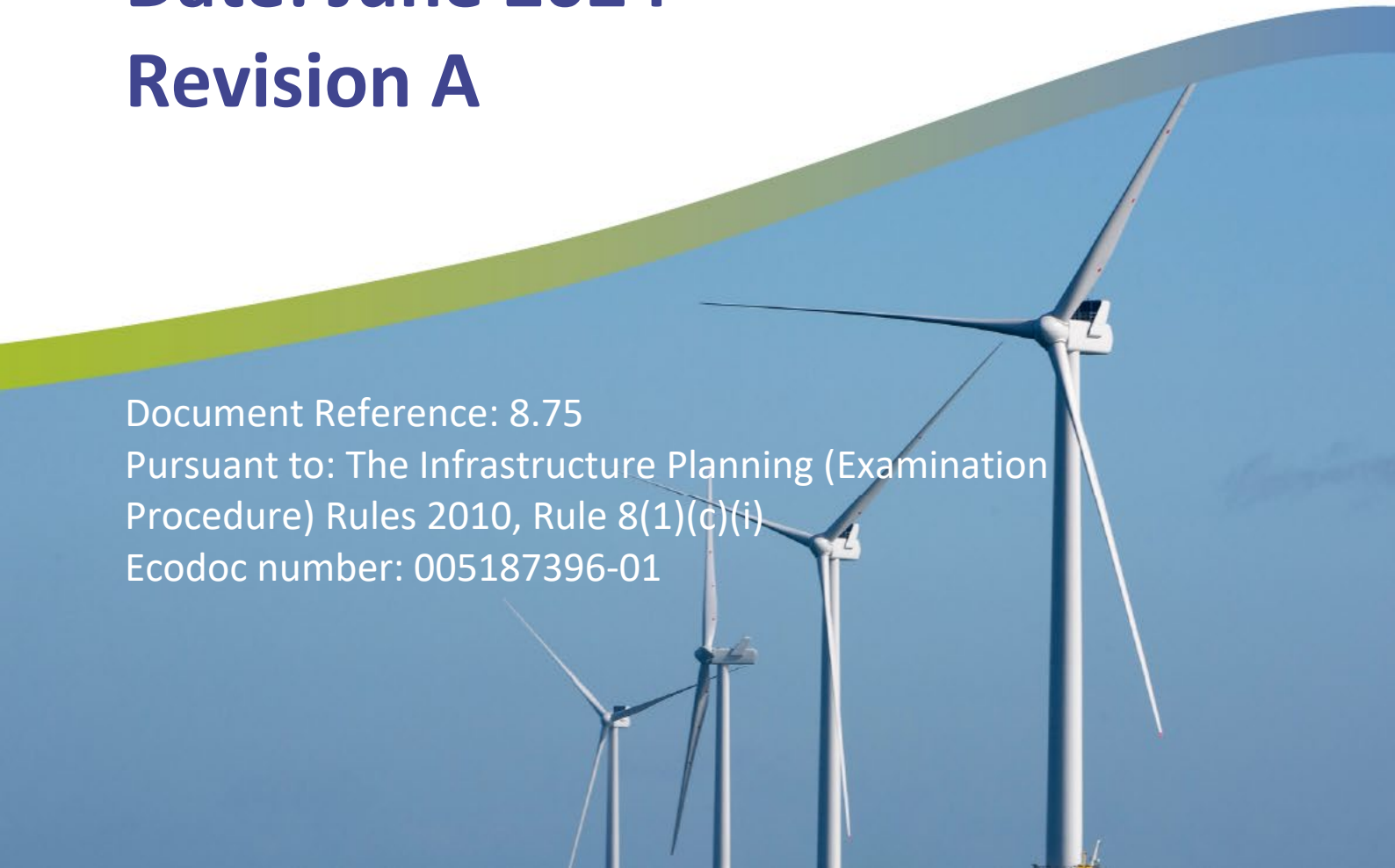


Rampion 2 Wind Farm Category 8: Examination Documents

Offshore Design Statement

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Executive Summary

This Offshore Design Statement for Rampion 2 has been prepared in response to the Examining Authority's question (DE1.1) **[PD-009]** to the Applicant to explain how the Proposed Development responds to 'Good Design'. It explains the design evolution of the offshore works to date and the considerations that will inform the detailed design of the final offshore works in a clear and structured way.

This statement addresses all phases of the Rampion 2 development. It does not cover the onshore environment,

This report has been subdivided into the following sections:

- **Design Framework:** establishes how the project will fulfil the criteria of 'good design' through clearly defined aims and design principles.
- **Delivering Good Design:** establishes the approach to good design.
- **Site Overview:** an overview of the physical, environmental and cultural context of the offshore works.
- **Agreement for Lease Area Definition:** summary and justification of the Agreement for Lease (AfL) area definition.
- **Layout:** summary and justification of the turbine layout design proposals.
- **Wind Turbine Generators:** summary and justification of the turbine generator design proposals.
- **Electrical Infrastructure:** summary and justification of the electrical infrastructure including the offshore export cables and array cables.
- **Conclusion:** summary of the Rampion 2 offshore works design proposals.

Glossary of Acronyms

Term	Definition
AfL	Agreement for Lease Area Definition
AIS	Automatic Identification System
AOI	Area of Interest
AONB	Area of Outstanding Natural Beauty
DCO	Development Consent Order
DEFRA	Department for Environment Food and Rural Affairs
EIA	Environmental Impact Assessment
ES	Environmental Statement
GHG	Greenhouse Gas
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
km	Kilometre
kV	Kilovolt
LPA	Local Planning Authority
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MGN	Marine Guidance Note
MMO	Marine Management Organisation
MW	Megawatt
NIC	National Infrastructure Commission
NMP	Navigational Management Plan
NNR	National Nature Reserves
NPPF	National Planning Policy Framework

Term	Definition
NPS	National Policy Statement Nationally
NSIP	Significant Infrastructure Project
OS	Ordnance Survey
OWF	Offshore Wind Farm
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
TEU	Treaty of the European Union
TH	Trinity House
WTG	Wind Turbine Generator
WWI	World War I
WWII	World War II
ZVI	Zone of Visual Influence

Glossary of Terms

Term	Definition
DCO boundary	The area subject to the application for development consent, including all permanent and temporary works for DEP and SEP.
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Inter-array cables	Cables which link the wind turbine generators to the offshore substation platform(s).
Integrated Grid Option	Transmission infrastructure which serves both extension projects.
Landfall	The point at the coastline at which the offshore export cables are brought onshore and connected to the onshore export cables.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall. Up to 275kV.
Offshore substation	A fixed structure located within the wind farm area, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. Up to 275kV to Oakdene substation and 400kv from there to existing National Grid Bolney substation.
Onshore substation	Compound containing electrical equipment to enable connection to the National Grid.
Separated Grid Option	Transmission infrastructure which allows each project to transmit electricity entirely separately

Term	Definition
Study Area	Area where potential impacts from the project could occur, as defined for each individual EIA topic.
The Applicant	Rampion Extension Development Limited (RED or the Applicant)
Transition joint bay	Connects offshore and onshore export cables at the landfall. The transition joint bay will be located above mean high water.

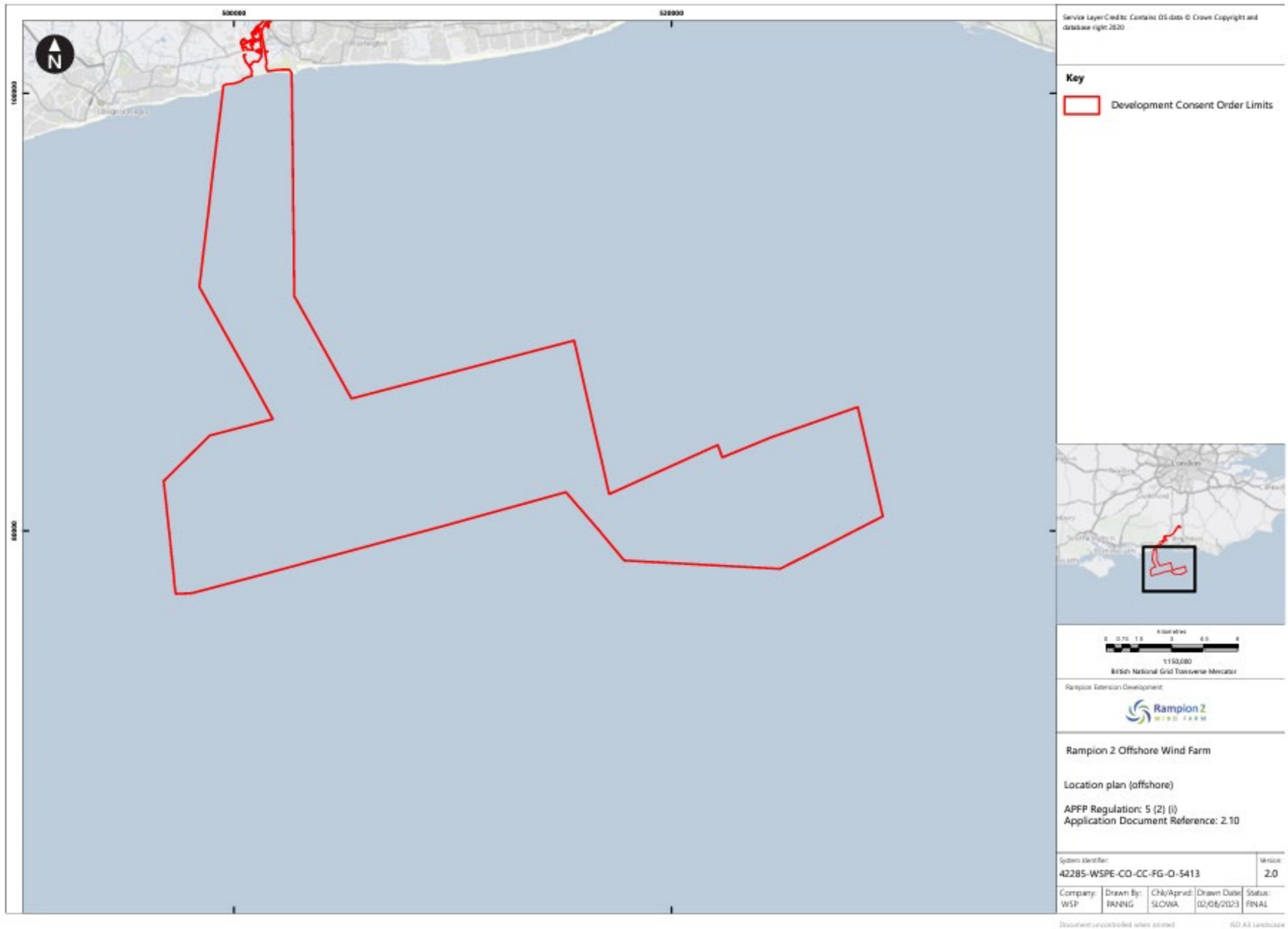
1. Introduction

- 1.1.1 This Offshore Design Statement has been prepared on behalf of Rampion Extension Development Limited (RED or the Applicant) in support of the application for a Development Consent Order (DCO) for the Rampion 2 Offshore Wind Farm Project (Rampion 2) located adjacent to the existing Rampion Offshore Wind Farm Project ('Rampion 1') in the English Channel.

1.2 Purpose of Document

- 1.2.1 This Offshore Design Statement for Rampion 2 has been prepared in response to the Examining Authority's question (DE1.1) **[PD-009]** to the Applicant to explain how the Proposed Development responds to 'Good Design'. The Applicant notes that the Examining Authority's question related to the Proposed Development in its entirety, however the Applicant notes it has provided response in relation to onshore aspects in its response to the Examining Authority's question DE1.3 (in relation to Works No. 16) and DE1.4 (in relation to Works No. 20), submitted into the Examination at Deadline 3; **Applicant's Responses to Examining Authority's First Written Questions (EXQ1) [REP3-051]**.
- 1.2.2 The purpose of this Offshore Design Statement is to demonstrate how Rampion 2 will fulfil the requirement for "Good design" as set out within the Overarching National Policy Statement for Energy (NPS EN-1) (DECC, 2011) and (Department for Energy Security & Net Zero (DESNZ), 2023a). It explains the design evolution of the offshore works to date and the considerations that will inform the detailed design of the final offshore works in a clear and structured way. This statement addresses all phases of the Rampion 2 development. It does not cover the onshore environment, which is described in **Chapter 4: The Proposed Development, Volume 2** of the Environmental Statement (ES) **[APP-045]** as well as in responses to the Examining Authority's questions provided at Deadline 3 as noted above. Noting that RED's approach to good design is inherent throughout the Environmental Statement, this document also highlights the important role played by consultation and the way in which it has influenced the indicative layout and design of the proposed offshore works, including particularly Natural England, the Maritime and Coastguard Agency (MCA), the Marine Management Organisation (MMO) and the relevant local authorities.

Figure 1-1 Location plan



1.3 Document Structure

1.3.1 This report has been subdivided into the following sections:

- Design Framework: establishes how the project will fulfil the criteria of ‘good design’ through clearly defined aims and design principles.
- Delivering Good Design: establishes the approach to good design.
- Site Overview: an overview of the physical, environmental and cultural context of the offshore works.
- Agreement for Lease Area Definition: summary and justification of the Agreement for Lease (AfL) area definition.
- Layout: summary and justification of the turbine layout design proposals.
- Wind Turbine Generators: summary and justification of the turbine generator design proposals.
- Electrical Infrastructure: summary and justification of the electrical infrastructure including the offshore export cables and array cables.
- Conclusion: summary of the Rampion 2 offshore works design proposals.

1.4 Project Overview

1.4.1 A description of the key components of the proposed Rampion 2 project, as well as details of how the wind farm will be constructed, operated, maintained and decommissioned is provided in [Chapter 4 The Proposed Development, Volume 2](#) of the ES [APP-045].

1.4.2 Rampion 2 will have a maximum export capacity greater than 100 MW, so it is defined as a Nationally Significant Infrastructure Project (NSIP) under Section 15(3) of the Planning Act 2008. The Rampion 2 wind farm array area is approximately 13 km from the coast at the closest point (**Figure 1-1**).

