Rampion 2 Wind Farm

Category 5: Reports

Report to Inform Appropriate Assessment (tracked)

Date: August 2024

Revision C



Document Reference: 5.9
Pursuant to: APFP Regulation 5 (2) (g)
Ecodoc number: 004866018-03

Document revisions

Revision	Date	Status/reason for issue	Author	Checked by	Approved by
A	04/08/2023	Final for DCO Application	GoBe	RED	RED
B	09/07/2024	Updates at Deadline 5	GoBe	RED	RED
C	01/08/2024	Updates at Deadline 6	GoBe	RED	RED

© WSP UK Limited

Executive summary

Rampion Extension Development Limited (hereafter 'RED') (the Applicant) intends to build a new offshore windfarm 'Rampion 2' (the Proposed Development) adjacent to the existing Rampion 1 Offshore Windfarm in the English Channel, 13km to 25km off the Sussex coast.

The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (together, the 'Habitats Regulations') are amended by The European Union Exit Regulations (2019). These Regulations require that the relevant competent authority (in this case, The Secretary of State for the Department Energy Security and Net Zero (DESNZ)) must undertake an appropriate assessment of the implications if a proposed plan or project is likely to have a significant effect on a particular type of designated conservation site (traditionally known as European sites), alone or in-combination with other plans or projects. The three-stage process of determining impacts to the sites to which the Habitats Regulations apply is known as Habitats Regulations Assessment (HRA). This report provides information to support Stage Two (Appropriate Assessment (AA)) of the HRA process.

A HRA Stage One Screening exercise was completed for the Proposed Development in September 2020 to determine whether and how Likely Significant Effects (LSEs) might result on European sites. This Report to Inform an Appropriate Assessment (RIAA) builds upon the conclusions of the Screening exercise, with further information presented to better understand the risks presented by potential effects identified at Screening. It constitutes Stage Two of the HRA by presenting a study of the potential implications of the Proposed Development on the integrity of 35 European sites. These sites protect designated features from four receptor groupings: terrestrial (onshore) ecology which includes wetland wildfowl and waders, migratory fish species (for offshore effects only), marine benthic habitats and offshore ornithology.

An analysis of each mechanism for LSEs identified at Stage One was undertaken for the 35 sites advanced to HRA Stage Two (AA). This includes three 'transboundary' sites in France, also the Alderney West Coast and the Burhou Islands Ramsar site in Guernsey. Consideration was given to the potential for the Proposed Development to result in an adverse effect on the integrity of the sites against the respective sites' conservation objectives, for the project alone or in-combination with other plans and projects.

On detailed consideration of the potential for Adverse Effects on Integrity (AEoI) and in light of Commitments (embedded environmental measures) secured for the Proposed Development, a determination that no AEoI will result was reached for all sites considered alone and in-combination.

In conclusion, based on the information presented in this report, it is considered that there will be no AEoI of any European sites caused by the Proposed Development, however a 'Without Prejudice' derogation case has been provided with the Application (Document Reference: 5.10).

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Contents

1.	**Introduction**	**9**
1.1	Report overview	9
1.2	Habitats Regulations Assessment	9
1.3	Background to the Proposed Development	10
1.4	Rampion 2	11
1.5	Progress to date	11
1.6	RIAA development	12
1.7	The structure of the RIAA	17
2.	**Habitats Regulations Assessment**	**19**
2.1	Requirement for Habitats Regulations Assessment	19
2.2	European sites (post EU Exit)	19
2.3	The HRA process	19
2.4	Guidance	20
2.5	Case law	21
3.	**Information on the Proposed Development**	**23**
3.1	Overview of the Proposed Development	23
3.2	Proposed Development components	23
3.3	Maximum Design Scenario (Rochdale Envelope)	29
3.4	Construction programme	47
4.	**Consultation**	**49**
4.1	The Evidence Plan Process	49
4.2	Consultation to date	49
4.3	Transboundary consultation	81
4.4	Transboundary Screening (Planning Inspectorate, 2021)	81
4.5	Transboundary PEIR consultation (France, 2021)	83
5.	**HRA Stage One Screening**	**89**
5.1	Screening outcomes for the Proposed Development alone	89
5.2	Introduction	89
5.3	Terrestrial ecology (including wildfowl and waders) (effects alone)	93
5.4	Migratory fish (effects alone)	94
5.5	Marine mammals (effects alone)	94
5.6	Pinnipeds	94

© WSP UK Limited

5.7	Cetaceans	95
5.8	Benthic habitats and communities (effects alone)	95
5.9	Offshore ornithology (effects alone)	96
5.10	Screening outcomes for the Proposed Development in-combination	97
5.11	Terrestrial ecology (including wildfowl and waders) (effects In-combination)	98
5.12	Migratory fish (effects In-combination)	98
5.13	Marine mammals (effects In-combination)	99
5.14	Benthic habitats and communities (effects In-combination)	100
5.15	Offshore ornithology (effects In-combination)	100
5.16	Summary of Screening conclusions	103
6.	**Embedded environmental measures**	**111**
7.	**Appraisal of potential AEoI (the Proposed Development alone)**	**121**
7.1	Introduction	121
7.2	Appraisal of potential AEoI alone for terrestrial ecology (including wildfowl and waders)	121
	Introduction	121
	Arun Valley Ramsar	121
	Construction and decommissioning	122
	Operation and maintenance	128
	Arun Valley SPA	129
	Construction and decommissioning	130
	Operation and maintenance	133
	Arun Valley SAC	133
	Operation and maintenance	133
	The Mens SAC	134
	Construction and decommissioning	135
7.3	Appraisal of potential AEoI alone for migratory fish	137
	Introduction	137
	River Itchen SAC	137
	Construction and decommissioning	138
7.4	Appraisal of potential AEoI alone for benthic habitats and communities	150
	Introduction	150
	Solent Maritime SAC	150
	Construction and decommissioning	153
	Operation and maintenance	168
	South Wight Maritime SAC	171
	Construction and decommissioning	176
	Operation and maintenance	177
	Solent and Isle of Wight lagoons SAC	178
	Construction and decommissioning	179
	Operation and maintenance	180
7.5	Appraisal of potential AEoI alone for offshore ornithology	181
	Introduction	181

© WSP UK Limited

Assessment criteria 182
Construction 182
Operation and maintenance 183
Decommissioning 188
Assessment Structure 189
Pagham Harbour SPA and Ramsar 189
Operation and maintenance 189
Portsmouth Harbour SPA and Ramsar 191
Operation and maintenance 191
Dungeness, Romney Marsh and Rye Bay SPA 192
Construction and decommissioning 192
Operation and maintenance 193
Solent and Dorset Coast SPA 194
Construction 194
Operation and maintenance 196
Decommissioning 197
Chichester and Langstone Harbours SPA and Ramsar 197
Operation and maintenance 197
Collision risk 197
Solent and Southampton Water SPA and Ramsar 200
Operation and maintenance 200
Medway Estuary & Marshes SPA 202
Operation and maintenance 202
Littoral seino-marin SPA, France 203
Operation and maintenance 203
Foulness (Mid-Essex Coast Phase 5) SPA 205
Operation and maintenance 205
Falaise du Bessin Occidental SPA, France 206
Operation and maintenance 206
Alde-Ore Estuary (UK) SPA and Ramsar 207
Operation and maintenance 208
The Wash SPA 208
Operation and maintenance 208
Breydon Water SPA 209
Operation and maintenance 209
Greater Wash SPA 209
Operation and maintenance 210
North Norfolk Coast SPA and Ramsar 210
Operation and maintenance 210
Cote de Granit Rose-Sept Iles SPA, France 211
Operation and maintenance 211
Alderney West Coast and Burhou Islands Ramsar 218
Operation and maintenance 218
Grassholm SPA 224
Operation and maintenance 224
Flamborough and Filey Coast SPA 225
Construction 225
Operation and maintenance 227
Decommissioning 229
Northumbria Coast SPA and Ramsar 229

© WSP UK Limited

Operation and maintenance 229
Coquet Island SPA 230
Operation and maintenance 230
Farne Islands SPA 232
Construction 232
Operation and maintenance 232
Decommissioning 234
Migratory Waterbirds – English South Coast SPAs and Ramsar sites 234
Operation and maintenance 235
Migratory Gannets – English, Welsh, French SPAs and Channel Island Ramsar 240
Operation and Maintenance 241
Migratory Gulls – English SPAs and Ramsar 248
Operation and maintenance 249
Migratory Terns – English SPAs and Ramsar sites 255
Operation and maintenance 256
Migratory and non-breeding auks – English SPAs 257
Construction and decommissioning 257
Operation and maintenance 258

8. Appraisal of potential AEoI (Proposed Development in-combination) 264

8.1 Introduction 264

8.2 Appraisal of potential AEoI in-combination for terrestrial ecology 264
Arun Valley Ramsar site 264
Arun Valley SPA 265
The Mens SAC 266

8.3 Appraisal of potential AEoI in-combination for migratory fish 266
River Itchen SAC 266

8.4 Appraisal of potential AEoI in-combination for benthic habitats and communities 269
Introduction 269

8.5 Appraisal of potential AEoI in-combination for offshore ornithology 270
Construction and decommissioning 270
Operation and maintenance 271
Flamborough and Filey Coast SPA 277
Farne Islands SPA 312
Alde-Ore Estuary SPA 322
Alderney West Coast and Burhou Islands Ramsar 323

9. Transboundary statement 335

10. Conclusions of the assessment 337

11. Acronyms 351

12. Species Glossary 355

© WSP UK Limited

13. References 359

List of Tables

Table 3-1 DCO order limit characteristics 24
Table 3-2 Maximum Design Scenarios applied for each phase of the Proposed Development for the relevant AA 31
Table 4-1 Summary of key points from consultation on the HRA (September 2020 – May 2022). 51
Table 4-2 Summary of recommendations made by the French Office for Biodiversity relevant to the draft PEIR (RED, 2021) and Applicant requests 85
Table 5-1 Descriptions of tiers of projects to be included in the in-combination assessment. 101
Table 5-2 European sites (and relevant pathways) for which LSEs/LSEI could not be discounted and Stage Two (AA) is required. 103
Table 6-1 Embedded environmental measures of relevance to the AA of potential impacts on European sites 113
Table 7-1 Maximum simultaneous piling worst-case noise impact areas for monopile foundations at the east and west modelling locations for fleeing fish (Group 2, 1.5ms^{-1}) according to Popper *et al*. (2014) 142
Table 7-2 Maximum simultaneous piling worst-case noise impact areas for multileg foundations at the east and west modelling locations for fleeing fish (Group 2, 1.5ms-1) according to Popper et al. (2014) 142
Table 7-3 Gannet operation and maintenance phase displacement matrix for annual impacts apportioned to Cote de Granit Rose-Sept Iles SPA 216
Table 7-4 Gannet operation and maintenance phase displacement matrix for annual impacts apportioned to Alderney West Coast and Burhou Islands Ramsar 222
Table 7-5 Summary of migration modelling and CRM results 236
Table 7-6 Summary of increase in baseline mortality as a result of estimated collision mortality rates 238
Table 7-7 Apportionment of potential migratory gannet consequent mortality from collision apportioned to the sites during the non-breeding bio-seasons. 242
Table 7-8 Apportionment of potential migratory gannet consequent mortality from displacement apportioned to the sites during the non-breeding bio-seasons 246
Table 7-9 Apportionment of potential migratory gull consequent mortality from collision apportioned to the English sites during the non-breeding bio-seasons 252
Table 7-10 Apportionment approach for potential auk mortality from operation and maintenance displacement and disturbance apportioned to English SPAs during the non-breeding bio-seasons 260
Table 7-11 Apportioned potential auk mortality from operation and maintenance displacement and disturbance apportioned to English SPAs during the non-breeding bio-seasons 261

© WSP UK Limited

Table 8-22 Gannet: In-combination collision mortality estimates after accounting for macro-avoidance from projects across all bio-seasons with connectivity to Alderney West Coast and Burhou Islands Ramsar (pre-apportionment) 325
Table 8-23 Gannet cumulative bio-season and total abundance estimates from all Tier 1 & 2 external projects 328
Table 10-1 Summary of the potential for adverse effects from the Proposed Development alone and in-combination during the construction (C), operation and maintenance (O&M), and decommissioning (D) phases 339

List of Figures (located in this document) all figures highlighted in blue are located within Volume 3 of the ES

Figure 1-1 The Proposed Development DCO Order Limits 15
Figure 3-1 Key components of the Proposed Development 27
Figure 3-2 Indicative construction programme 47
Figure 5-1 The Proposed Development and European sites within 100km that are subject to Stage Two (AA) 91
Figure 7-1a The Proposed Development and underwater noise impact ranges for the piling of monopile foundations relative to the River Itchen SAC and Southampton Water (fleeing receptor) 147
Figure 7-1b The Proposed Development and underwater noise impact ranges for the piling of multileg foundations relative to the River Itchen SAC and Southampton Water (fleeing receptor) 148
Figure 7-2 The distribution of estuarine habitats* in the Solent 156
Figure 7-3 Location of the reef habitats in South Wight Maritime SAC 174

List of Appendices

Appendix A Record of Consultation Responses on Screening
Appendix B Full Account of Screening Updates
Appendix C Technical note: Screening migratory species
Appendix D Technical note: Screening breeding seabirds
Appendix E HRA Screening matrices (updated)
Appendix F European sites information
Appendix G PVA for gannet of Alderney Wesr Coast and Burhou Islands Ramsar
Appendix H HRA integrity matrices
Appendix I Glossary for Habitats Regulations Assessment
Appendix J Stationary receptor noise modelling outputs
Appendix K In-combination assessment update for guillemot and razorbill

© WSP UK Limited

1. Introduction

1.1 Report overview

1.1.1 Rampion 2 Offshore Wind Farm (hereafter referred to as 'the Proposed Development') is a proposed extension of the existing Rampion Offshore Wind Farm (Rampion 1). The Proposed Development is a Nationally Significant Infrastructure Project (NSIP) under Section 15(3) of the Planning Act 2008 (as amended) (PA 2008) and therefore consented through a Development Consent Order (DCO).

1.1.2 This 'Report to Inform the Appropriate Assessment' (or RIAA) supports the Habitats Regulations Assessment (HRA) of the Proposed Development in the determination of the implications for European sites, if the Proposed Development is consented. Following the United Kingdom's (UK) exit from the European Union (EU Exit), these European sites (if located within the UK) are collectively referred to as the UK's National Site Network (Department for Environment, Food and Rural Affairs (Defra), (2021).

1.1.3 This RIAA is informed by the Environmental Statement (ES) for the Proposed Development's DCO Application and considers its effects on European designated site features. Ultimately this information will be used by the Secretary of State (SoS) for the Department for Energy Security & Net Zero (DESNZ), as the relevant competent authority, to inform its Appropriate Assessment (AA), if so required, for the HRA in accordance with the legislation detailed in **Section 2.4**. It builds upon both the HRA Stage One Screening exercise completed in September 2020 (Rampion Extension Development Ltd (RED), 2020a)[1] and feedback received on the draft RIAA following consultation in July 2021 during the pre-application stage when it accompanied the Preliminary Environmental Information Report[2] (PEIR) (RED, 2021)[3].

1.2 Habitats Regulations Assessment

1.2.1 HRA provides the process for the consideration of potential impacts of plans and projects on a particular type of designated conservation site. The requirement follows from the EU Habitats Directive (European Commission, 1992) and, by virtue of Article 8 of that Directive, also the Wild Birds Directive (the Nature Directives) (European Commission, 2009).

1.2.2 The Europe-wide network of nature conservation areas that are the subject of the HRA process was established under the Nature Directives. These areas are known as "European sites" and collectively, as the "Natura 2000" network. The wording of Article 6(3) and 6(4) of the Habitats Directive underlies the sequential

[1] A summary of the HRA Screening updates is available at **Appendix B**
[2] prepared as part of the Environmental Impact Assessment ("EIA") of the Proposed Development
[3] published alongside the draft RIAA

decision-making tests applied under the HRA process to projects likely to affect European sites.

1.2.3 Following the United Kingdom's (UK) departure from the European Union (EU) on 31 December 2020 (EU Exit), the UK is no longer an EU Member State. Notwithstanding, the Habitats Regulations (2017) (as amended) continue to provide the legislative backdrop for HRA in the UK through the Conservation of Habitats and species Amendment (EU Exit) Regulations 2019 ("EU Exit Regulations"). The HRA process implemented under the Habitats Regulations (2017) continues to apply (subject to minor changes) and the UK is bound by HRA judgments handed down by The Court of Justice of the European Union (CJEU) prior to 31 December 2020[4].

1.2.4 Accordingly, the EU Exit Regulations are considered to have no material bearing on the requirement or process for the HRA of the Proposed Development. The Applicant, in providing a RIAA for the competent authority, will comply with the requirements of Habitat Regulations (2017) (as amended) other than where specific changes are identified by the government. In accordance with the present position on HRA terminology (Department for Environment, Food and Rural Affairs (Defra), 2021), this report will still refer to "the Habitats Regulations", "European sites" and HRA caselaw[5]. However, as mentioned above, European sites in the UK are collectively termed the "National Site Network" and no longer form part of the Natura 2000 network. However, for the sake of this report they are still referred to as European Sites. The HRA will not refer to any obligations under the Nature Directives but may have regard to European Commission (EC) guidance, so far as it is relevant.

1.3 Background to the Proposed Development

1.3.1 The UK government has committed to deliver 50 gigawatts (GW) of offshore wind generating capacity by 2030. The announcement was part of the British Energy Security Strategy (DESNZ, 2022) and optimising the potential of the UK's offshore energy resources is part of the strategy to deliver this target.

1.3.2 The Crown Estate, as the managers of most of the seabed around England and Wales and Northern Ireland, has identified 'extension projects' (the expansion of existing offshore wind farms (OWF)) as an efficient means to increase the UK's installed capacity (The Crown Estate, 2019a). The Crown Estate's '2018 Offshore Wind Extensions opportunity' brought forward eight projects seeking to extend existing windfarms. These included a proposal to extend the existing Rampion Offshore Wind Farm (Rampion 1) which forms part of the Crown Estate's 2018 Offshore Wind Extensions Plan (OWEP).

1.3.3 A plan-level HRA of OWEP concluded that the plan, with the Rampion extension as a component, will not adversely affect the integrity of any European sites (The Crown Estate, 2019b). The OWEP HRA also included an in-combination assessment of the adjacent (to Rampion 2) Zone 6 site wherein Rampion 1 is

[4] Other than the Supreme Court. The stipulated mase under section 6(3) EU (Withdrawal) Act 2018 (as amended) only relates to Judgements prior to 31 December 2020
[5] From before 31 December 2020

located, as well as the remaining (undeveloped) balance of Zone 6, as allocated for future development.

1.3.4 The proposal to extend Rampion 1 OWF (i.e., the Proposed Development) was subsequently awarded seabed development rights, subject to the necessary consents and the project-level assessments required as a matter of law.

1.4 Rampion 2

1.4.1 Rampion Extension Development (RED) ('the Applicant')' is a joint venture between RWE Renewables, and a consortium consisting of Macquarie and Enbridge. The Applicant intends to build a new OWF adjacent to Rampion 1 OWF in the English Channel, 13km to 25km off the Sussex coast, within DCO limits that include the defined OWEP Rampion 1 extension area and the balance of Zone 6 (see **Figure 1-1,** located within this document). The Proposed Development will comprise an array of wind turbine generators (WTG) and associated foundations and the onshore and offshore components of a transmission system. Information about the Proposed Development is provided in **Section 3** and **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

1.4.2 With a generating capacity of over 100 megawatts (MW), the Proposed Development qualifies as a NSIP. The PA 2008 is the primary legislation that establishes the legal framework for applying for, examination and determination of applications for DCOs for NSIPs.

1.4.3 A number of environmental assessments and surveys are required before an Applicant can seek a DCO, including the appropriate marine licences under the Marine and Coastal Access Act (2009). These include the requirement to undertake a HRA under Regulation 63 of the Habitats Regulations (2017 and Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations (2017)). The Applicant must therefore provide the relevant competent authority with the information it needs to undertake a HRA and establish the implications of the Proposed Development for European sites.

1.5 Progress to date

1.5.1 A Screening exercise was completed for the Proposed Development in September 2020 (RED, 2020a) to determine whether and how likely significant effects (LSEs) might result on European sites. This Screening was not able to exclude the potential for risk of LSEs on a number of European Sites and therefore Stage Two (AA) is required.

1.5.2 The Applicant's Screening Report (RED, 2020a) was shared with consultees through late September 2020 to mid-October 2020. The Screening Report responses (detailed in full at **Appendix A**) raised a number of points. In particular, the Applicant was advised to apply the mean-maximum foraging range plus 1 standard deviation (SD) when using foraging ranges for seabirds (i.e., Woodward *et al*., 2019) to establish potential connectivity between OWFs and Special Protection Areas (SPA) (no standard deviation had been applied at the Screening stage).

1.5.3 Following Screening and S42 consultation, in September 2020 and July 2021 respectively (see **Section 4: Consultation**), this RIAA document incorporates the necessary updates made in response to the points raised. This document therefore firstly confirms the final list of European sites, features, and pathways for which the potential for LSEs have been identified or discounted, as well as provides a complete account of post Screening and post PEIR consultation updates. All post-consultation updates (and sites for which the risk of LSEs was discounted) are provided at **Appendix B**.

1.5.4 Additional comments concerning collision risk to migratory species prompted the Screening to be revisited with the methodologies updated; accordingly, however, this did not result in the inclusion of additional sites. Technical notes explaining the method and outcomes of these Screening updates are available at **Appendix C** (regarding migratory non-seabirds) and **Appendix D** (breeding seabirds), while **Appendix E** presents the updated Screening matrices, based on the Planning Inspectorate (2022).

1.5.5 A summary of sites for which the potential for LSEs was identified and for which AA is required is provided in **Table 5-2**.

1.6 RIAA development

1.6.1 To ensure potential impacts are accurately described at every stage of the iterative HRA process, the assessments have been updated to take account of new developments, changes or information. This RIAA builds upon the conclusions of both the Screening and draft RIAA consultations, with further information presented to better understand the risks presented by potential effects identified at previous stages. This includes updated Screening and assessment methods (see **Appendix C** and **D**), review of baseline ecological conditions of the European sites under consideration (existing condition, threats, and pressures (see **Appendix F**)), results from project-specific technical reports and the likely manifestation of effects in this context (such as the updated study area to match the impact range identified in the sediment plume model).

1.6.2 Further, this RIAA has been developed alongside the Proposed Development's final ES produced as part of the Environmental Impact Assessment ("EIA") process (under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017). Previously, where information was not available the Screening adopted a highly precautionary stance; however, the RIAA is informed by assessments available in the final ES supporting the EIA process which provides the evidence to refine the conclusions concerning impacts to European sites. Where design or supporting information is common to both assessments (ES and the HRA) this information has been used as referenced throughout the RIAA.

1.6.3 Key information about the Proposed Development is found in the following chapters and documents:

- **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4) provides a description of the Proposed Development including the design parameters, described in accordance with the Rochdale Envelope approach which is an acknowledged way of assessing a Proposed Development comprising EIA development where uncertainty exists and

necessary flexibility is sought. It allows a flexible and evolutive process to be used during consent applications in the absence of fully defined technical aspects of a project.

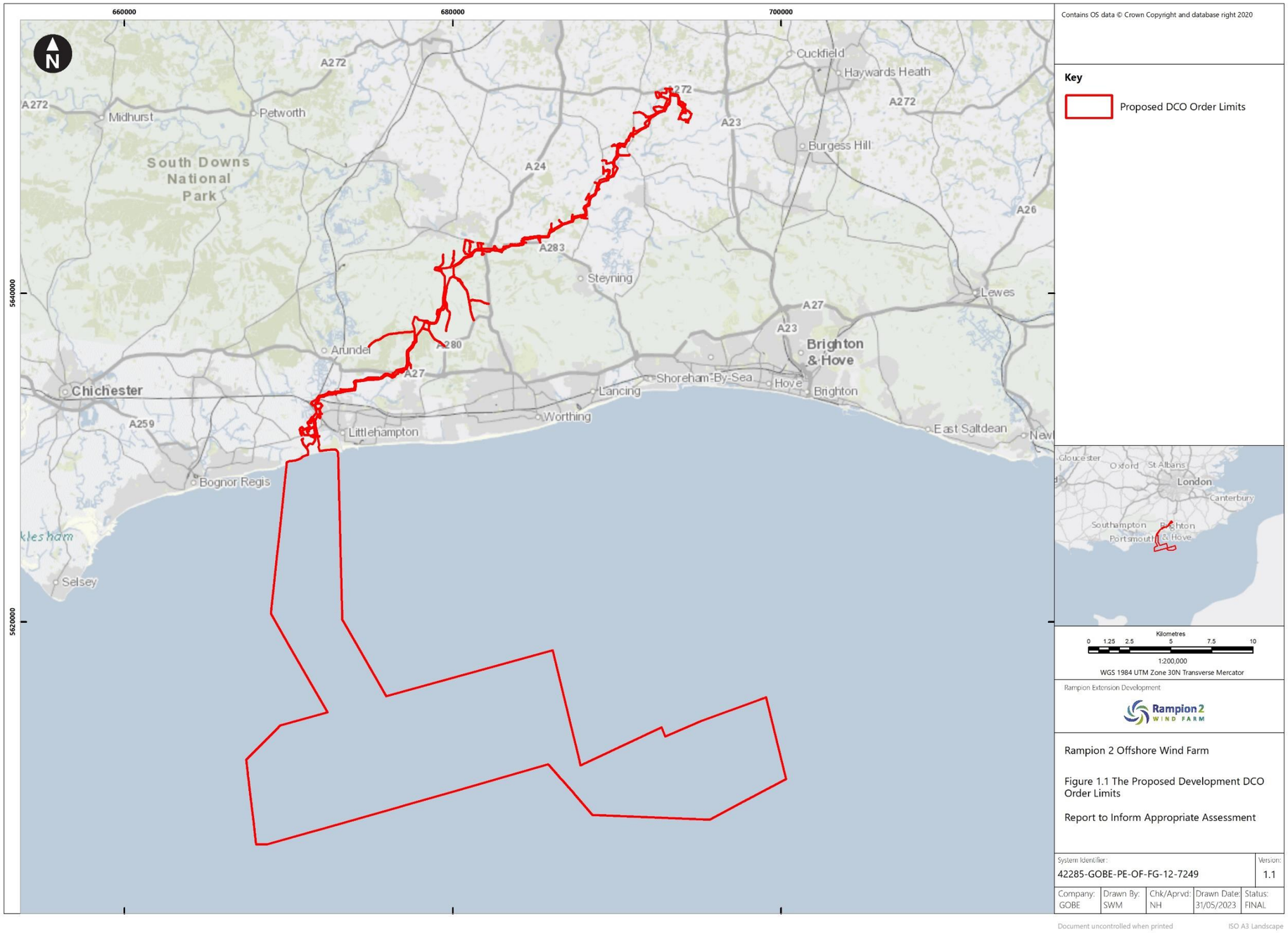
- **Chapter 5: Approach to the EIA, Volume 2** of the ES (Document Reference: 6.2.5) provides details of the method followed to assess cumulative effects in relation to the offshore environment. This approach has helped to inform the assessment of in-combination effects for the HRA.
- **Commitments Register** (Document Reference: 7.22) is the Commitments register document which summarises the embedded environmental measures within the chapters of the ES and associated appendices.
- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) sets out the approach used to characterise the benthic subtidal and intertidal ecology baseline environment as a basis for the EIA presented in the ES.
- **Appendix 5.4: Cumulative effects assessment shortlisted developments, Volume 4** of the ES (Document Reference: 6.4.5.4) sets out a short list of 'other developments' (in this report, 'external plans or projects') that may interact with the Proposed Development's respective Zones of Influence (ZOIs) during construction, operation and maintenance or decommissioning.
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) presents an assessment at the EIA level of potential effects from the impacts of the Proposed Development to ornithological features in the offshore and intertidal environment.
- **Appendix 12.1: Offshore and intertidal ornithology baseline technical Report, Volume 2** of the ES (Document Reference: 6.4.12.1) provides a detailed description of the baseline environment with respect to offshore and intertidal ornithology.
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22) provides an EIA of the potential effects on habitats and legally protected and notable species above mean high water springs due to the construction, operation and maintenance and decommissioning of the onshore transmission cables and substation.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Figure 1-1 The Proposed Development DCO Order Limits



© WSP UK Limited

Page intentionally blank

© WSP UK Limited

1.7 The structure of the RIAA

1.7.1 The RIAA is structured in the following way:

- **Section 1: Introduction** - introduces the Proposed Development and establishes the need for, and the purpose and structure of the RIAA;
- **Section 2: Habitats Regulations Assessment** - sets out the process, principles, tests, (including those established by case law) and guidance applied to the RIAA;
- **Section 3: Information on the Proposed Development** - drawing on the information presented in relevant ES chapters, this section sets out information on the Proposed Development and programme considered pertinent to the AA, including relevant maximum design parameters;
- **Section 4: Consultation** - provides a summary of the consultation undertaken, responses provided and how these have been addressed; and
- **Section 5: HRA Stage One Screening** - clarifies the updates to Screening (methodologies and outcomes) and presents the final list of sites at risk of LSEs and the features and pathways for which AA is required, both alone and in-combination.

1.7.2 Information for Stage Two (AA) is then provided in the following sections.

- **Section 6: Embedded environmental measures** – all commitments to avoid or reduce effects that are relevant to the receptors under consideration are presented in this section;
- **Section 7: Appraisal of potential Adverse Effects on Integrity (AEoI) on relevant sites alone** - for each of the sites, features and pathways identified at Screening, a determination of AEoI alone is made;
- **Section 8: Appraisal of potential AEoI on relevant sites in-combination** - for each of the sites, features and pathways identified at Screening, a determination of AEoI in-combination is made;
- **Section 9: Transboundary Statement** - statement on the potential for any transboundary effects; and
- **Section 10: Conclusions of the assessment** – the conclusions of **Section 7** (effects alone) and **Section 8** (effects in-combination) are summarised for clarity and the overall finding of the RIAA is provided.

1.7.3 Appendices that provide information to support this report are as follows:

- **Appendix A: Consultation responses on Screening** - provides a record of consultation comments received in response to the Screening Report issued in September 2020 (RED, 2020a), together with the Applicant's responses;
- **Appendix B: HRA Screening update** – provides an update to the original Screening Report 2020 (RED, 2020a) in response to comments received, summarising conclusions on the potential for LSEs for all sites considered. It

therefore addresses comments received on the Screening Report and identifies where material changes to Screening outcomes have occurred;

- **Appendix C: Technical note: European site identification for migratory non-seabirds** - reports on the approach and outcomes of the Screening update for migratory birds;
- **Appendix D: Technical note: European site identification for breeding seabirds** – reports on the approach and outcomes of the Screening update for foraging ranges for breeding seabirds;
- **Appendix E: HRA Screening matrices** - provides (updated) Stage One Planning Inspectorate (PINS) Screening matrices for all sites considered through Screening;
- **Appendix F: European site information** - site-specific information supporting the AAs is provided in this appendix;
- **Appendix G: Offshore Ornithology Population Viability Analysis for Alderney** - methods and results of population viability analysis (PVA) run for the gannet, *Morus bassanus*, feature of the Alderney West Coast and Burhou Islands Ramsar site;
- **Appendix H: HRA Stage Two (AA)** - PINS integrity matrices for all AA in the **RIAA**; and
- **Appendix I: HRA Glossary of terms -** a glossary of HRA-specific terms used in this report has been prepared and is provided in this appendix.

© WSP UK Limited

2. Habitats Regulations Assessment

2.1 Requirement for Habitats Regulations Assessment

2.1.1 As explained in **Section 1.2**, the EU Exit Regulations (UK Government, 2019) establish that the regimes that inform planning decisions (including environmental impact assessments such as HRA) will largely remain as set out in the founding legislation and UK European sites will continue to receive the same level of protection. EU Exit-related changes to the Habitats Regulations (2017) are considered to have no material implications on the requirement or process for a HRA for the Proposed Development.

2.1.2 This document has therefore been drafted on the basis that all relevant HRA-related legislation remains in place and in accordance with The Conservation of Habitats and Species Regulations 2017 and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (together, the Habitats Regulations (2017)) that transposed the European requirements for HRA into UK law and as effected by the EU Exit Regulations (2019) (the Habitats Regulations (2017) (as amended).

2.2 European sites (post EU Exit)

2.2.1 The National Site Network comprises of European sites in the UK that already existed on 31 December 2020 (or proposed to the EC before that date) and established under the Nature Directives (Defra, 2021). Regulation 8 of Habitats Regulations (2017) (as amended) defines European sites as Special Areas of Conservation (SAC), Sites of Community Importance (SCI), candidate SACs, proposed SPAs (pSPA)) and SPAs.

2.2.2 The term ‘European marine site’ is interchangeable with ‘European site’ and refers to Special Areas of Conservation (SACs) and SPAs covered by tidal water that protect marine and coastal habitats and species. UK planning policy extended the definition to include proposed and designated Ramsar wetland sites of international importance designated under the Ramsar Convention 1971[6]. Defra has confirmed that following EU Exit, Ramsar sites remain protected in the same way as SACs and SPAs, but do not form part of the National Site Network (Defra, 2021).

2.3 The HRA process

2.3.1 The Stages covered by HRA are referenced in Planning Inspectorate Advice Note Ten (Planning Inspectorate, 2022). Each stage (except the last) defines the

[6] stated in para 176 of the National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2019), Ramsar sites are afforded the same consideration as European sites and are addressed in this document accordingly.

requirement for and scope of the next. An initial 'Screening' stage (Stage One) is followed by Stage Two (AA) if proposals are likely to have a significant effect.

2.3.2 The latter stage becomes relevant if the AA cannot exclude the risk of an adverse effect on (European site) integrity. The derogation stage will be addressed in the event there is a negative outcome to the Stage Two (AA). The current report therefore presents the conclusions of Stage One and the findings of Stage Two; these findings do not identify any requirement to progress beyond Stage Two (AA).

2.4 Guidance

2.4.1 The EC guidance listed in this section has been referenced. However, The Planning Inspectorate's Advice Note Ten, which deals explicitly with HRA for NSIP under the PA 2008 process, is a principal resource. That document states:

2.4.2 "Applicants should provide the following HRA information with their application:

- A summary table of all European sites and qualifying features and each pathway of effect considered at each HRA Stage (screening, AA/IROPI, and the derogations, as applicable), for each phase of the Proposed Development (construction, operation, decommissioning, as relevant) (**Appendix E and H**);
- A copy of the citation/Natura 2000 data sheet for each European site (**Appendix F**);
- A copy of the conservation objectives for all European sites for which LSE have not been excluded and have been carried forward to HRA Stage 2 (**Appendix F**);
- a plan of the European site(s) potentially affected in relation to the Proposed Development (as required to be submitted with the DCO application in accordance with Regulation 5(2)(l)(i) of the APFP Regulations);
- a statement which identifies (with reasons) whether significant effects are considered to be likely in respect of European sites in devolved administrations or within EEA States (**Section 9**);
- evidence (such as Evidence Plans, copies of correspondence, agreement logs, or Statement of Common Ground (SoCG)) of agreement between the Applicant and relevant ANCBs (including those in devolved administrations and/or relevant bodies in EEA States, where applicable) on the scope, methodologies, interpretation, and conclusions of the screening assessment (**Appendix A**); and
- cross references to relevant draft DCO requirements, development consent obligations and any other mechanisms proposed to secure measures relied upon in the AA and derogation cases (as applicable), including the identification of any factors that might affect the certainty or efficacy of their implementation (throughout this document as relevant)."

2.4.3 Advice Note Ten also provides the templates for assessment matrices (HRA Stage One: Screening Matrices and HRA Stage Two: Integrity Matrices) (**Appendix E**

and H respectively). The Planning Inspectorate expects that Applicants complete these and submit them with the HRA.

2.4.4 Reference to EC guidance on the interpretation of key HRA concepts post EU Exit appears optional. Section 6(2) of the EU (Withdrawal) Act 2018 (as amended) establishes that UK courts "may have regard to anything done by an EU entity [i.e., the European Commission] (…) so far as it is relevant" (Defra, 2021). The appropriate authorities may publish guidance on meeting the management objectives for the National Site Network (the 'Network Objectives'). No such guidance has been identified and Defra (2021) has confirmed that existing guidance is still relevant.

2.4.5 The RIAA has been carried out with reference to guidance listed below:

- Defra. 1 January 2021. Policy paper - Changes to the Habitats Regulations 2017 (Defra, 2021);
- Planning Inspectorate's Advice Note Ten (2022) (Version 9) (The Planning Inspectorate, 2022);
- 'Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC' (European Commission, 2018);
- Commission notice Guidance document on wind energy developments and EU nature legislation (European Commission, 2020);
- Communication from the Commission on the precautionary principle (European Commission, 2000);
- Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission, 2018);
- When new marine Natura 2000 sites should be taken into account in offshore renewable energy consents and licences' (Department of Energy and Climate Change (former) (DECC), 2016); and
- Regulations and the Habitats Regulations Assessment Handbook (Tyldesley and Chapman, 2013).

2.5 Case law

2.5.1 Two cases are considered particularly pertinent to the RIAA and the principles defined by them have been applied to this RIAA.

2.5.2 First, the approach takes into consideration the decision of the Court of Justice of the European Union in 'People Over Wind and Sweetman v Coillte Teoranta' (C323/17) (April 2018) (the 'Sweetman ruling') and where significant effects are likely in the absence of mitigation, it is determined that an AA should be undertaken.

2.5.3 Secondly, the ruling in *Holohan and others v An Bord Pleanala [2018] (Case C-461/17) EU:C:2018:883*, on 7 November 2018 determined that the AA must identify and examine the implications of the Proposed Development for the designated features present at the site, but also habitat types and species present

© WSP UK Limited

outside the boundaries of that site and functionally linked; insofar as those implications are liable to affect the conservation objectives of the site.

© WSP UK Limited

3. Information on the Proposed Development

3.1 Overview of the Proposed Development

3.1.1 The Applicant will seek development consent for an OWF, located adjacent to the existing Rampion Offshore Wind Farm (Rampion 1) located in the Eastern English Channel in the south of England, as illustrated in **Figure** 1-1 **(**located within this document **p15)**.

3.1.2 The proposed DCO Order Limits (as illustrated in **Figure** 1-1**,** located within this document **p15**) has been used to inform the HRA. It is defined as the area within which the Proposed Development and associated infrastructure will be located, including the temporary and permanent construction and operational work areas.

3.1.3 Full details on the project description, upon which this RIAA is based, are presented within the ES, specifically in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4) **– Section 4.3 (offshore)** and **Section 4.4 (Onshore)**.

3.1.4 For the purposes of this RIAA, the assessments are based on the Maximum Design Scenario (MDS) / Rochdale Envelope presented within **Section 3.3**.

3.1.5 The key components of the Proposed Development are illustrated in **Figure** 3-1 (located with this document).

3.2 Proposed Development components

3.2.1 The Offshore Elements of the Proposed Development are situated within an area adjacent to the south and west of the existing Rampion 1 project site comprising seabed areas extending between 13km and 26km offshore.

3.2.2 The offshore part of the proposed DCO Order Limits comprises the following:

- an area of approximately 160km^2 include the WTGs, WTG foundations, offshore substations and associated foundations, and an additional area of approximately 36km^2 to accommodate marine cables;
- a marine cable link area is located at the south west corner of the Rampion 1 site. For clarity, no WTGs or offshore substations will be located in the cable link area, and will be shown on the DCO Works Plans (Doc Ref);
- the Offshore Export Cable Corridor (ECC) of approximately 59km^2, which will connect the offshore wind farm area to the shore. The nearest coastal settlements are Littlehampton, Worthing, Shoreham-by-Sea, Brighton and Newhaven; and
- An area to the west of Rampion 1, which is designated a Helicopter Refuge Area (HeRA), with the sole purpose of addressing the lines of sight (for search and rescue) and navigational safety concerns safety concerns raised by the

Marine and Coastguard Agency (MCA) during statutory consultation. An area to the south of Rampion 1, which was introduced to mitigate visual impacts by separating the Rampion 2 array area from the built Rampion 1 turbines. This will also be compliant for use as a HeRA at 1nm width, but it has not been designated solely for this purpose.

3.2.3 The onshore part of the proposed DCO Order Limits comprises the following:

- a landfall area at Climping, West Sussex;
- an onshore cable corridor, approximately 38.8 km in length and nominally 40m in width (20m either side of a centreline), widened locally, where necessary, for construction purposes; and
- a new onshore substation, to be located at Oakendene 2km east of Cowfold, that will connect to the existing National Grid Bolney substation, mid Sussex, via buried onshore cables.

