹ This excludes Saltdean and Rottingdean which were initially considered, but immediately discounted. The steep cliffs at these locations were of concern, as there would likely be significant technical challenges in installing cable circuits beneath cliffs of these heights.

drilling rig and construction logistical operations which would likely be required, and an unconstrained inshore area for when export cable laying vessels will come in close to shore.

- 3.4.12 In addition, as well as sufficient physical space at the landfall itself, it is crucial that there is a workable onwards route towards the eventual grid connection point. There were some locations with open space at the coast, such as Goring Gap, which then had a built environment barrier slightly further inland, thereby not providing a feasible onward route towards the grid connection point.
- 3.4.13 A potential landfall location at Lee-on-the-Solent was excluded due to the presence of Ministry of Defence land and close proximity to Alver Country Park. Similarly, a landfall location at West Wittering was excluded as a potential option due to recreational constraints and the presence of Chichester and Langstone Harbours SPA.

Identification of indicative onshore cable routes

- 3.4.14 Indicative onshore cable routes between potential landfall locations and onshore substations were identified through the multidisciplinary workshop, based on the 'heat maps' and site visits. This used professional judgement to establish which routes minimised the likely impact on the environment whilst complying with technical feasibility criteria (e.g., construction width requirements, gradients, and bend radius). Any pinch points within the indicative onshore cable routes were also identified, and potential solutions and mitigations were proposed.
- 3.4.15 In addition to those indicative onshore cable routes shown on [Figure 3.4, Volume 3](#) of the ES (Document Reference: 6.3.3), a number of other potential options were sought but not further developed due to insurmountable constraints such as existing developments.
- 3.4.16 These indicative onshore cable routes from the landfall options are shown on [Figure 3.4, Volume 3](#) of the ES (Document Reference: 6.3.3).

Conclusion of options appraisal

- 3.4.17 A summary of the constraints identified in the optional appraisal process is provided in [Table 3-5](#). This represents the known constraints and proposed onshore cable route lengths at the Scoping stage, and does not include information on the chosen option which became available later in the design evolution process. Information that became available following Scoping is covered in [Paragraphs 3.4.27 to 3.4.36](#).
- 3.4.18 It was concluded that it is not technically feasible to follow the original Rampion 1 onshore cable route as additional infrastructure cannot be physically accommodated at the Brooklands and due to environmental constraints at Tottington Mount (see [Table 3-5](#)). The option was therefore not a reasonable alternative.
- 3.4.19 All onshore cable options to Lovedean were rejected due to technical issues and environmental constraints including areas of woodland and transport links. It is planned that the Lovedean substation will be extended by National Grid for the Aquind interconnector project, which would limit the maximum capacity available

to Rampion 2 to circa 800MW with an associated scaling back of the proposed output. Although the Aquind interconnector project was refused by the Secretary of State (SoS) on 20 January 2022 (following recommendation for approval by the Planning Inspectorate), a subsequent Judicial Review on 24 January 2023 has quashed the decision meaning that the decision will need to be taken again by the SoS.

- 3.4.20 On the basis that a landfall at Climping was selected, in total the onshore cable route from the proposed landfall at Climping to Lovedean would be 10km longer than from Climping to Bolney and would provide a longer route across the SDNP.
- 3.4.21 The development of Little Horsted substation was uncertain at the time of the initial search. This uncertainty, and consequent risk to the project, was one of the factors weighing against selection of this site. Additionally, the substation is planned to provide new connection for UK Power Networks to meet distribution needs, thus would not be designed to accommodate the 1,200MW generation capacity of Rampion 2. The substation would need to be significantly enlarged, so the financial, technical and environmental costs of this also weigh against this option. Finally, an onshore cable route from Tide Mills to Little Horsted would pass through the SDNP for approximately 10km and may incur a loss of a Scheduled Monument.
- 3.4.22 Following the granting of planning permission in November 2021, National Grid (National Grid, 2023) is now expected to commence work to construct Little Horsted substation in 2024, and is expected to become operational in 2025. Although there is now less uncertainty about Little Horsted substation being constructed than at previous stages in the Rampion 2 project, it is still not considered a viable alternative grid connection. The costs and impacts of building the substation extension and cable route still apply (as appraised here and in the CION). In addition, pursuing this option would cause considerable delay to the project. Such a delay to the provision of infrastructure considered a critical national priority within draft NPS EN-1 and NPS EN-3 (DESNZ 2023a and DESNZ 2023b) would likely mean that the project could not contribute to the achievement of offshore wind targets by 2030.
- 3.4.23 Based on the options appraisal process, a landfall at Climping was selected with an identified onshore cable route connecting it to the existing National Grid Bolney substation, noting that the new onshore substation site may not be directly adjoining the existing National Grid Bolney substation site. This existing National Grid interface point, landfall and connecting onshore cable route combination was selected largely due to Climping being in closest proximity to the preferred connection point (relative to other options considered) but also for the following key reasons:
- the limited number of statutory designations at the coast and immediately inland in association with the Climping landfall;
 - the availability of large foreshore areas clear of development and large flat areas immediately inland at the Climping landfall;
 - there are isolated Listed Buildings in the vicinity of Climping landfall, but these can be avoided through the sensitive locating of temporary construction works;

- the Ancient Woodland and Priority Habitat woodland in the vicinity of the Climping landfall and the potential onshore substation site options are avoidable;
- the Climping landfall is well screened for local residential receptors;
- the landfall is located in close proximity (relative to the other landfall options identified) to Rampion 2 site minimising the offshore cable route required;
- the limited number of Listed Buildings within 500m of the existing National Grid Bolney substation and the potential satellite onshore substation site options are generally well screened/within the bounds of properties;
- statutory ecological designations are largely avoided along the onshore cable route, and none were identified within the onshore cable corridor at this stage; and
- the identified onshore cable route generally avoids developments including settlements, isolated houses, and other buildings. Any impacts on isolated Listed Buildings that may be in the vicinity should be avoidable through detailed design and planning of the cable laying works in those sections. Following the Scoping stage, the onshore cable corridor refinement process considered the proximity to residential properties (see **paragraph 3.4.31**).

3.4.24 A more detailed investigation of the Climping to Bolney onshore cable route and potential onshore substation sites in proximity to the existing National Grid Bolney substation was subsequently undertaken to:

- investigate and appraise potential new onshore substation site options in the vicinity of the existing National Grid interface point (which is explored in the next section) using the same methodology described above and determine potential cable routes to these from the indicative onshore cable route;
- understand land ownership along the onshore cable route and at potential onshore substation site options; and
- consider potential technical pinchpoints including ground truthing along the indicative onshore cable route and understand options to minimise these.

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Table 3-5 Summary of constraints for landfall to onshore substation options, as at Scoping

Landfall / Onshore Substation Option	Approximate length of onshore cable route	Environmental issues identified	Technical issues identified	Delivery risk factors	Outcome
Existing Rampion Route via Brooklands (as per existing Rampion 1 development landfall)	26.2km (including 14.0km through SDNP)	Tottington Mount – visually prominent and has a significant sensitive Chalk Grassland habitat.	Required additional infrastructure cannot be physically accommodated at the Brooklands landfall, due to existing constraints both onshore and offshore.	No specific issues identified.	It was concluded it is not technically feasible to follow the original Rampion 1 route due constraints at the landfall and Tottington Mount. This option is therefore not a reasonable alternative.
Climping to Bolney (Climping is the next nearest landfall option west of Brooklands which met the necessary criteria)	36.6km (including 14.0km through SDNP)	Mature woodland, Priority Habitat. SDNP including areas of low to medium tranquillity. Flood zone 3	Limited space for construction and/or potential disturbance at: <ul style="list-style-type: none"> • crossing of the A259; • Priory Farm; • Crossing of A24; • Fair Oak Farm and Upper Buncton Farm; and • Spithandle Lane. 	No specific issues identified.	Selected as onshore cable route for Scoping.

Landfall / Onshore Substation Option	Approximate length of onshore cable route	Environmental issues identified	Technical issues identified	Delivery risk factors	Outcome
Climping to Lovedean	46.7km (including 31.0km through SDNP)	<p>Scheduled monument</p> <p>Flood zone 3</p> <p>Mature woodland, Priority Habitat, proximity to Ancient Woodland</p> <p>SDNP including viewpoints and areas of high tranquillity.</p> <p>Regional PRow.</p>	<p>Lovedean substation has capacity limit of 800MW so would require a significant scaling back of the proposed output of Rampion 2².</p> <p>Limited space for construction and/or potential disturbance at:</p> <ul style="list-style-type: none"> • agricultural retailers/wholesalers and New Road • woodland of Chilgrove Hill and the B2141, Bow Hill Farm (also potential slopes in this area); and • the crossing of a railway and a minor road due to Old 	No specific issues identified.	Rejected due to technical issues (capacity at Lovedean substation) and environmental constraints.

² Constraints mapping is an iterative process, and the technical information on the capacity limit at Lovedean was identified after it was included as a potential onshore substation location.

Landfall / Onshore Substation Option	Approximate length of onshore cable route	Environmental issues identified	Technical issues identified	Delivery risk factors	Outcome
			Idsworth Garden and its access road.		
East Wittering to Lovedean	47.3km (including 28.5km through SDNP)	International, European and national biodiversity designations at Fishbourne Channel. Scheduled monument Flood zone 3 Mature woodland, Priority Habitat, proximity to ancient woodland SDNP including viewpoints and areas of high tranquillity. Regional PRoW. Chichester Harbour AONB.	Lovedean substation has capacity limit of 800MW so would require a significant scaling back of the proposed output of Rampion 2. Limited space for construction and/or potential disturbance at: <ul style="list-style-type: none"> woodland of Chilgrove Hill and the B2141, Bow Hill Farm (also potential slopes in this area); and the crossing of a railway and a minor road due to Old Idsworth Garden and its access road. 	No specific issues identified.	Rejected due to technical issues (capacity at Lovedean substation) and environmental constraints.
Bracklesham to Lovedean	45.2km (including	As East Wittering to Lovedean	As East Wittering to Lovedean	No specific issues identified.	Rejected due to technical issues (capacity at

Landfall / Onshore Substation Option	Approximate length of onshore cable route	Environmental issues identified	Technical issues identified	Delivery risk factors	Outcome
	28.5km through SDNP)				Lovedean substation) and environmental constraints.
Church Norton to Lovedean	47.7km (including 28.5km through SDNP)	As East Wittering to Lovedean	As East Wittering to Lovedean	No specific issues identified.	Rejected due to technical issues (capacity at Lovedean substation) and environmental constraints.
Tide Mills to Little Horsted	22.4 to 23.3km (including approximately 10km through SDNP)	Western option: loss of a Scheduled Monument, elevation and visibility of construction works. Eastern sub-option passes through Local Wildlife Site. Both options: flood zone 3, priority habitats, SDNP, leisure activities, recreation ground.	No specific issues identified.	It was not known at this stage in the design process if National Grid's substation at Little Horsted would be progressed.	Rejected due to uncertainty over Little Horsted substation site.

Summary

- 3.4.25 The options appraisal described above concluded that the Climping to Bolney onshore cable corridor was to be taken forward to the Scoping stage. This was the basis upon which the Scoping assessment was presented in the Rampion 2 EIA Scoping Report (RED, 2020).
- 3.4.26 The Scoping Boundary was approximately 37km in length, this included the landfall area at Climping, an onshore cable corridor stretching from Climping to Bolney, and an area within which to identify the new onshore substation. The Scoping Boundary was approximately 2km wide along the onshore cable corridor, including a 1km buffer either side of the indicative potential onshore cable centreline. At the Scoping stage, an indicative 50m cable corridor was assumed within this buffer. The Scoping Boundary was approximately 5.7km wide in the area being considered for the onshore substation at the northeastern extent of the onshore cable corridor as a preferred location had not yet been identified.

Onshore cable corridor refinement between Scoping and first Statutory Consultation exercise

Overview

- 3.4.27 Following the Scoping stage in 2020, the onshore cable route was further refined to reduce the number of options being considered and the size of the area included in the PEIR Assessment Boundary (RED, 2021). The rest of this section focuses on the onshore cable route only, as the landfall location and point of connection was fixed at the Scoping stage following the assessment set out above, and no further alternatives were considered³.

Non-statutory consultation

- 3.4.28 Following the Scoping stage, RED carried out a non-statutory consultation exercise from 14 January 2021 to 11 February 2021. This was a virtual exhibition to raise awareness of the Proposed Development, the development process, and share information on the emerging design process inviting feedback from stakeholders. At this point in the design evolution process, an indicative onshore cable route corridor had been identified within the Scoping Boundary, with a number of branch options in some sensitive locations. Three onshore substation options had been identified, as described in **Section 3.6**, along with potential cable routes to these locations. These options were presented during this non-statutory consultation exercise.
- 3.4.29 Feedback on these cable corridor options was considered as part of the process to refine the Scoping Boundary to the PEIR Assessment Boundary (RED, 2021)

³ Although the uncertainty about the Little Horsted substation coming forward has reduced since the Scoping stage in 2020, the option would still be considered to not provide the certainty required to provide a viable connection for the Proposed Development (see **Paragraph 3.4.21**). Therefore, it was not considered again as an alternative.

which was presented at the first Statutory Consultation exercise in July 2021 (and subsequently reopened in February 2022) (RED, 2021).

Developing the PEIR Assessment Boundary

- 3.4.30 The design refinement process delivering the onshore cable corridor element of the PEIR Assessment Boundary, which was presented at the first Statutory Consultation exercise in July 2021 (and subsequently reopened in February 2022) (RED, 2021), was informed by several multi-disciplined activities. These brought together engineering, environmental, land ownership and stakeholder concerns and sensitivities to propose, appraise and reduce alternatives within the Scoping Boundary.
- 3.4.31 When refining the proposed onshore cable corridor location, the following high-level guiding principles were identified:
- selection of the shortest possible onshore cable route to minimise environmental effects through Proposed Development footprint between the landfall at Climping and potential onshore substation search areas near Bolney;
 - minimising disruption by considering the proximity to residential properties; and
 - avoidance of key sensitive features where possible by the early adoption of commitments outlined in the [Commitments Register](#) (Document Reference: 7.22) and such as C-6, C-20, and C-75 (see [Table 3-11](#)); and
 - minimising disruption to sensitive features where possible by the early adoption of commitments outlined in the [Commitments Register](#) (Document Reference: 7.22) such as C-5, C-6, C-20, and C-61 (see [Table 3-11](#)).
- 3.4.32 Onshore cable corridor design refinement workshops interrogated technical, environmental and land ownership pinch points along the potential onshore cable corridor, incorporating a review of stakeholder concerns to propose, appraise and reduce alternatives. A comparative analysis exercise was performed where onshore cable corridor options were identified to facilitate a clear and robust approach to the selection of a preferred option or reduce the number of options being considered. This approach also facilitated incorporation of National Planning Statement (NPS) and National Planning Policy Framework (NPPF) (Ministry of Housing Communities and Local Government (MHCLG), 2021) mitigation requirements described in [Table 3-1](#) as well as balancing technical engineering constraints.
- 3.4.33 The onshore design refinement workshops described above adopted a BRAG appraisal approach to define constraints for each option using the colour coding and rating system, as described in [Section 3.1](#).
- 3.4.34 The onshore cable corridor element of the Scoping Boundary was refined through these workshops, by considering alternatives where appropriate to avoid or minimise environmental sensitivities, and take account of technical constraints. Feedback from the non-statutory consultation exercise in January 2021 was also considered during this process.