1.4.3 Rampion 2 will be connected to shore by offshore export cables installed to the landfall near Climping, Arun District. From there, the onshore export cables travel approximately 38.8 km inland to a new high voltage alternating current (HVAC) onshore substation near Cowfold, Horsham District, which will connect to an extension to the existing National Grid Bolney substation, Mid Sussex.

1.4.4 The key offshore components comprise:

- Up to 90 offshore wind turbine generators (WTGs) and associated foundations:
 - ▶ blade tip of the WTGs will be up to 325m above Lowest Astronomical Tide (LAT) and will have a 22m minimum air gap above Mean High Water Springs (MHWS).
- Inter-array cables connecting the WTGs to up to three offshore substations:
 - ▶ Up to two offshore interconnector export cables between the offshore substations.

- Up to four offshore export cables each in its own trench, will be buried under the seabed within the final cable corridor:
 - ▶ The export cable circuits will be High Voltage Alternating Current (HVAC), with a voltage of up to 275kV.

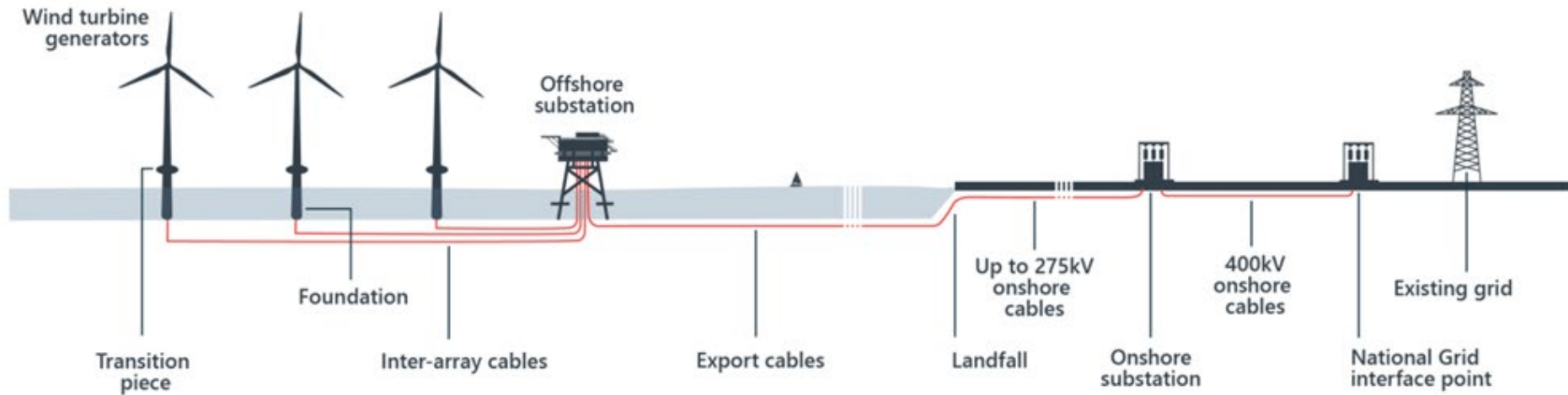
1.4.5 The key onshore components comprise:

- A single landfall site near Climping, Arun District, connecting offshore and onshore cables using Horizontal Directional Drilling (HDD) installation techniques:
 - ▶ Buried onshore cables in a single corridor for the maximum route length of up to 38.8 km using:
 - Trenching and backfilling installation techniques; and
 - Trenchless and open cut crossings.
- A new onshore substation, proposed near Cowfold, Horsham District;
- Extension to and additional infrastructure at the existing National Grid Bolney substation, Mid Sussex District to connect Rampion 2 to the national grid electrical network;
- Construction and operational accesses; and
- Temporary construction compounds.

1.4.6 An overview schematic of the key offshore and onshore project infrastructure is shown in **Figure 1-2**

1.4.7 The offshore works are the primary focus of this document and are described in detail in the subsequent sections.

Figure 1-2 Overview schematic of the key offshore and onshore project infrastructure



2. Design Framework

2.1 Project Aims

2.1.1 Rampion 2 will aim to contribute materially towards:

- meeting the urgent national need established in both the 2011 and 2023 version of National Policy Statement (“NPS”) EN-1 (DECC, 2011; DESNZ, 2023a) for new renewable/low carbon electricity supply in the UK, including offshore wind which has been identified as a critical national priority (“CNP”) in NPS EN-1 and NPS EN-3 (DESNZ, 2023a, 2023b);
- generating low carbon electricity from an Offshore Wind Farm (OWF) in support of the decarbonisation of the UK electricity supply;
- exporting electricity to the UK National Grid to support UK commitments for offshore wind generation and security of supply;
- optimising generation and export capacity within the constraints of available (UK) sites and onshore transmission infrastructure;
- delivering a significant volume of (UK) offshore wind generated energy and assist with the achievement of the UK Government’s climate change commitments and carbon reduction objectives,
- maximising renewable energy generation at optimal UK seabed locations; and
- maximising the use of existing infrastructure.

2.1.2 These seven aims provide a set of criteria for demonstrating Rampion 2’s contribution towards key public-interest outcomes as reflected in UK Government’s national policy aims as set out within, for example NPS EN-1; the UK Government’s energy security plan (Powering Up Britain, March 2023); (the British Energy Security Strategy, BEIS, 2022), climate change (for example, Net Zero Strategy: Build Back Greener (BEIS, 2021d)), and economic growth (such as Build Back Better Strategy (HM Government, 2021), Powering Up Britain: The Net Zero Growth Plan (HM Government, 2023a), Powering Up Britain: Energy Security Plan (HM Government, 2023b) and the Carbon Budget Delivery Plan (HM Government, 2023c), as follows:

- decarbonisation;
- maximising provision of renewable/ wind generated electricity; and
- electricity supply resilience.

2.1.3 Additionally, it will deliver a range of environmental, social and economic benefits including biodiversity net gain, jobs creation during all phases of the project, and investment.

2.2 Design Principles

- 2.2.1 The National Infrastructure Commission (NIC) provide expert impartial advice to Government on major infrastructure projects. The NIC's Design Group (NIC, 2020) has identified four principles to guide the planning and delivery of major infrastructure projects: Climate, People, Places and Value. These principles have been used to develop high-level design principles for Rampion 2.
- 2.2.2 These design principles will ensure the project fits as sensitively as possible into the local context, mitigating and providing enhancements to community and environment where possible, whilst achieving the requirements of energy production to help meet growing demand for low carbon energy.
- 2.2.3 The following design principles have been identified:

Table 2-1 Offshore design principles

	Offshore design principles	Examples of how principle is implemented
Climate		
1	<p>Maximise generation capacity of the Proposed Development within the site constraints to positively contribute to the UK energy transition and climate commitments, through contributing to:</p> <ul style="list-style-type: none"> • addressing the urgent need for new renewable energy infrastructure in the UK which has been identified as a Critical National Priority in Draft NPS EN-1 and Draft NPS EN-3 (DESNZ, 2023a, 2023b); • achieving the target for a five-fold increase in offshore wind capacity to 50 gigawatts (GW) by 2030 from the starting position of 10GW in 2020; • delivering new energy infrastructure in order to provide a secure, reliable and affordable supply of energy (Draft NPS EN-1 (DESNZ, 2023a); • meeting the UK's commitment to a 68% reduction in greenhouse gas emissions by 2030, compared to 1990 levels (Paris Climate Agreement) • achieving net-zero by 2050. 	<ul style="list-style-type: none"> • The Proposed Development will contribute significantly to the UK's renewable energy production and deliver additional renewable energy capacity (estimated at 1,200MW), supporting the attainment of the UK Government's carbon budgets and its net zero strategy and will be able to power the equivalent of over 1 million homes. • The Proposed Development would have a lifetime GHG emissions saving of 35,901ktCO₂e which is assessed as a significant beneficial effect in the Chapter 29: Climate change, Volume 2 of the ES [APP-070]. • Rampion 2 will make a significant contribution to the UK's energy security. By being connected at the transmission system level, Rampion 2 will play an important role in the resilience of the GB electricity system from an adequacy and system operation perspective • The assessment of Rampion 2 impacts considers the maximum foreseeable impacts of the turbine technology that could be available by the time of construction; in this way a maximum design (worst-case) envelope is defined. By assessing maximum parameters for turbines, flexibility is provided to enable an optimal layout for this infrastructure to be brought forward within this envelope with lesser environmental effects.
2	<p>Prioritise sustainable resource management and techniques and minimise carbon emissions throughout the project lifecycle.</p>	<ul style="list-style-type: none"> • Section 4.9: Decommissioning in Chapter 4: The Proposed Development, Volume 2 of the ES [APP-045] of our Environmental Statement sets out a wide range of materials and methods RED will employ to reduce the lifetime carbon emissions of the offshore turbines, foundations, substation foundations, array and export cables. • This will involve reusing or recycling the primary materials used in their manufacture, such as steel, copper, aluminium, fluids and other metals).
3	<p>The project will endeavour to employ materials specifically designed to withstand marine conditions and prioritise solutions that have reduced long-term maintenance needs. This minimises ongoing operational resources and promotes sustainability.</p>	<ul style="list-style-type: none"> • Specialised paint systems will be utilised to safeguard offshore assets, optimising resource utilisation by reducing the necessity for maintenance activities offshore throughout the asset's operational lifespan.

Offshore design principles	Examples of how principle is implemented
People	
<p>4 Engage openly, transparently and meaningfully with key stakeholders and the local community, taking their feedback and local knowledge into account. Engagement conducted in line with the following key principles:</p> <ul style="list-style-type: none"> • Inclusivity – to involve the widest possible range of local stakeholders, local groups, local residents and businesses. • Transparency – for plans to be visible and to be open and honest in approach. • Continuous dialogue – to encourage a continuous dialogue with all stakeholders. • Timely – to enable responses to have a meaningful impact on the project’s design 	<ul style="list-style-type: none"> • RED consulted key stakeholders and the Sussex community over a two-and-a-half-year period using a range of online and face-to-face methods of engagement. Full details of the consultation completed to date can be found in the Consultation Report [APP-027] • Consultation and engagement with key stakeholders has continued throughout the examination process and will continue throughout all phases of the Proposed Development • Seascape and visual effect - ongoing engagement with key stakeholders led to significant design changes and the creation of the seascape, landscape and visual impacts (SLVIA) specific design principles. See Section 4.3 for additional details. • Early engagement with marine aggregates companies, led to additional datasets being used to inform Chapter 8: Fish and shellfish ecology, Volume 2 of the ES [APP-049] to inform micro-siting design. See Section 4.4 for additional details. • Engagement with aggregates companies also identified the need for a buffer zone in proximity to marine aggregates sites. See Section 4.6 for additional details. • Engagement with Shipping and Navigation stakeholders resulted in several reductions to the Order Limits. See Section 4.6 for additional details.
<p>5 Develop proposals, construction and operation method plans, while bearing in mind the sensitivities of local residents, those working in the area, visitors and those enjoying the South Downs, the heritage coast and beaches for leisure, landowners, fishing and maritime industries.</p>	<ul style="list-style-type: none"> • Throughout the development process, RED has considered all the views received and strived to accommodate the feedback to improve the design as we continued to develop our proposals, while proposing mitigation solutions to reduce residual impacts to those who live in the area local to our project proposals. • Seascape and visual effect - ongoing engagement with key stakeholders led to significant design changes and the creation of the seascape, landscape and visual impacts (SLVIA) specific design principles. See Section 4.3 for additional details. • Consultation and ongoing engagement with offshore stakeholders included: <ul style="list-style-type: none"> ○ 5 Project Liaison Groups which includes an Offshore Community PLG and a Sea Users PLG ○ 5 Fishing Working Groups covering the geographical area from Beachy Head to Selsey Bill ○ ongoing development of the Outline Fisheries Liaison and Co-existence Plan [APP-241], plus commitments such as engaging and communicating with divers during construction.
<p>6 Aim to be an industry-leading organisation in supporting communities and individuals into education, employment and training; career development; and expanding the talent pool; particularly in support of the companies within the supply chain.</p>	<ul style="list-style-type: none"> • In consultation with key skills & employment stakeholders, RED has developed an Outline Skills and Employment Strategy (SES) [PEPD-037] with the aim of promoting skills and employment opportunities, via education and training for local economic benefit within the Sussex area. • RED has started to build a regional supplier network, recently holding an inaugural Supplier Engagement Day in Worthing with over 100 suppliers from the region attending to discuss project opportunities and start linking potential supply chains. • RED will continue to develop positive and meaningful commitments and activities for implementation during construction and operation of the wind farm, as part of the process to finalise the SES.
Value	
<p>7 Assess the latest technology, design the wind farm, select the most effective components and coordinate the</p>	<p>The assessment of Rampion 2 impacts considers the maximum foreseeable impacts of the turbine technology that could be available by the time of construction; in this way a maximum design (worst-case) envelope is defined. By assessing maximum parameters for turbines, flexibility is provided to enable an optimal layout for this infrastructure to be brought forward within this envelope with lesser environmental effects. This will enable the project to employ the best available technology and knowledge at the time of construction.</p>

Offshore design principles	Examples of how principle is implemented
<p>construction, to maximise cost efficiency of the project and reduce cost to the consumer.</p>	
<p>8 Conduct robust assessments to influence the construction methods that we use and the technical design of the project, so that the benefits of Rampion 2 are optimised and any negative effects are minimised.</p>	<p>The assessment of the worst case scenario as set up above has and will continue to enable to project to identify the optimum design and mitigation, for example:</p> <ul style="list-style-type: none"> • The proposed mitigation for the impacts of underwater noise has continuously evolved, taking into account the impacts on a variety of marine receptors and the technical and logistical constraints of the Proposed Development. • Taking into account feedback from a variety of bodies, during the examination process, RED has committed to: <ul style="list-style-type: none"> <i>Double big bubble curtains will be deployed as the minimum single offshore piling noise mitigation “technology to deliver underwater noise attenuation for all foundation installations throughout the construction of the Proposed Development where percussive hammers are used in order to reduce predicted impacts to:</i> <ul style="list-style-type: none"> • <i>sensitive receptors at relevant Marine Conservation Zone (MCZ) sites and reduce the risk of significant residual effects on the designated features of these sites;</i> • <i>spawning herring; and</i> • <i>marine mammals.”</i> • The refinement of the export cable routing design will provide avoidance of known sensitive features (known black seabream nesting sites and NERC geogenic and biogenic reef habitats) as far as is reasonably practicable within the offshore export cable corridor area. • Where relevant and required, the adoption of specialist offshore export cable laying and installation techniques will minimise the direct and indirect (secondary) seabed disturbance footprint to reduce impacts. • RED has committed cable protection being used that minimises the environmental impacts as far as practicable. At the point of selecting a cable protection supplier, consideration will be given to using the method of cable protection which is likely to be removable at decommissioning.
<p>9 Through consultation and engagement with the local community and supply chain, RED will seek to identify opportunities where the project can offer social, economic and environmental benefits.</p>	<ul style="list-style-type: none"> • In the second half of 2024, RED will be consulting key stakeholders and local communities on whether, and if so how a community benefit package could support Sussex communities. The final package may include a range of initiatives to benefit business, education and residential communities.
<p>Place</p>	
<p>10 Employ the general principles of the mitigation hierarchy and reflect the requirements of ‘Good Design’ from NPS EN-1 (2011 and 2023).</p>	<ul style="list-style-type: none"> • Seascape and visual effect - ongoing engagement with key stakeholders led to significant design changes and the creation of the seascape, landscape and visual impacts (SLVIA) specific design principles. See Section 4.3 for additional details. • Through careful siting RED has avoided all Marine Protected Areas (MPAs). • RED has employed these principles of good design through e.g. proposing trenchless crossings at landfall, micrositing of offshore cables, coexisting with commercial fishing for the operational life of the project, evolving the site area to avoid commercial navigational routes and heritage designations, and reduce impacts on species and MPAs.
<p>11 Protect and support local ecology, wildlife and habitat.</p>	<ul style="list-style-type: none"> • Through careful siting RED has avoided all Marine Protected Areas (MPAs).