3.2.4 The onshore and offshore parts of the proposed DCO Order Limits has been refined through multidisciplinary workshops, which took stakeholder feedback, including supplemental statutory consultation (Preliminary Environmental Information Report (PEIR), Supplementary Information Report (SIR), PEIR Further Supplementary Information Report (FSIR), Preliminary Environmental Information (PEI) Bolney Substation Extension works) to seek feedback on alternative routes, into account. Further details on changes made through the pre-application process are provided in **Chapter 3: Alternatives, Volume 2** of the ES (Document Reference: 6.2.3). The offshore part of the proposed DCO Order Limits is illustrated in **Figure 3.2, Volume 3** of the ES (Document Reference: 6.3.3) onshore part of the proposed DCO Order Limits are illustrated in **Figure 4.2, Volume 3** of the ES (Document Reference: 6.3.4).

3.2.5 The key characteristics of the proposed DCO Order Limits are summarised in **Table 3-1**.

Table 3-1 DCO order limit characteristics

Characteristic	Measurement
Wind farm and cable corridor area for the Proposed Development	196km^2
ECC Area of Search	59km^2
Closest distance to shore of wind farm area	13km
Water depth range in wind farm area	15m – 65m below Lowest Astronomical Tide (LAT)

© WSP UK Limited

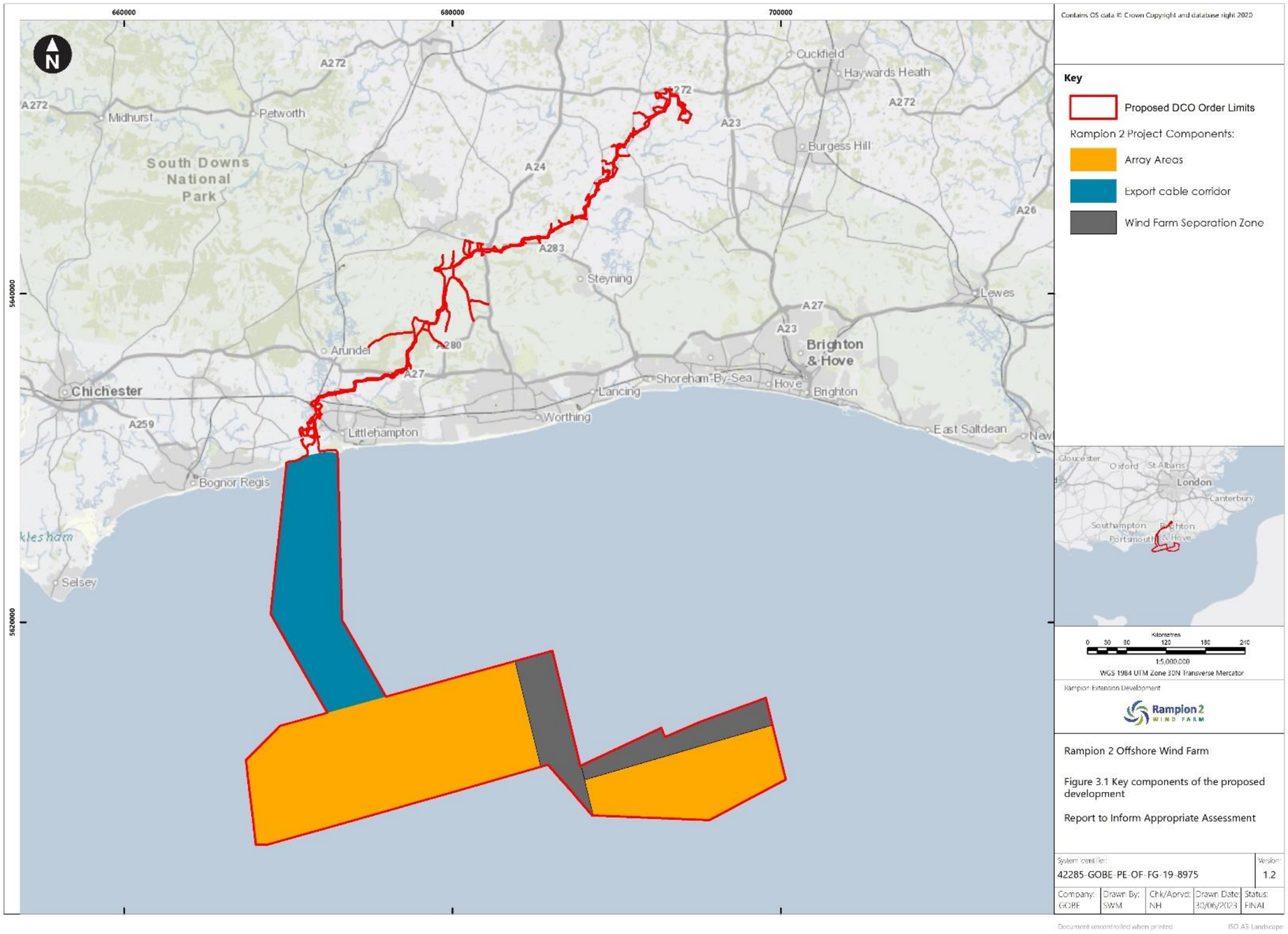
Characteristic	Measurement
Onshore cable corridor length	Approximately 38.8km
Onshore cable corridor width (indicative cable route)	40m
Onshore cable corridor proposed trenchless crossings and associated compounds	27 crossings which are likely to utilise HDD
Onshore temporary construction compounds	Various area measurements – 5 compounds required along onshore cable route.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Figure 3-1 Key components of the Proposed Development



© WSP UK Limited

Page intentionally blank

3.3 Maximum Design Scenario (Rochdale Envelope)

3.3.1 The maximum adverse (or worst-case) scenario (hereafter, the Maximum Design Scenario (MDS) is applied within the RIAA for the assessment of adverse effects. This approach ensures that the scenario that will have the greatest impact (e.g., largest footprint, longest exposure, or tallest dimensions, depending on the relevant aspect) is assessed; it can then be assumed that any other (lesser) scenarios will have an impact that is no greater than that assessed.

3.3.2 The Screening exercise identified a number of receptor groups, with the topic specific MDS for each group presented within the relevant aspect chapter from the ES, with those drawn on here. The receptor groups are outlined below, together with the relevant ES aspect chapter and Table number. The potential for impacts from Rampion 2 to cause an LSE on marine mammals was screened out during the screening exercise (see RED, 2020a) and consequently effects on sites for which marine mammals are a qualifying interest are also screened out in so far as effects relate to those interests; therefore, the RIAA does not draw on ES assessment information for marine mammals.

- **Table 22.18** from **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- **Table 9.15** from **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9);
- **Table 8.12** from **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8); and
- **Table 12.19** from **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12).

3.3.3 The MDS, as it applies to each receptor group, is defined below in **Table** 3-2**.** For clarity regarding the differences between receptor groups, the information is presented according to individual parameters for the Proposed Development, including a note regarding why the scenario is relevant to that receptor. Where relevant, the information includes any embedded environmental measures.

3.3.4 In the opinion of the assessor any development scenario that fall below the maximum design parameters presented in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4) would fall below the MDS.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table 3-2 Maximum Design Scenarios applied for each phase of the Proposed Development for the relevant AA

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
Construction			
Horizontal Directional Drilling (HDD) and general operations **Intertidal**	**Ornithology** (birds utilising coastal habitats) Visual or noise disturbances leading to displacement	Method: Horizontal Directional Drilling (HDD) Number of HDD drills: 4 Landfall construction compound (m^2): 50m x 75m (located inland from intertidal zone) Duration of works (start – finish) (months): four months	HDD to take place between marine habitats (below MLWS) and an arable field above MHWS. All activities associated with the HDD are proposed to be within the landfall construction compound within an onshore location that is not visible to the intertidal area.
Piling to install WTG foundations **Offshore**	**Migratory fish** (during offshore phase of lifecycle) Underwater noise resulting in mortality, injury, behavioural changes and auditory masking from noise and vibration.	**Maximum design scenario (monopiles):** Sequential installation monopiles. Piling of 90 smaller monopile WTG foundations (13.5m diameter) Up to 3 offshore converter substations	The maximum spatial design scenario equates to the greatest effect from subsea noise at any one-time during piling. This scenario assumes monopile foundations installed sequentially, with a higher hammer energy. The maximum temporal design scenario represents the longest duration of effects from subsea noise. This scenario assumes

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
		Maximum hammer energy 4,400kJ 12 months duration **Maximum spatial design scenario (monopiles):** 2 monopiles per day = 45 days piling **Maximum temporal design scenario (monopiles):** 90 WTGs on piled multileg foundations = 360 pin piles Up to 3 offshore substations = 36 pin piles Total of 396 pin piles in the array = 99 piling days **WTG foundation installation:** Crew transport vessels; 400 trips - assuming 4 visits per foundation for bolting and finalising purposes from local construction harbour	pin-pile foundations, which could result in a longer duration of piling per foundation.

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
		Maximum design scenario (multileg foundations) maximum spatial and temporal design scenario: Sequential piling of multileg foundations (4.5m diameter piles) Installation of 396 pin piles (4 pin piles piled sequentially at separate locations within a period of 24 hours) Up to 3 offshore converter substations (maximum of 6 legs per multileg foundation, up to 12 pins per multileg foundation) Maximum hammer energy 2,500kJ 4 pin piles per day 30-minute soft-start ramp up. The total number of vessel return trips made during foundation installation = 680	

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
Installation of Array and Interconnector Cables **Offshore**	**Migratory fish** (during offshore phase of lifecycle) Underwater noise resulting in mortality, injury, behavioural changes, auditory masking	**Array and Interconnector Cable installation:** Number of interconnector cables: 2 Total interconnector cable length: 40km Total array cable length: 250km Total duration of cable installation: 12 months **Export Cable Installation:** Where possible, the export cables will be buried below the seabed through to landfall (1 m burial depth) Total length of export cable: 170km Total duration of cable installation: 6 months. **Array and Interconnector Cable Installation:** A maximum of 21 vessels making up to 318 return trips.	**Maximum spatial design scenario** The maximum spatial design scenario equates to the greatest effect from subsea noise at any one-time during piling. Piling fewer (65) but larger (13.5m) WTG monopiles represents a greater spatial impact than more (90) smaller (10m) monopiles. **Maximum temporal design scenario** The maximum temporal design scenario represents the longest duration of effects from subsea noise. This scenario assumes pin-pile foundations, which could result in a longer duration of piling per foundation.

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
		Export Cable Installation: A maximum of 24 vessels making up to 154 return trips.	
Seabed preparations for foundation installation **Foundation installation** **Export cable installation** **Offshore**	**Benthic ecology, coastal habitats** Degradation of habitats/communities due to deposition (smothering) of re-suspended sediments and/or release of sediment-bound contaminants **Seabirds** (intertidal or offshore foraging) Direct: Visual impairment during foraging due to suspended sediment concentration (SSC). Indirect: Effects due to prey affected by habitat changes.	**Sandwave clearance** Total sandwave clearance volume in array area = 1,375,000m^3. **WTG foundations** Spoil volume for all WTG foundations from drill arising (if drilling required due to pile driving refusal and assuming 10 m diameter 60 m embedment monopile): 4,000m^3 x 90 monopiles = 360,000m^3. Spoil volume for offshore substation foundations (multileg with pin pile foundations) from drilling arisings (if drilling required): 12,000m^3 x 3 offshore substations = 36,000m^3.	The maximum adverse scenario for foundation installation results from largest volume suspended from seabed preparation (suction bucket foundation) or the largest volume suspended from potential drilling of foundations (monopiles) as these are mutually exclusive, both with the maximum number of foundations (90). For cable installation, the maximum adverse scenario results from the greatest volume from sandwave clearance and installation. This also assumes the largest number of cables and the greatest burial depth.

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
		Export cable installation Burial spoil (jetting) = 340,000m^3. HDD bentonite drilling fluid loss = 450m^3. **Interconnector cable installation** Burial spoil jetting = 80,000m^3 **Array cable installation** Burial spoil (ploughing/mass flow excavation) = 500,000m^3	
Vessels operating within array and associated activities **Offshore**	**Offshore Ornithology** (foraging or commuting) Direct disturbance and displacement from foraging due to unfamiliar stimulus (vessel activities) Indirect: Effects due to degradation of supporting habitats	Foundation installation Installation vessel – maximum number of vessels: 3 Installation vessel – maximum number of return trips: 60 Support vessels – maximum number of vessels: 10	The greatest number of vessels and greatest total number of trips will lead to the greatest disturbance to ornithological receptors. As the risk of introduction of marine invasive and non-native species (MINNS) is via vessel fouling and vessels

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
	due to invasives, pollution or direct interactions with seabed (e.g., anchoring)	Support vessels – maximum number of return trips: 60 Transport vessels – maximum number of vessels: 6 Transport vessels – maximum number of return trips: 60 Crew Transfer vessels – maximum number of vessels: 6 Crew Transfer vessels – maximum number of return trips: 500 Helicopters: maximum number of vessels: 2 Helicopters – maximum number of return trips: 500	entering ports, the greatest number of vessels and greatest total number of trips will represent the best 'worst-case' for this effect. The greatest number of vessels operating within the array will lead to the greatest potential for seabed interactions.
Vessels operating within offshore cable corridor and associated activities **Offshore**	**Offshore Ornithology** (foraging or commuting) Disturbance and displacement from foraging due to unfamiliar stimulus (vessel activities)	Length of offshore cable corridor, link to shore (km): 19km Width of offshore cable corridor, link to shore (km): 1.5km Main Laying vessels: Number: 2	The greatest number of vessels and greatest total number of trips will lead to the greatest disturbance to ornithological receptors. For more details on the vessels involved, see **Chapter 4: The Proposed Development,**

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
	Indirect: Effects due to degradation of supporting habitats due to invasives, pollution or direct interactions with seabed (e.g., anchoring)	Main laying vessels (return trips): 6 Main jointing vessels: Number: 2 Main jointing vessels (return trips): 6 Main burial vessels: Number: 2 Main burial vessels (return trips): 6 Number of Multicat-type vessels (for excavating duct extensions): 4 Multicat-type vessels (return trips): 16 Number of Spoil barges (for duct extensions): 4 Spoil barges (return trips): 60 Support vessels: Number: 10 Support vessels (return trips): 60 Helicopter support (return trips): 0 Duration: six months	Volume 2 of the ES (Document Reference: 6.2.4). As the risk of introduction of marine invasive and non-native species (MINNS) is via vessel fouling and vessels entering ports, the greatest number of vessels and greatest total number of trips will represent the best 'worst-case' for this effect. The greatest number of vessels operating within the array will lead to the greatest potential for seabed interactions and pollution.

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
Installation of onshore infrastructure **Cable laying (trenching)** **Construction of substation** **Onshore**	**Terrestrial ecology** (wildfowl and waders, barbastelle bats) Habitat loss, fragmentation and disturbance due to land-take for onshore infrastructure and associated activities.	Closest assumed construction activity measured from DCO order limit Land take by habitat type based on realistic worst-case scenario accounting for the indicative cable corridor, trenchless crossing compounds, temporary construction compounds, access tracks and associated visibility splays and the substation footprint. Length of each section is a maximum of 1,000m in any given location (based on maximum lengths of cable between joint bays), with progression of duct installation assumed to be 150m per day.	The greatest level of land take will result in the greatest levels of habitat loss, fragmentation and disturbance.
Operation and Maintenance			
Cable repairs **Maintenance activities**	**Ornithology** (birds using coastal habitats)	Operational lifetime: around 30 years	The maximum amount of routine maintenance and repairs will

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
Coastal habitats	Direct: Visual or noise disturbances leading to displacement Indirect: Effects on foraging due to degradation of supporting (intertidal) habitat due to invasives, pollution or direct interactions.	Routine maintenance: minimal	lead to the greatest disturbance to key ornithological receptors. No works directly on land below MHWS are expected to occur. This parameter refers more generally to the potential for noise and visual disturbances, general operations associated with repairs or maintenance such as the presence of people and machines on the coastline
Presence of WTG foundations **Presence of scour protection** **Presence of cable protection** **Offshore**	**Benthic ecology, coastal habitats** Loss or degradation of habitat due to scour or wider effects on coastal process (waves, current, sediment transport regimes) Or invasive species that benefit from increased hard substrate	**WTG and substation foundations:** WTG footprint with scour protection (3,580m^2 per monopile), based on 65 WTG monopiles = 232,700m^2. Offshore Substation footprint (multileg foundation with pin pile foundations) with scour protection (7,300m^2 per multileg foundation). Based on up to three offshore substations = 21,900m^2.	This represents the MDS for the Proposed Development and therefore the maximum area of seabed lost as a result of the placement of structures, scour protection and cable protection. Habitat loss from drilling and drill arisings is of a smaller magnitude than presence of the Proposed Development's infrastructure.

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
		Array and interconnector cables: Maximum rock protection area for array cable crossing = 40,000m^2. Maximum rock protection area for array cables (based on 20% of cable requiring protection) = 300,000m^2. Maximum rock protection area for interconnector cables (based on 20% of cable requiring protection) = 122,000m^2. Offshore Export Cable Corridor Protection: Maximum rock protection area for export cables (based on 20% of cable requiring protection) = 517,000m^2 Total Habitat Loss/Change: 4,250,000m^2	Cable protection requirements have been identified as a maximum of 20% of the entire cable. This is derived from a cable route study of the underwater terrain and an estimate of the percentage of seabed that would not support natural reburial and may require trenching and subsequent rock protection. The value of 20% therefore is based on the potential maximum expected area of cable that may interact with seabed that required protection. This is an estimate and may be lower (see **Appendix 9.5: Rampion 2 Technical Note: Cable Corridor area mitigation for sensitive features, Volume 4** of the ES (Document Reference: 6.4.9.5)).

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
The operation of WTG **Offshore**	**Ornithology** (foraging. commuting, migrating) Mortality or injury due to interaction with WTG (collision risk)	Number of WTGs: 90 Rotor diameter: 250m Minimum height of lowest blade tip above MHWS: 22m	For collision risk, the worst-case scenario is the greatest number of smaller WTG. Although the total frontal area is higher using larger WTG, the vast majority of bird flights are at low heights e.g., for kittiwake 90.7% are below 25m above sea level (ASL) and 99.995% are below 100m ASL (Cook *et al*., 2012). Therefore, a greater number of smaller WTG creates a higher collision risk (Johnston *et al*., 2016).
Maintenance vessels operating within array and associated activities **Offshore**	**Ornithology** (offshore foraging / commuting) Direct: Visual or noise disturbances leading to displacement Indirect: Effects on foraging due to degradation of supporting seabed habitats (pollution, MINNS, sediment)	Operational lifetime: around 30 years Helicopter total trips (per year): 120 Jack-up WTG visits (per year): 10 Jack-up platform visits (per year): 9 Jack-up total trips (per year): 19 Crew vessels wind WTG visits (per year): 850	The greatest number of vessels and greatest total number of trips will lead to the greatest disturbance to ornithological receptors. For more details on the vessels involved, see **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
		Number of WTG 90 Rotor diameter: 250m Minimum height of lowest blade tip above MHWS (m): 22 m	Most scheduled maintenance is expected to occur April – September. The greatest number of vessels operating within the array will lead to the greatest potential for seabed interactions and pollution. As the risk of introduction of MINNS is via vessel fouling and vessels entering ports, the greatest number of vessels and greatest total number of trips will represent the best 'worst-case' for this effect.
Maintenance vessels operating within offshore cable corridor and associated activities **Offshore**	As above	Maximum number of remedial burial events – lifetime quantity: 18 Maximum length of cable subject to jetting remediation re-burial) per remedial burial event (m): 2,000m	The maximum amount of remedial work will lead to the greatest impact through disturbance. Also, the greatest potential for pollution, the introduction or spread of MINNS and activities disturbing sediments.

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
Routine system maintenance and repairs **Onshore**	**Terrestrial ecology** (wildfowl and waders, barbastelle bats) Visual or noise disturbances leading to displacement	Operational lifetime: around 30 years Routine maintenance: minimal	The maximum amount of routine maintenance and repairs will lead to the greatest disturbance. Majority of activity located within substation compound. Maintenance restricted in location to joint bays, with typical access taken by a light van or 4 x 4 using existing tracks and field edges.
Water usage during maintenance visits to unmanned substation	**Terrestrial ecology** (wetland features and associated fauna) Habitat degradation through over-abstraction of water	Operational lifetime: around 30 years Routine maintenance: minimal	Maintenance of substation will be required. Welfare facilities on-site will result in mains water usage. Mains water may also be required in emergencies to feed a sprinkler system in case of fire.
Decommissioning			
Removal of offshore structures **Offshore**	As for construction phase (regarding seabed and visual/ noise disturbances)	MDS is identical (or less) to that of construction phase.	See justification above.
Removal of structures Underwater cutting	As for construction phase (regarding underwatering noise)	Maximum levels of underwater noise during	This will result in the maximum potential disturbance associated

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
Offshore		decommissioning will be from underwater cutting required to remove structures. This is much less than pile driving and therefore impacts will be less than as assessed during the construction phase/piled foundations will likely be cut approximately 1m below the seabed.	with noise associated with decommissioning activities including foundation decommissioning.
Activities to disconnect the transmission system **Coastal habitats**	As for construction phase (regarding visual / noise disturbances and indirect effects)	Minimal	It is anticipated that the electrical cables passing through the landfall area will be left in-situ with ends cuts, sealed, and buried to minimise environmental effects associated with removal.
Decommissioning vessels operating within array and associated activities **Offshore**	As for construction phase (regarding visual / noise disturbances and indirect effects)	As per construction	The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. The greatest number of vessels and greatest total number of trips

© WSP UK Limited

Relevant activity	Receptor group and relevant effect	Parameters for the worst-case scenario applied to the AAs	Justification
			will lead to the greatest disturbance to ornithological receptors and supporting environment.
Removal of offshore cables **Offshore**	As for construction phase (regarding visual / noise disturbances, sediment dispersal and indirect effects)	As per construction	It is expected that most array and export cables will be left in situ in line with current UK Government approved practice, however for the purposes of the assessments within this RIAA, the MDS assumes that all offshore cables will be removed, which will be a similar process to the construction process in reverse. This will therefore entail a similar amount of disturbance over a similar period of time.
Removal of onshore (terrestrial) cables **Onshore**	**Terrestrial ecology** (bats and wintering wildfowl/ waders)	Minimal	It is anticipated that the electrical cables passing through the landfall area will be left in-situ with ends cuts, sealed and buried to minimise environmental effects associated with removal.

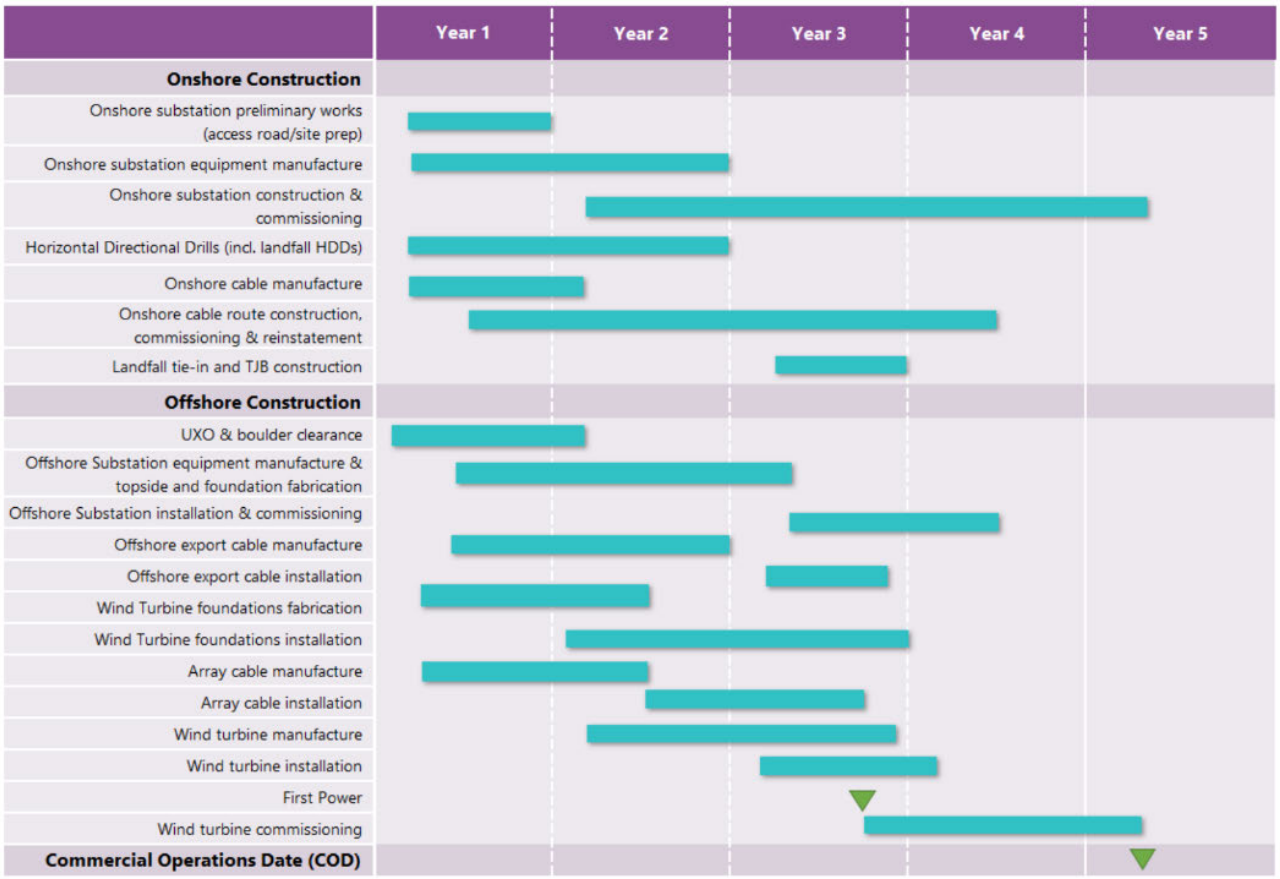
© WSP UK Limited

3.4 Construction programme

3.4.1 An indicative construction programme for the Proposed Development is presented in **Figure** 3-2 below.

3.4.2 The programme illustrates the anticipated duration of the major construction / installation elements. The anticipated maximum total construction duration is approximately four years.

Figure 3-2 Indicative construction programme



© WSP UK Limited

Page intentionally blank

© WSP UK Limited

4. Consultation

4.1 The Evidence Plan Process

4.1.1 The Evidence Plan process is a voluntary, but formal mechanism that the Applicant has undertaken to meet the recommendation for pre-application consultation (Advice Note Ten (PINS, 2022) and agree the information the Applicant needs to supply to meet statutory nature conservation bodies (SNCB) expectations. The Evidence Plan Process has been followed during the development of the RIAA and includes a number of relevant authorities and stakeholders, although not all provide comment directly on the HRA process. The Evidence Plan Process has been managed through a series of Expert Topic Group (ETG) meetings, which have been held throughout the project design phases.

4.2 Consultation to date

4.2.1 The Applicant shared the Screening Report (RED, 2020a), together with supporting matrices, with consultees on 11 September 2020. The consultation period (initially 11 September 2020 to 09 October 2020) was extended to enable consultees additional time to consider and respond due to restrictions arising from measures put in place to protect individuals during the Covid-19 pandemic. The Screening Report (approach and conclusions) was also discussed with Natural England at an additional ETG meeting on 13 October 2020 and a further ETG on the 26 March 2021.

4.2.2 The following consultees provided written responses to the invitation to participate in the consultation:

- Arun District Council;
- Horsham District Council;
- Natural England;
- Sussex Ornithological Society (SOS);
- Sussex Wildlife Trust (SWT);
- The Wildlife Trusts (TWT);
- West Sussex County Council (WSCC); and
- Whale and Dolphin Conservation.

4.2.3 No responses were received from the following during the consultation period, although a number have participated in later ETG meetings including the Marine Management Organisation (MMO), the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and the Royal Society for the Protection of Birds (RSPB):

- The Planning Inspectorate;

- The MMO;
- RSPB;
- The Environment Agency;
- East Sussex County Council (ESCC);
- Sussex Inland Fisheries Conservation Authority;
- South Downs National Park Authority (SDNPA);
- Adur District Council and Worthing;
- Brighton and Hove City Council;
- Lewes and Eastbourne Councils;
- Mid Sussex District Council;
- West Sussex County Council;
- Hampshire County Council;
- Inshore Fisheries and Conservation Authority (IFCA);
- Isle of Wight Council;
- Zoological Society London (ZSL);
- Chichester City Council; and
- Cefas (made aware by a third party as direct requests for consultation do not accord with the organisation's policies).

4.2.4 In July 2021 the Applicant shared the draft RIAA with consultees together with supporting matrices during PEIR consultation (RED, 2021). The following consultees provided written responses to the invitation to participate in the PEIR consultation:

- The MMO; and
- Natural England.

4.2.5 The draft RIAA conclusions and Natural England response was also discussed with Natural England at additional ETG meetings on 02 November 2021, 03 November 2021, 12 April 2022 and 26 May 2022.

4.2.6 A complete record documenting all consultation responses received from the consultation on the Screening report in September 2020 and consultation on the draft RIAA in July 2021 (along with the Applicants responses) are summarised in **Appendix A**. The key comments (those that most defined the updates made to Screening and the draft RIAA) are listed in **Table** 4-1.

© WSP UK Limited

Table 4-1 Summary of key points from consultation on the HRA (September 2020 – May 2022).

Note: A full account of consultation undertaken regards the Screening Report (RED, 2020a) is provided at **Appendix A**

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
18 September 2020	MMO SOS TWT Cefas	ETG Meeting (online)	Offshore Ornithology, Marine Mammals and HRA	Presentations outlining scope of assessments for ornithology and marine mammals. Methodologies, baseline data, datasets, modelling and data concerns. set out, followed by group discussions. For the HRA: Aim 1 – to agree principles of HRA Screening Report. Aim 2 – agree the appropriateness and sufficiency of the datasets to inform the baseline for HRA Screening. Applicant presented criteria used in the European site selection process and the parameters used to determine connectivity between sites. For cetaceans (Species Management Units (MU) and seals (ranges of 145km and 120km for grey and harbour seal). There were no questions about the screening parameters proposed for birds and marine mammal HRA Screening.	The HRA Screening Report was sent out for consultation (week commencing 14 September 2020) shortly before this meeting. **Appendix B** presents the HRA Screening Updates made in response to comments received during this consultation.
13 October 2020	Natural England RSBP	ETG Meeting (online)	Offshore Ornithology, Marine Mammals and HRA	For breeding ornithological features, the standard deviation range should be applied to the foraging ranges (Woodward *et al.*, 2019) for the identification of European sites.	The standard deviation range has been considered in the revised Screening. This exercise has been undertaken for all breeding

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
	Sea Mammal Research Unit (SMRU)				ornithological features listed in Woodward *et al*., 2019. The update is reported in **Appendix D**.
28 October 2020	Natural England WSCC Environment Agency, SOS, SDNPA, SWT RSPB Ouse and Adur Rivers Trust	ETG Meeting (online)	Terrestrial ecology and HRA	The survey programme was described and discussed to ensure sufficient baseline information was to be collected. The draft Sussex SAC bat protocol was agreed as applying.	The draft Sussex SAC bat protocol has been used to inform the HRA screening assessment.
09 October 2020	Natural England	Letter by email	Benthic habitats	Due to the application of mitigation measures, Solent Maritime SAC, South Wight Maritime SAC and Isle of Wight Lagoons SAC- should be considered at Stage Two (AA) unless there is more information to clarify sediment dispersal, including during operational activities.	Sites considered at Stage Two (AA).
09 November 2020	Natural England	Letter by email	Marine mammals	The HRA suggests there are low numbers of harbour seal present in the Solent. Whilst Natural England agree that there are relatively low numbers here compared to	Noted. However, as reported in **Appendix B** (and summarised in **Appendix A**), no LSEs were

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				other areas, the numbers in the Solent are increasing annually and therefore Natural England would advise the Applicant looks for more recent data sources than Special Committee on Seals (SCOS), 2018.	identified to SACs for harbour seal features based on the application of the provisional Seal Management Units (SCOS, 2016).
09 November 2020	Natural England	Letter by email	Marine mammals	For grey seals and harbour seals, receptor ranges of 145km and 120km have been used respectively. Natural England would advise that Seal Management Units should be used	Screening has been revisited in line with the comment. The relevant Seal Management Unit (SMU) (South England – Unit 10) was applied to the site identification process (SCOS, 2016). This indicated that there are no SACs for either seal species that share the SMU with the Proposed Development. Therefore, no sites for seals have been identified (or 'Screened') in the updated Screening. To align with comments made on the marine mammal EIA (Scoping Opinion, July 2020 (RED, 2020b), the HRA also considered connectivity to SACs within the adjacent

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
					SMU (MU 9 – South East England). No connectivity to SACs within that SMU (i.e., The Wash and North Norfolk SAC for harbour seals or the Humber Estuary SAC for grey seals) could be established.
09 October 2020	Natural England	Letter by email	In-combination assessment	Expected Applicant to have identified a comprehensive list of projects based on information currently available. Natural England acknowledge that further information is likely to become available throughout the application process, however Natural England expect the Applicant to make all efforts to consider a comprehensive list of plans or projects with the potential to result in in-combination effects at this stage. It is unclear if the projects listed in Table 3.3 (of the Screening Report (RED,2020a) represent a comprehensive list and whether LSEs in-combination decisions have been made in this assessment have been made taking into account all relevant projects.	External plans and projects to include in-combination have been updated for the RIAA. The working assumption is that potential for LSEs alone requires consideration of potential for LSEs from effects in-combination (hereafter 'LSEI'). The potential for LSEI (where there is no LSEs alone) has also been addressed with 14 sites identified for inclusion in the Stage Two (AA).
09 October 2020	Natural England	Letter by email	Migratory birds	If collision risk mortality has been ruled out for migratory birds, it is unclear why	Collision risk mortality has not been ruled out for

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				common and Sandwich terns associated with the east coast SPAs have been included in the matrices.	migratory birds. Common and Sandwich terns associated with east coast SPAs have been revisited as part of the Screening update, along with other ornithological receptors recorded at the Proposed Development array area during site specific surveys. These sites are included in the revised Screening (see **Appendix C**).
09 October 2020	Natural England	Letter by email	Breeding birds non-breeding season	The matrices do not acknowledge the potential pathway for impact from collision to migratory waterbirds. It would be helpful if collision risk was added and the reasoning why it has been ruled out for waterbirds on migration.	Migratory non-seabirds have been re-considered (see **Appendix C**). Migratory waterbirds, which may have connectivity with the Proposed Development, have also been considered in the migratory non-seabirds HRA Screening update.
09 October 2020	Natural England	Letter by email	In-combination assessment	Expected the Applicant to have identified a comprehensive list of projects based on the information currently available. Natural England acknowledge that further	External plans and projects to include in-combination have been updated for the RIAA. The working

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				information is likely to become available throughout the application process, however Natural England expect the Applicant to make all efforts to consider a comprehensive list of plans or projects with the potential to result in in-combination effects.	assumption is that potential for LSEs alone requires consideration of potential for LSEI.
23 March 2021	Natural England, WSCC, the Environment Agency, SOS, SDNPA, Mid-Sussex District Council, RSPB, and Adur & Worthing District Council	ETG Meeting (online)	Terrestrial ecology	Winter bird survey results were discussed, including linkages from the Arun Valley SPA / Ramsar site to functionally linked land within and adjacent to the PEIR Assessment Boundary. Need for survey work for bats to focus on areas within 12km of The Mens SAC was raised.	Winter bird survey results are provided within **Sections 5.3** and 7.2. Bat surveys focused on the areas within 12km of The Mens SAC took place during the spring / summer of 2021.
26 March 2021	MMO, Cefas, Natural England, RSPB, SOS, SWT and TWT	ETG Meeting (Video conference via Microsoft Teams)	Updates and intended roadmap for 2021 Section 42 consultation: Sept 2021	Update addressed Scoping Opinion (Planning Inspectorate, 2020), development of the PEIR (RED, 2021) and the design process for the indicative Assessment Boundary. The refined offshore boundary and new cable route were presented, and consultation feedback summarised. Also, intentions for future consultations and a	No requirement for responses.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
		Titled: 'Ornithology, Marine Mammals and HRA (offshore)	Application: end of 2021	possible environmental enhancement (kelp restoration). Some PEIR survey data is not yet available.	
26 March 2021	As above: MMO, Cefas, Natural England, RSPB, SOS, SWT and TWT.	As above: Expert Topic Group Meeting Ornithology	Ornithology presentation covering: i) baseline	Survey updates; information gaps & initial trends presented. Analysis not yet complete (no estimated densities, corrections, or apportionment). Aerial (Feb 21) & intertidal (Mar 21) survey data supplements ES Baseline Report.	Natural England was concerned about the use of preliminary data to make final conclusions, however the final assessments presented within this RIAA are based on the full 24 months of data as agreed with Natural England as being appropriate.
			Ornithology ii) trends	Relatively low numbers of most species (all gull spp. and prior to 2020, kittiwakes) Large numbers (locally) of Dark-bellied Brent goose, Mediterranean & herring gull (offshore). Post-breeding migration of gannet, guillemot, razorbill may pass through. High numbers reported for Feb 2020 - unusually high auk numbers and kittiwake. Storm Ciara believed to have skewed data towards higher numbers.	Natural England advised not to exclude data believed to be influenced by the storm. SOS and Natural England expressed concern that the local kittiwake population (may winter in the English Channel) is not given due regard. A detailed assessment of the potential impact on local kittiwake

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
					colonies is presented within the ES but is not considered within the RIAA as the local colonies are not relevant to the HRA process.
			Ornithology iii) approach to assessment	Method Statement & in-combination effects discussed. The current sample size is currently too small to provide site-specific flight heights. A displacement analysis will not be undertaken for Sandwich tern due to very low abundance. For gannet, the array area plus a 2 km buffer is proposed as the reference for displacement	Parties agree operational OWFs are not part of the baseline. As agreed, the assessment methodologies used (flight heights) have been shared through the Evidence Plan process.
			Ornithology iv) feedback	Consultation comments (as addressed by Screening updates) were explored. This is covered in more detail below.	LSEs identified to additional SPAs and Ramsar sites. For others, LSE is discounted. New pathways include Dungeness, Romney Marsh and Rye Bay SPA and Ramsar in the HRA as well as the Alderney West Coast and Burhou Islands Ramsar.
26 March 2021	As above: MMO, Cefas,	ETG Meeting	Marine mammals	As the HRA has not identified LSEs for any marine mammal sites, discussion was more for the benefit of EIA considerations	Baseline information and approaches to the EIA were presented in detail. The

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
	Natural England, RSPB, SOS, SWT and TWT.		(seals)		HRA references its conclusions against pertinent baseline information.
			Marine mammals baseline, method statements	New potential data sources discussed (e.g., Natural Resources Wales research on behavioural responses to dredging, drilling & vessels). SMRU Consulting will compile both at sea usage and habitat preference maps but use only the latter.	The Applicant confirms the use of updated MU data within the assessments.
26 March 2021	As above: MMO Cefas Natural England, RSPB, SOS, SWT and TWT.	ETG Meeting	HRA (offshore) Consultation comments on HRA Screening	Presentation of process & outcomes of an updated Screening in response to stakeholder comments. Substantial changes with most relate to seabirds. minor updates to terrestrial ecology, benthic.	Natural England was grateful for the breakdown of comments/responses and was pleased to note that a breakdown of the Screening and a summary table is provided, as it was what Natural England asked for.
			HRA (offshore) ETG materials Updates to HRA Screening	Substantial detail was provided in ETG documents: 'Summary of Consultation' with the Applicant's answers to comments 'Post-consultation Screening outcomes' – a full account of the revised Screening for every site	The ETG materials provide an account of the substantial changes made in response to comments. The Applicant has added one standard deviation to the Woodward *et al.*, 2019 mean max foraging ranges,

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				Two technical notes explain two notable updates and concern sites identification for: a) breeding seabirds and b) migratory non-seabirds.	which extended those ranges and identified additional sites. New LSEs are identified for migratory birds, to benthic habitat sites on the South coast
			HRA (offshore) Other points HRA Screening	The Applicant clarified that following the updates, and on the application of the requested MUs, no LSEs are identified. RSPB sought clarification that the appropriate tern ranges are applied. A number of 'points for clarification' arose during the process and these were resolved. A revised Screening Report will not be issued. The RIAA clarifies Screening outcomes. TWT & Natural England believe the comments on benthic ecology impacts were more about EIA considerations.	Natural England advised it will consider the detail of the ETG materials and the specific questions asked by the Applicant (to ensure due regard) in a written response, but on an uncertain timeframe. The draft RIAA was issued as part of the first Statutory Consultation exercise in July 2021 (with the PEIR).
16 September 2021	Natural England	Letter by email	Section 42 consultation response on draft RIAA (RED, 2021):	Clarification requested on parameters presented in the MDS (need for concurrent piling, cable burial depths, HDD and associated intertidal disturbance risks, cable protection quantities, commitments in piling methodology).	**Table** 3-2 presents the final MDS.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
			General comments		
			In-combination assessment	The operation, maintenance and decommissioning of Rampion 1 should be included in receptor specific in-combination assessments that the HRA relies upon.	The operation, maintenance and decommissioning of Rampion 1 has been included in the cumulative effects assessments presented in the following ES aspect-specific chapters listed used to inform this RIAA: **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6). **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8). **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9).