- 3.4.35 The indicative onshore cable route from the initial onshore appraisal study that connected Climping to Bolney within the Scoping Boundary was used as a starting point. Localised options along the onshore cable route were compared against this original route, to identify alternative routes to avoid constraints. Alternative cable route options at four broad locations were presented in the non-statutory consultation in January 2021 (Warningcamp, Norfolk Clump, Windmill Quarry, and at the substation areas of search). In addition to these cable route options, further alternative cable route options were subsequently considered at Climping, Washington, and Henfield. Preferred cable route options were chosen for the majority of these locations at this stage, and were incorporated into the PEIR Assessment Boundary (RED, 2021). The PEIR Assessment Boundary also included cable route options that were still under consideration at Warningcamp and the onshore substation locations as further baseline data and consultation feedback was required at this stage to identify a preferred option.
- 3.4.36 A summary of the onshore cable route options considered is presented in **Table 3-6** and **Figure 3.5, Volume 3** of the ES (Document Reference: 6.3.3).

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Table 3-6 Onshore cable route options considered between Scoping and first Statutory Consultation exercise

Location	Options considered	Option(s) chosen and reason
Climping	Climping A – Initial appraisal study route	Initial appraisal study route at the Scoping stage, but not included in PEIR Assessment Boundary (RED, 2021) due to length of route and proximity to residential receptors.
	Climping B – to provide a more direct route than Climping A	Considered following Scoping but not included in PEIR (RED, 2021) Assessment Boundary. Discounted in favour of C due to proximity to residential receptors.
	Climping C – to provide a more direct route than Climping A	Considered following Scoping and included in PEIR Assessment Boundary (RED, 2021). Chosen as this is a more direct route than Climping A and further from residential receptors than Climping B.
Warningcamp	Warningcamp A – initial appraisal study route, not considered after scoping due to environmental and engineering constraints.	Initial appraisal study route at the Scoping stage, but not included in PEIR Assessment Boundary (RED, 2021) due to several environmental and engineering constraints.
	Warningcamp B – alternative route to the north and west of Crossbush.	Considered following Scoping, and included in non-statutory consultation (January 2021). Included in PEIR Assessment Boundary (RED, 2021) along with Warningcamp C as there was no clear preference and further baseline data and consultation feedback was required to make a selection.
	Warningcamp C – alternative route to the south and east of Crossbush.	Considered following Scoping, and included in non-statutory consultation (January 2021). Included in PEIR Assessment Boundary (RED, 2021) along with Warningcamp C as there was no clear preference and

Location	Options considered	Option(s) chosen and reason
Wepham and Norfolk Clump	Warningcamp D – alternative route considered close to A.	further baseline data and consultation feedback was required to make a selection. Considered following Scoping but not included in PEIR Assessment Boundary (RED, 2021) due to several environmental and engineering constraints.
	Norfolk Clump A – alternative route to avoid engineering constraints, to the northwest of Norfolk Clump	Considered following Scoping and included in non-statutory consultation (January 2021). Not included in PEIR Assessment Boundary (RED, 2021) as Norfolk Clump B was preferred.
	Norfolk Clump B – alternative route to avoid engineering constraints to the southeast of Norfolk Clump	Considered following Scoping and included non-statutory consultation (January 2021). Included in PEIR Assessment Boundary (RED, 2021) as preferred to Norfolk Clump A from an environmental perspective.
	Norfolk Clump C – initial appraisal study route	Initial appraisal study route at the Scoping stage, but not included in PEIR Assessment Boundary (RED, 2021) due to technical challenges associated with side slopes.
Washington	Washington A – initial appraisal study route	Initial appraisal study route at the Scoping stage, but not included in PEIR Assessment Boundary (RED, 2021) due to technical construction challenges and environmental constraints, which included a (including crossing of a steepside slope with ancient woodland. The option is within 40m of Washington Chalk Pit, a Locally Important Geological Site, and passes through a historic landfill. The route passes through two Archaeological Notification Areas and runs in close proximity to and then crosses the South Downs Way. resulting challenges to reinstatement

Location	Options considered	Option(s) chosen and reason
	Washington B – to reduce technical difficulties associated with a slope and potential environmental impacts.	<p>and the risks and restrictions due to proximity to functionally linked habitat to Arun Valley S. Additionally, options for trenchless crossings to avoid constraints (including Scheduled Monument and ancient woodland) would be of a length that would adversely derate the cable.</p> <p>Considered following Scoping and included in PEIR Assessment Boundary (RED, 2021) as this avoids technical difficulties and constraints associated with Washington A.</p>
Windmill Quarry	Windmill Quarry A – alternative to avoid landfill site	Considered following Scoping and included in non-statutory consultation (January 2021). Not included in PEIR Assessment Boundary (RED, 2021) as it is less preferred than B from an environmental and engineering perspective.
	Windmill Quarry B (and extension) – alternative to avoid landfill site	Considered following Scoping and included in non-statutory consultation (January 2021). Included in PEIR Assessment Boundary (RED, 2021) as it provides a viable alternative to C and is preferred from an environmental and engineering perspective.
	Windmill Quarry C – initial appraisal study route	Initial appraisal study route at the Scoping stage, but not included in PEIR Assessment Boundary (RED, 2021) as it crossed an authorised and active landfill site and is therefore unviable.
Henfield	Henfield 1A – initial appraisal study route	Initial appraisal study route at the Scoping stage, as an option alongside Henfield 1B. Not included in PEIR

Location	Options considered	Option(s) chosen and reason
	Henfield 1B – initial appraisal study route	Assessment Boundary (RED, 2021) due to water environment constraints and associated engineering challenges.
	Henfield 1C – alternative route to reduce the number of watercourse crossings and area of flood zone crossed.	Initial appraisal study route at the Scoping stage, as an option alongside Henfield 1A. Not included in PEIR Assessment Boundary (RED, 2021) due to water environment constraints and associated engineering challenges. Considered following Scoping and included in PEIR Assessment Boundary (RED, 2021) as this avoids water environment constraints and associated engineering challenges.
Bolney Road/Kent Street	Bolney Road 1A&1B – initial appraisal study route	Initial appraisal study route at the Scoping stage and included in non-statutory consultation (January 2021). Not included in PEIR Assessment Boundary (RED, 2021) as 1C&1D provides a more direct route avoiding the flood plain.
	Bolney Road 1C&1D – alternative to avoid flood plain and provide a more direct route	Considered following Scoping and included in non-statutory consultation (January 2021). Included in PEIR Assessment Boundary (RED, 2021) as it was preferred from an environmental and engineering point of view.
	Bolney Road 1E – alternative to avoid flood plain and provide a more direct route.	Considered following Scoping as a shorter route than 1A&1B but not included in PEIR Assessment Boundary (RED, 2021) due to environmental constraints.

Location	Options considered	Option(s) chosen and reason
Wineham Lane North	Wineham Lane North 1A&1B – initial appraisal study route	Considered following Scoping and included in non-statutory consultation (January 2021). Included in PEIR Assessment Boundary (RED, 2021) along with Wineham Lane North 1B as there was no clear preference and further baseline data and consultation feedback was required to make a selection.

Alternatives and modifications between the first Statutory Consultation exercise and the second Statutory Consultation exercise

Overview

- 3.4.37 Since the first Statutory Consultation exercise in July 2021 (and subsequent reopening in February 2022), alternatives and modifications were identified for the onshore part of the original PEIR Assessment Boundary (RED, 2021). These were generated as a result of:
- further design evolution which has been informed by the first Statutory Consultation exercise (RED, 2021);
 - having regard to stakeholder and landowner feedback, and
 - further engineering considerations and environmental assessment information that has arisen since the first Statutory Consultation exercise (RED, 2021).
- 3.4.38 These refinements are described in full in the PEIR Supplementary Information Report (SIR) (RED, 2022), published in October 2022 to support a second Statutory Consultation exercise. The PEIR SIR (RED, 2022) treated the new alternatives and modifications as potential additions to the PEIR Assessment Boundary (RED, 2021) without taking account of any future refinement once options were selected to inform the final design and proposed DCO Order Limits. Full descriptions are provided in [Appendix 3.1: Supporting Information, Volume 4](#) of the ES (Document Reference: 6.4.3.1).
- 3.4.39 The PEIR SIR (RED, 2022) presents an environmental review of the alternatives and modifications which were informed by a desk-based review of publicly available information, mapping and documents alongside environmental information previously collated for the first Statutory Consultation exercise presented in the PEIR (RED, 2021) and outcomes of further surveys and engineering design investigations undertaken since the PEIR (RED, 2021) was published.
- 3.4.40 The supplementary environmental review did not constitute a full assessment of effects. It determined whether the environmental receptors, the magnitude of change, and/or resulting assessment outcomes presented in the PEIR (RED, 2021) changed as a result of the alternatives and modifications presented to the onshore part of the original PEIR Assessment Boundary (RED, 2021). It also considered whether the changes are likely to give rise to new or different residual significant effects. The outcomes of the first Statutory Consultation exercise and the further second Statutory Consultation exercise helped to inform the proposed DCO Order Limits.

Longer Alternative Cable Routes (LACRs)

- 3.4.41 Two LACRs (LACR-01 and LACR-02) were identified for consideration which deviate geographically from the onshore part of the original PEIR Assessment Boundary (RED, 2021). This was to enable alternative onshore cable corridor options to be considered by RED.

- 3.4.42 LACR-01 and LACR-02 arose as a result of a combination of Statutory Consultation feedback received on the PEIR (RED, 2021) from local community members, statutory bodies, and others. This included statutory bodies highlighting the effects on the chalk grassland from the open cut crossing of the Warningcamp Hill and New Down Local Wildlife Site and the need to avoid this. In addition, the potential for archaeological remains of potentially high significance at Crossbush associated with an Archaeological Notification Area (ANA) (Napoleonic Barracks and possible burial ground, Crossbush). However, this was subsequently confirmed to be of lower significance following archaeological trial trenching. Consultation responses provided at the first Statutory Consultation exercise in 2021 (subsequently reopened in February 2022) also highlighted concern with the PEIR Assessment Boundary (RED, 2021) crossing an agri-environment scheme. Feedback was also considered from ongoing stakeholder and landowner engagement.
- 3.4.43 These LACRs were compared from an environmental, engineering, land interest and cost perspective using BRAG appraisals. Of these LACRs considered, the two preferred options were presented in the second Statutory Consultation exercise in the PEIR SIR as LACR-01 and LACR-02 (RED, 2022).
- 3.4.44 LACR-01 and LACR-02 also considered and took account of the outcomes of further surveys and engineering design investigations undertaken since the first Statutory Consultation exercise that was presented in the PEIR (RED, 2021) (e.g., geophysical surveys in areas of archaeological potential within the original PEIR Assessment Boundary).
- 3.4.45 In addition to these LACRs, several localised onshore cable route changes were developed with the aim of minimising these effects, and were compared using a BRAG appraisal. Two options were found to be viable, and were included in the second Statutory Consultation exercise and presented in the PEIR SIR (RED, 2022), as follows:
- a minor onshore cable route change, presented as part of ACR-04 (see **Paragraph 3.4.52** and **Table 3-7**); and
 - the PEIR Assessment Boundary with additional trenchless crossings and a new construction access track (AA-08, see **Paragraph 3.4.54**).
- 3.4.46 In addition to the onshore cable route presented in the first Statutory Consultation exercise in the PEIR (RED, 2021) (the PEIR Assessment Boundary), LACR-01 and LACR-02 were presented in the second Statutory Consultation exercise presented in the PEIR SIR (RED, 2022) (shown in **Figure 3.6, Volume 3** of the ES (Document Reference: 6.3.3) and described in detail in PEIR SIR Table 2-1 (RED, 2022)). LACR-01 separates into two onshore cable route options around Michelgrove and therefore is subdivided into LACR-01a, LACR-01b and LACR-01c. LACR-02 connects either to LACR-01b or LACR-01c.
- 3.4.47 As presented in the second Statutory Consultation exercise (RED, 2022), the following constraints were identified for these alternative routes. Further details are provided in Section 2.2 of the PEIR SIR (RED, 2022).

LACR-01a

- 3.4.48 Additional sensitive receptors introduced as a result of LACR-01a include socio-economics, Landscape and Visual Impact Assessment (LVIA), air quality, soils and agriculture, noise and vibration, terrestrial ecology and nature conservation, transport, ground conditions, historic environment, and water environment receptors. Some changes in the magnitude of impact to sensitive receptors will be experienced by socio economics, LVIA, water environment, and historic environment receptors, compared to those reported at the first Statutory Consultation exercise in the PEIR (RED, 2021). Considering the implementation of embedded environmental measures (see **Section 3.10**), new or different significant residual effects were identified which altered the assessment outcomes and conclusions presented in the PEIR (RED, 2021) for the following aspects:
- LVIA: The LVIA significant residual effects, which are related to construction activities, are likely to be for a temporary period.
 - Water environment: At the second Statutory Consultation exercise, further information was required to understand the potential relationship between LACR-01a and the public water supply and other potential receptors including karst features.

LACR-01b

- 3.4.49 Additional sensitive receptors introduced as a result of LACR-01b include socio-economics, LVIA, air quality, soils and agriculture, noise and vibration, terrestrial ecology and nature conservation, transport, ground conditions, historic environment, and water environment receptors. Some changes in the magnitude of impact to sensitive receptors will be experienced by socio economics, LVIA, water environment, and historic environment, compared to those reported at the first Statutory Consultation exercise in the PEIR (RED, 2021). Considering the implementation of embedded environmental measures (see **Section 3.10**), new or different significant residual effects were identified which altered the assessment outcomes and conclusions presented in the PEIR for the following aspects:
- LVIA: The LVIA significant residual effects, which are related to construction activities, are likely to be for a temporary period.
 - Water environment: At the second Statutory Consultation exercise, further information was required to understand the potential relationship between LACR-01b and the public water supply and other potential receptors including karst features.

LACR-01c

- 3.4.50 Additional sensitive receptors introduced as a result of LACR-01c include socio-economics, LVIA, air quality, soils and agriculture, noise and vibration, terrestrial ecology and nature conservation, transport, ground conditions, historic environment, and water environment receptors. Some changes in the magnitude of impact to sensitive receptors will be experienced by socio economics, LVIA, water environment, and historic environment receptors, compared to those reported at the first Statutory Consultation exercise in the PEIR (RED, 2021). Considering the implementation of embedded environmental measures (see

Section 3.10), new or different significant residual effects were identified which altered the assessment outcomes and conclusions presented in the PEIR (RED, 2021) for the following aspects:

- Socio economics: these relate to construction activities and are likely to be for a temporary period;
- LVIA: The LVIA significant residual effects, which are related to construction activities, are likely to be for a temporary period; and
- Water environment: At the second Statutory Consultation exercise, further information was required to understand the potential relationship between LACR-01c and the public water supply and other potential receptors including karst features.

LACR-02

3.4.51 Additional sensitive receptors introduced as a result of LACR-02 include socio-economics, LVIA, air quality, soils and agriculture, noise and vibration, terrestrial ecology and nature conservation, transport, ground conditions, historic environment, and water environment receptors. Some changes in the magnitude of impact to sensitive receptors will be experienced by socio economics, LVIA, soils and agriculture, water environment, terrestrial ecology, and historic environment receptors, compared to those reported at the first Statutory Consultation exercise in the PEIR (RED, 2021). Considering the implementation of embedded environmental were identified which altered the assessment outcomes and conclusions presented in the PEIR (RED, 2021) for the following aspects:

- Socio economics: these relate to construction activities and are likely to be for a temporary period;
- LVIA: The LVIA significant residual effects, which are related to construction activities, are likely to be for a temporary period.
- Water environment: At the second Statutory Consultation exercise, further information was required to understand the potential relationship between LACR-02 and the public water supply and other potential receptors including karst features;
- Soils and agriculture: At the second Statutory Consultation exercise, further Agricultural Land Classification survey information was required, and this informs the final updated ES assessment and conclusions on significance.
- Terrestrial ecology: LACR-02 would alter the type of effects on the Warningcamp Hill to New Down LWS, but the conclusions drawn (i.e., a significant effect) in Chapter 23: Terrestrial Ecology and Nature Conservation of the PEIR (RED, 2021) remain valid. Significant effects on plantations on Ancient Woodland Soils (PAWS) are also reported for LACR-02.