Offshore design principles	Examples of how principle is implemented
	<ul style="list-style-type: none"> • RED will also survey for sensitive habitats and avoid them via micrositing foundations and micro-routing cables as far as practicable, while proposing mitigation solutions for any residual impacts to sensitive or protected species, e.g. our noise mitigation proposals to protect Black Seabream. • As noted in principle 8 double bubble curtains will be deployed to protect local marine wildlife.
<p>12 Respond to the distinctive and unique character of the local landscape / seascape, including nationally designated landscapes and views out to sea.</p>	<p>Through the design evolution process to the final DCO proposals, RED has:</p> <ul style="list-style-type: none"> • moved the redline boundary further from the Sussex Heritage Coast to omit a large area to the east and southeast of Rampion 1; • reduced the final turbine array area to 160km², half the original site area presented at the Scoping stage; • introduced two wind farm separation zones to the west and south of Rampion 1, driven by visual impact in relation to the difference in turbine heights; and • reduced turbine numbers from max 116 (same as Rampion 1) to 90.
<p>13 Acknowledge and honour the rich historical context and unique characteristics of local landmarks, cultural sites, and heritage assets of the region.</p>	<ul style="list-style-type: none"> • Through site evolution, RED has excluded the eastern area closest to the Heritage Coast and will continue with sensitive design and turbine layout through e.g. micrositing turbine locations and cable routes to avoid sites of archaeological interest, such as wrecks. • RED will employ a series of commitments and duties to monitor, report and record any archaeological finds. • The Marine Written Schemes of Investigation (WSI) will detail environmental measures including the archaeological exclusion zones (AEZ), the implementation of a Protocol for Archaeological Discoveries and methodologies for future monitoring, survey and assessment requirements. See Section 4.5 for further details.

3. Delivering Good Design

3.1 What is Good Design

- 3.1.1 In the United Kingdom the design of infrastructure projects is referenced in key policy documents and guidance notes, which have been used to help inform the principles of ‘good design’. These include the Overarching National Policy Statements for Energy (EN-1) (DECC, 2011) and Renewable Energy Infrastructure (EN-3) (DECC, 2011), the Overarching National Policy Statements for Energy (EN-1) (DESNZ, 2023a) and Renewable Energy (EN-3) (DESNZ, 2023b), the National Infrastructure Commission’s ‘Design Principles for National Infrastructure’ report (National Infrastructure Commission, 2020) and Scottish Natural Heritage’s (now NatureScot) Siting and Designing Wind Farms in the Landscape Guidance (2017).
- 3.1.2 The Overarching National Policy Statement for Energy (EN-1) (DECC, 2011) paragraph 4.5.1 states that *“The visual appearance of a building is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object — be it a building or other type of infrastructure — including fitness for purpose and sustainability, is equally important. Applying “good design” to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area... Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, landform and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area.”*
- 3.1.3 The National Policy Statement for Renewable Energy (EN-3) (DECC, 2011) paragraph states that *“Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology.”*
- 3.1.4 The Overarching National Policy Statement for Energy (EN-1) (DESNZ, 2023a) paragraph 4.7.1 states that *“the visual appearance of a building, structure, or piece of infrastructure, and how it relates to the landscape it sits within, is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations ... [good design of energy projects] should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible.”*

- 3.1.5 The National Policy Statement for Renewable Energy (EN-3) (DESNZ, 2023b) paragraph 2.5.2 states that “*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 and terrestrial uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage.*”
- 3.1.6 The NPS for Energy further highlights the need to consider good design from the early stages of a project stating that “*Design principles should be established from the outset of the project to guide the development from conception to operation*”.
- 3.1.7 In line with the NPSs, this document sets out how the project’s proposals will fulfil the criteria of good design and are informed by the overarching design principles identified in **Section 2**.
- 3.1.8 While the focus of this report is on the planning stages, the project objectives will equally apply to any future stages of the project, including detailed design.
- 3.1.9 Additional information on how the Proposed Development respond to good design is set out in Section 15-7 of **Chapter 15: Seascape, landscape and visual impact assessment, Volume 2** of the ES [APP-056].

3.2 Sustainable Design

- 3.2.1 Rampion 2 is expected to be operational for approximately 30 years and will represent a significant contribution towards net zero targets over the majority of the lifetime of the project.
- 3.2.2 RED has undertaken a Greenhouse Gas Assessment within **Chapter 29: Climate change, Volume 2** of the ES [APP-070] that provides a quantified assessment of greenhouse gas emissions over the lifetime of Rampion 2.
- 3.2.3 The assessment considered emissions from the extraction and manufacture of equipment and materials, marine vessel and road traffic movements, and the use of plant and equipment.
- 3.2.4 Greenhouse gas emissions from construction, operation and decommissioning of Rampion 2 are predicted to be 2.5 million tonnes of CO_{2e}. The largest GHG contribution is from embodied emissions within materials to be used during construction, particularly in the offshore components of the project.
- 3.2.5 The greenhouse gas intensity of energy produced by Rampion 2 is anticipated to be 12.7 g CO_{2e}/ kWh depending on the scenario constructed. This is around the midrange of previous studies for offshore wind farms and therefore the GHG payback of emissions is likely to be less than 1.1 years from the start of Rampion 2 producing electricity for the UK grid.

3.3 Consultation

- 3.3.1 RED has undertaken an extensive programme of community and stakeholder consultation to inform the EIA process and the design of Rampion 2. This has included consultation with Expert Topic Groups (ETG), as detailed in the respective ES topic chapters, where the design of various elements was

discussed. As an example, offshore windfarm layout was discussed several times at the seascape and landscape ETG meetings.

- 3.3.2 An iterative approach to consultation has been used by RED to ensure that consultation could take place at an early stage where feedback could influence the proposals. The non-statutory consultation was undertaken in respect of an area of search before proposals were developed taking feedback into response and then presented at the project wide consultation stage. Later stages of consultation had more information as the proposal developed, including preliminary environmental information, to enable consultees to understand the potential benefits and impacts.
- 3.3.3 Pre-application consultation is a legal requirement for NSIPs and an important part of the design process. RED has consulted the local community, statutory bodies and other relevant stakeholders on its development proposals in accordance with the requirements of the Planning Act 2008.
- 3.3.4 The comments received at each stage of the consultation were recorded, analysed and used to inform the evolution of the proposals.
- 3.3.5 The **Consultation Report [APP-027]** provides full details of the consultation process and includes a description of key design decisions that have been made by RED as a result of feedback received to date. Details of how RED has taken account of the comments received are also provided in each assessment topic chapter of the ES where relevant.
- 3.3.6 Below is a table of the consultations that were carried out, the statutory requirements they fulfilled, the status of preliminary environmental information consulted and the changes to the Project as a result of that consultation.

Table 3-1 Summary of changes to the proposals as a result of consultation

Stage of consultation	Type of consultation and PEIR status	Summary of offshore changes to the Project as a result of consultation
1. Non-statutory consultation	Non-statutory No preliminary environmental information published	The offshore Area of Search was reduced from 315km ² to 270km ² ; Commitment to drill underneath Climping Beach.
2. Project wide consultation	Statutory consultation under sections 42, 46,47 and 48 of the Planning Act 2008 PEIR published and consulted on.	A further reduction of the overall boundary of the offshore wind farm by over 40% from 270km ² in the previous consultation, to 160km ² . Reduction of the Zone 6 area closest to the Dover Strait Traffic Separation Scheme (TTS) and at the western edge of the array area due to shipping and navigation constraints.

Stage of consultation	Type of consultation and PEIR status	Summary of offshore changes to the Project as a result of consultation
		<p>Reductions in the Zone 6 area in the east to reduce the seascape and landscape impacts on the Sussex Heritage Coast.</p> <p>Reduction of the maximum number of wind turbines to a maximum of 90 turbines - 26 fewer than in the previous proposal;</p> <p>Introduction of the Windfarm Separation Zones (where no WTGs or offshore substations can be built) between the turbine areas for Rampion 2 and the existing operational Rampion Offshore Wind Farm to mitigate visual impacts by separating the Rampion 2 array area from the built Rampion 1 turbines, and to serve as a navigation corridor and provide Helicopter Refuge Areas (HeRA).</p>
3. Onshore consultation	Statutory consultation under sections 42, 46,47 and 48 of the Planning Act 2008 Supplementary Information Report to support the PEIR published and consulted on.	No changes to offshore elements.
4. Targeted onshore cable route consultation – LACR 01d	Statutory consultation under section 42, non statutory consultation with the community. Further Supplementary Information Report to support the PEIR published and consulted on.	No changes to offshore elements.
5. Targeted Rampion 2 extension to the	Statutory consultation under section 42, non	No changes to offshore elements.

Stage of consultation	Type of consultation and PEIR status	Summary of offshore changes to the Project as a result of consultation
National Grid substation consultation	statutory consultation with the community Standalone Preliminary Environment Information document published consulted on.	
6. Minor highways changes and new parties consultation	Targeted consultation under section 42, no consultation with the community Existing PEIR and supporting documents consulted on.	No changes to offshore elements.
7. Project refresh consultation	Targeted consultation under section 42, no consultation with the community Existing PEIR and supporting documents consulted on.	No changes to offshore elements.

3.4 Design Evolution and Process

- 3.4.1 The design evolution process adopted for Rampion 2 is a fundamental element of the EIA. The design decisions taken in terms of the infrastructure and location are set out in **Chapter 3 Alternatives, Volume 2** of the ES [APP-044]. From the outset the environment has been central to the design of Rampion 2, from its earliest stages, and this is demonstrated through the development of the **Commitments Register [REP3-049]**. 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.
- 3.4.2 The design proposals for Rampion 2 have been developed through a series of clearly defined stages which were closely aligned to the pre-application consultation process. These are defined as follows:
- Scoping boundary and commitments register
 - Preliminary Environmental Information Report (PEIR) Assessment Boundary and Commitments Register
 - Updates to assessment boundary and Commitments Register following PEIR
 - Proposed DCO Order Limits and Commitments Register

- Updates to the Commitments Register pursuant to further engagement during the Examination period

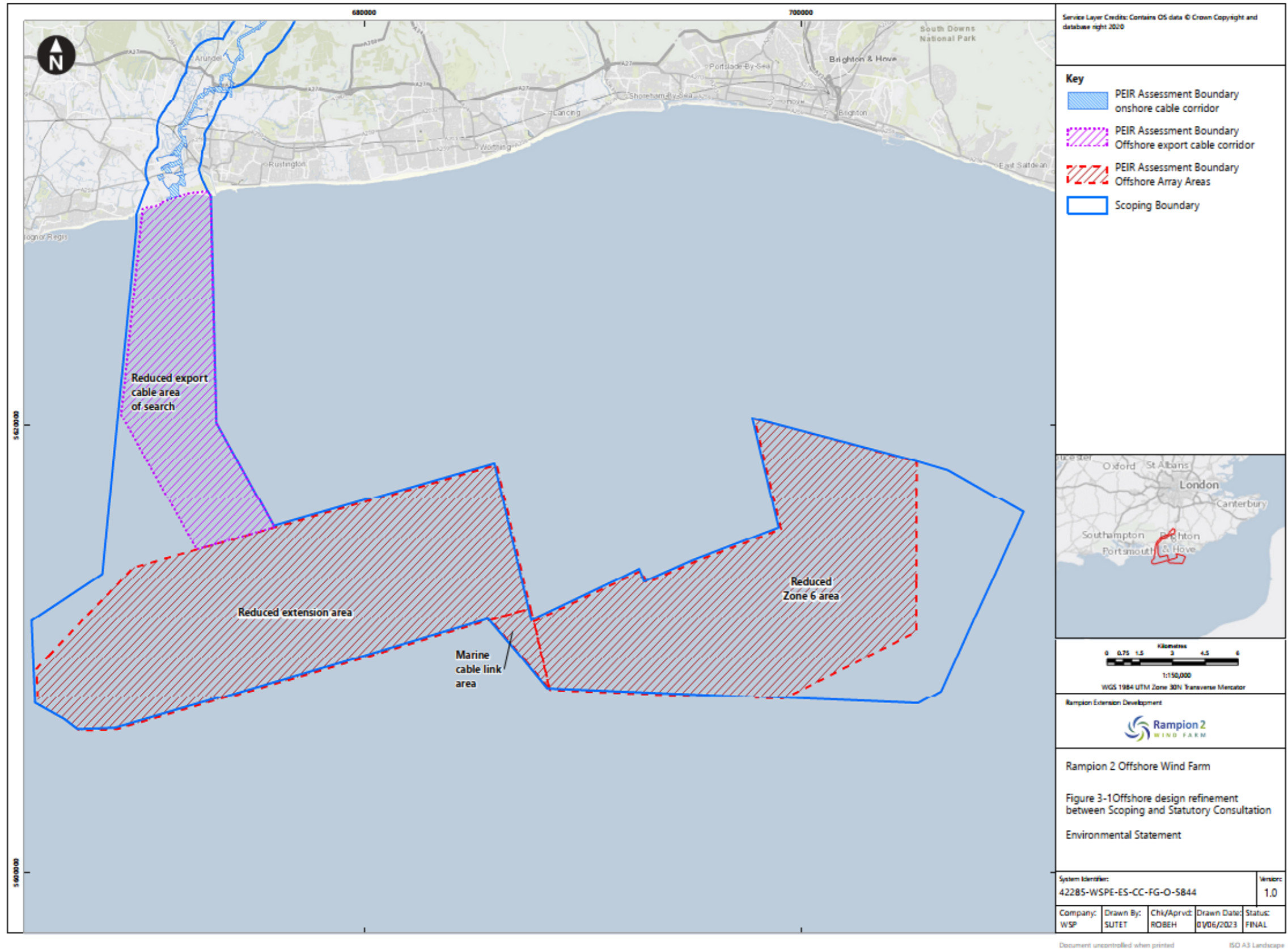
3.4.3 The Environmental Impact Assessment Scoping Report (RED, 2020) was based on a Scoping Boundary which at that early stage of the project combined the Areas of Search for the offshore and onshore infrastructure associated with Rampion 2. It defined the area within which Rampion 2 and associated infrastructure 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.