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				The Applicant should ensure that the timescales presented for the Aquind Interconnector (AQI) are correct in order to properly assess temporal overlap with the Proposed Development (only some chapters of the PEIR assume there will be temporal overlap).	**Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12). **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22). The AQI project did not obtain a development consent; however, the project was given permission to apply for a judicial review of the rejection decision, which was upheld (24 January 2023) and the project is now with the SoS for re-determination. The proposed development has therefore been retained in the in-combination assessments. No updated construction programme for AQI is available at this stage

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
					however it is anticipated that the minimum delay would be around 2 years based on the currently uncertain progression of the subsequent referral back to the Secretary of State for decision following the judgement. Therefore, following the precautionary approach based on the high level of uncertainty, the maximum design scenario for the project would be if the timeline is pushed back by 2 years, with construction is completed by 2026, and site preparation works related to its cable laying completed by 2025.
			Marine mammals	Joint Nature Conservation Committee (JNCC) reported updated abundances for cetacean Management Units in 2021 (JNCC, 2021): the Applicant should use the updated abundances.	The potential for LSEs was discounted at Screening for marine mammals, therefore no sites were progressed to Stage Two (AA). Given this, abundances for MUs are not reported in the RIAA.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				That the Proposed Development will potentially have less of an impact on marine mammals than AQI is not a reason to justify no LSEI. Any impact from the Proposed Development would add to the impact already identified from the AQI.	The justification for a lack of in-combination impact pathways for marine mammals has been updated. It now relates to both the lack of connectivity between the Proposed Development and sites designated for marine mammals, and the lack of significance of in-combination impacts on all marine mammal species (at the broader MU level) presented in **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11).
			Benthic and intertidal ecology	Noted not yet satisfied with level of sediment plume modelling presented. Updated modelling (to include mapped locations of ZOI and designated sites) should take tidal state, range and sediment types into account and resultant impacts (temporary changes in water quality, increased sediment deposition and smothering and exposure to sediment-bound contaminants) should be used to update the assessments.	Detailed quantitative assessments of sediment plumes are provided in **Appendix 6.3: Coastal processes technical report: Impact assessment, Volume 4** of the ES (Document Reference: 6.4.6.3), also summarised in **Chapter 6:**

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				Evidence used to demonstrate the short-term and localised nature of sediment plume effects (i.e., increases in SSC) from aggregates activities should use up-to-date references from recent aggregate site monitoring data. Welcomed inclusion of assessments of suspended sediment and deposition within Solent Maritime SAC, South Wight Maritime SAC and Solent & Isle of Wight lagoons SAC. Noted that the tidal excursion is identified to be 16km the buffer from both the array and cable corridor should also be	**Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6) and **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9). The assessments in **Section 7.4** are based on the modelled effects of suspended sediment concentration and the resulting patterns of sediment deposition, including cumulative and in-combination effects where appropriate (e.g., in conjunction with nearby aggregate dredging). Updated reference used in **paragraph 7.4.21**.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				16km (rather than 15km for the array and 10km for the cable corridor) and this should be reflected in the screening of these sites. Where they overlap, SAC habitats are also supporting habitats for SPA features; therefore, conclusions of AAs for such benthic sites should feed into the site-specific assessments for functionally linked SPA sites (i.e., those overlapping with Solent Maritime SAC). Agreed that the HRA risks presented by elevated levels of sediment contaminants identified in EMU (2011) should be assessed. Requested relevant references to support the expectation that any contaminants released would be subject to rapid dilution, weathering and dispersion and are therefore unlikely to persist in the marine environment. Requested details of the Marine Pollution Contingency Plan (MPCP) to be presented within the RIAA. In-combination sediment plume modelling should be carried out to assess potential for cumulative impacts during construction with	The assessments in **Section 7.4** are based on a ZOI of 16km from both the array and cable corridor. Conclusions of AAs for SAC benthic features (**Section 7.4**) are aligned with assessments for supporting habitats of overlapping SPAs (**Section 7.5**).

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				existing aggregates sites (as was undertaken for Rampion 1). There is also a need to consider if there is the potential for in-combination effects to arise with the operation and maintenance of Rampion 1.	**Section 8.4** addresses the potential for cumulative impacts during construction to occur with existing aggregates sites.
			Ornithology	Do not agree with conclusion of no AEoI in-combination for kittiwake of Flamborough and Filey Coast (FFC) SPA and lesser black-backed gull of Alde-Ore Estuary (AOE) SPA based on other recent OWF DCO decisions (i.e., Norfolk Vanguard and Norfolk Boreas). There is also the potential for AEoI in-combination for gannet, guillemot and razorbill of Flamborough and Filey Coast SPA although firm conclusions for these features will be led by the outcome of the Hornsea Four examination.	In-combination assessments for Flamborough and Filey Coast SPA and Alde-Ore Estuary SPA are presented in **Section 8.5**.
02 November 2021	MMO, Cefas, Natural England, SOS, SWT, SMRU.	ETG Meeting (Video conference via Microsoft Teams) Titled: 'Ornithology, Marine	Ornithology Update on survey data Discussion comments received from S42 Consultation	Applicant presented aerial digital survey data (which was undergoing review at that time, particularly with regards to auk identification), as initial findings indicated there may be some anomalies in the levels of with razorbill to guillemot that were unexpected.	The full results from the aerial digital surveys are presented in **Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1). All auk IDs were reviewed.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
		Mammals and HRA (offshore)		The Applicant requested clarification with regards to Natural England comments on the use of *de minimis*	As Natural England did not provide clarification on the use of *de minimis*, that phrase is no longer used in the ornithology appraisals.
			HRA (offshore) Discussion comments received from S42 Consultation	Consider the Alderney and Burhou Islands Ramsar in your Section 42 Responses	A meeting was held with the Alderney Wildlife Trust and the States of Guernsey on 15/05/2023. It was agreed that as this Application was due to be submitted imminently, the approach set out would not be altered prior to submission but the Applicant would continue to engage with any concerns through the post-submission and examination phase.
02 November 2021	MMO Centre for Environment, Fisheries and Aquaculture Science (Cefas,)	ETG Meeting (Video conference via Microsoft Teams)	Physical Processes Discussion comments received from S42 Consultation	Spreadsheet modelling approach: some groups felt it was difficult to visualise or interpret. Consideration for plume extent from the array and export cable route. The proposed DCO order limits will not show the extent of the plume and impact on designated sites.	Proposed new example for modelling approach. Buffers would be continuous along the whole cable route and array area.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
	Natural England, Environment Agency, SWT, ZSL, and IFCA.	Titled: Physical Processes (Water Quality), Benthic Ecology & Fish Ecology			The narrow buffers describe the sands and gravels. The finer sediment is the orange buffer on the figure. Refer to **Appendix 6.3: Coastal processes technical report: Impact assessment, Volume 4** of the ES (Document Reference: 6.4.6.3), also summarised in **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6) and **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9).
			Ornithology Discussion on remaining S42 Consultation	Natural England queried whether any boat-based surveys/ radar surveys have been conducted in areas of high migration.	There is no requirement for radar in UK legislation and boat-based has moved in the last 10-years to aerial digital surveys.
				Common Scoter has not been mentioned at all.	Common scoter not factored in the collision risk modelling

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
					(CRM) based on an encounter likelihood. Individuals are considered to avoid the Proposed Development in its entirety.
			HRA (offshore) Discussion on remaining S42 responses, particularly in response to: French Authorities' response and data clarification. No AEoI (FFC SPA, AOE SPA). Non-material contribution and proportionality	PVA modelling Derogation risk The Applicant asked, if given that decisions are made on earlier OWF projects and appropriate compensation secured, is it still considered that the Proposed Development's impacts are big enough for a derogation case. Natural England responded they will defer to the Secretary of State.	The Applicant remains of the position that a derogation case is not required for the Proposed Development. Given the Proposed Development has a minimal impact of less than one individual kittiwake per annum apportioned to Flamborough and Filey Coast SPA, it is considered, following discussion with Natural England, that any compensation required may be better delivered through strategic compensation or collaboration with other projects. Further, without prejudice, detail on this is provided within the **Outline Kittiwake Implementation**

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
			of compensation in relation to the Proposed Development		**and Monitoring Plan (KIMP), Appendix A** of the **Without Prejudice HRA Derogation Case** (Document Reference: 5.10).
			Benthic ecology Discussion comments received from S42 Consultation	Natural England queried if the predictive habitat model will incorporate new data?	Further discussion was had with Sussex Ornithological Society (SOS) concerning screening, HRA, SPAs and how the methodologies used were decided on. This was carried out at the Ornithology, Marine Mammals & HRA (offshore) ETG Meeting in April 2022 (see below). Since PEIR further site-specific survey data has been added to habitat mapping. It should be stressed that where site specific data have been collected, this has been prioritised within the predictive habitat map and that an appropriate baseline

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				What other options is the Applicant considering as an alternative to floatation pits?	has been characterised. **Chapter 9: Benthic, subtidal and intertidal ecology** (Document Reference: 6.2.9) has been updated accordingly. Flotation pits are no longer required for the Proposed Development
12 April 2022	MMO, Cefas, Natural England, RSPB, SOS, SMRU.	Expert Topic Group Meeting (Video conference via Microsoft Teams) Titled: Ornithology, Marine Mammals & HRA (offshore)	HRA (offshore ornithology) Discussion on remaining S42 responses, particularly in response to agreeing HRA approach:	Applicant presented offshore ornithology updates including the full 24 months of aerial digital survey data (no requirement for radar surveys) and updated collision risks based on reduced WTGs (116 to 90). Migratory seabirds and non-seabirds (i.e., scoter) have been considered in the Spring and Autumn, using APEM bespoke Migropath model and seabird apportionment, as requested in Section 42 responses. Natural England expressed agreement with assessment methodology and requested both Migropath and MacArthur Green approaches are used in assessment, with a presentation of both.	Migropath modelling for non-seabirds (primarily waders) and a "broad front" approach for migratory seabirds has been presented. The "broad front" approach is comparable to the MacArthur Green approach (WWT & MacArthur Green, 2014), but not identical. The results for this modelling are included in Sections **7.5** and **8.5**.
			CRM and displacement	For displacement, the applicant proposed a revised lower rate of gannet displacement to	

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				be used during the breeding season (40-60%) and higher rate in the non-breeding season (60-80%); thus reducing monthly densities, further reducing birds assessed for the impact of collision from WTGs through the CRM. Natural England noted that the current advice will be to apply 70% or more avoidance.	70% macro-avoidance rate for gannet has been applied in **Sections 7.5** and **8.5**.
			French Authorities' response and data clarification. No AEoI (FFC SPA, AOE SPA). Non-material contribution and proportionality of compensation in relation to the Proposed Development.	FFC SPA and AOE SPA: Annual in-combination impacts for Rampion 2 are low values constituting non-material impacts (under one bird per annum). If French Authorities respond with updated colony counts, the assessments can be updated; however, Natural England discouraged changing apportioning assessments. Natural England confirmed impacts for UK sites are presented satisfactorily, but whether this constitutes an AEoI will be the decision of the SoS. Therefore, it is not possible to advise whether a derogation case is required. If it is, it is hoped that the small impacts can be addressed through strategic compensation although it is not clear what compensation measures would be appropriate. Natural England confirmed that they will discuss internally and escalate	**Section 8.5** presents the full in-combination impacts on features of FFC SPA and AOE SPA with the meeting on 22.9.22 summarising the further discussions on proportionate compensation on a without prejudice basis.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
				within Natural England with a view to giving advice at a later date.	
26 May 2022	MMO, Cefas, Natural England, Environment Agency, RSPB. SWT, IFCA.	ETG Meeting (Video conference via Microsoft Teams) Titled: Physical Processes, Benthic ecology & Fish ecology	Discussions on remaining S42 Consultations and agreeing ES approach for: Fish and Shellfish Ecology Benthic ecology	Rampion 1 had a seasonal restriction to herring, what survey information is available now that confirms that isn't necessary for the Proposed Development? In terms of cable corridor mitigation, Natural England raised concerns on the sufficiency of the data that has informed the mitigation, lack of habitat mapping and identification of impacts on designated sites. Chalk reef permanent loss is significant.	The restriction was relaxed. The modelling outputs and likelihood of meaningful interactions with gravel is low with these grounds. Not addressed in the text. Applicant has incorporated all data available including aggregate and drop-down data from 2020 and 2019. See **Table 9.9** of **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9). The secondary ZOI buffer area has been increased to 16km around the proposed DCO Order Limits to match the 16km tidal excursion zone for SSC (**Figure 9.1** within **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
			Physical processes	Requested evidence that there is little to no effect on the sediment and tidal regime.	ES (Document Reference: 6.2.9). Follow up meeting with Cefas, MMO and Natural England concerning cables passing through chalk feature and permanent habitat loss. The changes in the currents, wave and sediment transport regimes as a result of the fully operational Proposed Development are set out in **paragraphs 6.10.1 to 6.10.8, paragraphs 6.10.10 to 6.10.16 and paragraphs 6.10.19 to 6.10.32**, respectively within **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6). Changes to waves have been assessed by numerical modelling of various complete layouts

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
					and wave climate scenarios and changes to currents and sediment transport have been assessed (in conjunction with the assessment of waves) using an evidence-based approach, as presented in **Appendix 6.3: Coastal processes impact assessment, Volume 4** of the ES (Document Reference: 6.4.6.3).
22 September 2022	Natural England	(Video conference via Microsoft Teams)	Ornithology Project updates	Refined DCO Order Limit (now two distinct array areas, one to south and one to the west), re-run collision risk modelling. The reduction in DCO Order Limit hasn't changed any of the outcomes for assessment conclusion so project maintaining no AEoI conclusion for all features. The primary objective of this meeting is to establish what would be a proportionate compensation measure for less than 1 kittiwake per annum, and whether a proportionate approach constitutes a strategic/regional level option rather than the traditional project alone compensation measure.	The updated appraisals for all ornithological receptors screened in is presented in **Section 7.5** of this report.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
			Apportioning for kittiwake	Using the Furness apportioning method, the number of kittiwake from FFC SPA that are estimated to be lost in the return migration is 0.56, and 0.16 post-breeding migration, equalling an annual total of 0.72 birds from FFC SPA. Apportioning for auks not available during meeting.	Apportioning results are presented in **paragraph 8.5.29**.
			Proportionate, strategic kittiwake compensation	Natural England advised that most parallels are EA1N and EA2 which collaborated with Vanguard and Boreas for kittiwake and LBBG but included caveat in compensation package whereby if collaborative compensation didn't materialise, there was a commitment to deliver project alone compensation. For the proposed development project alone compensation does not seem appropriate and ideally a strategic measure i.e., the marine recovery fund (as part of the Offshore Wind Environmental Improvement Programme) will be in place to address the proposed development's impact. A collaboration with other OWFs that may be overcompensating could be the best option, providing timelines align, or a contributions type approach.	N/A
					N/A

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
			Gannet, auks and lesser black-backed gull potential for compensation	The Applicant advised that the RIAA will include wording that confirms that a non-standard, strategic/collaborative compensation strategy will be sought as a priority due to the very small impact on kittiwake, if compensation is required. Contact with Defra has been made which confirmed that there is low confidence in strategic compensation options being in place in time for the Proposed Development's DCO submission. Points discussed for kittiwake are relevant to other features at FFC SPA and lesser lack-backed gull of Alde-Ore Estuary SPA. Should await the Hornsea Four decision on auks (guillemot and razorbill), but decision is unlikely to be in public domain by time the Proposed Development submits DCO application. Possible advantages of offshore structures over onshore for auks, early indication that auks also take to offshore structures which may be an option.	
08 November 2022	Natural England, Environment Agency,	ETG Meeting (Video conference via	Terrestrial ecology (HRA related sections	Mitigation measures to reduce potential effects of construction disturbance	Mitigation through construction scheduling is addressed in **Section 6**.

© WSP UK Limited

Date	Consultee	Type of contact	Topic	Key issues raised	Applicant response and section where addressed
	WSCC, SDNPA, SWT, RSPB, SOS	Microsoft Teams) Entitled: Terrestrial Ecology and Nature Conservation	focused on waterbirds from Arun Valley SPA / Ramsar site		
07 March 2023	Natural England, SDNPA, WSCC, SWT, Environment Agency, and RSPB	ETG Meeting (Video conference via Microsoft Teams) Entitled: Terrestrial Ecology and Nature Conservation	Terrestrial ecology update	Water Neutrality was raised as a potential issue due to the allowance of water main fed welfare facilities within the substation when operational	Assessment is provided in **Section 7.2**.

© WSP UK Limited

Page intentionally blank

4.3 Transboundary consultation

4.3.1 The requirement for energy developments to consider transboundary effects (effects on European sites in other Member States) is established in the principles of the Habitats Directive. As per Advice Note Ten (PINS, 2022) (paragraph 2.1), prior to EU-Exit, the Applicant was required to provide the necessary information with its DCO Application to enable the SoS DESNZ to consider such effects.

4.3.2 The UK is committed under the 'Espoo Convention' to preventing transboundary harm. Noting this and that "the obligations of the competent authority as set out in the Habitats Regulations (2017) do not change" [post EU-Exit] (Defra, 2021) the continuation of the expectation of transboundary consultation is assumed for developments likely to affect interest features in other European countries.

4.3.3 The Applicant has referenced DECC's '*Guidelines on the assessment of transboundary impacts of energy developments on Natura 2000 sites outside the UK'* (2015) that advise the Applicant to agree the format and extent of transboundary consultation with PINS. The Screening Report (RED, 2020a) addressed possible effects on transboundary sites. A full account of the Screening is provided in **Appendix B** and in the Screening matrices at **Appendix E**. Transboundary consultation received will be published on the Planning Inspectorate website.

4.4 Transboundary Screening (Planning Inspectorate, 2021)

4.4.1 On 20 May 2021, the Applicant was advised that a Transboundary Screening had been undertaken for the Proposed Development on behalf of the SoS BEIS (now DESNZ) under the (Environmental Impact Assessment) Regulations 2017 (Planning Inspectorate, 2021). The reported findings of the Transboundary Screening have been reviewed as to how they pertain to the HRA.

4.4.2 With reference to the Scoping Report, within their Scoping Opinion (Planning Inspectorate, 2020) the Planning Inspectorate concluded that, in applying a precautionary approach, the Proposed Development **may potentially** have transboundary interactions (the magnitude of which has not been specifically identified) on the environment in Netherlands, Belgium, France, and Spain. These states have been notified, accordingly.

4.4.3 The potential for significant transboundary impacts is identified for the HRA-specific receptors below. Planning Inspectorate (2021) advises that these pathways are assessed further in the EIA and mitigation strategies considered.

- **Marine mammals**: underwater noise during offshore development. Impacts could extend to France, Belgium, the Netherlands, and Spain.
- **Ornithological receptors**: collisions with WTG offshore. Impacts could extend to France, Belgium, the Netherlands, and Spain.

4.4.4 The RIAA information provided for the Proposed Development's HRA has addressed the above-mentioned receptors as follows:

- **Marine mammals:** On SNCB advice, the Inter-Agency Marine Mammal Working Group (IAMMWG) species MU together with any potential connectivity

indicated by current research, were referenced to identify sites during Screening. Sites in France, Belgium, the Netherlands, and Denmark were Screened[7], but connectivity was not established to sites in Spain. LSEs were discounted for all sites on distance and low species densities in the Channel. With no site within 101km of the Proposed Development, once effects are diluted over these ranges and apportionment to all SACs with that range, impacts would be of negligible magnitude and significance, alone and in-combination. These findings have not raised comment at consultation.

- **Ornithological receptors:** On SNCB advice[8], the application of Woodward (*et al*., 2019) breeding season mean max foraging ranges plus one SD (a highly precautionary approach) and information on migratory routes were referenced to identify sites for Screening. Ten sites in France[9], five sites in Ireland[10] and the Alderney West Coast and the Burhou Islands Ramsar in Guernsey were Screened. No sites were identified in Belgium, the Netherlands or Spain. Three French sites and the Ramsar in Guernsey were advanced to Stage Two (AA) but AEoI on those sites can be discounted on the information provided in this RIAA.

- On the robust and precautionary approaches applied to identify risks to HRA receptors, the HRA is satisfied there is either no connectivity or the potential only for *de minimis* interactions between the Proposed Development and European sites in the transboundary countries Planning Inspectorate has indicated (alone and in-combination), or any others. With no LSEs to Irish sites and France notified by Planning Inspectorate, there remains for the HRA only a potential obligation with respect to notify Guernsey.

4.4.5 The following, additional findings were of note to the HRA:

- Planning Inspectorate (2021) found there would not be significant transboundary impacts associated with the onshore development (given the nature, scale and duration of potential effects and the relative distances between the onshore works); and

- Planning Inspectorate (2021) did not identify any interests within the European site network that could be exposed to significant transboundary impacts regarding Annex II fish.

- AQI and the A27 Arundel by-pass are the key external projects considered to have the potential to act cumulatively (in-combination) with Rampion 2.

---

[7] see Section 6 of the Screening Report (RED, 2020a) 'Consideration of Likely Significant Effects'

[8] See **Appendix A**, **B**, **C** and **D**

[9] i) Littoral seino-marin SPA (**Matrix 14)** ii) Falaise du Bessin Occidental SPA **(Matrix 29)** iii) Chausey SPA (**Matrix 32)** iv) Cap d'Erquy-Cap Fréhel SPA (**Matrix 33)** v) Tregor Goëlo SPA (**Matrix 36)** vi): Côte de Granit Rose-Sept Iles SPA **(Matrix 40)** vii) **Matrix 44:** Ouessant-Molène SPA viii) Camaret SPA **(Matrix 45)** ix) Iles Houat-Hoëdic SPA (**Matrix 46)** x) Cap Sizun SPA (**Matrix 47) (Appendix E)**

[10] i) Deenish Island and Scariff Island SPA (**Matrix 57**)/ ii) Puffin Island SPA (**Matrix 59**)/ iii) Skelligs SPA **(Matrix 60)/** vi) Blasket Island SPA (**Matrix 61**) v) Cruagh Island SPA (**Matrix 62**) (**Appendix E)**

Following the SoS decision to refuse consent for AQI in January 2022, AQI have been given permission to apply for a judicial review of the decision. Accordingly, AQI will be addressed in the in-combination assessments for the HRA (between **Section 8.2** and **Section 8.5**).

4.5 Transboundary PEIR consultation (France, 2021)

4.5.1 On 6 September 2021 following PEIR consultation, the Applicant received a response from the French Office for Biodiversity (FOB) making six recommendations for assessment updates. Those addressing the assessments presented in the draft RIAA (RED, 2021) focused on mobile receptors (marine mammals and seabirds) of Natura 2000 sites designated in France. On 17 March 2022, the Applicant sent a response to the FOB including a number of requests for further information in order to update the RIAA in line with the recommendations made.

4.5.2 **Table 4-2** summarises the FOB recommendations with relevance to the draft RIAA and the requests made by the Applicant in response to each.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table 4-2 Summary of recommendations made by the French Office for Biodiversity relevant to the draft PEIR (RED, 2021) and Applicant requests

Recommendation number	Recommendation summary	Applicant response/request summary
2	Consider all sites designated under Article L.334-1 of the Environmental Code.	Only protected areas designated under the Birds Directive (Directive 2009/147/EC) (i.e., SPAs), the Habitats Directive (Council Directive 92/43/EEC) (i.e. SCIs and SACs) as well as Ramsar sites are assessed in the Habitats Regulations Assessment (HRA).
3	Review the analysis of French Natura 2000 zones, for each species of seabird and marine mammal (and provided list of Natura 2000 sites to consider).	Noted only Natura 2000 sites within approximately 200km from the proposed DCO Order Limits boundary listed as having potential connectivity; however, for bird species connectivity to the proposed DCO Order Limits is expected to be further than 200km. **Request 3:** Request to provide species specific standard foraging distances for seabirds and marine mammals that should be used for assessing connectivity with sites in France. Regarding the Littoral seino-marin SPA assessment within draft RIAA matrices (**Appendix H, Matrix 19**), clearer cross-referencing to earlier chapters will be provided in the final RIAA matrices to provide justifications for why non-seabird features of this SPA have been screened out.

© WSP UK Limited

Recommendation number	Recommendation summary	Applicant response/request summary
5	Review the analysis of French sites containing colonies of nesting seabirds whose foraging ranges reach the Proposed Development project zone.	Deferred to **Recommendation 3** and **Request 3** above. Confirmed apportioning calculations will be reconsidered using information received in response to **Request 2**[11] (not specific to the draft RIAA) and **Request 3**[12].
6	Review risk of impacts on seabirds by considering the indices of sensibility regardless of the geographic origin of species expected to be present in and around the wind farm.	Acknowledged that limiting some sensitivity scores to UK/British populations potentially introduces a bias against seabirds originating from France. **Request 4:** Request to identify additional designated species missed by only using English / British scores of sensitivities. **Request 5:** Request to identify species whose sensitivity scores should be updated. **Request 6:** Request to provide the proportion of individuals from each French SPA colony that enter UK waters (during the non-breeding bio-season), specifically within the relevant biologically defined minimum population scales (BDMPS) region defined for each species in Furness (2015)

.

[11] Request 2 to FOB: A list of non-natura 2000 designated seabird colonies and their counts is provided.
[12] In line with advice from Natural England received on 12 April 2022 (see **paragraph 4.5.3**), final apportioning rates presented in this document do not include colony counts from non-natura 2000 designated colonies in France.

4.5.3 No further information in response to the Applicant's requests have been received from the FOB since their response on 06 September 2021. Furthermore, in a subsequent ETG meeting (12 April 2022) Natural England discouraged changing the ornithology apportioning methodology to include transboundary colonies as the adopted methodology is an agreed, well-defined protocol. Therefore, no changes to the assessments presented in the draft RIAA have been made, with specific relevance to the recommendations submitted by the FOB.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

5. HRA Stage One Screening

5.1 Screening outcomes for the Proposed Development alone

5.2 Introduction

5.2.1 The potential for LSEs to result from the Proposed Development acting alone, was identified at Screening for 35 European sites. Therefore, these sites require an AA. European sites within 100km (and subject to Stage Two (AA)) are presented within **Figure** 5-1 (located with this document **page 91**).

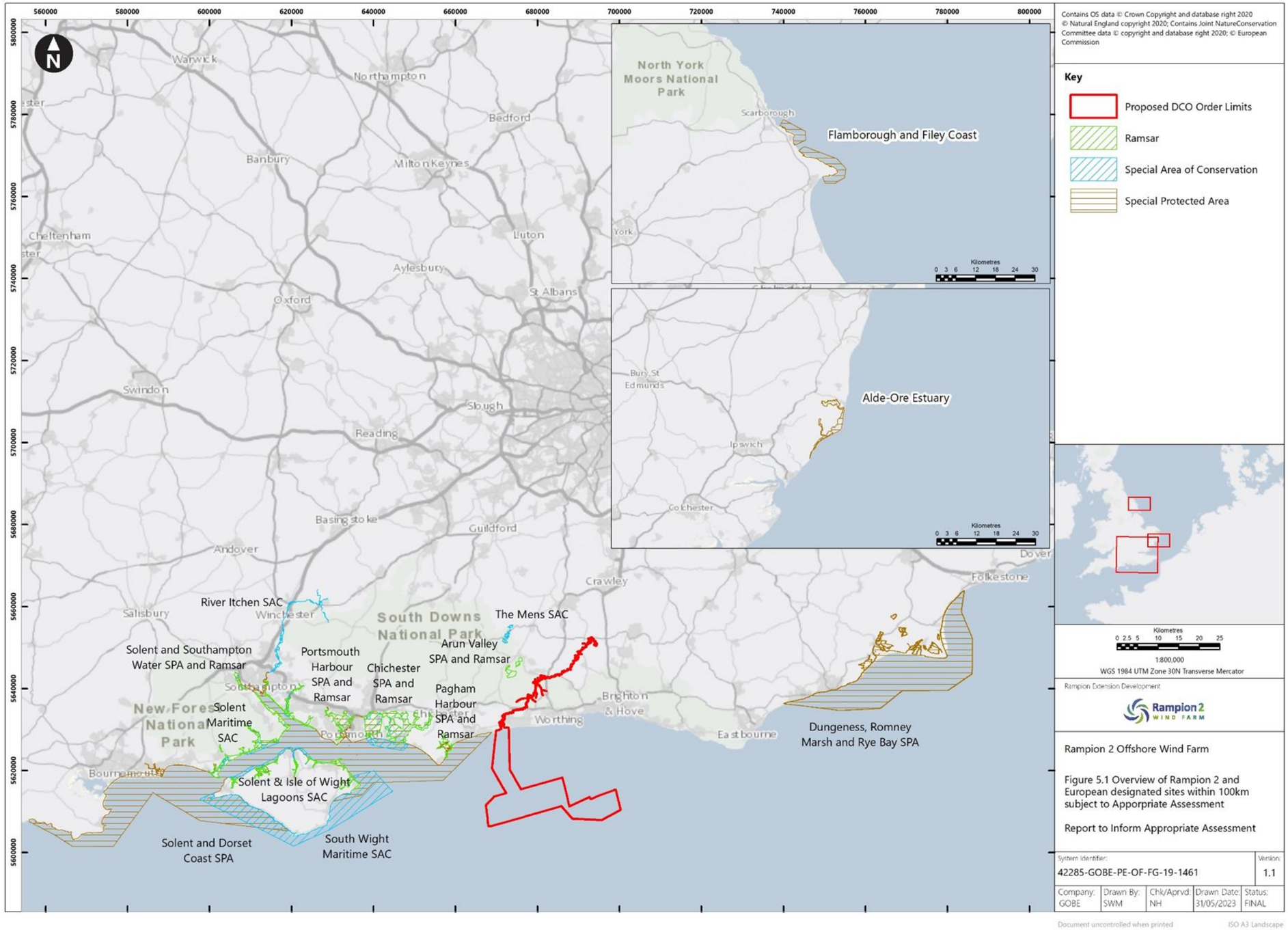
5.2.2 Screening Matrices for all sites identified for all receptor groups are provided at **Appendix E**.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Figure 5-1 The Proposed Development and European sites within 100km that are subject to Stage Two (AA)



© WSP UK Limited

Page intentionally blank

© WSP UK Limited

5.3 Terrestrial ecology (including wildfowl and waders) (effects alone)

5.3.1 The Applicant's Screening Report (RED, 2020a) identified seven European sites for consideration within the Screening exercise, as follows.

- Arun Valley (UK) Ramsar;
- Arun Valley (UK) SPA;
- Arun Valley (UK) SAC
- The Mens (UK) SAC;
- Pagham Harbour (UK) Ramsar;
- Pagham Harbour (UK) SPA; and
- Duncton to Bignor Escarpment SAC.

5.3.2 Of these seven sites, LSEs both alone and /or in-combination with external plans or projects were identified for three, these being the Arun Valley Ramsar site, Arun Valley SPA and The Mens SAC. Following consultation, a further two European sites supporting designated features that may occur above MHWS have been included within the assessment, namely Portsmouth Harbour Ramsar site and SPA.

5.3.3 The publication of the Applicant's HRA Screening Report (RED, 2020a), the EIA Scoping Opinion (Planning Inspectorate, 2020a) and consultation responses (as detailed in **Table** 4-1) have enabled further clarity to be drawn within the Screening process. Firstly, for reasons of clarity an LSE of land take / land cover change for functionally linked land has been included. Previously this was included within the LSEs covering fragmentation of habitat.

5.3.4 Secondly, the emissions associated with construction and operational traffic and site plant both alone and in-combination have now been discounted for all European sites alone and in-combination. This is based both on the location of the European sites identified in relation to the Proposed Development and the temporary (when considering the construction and decommissioning phases) and relatively low levels of road traffic predicted. This was confirmed within the EIA Scoping Opinion (Planning Inspectorate, 2020a) when specifically addressing European sites.

5.3.5 Lastly, it was also agreed that the potential for effects on dark-bellied brent geese associated with the Pagham Harbour Ramsar site and SPA could be screened out for all potential terrestrially based effects based on the geographical separation between these European sites and the Proposed Development (in excess of 10km). However, Pagham Harbour Ramsar site and SPA and Portsmouth Harbour Ramsar site and SPA are now included with regards the potential for birds to collide with WTG whilst on migration following consultation. The Arun Valley Ramsar site and SPA are not considered with regards to collision risk as the typical patterns of movement to and from these designated sites will not take birds across the array area.

5.3.6 LSEs due to changes in hydrology on functionally linked land associated with cable landfall and cable installation were concluded for the Arun Valley Ramsar site and SPA and The Mens SAC within the Applicant's HRA Screening Report (RED, 2020a). However, following the release of that document, further assessment of the effects on the water environment was provided within the PEIR (RED, 2021). This demonstrated that the potential for degradation of habitats sensitive to changes in groundwater (e.g., from water extraction from cable trench excavations) is negligible. This includes consideration of areas of adjacent habitat known to be functionally linked to the Arun Valley Ramsar site and SPA, namely the Arun Valley: Arundel to Watersfield Local Wildlife Site. Therefore, changes of hydrology are now screened out of consideration at Stage Two (AA).

5.3.7 Additional water usage during the operational phase was raised as a potential issue by the Environmental Technical Group in March 2023 based on concerns around water neutrality. Additional abstraction from the Sussex North Water Supply Zone is threatening the conservation objectives of the Arun Valley SAC, SPA and Ramsar site. Although, the water usage at the substation would be highly restricted as it would be used for the provision of welfare facilities that would be used sporadically only (noting that the substation is not a permanently staffed facility, with people present for routine maintenance and repairs only) to achieve water neutrality mitigation would still be necessary and therefore it has been screened in for consideration at Stage Two (AA).

5.3.8 A full account of HRA Screening is available at **Appendix B** which identifies the outcomes for all sites considered, post-consultation updates and the potential for LSEs. Where the potential for LSEs has been identified, this is noted in **Table** 5-2.

5.4 Migratory fish (effects alone)

5.4.1 Two European sites designated for migratory fish species were considered at Screening:

- River Itchen (UK) SAC; and
- Littoral Cauchois (FR) SAC.

5.4.2 Only the River Itchen SAC, designated for Atlantic salmon, was advanced to Stage Two (AA). These are the same sites identified in the HRA Screening Report (RED, 2020a) and no updates have been made to the Screening for migratory fish. A full account of HRA Screening is available at **Appendix B** which identifies the outcomes for all sites considered, post-consultation updates and the potential for LSEs. Where the potential for LSEs has been identified, this is noted in **Table** 5-2.

5.5 Marine mammals (effects alone)

5.6 Pinnipeds

5.6.1 Following consultation on the Applicant's Screening Report (RED, 2020a), the Screening was revisited with respect to grey seals and harbour seals (see **Appendix A**). The Applicant has applied the relevant provisional SMU (South England – unit 10) provided by the SCOS (2016). This indicated that there are no

SACs for either seal species that share the MU with the Proposed Development. Consequently, no sites were identified for either seal species for Screening and the conclusion remained that there was no potential for LSEs.

5.6.2 To align with comments made on the marine mammal EIA (Scoping Opinion, Planning Inspectorate, 2020a), HRA Screening also considered connectivity to SACs within the adjacent SMU (MU 9 – South East England) (SCOS, 2016). No connectivity to SACs within that MU (i.e., The Wash and North Norfolk SAC for harbour seals or the Humber Estuary SAC for grey seals) could be established. Therefore, no European sites, with Pinniped features, were identified for Stage Two (AA).

5.6.3 A full account of HRA Screening is available at **Appendix B** which identifies the outcomes for all sites considered, post-consultation updates and the potential for LSEs.

5.7 Cetaceans

5.7.1 For cetaceans, the SMU defines the spatial extent over which effects were considered (Inter-Agency Marine Mammal Working Group (IAMMWG, 2015)). The Screening accordingly considered all (24) SACs designated for harbour porpoise within the North Sea SMU and all SACs (15) designated for bottlenose dolphin within the Offshore Channel, Celtic Sea and South West England SMU. This includes sites in France, the Netherlands and Denmark.

5.7.2 The potential for LSEs was discounted at HRA Screening and no sites were progressed to Stage Two (AA). Natural England has confirmed (Natural England, 2020a) with respect to the closest SAC to the Proposed Development for harbour porpoise (The Southern North Sea SAC), that, given the distance of the site from the array (>127km), it is satisfied with the decision to discount LSEs for this site. No comments were made as to the findings of no LSEs for all SACs with bottlenose dolphin features, or other SACs designated for harbour porpoise other than to support the method applied to identify sites for consideration at Stage One Screening.

5.7.3 A full account of HRA Screening is available at **Appendix B** which identifies the outcomes for all sites considered, post-consultation updates and the potential for LSEs.

5.8 Benthic habitats and communities (effects alone)

5.8.1 Three European sites explicitly designated for Annex I habitat features were considered at Screening, and all were advanced to Stage Two (AA). These are as follows:

- Solent Maritime (UK) SAC;
- Solent and Isle of Wight lagoons SAC (UK); and
- South Wight Maritime (UK) SAC.

5.8.2 These sites were initially identified for inclusion in the Screening on the basis of a highly precautionary 30km range (as the maximum potential range for sediment

dispersal in the absence of supporting information at that time). As the maximum extent of effects is, on current information, not predicted to extend further than a 16km buffer around the array and ECC, no potential impact pathway was identified in the EIA or therefore, explicitly addressed in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9).

5.8.3 All three SACs are, however, still advanced to HRA Stage Two (AA) (and considered in **Section 7.4**). The SACs are addressed in the RIAA following advice at consultation (see **Appendix A**) and with reference to mitigation (commitments) applied (irrespective of the presence of these European sites) which will reduce seabed disturbance (and thereby potential effects related to sediment suspension) and risks related to MINNS and pollution. Since the Screening, and in response to comments received on the Screening Report (see **Table** 4-1**)**, the potential for LSEs have now been identified for additional pathways to these three sites during operation and maintenance.

5.8.4 A full account of HRA Screening is available at **Appendix B** which identifies, the outcomes for all sites considered, post-consultation updates and the potential for LSEs. A summary of sites potentially at risk of LSEs is provided in **Table** 5-2**.**

5.9 Offshore ornithology (effects alone)

5.9.1 Consultation responses identified two key points in relation to Screening European sites for breeding seabirds and migratory non-seabirds. Additional information on the approach taken in response is provided in **Appendices C** and **D**. The consequent updates to the Screening methodology resulted in a number of additional SPAs and Ramsar sites being advanced to HRA Stage Two.

5.9.2 Since Screening, the pathway to effects for a number of cited features of designated sites have been updated. This includes removal of potential collision risk to Bewick's swan and migratory waterbirds from the Arun Valley SPA, as their migratory flight paths do not cross over the Proposed Development array area (Wright *et al*, 2012).

5.9.3 Further updates included the removal of potential pathways to gannet (for collision and risk of displacement) during the breeding season from breeding colonies outside of the English Channel (e.g., with respect to Grassholm SPA and Flamborough and Filey Coast SPA), as evidence suggests birds do not realistically reach the English Channel, and therefore the Proposed Development array area, during the breeding season (Wright *et al*, 2013).

5.9.4 The potential for effects on prey species from construction activities to impact tern species from south coast SPAs has also been discounted (i.e., with respect to the common tern features of Pagham Harbour SPA and Solent and Dorset SPA). This latter potential pathway was removed on the basis that tern species were scarcely recorded foraging within the Proposed Development array area during site-specific surveys, which took place during the breeding season (as reported in the **Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** (Document Reference: 6.4.12.1)). In addition, any potential for this pathway from cable laying activities within nearshore waters surrounding a cable laying vessel is considered to be so minimal to be undetectable during the

restricted temporal and spatial period this may occur and therefore, no pathway to effects either alone or in-combination are considered.

5.9.5 89 European sites were considered at HRA Screening for breeding seabirds and migratory non-seabirds, of which, 24 sites were advanced to HRA Stage Two (AA). It would not be practicable to list those sites here; a full account of the HRA Screening conclusions is available at **Appendix B**, which identifies, the outcomes for all sites considered during Screening, post-consultation updates and the potential for LSEs. A summary of sites potentially at risk of LSEs is provided in **Table** 5-2.

5.10 Screening outcomes for the Proposed Development in-combination

5.10.1 In addition to the Screening process for the Proposed Development (alone), the Habitats Regulations also require consideration of the effects of the Proposed Development in-combination with other plans or projects (hereafter “external projects”), where these are not directly connected with or necessary for the management of the designated site.

5.10.2 The working assumption applied here is that where the potential for LSEs has been identified alone, the potential for LSEs in-combination requires consideration. It is also acknowledged that potential remains for a non-significant effect alone (insufficient to result in a conclusion of potential LSEs) to be deemed sufficient to contribute to potential LSEs in-combination.