Alternative Cable Routes (ACRs)

3.4.52 Seven ACRs were considered at the second Statutory Consultation exercise in the PEIR SIR (RED, 2022), as a result of stakeholder feedback and further information obtained since the publication of the PEIR (RED, 2021). These are smaller-scale

alternatives to the LACRs, and avoid constraints such as utilities, potential archaeological constraints, and engineering challenges. A summary description of these ACRs and the outcome of each environmental review is provided in **Table 3-8**, with further details in **Table 2-2, Appendix 3.1: Supporting Information, Volume 4** of the ES (Document Reference: 6.4.3.1). Their locations along the onshore cable route are shown in **Figure 3.7, Volume 3** of the ES (Document Reference: 6.3.3) and further details are provided in Section 4 of the PEIR SIR (RED, 2022).

Other modifications and alternatives

- 3.4.53 In addition to the alternatives described above, more minor modifications and alternatives were presented in the second Statutory Consultation exercise (RED, 2022) as a result of the ongoing design evolution process. They are designed to avoid constraints such as hedgerows, planning consents, and agricultural fields, or provide flexibility for construction activities. These modifications and alternatives comprise:
- 14 Modified Routes (MR), which are smaller scale route changes than the LACRs and ACRs. These are described in Section 4 of the PEIR SIR (RED, 2022).
 - 33 revised and/or additional trenchless crossings (TCs). These are described in Section 5 of the PEIR SIR (RED, 2022) with a summary provided in **Table 2-4, Appendix 3.1: Supporting Information, Volume 4** of the ES (Document Reference: 6.4.3.1).
 - 32 alternative temporary construction and permanent accesses (AAs). These are described in Section 6 of the PEIR SIR (RED, 2022).
- 3.4.54 Some of these modifications and alternatives altered the receptor types or introduced new receptors to those presented at the first Statutory Consultation exercise in the PEIR (RED, 2021), but the majority did not change the overall assessment outcomes and conclusions outlined in the PEIR (RED, 2021). A new significant effect on LVIA was reported in the second Statutory Consultation exercise in the PEIR SIR (RED, 2022) for AA-08, which was for the temporary construction and permanent access to the base of the valley approximately 400m north-east of Warningcamp. This access was required in association with ACR-04 and trenchless crossings TC-08 and TC-09, which was proposed to reduce potential impacts to calcareous grassland within the Warningcamp Hill to New Down LWS.

Modifications since second Statutory Consultation exercise

- 3.4.55 Taking into account the consultation responses from the second Statutory Consultation exercise in 2022 and further information generated following the publication of the PEIR SIR (RED, 2022), further alternatives and modifications were considered by RED in early 2023. These were outlined in the PEIR FSIR (RED, 2023a), and were presented at the third Statutory Consultation exercise in February 2023.

- 3.4.56 The modifications and alternatives considered at the third Statutory Consultation exercise in the PEIR FSIR (RED, 2023a) are shown in **Figure 3.8, Volume 3** of the ES (Document Reference: 6.3.3) and comprise:
- LACR-01d: This is an area that deviates geographically from the onshore part of the second Statutory Consultation exercise PEIR SIR Assessment Boundary (RED, 2022), to enable an alternative onshore cable corridor option to be considered by RED. LACR-01d is approximately 3km in length and is subdivided into LACR-01d (west), LACR-01d (east) and LACR-01d (north); and
 - three associated additional temporary construction and/or permanent accesses (AA-33 to AA-35).
- 3.4.57 LACR-01d is located within the South Downs National Park (SDNP), in the vicinity of Longfurlong, north of Patching. It is an alternative route to part of LACR-01c, as assessed at the second Statutory Consultation exercise in the PEIR SIR (RED, 2022). It deviates from LACR-01c north of Myrtle Grove Farm, and re-joins the PEIR Assessment Boundary (RED, 2021) at Sullington Hill. Modifications to AA-33 to AA-35 are proposed to link up with this alternative onshore cable route.
- 3.4.58 Feedback from landowners provided at the second Statutory Consultation exercise presented this alternative route which included a shorter overall length, reduced number of trenchless crossings and was further from affected rural businesses in comparison to LACR-01c.
- 3.4.59 Additional sensitive receptors introduced as a result of LACR-01d include socio-economics, LVIA, air quality, soils and agriculture, terrestrial ecology and nature conservation, transport, historic environment, and water environment receptors. Some changes in the magnitude of impact to sensitive receptors were identified by socio-economics, LVIA, and historic environment receptors. Considering the implementation of embedded environmental measures, new or different significant residual effects were identified which altered the assessment outcomes and conclusions presented at the first Statutory Consultation exercise in the PEIR (RED, 2021) for socio-economics with regards ProWs, LVIA in terms of special qualities of the SDNP and two Landscape Character Areas, and potentially impacts on archaeological remains.

Preferred options chosen following Statutory Consultation exercises

- 3.4.60 Following the Statutory Consultation exercises, each change along the whole onshore cable corridor was reviewed based on the consultation responses received, any further data collected and analysed through the BRAG process.
- 3.4.61 Analysis of the LACRs (LACR-01 and LACR-02) included comparison against the sections of the PEIR Assessment Boundary and associated alternatives (broadly from Lyminster where LACR-01 starts to Sullington Hill where the LACR options rejoin) in order to inform the final choice of the onshore cable corridor in this area.
- 3.4.62 On the basis of the impacts on ancient woodland and associated objections raised by statutory consultees in response to the second Statutory Consultation exercise, LACR-02 was rejected with the alternative routes avoiding this impact.

- 3.4.63 The primary issues identified from the first Statutory Consultation exercise on the PEIR Assessment Boundary between Lyminster and Sullington Hill and the amendments presented at the second Statutory Consultation exercise in the PEIR SIR (RED, 2022) are summarised as follows:
- a residual significant effect on Warningcamp Hill to New Down LWS including loss of Habitats of Principal Importance (HPI) and also SDNP priority habitat. This would be a residual effect regardless of the additional TCs proposed with the crossings still requiring work within the LWS and concerns over the likely success of reinstatement.
 - additional TCs at the Warningcamp Hill to New Down LWS would be within Warningcamp Source Protection Zone (SPZ 2) with a local Southern Water abstraction point. This would present a risk to public water supply in the event of a pollution incident for example, drilling fluid break out.
 - damage and disturbance to Species of Principal Importance (SPI) as part of an existing large scale and long running agri-environmental scheme including breeding birds and invertebrates that would also require extensive mitigation and seasonal restrictions (March – July inclusive).
 - crossing multiple ANAs including approximately 3.2km of Wepham Down, Barpham Hill and Perry Hill with the potential for buried archaeological remains of high significance to be present. Extensive mitigation would be required for buried archaeological remains comprising a Napoleonic Barracks identified during trial trenching at Crossbush.
- 3.4.64 LACR-01a also involves work within Angmering SPZ 2. Though these works would be open cut as opposed to trenchless, the risk of pollution pathways via underlying karstic features between the A27 and Michelgrove was highlighted during engagement with Southern Water and reported at the second Statutory Consultation exercise in PEIR SIR (RED, 2022). Further field surveys including walkovers and targeted geophysical investigation survey informed a hydrogeological risk assessment (see [Appendix 26.4: Hydrogeological risk assessment, Volume 4](#) of the ES (Document Reference: 6.4.26.4) for details) which identified a lower risk than originally identified. When compared, the residual risk is higher on the PEIR Assessment Boundary where the trenchless crossing in the high groundwater table in SPZ 2 would be required.
- 3.4.65 The LACR-01a section of LACR-01 was identified as a preferred route to the PEIR Assessment Boundary (RED, 2021) on the basis of the lower risks to SPZ 2 for water environment. LACR-01a is largely arable fields and pasture with trenchless crossings avoiding ancient woodland and majority of woodland strips are avoided, as is the residual significant effect on the LWS.
- 3.4.66 The remaining sections of LACR-01 (LACR-01b, LACR-01c, and LACR-01d) were also subject to further analysis following the outcome of the third Statutory Consultation exercise. The primary considerations are outlined under the headings below:
- LACR-01b*
- Presence of release project for curlew (listed as Near Threatened in the IUCN Red List of Threatened Species) centred on Harrow Hill and funded

enlargement of a large scale and long running agri-environmental scheme which would result in potential impacts to SPI. Multiple consultation responses were received from statutory bodies and non-statutory bodies citing that this area should be avoided.

- Largest areas of HPI affected in terms of hedgerows crossed and area of calcareous grassland.
- Crossing multiple ANAs, including approximately 1.6km within the boundary of the ANA at Harrow Hill. This area has potential for the presence of buried archaeological remains of high significance.

LACR-01c

- Requirement for two additional TCs and associated potential for noise and overall a greater cable length than other options.
- Impacts on a rural shooting business.
- Lower numbers of SPI bird species than 1b and the greatest distance from the Harrow Hill curlew release project.
- Marginally lower impact on HPI than LACR-01b (hedgerows and calcareous grassland overall).
- Crossing ANAs, including approximately 500m of the ANA at Harrow Hill, and approximately 1.2km of the ANA at Black Patch Hill and Cock Hill. These areas have potential for the presence of buried archaeological remains of high significance.

LACR-01d

- Closer to the curlew release project than LACR-01c however a distance of more than 500m from the proposed DCO Order Limits would be maintained. Lower numbers of SPI bird species are expected compared to LACR-01b and LACR-01c due to lack of boundary features separating arable fields.
- Avoids rural shooting business with buffer of approximately 300m.
- Lower impact overall on HPI compared to LACR-01b and 1c with fewest hedgerow crossings. Grassland at Black Patch Hill is shown on the priority habitats inventory, however further survey showed this does not meet the necessary criteria.
- Crossing approximately 2.4km of the ANA at Black Patch Hill and Cock Hill with high potential for archaeological remains of high heritage significance. Multiple responses to the third Statutory Consultation exercise raised concern over the remains of high heritage significance.

3.4.67 Overall a combination of LACR-01a and LACR-01d was selected as the preferred route on the basis of the further analysis of the engineering, environmental, cost and land acquisition factors. LACR-01b was ruled out primarily on the basis of the potential impacts to the curlew release project and other SPIs. Both LACR-01c and LACR-01d include high potential for archaeological remains of high significance and both would be required to be subject to detailed evaluation and mitigation. On balance, LACR-01d was chosen when considering the overall additional onshore cable length, additional TCs and impacts to rural business

resulting from LACR-01c. For further information on the proposals for archaeological evaluation and mitigation please see **Chapter 25: Historic environment, Volume 2** of the ES (Document Reference: 6.2.25) and the **Outline Written Scheme of Investigation (WSI) (onshore)** (Document Reference: 7.9).

- 3.4.68 The ACRs, MRs, AAs, and TCs on the section of the PEIR Assessment Boundary replaced by LACR-01 were not taken forward following adoption of this route. Of the remaining areas assessed in the three Statutory Consultation exercises on the onshore cable route, the majority were adopted as summarised in **Table 3-8** aside from ACR-01 and associated changes.
- 3.4.69 ACR-01 was identified as an alternative following archaeological geophysical survey at Brook Barn Farm which identified the potential for buried archaeological remains of high significance. Subsequent archaeological trial trenching identified buried archaeological remains of low significance (see **Chapter 25 Historic environment, Volume 2** of the ES (Document Reference: 6.2.25) for further information). ACR-01 included additional engineering risks comprising crossing the rail lines twice, the additional cost of the associated TCs and the safety risk of a construction access required to use an at grade level crossing. On balance the additional engineering and safety risks were judged to outweigh the impacts to the buried archaeological remains.
- 3.4.70 Further minor changes to the proposed DCO Order Limits were made through targeted consultation with landowners to add passing places for HGVs at Michelgrove and to amend the limits at the interface with highways.

Summary

- 3.4.71 The initial options appraisals for landfall and overall cable route corridor are summarised in **Table 3-5**, which fed into the Scoping Report (RED, 2020). The alternatives and refinements considered between Scoping and Statutory Consultation are summarised in **Table 3-7**. The alternatives and refinements considered following the Statutory Consultation exercises are summarised in **Table 3-8**.
- 3.4.72 The chosen landfall and onshore cable route are described in **Chapter 4: Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

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Table 3-7 Onshore cable route options considered following first Statutory Consultation exercise

Location	Options considered and reason	Option(s) chosen
LACR-01a	Alternative onshore cable route to PEIR Assessment Boundary from Lyminster to Sullington Hill	Adopted – see section on Preferred options chosen following statutory consultation.
LACR-01b	Alternative onshore cable route to PEIR Assessment Boundary from Lyminster to Sullington Hill	Not adopted – see section on Preferred options chosen following statutory consultation.
LACR-01c	Alternative onshore cable route to PEIR Assessment Boundary from Lyminster to Sullington Hill	Not adopted – see section on Preferred options chosen following statutory consultation.
LACR-01d	Alternative onshore cable route to PEIR Assessment Boundary from Lyminster to Sullington Hill	Adopted – see section on Preferred options chosen following statutory consultation.
LACR-02	Alternative onshore cable route to PEIR Assessment Boundary from Lyminster to Sullington Hill	Not adopted – see section on Preferred options chosen following statutory consultation.
ACR-01	North-west of Littlehampton, to avoid areas where geophysical surveys have revealed potential archaeological finds.	Not adopted – see section on Preferred options chosen following statutory consultation.
ACR-02	North of Littlehampton, to avoid commercial agricultural interests, potential archaeological constraints and reduced section of cable route through flood zones.	This route was discounted following adoption of LACR-01. It is noted that ACR-02 followed a largely similar route to LACR-01.

Location	Options considered and reason	Option(s) chosen
ACR-03	East of Crossbush, to avoid underground utilities to the northern sections of Warningcamp C route option	Not adopted – this route was discounted following adoption of LACR-01.
ACR-04	South-east of Wepham, to provide options through this highly constrained area.	Not adopted – this route was discounted following adoption of LACR-01.
ACR-05	North-east of Burpham, to avoid impacts on an environmental stewardship project	Not adopted – this route was discounted following adoption of LACR-01.
ACR-06	South of Ashurst, to avoid impacts on a private nature conversation scheme and engineering constraints	Introduced at second Statutory Consultation exercise (RED, 2022). No new or different significant residual effects have been identified which alter the assessment outcomes and conclusions from the first Statutory Consultation exercise presented in the PEIR (RED, 2021). This ACR and associated trenchless crossings were preferred over the PEIR Assessment Boundary (RED, 2021) and are included in the proposed DCO Order Limits.
ACR-07	East of Bines Green to avoid new infrastructure with planning permission and in response to further engineering considerations	Introduced at second Statutory Consultation exercise (RED, 2022). No new or different significant residual effects have been identified which alter the assessment outcomes and conclusions presented in the PEIR (RED, 2021). This ACR and associated trenchless crossings were preferred over the PEIR Assessment Boundary (RED, 2021) and are included in the proposed DCO Order Limits.

Location	Options considered and reason	Option(s) chosen
Modified routes	14 modified routes along the cable route, designed to avoid constraints such as hedgerows, planning consents and agricultural fields, or provide flexibility for construction activities.	Introduced at second Statutory Consultation exercise (RED, 2022). The MRs do not change the overall assessment outcomes and conclusions outlined in the PEIR (RED, 2021). MRs 1, 2, and 6 to 14 were accepted and included in the proposed DCO Order Limits with other MRs were on the discounted section of the PEIR Assessment Boundary (RED, 2021).
Trenchless crossings	33 new or modified trenchless crossings along the onshore cable route to provide mitigation and avoid constraints and associated with the LACRs, ACRs and MRs.	Introduced at second Statutory Consultation exercise (RED, 2022). The TCs do not change the overall assessment outcomes and conclusions outlined in the PEIR (RED, 2021). The TCs associated with LACR-01, the adopted ACRs and MRs have been included in the proposed DCO Order Limits.
Alternative accesses	32 alternative temporary construction and permanent accesses (AAs) along the cable route associated with the LACRs, ACRs and MRs.	Introduced at second Statutory Consultation exercise. The adopted AAs associated with LACR-01, the adopted ACRs and MRs do not change the overall assessment outcomes and conclusions outlined in the PEIR (RED, 2021) and have been included in the proposed DCO Order Limits.