Offshore refinements since the Scoping Stage

3.4.4 Following Scoping, two workshops were held which brought together technical engineering and environmental specialists. These considered feedback from stakeholders and the Scoping Opinion (RED, 2020), in order to reduce the area of the Scoping Boundary to the PEIR Assessment Boundary.

3.4.5 As a result of concerns about shipping and navigation issues, the eastern edge of the Scoping Boundary was refined to increase the distance to the Dover Strait Traffic Separation Scheme, and the western edge was refined to provide more space between the array area and the Marine Conservation Zone containing Owers and Mixon rocks. In addition, this eastern area was reduced in order to ensure it was fully covered by existing digital aerial ornithological surveys. Further refinements were also made to reduce the area of the offshore export cable corridor to take account of engineering requirements.

Figure 3-1: Offshore Design refinement between Scoping and Statutory Consultation



Offshore refinement since first Statutory Consultation exercise

3.4.6 Further design evolution has occurred since first Statutory Consultation exercise in July 2021, which has resulted in the reduction of the PEIR Assessment Boundary to the proposed DCO Order Limits. Reductions in the offshore array areas have been made to address consultation feedback from stakeholders, key concerns raised included:

- Visual effects, particularly to the Sussex Heritage Coast;
- Shoreham Port - disruption to vessel access to the Dover Straight;
- Maritime and Coastguard Agency – concerns raised on lines of sight for Search and Rescue;
- UK Chamber of Shipping – navigational safety concerns, particularly at the western extent of the array area;
- UK Chamber of Shipping – deviation required to well established shipping routes; and
- Marine aggregates - implementation of a buffer between aggregate Licence areas and offshore structures within the array area.

3.4.7 In response to these concerns, all constraints were considered and the design of the array area was amended to introduce two Windfarm Separation Zones (as secured by the **Offshore Works Plan [PEPD-004]**) where no WTGs or offshore substations will be built. Thereby mitigating visual impacts, by providing separation between the Rampion 2 structures and the built Rampion 1 turbines. The introduction of the Windfarm Separation Zones also provided benefits by reducing the disruption to marine traffic and by addressing line of sight safety concerns.

3.5 Summary

3.5.1 The evolution of the Offshore Array Area and the reasons for refinements are summarised in **Table 3-2**.

Table 3-2 Summary of reasons for area reduction

Location	Constraints	Refinement	Project Stage
'Round 6' array 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.

Location	Constraints	Refinement	Project Stage
'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).

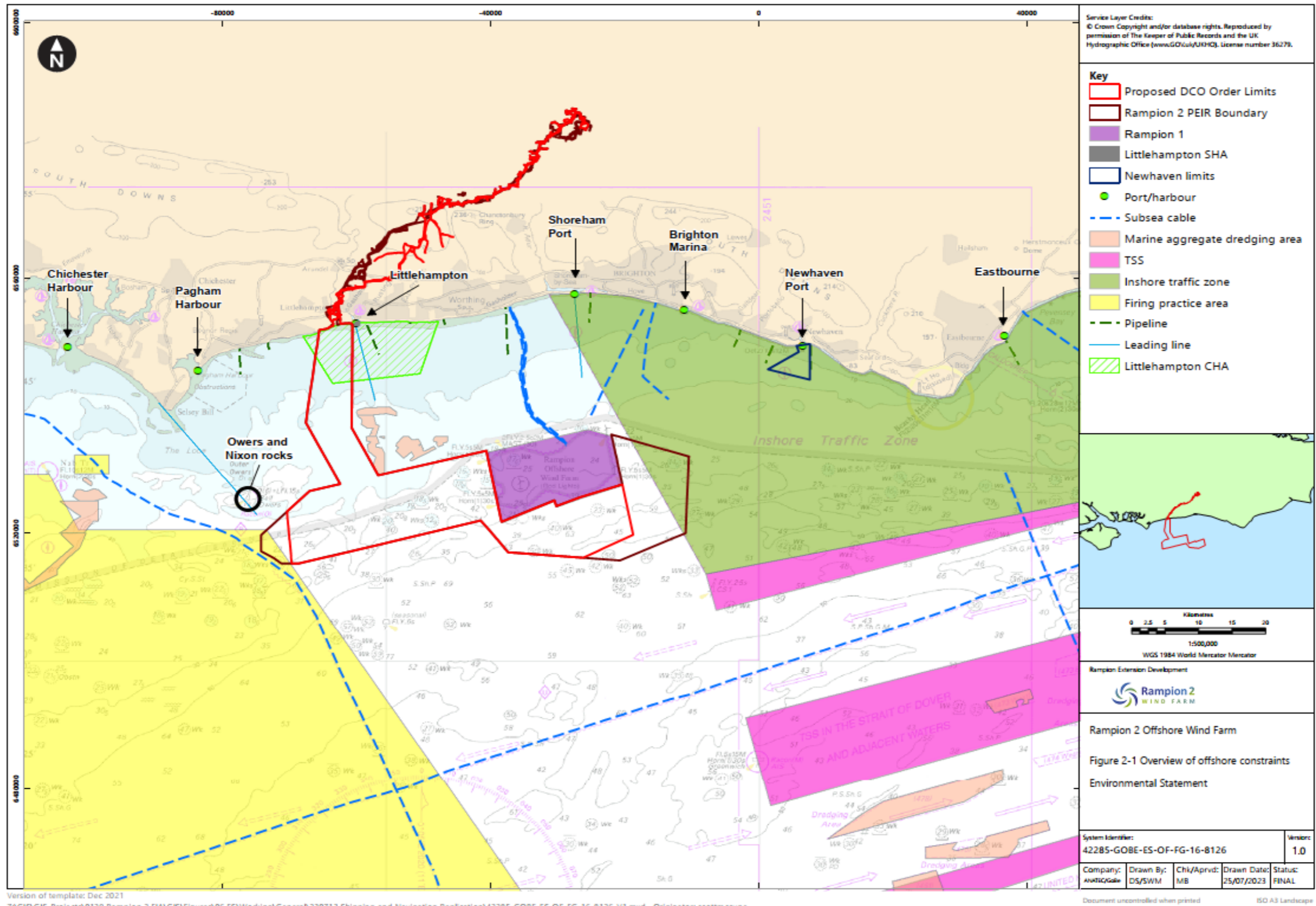
4. Site Overview

- 4.1.1 Rampion 2 is located adjacent to the existing Rampion Offshore Wind Farm Project ('Rampion 1') in the English Channel. Rampion 2 will be located between 13 km and 26 km from the Sussex Coast in the English Channel and the offshore array area will occupy an area of approximately 160 km².
- 4.1.2 The offshore Order Limits include the wind farm array area as defined by the two Crown Estate (TCE) AfLs, which comprised:
- the balance of the zone 6 area identified through the Crown Estate leasing rounds, which was subject to an agreement for lease as part of the original Rampion offshore wind farm proposals but was not subsequently developed; and
 - the extension area lease area and offshore cable corridor required to connect the wind farm to the landfall (export cable corridor).
- 4.1.3 These areas are located as shown in **Figure -1**.

4.2 Bathymetry and Geology

- 4.2.1 Water depths across the wind farm array area vary from approximately 13 m LAT (on a rocky outcrop in the north-west of the site) to 65 m LAT (within a broad depression) in the south-east of the array. Sandwaves are prevalent over much of the central and eastern array area, trending north-west to south-east, with heights of up to 2 m relative to the surrounding seabed. The seabed across the array and export cable corridor is dominated by the presence of coarse-grained sediments (sands and gravels) with outcropping bedrock in places. There is also a failed seawall and groynes in the vicinity of Climping, to the west of the onshore landfall corridor.
- 4.2.2 Consideration of seabed ground conditions and bathymetry, including water depth, have been key feasibility criteria in the design of the array and export cable areas of the proposed Order limits from the earliest stages of the design process. These aspects will continue to influence the design refinements as the project moves forward through the optimisation process to final design, influencing the selection of appropriate construction methodologies and infrastructure components. These detailed design activities will ensure RED is able to bring forward an efficient project which optimises the benefits of renewable energy generation, notably including reducing costs to consumers, whilst appropriately minimising negative impacts.
- 4.2.3 Further detailed analysis of the existing environment is provided in **Chapter 6: Coastal processes, Volume 2** of the ES [APP-047].

Figure -1 Overview of offshore constraints



4.3 Seascape and Landscape

- 4.3.1 Rampion 2 is located within the seascape of Sussex Bay, partially within the Selsey Bill to Seaford Head Marine Character Area (MCA) and partially within the English Channel MCA. The South Downs National Park (SDNP) is located to the north and its coastal extent is co-incident with the Sussex Heritage Coast, along the distinctive white cliffs of the Seven Sisters and Beachy Head between Seaford and Eastbourne. See **Figure -2** below.
- 4.3.2 This part of the SDNP is open at its seaward limit to encompass an associative (but not formally defined) extent of seascape, with this part of the SDNP having a maritime setting with 'breathtaking views' and 'stunning, panoramic views to the sea' that are recognised as part of the special qualities of the SDNP, as set out within the SDNP Special Qualities Report (SDNPA, undated).
- 4.3.3 The SDNP is of particular relevance to the SLVIA due to its association with the closest coastal landscapes of the SLVIA study area and its elevation which provides an 'auditorium' for sea views. The SDNP also has sea views from inland areas to the west from its spine of open elevated chalk downs that are traversed by the South Downs Way long distance trail; however, these views are across the settled coastal plain and extensively developed south coast urban areas within East Sussex and West Sussex.
- 4.3.4 There is a nearly continuous urban edge of coastal conurbations between Seaford, Brighton, Worthing and Bognor Regis, which form an undesignated, urbanised coastal strip that separate the SDNP from the coast. The location of Rampion 2 off the Sussex coast also means that it is exposed to and visible from these settlements along the coast.
- 4.3.5 Uninterrupted sea views are important to the character and sense of space when within the settlements and popular tourist/visitor areas along the seafront, including at Brighton & Hove, Worthing, Littlehampton, Bognor Regis and Selsey in West Sussex. The existing Rampion 1 offshore wind farm forms a notable visible element in the existing seascape and is part of the baseline for seascape, landscape and visual effects assessments.
- 4.3.6 Significant seascape, landscape and visual effects of Rampion 2 are contained within the areas of the SDNP, West Sussex, East Sussex and the City of Brighton & Hove. There will be some harm to the SDNP's Special Qualities, in particular 'diverse, inspirational landscapes and breathtaking views' would be changed in parts of the SDNP; however such harm does not translate to compromising the statutory purpose of the SDNP.

Design Evolution

- 4.3.7 No measures are available to completely mitigate the significant effects on views from coastal settlements, the SDNP and Heritage Coast; however, measures are embedded as part of the Rampion 2 design to avoid, minimise or reduce any significant environmental effects on seascape, landscape and visual receptors, as far as possible, and the project will compensate for residual effects.

- 4.3.8 Due regard to the statutory purpose of the SDNP has been had through the project design process, in order to reduce adverse effects on the ‘breathtaking views’ and ‘stunning, panoramic views to the sea’ defined in Special Quality 1 their magnitude and geographic extent (see seaward facing **Graphic -1** below). The spatial extent of the Rampion 2 array area has been reduced and designed according to a set of SLVIA specific design principles (as set out in **paragraph 6.3.3** of this document).
- 4.3.9 The SLVIA design principles determined that the area to the east of Rampion 1 be avoided and that the Rampion 2 array be focused to the south and west of Rampion 1 wind farm, which is further offshore at greater distance from the Heritage Coast of the SDNP, while also having a narrow additional lateral spread in the field of view and having a clear line of sight between Rampion 1 and 2 arrays which ensures that it appears as a distinct array with less contrast and a degree of balance with Rampion 1 when viewed from the Heritage Coast.
- 4.3.10 The SDNP has the highest status of statutory and policy protection in relation to landscape and scenic beauty. RED has had regard to the statutory purposes (as set out in the National Parks and Access to the Countryside Act 1949 (as amended)) through the selected project design, which helps ensure its continued protection, which also applies when considering applications outside the boundaries of the SDNP which might have impacts within. It is considered that Rampion 2 avoids compromising the purposes of the SDNP designation and has been designed sensitively with due regard to its statutory purpose, despite the fact that it will be visible from within the SDNP and that it may have significant effects on certain special qualities – its ‘breathtaking views’ and ‘stunning, panoramic views to the sea’ defined in Special Quality 1 (see seaward facing **Graphic -1** below).
- 4.3.11 It is concluded, however that while there is harm to SQ1 “Diverse, inspirational landscapes and breathtaking views” (during construction and operation) and SQ3 “Tranquil and unspoilt places” (during construction), it is not the duty to avoid all harm and such harm does not translate to compromising the statutory purpose of the SDNP. The natural beauty, wildlife and cultural heritage that make up the affected areas and the wider SDNP will remain and opportunities will still be present for understanding and enjoyment by the public of the special qualities of the SDNP and RED has sought to further these purposes as described.
- 4.3.12 Rampion 2 will not therefore undermine the statutory purpose of the SDNP or compromise the purposes of its designation and through the application of the mitigation hierarchy and compensation measures described above RED has brought forward the Proposed Development in a way which seeks to further the purposes of the SDNPA. Therefore, the Proposed Development accords with the requirements of the legal tests and the policy tests set out in the NPS in relation to the SDNP.