5.10.3 The amalgamation of non-significant effects alone that have the potential to result in a LSEs in-combination with external projects are hereafter referred to as LSEI (Likely Significant Effects In-combination). The potential for LSEI to arise via the identified effect pathways has been identified to 14 sites in the Screening matrices at **Appendix E** for the operation and maintenance phase of the Proposed Development. As summarised in **Table** 5-2.

5.10.4 A summary discussion on the potential for LSEI is also provided for each receptor group addressed in the RIAA in the sections below.

5.10.5 The consideration of LSEI draws on the Cumulative Effects Assessment (CEA) undertaken for the ES. The detailed method followed in identifying and assessing potential cumulative effects in relation to the offshore environment is set out in **Chapter 5: Approach to the EIA, Volume 2** of the ES (Document Reference: 6.2.5). The short list of ‘other developments’ (external projects”) that may interact with the Proposed Development’s Zones of Influence (ZOI) during their construction, operation and maintenance or decommissioning’ is presented in **Appendix 5.4: Cumulative effects assessment shortlisted developments, Volume 4** of the ES (Document Reference: 6.4.5.4).

5.10.6 A tiering structure has been used in the HRA Screening process and assessment of other developments in accordance with PINS Advice Note Seventeen (2019) (see **Chapter 5: Approach to the EIA** (Document Reference: 6.2.5)). The tiers describe the level of detail for the cumulative effects assessment for the EIA which has relevance to the in-combination assessments required for the HRA.

5.11 Terrestrial ecology (including wildfowl and waders) (effects In-combination)

5.11.1 LSEs for the Proposed Development alone for the Arun Valley Ramsar site, Arun Valley SPA and The Mens SAC associated with land take / land cover change, fragmentation of habitats and disturbance have the potential to be greater when considered in-combination with the A27 Arundel By-pass project. The A27 Arundel by-pass is within the Arun Valley, in areas where mobile species listed on the designations have been identified through desk study and field survey.

5.11.2 In accordance with the methodology, where the potential for LSEs alone is identified it is assumed that LSEI could result. Consideration for the potential for AEoI to result from effects acting in-combination is therefore provided in **Section 8.2.** No other in-combination dynamics are identified for this receptor group.

5.12 Migratory fish (effects In-combination)

5.12.1 There are two European sites for which the estuary connecting the SAC to the marine environment is within 100km of the Proposed Development. Both of these sites were considered at Screening. LSEs alone were discounted to Littoral Cauchois (France (FR)) SAC which is located 97km from the Proposed Development) on the basis of weak connectivity. Given the dissipation of potential effects over distance (and weak connectivity), there is considered to be no potential for the Proposed Development to contribute to measurable in-combination effects to Littoral Cauchois SAC.

5.12.2 For the impact of underwater noise, a search area of 100km was used to identify external projects for the CEA, which are discussed in **Section 8.3**. The following types of external development are considered to have the potential to result in effects on migratory fish:

- sub-sea cables, interconnectors, and pipeline (installation);
- aggregate production areas;
- tidal energy; and
- OWF (during construction).

5.12.3 AQI is a proposed sub-sea power transmission link between France and Portsmouth. Planning Inspectorate (2021) indicated AQI for potential cumulative interactions with Rampion 2 during its transboundary Screening.

5.12.4 The ‘Indicative worst-case construction programme’ for AQI was for a 2024 (Q2) end-date, with cable-related works ending 2023 (Q3) (AQUIND, 2019). However, given that the project is currently with the SoS for redetermination, the project remains uncertain and a delay to the potential construction period has therefore been assumed. On this basis, therefore, the maximum design scenario for this project considers that there will be a 2026 (Q2) end-date, with cable-related works ending 2025 (Q3) to ensure consideration of potential construction phase overlap. Therefore, any Unexploded Ordnance (UXO) clearance (the only underwater noise source from the construction of the AQI cable that is considered to have the potential to cause in-combination impacts on migratory fish) is likely to have

temporal overlap with the construction phase of the Proposed Development. However, the HRA of AQI found that standard mitigation would reduce their effects to negligible levels due to a substantial distance which results in the ZOIs for both projects having no overlap with the River Itchen SAC (AQUIND, 2019). Therefore, if it can be concluded that there is no pathway for in-combination impacts.

5.12.5 Therefore, the only potential for in-combination effects is considered to be limited to the potential impact of underwater noise during construction for salmon migrating to or from the River Itchen SAC. As the potential for LSEs is identified alone, it is assumed that LSEI could result. The potential for AEoI from effects acting in-combination is therefore provided in **Section 8.3**. No other in-combination issues are identified for this receptor group.

5.13 Marine mammals (effects In-combination)

5.13.1 All SACs considered for marine mammals (including transboundary sites) are at least 101km from the Proposed Development. Most SACs within the relevant MUs are considerably greater distance. It was established for the assessment of the Proposed Development acting alone that connectivity between its direct ZOIs and the SACs considered was possible, but the pathways to effect are extremely weak in view of the low species densities in the English Channel. The evidence supporting the lack of connectivity between SACs designated for marine mammals and the Proposed Development is set out in **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11).

5.13.2 For all potential pathways to effects, the severity of the effect experienced locally is considered to be not significant for the project alone. Measurable effects will not therefore manifest on distant SACs after the likelihood and severity of effects on the SAC populations have been diluted over distance. It is determined that over the relevant scales, the contribution of the Proposed Development to impacts would be small to the extent impacts will not likely amount to a measurable contribution to significant effects in-combination with external plans or projects.

5.13.3 For AQI specifically, LSEs were identified for numerous cetaceans and pinnipeds sites across the wider Channel (UK and France) concerning contaminants released from sediments and/or spills (AQUIND, 2019).

5.13.4 **Chapter 11: Marine mammals, Volume 2** of the ES (Document Reference: 6.2.11) considers the potential for in-combination effects from construction (i.e., all underwater noise impacts) to occur as a result of the Proposed Development and AQI. However, given that all SACs considered for marine mammals (including transboundary sites) are at least 101km from the Proposed Development and that the pathways to effects are extremely weak in view of the low species densities in the English Channel, impacts will not likely amount to a measurable contribution to in-combination effects. To support this conclusion, even when considering in-combination impacts on marine mammal populations at the MU level, all in-combination impacts assessments for all species drew conclusions of either minor adverse or negligible significance, which is **Not Significant** in EIA terms.

5.13.5 No LSEI are therefore identified for this receptor group and it is therefore not considered further in this document.

5.14 Benthic habitats and communities (effects In-combination)

5.14.1 For benthic subtidal and intertidal ecology, the potential for cumulative effects and therefore the search area for external projects for inclusion in the CEA was limited to the potential dispersal range of suspended sediment. As above, this search area extends 16km around the array and ECC. The following type of external project made the short list if located within this area:

- sub-sea cables and pipelines (telecom and power cables);
- aggregate production areas; and
- OWF.

5.14.2 Following consultation, the potential for LSE has been identified for the three European sites designated for benthic features that are closest to the Proposed Development (but beyond the 16km buffer defined to capture the greatest potential range of effects); Solent Maritime SAC, Solent and Isle of Wight lagoons SAC, and South Wight Maritime SAC. As the potential for LSEs is identified alone, it is assumed that LSEI could result. The potential for AEoI are therefore considered for these sites in **Section 8.4**.

5.14.3 A conclusion from the alone assessment of detectable measure of change (i.e., above natural variation) from the Proposed Development alone, would mean that the potential for an AEoI in-combination would need to be considered. This was with reference to the external projects identified within the CEA search area[13], with further regard given to the potential for external projects to consecutively, or concurrently affect the European sites under consideration.

5.15 Offshore ornithology (effects In-combination)

5.15.1 There is potential for cumulative impacts to birds as a result of construction, operational and decommissioning activities associated with the Proposed Development in-combination with external projects. For the purpose of this RIAA such cumulative impacts are defined as in-combination impacts. Potential in-combination collision risk with WTGs and associated infrastructure from OWFs could result in injury or fatality. This may occur when birds fly through multiple OWFs whilst foraging for food, commuting between breeding sites and foraging areas, or during migration.

5.15.2 A further in-combination risk from the Proposed Development and external projects may be to species that are sensitive to the presence of activities associated with the construction, operation and decommissioning of WTGs, such that they may result in mortality as a consequence of being displaced from multiple OWF site areas and buffers surrounding them. The only external projects identified for this RIAA are those defined as being within Tier 1 and Tier 2 presented in **Table 5-1**.

[13] See **Appendix 5.4: Cumulative effects assessment shortlisted developments, Volume 4** (Document Reference: 6.4.5.4)

5.15.3 The approach taken to assessing collision risk and displacement mortality from the Proposed Development in-combination with external projects is a quantitative one, drawing upon the published information produced by the respective project developers and / or as agreed as appropriate with SNCBs for historic projects that may not have quantified such risk. Such published, quantitative information on predicted mortality rates is not available at an early stage in the development of external projects e.g., an external project in Tier 3. The result is that the collision risk and displacement assessments for the Proposed Development in-combination with external projects therefore addresses external projects in Tiers 1 and 2, but not Tier 3 or below, for which no quantitative data are available.

5.15.4 The process taken for this RIAA in assessing cited features from designated sites identified for potential LSEI (but not for LSEs alone) considers the relative risk for LSEs alone first ahead of any potential contribution to LSEI. If the potential for LSEs was identified to a cited feature from designated sites with respect to the Proposed Development acting alone, the potential for LSEI is assumed (and assessed).

5.15.5 The foundation of the assessment of AEoI in-combination is the contribution made by the Proposed Development to the collective impact. Accordingly, the approach has assessed the nature of the effect acting alone for each cited feature from designated sites (see alone assessments in **Section 7.5**), even where only the potential for LSEI is identified.

5.15.6 Where a measurable effect (i.e., an effect that is detectable above baseline mortality) is identified in the course of the alone assessment to conclude AEoI, the cited feature from such a designated site is considered with respect to AEoI in-combination in **Section 8.5**.

5.15.7 However, where, on further scrutiny, there was found to be no pathway to effect, or no detectable measure of change, it is considered there is no potential for an AEoI in-combination. Accordingly, in such cases, the site has not been assessed in **Section 8.5**.

Table 5-1 Descriptions of tiers of projects to be included in the in-combination assessment.

RIAA Assessment Tiers	ES Assessment Tiers	Description of stage of development of project
Tier 1a	Tier 1	Operational and under construction projects which were not in place when baseline data was collected. Projects with a legally secure consent that have been awarded a contract for difference (CfD) but have not yet been implemented.
Tier 1b	Tier 2	Includes all projects/plans that have a legally secure consent, but have no CfD; therefore, there is uncertainty about the timeline for construction of these projects.

RIAA Assessment Tiers	ES Assessment Tiers	Description of stage of development of project
Tier 1c	Tier 3	Projects for which an application has been submitted, but not yet determined. There is therefore information on which to base a quantitative assessment of cumulative impact but there is a degree of uncertainty as to the final approved design of the project and the timeline for construction.
Tier 1d	Tier 4	Relevant marine infrastructure projects that the regulatory body are expecting to be submitted for determination and projects for which PEIR has been submitted, but not yet a full ES. There is therefore some information on which to base a quantitative assessment of cumulative impact but there is a large degree of uncertainty as to the final design of the project and the timeline for construction.
Tier 1e	Tier 5	Relevant marine infrastructure projects that the regulatory body are expecting to be submitted for determination.
Tier 2	N/A	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted
Tier 3	N/A	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted. Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited. Identified in other plans and programmes (as appropriate) which set the framework for future development consents / approvals, where such development is reasonably likely to come forward.

© WSP UK Limited

5.16 Summary of Screening conclusions

Table 5-2 European sites (and relevant pathways) for which LSEs/LSEI could not be discounted and Stage Two (AA) is required.

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF	Only European site features to which an effect pathway has been identified (relevant features) are listed	Construction	Operation & maintenance	Decommissioning
Terrestrial ecology (including wildfowl and waders) (NB - Non-breeding B - Breeding M - [on] Migration)								
1	Arun Valley Ramsar	26.8	4.7	12.2	Northern pintail	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects Spread of non-native species	Water neutrality	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects Spread of non-native species
					Assemblage of wintering waterfowl	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects Spread of non-native species	Water neutrality	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects Spread of non-native species
2	Arun Valley SPA	26.8	4.7	12.2	Bewick's swan	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects	Water neutrality	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects Spread of non-native species

© WSP UK Limited

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF	Only European site features to which an effect pathway has been identified (relevant features) are listed	Construction	Operation & maintenance	Decommissioning
						Spread of non-native species		
					Non-breeding waterfowl assemblage	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects Spread of non-native species	Water neutrality	Land take / land cover change (functionally linked land) Noise and vibration Fragmentation of habitats Pollution effects Spread of non-native species
3	Arun Valley SAC	26.8	4.7	12.2	Ramshorn snail	No LSEs	Water neutrality	No LSEs
4	Pagham Harbour SPA	14.7	11.5	9.5	Dark-bellied brent goose	No LSEs.	Collison risk on migration (NB)	No LSEs.
					Common tern	No LSEs	Collision risk (B)	No LSEs
					Ruff	No LSEs.	Collison risk on migration (NB)	No LSEs.
5	Pagham Harbour Ramsar	453.8	421.4	439.7	Dark-bellied brent goose	No LSEs.	Collison risk on migration (NB)	No LSEs.
6	Portsmouth Harbour SPA	382.8	349.4	345	Dark-bellied brent goose Black-tailed godwit Dunlin Red-breasted merganser	No LSEs	Collison risk on migration (NB)	No LSEs
7	Portsmouth Harbour Ramsar	38.2	34.8	34.4	Dark-bellied brent goose	No LSEs	Collison risk on migration (NB)	No LSEs
Bats								

© WSP UK Limited

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding Only European site features to which an effect pathway has been identified (relevant features) are listed	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF		Construction	Operation & maintenance	Decommissioning
8	The Mens SAC	35.2	11.2	20.7	Barbastelle bat	Land take / land cover change (functionally linked land) Habitat fragmentation Increased light levels Pollution effects Spread of non-native species	No LSEs#	Land take / land cover change (functionally linked land) Habitat fragmentation Increased light levels Pollution effects Spread of non-native species
Migratory fish								
9	River Itchen SAC	50.5km to the mouth of Southampton Water.			Atlantic Salmon	Underwater noise	No LSEs.	Underwater noise
Marine mammals – no sites identified for potential LSEs								
Benthic habitats and communities								
10	Solent Maritime SAC	23..3	16.2	15.9	Estuaries, Spartina swards, Atlantic salt meadows, Sandbanks slightly covered by sea water all the time, Mudflats & sandflats not covered by seawater, Coastal lagoons, Salicornia & other annuals colonizing mud/ sand	Suspended sediment/ deposition MINNS Pollution	MINNS Physical processes Suspended sediment / deposition Pollution	Suspended sediment / deposition MINNS Pollution
11	South Wight Maritime SAC	23	30.6	25	Reefs Submerged or partially submerged sea caves	Suspended sediment/ deposition MINNS Pollution	MINNS Physical processes Suspended sediment / deposition Pollution	Suspended sediment / deposition MINNS Pollution

© WSP UK Limited

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF	Only European site features to which an effect pathway has been identified (relevant features) are listed	Construction	Operation & maintenance	Decommissioning
12	Solent & Isle of Wight lagoons SAC	33.1	32	31.5	Coastal lagoons	Suspended sediment / deposition MINNS Pollution	MINNS Physical processes Suspended sediment / deposition Pollution	Suspended sediment / deposition MINNS Pollution
Offshore ornithology								
13	Dungeness, Romney Marsh & Rye Bay SPA	46	47.4	67.3	Common tern	No LSEs	Collison risk on migration (NB)	No LSEs
					Sandwich tern	Disturbance / displacement	Collision risk (B & NB) Disturbance / displacement	Disturbance / displacement
14	Solent and Dorset Coast SPA	11.6	2.5	0.96	Common tern Little tern	Disturbance / displacement	No LSEs	Disturbance / displacement
					Sandwich tern	Disturbance / displacement	Disturbance / displacement	Disturbance / displacement
15	Chichester and Langstone Harbours SPA	23.3	16.1	15.9	Sandwich tern	No LSEs	Collision during breeding season Barrier effect Disturbance / displacement	No LSEs
					Common tern	No LSEs	Collision risk (B)	No LSEs
					Bar-tailed godwit Curlew Dark-bellied B goose Dunlin Grey plover Pintail Red-b. merganser	No LSEs	Collison risk on migration (NB)	No LSEs

© WSP UK Limited

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF	Only European site features to which an effect pathway has been identified (relevant features) are listed	Construction	Operation & maintenance	Decommissioning
					Redshank Ringed plover Sanderling Shelduck Shoveler Teal Turnstone Wigeon Waterbird assemblage			
16	Chichester & Langstone Harbours Ramsar	23.1	16.1	15.8	Ringed plover Black-tailed godwit Redshank Dark-bellied Brent goose Shelduck Grey plover Dunlin Waterbird assemblage	No LSEs	Collison risk on migration (NB)	No LSEs
17	Solent and Southampton Water SPA	30.9	36.7	32.4	Sandwich tern	No LSEs	Collision risk (B) Barrier effect Disturbance / displacement	No LSEs
					Black-tailed godwit Dark-bellied brent goose Ringed plover Teal Waterbird assemblage	No LSEs	Collison risk on migration (NB)	No LSEs
18	Solent and Southampton Water Ramsar	30.8	36.7	32.3	Ringed plover Dark-bellied brent goose Teal Black-tailed godwit Waterbird assemblage	No LSEs	Collison risk on migration (NB)	No LSEs
19	Medway Estuary & Marshes SPA	97.5	72.1	102.2	Common tern	No LSEs	Collison risk on migration (NB)	No LSEs

© WSP UK Limited

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF	Only European site features to which an effect pathway has been identified (relevant features) are listed	Construction	Operation & maintenance	Decommissioning
20	Littoral seino-marin (FR) SPA	77.4	109.9	95.0	Lesser black-backed gull Kittiwake	No LSEs	Collision risk (B & NB)	No LSEs
21	Foulness (Mid-Essex Coast Phase 5 SPA	116.2	91.6	121.6	Sandwich tern Common tern	No LSEs	Collison risk on migration (NB)	No LSEs
22	Falaise du Bessin Occidental SPA	132.7	156.8	141.4	Kittiwake	No LSEs	Collision risk (B & NB)	No LSEs
23	Alde-Ore Estuary (UK) SPA	188.1	162.6	192.7	Sandwich tern	No LSEs	Collison risk on migration (NB)	No LSEs
24	Alde-Ore Estuary (UK) Ramsar	188.1	162.6	192.7	Lesser black-backed gull	No LSEs	Collison risk (NB)	No LSEs
25	The Wash SPA	239.2	204.3	229.9	Common tern	No LSEs	Collison risk on migration (NB)	No LSEs
26	Breydon Water SPA	245.1	215.9	245.5	Common tern	No LSEs	Collison risk on migration (NB)	No LSEs
27	Greater Wash SPA	253.7	218.8	244.6	Common tern Sandwich tern	No LSEs	Collison risk on migration (NB)	No LSEs
28	North Norfolk Coast SPA	260.7	225.8	251.8	Common tern	No LSEs	Collison risk on migration (NB)	No LSEs
					Sandwich tern	No LSEs	Collison risk on migration (NB)	No LSEs
29		260.7	225.8	251.8	Common tern	No LSEs	Collison risk on migration (NB)	No LSEs

© WSP UK Limited

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF	Only European site features to which an effect pathway has been identified (relevant features) are listed	Construction	Operation & maintenance	Decommissioning
	North Norfolk Coast Ramsar				Sandwich tern	No LSEs	Collison risk on migration (NB)	No LSEs
30	Côte de Granit Rose-Sept Iles SPA	259.3	278	268	Gannet	No LSEs	Collison risk (B and NB) Disturbance / displacement (NB and B)	No LSEs
31	Alderney West Coast & Burhou Islands Ramsar	148.1	N/A	154	Gannet	No LSEs	Collision risk (B & NB) Disturbance / displacement (B & NB)	No LSEs
32	Grassholm SPA	357.7	354.2	354.3	Gannet	No LSEs	Collison risk (NB) Disturbance / displacement (NB)	No LSEs
33	Flamborough and Filey Coast SPA	378.4	344.1	366.4	Gannet	No LSEs	Collison risk (NB) Disturbance / displacement (NB)	No LSEs
					Guillemot Razorbill	Disturbance / displacement (NB)	Disturbance / displacement (NB)	Disturbance/displacement (NB)
					Kittiwake Herring gull	No LSEs	Collison risk (NB)	No LSEs
34	Northumbria Coast SPA	453.8	421.4	439.7	Arctic tern	No LSEs	Collison risk on migration (NB)	No LSEs

© WSP UK Limited

No	Designated site	Distance to (km)			Relevant feature(s)* (NB - Non-breeding B - Breeding	Phase of the Proposed Development # Indicates pathway for which LSE alone is discounted but LSEI could result		
		Array	ON	OFF	Only European site features to which an effect pathway has been identified (relevant features) are listed	Construction	Operation & maintenance	Decommissioning
35	Northumbria Coast Ramsar	453.8	421.4	439.7	Arctic tern	No LSEs	Collision risk on migration (NB)	No LSEs
36	Coquet Island SPA	522.9	490.6	508.5	Sandwich tern Arctic tern Common tern	No LSEs	Collison risk on migration (NB)	No LSEs
					Herring gull Lesser black-backed gull Kittiwake	No LSEs	Collision risk (NB)	No LSEs
37	Farne Islands SPA	555.0	522.8	540.9	Common tern Arctic tern Sandwich tern	No LSEs	Collison risk on migration (NB)	No LSEs
					Black-legged Kittiwake	No LSEs	Collison risk (NB)	No LSEs
					Guillemot	Disturbance / displacement (NB)	Disturbance / displacement (NB)	Disturbance/displacement (NB)

© WSP UK Limited

6. Embedded environmental measures

6.1.1 Embedded environmental measures (commitments) of relevance to the assessment of potential impacts on European sites are presented in **Table 6-1**.

6.1.2 **Table 6-1** draws on embedded environmental measures from individual aspect chapters of the Proposed Development's ES and, where appropriate, embedded environmental measures (that are specific to the RIAA). In accordance with the *Sweetman* ruling (People over Wind, 2018), such measures were not considered during the Screening exercise but are included within the determination of AEoI.

6.1.3 The Applicant is cognisant that measures designed to avoid or reduce the overall impact of a plan or project on a European site, must be considered at the appropriate stage of the HRA. The distinction between 'mitigation' and 'compensation' was clarified in Grace v An Bord Pleanala (2018). Measures intended to avoid or reduce any adverse effects that might result from the proposal are mitigation and appropriately discussed at HRA Stage Two. However, measures that seek to offset, or 'make up for' the negative effects are compensation and should be examined at IROPI (HRA Stage Three). The RIAA refers only to the former.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table 6-1 Embedded environmental measures of relevance to the AA of potential impacts on European sites

Commitment ID	Commitment	Relevant Receptor / Pathway	Secured through
C-1	The onshore cable route will be completely buried underground for its entire length where practicable.	Waders and wildfowl – collision risk with overhead power lines	DCO requirements or dML conditions.
C-41	The subsea inter-array cables will typically be buried at a target burial depth of 1m below the seabed surface. The final depth of the cables will be dependent on the seabed geological conditions and the risks to the cable (e.g., from anchor drag damage).	Migratory fish – EMF and loss / change of habitat	DCO requirements or dML conditions.
C-43	The subsea export cable ducts will be drilled underneath the beach using horizontal directional drilling (HDD) techniques.	Benthic ecology – Suspended sediment	DCO requirements or dML conditions.
C-44	An **Outline Scour Protection and Cable Protection Plan** (Document Reference 7.12) has been submitted with this application, and includes details of the need, type, quantity and installation methods for scour protection. A Final Scour Protection and Cable Protection Plan will be completed prior to construction commencing and submitted to the Marine Management Organisation (MMO).	Migratory fish and benthic ecology – loss / change of habitat	DCO requirements or DML conditions.
C-45	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	Benthic ecology – Suspended sediment	DCO requirements or dML conditions.

© WSP UK Limited

Commitment ID	Commitment	Relevant Receptor / Pathway	Secured through
	detailed within the Cable Specification and Installation Plan.		
C-51	A Vessel Management Plan will be developed pre-construction which will determine vessel routeing to and from construction areas and ports to minimise, as far as reasonably practicable, encounters with marine mammals. It will also consider vessel codes of conduct provided by WiSe Scheme, Scottish Marine Wildlife Watching Code (MWWC) and the Nature Scott "Guide to best practice for watching marine wildlife".	Marine Mammals – vessel disturbance and collision risk	DCO requirements or dML conditions.
C-52	A piling Marine Mammal Mitigation Protocol (MMMP) will be implemented during construction and will be developed in accordance with Joint Nature Conservation Committee (JNCC, 2010) guidance and with the latest relevant guidance and information and in consultation with stakeholders. The piling MMMP will include details of soft starts to be used during piling operations with lower hammer energies used at the beginning of the piling sequence before increasing energies to higher levels. A **Draft Piling Marine Mammal Protocol** (Document Reference: 7.14) has been submitted with this application.	Marine mammals – underwater noise	DCO requirements or dML conditions.
C-53	An **Outline Marine Pollution Contingency Plan** (MPCP) has been submitted with this Application as Appendix A of the **Outline Project Environmental Management Plan** (Document Reference: 7.11). This	Benthic ecology – accidental pollution	DCO requirements or dML conditions

© WSP UK Limited

Commitment ID	Commitment	Relevant Receptor / Pathway	Secured through
	Outline MPCP provides details of procedures to protect personnel working and to safeguard the marine environment and mitigation measures in the event of an accidental pollution event arising from offshore operations relating to Rampion 2. The Final MPCP will include relevant key emergency contact details.		
C-54	A Decommissioning Marine Mammal Mitigation Protocol (MMMP) will be implemented during decommissioning. The Decommissioning MMMP will be in line with the latest relevant available guidance	Marine mammals – underwater noise	DCO requirements or dML conditions.
C-56	RED will apply for Safety Zones post consent. Safety Zones of up to 500m will be sought during construction, maintenance and decommissioning phases. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, maintenance and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards.	Benthic Ecology	Electricity application procedures (Section 95 of Energy Act 2004)
C-65	The proposed offshore cable corridor and cable landfall (below mean high water springs (MHWS)) will avoid all statutory marine designated areas.	Migratory fish, benthic ecology – underwater noise, suspended sediment, pollution	DCO requirements or dML conditions.

© WSP UK Limited

Commitment ID	Commitment	Relevant Receptor / Pathway	Secured through
C-76	In line with good practice, Pollution Prevention Plans (PPPs) will be developed to detail how ground and surface waters will be protected from construction and operation related pollution. These will include information on the use and storage of any fuels, oils and other chemicals (in line with C-8 and C-167), measures for protecting licenced and private groundwater abstractions (in line with commitment C-147) and pollution incidence response planning.	All mobile features of identified European sites using functionally linked land / pollution prevention	Code of Construction Practice (CoCP) and DCO articles and requirement
C-89	There will be a minimum blade tip clearance of at least 22m above Mean High Water Springs (MHWS).	Offshore ornithology – collision risk.	Secured in the description of the development
C-95	The assessment has taken into consideration the mitigation and control of invasive species measures, this has been incorporated into the **Outline Project Environmental Management Plan (PEMP)** (Document Reference: 7.11).	Benthic ecology – introduction and / or spread of invasive non-native species	DCO requirements or dML conditions
C-96	Subsea array and export cables will be installed via either ploughing, jetting, trenching, or post-lay burial techniques, to a target burial depth of 1m.	Migratory fish, benthic ecology - suspended sediment, pollution, habitat loss/change	DCO requirements or dML conditions
C-102	A UXO Clearance Marine Mammal Mitigation Protocol (MMMP) will be developed in consultation with Natural England to appropriately manage the risk to marine mammals during UXO clearance. A **Draft UXO Clearance MMMP** (Document Reference 7.15) has been submitted with this Application.	Marine mammals – underwater noise	DCO requirements or dML conditions

© WSP UK Limited

Commitment ID	Commitment	Relevant Receptor / Pathway	Secured through
C-103	Areas of temporary habitat loss will begin reinstatement within 2 years of the loss, other than at the temporary construction compounds, cable joint bays, some haul roads, some construction access roads, landfall and substation location where activities may take longer to complete. Habitat restoration (i.e., planting and seeding) will take place at an appropriate time of year dependent on habitat type. In general habitat restoration will seek to deliver the same habitat type as the baseline, unless there is an opportunity to deliver enhancements. Woodland cannot be replaced above the cable ducts and in these situations woodland ride habitats will be delivered.	All onshore mobile features of identified European sites using functionally linked land / habitat loss and fragmentation	Outline CoCP and DCO articles and requirement
C-105	A lighting design of all temporary and permanent lighting will be developed once contractors are appointed; however, the principles of lighting design will be detailed at the time of Application and adhere to the joint guidance provided by the Bat Conservation Trust and Institution of Lighting Professionals (2018). The lighting design will account for the potential effects on people (residents and walkers) and biodiversity by taking measures to minimise lighting usage, minimise light spill, use most appropriate wave lengths of light and locate lighting in the most appropriate locations – this is to decrease the potential displacement effects on light sensitive fauna such as bats.	Barbastelle / Disturbance via light	Outline CoCP and DCO articles and requirement

© WSP UK Limited

Commitment ID	Commitment	Relevant Receptor / Pathway	Secured through
C-107	Tried and tested invasive species control, disease control and biosecurity measures will be used to avoid the spread of infested materials or pathogens.	All European sites connected via a river system / spread of invasive non-native species	Outline CoCP and DCO requirement
C-111	A Decommissioning Plan will be prepared for the project in line with the latest relevant available guidance.	All European sites	DCO requirements or DML conditions
C-115	Hedgerows/tree lines crossed by the cable route will be 'notched' to reduce habitat loss and landscape and heritage impacts wherever possible. This is defined as temporarily displacing one or more short sections (i.e., notches) within the same hedgerow/tree line. Hedgerow/tree line losses will thereby be kept to approximately 14m total width at each hedgerow crossing point where notching can take place. Hedgerows deemed "important" under the Hedgerows Regulations 1997 (or where there are other considerations), losses will be reduced to a 6m notch for the temporary construction haul roads only, by trenchless installation of the cable ducts under them. Where appropriate, hedgerows will be temporarily translocated using a tree spade to maintain diversity and structure and result in more rapid reinstatement. Where chances of success are questionable, notches will be made by removal and reinstatement through planting. The ECoW will justify the approach being	Barbastelle bat / loss and fragmentation of functionally linked habitat	Outline CoCP and DCO requirement

© WSP UK Limited

Commitment ID	Commitment	Relevant Receptor / Pathway	Secured through
	taken in line with the responsibilities of implementing the vegetation retention plan (see C-220). Reinstated hedgerows and tree lines will be monitored over a period of 10 years, and remedial action taken rapidly where signs of failure are identified. Further details are provided in the **Outline Code of Construction Practice** (Document Reference: 7.2) **and Outline Landscape and Ecology Management Plan** (Document Reference: 7.10).		
C117	Works on areas identified as floodplain (Flood Zones 2 and 3) will be programmed to avoid the period between October and February inclusive to avoid disturbance of waterbirds, and where possible, will be programmed to occur in late summer/ early autumn, to avoid interaction with known flooding periods to minimise the potential for displacement of floodwater.	Wildfowl and waders / loss and fragmentation of functionally linked land and disturbance	Outline CoCP and DCO requirement
C-204	The working corridor within woodland will be narrowed to be no more than 30m to reduce tree loss. Where the working corridor passes close to woodland that is being retained (as shown on the Vegetation Retention Plan) root protection areas conforming to BS5837:2012 will be demarcated and maintained.	Barbastelle bat / loss and fragmentation of functionally linked habitat	Outline CoCP and DCO requirement

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

7. Appraisal of potential AEoI (the Proposed Development alone)

7.1 Introduction

7.1.1 Where the potential for a LSEs/LSEI on a relevant site has been identified, there is a requirement to consider whether those effects will adversely affect the integrity of the site in view of its conservation objectives. The conclusion on the potential for LSEs and LSEI for the Proposed Development is presented in **Table 5-2** and the conservation objectives for all relevant sites provided in **Appendix F**. The information is presented below according to the following receptor groupings:

- terrestrial ecology (including wildfowl and waders);
- migratory fish;
- benthic and intertidal habitats; and
- offshore ornithology.

7.2 Appraisal of potential AEoI alone for terrestrial ecology (including wildfowl and waders)

Introduction

7.2.1 Information to inform the assessment for terrestrial ecology is provided in **Table 3-2** (the MDS relevant to terrestrial ecology), **Section 6** (Embedded environmental measures),the **Commitments Register** (Document Reference: 7.22) and **Appendix F** (Information on the designated sites). The potential for LSEs as regards terrestrial ecology is summarised in **Section 5.11** with the Stage Two (AA) presented below.

Arun Valley Ramsar

Features and effects for assessment

7.2.2 The potential for LSEs to result from the Proposed Development acting alone has been identified for the following:

- northern pintail during construction and decommissioning due to land take / land cover change and fragmentation of functionally linked land, pollution and invasive species spread and disturbance from noise and vibration; and
- assemblage of wintering waterfowl (identified as being of importance due to teal, wigeon, shoveler and ruff within the Ramsar information sheet) during construction and decommissioning due to land take / land cover change and fragmentation of functionally linked land, pollution and invasive species spread and disturbance from noise and vibration.

Assessment information

7.2.3 The conservation objectives (as described in **Appendix F**) for the site[14] are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

7.2.4 In addition to the site-specific information presented in **Appendix F**, surveys for the Proposed Development have been carried out and reported in **Appendix 22.14 Onshore winter bird report 2020-2022, Volume 4** of the ES (Document Reference: 6.4.22.14).

Construction and decommissioning

Land take / land cover change

7.2.5 The installation of the cable within the Arun Valley will result in the temporary loss of habitat from coastal and floodplain grazing marshes and arable fields, that could provide functionally linked land for foraging wildfowl of the Arun Valley Ramsar site (located 4.7km from the DCO order limit at the closest point). The installation of the cable will be done sequentially to avoid large scale open excavations being present at any given time. It is estimated that within a single location less than four hectares will be within an active working area at any given time. This may include the following: open cable trenches, an HDD launch / retrieval pit, haul road, access points, soil storage and construction compounds.

7.2.6 The functionally linked land for the Arun Valley Ramsar site of interest with regards the Proposed Development is defined differently for different species as:

- for Northern pintail, wigeon, teal, and shoveler it is defined as the floodplain of the Arun Valley to the south of Arundel, the floodplain of the Adur Valley between Ashurst and Partridge Green, and the coastal strip at Climping Beach based on the location of the Proposed Development, the typical foraging distances of these species (Johnson *et al*., 2014) and information received from Natural England during technical engagement; and

[14] There are no published conservation objectives for the Arun Valley Ramsar site. Therefore, the conservation objectives for the Arun Valley SPA have been used due to their applicability to the wildfowl features being assessed.

- for ruff it is defined as the floodplain of the Arun Valley to the south of Arundel and the coastal strip at Climping based on habitat preferences.

7.2.7 The area of the Arun Valley described above is approximately 8.7km from the designation boundary at the closest point. It has been defined as that shown within the Priority Habitat Inventory as coastal and floodplain grazing marsh south of Warningcamp. This area is approximately 387ha in extent and characterised by a farmed landscape dominated by improved pasture and arable fields with a network of ditches on both the east and west banks of the River Arun. There are considerable areas of additional functionally linked land to the east and north of Arundel, as well as the Ramsar site itself. The area of Adur Valley has been defined as the 133ha of largely grazing land that lies immediately adjacent to the River Adur (at the closest point the DCO Order Limit is approximately 12.7km away). The areas defined as coastal and floodplain grazing marsh along the River Adur are relatively narrow and typically bordered by extensive areas of arable land. The coastal strip at Climping Beach is made up of arable fields (with some recent disturbance due to flood defence works) and a golf course when north of the sea wall.

7.2.8 A number of embedded environmental measures outlined in **Table 6-1** characterise the design and schedule of working that reduces the potential for conflict with the non-breeding wildfowl and waders. These are:

- C-1 – The onshore cable route will be completely buried underground for its entire length where practicable;
- C-4 – HDD technique will be used at the landfall location.
- C-103 – Areas of temporary habitat loss will be reinstated within 2 years of the loss, other than at the temporary construction compounds, cable joint bays, landfall and substation location where activities may take longer to complete. Habitat restoration will take place at an appropriate time of year dependent on habitat type. In general habitat restoration will seek to deliver the same habitat type as the baseline, unless there is an opportunity to deliver enhancements. Woodland cannot be replaced above the cable ducts and in these situations woodland ride habitats will be delivered; and
- C-117 – Works on areas identified as floodplain (Flood Zones 2 and 3) will be programmed to avoid the period between October and February inclusive to avoid disturbance of waterbirds, and where possible, will be programmed to occur in late summer/ early autumn, to avoid interaction with known flooding periods to minimise the potential for displacement of floodwater.

7.2.9 The baseline survey information on the distribution and numbers of over-wintering wildfowl and waders within the vicinity of the Proposed Development in the coastal strip (near Climping), Arun Valley and Adur Valley is provided within the ES (**Appendix 22.14: Onshore winter bird report 2020-2022, Volume 4** (Document Reference: 6.4.22.14)). This appendix identifies a peak count of 18 pintail recorded below MHWS at Climping Beach. This species was noted on a single occasion above MHWS in February 2022 (peak count of 4 individuals). The four individuals were recorded in flooded fields in the Adur Valley (classified as coastal and floodplain grazing marsh in the Priority Habitat Inventory) south of Partridge Green. A peak count of 600 wigeon were noted within the Adur Valley in January

2021 in the same area as the peak pintail count noted above. Wigeon were noted regularly in this area, although more frequent sightings came from the Arun Valley in waterbodies to the north-west of the Church of St. Mary Magdalene, Lyminster (peak count 116). Teal were noted on ten occasions above MHWS, with nine of these being from the Adur Valley (peak count 151). As with pintail and wigeon the birds recorded were in flooded fields between Partridge Green and Henfield. Shoveler was recorded on a single occasion during the survey period (peak count 15) in January 2021 close to Henfield and outside of the DCO order limit. No ruff were recorded during the two winters of survey.

7.2.10 The assessment within the ES (**Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22)) concludes that there will be no significant effect on the Arun Valley Ramsar site (in terms of the EIA Regulations) based on the location of the Proposed Development, the temporary nature of the works, the scale of development compared to the availability of functionally linked land, the timing of the works (outside of the period when these species tend to be present), the restoration of habitat and the sporadic occurrence of the designated features identified during the survey programme.

Northern pintail

7.2.11 The temporary loss of arable and coastal and floodplain grazing marsh that may be utilised by northern pintail (particularly when flooded) will occupy only a small proportion of the available functionally linked land based on the foraging range of this species (~18km – Johnson *et al*., 2014). The loss of habitats in-land, and within the construction footprint will largely take place outside of the period when pintail are present (October through February inclusive) largely negating this LSE.

7.2.12 In addition to the restricted spatial and temporal extent of the construction works, the potential for temporary habitat loss to result in the loss of fitness of individual northern pintail is further reduced by the small numbers, limited distribution and sporadic occurrence of this species within the vicinity of the Proposed Development.

7.2.13 **There is, therefore, no potential for an AEoI to the conservation objectives of the northern pintail of the Arun Valley Ramsar site in relation to land take / land cover change effects from Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Assemblage of wintering waterfowl

7.2.14 The floodplain of the Arun Valley and Adur valley within the proposed DCO Order Limit provides functionally linked habitat for shoveler, teal and wigeon (Johnson *et al*., 2014), it is assumed that ruff associated with the Arun Valley Ramsar site could also use this habitat as well as that associated with the coastal strip at Climping.

7.2.15 As no ruff were recorded and shoveler was only noted on a single occasion within the area within which land take / land cover change is proposed, these species can be discounted. It is acknowledged that these species could be present within the functionally linked land identified, however the survey data suggests that this

habitat is not providing an area that is relied upon to support the fitness of these populations.

7.2.16 Wigeon were noted on thirteen occasions in numbers exceeding 1% of the designation figure (4,742 individuals) in the Arun and Adur Valleys. In the Arun Valley the records were focused on waterbodies close to the Church of St. Mary Magdalene, Lyminster. The waterbodies favoured by wigeon are outside of the DCO Order Limits and screened from it by dense scrub; however these birds may venture onto the coastal and floodplain grazing marsh to forage. In the Adur valley wigeon are associated with flooded fields between Partridge Green and Henfield, including a number that lie within the DCO Order Limits. Teal were recorded on a single occasion in the Arun Valley (on the same waterbody favoured by wigeon in the area), with the other nine records from the flooded fields between Partridge Green and Henfield.