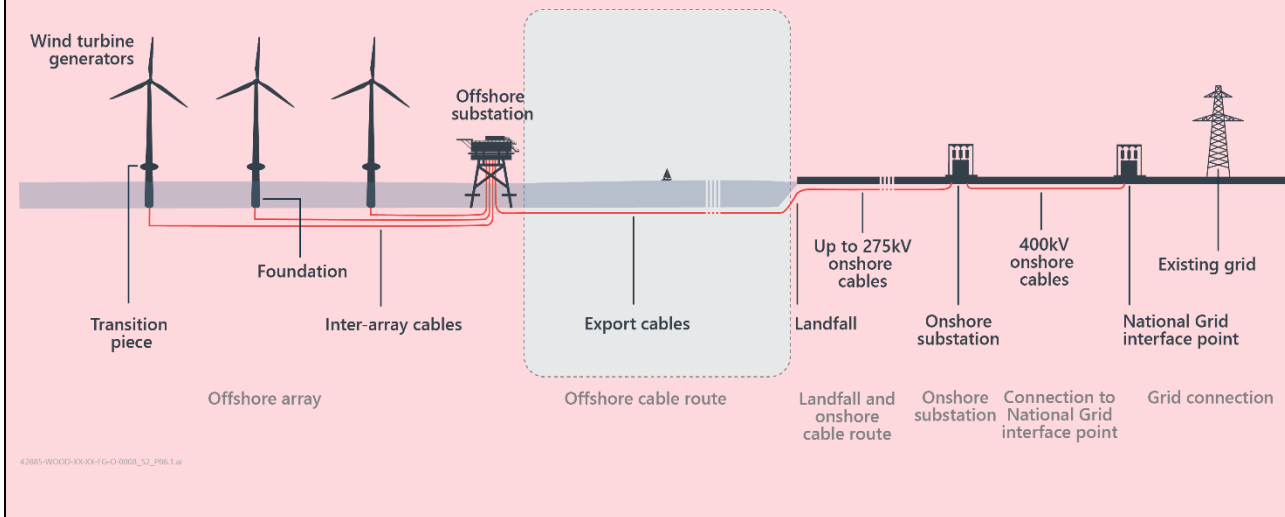
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3.5 Offshore cable route

This section describes the refinements to the offshore cable route, shown in **Graphic 3-7**, following the selection of the landfall at Climping.

- An initial export cable corridor was identified prior to scoping.
- Following scoping, and as constraints were identified, this area was refined and reduced in size to the export cable corridor area presented at the first Statutory Consultation exercise.
- Following the first Statutory Consultation exercise, and as further constraints were identified, the area was refined and reduced further to the export cable corridor area presented in this ES.

Graphic 3-7 Schematic showing offshore cable route



Offshore route selection prior to scoping

- 3.5.1 A broad offshore export cable corridor (ECC) was defined between the offshore wind farm search area and a landfall at Climping, West Sussex. The selection of the export cable corridor route, connecting the offshore wind farm to the onshore elements of Rampion 2, was primarily driven by the selection of the landfall site at Climping. The process by which Climping was identified as the proposed landfall point is set out in detail in **Section 3.4**. The selection of Climping was the culmination of feasibility work evaluating a number of possible grid connection, cable route corridor and landfall combinations.
- 3.5.2 In seeking the most appropriate route to link the offshore part of the Proposed Development with the onshore export cable route at Climping, a number of design principles have been applied to the offshore export cable corridor. These aim to minimise potential impacts associated with the installation and presence of the export cables and steer the decision-making process throughout. Initially these comprised:

- avoiding key sensitive features and marine protected areas where possible and where not, seeking to mitigate impacts; and
- identifying the shortest route as a preference for cable routing to minimise cost, construction timescales, and transmission losses.

3.5.3 These guiding principles have been applied alongside, and are compatible with, The Crown Estate's Cable Route Protocol (CRP) (The Crown Estate, 2019), which provides the overarching guidance and requirements for the identification of an appropriate and acceptable ECC.

3.5.4 The CRP (The Crown Estate, 2019) sets out principles and requirements for offshore wind developers in the planning of offshore export cable routes. Compliance with these principles and requirements has been secured within the offshore array Agreement for Lease (AfL) between RED and TCE. Compliance with these requirements must be demonstrated within the Corridor Identification and Approval for Linear Activities (CIAL) document which will accompany an Application to The Crown Estate for a transmission assets AfL. All the principles and requirements within the CRP are relevant to the site selection process, but of particular relevance are the following:

- **Principle 3:** This principle makes it clear that the “Cable Route Protocol applies specifically to Habitats Regulations Sites”, however it should be taken to include all other protected sites and sensitive habitats.
- **Requirement 9:** This requirement sets out what constraints must be mapped during the site selection process, namely: Habitats Regulations sites and features of these sites, areas of Annex I habitats and irreplaceable habitats. Requirement 9 also makes it clear that consultation with the relevant Statutory Nature Conservation Body should be undertaken at this stage.
- **Requirement 10:** This requirement makes it clear that design parameters of possible cabling infrastructure, including number and capacities of the export cables with their indicative spacing requirements and the additional structures, should be included within the site selection process.

3.5.5 Prior to Scoping, the consideration of the shortest route between the offshore wind farm area of search and the landfall point focused the ECC area of search on the northern boundary of Rampion 2 (see first image in [Figure 3.9, Volume 3](#) of the ES (Document Reference: 6.3.3)).

3.5.6 Engineering and environmental constraints were also considered in order to define the Scoping Boundary. This led to a focus on the western part of the Proposed Development area, west of the existing Rampion 1 footprint to avoid the need to cross the Rampion 1 export cables (see second image in [Figure 3.9, Volume 3](#) of the ES (Document Reference: 6.3.3)).

3.5.7 Care was also taken to ensure avoidance of other known constraints as the corridor was refined (see second image in [Figure 3.9, Volume 3](#) of the ES (Document Reference: 6.3.3)). These included:

- avoidance of Kingmere Marine Conservation Zone (MCZ) to the east of the export corridor; and

- avoidance of active aggregates extraction licence areas to the east of the export corridor.

Offshore refinement between Scoping and the first Statutory Consultation exercise

3.5.8 As described in **Paragraph 3.2.20**, the design refinement process delivering the offshore part of the PEIR Assessment Boundary (RED, 2021) was informed by two workshops which brought together technical engineering and environmental specialists. These led to further refinements of the offshore cable route, which were presented in the PEIR (RED, 2021) for the first Statutory Consultation exercise. These refinements are shown in the third image in **Figure 3.9, Volume 3** of the ES (Document Reference: 6.3.3), and comprised:

- avoidance of the SSSI designation at eastern part of landfall, ‘Climping Beach’; and
- removal of an area at the southwestern end of the ECC area of search, as this was no longer required from an engineering perspective.

Offshore refinement following first Statutory Consultation exercise (2021)

3.5.9 Following the first Statutory Consultation exercise, no further changes to the Export Cable Corridor boundary have been considered. However, a Cable Lay Study was carried out to explore micro-siting the cable within the offshore cable corridor to avoid sensitive features such as black bream nests (**In Principle Sensitive Features Site Integrity Plan** (Document Reference: 7.17)).

Summary

3.5.10 The evolution of the offshore cable route and the reason for refinements is summarised in **Table 3-8**. The chosen offshore cable route is described in **Chapter 4: Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

Table 3-8 Summary of alternatives considered

Location	Constraint	Refinement	Project stage
Export cable route	Rampion 1 export cables	Export cable corridor area of search reduced to the western part of the Proposed Development area, west of the existing Rampion 1 footprint to avoid cables.	Area reduced before Scoping
	Kingmere MCZ	Offshore cable route refined to avoid MCZ to	Boundary refined at Scoping.

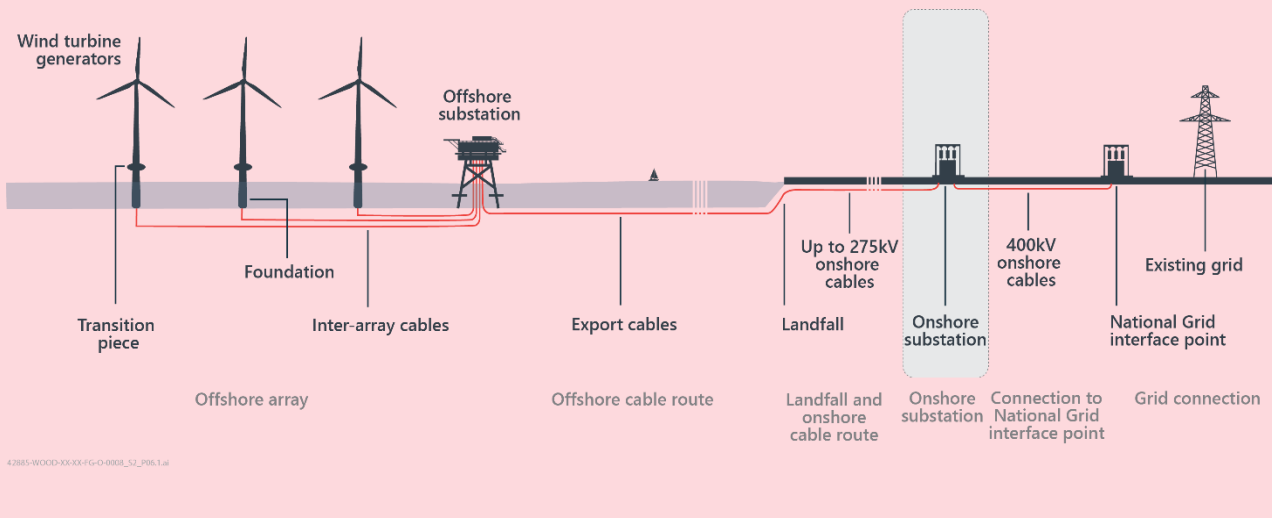
Location	Constraint	Refinement	Project stage
		the east of the export corridor.	
	Active aggregates extraction licence areas	Offshore cable route refined to avoid active aggregates extraction licence areas to the east of the export corridor.	Boundary refined at Scoping.
	SSSI designation at eastern part of landfall, 'Climping Beach'	Offshore cable route refined to avoid SSSI.	Boundary refined at first Statutory Consultation exercise (RED, 2021).
	Further refinements to the ECC area of search were made following scoping to remove area no longer required		Boundary refined at first Statutory Consultation exercise (RED, 2021).

3.6 New onshore substation identification

This section describes the options considered for the onshore substation location as shown in **Graphic 3-8**.

- Prior to Scoping, the existing National Grid Bolney substation was selected as the grid connection location, and the Scoping Boundary included a wide area around this location within which the new onshore substation would be located.
- Following Scoping, seven initial onshore substation locations were identified. A site selection process was carried out, and two options were presented at the first Statutory Consultation exercise. The onshore substation site selection process was carried out in parallel with the onshore cable route refinements (**Section 3.4**), which considered a number of onshore substation options.
- Following the first Statutory Consultation exercise, a further site selection process was undertaken, and the chosen onshore substation location was presented at the second Statutory Consultation exercise.
- There were no further changes to the onshore substation location following the second Statutory Consultation exercise.

Graphic 3-8 Schematic showing onshore substation



Onshore substation site selection prior to scoping

- 3.6.1 Prior to Scoping, the National Grid interface point location for Rampion 2 was confirmed to be National Grid's existing substation at Bolney in West Sussex (as described in **Section 3.3**⁴). In order to connect the transmission cable to the electricity network, a new onshore substation is required, which was identified to be located on land in proximity (up to circa 5km) to the existing National Grid

⁴ Although the uncertainty about the Little Horsted substation coming forward has reduced following the Scoping stage, the option would still be considered to not provide the certainty required to provide a viable connection for the Proposed Development (see **Paragraph 3.4.21**). Therefore, it was not considered again as an alternative.

Bolney substation. The Scoping Boundary therefore covered an area approximately 5.7km wide near the existing National Grid Bolney substation as a preferred location had not yet been identified at Scoping stage.

Onshore substation search area refinement between Scoping and the first Statutory Consultation exercise

Initial onshore substation search areas

- 3.6.2 Following the Scoping stage, more detailed site selection work was undertaken to appraise seven onshore substation search area options within the Scoping Boundary. These seven sites are shown on [Figure 3.10a, Volume 3](#) (Document Reference: 6.3.3). The following high-level guiding principles guided the initial identification of suitable sites:
- to be located within the Scoping Boundary and within 5km of the National Grid interface point location at the existing National Grid Bolney substation (see [paragraph 3.6.3](#));
 - avoid key sensitive features where possible by the early adoption of commitments outlined in the [Commitments Register](#) (Document Reference: 7.22) and set out in [Table 3-11](#) such as C-6, C-20, C-43, and C-75;
 - minimise disruption to sensitive features where possible by the early adoption of commitments outlined in the [Commitments Register](#) (Document Reference: 7.22) and set out in [Table 3-11](#) such as C-5, C-6, C-43, and C-20;
 - avoid residential properties, and consider proximity to residential properties and other sensitive land uses as far as possible; and
 - to have access from a suitable public highway.
- 3.6.3 In order to meet National Grid Code reactive power requirements, dynamic compensation electrical equipment should be installed ideally as close to the grid connection point as possible. As the distance from this equipment to the connection point increases, the size of the required compensation equipment also increases. This can have implications on National Grid's speed of response requirements. For these reasons a workable distance of 5km was determined from which to base the onshore substation search areas.
- 3.6.4 Onshore substation search area refinement workshops interrogated technical, environmental and land ownership issues at each of the seven sites, incorporating a review of stakeholder concerns to appraise and reduce the number of options. The seven sites were:
- Eight Acres Shaw;
 - Frylands;
 - Snake Harbour;
 - Star Road;
 - Wineham Lane South;

- Wineham Lane North; and
- Bolney Road/Kent Street.

3.6.5 Following further design work, three of these onshore substation search areas were discounted: Eight Acres Shaw, Frylands, and Snake Harbour (see **Figure 3.10a, Volume 3** of the ES (Document Reference: 6.3.3)). It was identified that an area of approximately 9ha is required to site the onshore substation, including areas for temporary construction, permanent infrastructure, and embedded environmental measures. The area available at these sites was insufficient, in combination with environmental constraints including planning issues, visual impacts and proximity to residential properties (see **Table 3-9**).

Appraisal of potential onshore substation search areas

3.6.6 A comparative analysis exercise was performed on the four remaining onshore substation search area options to facilitate a clear and robust approach to reducing the number of options considered in the PEIR (RED, 2021) for the first Statutory Consultation exercise. This exercise was informed by:

- a review of environmental constraints mapping, and any information provided by EIA surveys undertaken;
- stakeholder consultation with relevant Local Planning Authorities (LPAs), the SDNPA and Natural England to understand potential concerns and risks;
- a review of land ownership and ongoing engagement with landowners; and
- a technical site survey to confirm suitability.

3.6.7 As a result of this exercise one further substation search area (Star Road) was discounted from any further consideration in the PEIR (RED, 2021). This is adjacent to an industrial estate in the village of Partridge Green (**Figure 3.10a, Volume 3** of the ES (Document Reference: 6.3.3)).

3.6.8 On balance the Star Road substation search area option had the most environmental constraints when compared with the other onshore substation search areas, related to PRowS, longer construction traffic routes, flood risk, potential ground contamination, grazing marsh and adjacent to ancient woodland (priority habitats). When considering the configuration of permanent and temporary work areas within the remaining developable area of the onshore substation search area, it was considered to be too small.