Graphic -1: Existing views

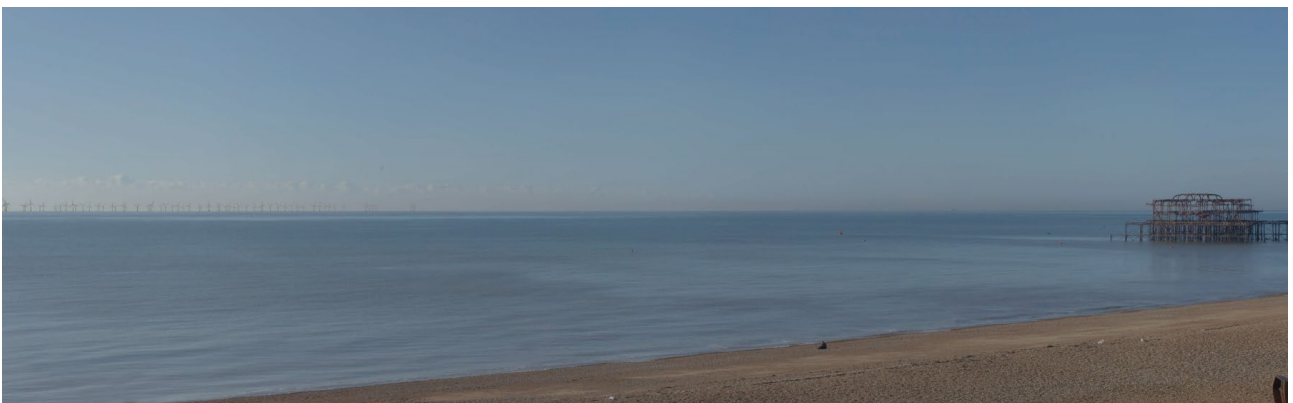
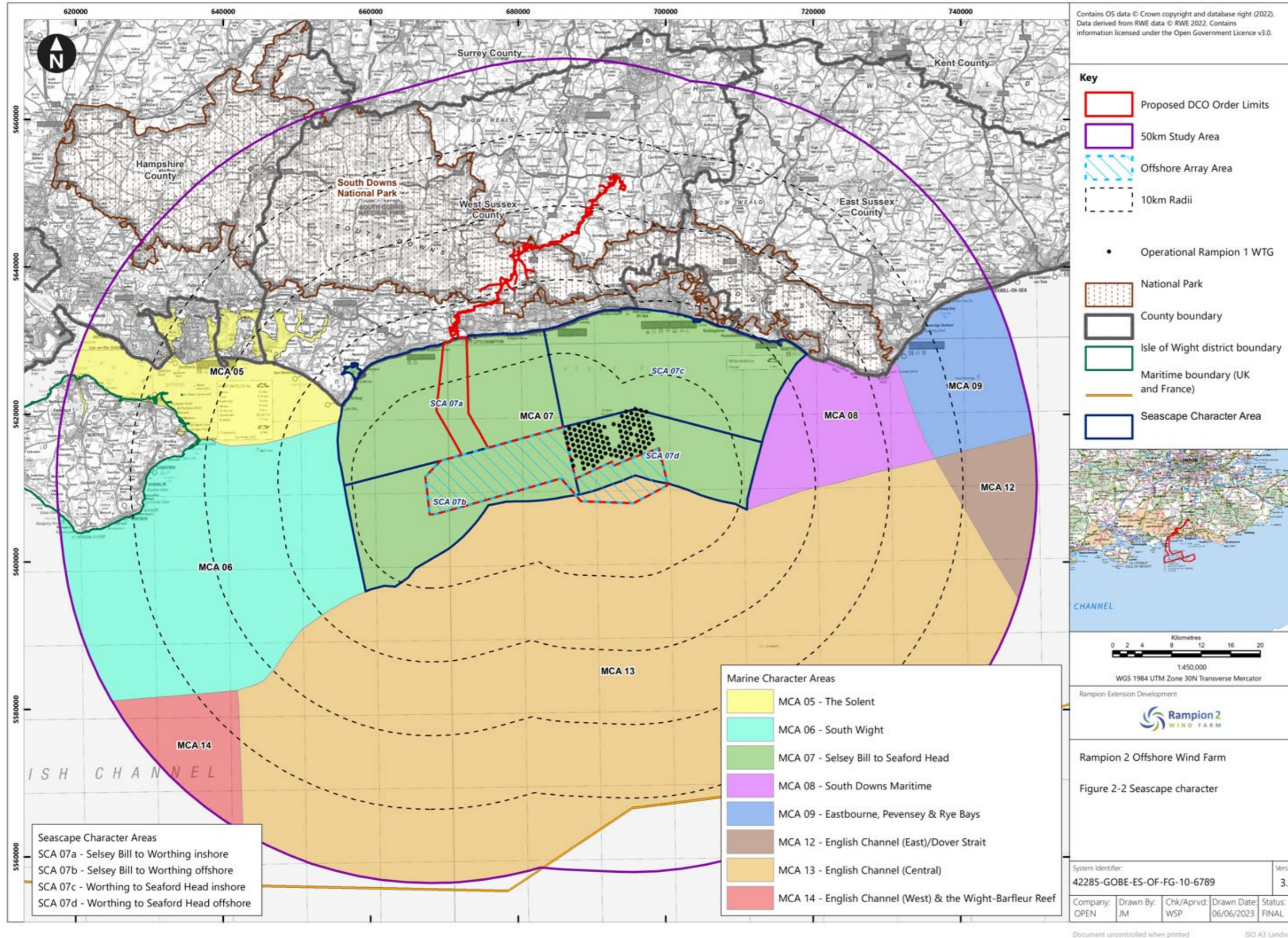


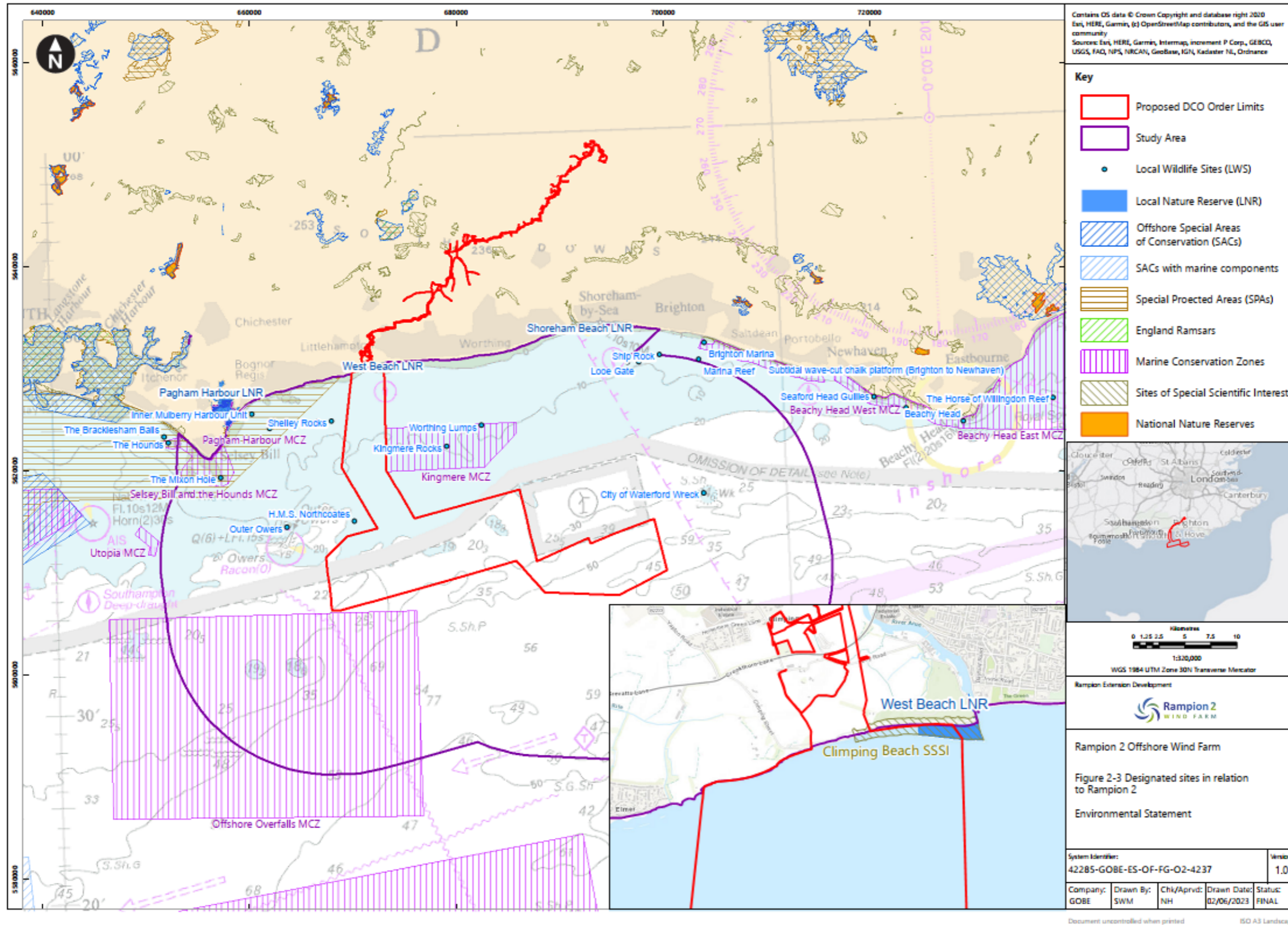
Figure -2 Seascape character



4.4 Offshore Ecological Environment

- 4.4.1 The closest sites with European designations to Rampion 2 are Solent and Dorset Coast SPA and Pagham Harbour SPA approximately 1 km and 10 km respectively. Information on European and nationally designated sites considered in the assessments undertaken during the consenting of Rampion 2 is provided in **Figure -3**.
- 4.4.2 There are a number of nationally designated Marine Conservation Zones (MCZs) and SSSIs within close proximity of the Proposed Development area. Kingmere MCZ lies adjacent to the proposed DCO offshore export cable corridor, and Offshore Overfalls MCZ lies 0.25 km to the southeast of the DCO limits.
- 4.4.3 The fish and shellfish assemblages within the region are typical of the wider English Channel. Many species of fish and shellfish are known to either spawn or have nursery areas in relatively close proximity to or overlapping the Study Area. Notably, black seabream nesting areas are located within and adjacent to the Rampion 2 offshore export cable corridor.
- 4.4.4 Existing data shows that the sediments within the western section of the study area are predominantly characterised by coarse and mixed sediments, with the eastern area identified as having a greater proportion of sand and muddy sand sediments. Predictive habitat modelling reveals 15 biotopes throughout the study area from a total of seven broadscale habitats. Habitat and biotope mapping of the intertidal area reveals nine unique biotopes (EUNIS level 5 or above) from a total of four broadscale habitats.
- 4.4.5 With regards to marine mammals, existing data identified the highest densities in the area were recorded for harbour porpoise and common dolphins. Lower densities of bottlenose dolphins and minke whales were recorded suggesting the area is not of high importance for these species. Grey seal and harbour seals have also been identified within the baseline.
- 4.4.6 The ornithological assessment has considered impacts from disturbance and displacement of birds, and indirect impacts on bird species due to impacts on prey species habitat loss. During the operational phase impacts that have been assessed include collision risk with rotating Wind Turbine Generator (WTG) blades and barrier effects (i.e. blocking of flight paths from the array area). The study area for the offshore and intertidal ornithology assessment includes the area in which the WTGs will be located plus a 4 km buffer, the export cable corridor and the cable landfall area. The key bird species present in the Rampion 2 array area, offshore export cable corridor and cable landfall area, based on the results of the desk study and aerial digital survey data presented in **Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES [APP-150] include gannet, kittiwake, guillemot, razorbill, and large gulls.

Figure -3: Designated Sites in relation to Rampion 2



- 4.4.7 Of the species present in the highest numbers, the following was reported: during winter and spring guillemot and razorbill were the dominant species whilst in summer the most abundant species were kittiwake and lesser black-backed gull and in autumn gannet, kittiwake and great black-backed gull were the most abundant. During the breeding season only kittiwake and lesser black-backed gull exceeded the threshold for regionally important numbers and no species were present in nationally or internationally important numbers. During winter red-throated diver, fulmar, kittiwake, lesser black-backed gull, guillemot and razorbill exceeded the threshold for regionally important numbers and no species were present in nationally or internationally important numbers.
- 4.4.8 Waterbird occurrence is generally very low on a regional and national scale within the intertidal environment at the proposed landfall area, with only sanderling and Mediterranean gull being found in sufficient numbers to warrant further consideration.
- 4.4.9 Further detailed analysis of the existing environment is provided in **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES [APP-049], **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES [APP-050], **Chapter 11: Marine mammals, Volume 2** of the ES [REP1-004], **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES [APP-053] and the **Draft Marine Conservation Zone assessment [APP-040]**.

Design Evolution – Ornithology

- 4.4.10 In response to the increasing level of cumulative impacts on ornithological receptors, during the 2021 statutory consultation of the Preliminary Environmental Information Report (PEIR) Natural England recommended that raising the turbine draught height should be considered as standard mitigation practice, and that relevant proposals should include this measure in order to reduce their contributions to the cumulative/in combination collision totals by as much as is possible.
- 4.4.11 RED considered the possibility of increasing the turbine draught height to above 22m Mean High Water Springs (MHWS). However, increasing the turbine draught height, without affecting the overall electricity generating potential, would require turbines of a greater overall height and would have repercussions for the visual impacts of the Proposed Development, in particular on the Sussex Heritage Coast and the South Downs National Park.
- 4.4.12 The cumulative impact of the Proposed Development on ornithological receptors (namely kittiwake, guillemot, and razorbill) is relatively small in comparison to other UK wind farms (described as ‘modest’ by Natural England in its Deadline 3 Submission **Appendix B3 Natural England’s Advice on the Applicant’s Deadline 1 submissions relating to Guillemot, Razorbill and Great black-backed gull [REP3-080]**). The **Report to Inform Appropriate Assessment [APP-038]** concluded that no adverse effects to site integrity would occur. However, in line with advice from Natural England, RED has submitted a **Habitats Regulations Assessment (Without Prejudice) Derogation Case [APP-039]**, alongside possible compensation options, if required.