7.2.17 The restricted spatial (compared to the availability of suitable habitat) and temporal extent of the construction works, and the restricted timing of works suggests that any land take / land cover change will not affect the fitness of individual birds. Within the Arun Valley this is largely due to the favoured habitat (waterbodies close to Lyminster) remaining unaffected, whilst in the Adur Valley areas in flood are favoured ensuring that when this habitat is available no works will be ongoing (i.e., it is not possible to install cable ducts within flooded fields).

7.2.18 **There is, therefore, no potential for an AEoI to affect the assemblage of wintering waterfowl of the Arun Valley Ramsar site in relation to land take / land cover change effects from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Fragmentation of habitats

Introduction

7.2.19 The installation of the cable within the Arun Valley and Adur Valley will result in periods of additional human activity within functionally linked land. If designated features of the Arun Valley Ramsar site avoid moving across or near to these areas due to the presence of human activity or the physical damage of habitat they may be prevented from reaching other suitable foraging opportunities.

Northern pintail

7.2.20 The presence of construction and decommissioning works could result in northern pintail avoiding certain fields (i.e., feeding resources) as they may not cross an active work site to reach them. This could reduce the effective resource base for the waterfowl of the Arun Valley Ramsar site.

7.2.21 The construction of the proposed onshore cable corridor will progress across relatively short distances (~1,000m, with active areas likely to be across 150m of this on any given day) at any given point limiting the potential for fragmentation to occur (i.e., avoidance of working area will be highly localised). The mobility of this species is such that a deviation of a few hundred metres will not result in a level of energy expenditure likely to alter the fitness of individual birds. It should also be

noted that to reach the floodplain of either the lower Arun Valley or the Adur Valley between Partridge Green and Henfield these birds will already have passed across or close to various towns and villages and crossed many roads, suggesting that they are already acclimatised to some degree of human activity. Further, as works will not be taking place during the vast majority of the period in which pintail would be expected to be present (see embedded environmental measure C-117) the potential to reduce fitness of individual birds due to fragmentation is negligible.

7.2.22 **There is, therefore, no potential for an AEoI to the conservation objectives on the northern pintail of the Arun Valley Ramsar site in relation to fragmentation of habitats from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Assemblage of wintering waterfowl

7.2.23 The assessment of the fragmentation of habitats for the Proposed Development for ruff and shoveler mirrors that provided in **paragraphs 7.2.16** and **7.2.18** for northern pintail.

7.2.24 With respect to wigeon and teal there will be periods when construction activity will be close to the waterbodies near the Church of Mary Magdalene, Lyminster (around 285m away) and within the coastal and floodplain grazing marsh within the Adur Valley. For these birds to move between the Arun Valley Ramsar and these areas will require them to cross the working area or divert around it. However, as the active working area will be discrete and require only a marginal change in flight line to avoid, will be temporary in nature (e.g., progression of 150m per week, assuming 4 cable ducts being installed) and works will mainly be undertaken outside the period when wigeon and teal are present the potential for these species to be excluded from this area due to fragmentation is negligible.

7.2.25 **There is, therefore, no potential for an AEoI to the conservation objectives on the assemblage of wintering waterfowl of the Arun Valley Ramsar site in relation to fragmentation of habitats from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Pollution effects and spread of non-native species

Introduction

7.2.26 The installation of the cable within the Arun Valley and Adur Valley comes with an inherent risk of accidentally releasing pollutants such as hydrocarbons or drilling fluids, or inadvertently spreading non-native invasive species. Based on the location of the DCO Order Limits any loss of pollutants or spread of non-native invasive species would only occur on functionally linked land. This is due to both the separation distance between the designation boundary and the working area and its location downstream.

7.2.27 A number of embedded environmental measures outlined in **Table 6-1** characterise the design and schedule of working that reduces the potential for pollutant loss or non-native species spread to occur. These are:

- C-76 – In line with good practice, pollution prevention plans (PPPs) will be drawn up to detail how ground and surface waters will be protected in construction and operation. These will include information on the storage of any fuels, oils and other chemicals (in line with C-8 and C-167) and pollution incidence response planning. These will include measures for the protection of licenced and private abstractions. This could include a monitoring regime associated with critical or very near receptors; and
- C-107 – Tried and tested invasive species control and biosecurity measures will be used to avoid the spread of infested materials.

7.2.28 Best practice is commonly implemented across all nationally significant infrastructure projects as they are delivered. These tried and tested methods provide confidence that accidental pollutant release or spread of non-native species can be adequately controlled within the working area. Further detail on these commitments is provided in the **Outline Code of Construction Practice** (Document Reference: 7.2).

7.2.29 There is, therefore, no potential for an AEoI to the conservation objectives on northern pintail or the assemblage of wintering waterfowl of the Arun Valley Ramsar site in relation to pollution effects and spread of non-native species from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term.

Disturbance due to noise and vibration

Introduction

7.2.30 The construction, and to a lesser extent decommissioning activity, will result in the production of noise and vibration through the use of plant, human presence etc. This activity may disturb designated features of the Arun Valley Ramsar site whilst foraging or loafing in functionally linked land within 500m (Cutts, Phelps & Burdon, 2009) of active parts of the construction / decommissioning site.

7.2.31 Two of the embedded environmental measures outlined in **Table 6-1** characterise the design and schedule of working that reduces the potential for conflict with the non-breeding wildfowl. These are:

- C-4 – Horizontal Directional Drill (HDD) technique will be used at the landfall location; and
- C-117 –Works on areas identified as floodplain (Flood Zones 2 and 3) will be programmed to avoid the period between October and February inclusive to avoid disturbance of waterbirds, and where possible, will be programmed to occur in late summer/ early autumn, to avoid interaction with known flooding periods to minimise the potential for displacement of floodwater.

Northern pintail

7.2.32 Northern pintail was not recorded frequently or in high numbers above MHWS, however it is still likely that they will be present occasionally within or close to the DCO Order Limits. However, the survey results do suggest that temporary displacement of this species at a level that is likely to result in a perceivable

reduction of fitness will not occur as they are not reliant on the locale (i.e., they have other foraging opportunities). Further, as the cable installation will mainly take place during the period when they are not present (as per commitment C-117) the potential for disturbance is negligible.

7.2.33 **There is, therefore, no potential for an AEoI to the conservation objectives on the northern pintail of the Arun Valley Ramsar site due to disturbance via noise and vibration from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Assemblage of wintering waterfowl

7.2.34 The assessment of disturbance due to noise and vibration for the shoveler, and ruff components of the assemblage of wintering waterfowl mirrors that provided in **paragraph 7.2.31** for northern pintail. For wigeon and teal, although the frequency of occurrence and size of peak counts is greater the temporal overlap between presence of wintering birds and construction (due to C-117) is such that any disturbance is unlikely to affect the fitness of individual birds. Should any construction activity occur in the coastal and floodplain grazing marsh of the Arun Valley when birds are present (i.e. in September or March) the waterbodies favoured by wigeon and teal are screened by dense scrub from the working area suggesting that these birds are unlikely to react due to human presence and construction noise (given the separation to main construction works will be in excess of 280m), whilst in the Adur Valley disturbance is highly unlikely to occur as if birds are present then the fields are flooded, thereby stopping construction works progressing.

7.2.35 **There is, therefore, no potential for an AEoI to the conservation objectives on the assemblage of wintering waterfowl of the Arun Valley Ramsar due to disturbance via noise and vibration from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Operation and maintenance

Water neutrality

7.2.36 Natural England cannot conclude that current levels of water abstraction within the 'Sussex North Water Supply Zone'[15] may be having an impact on the Arun Valley Ramsar site. Therefore, any newly proposed development within this zone must not add to the impact. To demonstrate water neutrality the Proposed Development will need to show that the use of water in the supply area is the same or lower than before the development is in place. It has been agreed between Natural England and Horsham District Council that there is sufficient 'head room' available during the construction phase to make it necessary to consider the operation and maintenance phase in detail only.

[15] See map on West Sussex County Council's water neutrality pages at https://www.westsussex.gov.uk/planning/water-neutrality/ [accessed 01 July 2023]

7.2.37 The substation location at Oakendene will include welfare facilities (including a toilet, wash hand basin and additional sink) and a fire control (sprinkler) system. These would be connected to the mains water supply, and therefore although the substation is not permanently staffed (i.e., welfare facilities would be used only during periods of maintenance or repair) and the sprinklers would only be used in the case of an emergency additional water usage is proposed. Therefore, to adhere to achieve water neutrality there is a need to ensure that water use elsewhere within the 'Sussex North Water Supply Zone'[16] is at least no greater than current (or lower).

7.2.38 West Sussex County Council and the local planning authorities within the Sussex North Water Supply Zone are currently working towards the delivery of a strategic scheme whereby developers can contribute financially to an offsetting scheme (based on predicted water usage) that will deliver the necessary water use reductions across the area to enable developments to achieve water neutrality. Currently this scheme is being formulated (following endorsement of approach by Natural England) but is expected to be in operation well before the substation at Oakendene would be commissioned. Assuming this strategic scheme is available at the time of commissioning RED would provide the required financial contribution to the scheme to enable the water usage at the substation to be fully mitigated.

7.2.39 The scale of the financial contribution cannot yet be estimated as there is neither a detailed design for the substation (which is reliant on a large range of factors including number, type and output of individual wind turbines, number of transmission cables etc.) allowing for an estimate of water usage.

7.2.40 If the strategic scheme is not available at the time, then a range of bespoke measures would be put in place. This would include the reduction of potential water use on-site at the substation (as per commitment **C-260**) via water harvesting and recycling and other measures (such as alternative supply of water via tanker) which are discussed within **Chapter 26: Water environment, Volume 2** of the ES (Document Reference 6.2.26).

7.2.41 **There is, therefore, no potential for an AEoI to the conservation objectives on the features of the Arun Valley Ramsar site due to over abstraction of water from the Proposed Development alone and therefore, subject to natural change, the features will be maintained in the long term.**

Arun Valley SPA

Features and effects for assessment

7.2.42 The potential for LSEs to result from the Proposed Development acting alone has been identified for the following:

[16] See map on West Sussex County Council's water neutrality pages at https://www.westsussex.gov.uk/planning/water-neutrality/ [accessed 01 July 2023]

- Bewick's swan during construction and decommissioning due to land take / land cover change and fragmentation of functionally linked land, pollution and invasive species spread and disturbance from noise and vibration;
- non-breeding waterfowl assemblage (identified as being of most importance due to the presence of teal, wigeon and shoveler within the designation) during construction and decommissioning due to land take / land cover change and fragmentation of functionally linked land, pollution and invasive species spread and disturbance from noise and vibration; and
- non-breeding waterfowl assemblage during operation due to potential for collision risk on migration.

Assessment information

7.2.43 The conservation objectives (as described in **Appendix F**) for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features, and
  - the distribution of the qualifying features within the site.

7.2.44 In addition to the site-specific information presented in **Appendix F**, surveys for the Proposed Development have been carried out and reported in **Appendix 23.3** (Document Reference: 6.4.22.3) of the ES.

Construction and decommissioning

Land take / land cover change

Bewick's swan

7.2.45 Bewick's swan were not recorded during the wintering bird surveys undertaken. Information provided by SOS for the same winter period provided first observations in December 2020 (10-year average has return date in November) with a peak count of 14 Bewick's swans. These records were from an area known as "Burpham Water Meadows" which is outside of the survey area being more than 900m from the proposed DCO Order Limits and separated by an area of ancient woodland and the crest of a hill.

7.2.46 The temporary loss of coastal and floodplain grazing marsh and arable land that may be utilised by Bewick's swan will occupy only a small proportion of the available functionally linked land based on the foraging range of this species

(10km – Robinson *et al*., 2004) – note it is assumed that Bewick's swan may be present in the area on occasion regardless of the survey findings. The loss of habitats within the construction footprint will largely take place outside of the winter period (commitment C-117) with trenches being dressed back following duct installation.

7.2.47 It is apparent, from desk study and field survey data, that the habitats within the proposed DCO Order Limits do not provide habitat relied on by Bewick's swan. Therefore, the potential for individuals birds to lose of fitness due to the installation of underground cables for the Proposed Development is minimal. Further, the restriction on the timing of construction (C-117) and the small spatial extent of construction works (compared to available habitat) ensure that Bewick's swan of the Arun Valley SPA will remain unaffected by the Proposed Development.

7.2.48 **There is, therefore, no potential for an AEoI to the conservation objectives on the Bewick's swan of the Arun Valley SPA in relation to land take / land cover change effects from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Non-breeding assemblage of waterfowl

7.2.49 For assessment of shoveler, teal and wigeon please refer to **paragraph 7.2.18** for the Arun Valley Ramsar site.

7.2.50 **There is no potential for an AEoI to the conservation objectives on the non-breeding assemblage of waterfowl of the Arun Valley SPA in relation to land take / land cover change effects from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Fragmentation of habitats

Introduction

7.2.51 The installation of the cable within the Arun Valley will result in periods of additional human activity within functionally linked land. If designated features of the Arun Valley SPA avoid moving across or near to these areas due to the presence of human activity or the physical damage of habitat, they may be prevented from reaching other suitable foraging opportunities.

Bewick's swan

7.2.52 The presence of construction and decommissioning works could result in Bewick's swan avoiding certain fields (i.e., feeding resources) as they may not cross an active work site to reach them. This could reduce the effective resource base for the waterfowl of the Arun Valley SPA. However, the location they favour regularly (i.e., Burpham Water Meadows) is north of the proposed DCO Order Limits meaning that movements between this area and the Arun Valley SPA will not require any movement across the construction area.

7.2.53 **There is, therefore, no potential for an AEoI to the conservation objectives on the Bewick's swan of the Arun Valley SPA in relation to fragmentation of**

habitats from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term.

Non-breeding assemblage of waterfowl

7.2.54 For assessment of shoveler, teal and wigeon please refer to **paragraph 7.2.18** for the Arun Valley Ramsar site.

7.2.55 **There is, therefore, no potential for an AEoI to the conservation objectives on the non-breeding assemblage of waterfowl of the Arun Valley SPA in relation to fragmentation of habitats from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Pollution effects and spread of non-native species

7.2.56 The installation of the cable within the Arun Valley and Adur Valley comes with an inherent risk of accidentally releasing pollutants such as hydrocarbons or drilling fluids, or inadvertently spreading non-native invasive species. Based on the location of the proposed DCO Order Limits any loss of pollutants or spread of non-native invasive species would only occur on functionally linked land. This is due to both the separation distance between the designation boundary and the working area and its location downstream.

7.2.57 For assessment of the effects of pollution and non-native species spread on the Arun Valley SPA, please refer to **paragraph 7.2.18**. Addressing this with regards the Arun Valley Ramsar site as the embedded environmental measures to be implemented to negate the effect are consistent.

7.2.58 There is, no potential for an AEoI to the conservation objectives on Bewick's swan or the assemblage of non-breeding waterfowl of the Arun Valley SPA site in relation to pollution effects and spread of non-native species from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term.

Disturbance due to noise and vibration

7.2.59 The construction, and to a lesser extent decommissioning activity, will result in the production of noise and vibration through the use of plant, human presence etc. This activity may disturb designated features of the Arun Valley SPA whilst foraging or loafing in functionally linked land within 500m (Cutts, Phelps & Burdon, 2009) of active parts of the construction / decommissioning site.

7.2.60 Two of the embedded environmental measures outlined in **Table 6-1** characterise the design and schedule of working that reduces the potential for conflict with the non-breeding wildfowl. These are:

- C-4 – Horizontal Directional Drill (HDD) technique will be used at the landfall location; and
- C-117 – Works on areas identified as floodplain (Flood Zones 2 and 3) will be programmed to avoid the period between October and February inclusive to avoid disturbance of waterbirds, and where possible, will be programmed to

occur in late summer/ early autumn, to avoid interaction with known flooding periods to minimise the potential for displacement of floodwater.

Bewick's swan

7.2.61 Although Bewick's swan were not recorded above MHWS, it is still likely that they will be present occasionally within the area. However, the survey results suggest that temporary displacement of this species at a level that is likely to result in a perceivable reduction of fitness will not occur as they are not reliant on the locale (i.e., they have other foraging opportunities). Further, as the cable installation is likely to take place outside of the period when Bewick's swans are present (as per commitment C-117) the potential for a temporal overlap is minimal.

7.2.62 **There is, therefore, no potential for an AEoI to the conservation objectives on the Bewick's swan of the Arun Valley SPA due to disturbance via noise and vibration from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Non-breeding assemblage of waterfowl

7.2.63 For assessment of shoveler, teal and wigeon please refer to **paragraphs 7.2.13** and **7.2.14** for the Arun Valley Ramsar site.

7.2.64 **There is, therefore, no potential for an AEoI to the conservation objectives of the non-breeding assemblage of waterfowl of the Arun Valley SPA due to disturbance via noise and vibration from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Operation and maintenance

Water neutrality

7.2.65 For assessment of water neutrality please refer to **paragraph 7.2.36 to 7.2.41** for the Arun Valley Ramsar site.

7.2.66 **There is, therefore, no potential for an AEoI to the conservation objectives on the features of the Arun Valley SPA due to over abstraction of water from the Proposed Development alone and therefore, subject to natural change, the features will be maintained in the long term.**

Arun Valley SAC

Operation and maintenance

Water neutrality

7.2.67 For assessment of water neutrality please refer to **paragraph 7.2.36 to 7.2.41** for the Arun Valley Ramsar site.

7.2.68 **There is, therefore, no potential for an AEoI to the conservation objectives on the features of the Arun Valley SAC due to over abstraction of water from the Proposed Development alone and therefore, subject to natural change, the features will be maintained in the long term.**

The Mens SAC

Features and effects for assessment

7.2.69 The potential for LSEs from the Proposed Development alone has been identified for the following:

- barbastelle during construction due to land take / land cover change (functionally linked land), habitat fragmentation and disturbance from light;
- barbastelle during decommissioning due to land take / land cover change (functionally linked land), habitat fragmentation and disturbance from light; and
- the potential for LSEI during operation.

Assessment information

7.2.70 The conservation objectives (as described in **Appendix F**) for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
  - the extent and distribution of qualifying natural habitats and habitats of qualifying species;
  - the structure and function (including typical species) of qualifying natural habitats;
  - the structure and function of the habitats of qualifying species;
  - the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
  - the populations of qualifying species, and
  - the distribution of qualifying species within the site.

7.2.71 In addition to the site-specific information presented in **Appendix F**, surveys for the Proposed Development have been carried out and reported in **Appendix 22.8: Passive and active bat activity report, Volume 4** (Document Reference: 6.4.22.8) of the ES.

© WSP UK Limited

Construction and decommissioning

Land take / land cover change

Barbastelle bat

7.2.72 The draft Sussex SAC bat protocol (SDNPA and Natural England, 2018) suggests that the barbastelle associated with The Mens SAC are known to commute up to 12km to reach foraging areas. This means that there are areas within the footprint of the Proposed Development that may be used by this species given that at its closest point it is 11.2km away (11.2km is the closest point of the proposed DCO Order Limits marking an operational access route that requires no construction activity (i.e. use of existing track), the closest point to potential construction activity is approximately 11.8km away and 11.9km to the indicative cable corridor)

7.2.73 The extent of the overlap with the Proposed Development (when a 12km buffer is placed around The Mens SAC boundary) is approximately 6.3ha (when accounting for areas within the proposed DCO Order Limits that could be subject to construction activity), which is a small proportion (0.01%) of the area within a 12km foraging range (45,239ha in 12km foraging range – noting that much of this area will not be suitable habitat for barbastelle bats). Further, the area of overlap lies within an area of the South Downs National Park at Sullington Hill that is dominated by large arable fields that support very limited amounts of the types of habitats preferred by this species for foraging such as riparian corridors and broad-leaved woodland (Zeale, Davidson-Watts and Jones, 2012).

7.2.74 Within the area of overlap of the 12km buffer the only two habitats present are improved pasture (which dominates) and a small section of an arable field. Both of these habitats are not typically used by barbastelle bat.

7.2.75 There is, therefore, no potential for an AEoI to the conservation objectives on the barbastelle bats of The Mens SAC due to land take / land cover change from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term.

Fragmentation of habitats

Barbastelle bat

7.2.76 The installation of the cable could result in the temporary loss of habitats that may be used by barbastelle of The Mens SAC to navigate the landscape. This may prevent barbastelle crossing the working area to reach suitable foraging opportunities.

7.2.77 However, the area of the Proposed Development within 12km of The Mens SAC where temporary habitat loss is proposed is made up of two habitat types only, namely improved pasture and arable land. These habitats are not typically considered to be favoured by barbastelle bats.

7.2.78 **There is, therefore, no potential for an AEoI to the conservation objectives on the barbastelle bats of The Mens SAC in relation to fragmentation of**

habitats from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term.

Pollution effects and spread of non-native species

7.2.79 The installation of the cable across land within 12km of The Mens SAC comes with an inherent risk of accidentally releasing pollutants such as hydrocarbons or drilling fluids, or inadvertently spreading non-native invasive species. Based on the location of the proposed DCO Order Limits any loss of pollutants or spread of non-native invasive species would only occur on functionally linked land, as opposed to within the SAC itself. This is due to the large separation distance between the designation boundary and the working area.

7.2.80 For assessment of the effects of pollution and non-native species spread on The Mens SAC please refer to **paragraphs 7.2.26** and **7.2.29** addressing this with regards the Arun Valley Ramsar site, as the embedded environmental measures to be implemented to negate the effect are consistent.

7.2.81 **There is, no potential for an AEoI to the conservation objectives on barbastelle bats of The Mens SAC in relation to pollution effects and spread of non-native species from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term.**

Disturbance by light

Barbastelle bat

7.2.82 Temporary lighting will be needed during works to install and decommission the cable. This lighting will be required in locations for security purposes (e.g., site access points, equipment storage), during periods when normal working hours are within periods of darkness (e.g., over-winter) and at sites that could operate over a 24-hour period (e.g., sites used to launch or retrieve sub-surface drills). These areas will be restricted, as lighting will not be needed in all areas; however, the specific locations of lighting are yet to be determined.

7.2.83 The embedded environmental measures outlined in **Table 6-1** will reduce the potential for conflict with barbastelle. Specifically:

- C-105 - A lighting design of all temporary and permanent lighting will be developed once contractors are appointed; however, the principles of lighting design will be detailed at the time of application and informed by the joint guidance provided by the Bat Conservation Trust and Institution of Lighting Professionals (2018). The lighting design will account for the potential effects on people (residents and walkers) and biodiversity by taking measures to minimise lighting usage, minimise light spill, use most appropriate wave lengths of light and locate lighting in the most appropriate locations – this is to decrease the potential displacement effects on light sensitive fauna such as bats.

7.2.84 As the degree of overlap with the 12km buffer zone around The Mens SAC is small (see **paragraph 7.2.73**), the works are temporary, lighting localised, lighting used most at times of year when bat activity will be lowest, the habitats being sub-

optimal and the lighting design being sensitive, it is unlikely that the patterns of barbastelle movement will be disrupted markedly, and not enough to challenge the fitness of individual bats.

7.2.85 **There is, therefore, no potential for an AEoI to the conservation objectives on the barbastelle bats of The Mens SAC in relation to disturbance by light from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

7.3 Appraisal of potential AEoI alone for migratory fish

Introduction

7.3.1 Information to inform the assessment for migratory fish is provided in **Section 3.3** (the MDS relevant to migratory fish), **Section 6** (Embedded environmental measures) and **Appendix F** (for information on the designated site). The potential for LSEs with regard to migratory fish is summarised in **Table 5-2** and **Section 5.4** with the Stage Two (AA) presented below.

River Itchen SAC

Features and effects for assessment

7.3.2 The potential for LSEs to result from the Proposed Development acting alone has been identified for the following:

- Atlantic salmon mortality and injurious effects due to exposure to underwater noise generated during construction and decommissioning; and
- Atlantic salmon behavioural changes due to exposure to underwater noise generated during construction and decommissioning causing barriers to migration.

Assessment information

7.3.3 The conservation objectives (Natural England, 2018 (as described in **Appendix F**)) for the site are as follows:

- to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
  - the extent and distribution of qualifying natural habitats and habitats of qualifying species;
  - the structure and function (including typical species) of qualifying natural habitats;
  - the structure and function of the habitats of qualifying species;
  - the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;

- the populations of qualifying species, and
- the distribution of qualifying species within the site.

7.3.4 The following targets from the Supplementary Advice (Natural England, 2019) for the site are considered to be pertinent to the AA.

- **Population (of the feature): Adult Run Size** - Restore the population to that expected under un-impacted conditions.
- **Supporting Habitat: Structure** / **Function Biological Connectivity -** Barriers to adult migration have cumulative effects on the ability of individuals to reach spawning grounds and need to be considered in combination.
- **Structure and Function: Supporting Off-Site Habitat** - The conditions experienced by long-distance migratory species (such as salmon) out with the site (through the saline transition zone, estuary, coastal waters and into the high seas) are critical to the well-being of populations within the site.
- **Structure and Function: Supporting Off-Site Habitat**- Habitats beyond the site boundary upon which characteristic biological communities of the site depend should be maintained in a state that does not impair the full expression of the characteristic biota within the site.

7.3.5 A detailed literature review was undertaken to describe the use of the area by fish in relation to key life stages (including on migration). This review was informed by the existing Rampion 1 project's Environmental Statement (ES) (E.ON, 2012), and broader surveys across the English Channel and its coastal waters. **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8) reports the full baseline characterisation (in Section 8.6) and the data sources used to inform the ES and the HRA (Table 8.10).

Construction and decommissioning

Underwater noise

7.3.6 The Southampton Water (located 49.3km from the closest boundary point of the Proposed Development) forms part of the migratory route for Atlantic salmon, some of which will likely contribute to the River Itchen SAC population. The migratory routes taken by salmon smolt, are considered to vary depending upon the river from which they originate (Malcolm *et al*., 2010). However, the main migration routes for this species are believed to be in and out of the western approaches / channel into the Atlantic, rather than via the North Sea (ABPmer, 2014). For example, evidence exists to show that returning Atlantic salmon to the River Frome (Dorset) were feeding in north Atlantic and Arctic waters around Iceland (MacKenzie *et al*., 2012). This may indicate a potential westward migration by salmon smolt out through the English Channel and on into the north Atlantic. Data from the River Test (as reported in the Catchment Summary for the Itchen(Natural England, 2013)) further indicate that salmon from the River Test head west to Iceland and return to the river again, from the west.

7.3.7 Further, the Environment Agency was noted to have commented the following in relation to the Navitus Bay OWF:

"Work under the SALSA (Salmon at Sea) programme has identified that salmon from the South of the UK feed as adults around the Icelandic basin (NASCO Salmon Summit 2011) and adult salmon returning to the Southern Chalk Streams are known to have been captured in the mixed stock drift net fisheries of the West of Ireland. This would indicate that the salmon returning to the Hampshire Avon and Itchen are doing so from a Westerly direction, therefore bringing them through the development area and/or the area of sea affected by it."

7.3.8 Therefore, the migratory route to (and from) the River Itchen is considered to be from the west and therefore unlikely to interact with underwater noise arising from the construction and decommissioning of the Proposed Development, except in the eventuality that underwater noise modelling shows potential for interaction at the eastern arm of the Solent and the entrance to Southampton Water. Therefore, during upstream (16 May to 15 August)[17] and seaward migrations (between 7 April and 15 May in any year) to and from the River Itchen, there is a theoretical risk individual salmon or salmon smolt could be exposed to underwater noise from pile-driving.

7.3.9 At the highest levels of noise, sub-lethal and lethal effects may occur, resulting in injury and in extreme cases, the death of exposed fish. Exposure to underwater noise will only result in physical injury at close range, but disturbance displacement or behavioural effects could occur over greater distances. As a result, returning salmon may be temporarily displaced and deflected from making their entry into the river.

7.3.10 Pile driving will not be continuous throughout the construction period. A total of 99 piling days is anticipated. However, as the timing depends on the weather and any piling restrictions etc, this total might occur outside a consecutive 99 day window.

7.3.11 An assessment has therefore been undertaken for the Proposed Development to quantify the spatial extent of any potential noise impacts on fish (including migratory salmon). This assessment is reported in full in **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8).

7.3.12 To inform the assessment of potential impacts associated with underwater noise as a result of the installation of foundations, predictive underwater noise modelling has been undertaken for the relevant piling MDS, full details of which are presented in **Appendix 11.3: Underwater noise assessment technical report, Volume 4** of the ES (Document Reference: 6.4.11.3).

7.3.13 The predictive modelling has been undertaken at four representative locations (locations illustrated in **Figure 8.16 and 8.17, Volume 3** of the ES (Document Reference: 6.3.8)), with consideration of the key parameters associated with two MDSs outlined below (presented in full in **Table 8.17** within **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8)):

- a spatial MDS (the scenario with the greatest potential spatial extent of impact); and

[17] These dates were agreed with respect to the Application for the proposed Navitus Bay Wind Park as reported in Planning Inspectorate (2015).

- a temporal MDS (the scenario with the longest potential duration).

7.3.14 There is the potential for foundations to be installed sequentially (multiple piles installed one after the other in the same location within a 24-hour period) (**Figure 8.16** and **Figure 8.17, Volume 3** of the ES (Document Reference: 6.3.8)). This scenario represents the worst-case piling scenario, and is assessed through reference to predictive underwater noise modelling, and the relevant metric and associated threshold criteria for migratory salmon.

7.3.15 The spatial MDS equates to the greatest area of effect from subsea noise at any one-time during piling which is considered to result from the sequential installation of two monopile foundations at separate locations within a 24-hour period (total of 90 monopiles) (**Appendix 11.3: Underwater noise assessment technical report, Volume 4** of the ES (Document Reference: 6.4.11.3)). The temporal maximum design scenario represents the longest duration of effects from subsea noise, this is considered to result from the sequential installation of four pin piles for multileg foundations at separate locations within the array (total of 396 pin piles).

7.3.16 The predictive underwater noise modelling was completed using a semi-empirical underwater noise propagation model (INSPIRE) based on the maximum design scenario hammer energy (4,400 kJ for monopile installation and 2,500kJ for pin-pile installation) at four noise modelling locations; one at the East, one at the North-west (the location closest to the Solent), one at the South and one at the West of the proposed DCO Order Limit. As the point closest to the Solent, the north-west location is considered to represent the worst-case piling location for the AA of migrating salmon and is therefore the only location reported in full in the RIAA.

7.3.17 The modelling outputs for all four locations are presented in **Table 8.21** within **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8), with full details presented in **Appendix 11.3: Underwater noise assessment technical report, Volume 3** of the ES (Document Reference: 6.4.11.3). The sensitivity assessment reported in the **Chapter 8: Fish and shellfish ecology, Volume 2** the ES (Document Reference: 6.2.8) puts the modelling into context with respect to sensitivity of fish receptors, including salmon. A summary of the findings from both reports is provided here.

7.3.18 The assessment focuses on underwater noise from pile-driving for the installation of foundations for offshore structures (for instance WTG and offshore substations). While other activities such as cable laying, dredging and vessel movements will result in underwater noise, these have the potential to affect a relatively small area in the immediate vicinity of activities and are therefore insignificant in the context of the underwater noise from piling operations.

7.3.19 Unexploded ordnance (UXO) removal will be sought in a separate future Marine Licence application, when geophysical survey data of suitable spatial resolution is available, prior to construction, to identify and quantify UXO. Detonation of UXO would represent a short term (seconds) increase in underwater noise (sound pressure levels and particle motion) and while noise levels will be elevated such that this may result in mortality, injurious effects or behavioural effects on fish and shellfish species, these effects would be considerably reduced compared to those associated with piling operations. As such, since the Proposed Development is not

applying for licence to detonate UXO at this stage, therefore no further consideration of the impacts from UXO clearance is provided here.

7.3.20 The following commitment (also set out in **Table 6-1**) is considered relevant to the AA:

- Hammer energies will likely start at low levels (soft start / ramp up) and gradually increase to the maximum required installation energy (see embedded environmental measure C-52).

Atlantic salmon

7.3.21 Due to the absence of secondary hearing modifications linking the swim bladder to the auditory system, salmon are understood not to have sensitive hearing, relative to many other marine fish (Simpson and Bruintjes, 2016). This understanding concurs with past studies (e.g., Hawkins and Johnstone, 1978) that have categorised salmon as a species with poor hearing. This poor hearing has been associated with smaller ranges of behavioural response (startle and alarm, avoidance, migration, fatigue, loss of equilibrium) to noise in the marine environment than those documented for other more sensitive species. Sound levels eliciting behavioural responses in salmon are between 102 and 205dB re 1µPa (Turnpenny and Nedwell, 1994 reported in Horst and Rodhouse, 2000).

7.3.22 The fish receptors within the DCO order limits have been grouped into the Popper *et al*., (2014) categories based on their hearing system. Atlantic salmon are Group 2 fish as their swim bladder is not involved in hearing. Fish from Group 2 are considered to be less sensitive to sound pressure, with these species detecting sound in the environment through particle motion. When considering particle motion, little to no data exists on the effect on demersal fish species or on the levels generated during marine impact piling (Hawkins and Popper, 2016). However, particle motion generated from piling would be expected to attenuate more rapidly than the acoustic pressure component in the water.

7.3.23 For fish in Group 2, the maximum worst-case underwater noise impact areas for fleeing receptors from the simultaneous piling of monopile and multileg foundations at the east and west modelled locations are presented in **Table 7-1** and **Table 7-2**. The location of the Proposed Development relative to the River Itchen SAC and the Southampton Water is presented in **Figure 7-1** (located within this document), together with the outcomes of the underwater noise modelling.

Table 7-1 Maximum simultaneous piling worst-case noise impact areas for monopile foundations at the east and west modelling locations for fleeing fish (Group 2, 1.5ms^{-1}) according to Popper *et al.* (2014)

Criteria	Noise level (dB re 1 µPa Sound Pressure Level (SPL)/ dB re 1 µPa2 s Sound Exposure Level (SEL))	Impact areas from the simultaneous piling of 2 monopiles		
		East modelling location	West modelling location	In-combination area
Mortality and potentially mortal injury				
SELcum	210	<0.1km^2	<0.1km^2	No in combination effect
Recoverable injury				
SELcum	203	<0.1km^2	<0.1km^2	No in combination effect
Temporary threshold shift (TTS)				
SELcum	186	800km^2	260km^2	1600 km²

Table 7-2 Maximum simultaneous piling worst-case noise impact areas for multileg foundations at the east and west modelling locations for fleeing fish (Group 2, 1.5ms-1) according to Popper et al. (2014)

Criteria	Noise level (dB re 1 µPa Sound Pressure Level (SPL)/ dB re 1 µPa2 s Sound Exposure Level (SEL))	Impact areas from the simultaneous piling of 4 multileg foundation piles		
		East modelling location	West modelling location	In-combination area
Mortality and potentially mortal injury				
SELcum	210	<0.1km^2	<0.1km^2	No in combination effect
Recoverable injury				
SELcum	203	<0.1km^2	<0.1km^2	No in combination effect
Temporary threshold shift (TTS)				

Criteria	Noise level (dB re 1 µPa Sound Pressure Level (SPL)/ dB re 1 µPa2 s Sound Exposure Level (SEL))	Impact areas from the simultaneous piling of 4 multileg foundation piles		
		East modelling location	West modelling location	In-combination area
SELcum	186	630km^2	180km^2	1300 km^2

7.3.24 The following paragraphs provide the assessment of potential impacts on migratory fish for the spatial and temporal maximum design scenarios associated with foundation installation.

Mortality and Injurious effects / Population Maintenance

Atlantic salmon

7.3.25 **Table 7-1** shows the potential for mortality and potential mortal injury of Atlantic salmon from the simultaneous piling of monopiles foundations has the potential to occur within an area of 0.1km^2 (4,400 kJ hammer energy, SEL_{cum}), within the immediate vicinity of the piling operations. Instantaneous injury may occur up to 310m (SPL_{peak}) from the piling activity. The temporal MDS worst-case impact ranges result from the sequential piling of pin piles for multileg foundations at a single location. As shown in **Table 7-2**, the mortality and potential mortal injury of Atlantic salmon from the simultaneous piling of pin piles has the potential to occur within an area of 0.1km^2 (2,500 kJ hammer energy, SEL_{cum}) within the immediate vicinity of the piling operations. Instantaneous injury may occur up to 250m (SPL_{peak}) from the piling activity.

7.3.26 Recoverable injury is a survivable injury with full recovery occurring after exposure, although decreased fitness during this recovery period may result in increased susceptibility to predation or disease (Popper et al., 2014). **Table 7-1** shows the potential for recoverable injury of Atlantic salmon from the simultaneous piling of monopile foundations to occur within an area of 0.1km^2 (4,400 kJ hammer energy, SEL_{cum}) within the immediate vicinity of the piling operations. Instantaneous injury may occur up to 310m (SPL_{peak}) from the piling activity. The temporal MDS worst-case impact ranges result from the sequential piling of pin piles for multileg foundations at a single location. As shown in **Table 7-2**, recoverable injury of Atlantic salmon from the simultaneous piling of pin piles has the potential to occur within an area of 0.1km^2 (2,500 kJ hammer energy, SEL_{cum}) within the immediate vicinity of the piling operations. Instantaneous injury may occur up to 250m (SPL_{peak}) from the piling activity.

7.3.27 Temporary threshold shift (TTS) is a temporary reduction in hearing sensitivity caused by exposure to intense sound. TTS has been demonstrated in some fishes, resulting from temporary changes in sensory hair cells of the inner ear and/or damage to auditory nerves. However, sensory hair cells within fish re-grow and are replaced when damaged and therefore the extent of TTS is of variable duration and magnitude. Normal hearing ability returns following termination of the

noise causing TTS, though this period is variable. When experiencing TTS, fish may have decreased fitness due to a reduced ability to communicate, detect predators or prey, and/or assess their environment. **Table 7-1** shows that the spatial MDS worst-case impact ranges for effects on Group 2 fish result from the simultaneous piling of monopile foundations. TTS of Group 2 fish receptors has the potential to occur within an area of up to 1,600 km^2 (4,400 kJ hammer energy, SEL_{cum}) from the piling activity. The temporal MDS worst-case impact ranges result from the sequential piling of pin piles for multileg foundations at a single location. As shown in **Table 7-2**, TTS of Atlantic salmon from the simultaneous piling of pin piles has the potential to occur within an areas of up to 1,300km^2 (2,500kJ hammer energy, SEL_{cum}) from the piling activity.

7.3.28 Based on the predictive underwater noise modelling for Group 2 receptors, **Chapter 8: Fish and shellfish ecology, Volume 2** the ES (Document Reference: 6.2.8) concluded minor adverse significance of effects for Group 2 fish with respect to mortality and injurious effects arising from noise and vibration during construction. The same conclusion was found for the decommissioning phase.

7.3.29 Atlantic salmon would not be attracted to the area within the proposed DCO Order Limits or be present within the area in significant numbers (as per the baseline reports in **Chapter 8: Fish and shellfish ecology, Volume 2** the ES (Document Reference: 6.2.8), or resident within or around the array. As such, the likelihood of exposure to lethal or injurious sounds levels is expected to be low and limited to sporadic, low numbers of passing migrants (at most). As such, mortality and injurious effects due to exposure to underwater noise are not expected to manifest at levels that could (with reference to the site's target objectives) undermine the viability of the SAC population. It is determined that the relevant target attribute (to maintain '**Population: Adult run size'** will not be hindered.

7.3.30 **There is, therefore, no potential for an AEoI to the conservation objectives on the Atlantic salmon feature of The River Itchen SAC in relation to mortality and injurious effects directly associated with underwater noise from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

Behavioural changes / barrier to migration

Atlantic salmon

7.3.31 Due to the range of behavioural responses elicited from fish receptors, and the influence from environmental variables and ecological stressors, Popper *et al*. (2014) recommend the application of a qualitative assessment. The qualitative behavioural criteria derived from Popper et al. (2014) categorise the risks of effects in relative terms as 'high, moderate or low' at three distances from the source: near (10s of metres), intermediate (100s of metres), and far (1000s of metres), respectively. This qualitative approach as recommended by Popper et al. (2014) has therefore been applied to the assessment of behavioural impacts of migratory fish. Considering the Popper et al. (2014) criteria, any risk of behavioural effects in Atlantic salmon from piling are expected to be high in in the near field, moderate in the intermediate field, and low in the far field.

7.3.32 Migrating salmon that encounter increased levels of underwater noise may display avoidance and displacement behaviour. Such behaviour would be intermittent and temporary. As the Southampton Water (which provides migratory access to the River Itchen) is c.50km from the Proposed Development, passage to the River Itchen would not be materially impeded over this scale, especially as fish are likely accessing the Solent and Southampton Water from the west (as evidenced in **paragraph 7.3.6**). Any short-term behavioural effects would be temporary and not amount to AEoI.

7.3.33 In light of the muted sensitivities and with reference to the modelled noise predictions (see **Chapter 8: Fish and shellfish ecology, Volume 2** the ES (Document Reference: 6.2.8) finds, due to the temporary and intermittent nature of any potential noise impacts, significant effects on migration, including barrier effects, effects on coastal migrations or movement to/from coastal habitats during key migration periods, would not be expected.