3.6.9 Therefore, Star Road was discounted prior to the non-statutory consultation exercise and was not presented for consideration as part of the non-statutory consultation (see **Table 3-9**).

Non-statutory consultation

3.6.10 RED carried out a non-statutory consultation exercise from 14 January 2021 to 11 February 2021. This was a virtual exhibition to raise awareness of the Proposed Development, the development process, and share information on the emerging design process inviting feedback from stakeholders. At this point in the design evolution process, three onshore substation options remained (Wineham Lane

South, Wineham Lane North, and Bolney Lane/Kent Street), and these were presented during this consultation exercise.

- 3.6.11 Wineham Lane South onshore substation search area was located on greenfield land immediately south of Bob Lane, to the south of the existing National Grid Bolney substation (see **Figure 3.10a, Volume 3** of the ES (Document Reference: 6.3.3). Access would be from Wineham Lane. Constraints associated with this onshore substation search area option include its close proximity to Ancient Woodland which borders the east of the area, and its proximity to a Grade II listed building. This option was less than 50m from the Royal Oak pub and residential properties on Wineham Lane, so there would be potential for socio-economic impacts and disturbance to residents.
- 3.6.12 As a result of non-statutory consultation feedback and the proximity to sensitive receptors, Wineham Lane South onshore substation search area was removed from the PEIR Assessment Boundary (RED, 2021).
- 3.6.13 Bolney Road/Kent Street onshore substation search area option was located to the east of Cowfold Village (see **Figure 3.10b, Volume 3** of the ES (Document Reference: 6.3.3) on greenfield land adjacent to an industrial estate. Constraints associated with this onshore substation search area option include its proximity to Oakendene Manor Grade II listed building, proximity to the High Weald Area of Outstanding Natural Beauty (AONB) and nearby residential properties. It was also the furthest onshore substation option from the National Grid interface point at Bolney. Access to the site would be directly from the A272.
- 3.6.14 Bolney Road/Kent Street substation search area was retained within the PEIR Assessment Boundary considered in the PEIR (RED, 2021) and presented as part of the first Statutory Consultation exercise in July 2021 (subsequently reopened in February 2022). This was to allow the collection of further environmental baseline information and feedback from consultees.
- 3.6.15 Wineham Lane North onshore substation search area is located immediately to the north of the existing National Grid Bolney substation (see **Figure 3.10b, Volume 3** of the ES (Document Reference: 6.3.3) on greenfield land. Access would be from Wineham Lane. Constraints associated with this onshore substation search area option include its close proximity to Ancient Woodland which borders the north of the area, and proximity to nearby residential properties.
- 3.6.16 The onshore cable corridor to this onshore substation option crosses an area that has planning consent to develop a solar farm. An amendment to the onshore cable corridor would need to be considered to avoid this area. A footpath runs through this site, although there would be potential to reroute the footpath.
- 3.6.17 Wineham Lane North onshore substation search area was retained within the PEIR Assessment Boundary considered in the PEIR (RED, 2021) and presented in the first Statutory Consultation exercise in July 2021. This was to allow the collection of further environmental baseline information and feedback from consultees.

Onshore substation site selection between the first Statutory Consultation exercise and the second Statutory Consultation exercise

Overview

3.6.18 Two onshore substation search areas (Bolney Road/Kent Street and Wineham Lane North) were assessed in the PEIR and presented in the first Statutory Consultation exercise in July 2021 (RED, 2021). In July 2022, RED announced that the preferred site was in the Bolney Road/Kent Street area, now referred to as 'Oakendene'. The removal of the Wineham Lane North onshore substation option was stated in the PEIR SIR (RED, 2022) and presented in the second Statutory Consultation exercise, but the site selection process was not described as this report focused on new alternatives and modifications to the Rampion 2 onshore part of the original PEIR Assessment Boundary (RED, 2021). The following sections provide further information on the background to the site selection and associated cable routes.

Onshore cable routes into onshore substation sites

3.6.19 The PEIR Assessment Boundary (RED, 2021) included space for several onshore cable routes options into and out of the onshore substation search areas. These options are summarised in **Figure 3.11, Volume 3** of the ES (Document Reference: 6.3.3) and were evaluated as part of the site selection process following the first Statutory Consultation exercise. This process compared the two options at each substation, and provided a recommendation for the best cable option for each substation location. A summary of the onshore cable options evaluation is provided below and in **Section 3.7**. An option evaluation was then carried out for each of the onshore substation locations with its associated best onshore cable route.

3.6.20 The two options considered for connection to Wineham Lane North were Option 1A, which is 3.7km in length and required one trenchless crossing, and Option 1B which is 3.9km in length and also required one trenchless crossing. The results of the BRAG appraisal were:

- *Engineering feasibility*: both options are similar.
- *Environmental*: both options are similar in terms of environmental constraints, but a marginal preference for 1A due to lower number of significant hedgerow crossings and a reduced loss calculated in biodiversity units.
- *Directly affected land interests*: both are similar.
- *Cost*: both options are similar, but a marginal preference for 1A due to a shorter route.

3.6.21 Therefore, Option 1A was recommended as the best onshore cable route for Wineham Lane North Substation.

3.6.22 The two cable route options associated with connection to Oakendene related to the cable routes from the onshore substation to the existing National Grid Bolney substation. The options appraisal is summarised in **Section 3.7 - Connection to the existing National Grid interface point**. Option 1D was recommended as the

best onshore cable route for Oakendene Substation, and was considered as part of the substation options appraisal.

Onshore substation sites

- 3.6.23 Wineham Lane North and cable route 1A was compared to Oakendene and cable route 1D. The results of the BRAG appraisal were:
- **Engineering feasibility:** Oakendene is the preferred option due to better access and a larger site. This means there is greater flexibility to adjust siting within the substation area in response to any new constraints that are identified. The marginal preference reported at the first Statutory Consultation exercise has been revised to a stronger preference based on improved knowledge of the sites and in response to stakeholder feedback.
 - **Environmental:** Both locations had equal BRAG with residual risks recorded for both sites. These included:
 - ▶ the potential landscape and visual impacts (arising at both sites) and impacts to the historic setting of the Grade II listed Oakendene Manor for Oakendene.
 - ▶ the contribution of the existing National Grid Bolney substation and Rampion 1 substation to the noise environment in the area of Wineham Lane North was judged to be likely to lead to the need for extensive mitigation including restrictions on layout, requirements for screening affecting availability of space and stringent restrictions on plant choice in relation to sound power levels.
 - ▶ construction traffic and access management restrictions from Wineham Lane at the Wineham Lane North site.
 - ▶ surface water drainage requirements at both sites.
 - ▶ physical space availability restricting the development of mitigation strategies including those for landscape and drainage at the Wineham Lane North site.
 - **Directly affected land interests:** Although red ratings were recorded for both options, due to potential development on or near both sites, Oakendene is the preferred option. Two proposed schemes at the Wineham Lane North site (with the support of the landowners) had been subject to EIA screening requests during site selection, with one of these schemes having submitted a planning application in March 2023. It should be noted that both sites have conflicting development proposals at different stages of maturity and either site may require Compulsory Acquisition if a bilateral deal cannot be concluded with the landowners.
 - **Cost:** Oakendene is the preferred option from a commercial perspective, based on the land interests described above.
- 3.6.24 Although not assessed in a BRAG appraisal, health and safety constraints were also considered. The Wineham Lane North site would entail greater construction risks in terms of necessity to work at height due to topography, and the area is more constrained by existing utilities with an increased risk of cable strikes due to

the proximity to the substation. However, there is a potentially elevated risk of pollution spill to watercourses at Oakendene due to more extensive ditch network crossing the work area. On balance, there is a marginal preference for the Oakendene site.

- 3.6.25 On balance, the Oakendene site was selected and is included in the proposed DCO Order Limits. Oakendene was preferred in terms of engineering and land interests. While both sites have residual environmental constraints as identified above, the combination of physical engineering space constraints and the residual risks associated with these led to a marginal preference for Oakendene. The site selection stage identified the need for further outline design development of embedded environmental measures, further information is provided in the **Design and Access Statement** (Document Reference: 5.8) and the design principles therein.

Summary

- 3.6.26 **Table 3-9** provides a summary of the onshore substation options considered. The chosen onshore substation location is described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

Table 3-9 Summary of onshore substation alternatives considered

Location	Constraint	Project stage
Eight Acres Shaw	Within an area being promoted within the Draft Local Plan for Horsham for development of a new town (Mayfield). Too small to accommodate the permanent substation area and construction laydown area (4.9ha).	Considered at Scoping stage but discounted prior to non-statutory consultation
Frylands	Too small to accommodate the permanent substation area and construction laydown area (3.3ha). Cannot be expanded in size due to existing properties to the north, west and south and overhead 400kV lines to the east Frylands Farm immediately to the south, has direct close-range views across the site.	Considered at Scoping stage but discounted prior to non-statutory consultation
Snake Harbour	Too small for the permanent substation area and construction laydown area (4.1ha). Cannot be expanded in size due to the close proximity of existing properties. Open views from Snake Harbour House to the immediate west and Snake Harbour Farm to the north.	Considered at Scoping stage but discounted prior to non-statutory consultation
Star Lane	Located in a floodplain, within Flood Zone 3.	Considered at Scoping stage but discounted

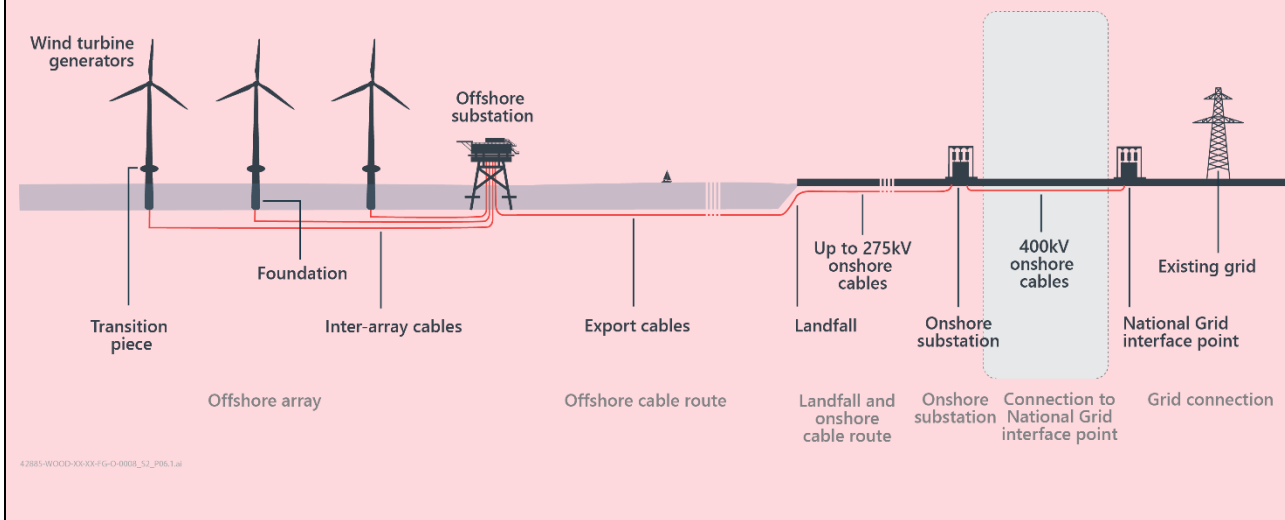
Location	Constraint	Project stage
	<p>Further from construction traffic routes than other options. Crossed by several PRow. Potential for existing ground contamination from sewage works. On grazing marsh, and adjacent to ancient woodland, both of which are priority habitats. Taking account of the above constraints, the developable area is too small.</p>	<p>prior to non-statutory consultation.</p>
<p>Wineham Lane South</p>	<p>Proximity to ancient woodland. Proximity to Grade II listed building. Proximity to Royal Oak pub and residential properties on Wineham Lane. Feedback from local residents requesting this option is removed. Planning applications for commercial developments on part of site.</p>	<p>Considered as a potential location at Scoping and non-statutory consultation, then discounted prior to PEIR and not presented in the first Statutory Consultation exercise.</p>
<p>Wineham Lane North</p>	<p>Proximity to ancient woodland. Proximity to nearby properties. Cable corridor initially considered crosses an area covered by a planning consent. Crossed by PRow.</p>	<p>Considered as a potential location at Scoping, non-statutory consultation, and first Statutory Consultation exercise, then discounted prior to second Statutory Consultation exercise.</p>
<p>Oakendene, previously named Bolney Road/Kent Street</p>	<p>Proximity to Oakendene Manor Grade II listed building and nearby residential properties. Proximity to the High Weald AONB. Furthest substation option from the grid connection point at Bolney.</p>	<p>Considered as a potential location at Scoping, non-statutory consultation, and first Statutory Consultation exercise. Selected as substation location following this and included in second Statutory Consultation exercise.</p>

3.7 Connection to the existing National Grid interface point

This section describes the options considered for the cable route to the existing National Grid substation at Bolney, see **Graphic 3-9**.

- Following Scoping, and the refinement of onshore substation options to two locations (Oakendene and Wineham Lane North), two potential onshore cable routes for the 400kV cables from Bolney Road/Kent Street were identified.
- Following the first Statutory Consultation exercise, an options appraisal process was carried out on the two onshore cable route options in parallel to the substation site selection process. The selected onshore cable route is presented in this ES.

Graphic 3-9 Schematic showing onshore cable route



Route selection prior to first Statutory Consultation exercise

- 3.7.1 The first Statutory Consultation exercise presented two potential new onshore substation locations in the PEIR (RED, 2021), Bolney Road/Kent Street and Wineham Lane North. Wineham Lane North is adjacent to the existing National Grid Bolney substation, so onshore cable routes from this option were not considered further.
- 3.7.2 Two potential onshore cable routes for the 400kV cables from Bolney Road/Kent Street substation search area were included in the PEIR Assessment Boundary (RED, 2021) (see **Figure 3.12, Volume 3** of the ES (Document Reference: 6.3.3)). An initial BRAG appraisal of the two onshore cable route options found no overall preference from an environmental, engineering, or other perspective, so both were included in the PEIR Assessment Boundary (RED, 2021).

Route selection between the first and second Statutory Consultation exercises

- 3.7.3 Following the first Statutory Consultation exercise in July 2021 (reopened in February 2022), a further BRAG options appraisal was carried out on the cable routes to the existing National Grid Bolney substation. The two options considered for connection to Oakendene (previously named Bolney Road/Kent Street) were Option 1C, which is 5.4km in length and required one trenchless crossing, and Option 1D which is 5.5km in length and also required one trenchless crossing. The results of the BRAG appraisal were:
- *Engineering feasibility:* based on the evaluation of the newly available substation layout and further examination of constraints, 1C was not considered to be technically feasible due to extremely limited space for the entry and exit point of cables. Option 1D was therefore recommended as this is the only technically feasible option.
 - *Environmental, directly affected land interests, cost:* 1D is accepted as only technically feasible option as no further black ratings were identified for either option from an environmental, directly affected land interest or cost point of view.
- 3.7.4 Therefore, Option 1D was recommended as the best cable route between the onshore substation and the National Grid Bolney substation and included in the proposed DCO Order Limits.