- 4.4.13 Natural England has agreed with this position in its Deadline 2 submission, row 9-1, **Appendix N2 to the Natural England Deadline 2 Submission [REP2-040]**, which states:

“A larger ‘air gap’ achieved by raising the blades higher from the sea surface has the potential to decrease the number of predicted collisions, thereby mitigating this impact to some extent. However as set out in our Relevant Representations, raising the turbine blades higher would result in increased visual impacts on designated landscapes, notably the South Downs National Park, and therefore in this instance, Natural England considers this is not an appropriate mitigation measure for the Applicant to pursue.”

- 4.4.14 Taking these factors into account, and noting the project aims set out in **Section 2.1** and the Design Principles set out in **Table 2-1** of this document. To maximise the renewable energy generation potential of the Proposed Development, increasing the turbine draught height was discounted as an option.

Design Evolution – Benthic and fish and shellfish ecology

- 4.4.15 **Micrositing** – a routing design exercise has been undertaken to demonstrate the principles of the approach that will be adopted for the final design. Outputs from this exercise have been used to illustrate the proposed route design mitigation process presented within **In Principle Sensitive Features Mitigation Plan [REP3-045]**.
- 4.4.16 The refinement of the export cable routing design will provide avoidance of known sensitive features (known black seabream nesting sites and NERC geogenic and biogenic reef habitats) within the offshore export cable corridor area (as far as practicable), as well as maximising the potential to achieve cable burial. Cable burial will aid seabed habitat recovery in sediment areas and reduce the need for secondary protection, consequently minimising any potential for longer-term residual effects.
- 4.4.17 Pre-construction surveys will be undertaken ahead of installation works and the results of these, along with the export cable specifications and installation equipment parameters, will inform the final routing/micrositing of cables.
- 4.4.18 **Use of specialist cable laying and installation techniques** – where relevant and required, the adoption of specialist offshore export cable laying, and installation techniques will minimise the direct and indirect (secondary) seabed disturbance footprint to reduce impacts, which will provide mitigation of impacts to all seabed habitats, but particularly chalk and reef areas as well as potential (unknown) black seabream nesting locations, where avoidance is not possible. RED will seek to utilise the most appropriate technology available at the time of construction to reduce the direct footprint impact from cable installation.
- 4.4.19 **Cable protection** – RED has committed to the use of cable protection that minimises environmental impacts as far as reasonably practicable. At the point of selecting a cable protection supplier, consideration will be given to using the method of cable protection which is likely to be removable at decommissioning.
- 4.4.20 **Data sharing** – early engagement with marine aggregates companies, led to additional datasets being used to inform **Chapter 8: Fish and shellfish ecology**,

Volume 2 of the ES [APP-049]. The additional data provided by the companies provided additional information on the context of black seabream populations in proximity to the Proposed Development for the purposes of assessment and informed the preliminary export cable route micro-siting design, as set out within the **In Principle Sensitive Features Mitigation Plan [REP3-045]**.

- 4.4.21 **Double big bubble curtains** – following continued engagement with Natural England and the MMO on the impacts of underwater noise, RED has committed to the use of double big bubble curtains throughout the piling campaign. The implementation of this mitigation will further reduce the impact ranges of underwater noise (including behavioural effect ranges) to: sensitive features such as seahorse as features of MCZs, spawning herring, and marine mammals within the vicinity of Rampion 2.

4.5 Historic environment

- 4.5.1 The area of seabed that the marine archaeology study area covers was previously a large swathe of dryland that was inhabited during the Pleistocene and early Holocene (Mesolithic). The dynamic processes of climate and landscape change throughout the Pleistocene as a result of warming and cooling cycles and fluctuations in sea-level resulted in repeat (re)colonisation and abandonment of these landscapes.
- 4.5.2 Within the marine archaeology study area there are a total of 38 live wrecks, 22 dead wrecks, four unknown or unconfirmed, and two lifted wrecks (**Figure -4**). There are also 17 reported losses of aircraft, all but one, which is unidentified, date to the Second World War, as well as a number of targets identified during seabed surveys which may have further archaeological interest. Where in-situ remains associated with any military aviation losses are found, they will be archaeologically significant and protected under the Protection of Military Remains Act 1986.
- 4.5.3 Further detailed analysis of the existing environment is provided in **Chapter 16: Marine archaeology, Volume 2** of the ES [APP- 057].

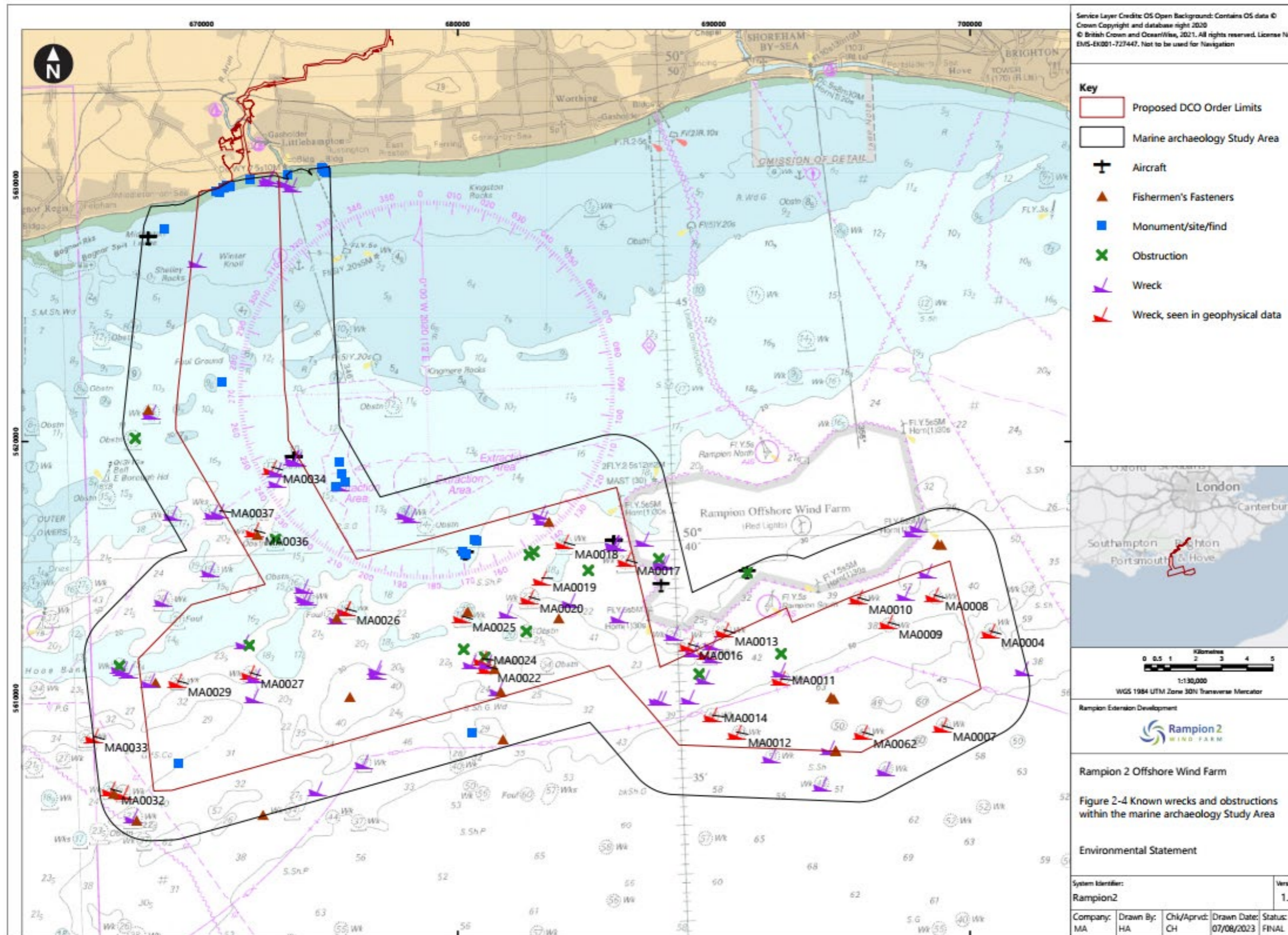
Design Evolution

- 4.5.4 Through site evolution, RED has excluded the eastern area of the array area as presented at PEIR closest to the Heritage Coast and will continue with sensitive design and turbine layout through micro-siting of turbine locations and cable routes to avoid sites of archaeological interest, such as wrecks.
- 4.5.5 Offshore geotechnical surveys will be undertaken following discussions with Historic England and the results of the geoarchaeological assessment will be presented in staged geoarchaeological reports inclusive of publication. The published results will aim to enhance the palaeogeographic knowledge and understanding the area. Offshore geophysical surveys will be subject to full archaeological review where relevant in consultation with Historic England.
- 4.5.6 The Marine Written Schemes of Investigation (WSI) will detail environmental measures including the archaeological exclusion zones (AEZ), the implementation of a Protocol for Archaeological Discoveries and methodologies for future

monitoring, survey and assessment requirements. RED will employ a series of commitments and duties to monitor, report and record any archaeological finds.

- 4.5.7 All intrusive activities undertaken during the life of the project will be routed and microsited to avoid any identified marine heritage receptors, (unless other mitigation is agreed with Historic England). Micrositing and AEZs will further be applied to yet undiscovered marine heritage receptors should they be located.
- 4.5.8 The post-construction monitoring plan will recommend areas or sites of archaeological interest or significance for monitoring and outline how post-construction monitoring campaigns will collect, assess and report on changes or impacts to marine heritage receptors that may have occurred during the construction phase.

Figure -4: Known wrecks and obstructions within the marine archaeology Study Area



4.6 Shipping and navigation

- 4.6.1 Key navigational features in proximity to Rampion 2 include the existing Rampion 1 (fully commissioned in November 2018), the Dover Strait Traffic Separation Scheme (TSS) and several marine aggregate dredging areas (see **Figure -5**). There are also several ports and harbours located along the coast within the Study Area.
- 4.6.2 From vessel traffic survey data recorded on-site there are notable volumes of vessel traffic passing within or in proximity to Rampion 2. Cargo, tankers, recreational and fishing vessels are all prominent, with movements dictated by the navigational features highlighted.
- 4.6.3 The Rampion 2 site and the offshore export cable route corridor are fished to varying degrees by UK beam trawlers, otter trawlers, long-liners, fixed and drift netters, dredgers and potters; and French dredgers and otter trawlers, Belgian beam trawlers, and Dutch and German pelagic trawlers.
- 4.6.4 Both UK and other EU demersal trawl fisheries are active across Rampion 2, with more heavily targeted grounds located to the southeast of the commercial fisheries study area. Trawling takes place within the offshore cable corridor, with activity fairly widespread throughout inshore waters along the wider coastline.
- 4.6.5 There is a vessel transit route passing through to Brighton and Eastbourne to/from the Solent.
- 4.6.6 There is a relatively high number of inshore sailing clubs and organisations in the vicinity of the study area. The general coastal and inshore area within the region is popular for dinghy sailing and racing. During the summer months in particular, jet skiing, water skiing and other small recreational motorboats are launched from the beaches along the coast. The majority of these recreational activities occur inshore, typically within 250m of the coast and are therefore well inshore of the Proposed Development area.
- 4.6.7 There are six active marine aggregate-extraction sites located within the study area. The closest marine aggregates licence area to the Proposed Development is the Inner Owers aggregate site (Licence area 396/1), from which flint gravel deposits are extracted. This licence area borders the Rampion 2 export cable corridor and at its closest is 0.06 km away.
- 4.6.8 Further detail on the existing environment is contained within **Chapter 13: Shipping and Navigation, Volume 2** of the ES [APP-054] and **Appendix 13.1: Navigational risk assessment, Volume 4** of the ES [APP-155].