7.3.34 The location of the Proposed Development relative to the River Itchen SAC and the Southampton Water is presented in **Figure 7-1** (located with this document). Behavioural effects on Group 2 fish receptors in the Proposed Development Study Area (for which particle motion is most relevant) have been found likely to be spatially limited to within tens to hundreds of meters of the piling operations (noting that any risk of behavioural effects beyond this distance are low)**.**

7.3.35 During decommissioning, the noise levels are expected to be much less than pile driving and therefore impacts would be less than as assessed during the construction phase. The noise resulting from WTG decommissioning employing abrasive cutting is unlikely to result in any injury, avoidance or significant disturbance. Some temporary minor disturbance might be experienced in the immediate vicinity of the decommissioning activity, for example, from jack-up vessels or from cutting piled foundations. The impact is predicted to be of highly local spatial extent, short term duration, intermittent and reversible.

7.3.36 It is determined that the relevant target attribute: to maintain '**Population: Adult run size** will not be hindered. In turn, the maintenance of the feature will continue to support site features dependent on the health of the salmon feature.

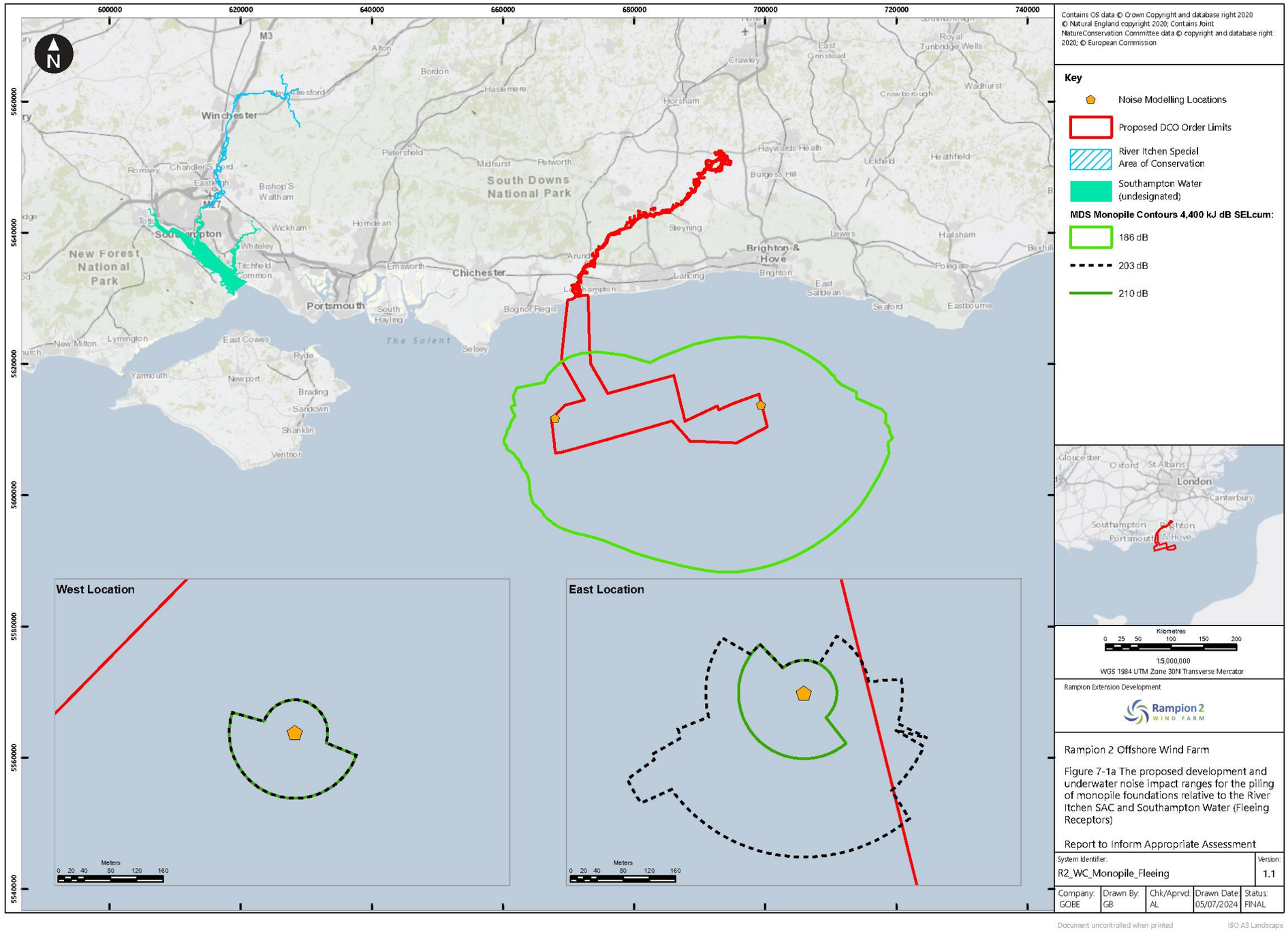
7.3.37 **There is, therefore, no potential for an AEoI to the conservation objectives on the Atlantic salmon feature of The River Itchen SAC in relation to disturbance (barrier to migration) from the Proposed Development alone and therefore, subject to natural change, the feature will be maintained in the long term**.

© WSP UK Limited

Page intentionally blank

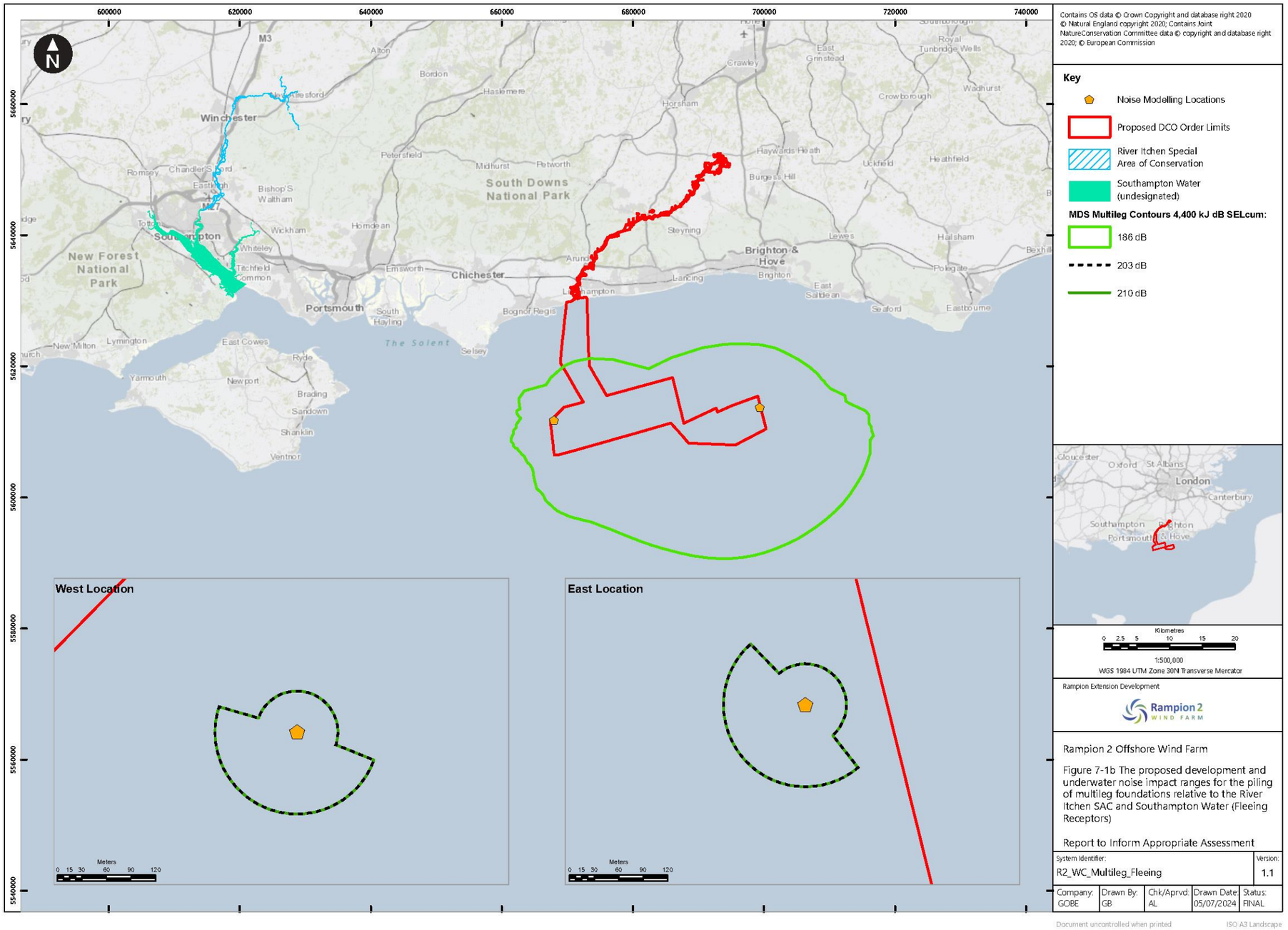
© WSP UK Limited

Figure 7-1a The Proposed Development and underwater noise impact ranges for the piling of monopile foundations relative to the River Itchen SAC and Southampton Water (fleeing receptor)



© WSP UK Limited

Figure 7-1b The Proposed Development and underwater noise impact ranges for the piling of multileg foundations relative to the River Itchen SAC and Southampton Water (fleeing receptor)



© WSP UK Limited

7.4 Appraisal of potential AEoI alone for benthic habitats and communities

Introduction

7.4.1 Information to inform the assessment for benthic habitats is provided in **Section 3.3** (the MDS relevant to benthic habitats), **Section 6** (embedded environmental measures and the commitments register) and **Appendix F** (Information on Designated sites). The potential for LSEs /LSEI as regards benthic habitats is summarised in **Table** 5-2, with the Stage Two (AA) presented below.

Solent Maritime SAC

Features and effects for assessment

7.4.2 The Potential for LSEs to result from the Proposed Development acting alone has been identified for the following listed features of the SAC:

- estuaries complex: an overarching habitat complex, comprising sub-feature habitats[18] some of which are designated in in their own right;
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);
- mudflats and sandflats not covered by seawater at low tide (mudflats and sandflats);
- salicornia and other annuals colonising mud and sand (Salcornia);
- spartina swards (Cord-grass swards) (*Spartinion maritimae*) (Spartina);
- sandbanks which are slightly covered by sea water all the time (subtidal sandbanks); and
- coastal lagoons.

7.4.3 The potential for LSEs to result from the Proposed Development acting alone relates to the following effect pathways (which apply to each feature listed above):

- *Construction and decommissioning:*
  - **Suspended sediment and deposition –** effects due to suspended sediment dispersion and deposition following works during construction and decommissioning.
  - **MINNS (introductions) –** effects associated with the potential introduction and/or spread of new or existing invasive non-native species during construction and/or decommissioning.

[18] Subtidal coarse sediment, subtidal sand, subtidal mixed sediments, subtidal seagrass beds, intertidal coarse sediment, intertidal sand and muddy sand, intertidal mud, intertidal mixed sediment and intertidal seagrass beds.

- **Pollution –** changes to water quality associated with the introduction of harmful contaminants to the environment following accidental leakages or spillages during marine works in the construction and decommissioning phases.

- *Operation and maintenance:*
  - **Suspended sediment and deposition –** effects due to suspended sediment dispersion and deposition associated with activities during the operation and maintenance phase**.**
  - **MINNS (new substrate) –** effects associated with the introduction of hard substrates and man-made underwater structures that could act as local vectors (new habitats) for the spread of introduced invasive and non-native marine species throughout operation**.**
  - **Pollution –** changes to water quality associated with the introduction of harmful contaminants to the environment following accidental leakages or spillages associated with activities during the operation and maintenance phase.
  - **Coastal processes –** effects on habitats, or processes supporting those habitats from changes in the hydrodynamic regime and/or coastal morphology (i.e., waves, currents and / or local sediment processes) due to the presence of the windfarm throughout its operation.

Assessment information

7.4.4 The conservation objectives (March 2013) (Natural England 2020b) (as described in **Appendix F**) for the site are as follows:

- To ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:
  - the extent and distribution of qualifying natural habitats and habitats of the qualifying species;
  - the structure and function (including typical species) of qualifying natural habitats;
  - the structure and function of the habitats of the qualifying species;
  - the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
  - the populations of each of the qualifying species; and
  - the distribution of qualifying species within the site.

7.4.5 The SAC overlaps geographically with the Solent and Southampton Water SPA, Solent and Southampton Water Ramsar and Solent and Dorset Coast SPA. The Conservation Objectives also refer to these sites and Chichester and Langstone Harbours SPA and Ramsar as functionally linked estuaries and habitat features.

The following Conservation Objectives (that apply to ornithological features in SPAs[19] and supporting habitats) are therefore also relevant:

- to ensure that the site contributes to achieving the aims of the Birds Directive, by maintaining or restoring:
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

7.4.6 At the conclusion of the AA for Solent Maritime SAC, any findings of significant or residual adverse effects on the supporting habitats of the SAC will feed into the site-specific assessments for functionally linked sites.

7.4.7 Supplementary Advice for the SAC (Natural England 2020c), sets out the ecological attributes that contribute to the site's integrity. The attributes and targets have been considered as they specifically relate to each feature identified in **paragraph 7.4.2**, each effect and the target objective to maintain, or recover the feature.

7.4.8 Natural England's Advice on Operations (Natural England 2020d), provides an initial assessment of potential impacts arising from for all phases of a theoretical 'offshore wind project' and direction (through the allocation of a sensitivity rating) as to, which interactions require further assessment. This advice is referenced where applicable.

7.4.9 In addition to the site-specific information presented in **Appendix F**, information supporting the assessment is reported in:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) which reports the full baseline characterisation (**Section 9.6**) and the data sources used to inform the benthic subtidal and intertidal assessment for the ES (listed in **Table 9.9** and **Table 9.10** of that chapter); and
- **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6) where a full description of the offshore physical environment (**Section 6.6**) and an assessment of the potential effects from the Proposed Development on that environment (**Sections 6.9 – 6.12**) is provided.

[19] For Ramsar sites, Defra and Natural England chose not to produce Conservation Advice. Natural England considers the advice for overlapping designations to be, in most cases, sufficient to support the management of the Ramsar interests (Natural England, 2016).

7.4.10 The location of designated benthic and intertidal habitats in the Solent Estuarine system are shown in **Figure 7-2**[20] (located within this document).

Construction and decommissioning

Suspended sediment and deposition

7.4.11 This section addresses the potential for AEoI from effects associated with the dispersion of suspended sediments specifically related to seabed preparation and physical disturbances during construction and decommissioning works.

7.4.12 During construction, offshore and/or intertidal works, notably foundation and cable installation and seabed preparation (including sandwave clearance) would cause a temporary, localised increase in SSC in the surrounding marine environment. During decommissioning, sediment could be mobilised during the removal of foundations, cables, and rock protection. Following this mobilisation, and dependent on hydrological conditions and sediment characteristics, the suspended sediment would be dispersed in the water column and ultimately, deposited. If contaminated seabed were disturbed, sediment bound contaminants could also be released and dispersed (Roberts, 2012).

7.4.13 Designated subtidal and intertidal habitats (and associated communities) and habitats supporting designated features present within the dispersal range of sediment plumes could be affected by a temporary change in water quality (i.e., reduced visual clarity[21]), increased sediment deposition (smothering) and/or exposure to sediment-bound contaminants. The 'Pressure Names' described in the Advice on Operations (Natural England, 2020d) for the SAC have been adopted in the sections below to address the three potential effects on each feature at risk:

- smothering and siltation rate changes (light or heavy);
- changes in suspended solids (water clarity); and
- contamination levels of sediment.

7.4.14 The implications of changes to SSC and seabed deposition are considered within **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9), with reference to **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6) which describes the coastal process in the receiving environment. The AA has drawn upon the information and conclusions of the ES to determine how effects might manifest on the SAC and its features in relation to the site-specific objectives, and component attributes and targets.

[20] The Estuary Complex feature of the Solent Maritime SAC comprises of the mapped sub-feature habitats (subtidal coarse sediment, subtidal sand, subtidal mixed sediments, subtidal seagrass beds) that are shown on **Figure 7-2** (located within this document).
[21] Turbidity is a relative measure of light scattering by suspended particles. Visual clarity is referred to instead of turbidity, as the preferred (and more precise) optical quantifier.

7.4.15 Potential effects are explored with reference to the maximum design parameters set out in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) (and **Section 3.3** of this report). These refer to the total volume (m^3) of sediment that could be mobilised (thereby resulting in a sediment plume) considering the area extent of the array and offshore ECC and the need for seabed preparation for foundations, sandwave clearance, offshore trenching for cables and drilling at foundations. This provides a total estimate of 'temporary habitat disturbance' in the Proposed Development array area and offshore ECC from construction activities.

7.4.16 The behaviour and impact of the plumes is relative to tidal state and range and sediment type. The baseline is described in in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) with reference to existing sources, notably work undertaken to characterise the benthic ecology baseline for Rampion 1 (EMU, 2011) and the Proposed Development specific site-surveys (presented in **Tables 9.9** and **9.10** in in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9), respectively). The most dominant habitat types are circalittoral coarse sediments, deep circalittoral coarse sediments, and deep circalittoral sand. These habitats are found predominantly across the proposed DCO Order Limits and across the mid to offshore portion of the Proposed Development. Sublittoral sediments, infralittoral coarse sediments and circalittoral fine sands or circalittoral muddy sands dominate the inshore portion of the offshore ECC. Suspended sediments originating from the adjacent coastline are transported in the direction of net tidal residual flow, that is, to the east-northeast (with some offshore dispersion) (see **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6).

7.4.17 Detailed quantitative assessments of sediment plumes arising from the Proposed Development activities (i.e., sediment plume modelling) have been undertaken and are provided in **Appendix 6.3: Coastal processes technical report: Impact assessment, Volume 4** of the ES (Document Reference: 6.4.6.3).

7.4.18 **Table 9.21** in in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) details the maximum sediment plume distance and the peak increases in SSC and deposition that could occur because of construction activities and relates to individual plumes/activities. Based on this information, the secondary ZOI buffer area has been set at 16km around the proposed DCO Order Limits to match the 16km tidal excursion zone for SSC (**Figure 9.1** in **Chapter 9, Volume 2** (Document Reference: 6.2.9)).

7.4.19 Plumes as a result of boulder clearance will be similar in nature to that described for 'offshore trenching of cables' in **Table 9.21** (**Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** (Document Reference: 6.2.9)). The SSC, dimensions and duration of the plumes resulting from boulder clearance will be at most similar to, or relatively smaller than described for trenching activities.

7.4.20 Jack-up vessels might cause very localised and temporary plumes as their feet are lowered into and raised from the seabed. The volume of sediment disturbed will be relatively small compared to the other activities considered (proportional to the size and number of feet on the vessel). The SSC, dimensions and duration of the

resulting plumes will be at most similar to, or relatively smaller than described for other activities.

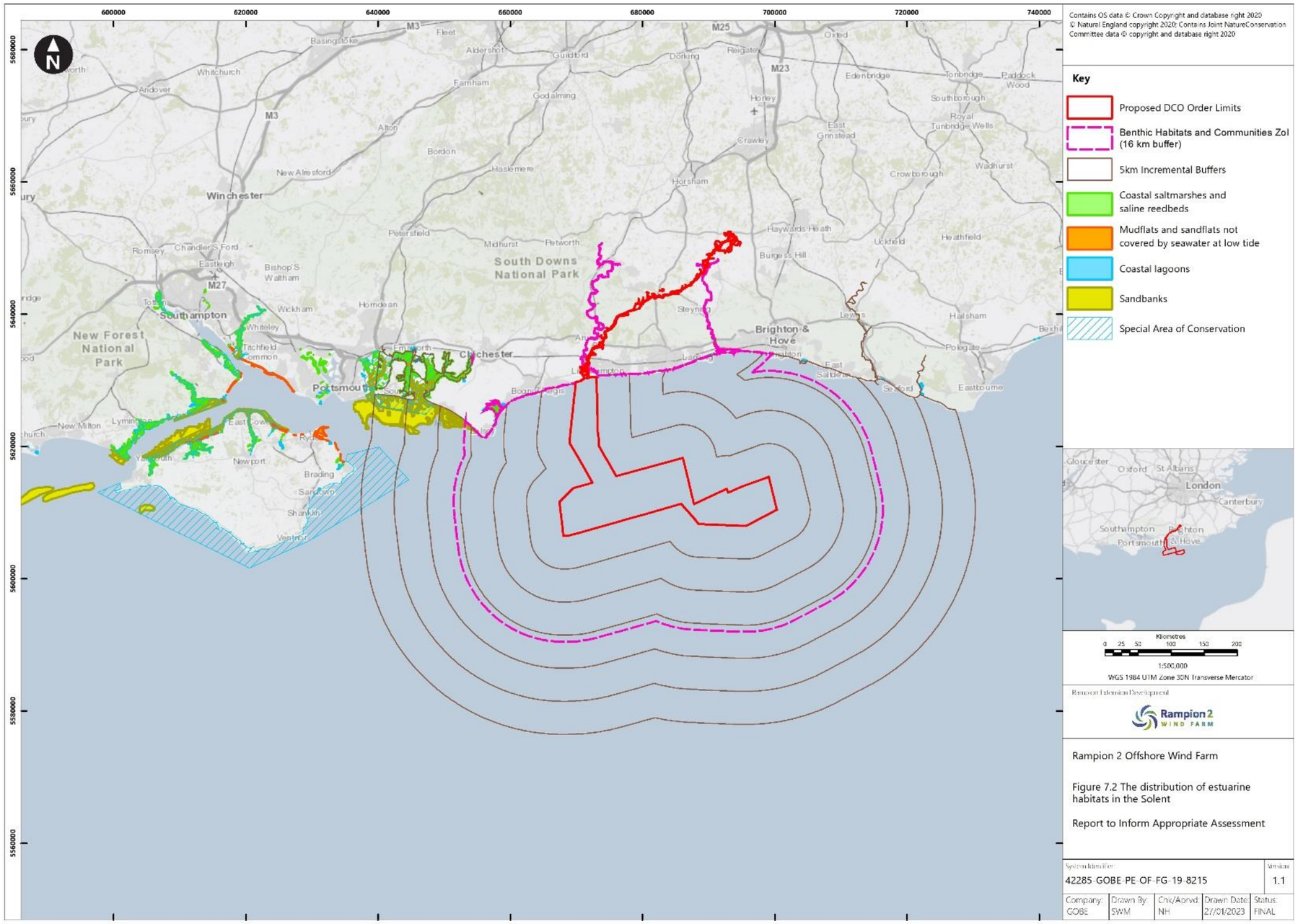
7.4.21 Prior analysis of sediment plumes resulting from marine aggregate activities in the vicinity of the Proposed Development have shown that increases in SSC due to disturbance of the locally present sediments are expected to present short-term, temporary and localised effects only (e.g., concentrations > 500 mg/l only occurring within 200m of the Licence Area boundary, see Wallingford (2010), and **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6). Furthermore, the target material at nearby marine aggregate areas is sands and gravels and characteristically, the aggregate deposits in the Marine Aggregate Regional Environmental Assessment region contain 1 to 3% mud (silt and clay) in situ; therefore, the SSCs in the overflow from dredging vessels are relatively low compared to other regions of the UK (EMU Limited, 2012) (see **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)).

7.4.22 Peak increases in SSC are expected to be local to the source. After larger (heavier) particles drop quickly out of suspension, the fine-grained sediments that are still suspended would form a plume. This plume would be rapidly dispersed by tidal currents and background concentrations restored rapidly. Activities that disturb the sediment would occur intermittently through construction and would not necessary manifest consistently (i.e., in the same direction). As the resulting sediment plume would be intermittent, transient, and subject to rapid dilution and dispersion, most material will be re-eroded between activities and non-appreciable within a few tidal cycles. There is little potential for the coalescence of plumes (e.g., during the installation of multiple foundations) and due to the transient nature of effects and dynamic receiving environment, little potential for cumulative effects between activities.

7.4.23 Embedded environmental measures (as referenced within each assessment below) have been secured to minimise seabed disturbance and reduce sediment suspension. In view of these commitments, the magnitude of the impact that construction activities relating to the Proposed Development will have on designated sites (generally) is concluded in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) to be **Minor** and of **Minor adverse significance**. This refers to effects that are discernible, temporary changes, over a minority of the receptor, and/or limited but discernible alterations to key characteristics of the feature.

© WSP UK Limited

Figure 7-2 The distribution of estuarine habitats* in the Solent



© WSP UK Limited

Page intentionally blank

Smothering and siltation rate changes

7.4.24 Sensitive habitats (and communities that define habitats) could be adversely affected by the redeposition of mobilised sediment through smothering, abrasion, or habitat alteration. The AA of the effects of suspended sediment deposition on features of the Solent Maritime SAC is provided below.

7.4.25 To minimise the disturbance of the seabed and potential impacts on designated sites, no temporary disturbance will occur within the intertidal (below MHWS). This is ensured by the following commitments (also set out in **Section 6**).

- C-65: The proposed offshore ECC and cable landfall (below mean high water springs [MHWS]) will avoid all statutory marine designated areas.
- C-43: The subsea export cable ducts will be drilled underneath the beach using horizontal directional drilling (HDD) techniques.
- C-45: Where possible, cable burial will be the preferred option for cable protection. Cable burial will be informed by the cable burial risk assessment and detailed within the Cable Specification Plan.

Inter-tidal habitats

7.4.26 Suites of habitats that consistently occur together (in this case, within sheltered estuarine environments) can be considered as functional units (or an intertidal sub-system) for which independent components should not be considered in isolation of each other (JNCC, undated). Given the inter-dependencies between the following intertidal habitats: Atlantic salt meadows; mudflats and sandflats; *Salicornia and Spartina*, these features are addressed here as 'saltmarsh habitat' (and as individual features where necessary).

7.4.27 Saltmarsh was not assessed as part of the 2020 Marine Condition Assessment (Natural England, 2021b), nor was its component species (e.g., *Salicornia and Spartina*). However, an increasing loss of saltmarsh throughout the Solent for unestablished reasons (Natural England, 2015) is, in part, the reason the condition of mudflats and sandflats is considered 'Unfavourable No Change' (100%). Intertidal seagrass[22] also has an 'Unfavourable' condition status; its extent has been severely reduced by disease.

7.4.28 The Advice on Operations (Natural England, 2020d) indicates that siltation /smothering impacts are not relevant[23] for these intertidal habitat features in relation to offshore windfarm constructions[24] (taken as works within the array), during decommissioning, or activities causing "light siltation". However, the installation of

[22] Considered as a sub-feature of the Estuaries Complex Feature.
[23] 'NOT RELEVANT': The evidence base suggests that there is no interaction of concern between the pressure and the feature (Advice on Operations for Solent Maritime SAC) (Natural England, 2020d).
[24] This this refers to a large offshore windfarm constructed over many years and covers seabed preparation, piling, drilling, vessel movements and the installation of scour protection and artificial substrate (Natural England, 2020c).

cables[25] could cause "heavy siltation." Still, this siltation would only exceed the pressure benchmark if 30cm of fine material were added to the habitat(s) in a single event (Natural England, 2020d). This pressure benchmark indicates a level of resilience of these features to varying and high levels of sediment (such that frequently occur during tidal inundations). Accordingly, small scale and transient influxes of fine material on benthic infauna communities would be insignificant. Seagrass beds are highly intolerant to deposited sediment. Large increases in sediment load will reduce the habitat available for recolonisation (Zabarte-Maeztu *et al*., 2020), however, the feature can withstand small-scale, short-term increases in deposition. The maximum expected deposition for predominantly gravelly sediments is 30 to 60cm within 5 to 10m downstream, and for predominantly sandy sediments it is 3 to 6cm within 100 to 200m downstream (**Table 9.21** in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)). Therefore, factoring in the distance to the Solent Maritime SAC (15.9km at closest point) there will be no pathway for sediment deposition (from any source) to exceed the 30cm pressure benchmark described above.

7.4.29 Both Chichester and Langstone Harbours contain extensive intertidal mudflats and sandflats with saltmarshes. There is a notable presence also, on the western shore of Southampton Water and Hamble Estuaries (**Figure 7-2**). Natural England (2021b) notes seagrass beds within the Solent Maritime SAC located within Chichester and Langstone harbours. At the closest points, the array is located 24.5km from Chichester Harbours and 28.3km from Langstone Harbours. At the closest point the Proposed Development boundary is 49.3km from to the western shore of Southampton Water and 53.3km from the Hamble Estuaries. The Proposed Development's Offshore Cable Corridor boundary is located 15.9km from this SAC, but notably further away from these known areas of substantial saltmarsh habitat.

7.4.30 Given the distance of the subject intertidal features within the SAC from the Proposed Development there is no potential for fine sediment within the plume to interact with these features.

7.4.31 **There is, therefore, no potential for an exceedance of the pressure benchmark (a 30cm settlement) or adverse effects on the integrity of features sensitive to effects at this level. It is determined that the relevant target attributes (in all cases to maintain 'Supporting Processes: Sedimentary Processes' and 'Structure and Function: Sediment Size') would not be hindered. In turn, the composition and distribution of habitats will continue to provide resources for bird species**.

[25] This covers the installation of cables laid directly on the seabed and covered with material for projection, otherwise buried by trenching (ploughing) and hydraulic jetting. A cable diameter 70 to 450mm is assumed. Seabed preparation works, preparatory, dredging, pre-laying grapnel runs, boulder removal, UXO clearance, vessel movements and anchoring within a footprint feature (Advice on Operations for Solent Maritime SAC) (Natural England, 2020d).

Subtidal habitats

7.4.32 Subtidal sandbanks occur throughout the SAC with subtidal sand and mud more prevalent within the estuaries and subtidal and gravel more predominant along the open coast. All subcomponents of this feature (subtidal sand, subtidal mixed and subtidal coarse sediments) are in unfavourable condition (Natural England, 2020e). Subtidal seagrass beds (a sub-feature of the sandbanks that has been surveyed by the Hampshire and Isle of Wight Wildlife Trust since 2008) are present within Chichester and Langstone harbours and across the north of the Isle of Wight and totalled 134.3ha in extent in 2014 (Marine Ecological Surveys Limited (MESL), 2015). The representative communities of subtidal sandbanks can include species that can be strongly influenced by sediment stability and type. The character of the feature could therefore be altered or impaired by sediment deposition (which could alter the character of the substrate), although sediment characteristics do fluctuate naturally (e.g. Collins *et al*., 1995)).

7.4.33 The Advice on Operations (Natural England, 2020d) indicates that the feature is sensitive to even light smothering and siltation rate changes (i.e., the introduction of another sediment type). The Advice directs that such an effect could be expected during the construction and decommissioning of an OWF and during cable works. The pressure benchmark would be exceeded if up to 5cm of fine material were added to the habitat in a single event. Given the secondary ZOI identified in the sediment plume modelling (see **Appendix 6.3: Coastal processes impact assessment, Volume 4** of the ES (Document Reference: 6.4.6.3)) is 16km and the vast distance (as summarised in **paragraph 7.4.29**) of the designated subtidal features relative to the Proposed Development is considered that there is a large spatial extent for fine sediment to disperse and therefore no potential exists for fine sediment within the plume to interact with these features. It follows that there is no potential for an exceedance of the pressure benchmark (a 5cm settlement) or adverse effects on the integrity of features sensitive to effects at this level. Sediment deposition as a result of construction activities at the Proposed Development is estimated as set out in **Table 9.21** of **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9).

7.4.34 In relation to sandwave clearance and seabed preparation for foundations (i.e. overspill of sandy sediment), the maximum expected average local thickness of deposition is 0.5m over an area of 16,950m^2, or 0.05m over an area of 169,503m^2 (these relate to 0.01% and 0.09% of the total Rampion 2 Offshore Array area, respectively).It is not possible to predict in advance the final distribution of sediment on the seabed from spoil disposal associated with sandwave clearance and seabed preparation; however, approximately 90% of the total spoil volume in the hopper will descend directly to the seabed as a high-density discrete unit in the 'active phase' of the plume – with the remaining 10% of material forming a more diffuse suspension in the 'passive phase' of the plume. This is not expected to directly cause any meaningful change of SSC.

7.4.35 Fines are expected to become widely dispersed (not exceeding a tidal excursion of 16km) and so will not resettle with measurable thickness even locally. It is therefore determined that the relevant target attributes (to maintain the: **Distribution**: **presence and spatial distribution of biological communities;**

Structure: **species composition of component communities** and: **substrate composition and distribution**) would not be hindered.

Coastal lagoons

7.4.36 Both coastal lagoons within the SAC (Newtown Quay Lagoon and Yar Bridge Lagoon) are situated landward of Natural England's coastal path (Natural England, 2013). Both lagoons are actively protected from tidal flooding by sea defences, namely a maintained embankment (Newtown Quay) and a sea wall sluice (Yar Bridge) (Isle of Wight Council & Royal Haskoning, 2010). As these features are isolated from the natural processes within the marine environment, the potential for interactions with the Proposed Development and adverse effects is discounted on the basis there is no viable pathway for effects.

Estuaries Complex Feature

7.4.37 The Estuary Complex Feature comprises nine sub-features[26] which are considered to be accounted for in the feature assessments above (i.e., inter-tidal habitats, subtidal habitats and coastal lagoons). The impact pathways and vulnerabilities are the same. The feature is considered to be in unfavourable condition (with reference to the condition of its components and due to elevated aqueous contaminants and nitrogen levels). The feature is assessed with reference to the findings for the component features (see feature assessments above). Many of the Estuary qualifying habitats are not considered particularly sensitive to sediment deposition generally and highly tolerant of the minimal, temporary, and transient increases in SSC predicted for the Proposed Development. Due to the lack of predicted effects on the sub-features of the Estuary qualifying feature, no adverse effects are anticipated for this feature. It is determined that the relevant target attributes would not be hindered. In turn, the composition and distribution of habitats will continue to provide resources for bird species.

7.4.38 **There is, therefore, no potential for an AEoI to the conservation objectives of the estuarine features of the Solent Maritime SAC in relation to effects associated with smothering and siltation rate changes during the construction and / or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term with respect to the potential for sediment deposition following sediment remobilisation**.

Changes in suspended solids (water clarity)

7.4.39 While sediment remains suspended, 'visual clarity' through the water is reduced. The presence of suspended matter limits light penetration and thereby, potentially primary productivity at affected sites (Bash *et al*., 2001). The information to support an AA of the effects of suspended sediment on sensitive site features is

[26] Subtidal coarse sediment, subtidal sand, subtidal mixed sediments, subtidal seagrass beds, intertidal coarse sediment, intertidal sand and muddy sand, intertidal mud, intertidal mixed sediment and intertidal seagrass beds.

provided below. The mitigation set out in **paragraph 7.4.25** to minimise the disturbance of the seabed at the source applies.

Inter-tidal habitats

7.4.40 The Advice on Operations (Natural England, 2020d) confirms that the potential for effects on these features does not relate to reduced photosynthesis, rather changes in sediment supplies (which are considered a hydrodynamic issue and addressed in **paragraph 7.4.85**). It is noted that the water surrounding the saltmarshes is naturally turbid (with varying levels between sites) and further, that increased SSC in the water could benefit saltmarsh and aid pioneer species by providing additional sediment to colonise (Natural England 2020c, citing Packham & Willis, 1997).

7.4.41 The location (as summarised in **paragraph 7.4.29)** of these features relative to the Proposed Development (at least 15.9km away) provides a large spatial extent for fine sediment to disperse. With reference to the manifestation of the effects (as summarised in **paragraph 7.4.16** to **7.4.25**) and the temporary, intermittent, transient, nature of effects (**paragraph 7.4.21**) there is extremely limited potential for the exposure of these features to this effect. Given this, that reduced photosynthesis is not of concern and that sediment deposition could, in any event, be advantageous to the system, no adverse effects are anticipated. It is therefore determined that the relevant target attributes to maintain supporting processes: sedimentary processes and structure and function: sediment size would not be hindered.

Subtidal habitats

7.4.42 The Advice on Operations (Natural England, 2020d) cites cable burial, and the secondary effect of construction works as activities with the potential to raise sediment and change water clarity (or turbidity). Prolonged changes in turbidity and average light attenuation affecting the habitat's associated communities should not decrease significantly from baseline conditions. The pressure benchmark is a change in one Water Framework Directive ecological status class for one year (Natural England, 2020d). As the Proposed Development's sediment plumes are expected to quickly dissipate, and with reference to the temporary nature of effects described in the **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) and as summarised in **paragraph 7.4.21** of this report, this feature (and associated sub-features) are not considered sensitive to this pressure at the benchmark. It is therefore determined that the relevant target attributes to maintain **Supporting processes: Sedimentary Processes** and **Structure and function: Sediment Size** would not be hindered.

Coastal lagoons

7.4.43 There is considered to be no pathway to effects on this feature. See **paragraph 7.4.36**.

Estuaries Complex Feature

7.4.44 The Estuaries feature is informed by the findings of the assessments undertaken for the sub-feature habitats the feature encompass. The impact pathways and vulnerabilities are the same. Due to the lack of predicted effects on the sub-features of the Estuary qualifying feature, no adverse effects are anticipated. It is therefore determined that the relevant attributes to maintain: Supporting Processes: Sedimentary Processes and Structure and Function: Sediment Size would not be hindered.

7.4.45 **There is, therefore, no potential for an AEoI to the conservation objectives of the Estuaries complex features of the Solent Maritime SAC in relation to effects associated with reduced water clarity (due to suspended sediments) during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term with respect to the potential for reduced visual clarity following sediment mobilisation**.

Contamination levels of sediment

All SAC features[27]

7.4.46 Should contaminated seabed be disturbed, sediment bound contaminants could be released and dispersed in marine environment (Roberts, 2012). Any degradation of water quality and/or uptake of contaminants by the ecosystem could result in deleterious effects on feature health, function, resilience, condition, and mortalities. The information to inform an AA of the potential effects of sediment-bound contaminant on sensitive site features is provided below. The mitigation set out in **paragraph 7.4.23** to minimise the disturbance of the seabed at the source applies.

7.4.47 The Estuaries Complex (and all sub-features) are in 'Unfavourable' condition, in part, due to elevated aqueous contaminants levels (Natural England, 2020e). Accordingly, feature target objectives are to restrict surface sediment contaminant levels.[28] Natural England has not provided Advice on offshore windfarm operations in relation to this pressure.

7.4.48 Risk is relative to the level of contamination and the proximity of the source to sensitive features. The distribution of features is discussed in **paragraph 7.4.29** (saltmarsh), **paragraph 7.4.32** (subtidal habitats including seagrass beds) and **paragraph 7.4.36** (lagoons). In all cases, the sub feature habitats designated within the SAC are located a considerable distance (no closer than 215.9km) over which any contaminants released would be dispersed across a large spatial extent.

7.4.49 **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) addresses contaminants within the seabed at the

[27] These are set out in **paragraph 7.4.2**.
[28] heavy metals (Hg, As, Zn, Ni, Ch, Cd, etc.), poly-aromatic hydrocarbons, poly-chlorinated biphenyls, organotins, pesticides (e.g., hexachlorobenzene)

array and offshore cable corridor. Ocean Ecology Limited (OEL) (2021) collected and analysed site-specific sediment contaminant data at seven stations which identified a total of eight heavy and trace metals. Levels were compared against Cefas Action Levels (thresholds for further assessment, with anything higher than action level 2 considered unsuitable for sea disposal, AL), the OSPAR Background Assessment Concentration (BAC) (OSPAR, 2008), which identifies ranges for effects on marine organisms, and the Canadian Sediment Quality Guideline (CSQG) (CCME, 2001) which also identifies levels at which adverse effects may occur. Full results of the analysis are presented in **Table 11** of **Appendix 9.3: Offshore wind farm subtidal benthic characterisation survey report, Volume 4** of the ES (Document Reference: 6.4.9.3) and summarised below.

7.4.50 No metals were recorded in excess of AL 2; and cadmium, copper, lead, mercury, nickel and zinc did not exceed Effective Range Low (ERL), BAC levels or levels identified in the CSQG. However, five stations exceeded AL 1 and the OSPAR ERL levels for arsenic, with all seven stations exceeding the CSQG Threshold Effect Level (TEL) whereby adverse effects to marine organisms may occasionally occur (at one station these levels exceeded the Probable Effect Level (PEL) whereby adverse effects may frequently occur). Six stations exceeded BAC levels for chromium but did not exceed ERL levels. All remaining metals fell below TEL and PEL limits.

7.4.51 Polycyclic Aromatic Hydrocarbons (PAH) were tested for all seven samples collected. With the exception of Phenanthrene (ST020) and Pyrene (ST030), all PAHs were recorded below limits of detection across all seven sampling stations. At the two stations where PAHs were detected, reference levels were not exceeded (see **Table 12** of **Appendix 9.3: Offshore wind farm subtidal benthic characterisation survey report, Volume 4** of the ES (Document Reference: 6.4.9.3)).