Summary

- 3.7.5 The alternatives considered for cable routes from the new onshore substation to the existing National Grid Bolney substation are summarised in **Table 3-10**. The chosen connection to the existing substation is described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

Table 3-10 Summary of onshore substation cable route alternatives considered

Route option	Constraint	Project stage
Oakendene (previously named Bolney Road / Kent Street) 1C	Proximity to ancient woodland. On a hill, so potential for visual impacts Adjacent to planning application for a solar photovoltaic farm. Proximity to residential properties. Found to be not technically feasible following first Statutory Consultation exercise.	Included in the PEIR Assessment Boundary (RED, 2021), but discounted following the second Statutory Consultation exercise.
Oakendene (previously named Bolney Road / Kent Street) 1D	Proximity to ancient woodland. Adjacent to a planning application for a solar photovoltaic farm.	Included in the PEIR Assessment Boundary (RED, 2021), and

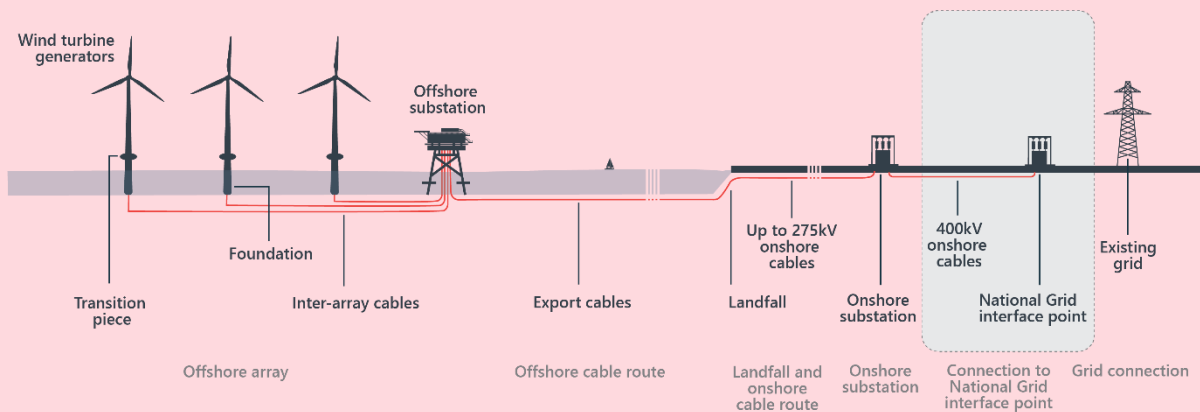
Route option	Constraint	Project stage
	Additional watercourse crossings/surface water flood risk compared to option 1C. Proximity to residential properties at Southfields Farm and Oakfield Farm.	selected as cable route for inclusion in proposed DCO Order Limits

3.8 National Grid Bolney substation extension

This section describes the options considered for the extension to the existing National Grid substation at Bolney, see **Graphic 3-10**.

- Following the first Statutory Consultation exercise and through the design evolution process, new infrastructure at the existing National Grid Bolney substation was identified. It was decided to incorporate the extension works required into the DCO Application to ensure grid connection availability upon completion of the Rampion 2 construction.
- The fourth Statutory Consultation exercise considered two options for the National Grid substation extension at Bolney. The final choice of infrastructure required at the substation is determined by National Grid Electricity Transmission, therefore both options have been retained in this ES.

Graphic 3-10 Schematic showing National Grid substation extension



National Grid Bolney substation extension site refinement included within the fourth Statutory Consultation exercise

3.8.1 The first Statutory Consultation exercise (RED, 2021) included a buried cable connection required from the proposed onshore substation to the existing National Grid Bolney substation as the National Grid interface point. However, the first Statutory Consultation exercise did not include any extension works to the existing National Grid Bolney substation as it was anticipated that this would be included

within a separate planning application, therefore not required in the Rampion 2 DCO Application.

- 3.8.2 Through the design evolution process and further discussions with National Grid, new infrastructure and extension works required at the existing National Grid Bolney substation to connect the Rampion 2 onshore cable route to the existing National Grid network (**Figure 3.13, Volume 3** of the ES (Document Reference: 6.3.3)) was to be incorporated into the DCO Application to ensure grid connection is available immediately upon completion of Rampion 2.
- 3.8.3 Two potential types of infrastructure were considered for the National Grid Bolney substation extension in the fourth Statutory Consultation exercise: Air Insulated Switchgear (AIS); or Gas Insulated Switchgear (GIS) (RED, 2023b) (see **Figure 3.13, Volume 3** of the ES (Document Reference: 6.3.3)). Only one of the Bolney substation extension options (AIS or GIS) will be required in the final Proposed Development.
- 3.8.4 The responses to the fourth Statutory Consultation identified no key issues arising that would lead to amendment of the details that were consulted on. The final choice of infrastructure and its design will be determined by National Grid Electricity Transmission therefore both AIS and GIS options have been considered and are described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

3.9 Alternative technologies

Alternative approaches to the Proposed Development

- 3.9.1 A number of high-level alternative approaches to the Proposed Development have been suggested by stakeholders. These have not been considered as reasonable alternatives in the design evolution for the reasons summarised below:
- use of an offshore ring main or transmission grid: consideration of this sort of solution is reliant on other projects being in the vicinity. Currently there are no further offshore wind projects being proposed for the South Coast.
 - Connection into the distribution network at Shoreham: This has not been considered as an alternative as this substation does not have capacity to accommodate the 1,200MW planned to be exported by Rampion 2, and much of the existing export capability of the distribution network is taken by the Shoreham power station.
 - Use the existing Rampion 1 export cables: this is not feasible as these export cables were specifically sized for Rampion 1 only and cannot export beyond the existing 400MW capacity.
 - Use of overhead power lines: although overhead power lines are cheaper than underground cables, overhead power lines are considered to have a higher environmental impact, particularly with regard to visual impact. To reduce environmental impacts, all offshore wind farms built in the UK have used underground cable to interface with the National Grid. The draft NPS EN-5 also sets out a general presumption in favour of undergrounding electricity cabling

in sensitive landscapes such as National Parks, which is a key element of the design of the Proposed Development to minimise impacts.

Offshore

WTG foundations

- 3.9.2 The following alternative offshore foundation types were initially considered for the Rampion 2 WTG foundations, in addition to monopiles and multi-leg (jacket or tripod) foundations:
- gravity base; and
 - mono suction bucket foundations.
- 3.9.3 Brief explanations are provided below as to why these were not taken further in the development of Rampion 2 and hence are not assessed for EIA purposes.
- 3.9.4 Gravity Base foundations are ballasted concrete foundations that sit on the seabed. The stability of these foundations is provided by the overall size and dead weight of the foundation, which is required to resist all the anticipated WTG loads and metocean forces. As a consequence, the foundations tend to be very large and expensive to manufacture onshore, transport to the offshore site and install on a pre-prepared seabed. Gravity foundations also occupy a large footprint on the seabed, so the environmental impact on the seabed and obstruction in the water column is much greater than other types of foundation.
- 3.9.5 Gravity foundations were considered for Rampion 1 at the EIA stage but were subsequently ruled out due the ground conditions being very variable and unsuitable for this type of foundation. Similar variable ground conditions are known to exist on Rampion 2. Due to the ground conditions and the environmental issues they have not been considered further for Rampion 2.
- 3.9.6 A mono suction bucket foundation is a large single open-bottom steel caisson (upturned bucket), which is attached to a tubular column that supports the WTG. During installation, the caisson is drawn into the seabed by creating a negative pressure in the void between the caisson and the seabed. Many demonstration projects have been undertaken to-date in the offshore wind industry. Most have encountered difficulties during installation. Hence the technology is not considered mature enough and carries too much risk for it to be considered as a suitable foundation solution for Rampion 2.
- 3.9.7 Despite the issues with mono suction bucket foundations, smaller suction buckets have been successfully deployed at the base of multi-leg foundations, in lieu of pin piles. Therefore, the option for multi-leg foundations with suction bucket has been retained for assessment and further consideration for Rampion 2.
- 3.9.8 Due to these constraints with gravity base and mono suction bucket foundations, only monopile and multi-leg foundations have been considered for Rampion 2. These options are described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

Export Cables

- 3.9.9 The following types of export cable were initially considered:
- High Voltage Direct Current (HVDC);
 - 400 kV High Voltage Alternating Current (HVAC); and
 - Up to 275kV HVAC.
- 3.9.10 Brief explanations are provided below as to why HVDC and 400kV HVAC were not taken further in the development of Rampion 2 and hence are not assessed for EIA purposes.
- 3.9.11 A HVDC connection was discounted on the following basis:
- The offshore array area within which the 1,200MW capacity for Rampion 2 is proposed to be installed includes a degree of separation east to west with a substantial distance between the two clusters of WTGs. A single point HVDC connection between the landfall and an offshore substation situated in the western part of the Array Area would result in long array cable lengths being required between the eastern portion of the Array Area WTGs and the substation, which would have a significant impact on costs.
 - HVDC is generally considered for export cable circuit lengths of greater than 100km which is approximately where the economic balance point is between HVDC and HVAC. The Rampion 2 export circuit length is significantly less than this threshold point.
- 3.9.12 HVAC was therefore chosen as the most economical means of connecting Rampion 2. A maximum of 275kV is considered, however this voltage may be reduced depending on the final configuration of the wind farm.
- 3.9.13 The alternative solution between a HVDC and a 275kV AC connection is 400kV AC. The circuit length is an issue for 400kV as the cable capacitance at this voltage power limits the ability to export power and leads to significant voltage rise. These factors in turn lead to the requirement for additional electrical equipment (both onshore and offshore) at significant additional cost therefore this was discounted.

Alternative landfall techniques

- 3.9.14 Cable landfalls can be accomplished through different methods depending on technical, environmental, social and economic considerations at a landfall site. The landfall construction methods for cable installation are typically:
- open cut;
 - HDD; or
 - a combination of both.
- 3.9.15 Under the open cut method, a trench is excavated on the beach, similar to the onshore cable route, the cables are installed, and the trench is backfilled. The trench can be divided into two sections; the onshore section, which can be

undertaken by land-based equipment and the offshore section which has to be undertaken by offshore specialist dredging/trenching equipment.

- 3.9.16 Open cut methodology can be disruptive from an environment and social perspective. Constraints to using open cut are listed below:
- close proximity to third party buildings;
 - environmentally sensitive ground that cannot be disturbed;
 - multiple obstructions that need to be crossed (roads, railways, canals, ditches) which cannot be disrupted during construction;
 - flood defences that cannot be disturbed; and
 - public access to the beach, as this will be restricted during installation.
- 3.9.17 HDD is a method of installing cables, in areas that cannot be open cut due to technical, environmental, or social considerations. The HDD technique involves drilling a hole through the ground between two points and installing a duct through which the cable will be installed, one of which is planned to be below mean low water springs (MLWS) for the construction of the landfall.
- 3.9.18 Due to the sensitive nature of the beach and natural flood defences, HDD has been selected for construction of the landfall and this is secured in the [draft DCO](#) (Document Reference: 3.1) Schedule 1, the Authorised Development. This will provide the best solution from an environmental perspective and also has the benefit of the beach remaining open to the general public during the construction activities.

Onshore

Alternative trenchless crossing techniques

- 3.9.19 RED has committed to use trenchless crossings for main watercourses, railways and roads that form part of the Strategic Highways Network (see C-5 in **Table 3-11**). There are several trenchless techniques that can be employed for these types of crossings. These non-open cut crossing methods include auger boring, HDD, pipe-jacking, and microtunnelling. In general, trenchless crossings are constructed at a minimum depth of 2m below roads, 5m below railways and 10m under major rivers.
- 3.9.20 The auger bore crossing technique may be used for non-major highway crossings, ditch crossings, minor river, and canal crossings, up to 100m in length. Ground conditions dictate where this technique can be best utilised. The technique is implemented in two forms, guided and non-guided. The preference would be using a guided auger bore in order to maintain accuracy over the crossing alignment. This technique requires that a launch pit and a smaller receiver pit are excavated either side of the crossing. Rails are installed on the floor of the launch pit for the auger boring machine to run on. The auger boring machine is lowered on to the rails and bores under the crossing to the receiver pit.
- 3.9.21 The HDD crossing technique is generally used for long crossings such as rivers and multiple crossings where trenching or open excavation is not feasible,

practical or the environmental and/or social impact is too high. This technique involves excavating shallow entry and exit pits either side of the crossing, then a drill rig bores under the crossing to emerge at a target point on the opposite side. The HDD crossing technique provides a good degree of accuracy.

- 3.9.22 Pipe-jacking uses a hydraulic ram or jack to thrust an open-ended pipe under the crossing. The soil is removed as the pipe is thrust forward. Closed face, unmanned operations are the preferred methods; manned excavations are avoided as far as possible.
- 3.9.23 Commonly the microtunnel crossing technique is used to cross infrastructure such as railway lines, major rivers, and motorways. This technique involves sinking a shaft either side of a crossing, lowering a microtunnelling machine into the shaft to create a tunnel and removing material on a conveyor. This performs well in a variety of ground conditions and gives the best guarantee of little or no settlement. This method requires additional temporary land take compared to HDD for launch and reception pits and to accommodate associated equipment.
- 3.9.24 The selection of the crossing methodology for installing a cable duct across natural or built infrastructure such as watercourses, roads and railways has considered various key technical, commercial, schedule and environmental aspects. These include:
- restrictions such as the ability of the installation contractor to avoid disturbing the surface of the natural obstacle or built infrastructure;
 - disruption and disturbance due to road closures and noise;
 - loss of or disturbance to environmentally sensitive areas such as protected or sensitive habitats, community facilities such as sports grounds, designated sites, and buried archaeology;
 - schedule constraints;
 - economics of crossing methodology;
 - owner's requirements of the natural and built infrastructure; and
 - local government restrictions.
- 3.9.25 Taking these aspects into consideration, where an open cut methodology is not feasible or practical, HDD is the preferred trenchless crossing method for the Proposed Development, subject to the specific requirements of the crossing/infrastructure owner. This is due to the HDD methodology providing the longest available crossing length and a lower cost compared to the alternatives for longer crossings. The detailed methodology and design of the trenchless crossings will be determined following site investigation and confirmed within detailed stage specific Onshore Construction Method Statements including confirmation that there are no new or materially different environmental effects arising compared to those assessed in the ES.

3.10 Commitments Register

- 3.10.1 As part of the EIA process, RED created a Commitments Register at the Scoping stage. This was initially presented in the Scoping Report (RED, 2020), and subsequently updated in the Statutory Consultation exercises (first to fourth: PEIR (RED, 2021), PEIR SIR (RED, 2022), PEIR FSIR (RED, 2023a), and PEI (RED, 2023b)), and has been further updated at the ES stage as the design evolved and more information became available. The register identifies environmental measures that RED has implemented as part of the Proposed Development and that have been embedded into design. The commitments that are relevant to individual aspect assessments are outlined in **Chapters 6: Coastal processes, Volume 2** to **Chapter 29: Climate change, Volume 2** (Document References: 6.2.6 to 6.2.29) and is presented in full in the **Commitments Register** (Document Reference: 7.22).
- 3.10.2 The **Commitments Register** (Document Reference: 7.22) contains a range of embedded environmental measures including proposed avoidance measures which were informed by the design evolution process, best practice commitments which were adopted as part of the Rampion 1 project, and/or are considered to be sectoral practices and procedures for NSIPs and in particular offshore wind farm development. An example is at sensitive crossing locations the construction working width was reduced as far as practicable. Several commitments informed the design evolution through avoidance of sensitive receptors where possible, or through commitments to use techniques such as trenchless crossings to reduce impact on sensitive receptors. Those that are applicable to site selection and consideration of alternatives are set out in **Table 3-11**.