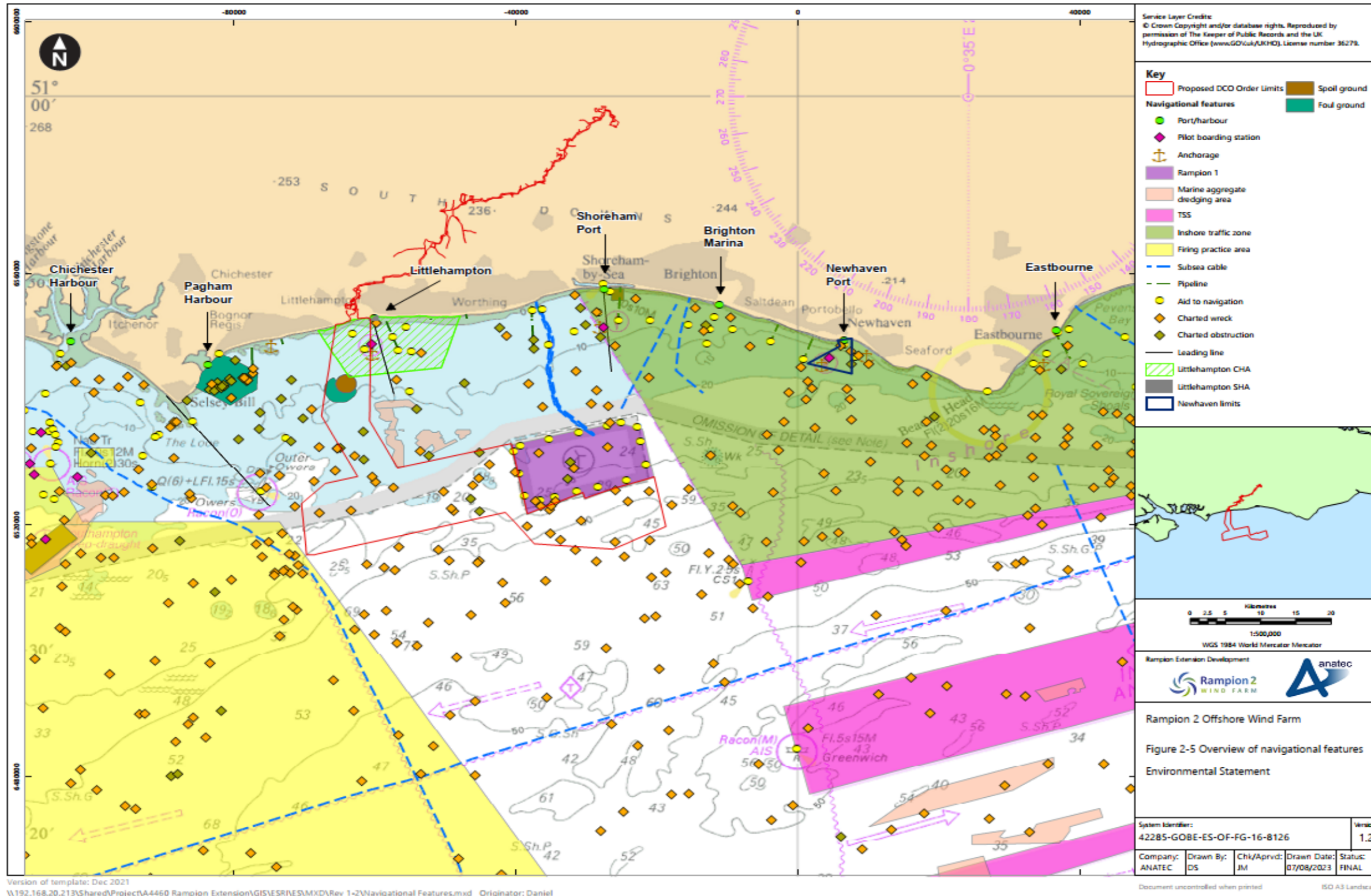
Design Evolution

- 4.6.9 Concerns were raised following the publication of the Scoping Report (RED, 2020) about the potential formation of a narrow channel between the array's western edge and the Owers and Mixon rocks, increasing collision and grounding risks. As a result, the Scoping Boundary was refined to allow more space, and the areas closest to the Traffic Separation Scheme and Shoreham's fishing grounds were reduced pre-application.

- 4.6.10 Due to the proximity of marine aggregates licence areas to the Proposed Development, engagement with aggregates companies (including Heidelberg Materials Marine (previously Hanson Aggregates Marine Ltd.), Tarmac Marine Ltd (Tarmac) and CEMEX UK Marine Ltd (CEMEX),) has been ongoing throughout the pre-application phase. Early engagement with these companies resulted in RED purchasing environmental monitoring reports which provided details of black seabream populations in the vicinity of the Proposed Development and was used to inform **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES [APP-049].
- 4.6.11 In 2021 and 2022, issues were raised by those companies regarding the proximity of the Proposed Development to their operations and the requirement for minimum clearances between the aggregates sites and the Proposed Development. In response to these concerns, RED presented safety buffer zones where no wind turbine or substation structures would be placed, providing a suitable separation distance, as shown on the **Offshore Works Plans [APP-008]**.
- 4.6.12 The following shipping and navigation concerns were also raised during statutory consultation:
- 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.
 - 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.
- 4.6.13 In response to these concerns, the layout of the Offshore Array Area was 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. 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.

Figure -5 Overview of navigational features



5. Agreement for Lease Area Definition

5.1 Overview

- 5.1.1 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 Department of Energy & Climate Change (DECC), which completed in 2009. Development rights for the zones were not awarded until the completion of the SEA.
- 5.1.2 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 the Rampion Extension Development in September 2019.
- 5.1.3 A description and justification of the AfL boundaries is provided below.

5.2 Initial Site Selection

- 5.2.1 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.
- 5.2.2 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 in addition to the extension area. One of TCE criteria for extension projects states that "The proposed extension must share a boundary with the existing wind farm" (TCE, 2017).

5.3 Rampion 2 Area of Interest

- 5.3.1 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 of **Chapter 3: Alternatives – Figures, Volume 3** of the ES [APP-075]). 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.
- 5.3.2 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.
- 5.3.3 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.
- 5.3.4 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.

5.3.5 The consideration of environmental parameters and other constraints has been a central theme of site selection. 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.

6. Layout

6.1 Introduction

- 6.1.1 The final layout of the project will not be finalised until completion of detailed pre-construction wind resource studies, site investigations and the selection of the preferred turbines and their foundations, taking account of the outcome of the site investigation data and detailed design works. **Chapter 4: The Proposed Development, Volume 2** of the ES [APP-045] outlines that the description of the Proposed Development is indicative and a ‘design envelope’ approach has been adopted which takes into account Planning Inspectorate Advice Note Nine: Rochdale Envelope, July 2018 (Planning Inspectorate, 2018). The provision of a design envelope is intended to identify key design assumptions to enable a robust environmental assessment to be carried out whilst retaining enough flexibility to accommodate further refinement during detailed design.
- 6.1.2 The key offshore and onshore component assessment assumptions are provided in Section 4.3 and Section 4.5 in **Chapter 4: The Proposed Development, Volume 2** of the ES [APP-045]. Where relevant, bold text indicates a parameter outlined in the **Draft Development Consent Order [REP3-003]** (updated at Deadline 4) within assessment assumption tables Table 4-2 to Table 4-27, a summary table for the parameters is also provided in **Appendix 4.3: Proposed Development Parameters, Volume 4** of the ES [APP-124]. These parameters are secured in the **Draft Development Consent Order [REP3-003]**, including within the Deemed Marine Licences (DML) conditions as relevant.

6.2 Layout Commitments

- 6.2.1 The final layout of the offshore wind farm infrastructure will be in accordance with the layout commitments that have been agreed in consultation with the Maritime and Coastguard Agency (MCA) and Trinity House (TH). These Layout Commitments have been developed in accordance with the guidance contained within the Marine Guidance Note (MGN 654) (Maritime and Coastguard Agency, 2021) and are presented in **Appendix 13.1: Navigational risk assessment, Volume 4** of the ES [APP-155].
- 6.2.2 A summary of the layout commitments is provided in **Table -1**.

Table -1 Navigational and Layout Commitments

Commitment	Details	Details
C-45	Cable burial	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 and Installation Plan.
C-60	Micrositing	All intrusive activities undertaken during the life of the project will be routed and microsited to avoid any identified marine heritage receptors, with Archaeological Exclusion Zones (AEZs) (buffers) as detailed in the Outline Marine Written Schemes of Investigation (WSI) [REP3-041] unless other mitigation is agreed with Historic England as per the Marine WSI. Micrositing and AEZs will further be applied to yet undiscovered marine heritage receptors should they be located.
C-84	Lighting and marking	RED will exhibit lights, marks, sounds, signals and other aids to navigation as required by Trinity House, MCA and Civil Aviation Authority (CAA). This will include a buoyed construction area around the Rampion 2 array
C-85	Promulgation of information	RED will ensure that the local notice to mariners (NtM) is updated and reissued at weekly intervals during construction activities and at least five days before any planned operations and maintenance works and supplemented with VHF (very high frequency) radio broadcasts agreed with the Maritime & Coastguard Agency (MCA) in accordance with the construction and monitoring programme approved under DML conditions.
C-86	Layout	A layout plan (including cables) will be agreed with the MMO following appropriate consultation with Trinity House and the Maritime & Coastguard Agency (MCA) setting out proposed details of the authorised Proposed Development.
C-87	MGN 654 Compliance	No part of the authorised Proposed Development may commence until the MMO, in consultation with the Maritime & Coastguard Agency (MCA), has confirmed in writing that the undertaker has taken into account and, so far as is applicable to that stage of the Proposed Development, adequately addressed all MCA recommendations as appropriate to the authorised Proposed Development contained within MGN654 " <i>Offshore Renewable Energy Installations (OREIs) safety response</i> " (Maritime and Coastguard Agency, 2021) and its annexes.

Commitment	Details	Details
C-45	Cable burial	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 and Installation Plan.
C-60	Micrositing	All intrusive activities undertaken during the life of the project will be routed and microsited to avoid any identified marine heritage receptors, with Archaeological Exclusion Zones (AEZs) (buffers) as detailed in the Outline Marine Written Schemes of Investigation (WSI) [REP3-041] unless other mitigation is agreed with Historic England as per the Marine WSI. Micrositing and AEZs will further be applied to yet undiscovered marine heritage receptors should they be located.
C-88	Marine coordination	Marine coordination will be implemented to manage Rampion 2 vessels throughout construction and maintenance periods.
C-89	Blade clearance	There will a minimum blade tip clearance of at least 22m above MHWS.
C-266	Light reduction	During operation, and where visibility conditions permit, the intensity of aviation warning lights will be reduced to no less than 200cd (in Accordance with the Air Navigation Order 2016), subject to the availability of a commercial system.
C-267	Marine aggregates buffer zones	A separation buffer zone around Marine Aggregates licence areas (1nm downtide/0.5nm across tide) has been implemented where no turbines or substations are to be constructed.
C-269	Cable micrositing	Cable routeing design will be developed to ensure micrositing where possible to identify the shortest feasible path avoiding subtidal chalk and reef features, peat and clay exposures and areas considered to potentially support black seabream nesting.
C-297	Gravel bed micrositing	The location of gravel beds will be microsited to avoid sensitive features, where practicable.

6.3 Identification of the Final Layout

- 6.3.1 A layout will be designed within the consented parameters to optimise energy output and the foundation installation process, accounting for water depths, ground conditions, wake effects and any other constraints.
- 6.3.2 Determination of the final layout will be dependent on a range of factors including:
- Further survey work;
 - Selection of the Wind Turbine Generators;
 - Detailed engineering;
 - Engagement with MCA and Trinity House on final layout; and
 - Compliance with DCO Requirement / DML conditions.
- 6.3.3 Whilst the technical, economic and safety requirements of the project will take precedent in refining the final layout, other considerations, guided by the SLVIA Design Principles, will include the potential effects upon seascape, landscape and visual receptors. These considerations have already been reflected in the adoption of 'wind farm separation zones', which achieve a separation between Rampion 1 and Rampion 2 arrays, affording a clear distinction and lines of sight between the two projects. Where practicable, noting MGN 654 (Maritime and Coastguard Agency, 2021), RED will seek to produce a layout that addresses the following design principles:
- 'Field of view' – reducing the field of view or 'horizontal extent/lateral spread' of Rampion 2 and the visually combined lateral spread of Rampion 1 and Rampion 2 insofar as possible, taking account of other project objectives.
 - 'Proximity' - increasing the distance of Rampion 2 from most sensitive areas of coastline to reduce the apparent height of WTGs and increase sense of remoteness (with consequential benefits to other design principles).
 - 'Wind farm separation zones' (inherent in design and reflected in the Offshore Works Plans, as noted above).
 - 'Separation foreground' - avoiding juxtaposition of larger Rampion 2 WTGs in front of smaller Rampion 1 WTGs, to balance arrays and apparent turbine size, insofar as possible, in views from the Sussex Heritage Coast.
- 6.3.4 In addition to the SLVIA Design Principles, other aspects that will influence the design of the final layout, include:
- All offshore surface structures (wind turbines and OSSs) will be located within the wind farm zones. No blade overfly or structural overhang is permitted, therefore all WTGs must be positioned at least half a rotor diameter inside the boundary of the area.
 - The WTG layout will provide a single line of orientation as a minimum.
 - Search and Rescue (SAR) access lanes shall be allowed for.

7. Wind Turbine Generators

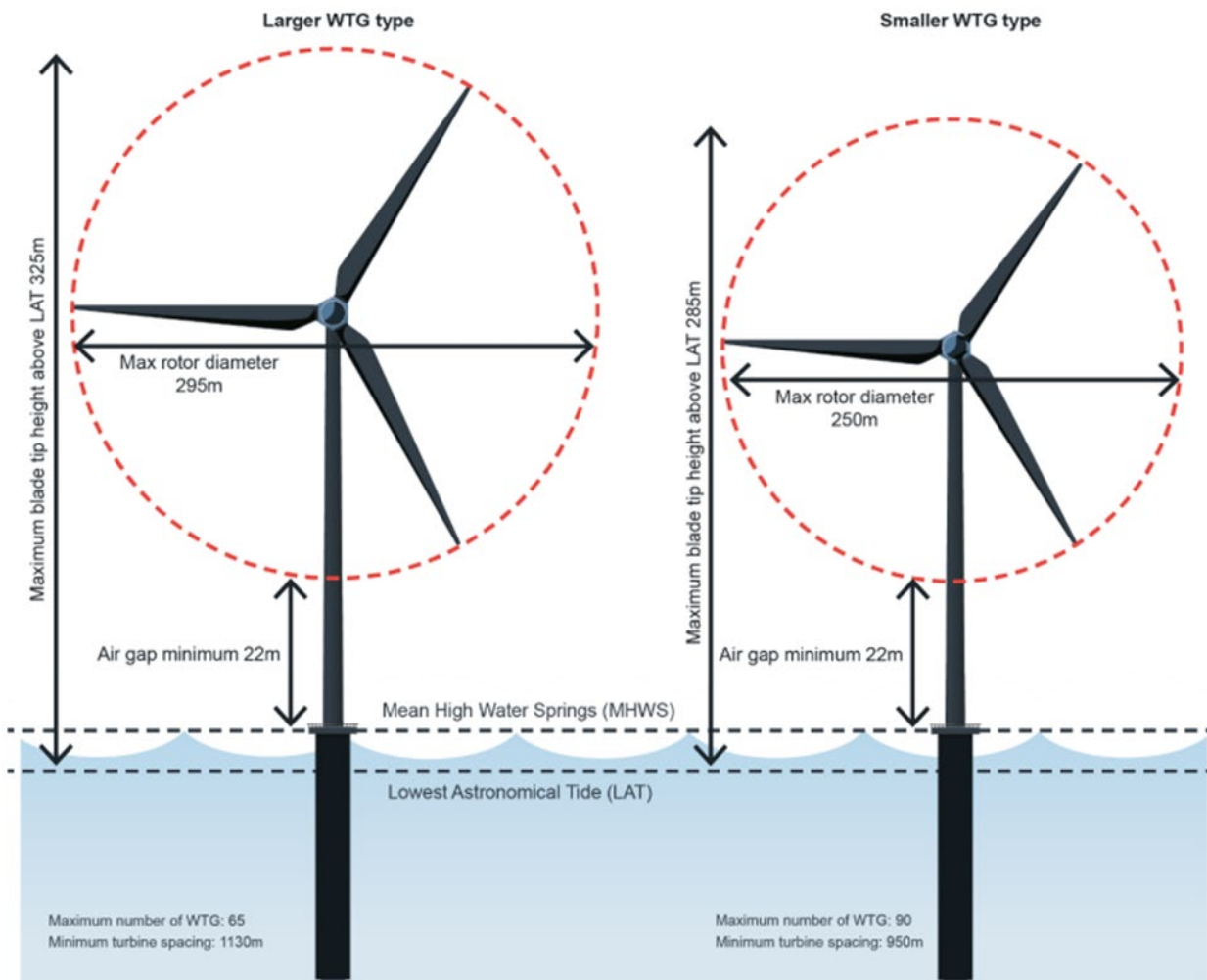
7.1 Wind Turbine Parameters

- 7.1.1 Rampion 2 will consist of up to 90 wind turbine generators. The project design envelope includes a range of turbines from small to large to accommodate the ongoing rapid development in wind turbine technology. Wind turbine parameters are summarised in **Table -1**, with key dimensions shown on **Figure -1**.
- 7.1.2 As is common for all offshore wind farms, the final choice of WTG and therefore the final capacity of the Proposed Development will be subject to a procurement exercise carried out post-consent. The assessment presented in the ES therefore considered two WTG typologies based on the characteristics of WTG models which are expected to be available at that future stage. These have been described throughout the ES as a “smaller WTG type” and “larger WTG type”, and the assessment considered two design scenarios based on up to 90 smaller WTG type turbines or up to 65 larger WTG type turbines. Nevertheless, the maximum total swept area is 4,450,000.00m² as secured in Requirement 2 of the **Draft Development Consent Order [REP3-003]** and this will not be exceeded, regardless of the choice of WTG in the final Proposed Development.