7.4.52 As any contaminants released would be subject to rapid dilution, weathering and dispersion and would be unlikely to persist in the marine environment, no adverse effects on site integrity are anticipated for a site at this distance from the proposed DCO Order Limits.

7.4.53 **There is, therefore, no potential for an AEoI to the conservation objectives of the features of the Solent Maritime SAC in relation to effects associated with the dispersal of sediment-bound contaminants in the marine environment during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term with respect to the potential for effects following the release of sediment-bound contamination**.

Marine invasive non-native species (introduction and/or spread)

All SAC features[27]

7.4.54 During the construction and decommissioning phases, MINNS could be accidentally imported to site. The most likely vectors are vessels; through fouling on the hulls, or the release of organisms in ballast water, should any such vessels be used (Eno *et al*., 1997). Vessels transiting ports and harbours and those berthed for long periods present a particular risk.

7.4.55 Of those organisms transported and released, a small proportion successfully establish and become invasive. The involvement of such species in competitive interactions could destabilise ecosystem structure and function and compromise native benthic communities. The AA of the potential effects of MINNS on sensitive site features is provided below.

7.4.56 The following commitments that will be secured by a DCO requirement or dML Condition to reduce the risk of introduction and spread of MINNS are relevant to the AA:

- C-95: The assessment has taken into consideration the mitigation and control of invasive species measures, this has been incorporated into the **Outline Project Environmental Management Plan** (PEMP) (Document Reference 7.11); and
- C-65: The proposed offshore cable corridor and cable landfall (below mean high water springs [MHWS]) will avoid all statutory marine designated areas.

7.4.57 The Advice on Operations (Natural England, 2020d) considers all features to be sensitive to MINNS, with the exception of intertidal coarse sediments. In 2018, the sandbanks, mud and sand flats, coastal lagoons and Estuaries features all failed to meet the target attribute: **Structure: non-native species and pathogens**. Although, as it was not evident that this was having an adverse effect on the communities present, and the finding did not inform the condition categories (which are 'Unfavourable' in all cases) (Natural England, 2020e).

7.4.58 Some protection against bio-invasion risk is provided by assumed compliance with international legislation, guidelines, and methodologies. The high-risk status currently assigned to the Solent and Southampton Water and the widespread presence of invasive present across the SAC (and neighbouring SACs) indicate further measures are required to ensure invasive species will not be introduced. It is recognised that the risk of impacts to site integrity could be exacerbated if the introduction of hard substrate (i.e., The Proposed Development's infrastructure) were to support the colonisation of MINNS**.**

7.4.59 The risk presented by the Proposed Development is associated with 2,473 return vessel movements[29] during construction. In the absence of mitigation, the risk of an invasive species being introduced to site during construction or decommissioning cannot be discounted. Therefore, as identified at Screening, the AA is required to illustrate how mitigation measures will be implemented to avoid the spread of non-native species.

7.4.60 As per commitment C-95, measures to avoid the introduction or spread of MINNS will be incorporated into a PEMP which will be approved by the relevant stakeholders and secured through DCO requirements or dML conditions. With reference to these two commitments, that include the avoidance of designated habitats **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the

[29] This refers to 2,473 return journeys from port to site. This total comprises numbers of return trips 680 for foundation installation, 1,033 for WTG installation, 154 for export cable installation, 288 for Offshore substation installation and 318 for array cable installation.

ES (Document Reference: 6.2.9) predicts non-significant effects in EIA terms (effects of minor adverse significance).

7.4.61 With reference to these findings, the information to inform an AA concludes that adherence to the above mitigation would further reduce the low risk of bio-invasions associated with Proposed Development vessels and ensure that there is no potential for adverse effects on integrity on the site as a result of invasive species. It is determined that the relevant attribute targets: **Structure: non-native species and pathogens: Reduce / restrict the introduction and spread of non-native species and pathogens, and their impacts** and for saltmarsh, to maintain **Structure and function: vegetation – undesirable species** would not be hindered.

7.4.62 **There is, therefore, no potential for an AEoI to the conservation objectives of the features of the Solent Maritime SAC in relation to effects associated with invasive non-native species introduced by vessels during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term with respect to the potential for species introductions**.

Pollution

All SAC features[27]

7.4.63 This effect refers to potential contamination of the marine environment resulting from the spillage of fluids, fuels[30] or construction materials from vessels and/or machinery during construction and decommissioning. Any degradation of water quality and/or uptake of contaminants by the ecosystem could result in deleterious effects on feature health, function, resilience, condition, and mortalities. Such effects would only result from non-compliance with legislation, codes of conduct or best practice. The Advice on Operations (Natural England, 2020d) lists all features and sub-features of the SAC as Not Sensitive[31] during the construction or decommissioning of an OWF.

7.4.64 Pollution events are not considered to present a risk of significant impacts on the designated benthic subtidal and intertidal receptors of this SAC. The magnitude of an accidental spill will be limited by the size of chemical or oil inventory on construction vessels. In addition, released hydrocarbons would be subject to rapid dilution, weathering and dispersion in a tidally dominated coastal marine environment and would therefore be unlikely to persist in the marine environment.

7.4.65 The likelihood of an incident will be further reduced by implementation of pollution prevention measures set out in a Marine Pollution Contingency Plan (MPCP) following approval by the relevant stakeholders and secured through DCO requirements or dML conditions, together with strict navigational protocols, an Outline MPCP is included in the **Project Environmental Management Plan**

[30] polycyclic aromatic hydrocarbons in vessel oil
[31] Specifically, “not sensitive to the pressure at the benchmark.” This means the activity under consideration generally does not cause impacts at a level of concern, but the activity-pressure-feature combination should be considered for in-combination effects.

(Document Reference: 7.11). The following commitments will be secured by a DCO requirement or dML condition to reduce the risk of water pollution:

- C-53: An **Outline Marine Pollution Contingency Plan (MPCP)** has been submitted with this Application as Appendix A of the **Outline Project Environmental Management Plan** (Document Reference: 7.11)). This **Outline MPCP** provides details of procedures to protect personnel working and to safeguard the marine environment and mitigation measures in the event of an accidental pollution event arising from offshore operations relating to Rampion 2. The Final MPCP will include relevant key emergency contact details;
- C-56: RED will apply for safety zones post consent. Safety zones of up to 500m will be sought during construction, maintenance and decommissioning phases. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, maintenance and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards;
- C-62: RED will comply with legal requirements with regards to shipping, navigation and aviation marking and lighting; and
- C-65: The proposed offshore cable corridor and cable landfall (below mean high water springs (MHWS)) will avoid all statutory marine designated areas.

7.4.66 The Planning Inspectorate has agreed (Scoping Opinion, 2020d) that, with the implementation of measures to limit any potential pollution incidents, any potential impacts on benthic subtidal and intertidal ecology are unlikely to result in significant effects. However, the Planning Inspectorate seeks assurances as to the detail of such measures that would be employed and how they would be secured and therefore considers that this detail should be described within the **ES**. Accordingly, an **Outline MPCP** is included in the **Outline Project Environmental Management Plan** (Document Reference: 7.11).

7.4.67 Due to the limited potential for effects and the application of pollution prevention measures and navigational protocols, unplanned oil or chemical spillages from vessels would not result in adverse effect on site integrity. The relevant attribute: targets to maintain **Supporting Processes: water quality – contaminants** or **restrict aqueous contaminants to avoid deterioration from existing levels** would not be hindered.

7.4.68 **There is, therefore, no potential for an AEoI to the conservation objectives of the features of the Solent Maritime SAC in relation to effects associated with unplanned oil or chemical spillages that may occur during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term with respect to the potential for pollution events**.

© WSP UK Limited

Operation and maintenance

Temporary increases in suspended sediment and deposition

All SAC features[27]

7.4.69 The potential for LSEs was identified following a request by Natural England (see **Appendix A**) at consultation to clarify the nature of the works likely to take place during the operation and maintenance phase of Rampion 2. Further information on these activities is set out in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4) and summarised in **Section 3**). With reference to these activities, the potential for sediment mobilisation during operation and maintenance activities would be small-scale, infrequent, intermittent and less than during construction.

7.4.70 Given a determination of no AEoI was made for effects (of a greater magnitude) during construction, the limited capacity and intermittent nature of sediment dispersal during the operation and maintenance phase, and the significant potential for dilution and dispersion in the open coastal environment (as described in **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6), impacts (as described in **paragraph 7.4.15**), are not expected to manifest at levels that could undermine the integrity of this SAC particularly given the distance of the features from the effect-source (feature locations relative to the Proposed Development are discussed in **paragraph 7.4.29** (saltmarsh), **paragraph 7.4.32** (subtidal habitats, including seagrass beds) and **paragraph 7.4.36** (lagoons).

7.4.71 On the rationale above, **there is no potential for an AEoI to the conservation objectives of the features of the Solent Maritime SAC in relation to effects associated with temporary increases in suspended sediment and deposition of the Proposed Development alone during operation. Therefore, subject to natural change, these features will be maintained or restored in the long term with respect to the potential for temporary increases in suspended sediment and deposition.**

Marine invasive non-native species (introduction of hard substrates)

All SAC features[27]

7.4.72 The introduction of hard substrates and man-made underwater structures could act as local vectors (new habitats) for MINNS. By creating new opportunities for organisms to settle, new substrates could encourage invasive species to spread and out-complete native species which could lead to the regime shifts described previously in **paragraph 7.4.55.**

7.4.73 This effect is associated with the colonisation of the WTGs and scour / cable protection and the presence of windfarm infrastructure throughout operation. Also, the MDS with regards to maximum number of vessel movements during operation and maintenance activities (see **Section 3.3**).

7.4.74 The following commitment, that will be secured by a DCO requirement, is relevant to the AA, as it limits, as far as practicable, the initial risk of introduction of MINNS that might be subsequently spread:

- C-95: The assessment has taken into consideration the mitigation and control of invasive species measures, this has been incorporated into the **Outline Project Environmental Management Plan** (PEMP) (Document Reference 7.11).).

7.4.75 The region surrounding the array and offshore cable corridor is a busy shipping channel, with numerous ports and harbours which contain hard substrate modifications for navigation and flood protection. The existing Rampion 1 also provides hard substrates. These harbours are associated with the high numbers of non-native species that are widely reported for the Solent and Southampton water (Natural England, 2016). MINNS already present in the region include (most notably) slipper limpet (*Crepidula fornicata*), Pacific oyster (*Crassostrea (Magallana) gigas*), Chinese mitten crab (*Eriocheir sinensis),* and the leathery sea squirt (*Styela clava*) (Eno *et al*., 1997; Great Britain Non-Native Species Secretariat, 2019). Many have been present in the Solent and its coastline since the early 1990s (Natural England, 2016) and likely, well before.

7.4.76 The distribution of these MINNS extends along the south coast of England with reports at Brighton, Portsmouth and Weymouth and in harbours on the south west (Natural England, 2016). The control of MINNS is the subject of site plans for numerous European sites along that coast line (Natural England, 2014). Despite the presence of MINNS across the Solent Maritime SAC, currently, these do not appear to be having an adverse effect on the communities present (Natural England, 2020d).

7.4.77 The embedded environmental measures secured for the Proposed Development (namely, commitment C-95) ensures there is a negligible risk of new species introductions. Given this and the prevalence of hard substrate surfaces and MINNS already in the region, the addition of hard substratum in the array and offshore cable corridor and infrastructure associated with the Proposed Development would not create any new ‘connectivity routes’ or "stepping stones" that were previously absent. This is particularly true given the Rampion 1 OWF is already present in the sea-space immediately adjacent to the Proposed Development. Further, it is considered that there is no pathway for the facilitated spread of MINNS to affect the supporting habitat of wader and wildfowl species.

7.4.78 The increased risk of introduction or spread of MINNS due to presence of infrastructure and potential impacts on benthic ecology biodiversity and productivity due to the introduction of hard substrates is addressed in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9). As the movement of commercial vessels is common throughout the region and hard substrates are already prevalent throughout the region, the significance of effect is deemed minor adverse significance. This finding is held to be applicable to the assessment of potential adverse effects on this SAC.

7.4.79 **There is, therefore, no potential for an AEoI to the conservation objectives of the features of the Solent Maritime SAC in relation to effects associated with the introduction of hard-substrate that might benefit MINNS during the operation and maintenance phase of the Proposed Development alone.**

Therefore, subject to natural change, these features will be maintained or restored in the long term.

Pollution

All SAC features[32]

7.4.80 The potential for impacts on benthic subtidal and intertidal receptors associated with accidental pollution events during operation and maintenance phase has been scoped out of the ES on the basis the pathway is not considered to have the potential to result in significant effects. The potential for LSEs was identified, however, following a request by Natural England (see **Appendix A**) at consultation, based on a need to clarify the nature of the works likely to take place during the operation and maintenance phase. Further information on these activities is set out in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4) and summarised in **Section 3.3** of this report.

7.4.81 The potential for pollution is associated, in part, with 26,089 vessel return trips over the 30-year design lifetime. With reference to the activities, as clarified, the potential for pollution events during operation and maintenance activities would be small-scale, infrequent, intermittent, and less than during construction. The magnitude of an accidental spill will be limited by the size of chemical or oil inventory on vessels. In addition, released hydrocarbons would be subject to rapid dilution, weathering and dispersion and would be unlikely to persist in the marine environment.

7.4.82 Further, the following commitment would be secured through DCO requirements or dML conditions to reduce the risk to negligible levels:

- C-53: An Outline Marine Pollution Contingency Plan (MPCP) has been submitted with this Application as Appendix A of the **Outline Project Environmental Management Plan** (Document Reference: 7.11). This Outline MPCP provides details of procedures to protect personnel working and to safeguard the marine environment and mitigation measures in the event of an accidental pollution event arising from offshore operations relating to Rampion 2. The Final MPCP will include relevant key emergency contact details.

7.4.83 With reference to the determination of no **AEoI** made for effects (of greater magnitude) during construction and the significant potential for dilution and dispersion in the open coastal environment, impacts are not expected to manifest at levels that could undermine the integrity of this SAC. PINS agrees (Scoping Opinion, 2020) that, with the implementation of measures to limit any potential pollution incidents, any potential impacts on benthic subtidal and intertidal ecology are unlikely to result in significant effects.

7.4.84 **There is, therefore, no potential for an AEoI to the conservation objectives of the features of the Solent Maritime SAC in relation to effects associated with unplanned oil or chemical spillages that may occur during the operation and maintenance phase of the Proposed Development alone. Therefore, subject**

[32] These are set out in **paragraph 7.4.2**.

to natural change, these features will be maintained or restored in the long term with respect to the potential for accidental pollution events.

Changes to coastal processes

All SAC features[33]

7.4.85 Potential effects on benthic and intertidal communities could result from changes to coastal processes. For example, array structures and/or sub-surface cables could influence the rate of erosion and deposition of sediment and/or prompt changes in water movement (e.g., to wave action). Changes to seabed habitats arising from effects on physical processes, including scour effects and changes in the sediment transport and wave regimes are addressed in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) with reference to **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6). The MDS for the assessment of changes to seabed habitats, including scour effects and changes in the sediment transport and wave regimes is presented in **Table 6-11** within **Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6).

7.4.86 The coastal processes assessment (PEIR Volume 2, Chapter 6) has determined that the impacts on hydrodynamic and wave regimes from cumulative impacts would be not significant and would therefore not result in any significant changes to sediment transport and consequently will not have any significant adverse impacts on benthic ecology.

7.4.87 **There is, therefore, no potential for an AEoI to the conservation objectives of the features of the Solent Maritime SAC in relation to changes to coastal processes during the operation of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term**.

South Wight Maritime SAC

Features and effects for assessment

7.4.88 The potential for LSEs from the Proposed Development acting alone has been identified for the following listed features of the SAC:

- reefs; and
- submerged or partially submerged sea caves[34].

7.4.89 The effects with the potential to result in LSEs relate to the same pathways identified for the features of the Solent Maritime SAC: suspended sediment and

[33] These are set out in **paragraph 7.4.2**.
[34] No pathways are identified to the Vegetated sea cliffs of the Atlantic and Baltic coasts feature of the site

deposition, pollution and MINNS (see **paragraph 7.4.2**) and apply to both features listed above.

7.4.90 The closest boundary of this SAC is located 23km from the array. As the maximum extent of the plume is not predicted to extend further than 16 km around the both the offshore cable corridor or the array, this site is not explicitly addressed in the PEIR Volume 2, Chapter 9 (RED, 2021). The SAC is addressed in this section following advice at consultation (see **Appendix A**) and with reference to mitigation applied to reduce potential effects related to sediment mobilisation, MINNS and pollution.

Assessment information

7.4.91 The conservation objectives (Natural England, March 2018) (as described in **Appendix F)** for the site are as follows:

- To ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:
  - the extent and distribution of qualifying natural habitats and habitats of the qualifying species;
  - the structure and function (including typical species) of qualifying natural habitats;
  - the structure and function of the habitats of the qualifying species;
  - the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
  - the populations of each of the qualifying species; and
  - the distribution of qualifying species within the site.

7.4.92 As the SAC overlaps geographically with the Solent and Dorset Coast SPA and the Solent and Southampton Water SPA and Ramsar (Natural England, 2018), the high-level conservation objectives listed in **paragraph 7.4.5** (that apply to ornithological features in SPAs and supporting habitats) are also relevant. At the conclusion of the AA for South Wight Maritime SAC, any findings of significant or residual adverse effects on the supporting habitats of the SAC will feed into the site-specific assessments for the relevant SPAs.

7.4.93 Supplementary Advice for the SAC, sets out the ecological attributes that contribute to the site's integrity. The attributes and targets have been considered as they specifically relate to both features, each effect and the target objective to maintain, or recover the feature.

7.4.94 Natural England's Advice on Operations provides an initial assessment of potential impacts arising from for all phases of a theoretical 'offshore wind project' and direction (through the allocation of a sensitivity rating) as to, which interactions require further assessment. This advice is referenced where applicable.

7.4.95 In addition to the site-specific information presented in **Appendix F**, information supporting the assessment are reported in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9) and**: Chapter 6: Coastal processes, Volume 2** of the ES (Document Reference: 6.2.6).

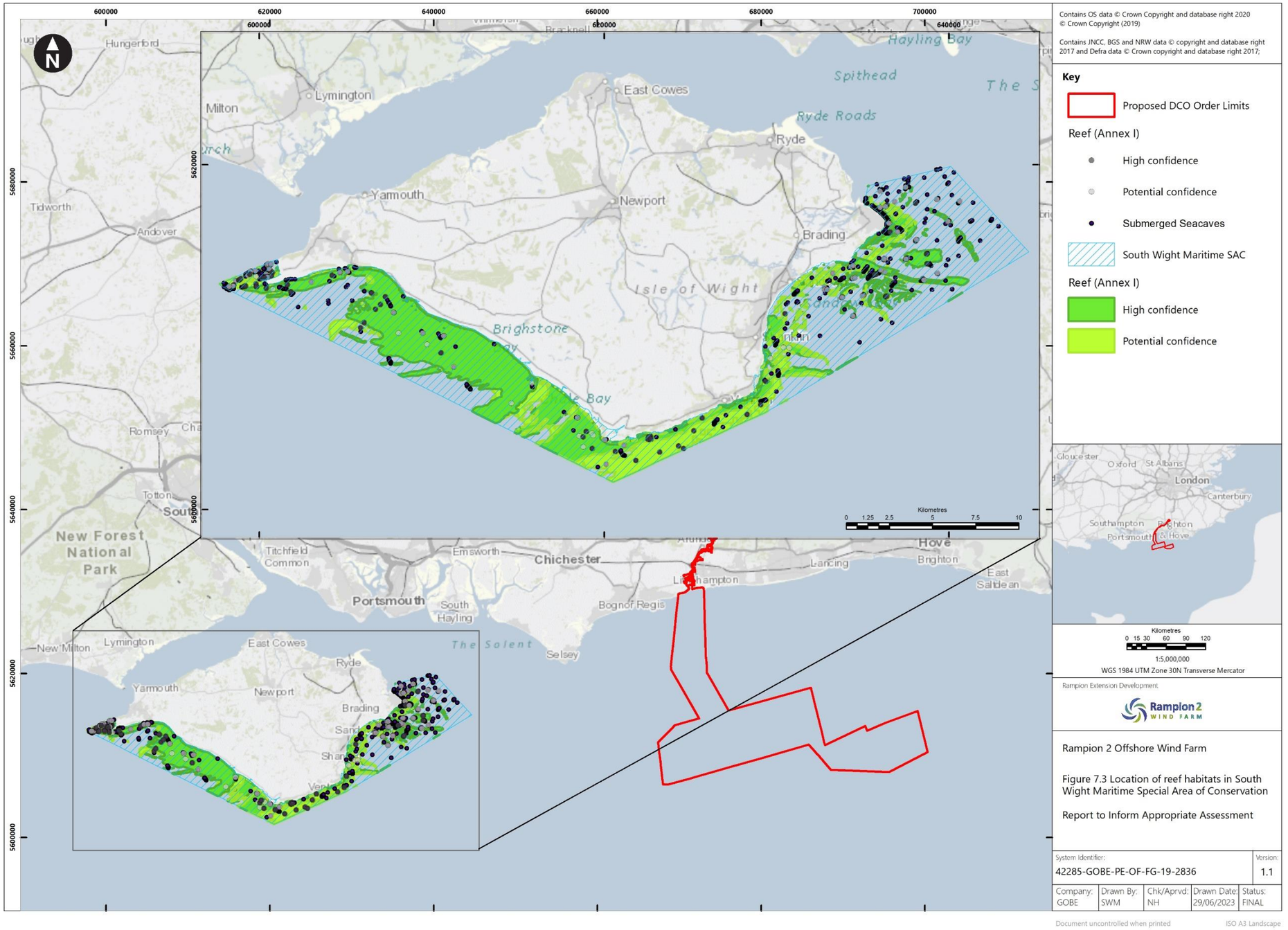
7.4.96 Potential effects and the information underpinning the assessments at the Proposed Development site have been described for subtidal and intertidal habitats previously. To avoid repetition, the reader is directed to:

- **paragraph 7.4.12**: for a description of source activities;
- **paragraph 7.4.14** for the data sources comprising the baseline;
- **paragraph 7.4.13:** for a summary description of the baseline;
- **paragraph 7.4.15** and **Table** 3-2 for the MDS associated with the assessment;
- **paragraph 7.4.16 - 7.4.22:** describe the behaviour of the sediment plume; and
- **paragraph 7.4.23:** for commitments relevant to benthic / intertidal receptors.

7.4.97 The location of the reef habitats in South Wight Maritime SAC relative to the Proposed Development are presented in **Figure 7-3** (located within this document).

© WSP UK Limited

Figure 7-3 Location of the reef habitats in South Wight Maritime SAC



© WSP UK Limited

Page intentionally blank

Construction and decommissioning

Temporary increases in suspended sediment and deposition

Partially submerged sea caves

7.4.98 The 'submerged or partially submerged sea caves' feature comprises mostly of cave systems located at the south western end of the Isle of Wight. The closest of these caves is approximately 60.1km from the closest boundary of the Proposed Development. The south coast of the Isle is exposed and waters have high turbidity (Bunker *et al*., 2005). Based on distance, the predicted extents of any plumes of fine suspended sediments (as described in **paragraph 7.4.21**) and the high-energy nature the receiving environment, there is no potential for exposure to this pressure for the south western caves.

7.4.99 The two/three caves on the south coast at the eastern end of the Isle are approximately 30km from the array and offshore cable corridor. Based on distance and the predicted extents of any plumes, there is considered to be no connectivity to these features. Further, as the features here are littoral caves exposed to frequent tidal flushing, they are not considered sensitive to redeposition of mobilised sediment, or suspended sediment causing reduced water clarity.

7.4.100 The assessment of the potential effects from the dispersal of sediment bound contaminants associated with the Proposed Development mirrors that provided in **paragraph 7.4.46**.

Reefs

7.4.101 The exposed coast between Alum Bay and St Catherine's Point supports a diverse range of moderate-energy and high-energy reef biotopes (English Nature, 2001). The coastline of the South Wight Maritime SAC is naturally dynamic, with exposure to wave action having a significant effect upon community structure. Reefs may be sensitive to suspended and deposited sediment (Isle of Wight Council, 2010). However, based on distance (the closest designated reefs are over 20km from the offshore cable corridor) (**Figure** 7 (located within this document **page 156**), the nature of the receiving environment and the predicted extents of any plumes (as described in **paragraph 7.4.16** to **7.4.21**), there is considered to be no connectivity to these features.

7.4.102 The assessment of the potential effects from the dispersal of sediment bound contaminants associated with the Proposed Development mirrors that provided in **paragraph 7.4.46** and adverse effects are not anticipated.

7.4.103 In conclusion, there is no potential for an AEoI to the conservation objectives of the features of the South Wight Maritime SAC in relation to effects associated with temporary increases in suspended sediment and deposition during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term.

Marine invasive non-native species (introduction and/or spread)

7.4.104 The assessment of the potential effects of pollution associated for the Proposed Development for the benthic habitats of the South Wight Maritime SAC mirrors that provided in **paragraph 7.4.3** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.105 There is no potential for an AEoI to the conservation objectives of the features of the South Wight Maritime SAC in relation to MINNS during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term.

Pollution

7.4.106 The assessment of the potential effects from pollution associated with the Proposed Development for the benthic habitats of the South Wight Maritime SAC mirrors that provided in **paragraphs 7.4.63** to **7.4.68** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.107 There is no potential for an AEoI to the conservation objectives of the features of the South Wight Maritime SAC in relation to pollution during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term.

Operation and maintenance

Temporary increases in suspended sediment and deposition

7.4.108 The assessment of the potential effects from the dispersal of sediment and any sediment bound contaminants associated with the Proposed Development mirrors that provided in **paragraphs 7.4.46** to **7.4.53** and adverse effects are not anticipated.

7.4.109 **There is no potential for an AEoI to the conservation objectives of the features of the South Wight Maritime SAC in relation to effects associated with the suspended sediment during the operation and maintenance phase of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term.**

Marine invasive non-native species (hard substrate)

7.4.110 The assessment of the potential effects of pollution associated for the Proposed Development for the benthic habitats of the South Wight Maritime SAC mirrors that provided in **paragraphs 0** to **7.2.62** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.111 **There is no potential for an AEoI to the conservation objectives of the features of the South Wight Maritime SAC in relation to MINNS during the operation and maintenance phase of the Proposed Development alone.**

Therefore, subject to natural change, these features will be maintained or restored in the long term.

Pollution

7.4.112 The assessment of the potential effects from pollution associated with the Proposed Development for the benthic habitats of the South Wight Maritime SAC mirrors that provided in **paragraphs 7.4.80** to **7.4.84** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.113 There is no potential for an AEoI to the conservation objectives of the features of the South Wight Maritime SAC in relation to pollution during the operation and maintenance phase of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term.

Coastal processes

7.4.114 The assessment of the potential effects from changes to coastal processes associated with the Proposed Development for the benthic habitats of the South Wight Maritime SAC mirrors that provided in **paragraphs 7.4.85** to **7.4.87** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.115 **There is no potential for an AEoI to the conservation objectives of the features of the South Wight Maritime SAC in relation to changes to physical processes during the operation and maintenance phase of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term.**

Solent and Isle of Wight lagoons SAC

Features and effects for assessment

7.4.116 Potential for LSEs alone has been identified for the following listed features of the SAC:

- Coastal lagoons

7.4.117 The effects with the potential to result in LSEs relate to the same pathways identified for the intertidal features of the Solent Maritime SAC which concern suspended sediment and deposition, pollution and MINNS (see **paragraph 7.4.3**).

7.4.118 The closest boundary of this SAC is located 33.2km from the array. As the maximum extent of the plume is not predicted to extend further than 16 km buffer around the both the offshore cable corridor or the array, this site is not explicitly addressed in **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9). The SAC is addressed in the HRA following advice at consultation (see **Appendix A**) and with reference to mitigation applied to reduce potential effects related to sediment mobilisation, MINNS and pollution.

Assessment information

7.4.119 The conservation objectives (November 2018) (as described in **Appendix F**) for the site are as follows:

- To ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
  - The extent and distribution of qualifying natural habitats;
  - The structure and function (including typical species) of qualifying natural habitats, and
  - The supporting processes on which qualifying natural habitats rely.

Construction and decommissioning

7.4.120 Site information indicates (e.g., English Nature, 2005) that many of the coastal lagoons within the SAC are isolated or sluiced lagoons and many are separated from the sea by a sea-wall. This includes, Gilkicker Lagoon (a sluiced lagoon), the lagoons in Keyhaven (within the saltmarsh behind a sea-wall) and the lagoons at Bembridge Harbour (formed in a depression behind the sea-wall) (see Bamber and Robbins, 2010). Although sea water does enter some of the lagoons by percolation, or during spring tides, connectivity to the marine environment is considered to be extremely weak.

Temporary increases in suspended sediment and deposition

7.4.121 The location of the lagoon features relative to the Proposed Development (>30km) provides a large spatial extent for fine sediment to disperse. Noting this distance, the temporary, intermittent, transient, nature of effects (as summarised in **paragraphs 7.2.16 - 7.2.22**) and based on the rationale presented in **paragraph 7.2.34** (concerning connectivity), it is considered that there is no potential for AEoI.

7.4.122 The assessment of the potential effects from the dispersal of sediment bound contaminants associated with the Proposed Development mirrors that provided in **paragraphs 7.4.46** to **7.4.53** and adverse effects are not anticipated.

7.4.123 In conclusion, there is a no potential for an AEoI to the conservation objectives of the features of the Solent and Isle of Wight lagoons SAC in relation to effects associated with temporary increases in suspended sediment and deposition during the construction or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term.

Marine invasive non-native species (introduction and/or spread)

7.4.124 The assessment of the potential effects of MINNS associated with the Proposed Development for the coastal lagoon habitats of the Solent and Isle of Wight lagoons SAC mirrors that provided in **Section 7.4** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.125 **There is no potential for an AEoI to the conservation objectives of the features of the Solent and Isle of Wight lagoons SAC in relation to MINNS during the construction and / or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term**.

Pollution

7.4.126 The assessment of the potential effects from pollution associated with the Proposed Development for the coastal lagoon habitats of the Solent and Isle of Wight lagoons SAC mirrors that provided in **paragraphs 7.4.63** to **7.4.68** for the **benthic and intertidal features of the Solent Maritime SAC**.

7.4.127 **There is no potential for an AEoI to the conservation objectives of the features of the Solent and Isle of Wight lagoons SAC in relation to pollution during the construction and/or decommissioning of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term**.

Operation and maintenance

Temporary increases in suspended sediment and deposition

7.4.128 The assessment of the potential effects from the dispersal of sediment and any sediment bound contaminants associated with the Proposed Development mirrors that provided in **paragraphs 7.4.46** to **7.4.53** and adverse effects are not anticipated.

7.4.129 **There is no potential for an AEoI to the conservation objectives of the features of the Solent and Isle of Wight lagoons SAC in relation to effects associated with temporary increases in suspended sediment and deposition during the phase of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term**.

Marine invasive non-native species (hard substrate)

7.4.130 The assessment of the potential effects of MINNS associated with the Proposed Development for the benthic habitats of the Solent and Isle of Wight lagoons SAC mirrors that provided in **paragraphs 7.4.54** to **7.4.62** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.131 **There is no potential for an AEoI to the conservation objectives of the features of the Solent and Isle of Wight lagoons SAC in relation to effects associated with the introduction of hard substrate during the operation and maintenance phase of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term**.

Pollution

7.4.132 The assessment of the potential effects from pollution associated with the Proposed Development for the benthic habitats of the Solent and Isle of Wight lagoons SAC mirrors that provided in **paragraphs 7.4.80** to **7.4.84** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.133 **There is no potential for an AEoI to the conservation objectives of the features of the Solent and Isle of Wight lagoons SAC in relation to effects associated with pollution during the operation and maintenance phase of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term**.

Coastal processes

7.4.134 The assessment of the potential effects from changes to coastal processes associated with the Proposed Development for the benthic habitats of the Solent and Isle of Wight lagoons SAC mirrors that provided in **paragraphs 7.4.85** to **7.4.87** for the benthic and intertidal features of the Solent Maritime SAC.

7.4.135 **There is no potential for an AEoI to the conservation objectives of the features of the Solent and Isle of Wight lagoons SAC in relation to changes to physical processes during the operation and maintenance phase of the Proposed Development alone. Therefore, subject to natural change, these features will be maintained or restored in the long term**.

7.5 Appraisal of potential AEoI alone for offshore ornithology

Introduction

7.5.1 Information to inform the assessment for offshore ornithology is provided in **Section 3.3** (the MDS relevant to offshore ornithology), **Section 6** (Embedded environmental measures and the **Commitments Register** (Document Reference: 7.22)) and **Appendix F** (European sites Information). The potential for LSEs as regards offshore ornithology is summarised in **Section 5.9,** with the Stage Two (AA) presented below. In addition, the assessment relies on information presented in the following documents:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) – an assessment at the EIA level of potential effects from the Proposed Development to ornithological features in the offshore and intertidal environment;
- **Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1) – a detailed description of the baseline environment with respects to offshore and intertidal ornithology;
- **Appendix 12.2: Offshore and intertidal ornithology displacement analysis, Volume 4** of the ES (Document Reference: 6.4.12.2) – methods and results used to estimate impacts from disturbance and displacement to key ornithological receptors;

- **Appendix 12.3: Offshore and intertidal ornithology collision risk modelling, Volume 4** of the ES (Document Reference: 6.4.12.3) – methods and results used to estimate impacts from collisions with WTGs to key ornithological receptors;
- **Appendix 12.4: Offshore ornithology Population Viability Analysis, Volume 4** of the ES (Document Reference: 6.4.12.4) – methods and results used to estimate impacts on population growth rates over the lifespan of the project; and
- **Appendix 12.5: Offshore ornithology Migratory Collision Risk, Volume 4** of the ES (Document Reference: 6.4.12.5) – methods and results used to estimate impacts from collisions with WTGs to migratory ornithological receptors.

7.5.2 As described in **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12), for each pathway discussed in this section, it was concluded that there will be no significant effect from the Proposed Development alone at the EIA level.

Assessment criteria

7.5.3 In addition to the general guidance presented in **Section 2**, specific assessment criteria have been used for this offshore ornithology assessment. The assessment has been based on the relevant guidance for conducting HRA and assessing OWF (European Commission, 2018; Maclean *et al*, 2009; Natural England, 2010; Planning Inspectorate, 2022; Parker et al, 2022) and applied the criteria contained in that guidance where relevant to the interest features under consideration.

7.5.4 The determination of AEoI is based on the factors that contribute to the definition of maintaining integrity, namely that the ecological structure and function of the site is not adversely affected, that the ability of the habitat to sustain the bird species that are interest features is not adversely affected (i.e. that breeding, roosting and foraging locations are maintained and that food sources are maintained) and that the population of the interest feature is maintained both in numbers and across the area of the site.

7.5.5 The Conservation Objectives for each site, against which impacts are assessed, are presented in **Appendix F**.

Construction

Disturbance and displacement

7.5.6 Activities in the offshore ECC associated with export cable laying, and activities within the array area associated within the construction of WTGs and other infrastructure, may disturb and displace species within the array area and potentially within surrounding buffers to a lower extent. This in effect represents indirect habitat loss, which would potentially reduce the area available to those seabirds to forage, loaf and/or moult that currently occur within and around the Proposed Development and may be susceptible to displacement from such a development. Displacement may contribute to individual birds experiencing fitness

consequences, which at an extreme level could lead to the mortality of individuals. The MDS used for assessment is given in **Table** 3-2.

7.5.7 The initial Screening process concluded there was potential for disturbance and displacement during the construction phase to result in an LSE relating to the following designated sites and the relevant features:

- Dungeness, Romney Marsh & Rye Bay SPA – Sandwich tern during the breeding bio-season;
- Solent and Dorset Coast SPA – common tern, little tern and Sandwich tern during the breeding bio-season;
- Flamborough and Filey Coast SPA – guillemot and razorbill during the migratory and non-breeding bio-seasons; and
- Farne Islands SPA – guillemot during the non-breeding bio-season.

7.5.8 Any impacts resulting from disturbance and displacement during the construction phase are considered to be short-term, temporary and reversible in nature, lasting only for the duration of construction activities, as birds would return to the area once construction activities have ceased. Disturbance and displacement of birds during the construction phase is most likely to affect birds foraging in and around the construction area. The level of disturbance at each work location would differ dependent on the activities taking place, but there could be vessel movements at any time of day or night over the entire construction period.

Operation and maintenance

Disturbance and displacement

7.5.9 The presence of WTGs has the potential to directly disturb and displace seabirds that would normally reside within and around the area of sea where the Proposed Development is planned to be constructed. Disturbance and displacement may also be caused by the movement of vessels during the operational phase, such as maintenance vessels. This in effect represents indirect habitat loss, which would potentially reduce the area available to those seabirds to forage, loaf and / or moult that currently occur within and around the Proposed Development and may be susceptible to displacement from such a development. Displacement may contribute to individual birds experiencing fitness consequences, which at an extreme level could lead to the mortality of individuals. The MDS used for assessment is given in **Table** 3-2**.**

7.5.10 The initial Screening process concluded there was potential for disturbance and displacement during the operation and maintenance phase to result in an LSE relating to the following designated sites and the relevant features:

- Dungeness, Romney Marsh & Rye Bay SPA – Sandwich tern during the breeding bio-season;
- Solent and Dorset Coast SPA – Sandwich tern during the breeding bio-season;
- Chichester and Langstone Harbours SPA – Sandwich tern during the breeding bio-season;

- Solent and Southampton Water SPA – Sandwich tern during the breeding bio-season;
- Côte de Granit Rose-Sept Iles SPA – gannet during all bio-seasons;
- Alderney West Coast & Burhou Islands Ramsar – gannet during all bio-seasons;
- Grassholm SPA – gannet during the migratory bio-seasons;
- Flamborough and Filey Coast SPA – gannet, guillemot and razorbill during the migratory and non-breeding bio-seasons; and
- Farne Islands SPA – guillemot during the non-breeding bio-season.

7.5.11 Seabird species vary in their response to the presence of operational infrastructure associated with OWFs, such as WTGs and shipping activity related to maintenance activities. OWFs are a new feature in the marine environment and as a result there is limited evidence as to the effects of disturbance and displacement by operational infrastructure in the long-term.

7.5.12 Garthe and Hüppop (2004) developed a scoring system for such disturbance factors, which has been widely applied in OWF EIAs. Furness and Wade (2012) developed a similar system with disturbance ratings for particular species that was applied alongside scores for habitat flexibility and conservation importance to define an index value that highlights the sensitivity of each species to disturbance and displacement. Bradbury *et al*., (2014) provided an update to the Furness and Wade (2012) paper to consider seabirds in English waters.

7.5.13 Natural England and JNCC issued a Joint Interim Displacement Advice Note (Natural England and JNCC 2012), which provided recommendations for presenting information to enable the assessment of displacement effects in relation to OWF developments. This has been superseded more recently by a joint SNCB interim displacement advice note initially issued in 2017 and updated again in 2022 (SNCBs, 2022), which provides the latest advice for UK development applications on how to consider, assess and present information and potential consequences of seabird displacement from OWFs. These guidance notes, as recommended in Natural England's best practice guidance note (Parker *et al*., 2022), have been used to infer the SNCB's assumed preferred approach to assessment provided below, in the absence of rates being recommended through stakeholder engagement.

7.5.14 Some species are more susceptible than others to disturbance from OWF operation, which may lead to subsequent displacement. Dierschke *et al*., (2016) noted both displacement and avoidance to varying degrees by some seabird species while others were attracted to OWFs. As summarised above, a total of four species (Sandwich tern, guillemot, razorbill and gannet) were concluded as requiring assessments of disturbance and displacement from the proposed development.

7.5.15 For each of the four species a review was undertaken of evidence from the literature on potential disturbance levels and displacement effects from OWFs and rates applied in assessments of displacement effects by other OWFs. The approaches taken are considered to represent a realistic, yet precautionary,

assessment based on SNCBs guidance and additional evidence presented within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12). However, in accordance with SNCB (2022) guidance on displacement matrices are also presented for potential annual apportioned impacts to designated sites.

Collision risk

7.5.16 There is a potential collision risk to birds which fly through the Proposed Development whilst foraging for food, commuting between breeding sites and foraging areas, or when on migration. The risk to birds arises from colliding with the WTG rotors and associated infrastructure resulting in injury or fatality. The MDS used for assessment is given in **Table** 3-2.

7.5.17 The Applicant is committed to minimising environmental impacts, and has made the following commitments to minimise the risk of collision:

- C-89: There will be a minimum blade tip clearance of at least 22m above MHWS.