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Table 3-11 Relevant embedded environmental measures to design evolution

ID	Environmental measure proposed
C-1	The onshore cable route will be completely buried underground for its entire length where practicable .
C-5	<u>Trenchless crossings will be provided for features where identified in Appendix A - Crossing Schedule of the Outline Code of Construction Practice. Main rivers, watercourses, railways and roads that form part of the Strategic Highways Network will be crossed by Horizontal Directional Drill (HDD) or other trenchless technology where this represents the best environment solution and is financially and technically feasible (see C-17).</u>
C-6	Where practical, sensitive sites will be avoided by the temporary and permanent onshore project footprint including SSSIs, Local Nature Reserves, Local Wildlife Sites, ancient woodland, areas of consented development, areas of historical and authorised landfill and other known areas of potential contamination, National Trust Land, Listed Buildings, Scheduled monuments, and mineral resources (including existing mineral sites, minerals sites allocated in development plans and mineral safeguarding areas).
C-10	No blasting is anticipated to be required and trenchless crossings will be undertaken by non-impact methods.
C-17	<u>Where trenchless techniques are not required or are not practical, Trenchless crossing of watercourses will be provided in accordance with Appendix A Crossing schedule of the Outline Code of Construction Practice. Where watercourses are shown in the Crossing schedule to be crossed by may be crossed by</u> open cut techniques (with flows overpumped around the working area), appropriate environmental permits or land drainage consents will be applied for works from the Environment Agency (e.g. for Main Rivers, works on or near sea defences/flood defence structures or in a flood plain) or from the Lead Local Flood Authority (LLFA) (for Ordinary Watercourse crossings) (see C-5) .
C-20	The typical construction working area will be 40m along the onshore cable corridor to minimise the construction footprint. At other discrete locations this may be expanded to accommodate working area for example for Horizontal Directional Drilling (HDD).

ID	Environmental measure proposed
C-37	<p>The maximum blade tip height is <u>will be</u> 325m from lowest astronomical tide (LAT) and <u>the maximum</u> rotor diameter of <u>will be</u> 295m.</p>
C-38	<p>The selection of the foundation type will primarily be based upon the site conditions combined with the wind turbine generator (WTG) that is selected. The following foundation types are being considered: Monopile and Multi-leg.</p>
C-40	<p>There will be up to three offshore substations installed to serve the Proposed Development. The exact locations, design and visual appearance will be subject to a structural study and electrical design, which is expected to be completed post consent. The offshore substations will be installed on multi-leg or monopile foundations, similar to those described for the wind turbine generators (WTGs) themselves.</p>
C-42	<p>The <u>subsea</u> inter-array cables and the subsea export cables will be installed using one or a combination of the three methods: ploughing, trenching or jetting. It is likely that a combination of these methods will be adopted for localised areas depending on seabed conditions. The installation methods will be selected during detailed design and tendering phases <u>and consideration will be given to the method that minimises the environmental impacts as far as practicable</u>.</p>
C-43	<p>The subsea export cable ducts will be drilled underneath the beach using horizontal directional drilling (HDD) techniques.</p>
C-45	<p>Where possible, subsea cable burial will be the preferred option for cable protection. Cable burial will be informed by the cable burial risk assessment and detailed within the Cable Specification Plan.</p>
C-60	<p>All intrusive construction activities undertaken during the life of the project will be routed and microsited to avoid any identified marine heritage receptors <u>pre-construction</u>, with Archaeological Exclusion Zones (AEZs) (buffers) as detailed in the Outline Marine Written Scheme of Investigation (WSI) (<u>Application</u> Document Reference: 7.13) unless other mitigation is agreed with Historic England as per the <u>Marine</u> WSI. Micrositing and AEZs will further be applied to yet undiscovered marine <u>archaeology-heritage</u> receptors should they be located.</p>

ID	Environmental measure proposed
C-61	<p>Due regard will be given to design principles held in Rampion 1 Design Plan and design principles to be developed for Rampion 2, with The design and layout for the array area will be produced in accordance with the design principles developed for Rampion 2 identified ES Volume 2 Chapter 15 Seascape, Landscape and Visual Impact Assessment. This will include consideration of the seascape, landscape and visual impacts on the South Downs National Park and Sussex Heritage Coast.</p>
C-65	<p>The proposed offshore cable corridor and cable landfall (below mean high water springs [MHWS]) will avoid all statutory marine designated areas.</p>
C-67	<p>The onshore cable route will avoid the brows of hills as far as is reasonably practical and is likely to follow the established pattern of the landscape i.e. routed to closely follow the line of existing field boundaries as far as is practicable.</p>
C-75	<p>Construction and permanent development in flood plains will be avoided wherever possible. Where this is not possible environmental measures will be developed to ensure the works are National Policy Statement compliant, including a sequential approach to siting of infrastructure and passing the Exception Test where appropriate.</p>
C-78	<p>Licensed and private water supplies will be avoided where practicable; if any impacts are anticipated then appropriate measures will be put in place to avoid impact on the quantity and quality of the supply.</p>
C-89	<p>There will be a minimum blade tip clearance of at least 22m above highest astronomical tide (HAT) <u>MHWS</u>.</p>
C-96	<p>Subsea array and export cables will be installed via either ploughing, jetting, trenching, or post-lay burial techniques, to a target burial depth of 1m. <u>Consideration will be given to the method that minimises the environmental impacts as far as practicable.</u></p>
C-112	<p>No ground-breaking activity or use of wheeled or tracked vehicles will take place south of the seawall (above mean high water springs) within Climping Beach Site of Special Scientific interest (SSSI) or <u>Within</u> Littlehampton Golf Course and Atherington Beach Local Wildlife Site (LWS) <u>vehicular access will be restricted to a low pressure rig for ground investigation purposes only during the site preparation works unless remedial action is required. Any predicted activity will be restricted to foot access for the purpose of surveying and monitoring of the progress of the horizontal directional drill (HDD).</u> <u>Should remedial action be required in the unlikely event of a drilling fluid breakout access would be taken</u></p>

ID Environmental measure proposed

[immediately to ensure drilling fluid can be contained and removed. Reinstatement and compensation measures would then be discussed and agreed with Natural England. This approach will be detailed in the Pollution Incident Response Plan secured through Requirement 22\(4\)\(j\) that will be agreed with the relevant planning authority in consultation with the Environment Agency and the statutory nature conservation body.](#)

C-114 No ground-breaking activity or use of wheeled or tracked vehicles will take place during the construction phase within Sullington Hill LWS unless remedial action is required. Any predicted activity will be restricted to foot access for the purpose of surveying and monitoring of the progress of the horizontal directional drill (HDD). The existing farm tracks through Sullington Hill LWS may be used by light vehicles (e.g. 4 x 4, light van) for access purposes during the operation and maintenance phase.

C-115 Hedgerows/tree lines crossed by the cable route will be 'notched' to reduce habitat loss and landscape and heritage impacts wherever possible. This is defined as temporarily displacing one or more short sections (i.e. notches) within the same hedgerow/tree line. [The removed sections will by default be replanted except where permanently lost on the Vegetation Retention and Removal Plan \(see Figure 7.2.1 Vegetation Retention and Removal Plans - Hedgerows and tree lines in the Outline Vegetation Retention and Removal Plan\). Where appropriate, hedgerows will be temporarily translocated to maintain diversity and structure and result in more rapid reinstatement.](#) Hedgerow/tree line losses will thereby be kept to approximately 14m total width at each hedgerow crossing point where notching can take place. [Hedgerows](#) ~~For hedgerows~~ deemed "important" under the Hedgerows Regulations 1997 (or where there are other considerations), losses will be reduced to a 6m notch for the temporary construction haul roads only, by trenchless installation of the cable ducts under them [wherever possible \(see Figure 7.2.1 Vegetation Retention and Removal Plans - Hedgerows and tree lines in the Outline Vegetation Retention and Removal Plan for the extent of hedgerow losses at each location\).](#)

[Hedgerows subject to temporary translocation will be lifted using a tree spade to maintain diversity and structure and result in more rapid reinstatement. Where chances of success are questionable, notches will be made by removal and reinstatement through planting. Where appropriate, hedgerows will be temporarily translocated using a tree spade to maintain diversity and structure and result in more rapid reinstatement. Where chances of success are questionable, notches will be made by removal and reinstatement through planting.](#) The ECoW will justify the approach being taken in line with the responsibilities of implementing the [Outline](#) vegetation retention [and removal](#) plan (see C-220).

ID Environmental measure proposed

Reinstated hedgerows and tree lines will be monitored over a period of 10 years, and remedial action taken rapidly where signs of failure are identified.

~~Further details are provided in the outline Code of Construction Practice and outline Landscape and Ecology Management Plan.~~

- C-122** All permanent cable crossings will pass beneath the bed of watercourses (no within bank crossings). Sufficient depth between the bed of the watercourse and the top of the cable (whether trenchless or open cut) will be provided to ensure no potential for exposure of cable due to scour.
- C-123** Starter (and exit) pits for Horizontal Directional Drilling (HDD) and other trenchless technologies will be micro-sited outside of the floodplain where possible (by moving the pits further away from watercourses).
- C-125** Where the cable route crosses an Environment Agency flood defence, trenchless methodologies will be used.
- C-137** All proposed onshore infrastructure and construction activities will be sited outside of the inner Source Protection Zone 1 (SPZ1) for the Southern Water public water supplies. The only exceptions to this will be for light 4 X 4 construction access route which crosses part of Warningcamp SPZ1 and the installation of several minor passing places within the Patching SPZ1. Access routes will utilise existing tracks, roads, farm entrances etc as far as practicable, and where necessary no-dig solutions (e.g. aluminium trackway) and other site specific measures (e.g. C-250 and C-251) would also be utilised. There will be no storage of hazardous materials including chemicals, oils and fuels within any SPZ.
- C-154** Within the fluvial floodplain and at surface water flow pathways, the permanent cables will be completely buried, with the land above reinstated to pre-construction ground levels (some mounding may be appropriate to allow for settlement).
- C-157** The proposed heavy goods vehicle (HGV) routing during the construction period to individual accesses will be developed to avoid major settlements such as Storrington, Cowfold, Steyning, Wineham, Henfield, Woodmancote and other smaller settlements where possible. [For Cowfold, this means that HGVs will only route through the village centre for trips related to accesses A-56 and A-57 or where use of local sourced materials / equipment makes its avoidance impracticable.](#)
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ID	Environmental measure proposed
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C-158	The proposed heavy goods vehicle (HGV) routing during the construction period to individual accesses will avoid the Air Quality Management Area (AQMA) in Cowfold where possible. This means that HGVs will only route through the village centre for trips related to accesses A-56 and A-57 or where use of local sourced materials / equipment makes its avoidance impracticable.
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C-159	The proposed heavy goods vehicle (HGV) routing during the construction period to individual accesses will avoid the A24 through Findon as advised from the West Sussex County Council (WSSCC) Freight Action Plan where possible .
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3.11 Consultation and engagement

Planning Inspectorate (2020) Scoping Opinion responses

3.11.1 **Table 3-12** sets out the comments received in Section four and five of the Planning Inspectorate (2020) Scoping Opinion relevant to the consideration of alternatives and how these have been addressed in this ES. A full list of the Planning Inspectorate (2020) Scoping Opinion comments and responses is provided in **Appendix 5.1: Response to the Scoping Opinion, Volume 4** of the ES (Document Reference: 6.4.5.1). Regard has also been given to other stakeholder comments that were received in relation to the Scoping Report (RED, 2020).

Table 3-12 Planning Inspectorate Scoping Opinion (2020) responses relevant to the consideration of alternatives

PINS ID number	Scoping Opinion comment	How this is addressed in this ES
2.3.5	<i>“The Scoping Report does not explain whether High Voltage Alternating Current (HVAC) or Direct Current (HVDC) technologies are proposed, and the ES should describe the technology proposed or options sought in this regard. The Scoping Report also explains that array cables will be 33kV or 66kV but not the circumstances in which either 33kV or 66kV options would be chosen, or whether it might be a combination of both. The ES should describe these options, any differences in the physical infrastructure requirements and provide an assessment of environmental effects that may result between one or the other (or combined) option”</i>	<p>Chapter 4: The Proposed Development, Volume 2 of the ES (Document Reference: 6.2.4) describes the technology proposed and states that the 33kV or 66kV option will be chosen based on the WTG model selected.</p> <p>Paragraph 3.5.1 describes the selection process between HVAC and HVDC.</p>
2.3.9	<i>“The Scoping Report states that the construction of the landfall is “anticipated” to be via a trenchless technique “such as” HDD. The Inspectorate notes that commitment C-4 of Scoping Report Appendix A states that a HDD technique “will” be used at the landfall location. No other trenchless or trenched techniques are presented. The ES should describe and assess the options considered in this regard and the assessment of alternatives</i>	<p>Chapter 4: The Proposed Development of the ES (Document Reference: 6.2.4) describes the construction of the landfall works including the adoption of HDD for the connection.</p> <p>This chapter (Chapter 3: Alternatives, Volume 2 of the ES (Document Reference: 6.2.3)) provides a</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this ES
	<p><i>should explain the reasons for the selected option(s)."</i></p>	<p>description and assessment of the techniques considered for landfall. The reasons for the selected landfall technique are provided in paragraphs 3.9.14 to 3.9.18.</p>
2.3.10	<p><i>"Onshore</i></p> <p><i>Paragraph 2.3.38 of the Scoping Report explains that, in addition to buried cabling, onshore cable installation methods such as HDD will be also be used as required to avoid or minimise potential effects where constraints are identified, including environmentally sensitive water course crossings, major roadways and railways. The ES should identify the locations and type of all such crossings. Where reliance is placed in the ES on the use of a specific method as mitigation, the Applicant should ensure that such commitments are appropriately defined and secured. The Inspectorate notes that commitment C–18 of the Scoping Report Appendix A refers to a "Crossing Schedule" being produced, and this should be cross-referenced throughout the aspect chapters where special crossing types are relevant."</i></p>	<p>The ES identifies the locations and type of all crossings in Appendix 4.1: Crossings schedule, Volume 4 of the ES (Document Reference: 6.4.4.1). Where reliance is placed in the ES on the use of a specific method as mitigation (such as HDD), the ES ensures that such commitments are appropriately defined and secured.</p> <p>This chapter (Chapter 3: Alternatives, Volume 2 of the ES (Document Reference: 6.2.3)) provides a description and assessment of the techniques considered for trenchless crossings in paragraphs 3.9.19 to 3.9.25.</p>
2.3.14	<p><i>"Alternatives</i></p> <p><i>The EIA Regulations require that the ES include 'A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'.</i> "</p>	<p>This chapter provides a description of the reasonable alternatives considered by RED throughout the design evolution of the Proposed Development.</p>
2.3.15	<p><i>"The Inspectorate acknowledges section 2.4 of the Applicant's Scoping Report setting out the consideration of alternatives</i></p>	<p>This comment is acknowledged.</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this ES
2.3.16	<p><i>to date, and ongoing and future activities that are proposed in this regard to inform the ES.”</i></p> <p><i>“Paragraph 3.5.21 confirms that the consideration of alternatives will be presented in the ES in line with the requirements of the EIA Regulations 2017. The Inspectorate would expect this to comprise a discrete section in the ES that provides details of the reasonable alternatives studied across all aspects of the Proposed Development and the reasoning for the selection of the chosen option(s), including a comparison of the environmental effects.”</i></p>	<p>This ES chapter provides a description of the reasonable alternatives considered by RED throughout the design evolution of the Proposed Development.</p>
2.3.18	<p><i>“The Applicant should make every attempt to narrow the range of options and explain clearly in the ES which elements of the Proposed Development have yet to be finalised and provide the reasons. At the time of application, any Proposed Development parameters should not be so wide-ranging as to represent effectively different developments. The development parameters will need to be clearly defined in the DCO and in the accompanying ES. It is a matter for the Applicant, in preparing an ES, to consider whether it is possible to robustly assess a range of impacts resulting from a large number of undecided parameters. The description of the Proposed Development in the ES must not be so wide that it is insufficiently certain to comply with the requirements of Regulation 14 of the EIA Regulations. In this regard, the Inspectorate expects that the component parameters presented in tables 2.2 and 2.3 of the Scoping Report will be refined and further detailed as part of the ES.”</i></p>	<p>This ES chapter provides narrative on the narrowing of the range of options through the design evolution and Chapter 4: The Proposed Development, Volume 2 of the ES (Document Reference: 6.2.4) provides the description of the Proposed Development and associated parameters.</p>
5.3.7	<p><i>“Careful consideration should be given to the siting of the onshore infrastructure in relation to grade 1 and grade 2 agricultural land; the potential temporary and</i></p>	<p>Consideration has been given to the siting of onshore infrastructure in relation to best and most versatile</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this ES
	<p><i>permanent loss of Agricultural Land Classification (ALC) land should be assessed within the ES. The potential effects on soil quality should be considered and relevant mitigation measures proposed where significant effects are likely to occur.”</i></p>	<p>agricultural land (Grade 1, 2, and 3a) in the design process. This is one of the factors considered when carrying out constraints mapping and BRAG appraisals (see paragraph 3.1.16). The assessment of potential temporary and permanent loss of Agricultural Land Classification land is assessed in Chapter 20: Soils and agriculture, Volume 2 of the ES (Document Reference: 6.2.20).</p>
<p>5.6.7</p>	<p><i>“The transport assessment should include an assessment of the potential impact on the rail network. Figure 6.7.1 indicates that several operational railway lines would be crossed. The assessment should also consider the potential impacts of any construction or diversion activities on public transport.”</i></p>	<p>The rail network will be crossed by HDD technique (outlined in embedded environmental measure C-5 (see Table 3-11)) ensuring no disruption to services. Further information is provided in Chapter 23: Transport, Volume 2 of the ES (Document Reference: 6.2.23) <u>and Chapter 32: ES Addendum, Volume 2 of the ES (Document Reference: 6.2.32 and [REP5-038] updated at Deadline 6)</u>. This chapter (Chapter 3: Alternatives) provides a description and assessment of the techniques considered for trenchless crossings in paragraphs 3.9.19 to 3.9.25.</p>
<p>5.9.2</p>	<p><i>“The Scoping Report does not clearly identify the locations where the cable may cross below or run near a river. This should be detailed in the ES. Site-specific assessments for each location should also be undertaken to inform the cable crossing techniques at each main river and where significant effects may occur.</i></p>	<p>A crossing schedule is provided in Appendix 4.1: Crossing schedule, Volume 4 of the ES (Document Reference: 6.4.4.1) which identifies the technique for crossing of each watercourse. As outlined in</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this ES
	<p><i>Any mitigation and/or design measures relied upon for the purposes of the assessment should be explained in the ES and appropriately secured. Effort should be sought to agree proposed mitigation and reinstatement measures with the relevant consultation bodies.”</i></p>	<p>embedded environmental measure C-5 (see Table 3-11) all main watercourses will be crossed by HDD or other trenchless technology where this represents the best environment solution and is financially and technically feasible. Further information and assessment is provided in Chapter 26: Water environment, Volume 2 of the ES (Document Reference: 6.2.26). This chapter (Chapter 3: Alternatives) provides a description and assessment of the techniques considered for trenchless crossings in paragraphs 3.9.19 to 3.9.25.</p>
4.9.5	<p><i>“The Inspectorate notes the Applicant’s identification of a “significant marine aggregate dredging route...within the north-west of the study area” in this regard.”</i></p>	<p>The proposed DCO Order Limits have been refined down to increase the distance between the array area and the Owers and Mixon rocks as well as dredging activity in the area. The ES has assessed any remaining possible impact on other marine users (see Section 3.2: Offshore site selection).</p>
4.7.5	<p><i>“Paragraph 5.8.5 and figures 5.8.3 – 5.8.6 show that a small part of the eastern area of the offshore study area has not been covered by digital survey. The ES should justify the extent of survey areas in supporting a robust assessment of significant effects on displacement of bird populations.”</i></p>	<p>The proposed DCO Order Limits have been refined down to fit within the survey area of collection including an appropriate buffer for ES assessment (see Section 3.2).</p>