Table -1 Wind Turbine Generator Maximum Design Parameters

Parameter	Value
Maximum number of WTGs	90
Maximum rotor diameter	295m
Minimum air gap above Mean High Water Springs (MHWS)	22m
Maximum blade tip height above Lowest Astronomical Tide (LAT)	325m
Tip height above HAT (m)	325m
Minimum turbine spacing	830m

Figure -1 Wind Turbine Generator Schematic



7.2 Navigation Lighting Requirements Colour Scheme

7.2.1 With respect to lighting and marking, the wind turbines and the Offshore Substation topsides will be designed and constructed to satisfy the requirements of the Civil Aviation Authority (CAA), MCA, Trinity House, and the Ministry of Defence (MOD) as required. As such exact lighting arrangements and design are not identified at this stage.

- Remote monitoring sensors using Supervisory Control and Data Acquisition (SCADA) will be included as part of the lighting and marking scope to ensure a high level of availability for all aids to navigation;
- Aviation lighting will be as per CAA requirements; however, will likely be synchronised Morse “W” at the request of Trinity House; and
- All lighting will be considered cumulatively with existing aids to navigation (including that associated with Rampion 1) to avoid the potential for light confusion to passing traffic.

- 7.2.2 During operation, and where visibility conditions permit, the intensity of aviation warning lights will be reduced to no less than 200cd, subject to the availability of a commercial system.
- 7.2.3 Further details including reference to the relevant guidance and regulations is presented in **Chapter 13: Shipping and navigation, Volume 2** of the ES [APP-054] and **Chapter 14: Civil and military aviation, Volume 2** of the ES [APP-055].
- 7.2.4 The scheme for nacelles, blades and towers is expected to be light grey and foundation steelwork yellow from HAT up to a minimum of 15m, to be determined by the relevant requirements and guidance at the time. **Figure -2** illustrates the typical colour scheme envisaged for Rampion 2.

Figure -2 Turbine colours and lighting



8. Electrical Infrastructure

8.1 Overview

- 8.1.1 National Policy Statement for Electricity Networks Infrastructure (EN-5) (DESNZ, 2023c) refers to Section 4.7 of EN-1 which sets out the principles for good design that should be applied to all energy infrastructure. EN5 also highlights the fact that the functional design constraints of safety and security may limit an applicant's ability to influence the aesthetic appearance of electrical infrastructure. Good Design including the avoidance and/or mitigation of potential adverse impacts has been applied in the design of the electrical infrastructure for the project wherever possible, albeit recognising the functional performance of the infrastructure in respect of security of supply and public and occupational safety must not thereby be threatened, as highlighted in the NPS. Some aspects of the design of the electrical infrastructure are described below.

8.2 Cables

- 8.2.1 The offshore cable infrastructure is described in Volume 2 of the ES **Chapter 4: The Proposed Development, Volume 2** of the ES [APP-045]. The design of the electrical infrastructure has responded to the sensitive nature of the seabed by minimising the number of cables and careful routing. The primary method for protecting cables will be via burial. In challenging ground conditions, the required depth of burial may not be achieved and in this event, the installation of external cable protection would be considered, being subject to the commitments made by RED in respect of minimising the release of plastics into the marine environment where practicable, and the consideration of using material offering opportunity for removal (again where practicable).

8.3 Array cables

- 8.3.1 Subsea array cables will connect the WTGs to each other in strings. The array cable strings will connect the WTGs to the offshore substations. The array cable profile will likely be a three core, armoured cable with copper or aluminium conductors covered in insulation material. The array cables will also contain fibreoptic cores that will be used for protection, control, and communications systems. The array cables will be up to 132kV and the length of cable will be dependent on the distance between the WTG.
- 8.3.2 Typical burial depth for Rampion 2 cables, excluding in areas of sand waves, is expected to be 1m for array cables.
- 8.3.3 Cable circuits (strings) will be optimised according to the electrical load they are required to carry. They will be integrated with fibre optic cables.
- 8.3.4 Each inter-array cable will be installed in its own trench, with the maximum length of inter-array cables being 250km.

8.4 Export cables

- 8.4.1 There will be up to four HVAC offshore export cables. The offshore Order Limits are designed to provide sufficient space for the cable trenches (including the potential need to microsite the offshore export cable corridor around any sensitive features that are confirmed at the pre-construction stage), as well as all temporary works and any future operation and maintenance activities such as cable reburial or repairs. The greater width of offshore export cable corridor on approach to landfall is designed to provide greater flexibility in the detailed routeing/ micro-siting of the export cable/s at the pre-construction stage.
- 8.4.2 Typical burial depth for Rampion 2 cables, excluding in areas of sand waves, is expected to be between a target depth of 1m to 1.5m for export cables. The maximum length of export cables is anticipated to be 170km.
- 8.4.3 Within the intertidal zone, RED has committed to the installation of offshore export cables via trenchless HDD technique.
- 8.4.4 RED will consider the likely seabed movements over the windfarm life when installing the cables, thus aiming to avoid cable reburial works in the operational phase, and the associated disruption to seabed

8.5 Offshore substation

- 8.5.1 The inter-array cables from each string of turbines will be brought to an Offshore Substation, located appropriately to optimise the inter-array and export cable lengths.
- 8.5.2 There will be up to three Offshore Substations, depending on how Rampion 2 is developed in detailed engineering.
- 8.5.3 The basic Offshore Substation design will consist of a topside structure 65m above LAT (lightning protection to 115m above LAT), with a layout of 80m x 50m configured in a multiple deck arrangement, with the decks either open with modular equipment, or fully clad. Weather sensitive equipment would be housed accordingly.
- 8.5.4 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. There shall be no offshore substation located within 500 metres of the array periphery (as defined in the draft DCO).
- 8.5.5 The offshore substation colouring will be chosen to minimise visual impact except where safety or regulations mandate certain colours.
- 8.5.6 Lighting on the offshore substation will meet regulatory and safety requirements, whilst being cognisant of the need to minimise light pollution and visual impact.

8.6 Export cable corridor and landfall site selection

- 8.6.1 The route of the offshore export cable corridor and the location of landfall has been subject to an extensive site selection process (see [Chapter 3: Alternatives, Volume 2](#) of the ES [APP-044]) considering environmental and technical constraints.
- 8.6.2 The proposed location for landfall is near Climping Beach, West Sussex. This site has been selected for the following reasons:
- Closest proximity to the preferred connection point (relative to other options considered);
 - 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 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;
 - The Climping landfall is well screened for local residential receptors; and
 - There are isolated Listed Buildings in the vicinity of Climping landfall, but these can be avoided through the sensitive locating of temporary construction works.

9. Conclusion

9.1 Conclusion

- 9.1.1 This Offshore Design Statement forms part of a suite of supporting documents for the Rampion 2 DCO application and sets out the approach to securing the delivery of good design in accordance with the Overarching National Policy Statements for Energy (EN-1) (DECC, 2011) and Renewable Energy Infrastructure (EN-3) (DECC, 2011), the Overarching National Policy Statements for Energy (EN-1) (DESNZ, 2023a) and Renewable Energy (EN-3) (DESNZ, 2023b),
- 9.1.2 RED has clearly stated a commitment to good design quality based on a defined set of Design Principles (described in **Section 2.2**) and layout commitments (**Section 6**) which have guided the design development process to date. This has ensured mitigation is at the heart of the Rampion 2 proposal, embedding environmental principles as part of good design.
- 9.1.3 The design has been informed by extensive statutory and non-statutory consultation with stakeholders to ensure that the appreciation of the site's varied context is agreed and that RED has explored design flexibility and design rationale in an open and transparent manner. A summary of the key offshore design decisions that have been made by RED as a result of the robust environmental assessment detailed consultation processes are provided in this document.
- 9.1.4 The design for the offshore works will set out to achieve a high standard of design whilst at the same time balancing the operational requirements of the works with the character and appearance of the existing environment.
- 9.1.5 The final design of Rampion 2 offshore works will depend on the final development scenario and confirmed through detailed engineering design studies that will be undertaken post-consent to enable the commencement of construction. RED will continue to be dedicated to good design throughout this process and for the duration of the construction, operation and decommissioning of Rampion 2.

10. References

Climate Change Committee (2022). *Reducing UK emissions: 2022 Progress Report to Parliament*. [Online]. Available at <https://www.theccc.org.uk/publication/2022-progress-report-to-parliament/> [Accessed May 2023].

Department for Business, Energy & Industrial Strategy, (2021d) *Net Zero Strategy: Build Back Greener* [online] Available at [net-zero-strategy-beis.pdf \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/101311/net-zero-strategy-beis.pdf) [Accessed: June 2024].

Department for Business, Energy & Industrial Strategy, (2022) *The British Energy Security Strategy*, [online] Available at [British Energy Security Strategy \(print-ready PDF\) \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/101311/british-energy-security-strategy.pdf), [Accessed: June 2024].

Department for Energy Security & Net Zero (2023a) *National Policy Statement for Energy (EN-1)*. [online] Available at: <https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1> [Accessed: May 2024].

Department for Energy Security & Net Zero (2023b) *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. [online] Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3> [Accessed: May 2024].

Department for Energy Security & Net Zero (2023c). *National Policy Statement for electricity networks infrastructure (EN-5)*. [online] Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5> [Accessed: May 2024].

Department of Energy & Climate Change (2011), *National Policy Statement for Energy (EN-1)*. [online] Available at: <https://assets.publishing.service.gov.uk/media/65a794dd96a5ec000d731abe/1938-overarching-nps-for-energy-en1-withdrawn.pdf> [Accessed: June 2024].

Department of Energy & Climate Change (2011), *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. [online] Available at: <https://assets.publishing.service.gov.uk/media/65a79517867cd8000d5ae9c1/1940-nps-renewable-energy-en3-withdrawn.pdf> [Accessed: June 2024].

HM Government, (2021), *Build Back Better Strategy* [online] Available at: ([Build Back Better: our plan for growth - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/strategies/build-back-better)) [Accessed: June 2024].

HM Government (2023) *Powering Up Britain*, [online] Available at [Powering Up Britain - Joint Overview \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/101311/powering-up-britain-joint-overview.pdf) [Accessed: June 2024].

HM Government (2023a) *Powering Up Britain: The Net Zero Growth Plan* [online] Available at [Powering Up Britain - The Net Zero Growth Plan \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/101311/powering-up-britain-net-zero-growth-plan.pdf) [Accessed: June 2024].

HM Government (2023b) *Powering Up Britain: Energy Security Plan* [online] Available at [Powering Up Britain: Energy Security Plan \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/101311/powering-up-britain-energy-security-plan.pdf) [Accessed: June 2024].

HM Government, (2023c) *Carbon Budget Delivery Plan* [online] Available at [Carbon Budget Delivery Plan \(publishing.service.gov.uk\)](https://publishing.service.gov.uk) [Accessed: June 2024].

Maritime and Coastguard Agency (2021). *MGN 654 (M+F) Offshore Renewable Energy Installations (OREI) safety response*. [online] Available at: <https://www.gov.uk/government/publications/mgn-654-mf-offshore-renewable-energy-installations-orei-safety-response> [Accessed: May 2024].

National Infrastructure Commission (2020). *Design Principles for National Infrastructure*. [online] Available at: <https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/> [Accessed: May 2024].

Planning Inspectorate (2018). *Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope*. [online] Available at: <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope> [Accessed: May 2024].

Rampion Extension Development Limited (RED). (2020). *Rampion 2 Offshore Wind Farm – Environmental Impact Assessment Scoping Report*, [online]. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010117/EN010117-000006-EN010117%20-%20Scoping%20Report.pdf> [Accessed: May 2024].

Scottish Natural Heritage (2017). *Siting and designing wind farms in the landscape*. [online] Available at: <https://www.nature.scot/doc/siting-and-designing-wind-farms-landscape-version-3a#:~:text=Siting%20and%20Designing%20Wind%20Farms%20in%20the%20Landscape%20helps%20to,minimise%20landscape%20and%20visual%20impacts>. [Accessed: May 2024].

South Downs National Park Authority (Unknown Publication date), *South Downs National Park Special Qualities*. [online] Available at: [SDNP-Special-Qualities.pdf \(southdowns.gov.uk\)](https://southdowns.gov.uk/SDNP-Special-Qualities.pdf) [Accessed 27 June 2023].