Non-statutory Consultation

- 3.11.2 RED carried out a non-statutory consultation exercise from 14 January 2021 to 11 February 2021. This was a virtual exhibition to raise awareness of the Proposed Development, the development process, and share information on the emerging design process inviting feedback from stakeholders.
- 3.11.3 At this point in the design evolution process, three onshore substation options remained (Wineham Lane South, Wineham Lane North, and Bolney Lane/Kent Street), and these were presented during this non-statutory consultation exercise.
- 3.11.4 Wineham Lane South onshore substation search area was located on greenfield land immediately south of Bob Lane, to the south of the existing National Grid Bolney substation (see [Figure 3.10a, Volume 3](#) of the ES (Document Reference: 6.3.3). Access would be from Wineham Lane. Constraints associated with this onshore substation search area option included its close proximity to ancient woodland which borders the east of the area, and its proximity to a Grade II listed building. This option was less than 50m from the Royal Oak pub and residential properties on Wineham Lane, so there would be potential for socio-economic impacts and disturbance to residents.
- 3.11.5 As a result of non-statutory consultation feedback and the proximity to sensitive receptors, Wineham Lane South onshore substation search area was removed from the PEIR Assessment Boundary (RED, 2021). In addition to consultations, RED carried out engagement through a series of individual topic focused ETGs. These groups are formed of experts from relevant organisations relative to the topics considered. The ETGs provide a forum for discussion on the evidence and assessment requirements for each EIA and HRA topic area identified. The ETGs provided feedback and additional baseline information which fed into the design evolution process.

Statutory Consultation

- 3.11.6 The first Statutory Consultation exercise ran from 14 July 2021 to 16 September 2021, a period of nine weeks. The first Statutory Consultation exercise was reopened between 7 February 2022 and 11 April 2022. The PEIR (RED, 2021) was published as part of first Statutory Consultation exercise, preliminary information on alternatives considered were presented in Chapter 3 of the PEIR (RED, 2021).
- 3.11.7 Key themes from the first Statutory Consultation exercise included:
- concerns about the PEIR Assessment Boundary (RED, 2021) crossing an agri-environmental scheme and commercial agricultural interests. Feedback also highlighted concerns relating to the PEIR Assessment Boundary through Warningcamp Hill and New Down LWS based on the environmental sensitivity of chalk grassland and the LWS status. Stakeholders highlighted that this area should be avoided. In response to this the alternatives and modifications presented in the second Statutory Consultation exercise in 2022 were developed.
 - stakeholders raised concerns on loss of woodland relating to the Wineham Lane North onshore substation site. As a result of this, amongst other

considerations, Wineham Lane North was removed from consideration as stated in the PEIR SIR (RED, 2022).

- concerns regarding Search and Rescue and navigational safety required and at least one line of orientation to be maintained between Rampion 1 and Rampion 2. Stakeholders expressed a preference for two lines of orientation within the Offshore Array Area. In response to these concerns the Offshore Array Area has been amended to introduce two wind farm separation areas where no WTGs or substations will be built. The proposed DCO Order Limits have also been revised in the east of the Offshore Array Area in response to concerns on SLVIA.

3.11.8 As a result of further design changes to the Proposed Development, a second Statutory Consultation exercise ran from 18 October 2022 to 29 November 2022, a third Statutory Consultation exercise ran from 24 February 2022 to 27 March 2023, and a fourth Statutory Consultation exercise ran from 28 April 2023 to 30 May 2023. These were targeted consultation exercises that presented alternatives and modifications to the onshore cable corridor route, and extension to the existing National Grid Bolney substation only. Further preliminary environmental information relating to these alternatives and modifications was provided in the PEIR SIR (RED, 2022), PEIR FSIR (RED, 2023a), and PEI – Bolney Substation Extension Works (RED, 2023b) for onshore aspects only.

3.11.9 Key themes from these consultation exercises included:

- the modifications presented in the second Statutory Consultation exercise (RED, 2022) resulted in concerns from stakeholders regarding effects on the viability of businesses, including those on LACR-01c;
- stakeholders highlighted the potential impact on the Peppering Project and the success of the curlew release scheme at Harrow Hill from LACR-01b during the construction phase of the Proposed Development; and
- concerns were raised on LACR-02 included the proposed permanent and irreplaceable loss of approximately 0.99ha of PAWS. Stakeholders suggested that this route should only be considered where no other routes were viable.

3.11.10 In response to these concerns the alternatives introduced in the PEIR FSIR (RED, 2023a) were presented as part of the third Statutory Consultation exercise.

3.11.11 A full list of all comments received during the Statutory Consultation exercises and the response to those comments is provided in the [Consultation Report](#) (Document Reference: 5.1).

3.12 Glossary of terms and abbreviations

Table 3-13 Glossary of terms and abbreviations

Term (acronym)	Definition
Agricultural Land Classification (ALC)	Agricultural Land Classification provides a means of assessing the quality of farmland. Its assessment is based on physical limitations of the land, such as climate, site characteristics (e.g. gradient) and soil. The assessment gives an indication of the versatility and expected yield of the land. The system classifies agricultural land in five grades. The 'best and most versatile' agricultural land is classified as 1, 2 and 3a. The Agricultural Land Classification was developed by the former Ministry of Agriculture, Fisheries and Food in 1988 and revised in 1996.
Air Insulated Switchgear (AIS)	High voltage electrical switchgear infrastructure, whereby the majority of the equipment utilises air as the insulating medium.
Area of Outstanding Natural Beauty (AONB)	Land protected for conservation and preservation under section 82 of the Countryside and Rights of Way Act 2000 for its natural beauty.
BEIS	Department of Business, Energy and Industrial Strategy
BRAG	Black, Red, Amber, Green
Code of Construction Practice (CoCP)	The code sets out the standards and procedures to which developers and contractors must adhere to when undertaking construction of major projects. This will assist with managing the environmental impacts and will identify the main responsibilities and requirements of developers and contractors in constructing their projects.
Commitments Register	The register of environmental measures that RED has implemented as part of the Proposed Development and that have been embedded into design.
Development Consent Order	This is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects, under the Planning Act 2008.
Development Consent Order (DCO) Application	An application for consent 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,

Term (acronym)	Definition
	who will decide on whether development consent should be granted for the Proposed Development.
DESNZ	Department for Energy Security & Net Zero
DML	Deemed Marine Licence
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017	The EIA regulations require that the effects of a project, where these are likely to have a significant effect on the environment, are taken into account in the decision-making process for the project.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach and the information required to support the EIA and HRA for certain aspects.
ETG	Expert Topic Group
Extension Area	The area of seabed to the west of the existing Rampion 1 offshore windfarm that has been considered within the Proposed Development in addition to the Zone 6 area.
Gas Insulated Switchgear (GIS)	High voltage electrical switchgear infrastructure, whereby the majority of the equipment utilises an inert gas (with strong insulating properties) as the insulating medium.
Habitats Regulation Assessment (HRA)	The assessment of the impacts of implementing a plan or policy on a European Site, the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it would adversely affect the integrity of the site.
HeRA	Helicopter Refuge Area
Horizontal Directional Drill (HDD)	Trenchless crossing engineering technique that uses a drill steered underground without the requirement for open trenches. The technique is often employed when crossing environmentally sensitive areas, major water courses and highways. This method is able to be

Term (acronym)	Definition
	carried out underground for the installation of pipes and cables with minimal surface disruption.
Iterative design	A process by which the design is reviewed and amended to make improvements, solve problems, respond to and incorporate environmental measures and feedback from stakeholders.
ITZ	Inshore Traffic Zone
LACR	Longer Alternative Cable Routes presented at the Supplementary Statutory Consultation
LAT	Lowest Astronomical Tide
LPA	Local Planning Authority
Local Wildlife Site (LWS)	Local Wildlife Sites are non-statutory designations conferred by local planning authorities and given weight through local planning policy. These sites are selected through a selection of criteria (criteria are area dependent) aimed at identifying “substantive nature conservation value”.
Marine Conservation Zone (MCZ)	A Marine Conservation Zone (MCZ) is a type of marine nature reserve in UK waters. They were established under the Marine and Coastal Access Act (2009) and are areas designated with the aim to protect nationally important, rare or threatened habitats and species.
MHWS	Mean high water springs
MLWS	Mean low water springs
National Planning Policy Framework (NPPF)	The National Planning Policy Framework sets out the Government’s planning policies for England and how these are expected to be applied. It provides a framework within which local plans can be developed which reflect the community’s needs.
NPS	National Policy Statement
Offshore	The offshore elements of the Proposed Development refer to works seaward of Mean High Water Springs (MHWS).
Onshore	The onshore elements of the Proposed Development refer to works landward of the Mean High Water Springs (MHWS).

Term (acronym)	Definition
Planning Inspectorate	The Planning Inspectorate is the government agency supervising the planning process for NSIPs under the Planning Act 2008. The purpose of the Planning Inspectorate is to provide expertise on planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales.
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken for the first Statutory Consultation exercise on the Proposed Development. It is developed to support Statutory Consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, draw preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
Preliminary Environmental Information Report Supplementary Information Report (PEIR SIR)	The PEIR Supplementary Information Report (SIR) identified and provided additional supporting preliminary environmental information associated with proposed alternatives and modifications to the onshore part of the original PEIR Assessment Boundary which have been identified since the publication of the original PEIR (RED, 2021) in July 2021.
Preliminary Environmental Information Report Further Supplementary Information Report (PEIR FSIR)	The PEIR Further Supplementary Information Report (FSIR) identified and provided further preliminary environmental information associated with the proposed alternative route option identified since the publication of the original PEIR and PEIR SIR in July 2021 and October 2022 respectively (RED, 2021; 2022).
Preliminary Environmental Information (PEI)	Preliminary Environmental Information – Bolney Substation Extension Works identified and provides further preliminary environmental information associated with the proposed Bolney substation extension works identified since the publication of the original PEIR, PEIR SIR, and PEIR FSIR in July 2021, October 2022, and February 2023 respectively (RED, 2021; 2022; 2023).
Proposed Development	The development that is subject to the application for development consent, as described in Chapter 4: The

Term (acronym)	Definition
	<p>Proposed Development, Volume 2 of the ES (Document Reference: 6.2.4).</p>
Public Rights of Way (PRoW)	Public Rights of Way include footpaths, byways and bridleways.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be directly or indirectly impacted as a result of the Proposed Development.
RED	Rampion Extension Development Limited
Rochdale Envelope	The Rochdale Envelope is a parameter-based approach to environmental assessment which aims to take account of the need for flexibility in the evolution of detailed design.
Scoping Opinion	A Scoping Opinion is adopted by the Secretary of State for a Proposed Development.
Scoping Report	A report that presents the findings of an initial stage in the Environmental Impact Assessment process.
SDNP	South Downs National Park
SDNPA	South Downs National Park Authority
SEA	Strategic Environmental Assessment
Secretary of State (SoS)	The SoS of Business, Energy and Industrial Strategy oversees the planning system and decision making with regards to development consent. This agent works within the relevant government department relating to the application.
Site of Importance for Nature Conservation	A designation used by local authorities for area of land of local conservation value.
SM	Scheduled Monument
Site of Special Scientific Interest (SSSI)	Sites designated at the national level under the Wildlife & Countryside Act 1981 (as amended). They are a series of sites that are designated to protect the best examples of significant natural habitats and populations of species.

Term (acronym)	Definition
Special Area of Conservation (SAC)	International designation implemented under the Habitats Regulations for the protection of habitats and (non-bird) species. Sites designated to protect habitats and species on Annexes I and II of the Habitats Directive. Sufficient habitat to maintain favourable conservation status of the particular feature in each member state needs to be identified and designated.
Special Protection Area (SPA)	Sites designated under EU Directive (79/409/EEC) to protect habitats of migratory birds and certain threatened birds under the Birds Directive
Stakeholder	Person or organisation with a specific interest (commercial, professional or personal) in a particular issue.
TCE	The Crown Estate
TSS	Traffic Separation Scheme
Unexploded Ordnance (UXO)	Unexploded ordnance are explosive weapons (bombs, shells, grenades, land mines, naval mines, etc.) that did not explode when they were employed and still pose a risk of detonation, potentially many decades after they were used or discarded.
Zone 6 area	In 2008, nine strategic zones were identified for the third licensing round for offshore wind farms (Round 3) following strategic environmental assessment. The Rampion offshore windfarm was development within the Zone 6 area. The remainder of the Zone 6 area as been considered in the Proposed Development in addition to the Extension Area.

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