7.5.18 The initial Screening process concluded there was potential for collision risk during the phase to result in an AEoI relating to the following designated sites and the relevant features:

- Pagham Harbour SPA – migratory dark-bellied brent goose, ruff. Common tern during the breeding bio-season;
- Pagham Harbour Ramsar – migratory dark-bellied brent goose;
- Portsmouth Harbour SPA – migratory black-tailed godwit, dark-bellied brent goose, dunlin and red-breasted merganser;
- Portsmouth Harbour Ramsar – migratory dark-bellied brent goose;
- Dungeness, Romney Marsh & Rye Bay SPA – migratory common tern and Sandwich tern during the breeding and migratory bio-seasons;
- Chichester and Langstone Harbours SPA –migratory bar-tailed godwit, curlew, dark-bellied brent goose, dunlin, grey plover, northern pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone, wigeon and the waterbird assemblage. Common tern and Sandwich tern during the breeding bio-season;
- Chichester and Langstone Harbours Ramsar – migratory ringed plover, black-tailed godwit, redshank, dark-bellied brent goose, shelduck, grey plover, dunlin and the waterbird assemblage;
- Solent and Southampton Water SPA –migratory black-tailed godwit, dark-bellied brent goose, ringed plover, teal and the waterbird assemblage. Sandwich tern during the breeding bio-season;
- Solent and Southampton Water Ramsar – migratory ringed plover, dark-bellied brent goose, teal, black-tailed godwit and the waterbird assemblage;
- Medway Estuary and Marshes SPA – migratory common tern;

- Littoral seino-marin SPA – lesser black-backed gull and kittiwake during the breeding bio-season;
- Foulness (Mid-Essex Coast Phase 5) SPA – migratory Sandwich tern and common tern;
- Falaise du Bessin Occidental SPA – kittiwake during the breeding bio-season;
- Alde-Ore Estuary SPA – migratory Sandwich tern and lesser black-backed gull;
- Alde-Ore Estuary Ramsar – migratory lesser black-backed gull;
- The Wash SPA – migratory common tern;
- Breydon Water SPA – migratory common tern;
- Greater Wash SPA – migratory Sandwich tern and common tern;
- North Norfolk Coast SPA – migratory Sandwich tern and common tern;
- North Norfolk Coast Ramsar – migratory Sandwich tern and common tern;
- Côte de Granit Rose-Sept Iles SPA – Gannet during all bio-seasons;
- Alderney West Coast & Burhou Islands Ramsar – Gannet during all bio-seasons;
- Grassholm SPA – migratory gannet;
- Flamborough and Filey Coast SPA – migratory gannet, kittiwake and herring gull;
- Northumbria Coast SPA – migratory Arctic tern;
- Northumbria Coast Ramsar – migratory Arctic tern;
- Coquet Island SPA – migratory Sandwich tern, Arctic tern, common tern, herring gull, lesser black-backed gull and kittiwake; and
- Farne Islands SPA – migratory Sandwich tern, Arctic tern, common tern and kittiwake.

7.5.19 CRM has been carried out for the Project, with detailed methods and results presented in **Appendix 12.3: Offshore and intertidal ornithology collision risk modelling, Volume 4** of the ES (Document Reference: 6.4.12.3), to provide information for seabird species of interest identified as potentially at risk and of interest for impact assessment.

7.5.20 CRM was undertaken using the stochastic collision risk model (sCRM) (McGregor, 2018), using the latest recommended parameters within Natural England's interim guidance note on collision risk modelling avoidance rates (Natural England, 2023) and best practice guidance (Parker *et al.,* 2022) for each seabird species, to determine the risk of collision when in flight.

7.5.21 CRM accounts for several different species-specific behavioural aspects of the seabirds being assessed, including the height at which birds fly, their ability to avoid moving or static structures and how active they are diurnally and nocturnally. Details of these considerations are provided in **Appendix 12.3: Offshore and**

intertidal ornithology collision risk modelling, Volume 4 of the ES (Document Reference: 6.4.12.3).

7.5.22 All estimates are presented using Band Option 2 (BO2) following Natural England best practice guidance (Parker *et al.,* 2022). Robustly estimating site-specific flight heights from aerial digital imagery requires a sufficient sample size of birds of each species from which flight height can be determined. Not all individuals are suitable for flight height estimation, as the method requires clear imagery of individuals in straight and level flight, with wings fully extended. Following completion of the full 24 months of site-specific baseline surveys, sample sizes were insufficient to accurately calculate site-specific flight heights for the four species selected for CRM, therefore Band Option 1 has not been modelled.

7.5.23 It must be noted that a number of elements of additional precaution were included in the input parameters applied in the sCRM for this assessment, including considering a range of nocturnal activity factors and lower avoidance rates than that currently predicted from the latest scientific evidence. The nature of such precaution is evidenced through the findings of post consent monitoring studies. The Offshore Renewables Joint Industry Programme (ORJIP) funded a study to understand seabird behaviour at sea around OWFs, the Bird Collision Avoidance Study (Skov *et al*., 2018). The ORJIP project studied birds around Thanet OWF for a two-year period (between 2014 and 2016) recording over 12,000 bird movements throughout the day and night (Skov *et al*., 2018). The findings of this study presented updated values for both nocturnal activity, flight speeds and avoidance behaviour from an empirical data source, which is recommended for future incorporation in CRM to provide greater confidence in predicted impacts and reduce the current levels of uncertainty in assessments. It also reported that only six birds (all gull species) collided with WTGs from over 12,000 birds recorded during the two-year period, providing evidence of the current level of precautionary nature of collision risk modelling for all species of seabirds assessed for the Offshore Project.

7.5.24 The most recent empirical led study of collision risk to seabirds (AOWFL, 2023) was undertaken over two years off the coast of Aberdeen at an OWF site with 11 WTGs collecting data during the breeding and post-breeding season (covering the months of April to October 2020 and 2021). The results from this study and its overall conclusions were that it is now evident that seabirds are exposed to very low risks of collision with WTGs during daylight hours. This was also substantiated by the fact that no collisions or even narrow escapes were recorded in over 10,000 bird videos during the two years of monitoring. Despite this study not covering the period outside of the breeding / post-breeding season, when weather conditions may be more testing for birds and may influence flight behaviour more, it is evident that current annual collision risk modelling outputs are likely to overestimate the risk to seabirds. Therefore, it is considered that the collision mortality rates estimated for seabirds within this impact assessment are likely to be overestimates during the breeding and post-breeding months and therefore base impacts on a total annual risk level that is precautionary in nature.

7.5.25 Therefore, it is considered that the CRM input parameters used in the assessment of collision risk to seabirds for the Project and those from other developments at the cumulative level incorporate a high degree of precaution.

Barrier effects

7.5.26 In the operational phase of the Proposed Development, the presence of WTGs could create a barrier to the movements of birds. This may result in permanent changes in flight routes for the birds concerned and an increase in energy demands associated with those movements. This might result in a lower rate of breeding success or in reduced survival chances for the individuals affected. The MDS used for assessment is given in **Table** 3-2.

7.5.27 The initial screening process concluded there was potential for barrier effects during the operation and maintenance phase to result in an AEoI relating to the following designated sites and the relevant features:

- Chichester and Langstone Harbours SPA – Sandwich tern during the breeding bio-season; and
- Solent and Southampton Water SPA – Sandwich tern during the breeding bio-season.

Decommissioning

Disturbance and displacement

7.5.28 The decommissioning phase has the potential to affect birds in the marine environment through disturbance due to decommissioning activities, including the removal of foundations, towers, blades, export cables and other infrastructure and the movement of vessels and helicopters. The disturbance created has the potential to result in displacement of birds from the site of decommissioning, from an area around it and from routes used by vessels to access the decommissioning site. This displacement would effectively result in temporary habitat loss through a reduction in the area available to birds for feeding, resting and moulting. The MDS used for assessment is given in **Table** 3-2.

7.5.29 The initial screening process concluded there was potential for disturbance and displacement during the decommissioning phase to result in an AEoI relating to the following designated sites and the relevant features:

- Dungeness, Romney Marsh & Rye Bay SPA – Sandwich tern during the breeding bio-season;
- Solent and Dorset Coast SPA – common tern, little tern and Sandwich tern during the breeding bio-season;
- Flamborough and Filey Coast SPA – guillemot and razorbill during the migratory and non-breeding bio-seasons; and
- Farne Islands SPA – guillemot during the non-breeding bio-season.

7.5.30 Any impacts resulting from disturbance and displacement during the decommissioning phase are considered to be short-term, temporary and reversible in nature, lasting only for the duration of decommissioning activities, as birds would return to the area once decommissioning activities have ceased. Disturbance and displacement of birds during the decommissioning phase is most likely to affect birds foraging in and around the decommissioning area. The level of

disturbance at each work location would differ dependent on the activities taking place, but there could be vessel movements at any time of day or night over the entire decommissioning period.

Assessment Structure

7.5.31 In most cases, the impact of Rampion 2 on designated sites is calculated by first calculating the total impact of Rampion 2 to a given species and secondly apportioning that impact to individual designated sites for that species. In order to reduce repetition, this process is detailed in standalone sections for the following impacts:

- Collision risk to migratory waterbirds (**Paragraph 7.5.261** and onwards);
- Collision and displacement risk to migratory and non-breeding gannets (**Paragraph 7.5.267** and onwards);
- Collision risk to migratory gulls (**Paragraph 7.5.284** and onwards);
- Collision risk to migratory terns (**Paragraph 7.5.300** and onwards); and
- Displacement risk to migratory and non-breeding auks (**Paragraph 7.5.308** and onwards).

Pagham Harbour SPA and Ramsar

Features and effects for assessment

7.5.32 The potential for LSEs from the Proposed Development acting alone has been identified for the following features of Pagham Harbour SPA:

- Common tern (breeding season), operation and maintenance, collision risk; and
- Ruff (migratory), operation and maintenance, collision risk.

7.5.33 Potential for LSEs has been identified for the following for Pagham Harbour SPA and Ramsar:

- Dark-bellied Brent goose (migratory), operation and maintenance, collision risk.

Operation and maintenance

Collision risk

Common tern (breeding)

7.5.34 Due to difficulty distinguishing common and Arctic terns from aerial digital survey imagery, these two species were considered together as ‘commic’ terns for the purpose of CRM at PEIR stage (see RED 2021 Volume 4, Appendix 12.3). However, it is recognised that as Arctic tern do not breed on the south coast of England any ‘commic’ terns are most likely to be common terns during this period.

7.5.35 The total estimated number of 'commic' tern collisions during the full UK breeding bio-season at PEIR stage was 0.13 birds per annum (see RED 2021 Volume 4, Appendix 12.3). When this is apportioned between different colonies it, therefore, represents no material change. Given the reduction in the proposed array area and the absence of common tern records from the final six months of Digital Aerial Surveys (DAS), the previously-conducted CRM results represent the upper bound of the likely collision rate for the Proposed Development. CRM for common tern was, therefore, not updated for this final assessment.

7.5.36 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Pagham Harbour SPA in relation to collision risk effects from the Proposed Development alone and therefore, subject to natural change, the common tern feature will be maintained in the long term with respect to the potential for collision risk effect**.

Ruff

7.5.37 In order to minimise repetition and provide a clear and concise approach, all migratory waterbirds have been considered together below in **paragraph 7.5.261**: '**Migratory Waterbirds – English South Coast SPAs and Ramsars'** onwards.

7.5.38 As per that section, no AEoI was found for any waterbird feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.39 **There is, therefore, no potential for an AEoI to the conservation objectives of the ruff feature of Pagham Harbour SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the ruff feature of Pagham Harbour SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Dark-bellied brent goose

7.5.40 In order to minimise repetition and provide a clear and concise approach, all migratory waterbirds have been considered together below (**paragraph 7.5.261 'Migratory Waterbirds – English South Coast SPAs'** and onwards). As per that section, no AEoI was found for any waterbird feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.41 **There is, therefore, no potential for an AEoI to the conservation objectives of the dark-bellied brent goose feature of Pagham Harbour SPA or the dark-bellied brent goose feature of Pagham Harbour Ramsar in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the dark-bellied brent goose feature of Pagham Harbour SPA and the dark-bellied brent goose feature of Pagham Harbour Ramsar will be maintained as a feature in the long term with respect to potential for adverse effects**.

© WSP UK Limited

Portsmouth Harbour SPA and Ramsar

Features and effects for assessment

7.5.42 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Portsmouth Harbour SPA:

- Black-tailed godwit, dark-bellied brent goose, dunlin and red-breasted merganser (migratory); operation and maintenance Phase; collision risk.

7.5.43 Potential for LSEs has been identified for the following for Portsmouth Harbour SPA and Ramsar:

- Dark-bellied brent goose (migratory), operation and maintenance Phase, collision risk.

Operation and maintenance

Collision risk

7.5.44 In order to minimise repetition and provide a clear and concise approach, all migratory waterbirds have been considered together below (**paragraph 7.5.261** '**Migratory Waterbirds – English South Coast SPAs and Ramsars'** onwards). As per that section, no AEoI was found for any waterbird feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.45 There is, therefore, no potential for an AEoI in relation to collision risk from the Proposed Development to the conservation objectives of the following features of Portsmouth Harbour SPA:

- black-tailed godwit;
- dark-bellied brent goose;
- dunlin;
- red-breasted merganser; or
- dark-bellied brent goose.

7.5.46 There is no potential for an AEoI in relation to collision risk from the Proposed Development to the conservation objectives of the following features of Portsmouth Harbour Ramsar:

- dark-bellied brent goose.

7.5.47 Therefore, subject to natural change, the black-tailed godwit, dark-bellied brent goose, dunlin and red-breasted merganser features of Portsmouth Harbour SPA, and the dark-bellied brent goose feature of Portsmouth Harbour Ramsar will be maintained in the long-term with respect to potential for adverse effects.

Dungeness, Romney Marsh and Rye Bay SPA

Features and effects for assessment

7.5.48 The potential for LSEs from the Proposed Development acting alone been identified for the following features of Dungeness, Romney and Rye Bay SPA:

- Sandwich tern (breeding bio-season), operation and maintenance phase, collision risk;
- common and Sandwich tern (migratory), operation and maintenance phase, collision risk; and
- Sandwich tern (breeding bio-season), construction, operation and maintenance, and decommissioning phases, disturbance/displacement.

Construction and decommissioning

Disturbance and displacement

Sandwich tern (breeding)

7.5.49 Within the offshore ECC, construction activities are likely to be spatially and temporally restricted. As given in **Table 12-17** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12), construction activities associated with cable laying may take up to 24 months. Any disturbance and displacement will be restricted to the immediate vicinity of the construction vessel, which would represent only an insignificant proportion of the amount of total habitat available for foraging. Therefore, any impact from disturbance and displacement associated with cable laying activities is likely to be negligible.

7.5.50 Displacement from the array area for Sandwich terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2022). The bio-season mean peak abundance for Sandwich terns during the migration free breeding season for the Proposed Development array area plus a 2km buffer was zero birds (**ES Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.51 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Dungeness, Romney Marsh and Rye Bay SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Operation and maintenance

Collision risk

Sandwich tern (breeding)

7.5.52 The total estimated number of Sandwich tern collisions during the full UK breeding bio-season at PEIR stage was 0.84 birds per annum (see RED, 2021, Volume 4, Appendix 12.3). When this is apportioned between different colonies it, therefore, represents no material change. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final six months of DAS, the previously-conducted CRM results represent the upper bound of the likely collision rate for the Proposed Development. CRM for Sandwich tern was, therefore, not updated for this final assessment.

7.5.53 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Dungeness, Romney Marsh and Rye Bay SPA in relation to collision risk effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for collision risk effect**.

Common tern (migratory)

7.5.54 All migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Waterbirds – English South Coast SPAs'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.55 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Dungeness, Romney Marsh and Rye Bay SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Dungeness, Romney Marsh and Rye Bay SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Sandwich tern (migratory)

7.5.56 As noted above, all migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Waterbirds – English South Coast SPAs'** and onwards. As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.57 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Dungeness, Romney Marsh and Rye Bay SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature of Dungeness, Romney Marsh and Rye Bay SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Disturbance/displacement

Sandwich tern (breeding)

7.5.58 Displacement for Sandwich terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2022). The bio-season mean peak abundance for Sandwich terns during the migration-free breeding season for the Proposed Development array area plus a 2km buffer was zero birds (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.59 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Dungeness, Romney Marsh and Rye Bay SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Solent and Dorset Coast SPA

Features and effects for assessment

7.5.60 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Solent and Dorset Coast SPA:

- common tern, little tern and Sandwich tern (breeding bio-season), construction and decommissioning phases, disturbance / displacement; and
- Sandwich tern (breeding bio-season), operation and maintenance phase, disturbance / displacement.

Construction

Disturbance and displacement

Common tern (breeding)

7.5.61 Displacement for common terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2017). Within the offshore ECC, construction activities are likely to be spatially and temporally restricted. As given in **Table 12.17** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12), construction activities associated with cable laying may take up to 24 months. Any disturbance and displacement would be restricted to the immediate vicinity of the construction vessel, which would represent only an insignificant proportion of the amount of total habitat available for foraging. Therefore, any impact from disturbance and displacement associated with cable laying activities is likely to be negligible.

7.5.62 Within the Proposed Development array area plus a 2km buffer, the bio-season mean peak abundance for common terns during the migration free breeding season for was zero birds (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.63 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Solent and Dorset Coast SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the common tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Sandwich tern (breeding)

7.5.64 Within the offshore ECC, construction activities are likely to be spatially and temporally restricted. As given in **Table 12.17** of **Chapter 12: Offshore & intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12), construction activities associated with cable laying may take up to 24 months. Any disturbance and displacement would be restricted to the immediate vicinity of the construction vessel, which would represent only an insignificant proportion of the amount of total habitat available for foraging. Therefore, any impact from disturbance and displacement associated with cable laying activities is likely to be negligible.

7.5.65 Displacement from the array area for Sandwich terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2017). Within the Proposed Development array area plus a 2km buffer, the bio-season mean peak abundance for Sandwich terns during the migration free breeding season was zero birds (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.66 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Solent and Dorset Coast SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Little tern (breeding)

7.5.67 Within the offshore ECC, construction activities are likely to be spatially and temporally restricted. As given in **Table 12.17** of **Chapter 12: Offshore & intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12), construction activities associated with cable laying may take up to 24 months. Any disturbance and displacement will be restricted to the immediate vicinity of the construction vessel, which would represent only an insignificant proportion of the

amount of total habitat available for foraging. Furthermore, whilst the distance between the offshore ECC and the boundary of the Solent and Dorset Coast SPA is only 0.63km (see **Table** 5-2), this takes no account of the location of breeding colonies. The nearest breeding colony is in Pagham Harbour, which is 10.3km away from the offshore cable corridor. Little terns have a maximum foraging range of 5km according to Woodward *et al*. (2019). It is therefore evident that there is minimal, if any, overlap of foraging little terns from colonies within Solent and Dorset Coast SPA with the offshore ECC and associated construction activities. Therefore, any impact from disturbance and displacement associated with cable laying activities is likely to be negligible.

7.5.68 Displacement from the array area for little terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2017). Within the Proposed Development array area plus a 2km buffer, the bio-season mean peak abundance for little terns during the migration free breeding season was zero birds (**ES Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.69 **There is, therefore, no potential for an AEoI to the conservation objectives of the little tern feature of Solent and Dorset Coast SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the little tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Operation and maintenance

Disturbance and displacement

Sandwich tern (breeding)

7.5.70 Displacement for Sandwich terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2017). The bio-season mean peak abundance for Sandwich terns during the migration free breeding season for the Proposed Development array area plus a 2km buffer was zero birds (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.71 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Solent and Dorset Coast SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Decommissioning

Disturbance and displacement

7.5.72 Decommissioning activities associated with removing foundations and WTGs and decommissioning the offshore export cable may lead to disturbance and displacement of species within the array area and offshore cable corridor, and different degrees of buffers surrounding it.

7.5.73 The impacts from the decommissioning phase are expected to be equal to or lower than the impacts from the construction phase.

7.5.74 As no AEoI is expected for any feature during the construction phase, it follows that no AEoI is expected for any feature during the decommissioning phase.

7.5.75 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern, Sandwich tern or little tern features of Solent and Dorset Coast SPA in relation to disturbance and displacement effects from the Proposed Development alone during the decommissioning phase and therefore, subject to natural change, the common tern, Sandwich tern and little tern features will be maintained in the long term with respect to the potential for disturbance and displacement.**

Chichester and Langstone Harbours SPA and Ramsar

Features and effects for assessment

7.5.76 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Chichester and Langstone Harbours SPA:

- common tern and Sandwich tern (breeding bio-season), operation and maintenance phase, collision risk;
- Sandwich tern (breeding bio-season), operation and maintenance phase, disturbance/displacement;
- Sandwich tern (breeding bio-season), operation and maintenance phase, barrier effect; and
- waterbirds listed in **Table** 5-2 for the SPA and for the Ramsar sites (migratory) operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Common tern (breeding)

7.5.77 Due to difficulty distinguishing common and Arctic terns from aerial digital survey imagery, these two species were considered together as ‘commic’ terns for the purpose of CRM at PEIR stage (see RED 2021, Volume 4, Appendix 12.3).

However, it is recognised that as Arctic tern do not breed on the south coast of England any 'commic' terns are most likely to be common terns during this period.

7.5.78 The total estimated number of 'commic' tern collisions during the full UK breeding bio-season at PEIR stage was 0.13 birds per annum (see RED, 2021, Volume 4, Appendix 12.3). When this is apportioned between different colonies it, therefore, represents no material change. Given the reduction in the proposed array area and the absence of common tern records from the final six months of DAS, the previously- conducted CRM results represent the upper bound of the likely collision rate for the Proposed Development. CRM for common tern was, therefore, not updated for this final assessment.

7.5.79 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Chichester and Langstone Harbours SPA in relation to collision risk effects from the Proposed Development alone and therefore, subject to natural change, the common tern feature will be maintained in the long term with respect to the potential for collision risk effect**.

Sandwich tern (breeding)

7.5.80 The total estimated number of Sandwich tern collisions during the full UK breeding bio-season at PEIR stage was 0.84 birds per annum (see RED, 2021, Volume 4, Appendix 12.3). When this is apportioned between different colonies it represents no material change. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final six months of DAS, the previously-conducted CRM results represent the upper bound of the likely collision rate for the Proposed Development. CRM for Sandwich tern was, therefore, not updated for this final assessment.

7.5.81 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Chichester and Langstone Harbours SPA in relation to collision risk effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for collision risk effect**.

Waterbirds

7.5.82 In order to minimise repetition and provide a clear and concise approach, all migratory waterbirds have been considered together below (**paragraph 7.5.261** and onwards) As per that section, no AEoI was found for any waterbird feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.83 **There is, therefore, no potential for an AEoI to the conservation objectives of the waterbird features of Chichester and Langstone Harbours SPA or the waterbird features of Chichester and Langstone Harbours Ramsar in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the waterbird features of Chichester and Langstone Harbours SPA and the waterbird features of Chichester and Langstone Harbours Ramsar will be maintained in the long term with respect to potential for adverse effects**.

Disturbance/displacement

Sandwich tern (breeding)

7.5.84 Displacement for Sandwich terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2017). The bio-season mean peak abundance for Sandwich terns during the migration free breeding season for the Proposed Development array area plus a 2km buffer was zero birds (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.85 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Chichester and Langstone Harbours SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Barrier effect

Sandwich tern

7.5.86 Whilst the Proposed Development array area is within the mean-max + 1SD foraging range (Woodward *et al*., 2019) of Sandwich terns from the colonies at both Chichester harbour and Langstone harbour, modelling by the Joint Nature Conservation Committee (JNCC) (Wilson *et al*., 2014) suggests that very few, if any, birds from those colonies will forage in the area of sea on the far side of the Proposed Development, with the majority of birds foraging within the Solent or remaining close to the coast. Sandwich terns prefer to forage in shallow waters near the coast or shallow sandbanks (Natural England, 2012), and the waters to the south of the Proposed Development are therefore unsuitable foraging habitat.

7.5.87 The aerial digital surveys (see **Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)) found zero Sandwich terns within the array area in the migration-free breeding bio-season, and an estimated mean peak abundance of 10 within a 4km buffer around the array area. The birds observed within the 4km buffer in the migration-free breeding bio-season were all to the northwest of the array area i.e. between the array area and Chichester and Langstone harbours. Therefore, there is no evidence from the site-specific surveys that Sandwich terns fly through the Proposed Development array area or forage in the waters on the far side of the array area.

7.5.88 Therefore, there is no evidence to suggest that a barrier effect would occur. Although it cannot be completely ruled out that, on occasion, Sandwich terns from the colonies at Chichester and Langstone harbours might forage in the waters on the far side of the Proposed Development array area, the evidence suggests that this would be a very rare occurrence and of negligible consequence to the fitness of the individual involved or the colony.

7.5.89 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Chichester and Langstone Harbours SPA in relation to barrier effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for barrier effects**.

Solent and Southampton Water SPA and Ramsar

Features and effects for assessment

7.5.90 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Solent and Southampton Water SPA:

- Sandwich tern (breeding bio-season), operation and maintenance phase, collision risk;
- Sandwich tern (breeding bio-season) operation and maintenance phase, disturbance/displacement; and
- Sandwich tern (breeding bio-season) operation and maintenance phase, barrier effect.

7.5.91 Potential for LSEs alone has been identified for the following for Solent and Southampton Water SPA and Ramsar:

- black-tailed godwit, dark-bellied brent goose, ringed plover, teal and waterbird assemblage (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Sandwich tern (breeding)

7.5.92 The total estimated number of Sandwich tern collisions during the full UK breeding bio-season at PEIR stage was 0.84 birds per annum (see RED, 2021, Volume 4, Appendix 12.3). When this is apportioned between different colonies it, therefore, represents no material change. Given the reduction to the proposed array area and the absence of Sandwich tern records from the final six months of DAS, the previously-conducted CRM results represent the upper bound of the likely collision rate for the Proposed Development. CRM for Sandwich tern was, therefore, not updated for this final assessment.

7.5.93 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Solent and Southampton Water SPA in relation to collision risk effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for collision risk effect**.

Waterbirds

7.5.94 In order to minimise repetition and provide a clear and concise approach, all migratory waterbirds have been considered together below (**paragraph 7.5.261 'Migratory Waterbirds – English South Coast SPAs'** and onwards). As per that section, no AEoI was found for any waterbird feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.95 **There is, therefore, no potential for an AEoI to the conservation objectives of the waterbird features of Solent and Southampton Water SPA or the waterbird features of Solent and Southampton Water Ramsar in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the waterbird features of Solent and Southampton Water SPA and the waterbird features of Solent and Southampton Water Ramsar will be maintained in the long term with respect to potential for adverse effects**.

Disturbance and displacement

Sandwich tern (breeding)

7.5.96 Displacement for Sandwich terns has been assessed using the recommended standard buffer of 2km (SNCBs, 2017). The bio-season mean peak abundance for Sandwich terns during the migration free breeding season for the Proposed Development Array area plus a 2km buffer was zero birds (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)). Therefore, regardless of the displacement rates and mortality rates chosen, the estimated mortality resulting from disturbance and displacement is zero birds. This represents no change.

7.5.97 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Solent and Southampton Waters SPA in relation to disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for disturbance and displacement**.

Barrier effect

Sandwich tern

7.5.98 Whilst the shortest distance between the Proposed Development array area and the Solent and Southampton Waters SPA is 29.6km, the Sandwich tern colonies within that SPA are significantly further away. The Sandwich tern colonies within the SPA are located at Pitts Deep, North Solent National Nature Reserve (NNR) and Newtown NNR. The shortest distance from Pitts Deep is 60.1km, from North Solent NNR it is 53.4km and from Newtown NNR it is 51.2km. Therefore, the nearest edge of the Proposed Development array area is at the limit of the mean-max + 1SD foraging range (34.3km+/-23.2km; (Woodward *et al.*, 2019) from any colony location, and it is highly unlikely that birds from those colonies would travel further than this to forage.

7.5.99 Furthermore, modelling by JNCC (Wilson *et al*., 2014) suggests that very few, if any, birds from those colonies will forage in the area of sea on the far side of the Proposed Development, with the majority of birds foraging within the Solent or remaining close to the coast. Sandwich terns prefer to forage in shallow waters near the coast or shallow sandbanks (Natural England, 2012), and the waters to the south of the Proposed Development are therefore unsuitable foraging habitat.

7.5.100 The aerial digital surveys (see **Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.1)) found zero Sandwich terns within the array area in the migration-free breeding bio-season, and an estimated mean peak abundance of 10 within a 4km buffer around the array area. The birds observed within the 4km buffer in the migration-free breeding bio-season were all to the northwest of the array area i.e. between the array area and the Solent. Therefore, there is no evidence from the site-specific surveys that Sandwich terns fly through the Proposed Development array area or forage in the waters on the far side of the array area.

7.5.101 As such, there is no evidence to suggest that a barrier effect would occur. Although it cannot be completely ruled out that, on occasion, Sandwich terns from the colonies at Chichester harbour and Langstone harbour might forage in the waters on the far side of the Proposed Development array area, the evidence suggests that this would be a very rare occurrence and of negligible consequence to the fitness of the individual involved or the colony.

7.5.102 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Solent and Southampton Waters SPA in relation to barrier effects from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for barrier effects**.

Medway Estuary & Marshes SPA

Features and effects for assessment

7.5.103 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Medway Estuary & Marshes SPA:

- common tern (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Common tern (migratory)

7.5.104 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.105 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Medway Estuary & Marshes SPA in relation to**

collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Medway Estuary & Marshes SPA will be maintained in the long term with respect to potential for adverse effects.

Littoral seino-marin SPA, France

Features and effects for assessment

7.5.106 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Littoral seino-marin SPA:

- Kittiwake and lesser black-backed gull (breeding), operation and maintenance Phase, collision risk.

Operation and maintenance

Collision risk

Kittiwake

7.5.107 Kittiwake has been screened into the assessment of the operation and maintenance phase on a precautionary basis based on the potential for connectivity with the array area and its flight behaviour that places it at risk of collision with the turning blades of the WTGs. Kittiwake has been screened in for the breeding bio-season in relation to Littoral seino-marin SPA.

7.5.108 During the migration-free breeding bio-season (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) for seasonal definitions), when birds are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, it can be expected that the area in and around the Proposed Development will contain a proportion of adult birds that can be attributed to those designated sites within foraging range. Littoral seino-marin SPA at 72.2km from the Proposed Development array lies within the mean max foraging distance (+1SD) of kittiwake (156.1±144.5km; Woodward *et al*., 2019), along with one other designated site based on distances around land. Predicted collision mortality has therefore been apportioned to each of these sites following Scottish Natural Heritage (SNH) (2018).

7.5.109 A generic population adult age ratio of kittiwake has been used of 53.5% across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

Breeding

7.5.110 The total predicted collision resultant mortality from the operation of the Proposed Development in the migration-free breeding bio-season is less than two (1.21) individuals per annum. Mortality during the migration-free breeding bio-season was apportioned to Littoral seino-marin SPA following the SNH (2018) method. Following this method, 51.4% of adult birds subject to collision risk may be

individuals from Littoral seino-marin SPA. On this basis and combined with the generic age ration of 53.5%, less than a single breeding adult (0.33) per annum is predicted to be subject to collision mortality attributable to this SPA.

Conclusion

7.5.111 With a potential predicted mortality of well under a single breeding adult (0.33) per annum attributable to the Littoral Seino-Marin SPA annually, this level of impact can be considered no material contribution and will, therefore, will not affect the achievement of the conservation objectives for the SPA and as a result will not have an adverse effect on the integrity of the SPA.

7.5.112 **There is, therefore, no potential for an AEoI to the conservation objectives of the kittiwake feature of the Littoral Seino-Marin SPA in relation to collision effects from the Proposed Development alone and therefore, subject to natural change, kittiwake will be maintained as a feature in the long term with respect to the potential for adverse effects from collision**.

Lesser black-backed gull

7.5.113 Lesser black-backed gull has been screened into the assessment of the operation and maintenance phase on a precautionary basis based on its potential connectivity with the array area during the breeding season and its flight behaviour that places it at risk of collision with the turning blades of the WTGs. Lesser black-backed gull has been screened in for the breeding bio-season in relation to Littoral seino-marin SPA.

7.5.114 During the migration-free breeding bio-season (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) for seasonal definitions), when birds are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, it can be expected that the area in and around the Proposed Development will contain a proportion of adult birds that can be attributed to those designated sites within foraging range. Littoral seino-marin SPA at 72.2km from the array lies within the mean max foraging distance (+1SD) of lesser black-backed gull (127±109 km; Woodward *et al*., 2019), along with one other designated site based on distances around land. Predicted collision mortality has therefore been apportioned to each of these sites following SNH (2018).

7.5.115 Outside of the migration-free breeding bio-season, when the population contains a mix of birds from UK breeding colonies and breeding colonies from further away, then a much lower percentage of birds can be attributed to any particular breeding colony SPA population. In the migratory bio-seasons, the information on populations contained in Furness (2015) has been applied for the purpose of apportionment.

7.5.116 A generic population adult age ratio of lesser black-backed gull has been used of 50.11% across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

Breeding

7.5.117 The total predicted collision resultant mortality from the operation of the Proposed Development in the migration-free breeding bio-season is less than two (1.51) individuals per annum. Mortality during the breeding bio-season was apportioned to Littoral Seino-Marin SPA following the SNH (2018) method. Following this method, 35.5% of birds subject to collision risk may be breeding age individuals from Littoral Seino-Marin SPA. On this basis and combined with the generic age ration of 50.11%, less than a single (0.27) breeding adult is predicted to be subject to collision mortality attributable to this SPA.

Conclusion

7.5.118 With a potential predicted mortality of well under a single (0.27) breeding adult attributable to the Littoral Seino-Marin SPA annually, this level of impact can be considered no material contribution, and will therefore will not affect the achievement of the conservation objectives for the SPA and as a result will not have an adverse effect on the integrity of the SPA.

7.5.119 **There is, therefore, no potential for an AEoI to the conservation objectives of the lesser black-backed gull feature of the Littoral Seino-Marin SPA in relation to collision effects from the Proposed Development alone and therefore, subject to natural change, lesser black-backed gull will be maintained as a feature in the long term with respect to the potential for adverse effects from collision**.

Foulness (Mid-Essex Coast Phase 5) SPA

Features and effects for assessment

7.5.120 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Foulness (Mid-Essex Coast Phase 5) SPA:

- common tern and Sandwich tern (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Common tern (migratory)

7.5.121 All migratory terns have been considered together below (**paragraph 7.5.300: ‘Migratory Terns – English SPAs and Ramsar sites’** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.122 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Foulness (Mid-Essex Coast Phase 5) SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Foulness**

(Mid-Essex Coast Phase 5) SPA will be maintained as a feature in the long term with respect to potential for adverse effects.

Sandwich tern (migratory)

7.5.123 As above, all migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site **from the Proposed Development alone.**

7.5.124 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Foulness (Mid-Essex Coast Phase 5) SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature of Foulness (Mid-Essex Coast Phase 5) SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Falaise du Bessin Occidental SPA, France

Features and effects for assessment

7.5.125 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Falaise du Bessin Occidental SPA:

- kittiwake (breeding), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Kittiwake

7.5.126 Kittiwake has been screened into the assessment of the operation and maintenance phase based on the potential for connectivity with the array area and its flight behaviour that places it at risk of collision with the turning blades of the WTGs. Kittiwake has been screened in for the breeding bio-season in relation to Falaise du Bessin Occidental SPA.

7.5.127 During the migration-free breeding bio-season (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology** of the ES (Document Reference: 6.2.12) for seasonal definitions), when birds are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, it can be expected that the area in and around the Proposed Development will contain a proportion of adult birds that can be attributed to those designated sites within foraging range. Falaise du Bessin Occidental SPA lies within the mean max foraging distance (+1SD) of kittiwake (156.1±144.5km; Woodward *et al*., 2019), along with one other designated site based on distances around land. Predicted collision mortality has therefore been apportioned to each of these sites following SNH (2018).

7.5.128 A generic population adult age ratio of kittiwake has been used of 53.5% across all months of the year (**Table 12.18** of **Chapter 12: Offshore ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

Breeding

7.5.129 The total predicted collision resultant mortality from the operation of the Proposed Development in the migration-free breeding bio-season is less than two (1.21) individuals per annum. Mortality during the migration-free breeding bio-season was apportioned to Falaise du Bessin Occidental SPA following the SNH (2018) method. Following this method, 48.6% of birds subject to collision risk may be breeding age individuals from Falaise du Bessin Occidental SPA. On this basis and combined with the generic age ration of 53.5%, less than a single (0.31) breeding adult predicted to be subject to collision mortality attributable to this SPA.

Conclusion

7.5.130 With a potential predicted mortality of well under a single (0.31) breeding adult attributable to the Falaise du Bessin Occidental SPA annually, this is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species.

7.5.131 **There is, therefore, no potential for an AEoI to the conservation objectives of the kittiwake feature of the Falaise du Bessin Occidental SPA in relation to collision effects from the Proposed Development alone and therefore, subject to natural change, kittiwake will be maintained as a feature in the long term with respect to the potential for adverse effects from collision.**

Alde-Ore Estuary (UK) SPA and Ramsar

Features and effects for assessment

7.5.132 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Alde-Ore Estuary (UK) SPA:

- Sandwich tern (migratory), operation and maintenance phase, collision risk.

7.5.133 The potential for LSEs alone has been identified for the following for Alde-Ore Estuary (UK) SPA and Ramsar:

- lesser black-backed gull (migratory), operation and maintenance phase , collision risk.

Operation and maintenance

Collision risk

Sandwich tern (migratory)

7.5.134 All migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.135 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Alde-Ore Estuary (UK) SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature of Foulness (Mid-Essex Coast Phase 5) SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Lesser black-backed gull (migratory)

7.5.136 In order to minimise repetition and provide a clear and concise approach, all migratory gulls have been considered together below (**paragraph: 7.5.284 'Migratory Gulls – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any gull feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.137 **There is, therefore, no potential for an AEoI to the conservation objectives of the lesser black-backed gull feature of Alde-Ore Estuary (UK) SPA or Ramsar in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the lesser black-backed gull feature of Alde-Ore Estuary (UK) SPA or Ramsar will be maintained as a feature in the long term with respect to potential for adverse effects**.

The Wash SPA

Features and effects for assessment

7.5.138 The potential for LSEs from the Proposed Development acting alone has been identified for the following for The Wash SPA:

- common tern (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Common tern (migratory)

7.5.139 All migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that

section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.140 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of The Wash SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of The Wash SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Breydon Water SPA

Features and effects for assessment

7.5.141 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Breydon Water SPA:

- common tern (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Common tern (migratory)

7.5.142 As noted previously, all migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.143 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Breydon Water SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Breydon Water SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Greater Wash SPA

Features and effects for assessment

7.5.144 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Greater Wash SPA:

- common tern and Sandwich tern (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Common tern (migratory)

7.5.145 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.146 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Greater Wash SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Greater Wash SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Sandwich tern (migratory)

7.5.147 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300: Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.148 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Greater Wash SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature of Greater Wash SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

North Norfolk Coast SPA and Ramsar

Features and Effects for Assessment

7.5.149 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Greater Wash SPA:

- common tern and Sandwich tern (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Common tern (migratory)

7.5.150 All migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that

section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.151 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Greater Wash SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Greater Wash SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Sandwich tern (migratory)

7.5.152 As noted above, all migratory terns have been considered together below (**paragraph 7.5.300: 'Migratory Terns – English SPAs and Ramsar sites'** and onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.153 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Greater Wash SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature of Greater Wash SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Cote de Granit Rose-Sept Iles SPA, France

Features and effects for assessment

7.5.154 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Cote de Granit Rose-Sept Iles SPA:

- gannet (breeding and migratory bio-seasons), operation and maintenance phase, collision risk; and
- gannet (breeding and migratory bio-seasons), operation and maintenance phase, disturbance / displacement.

Operation and maintenance

Collision risk

Gannet

7.5.155 Gannet has been screened into the assessment of the operation and maintenance phase based on the density of birds in flight in the array area and its flight behaviour that places it at risk of collision with the turning blades of the WTGs. Gannet has been screened in for both the breeding and non-breeding bio-seasons (see **Table 12.17** within **Chapter 12: Offshore & Intertidal Ornithology, Volume 2** of the ES (Document Reference: 6.2.12) for seasonal definitions) in relation to the Cote de Granit Rose-Sept Iles SPA since birds breeding at this colony may pass through the Proposed Development during their post-breeding and return migrations (Fort *et al*., 2012; Furness, 2015).

7.5.156 During the migration-free breeding bio-season, when birds are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, it can be expected that the area in and around the Proposed Development will contain a high proportion of adult birds that can be attributed to those designated sites within foraging range. The Cote de Granit Rose-Sept Iles SPA lies within mean max foraging distance (+1SD) of gannet (315.5±194.2km; Woodward *et al*., 2019), along with two other designated sites based on distances around land. Predicted collision mortality has therefore been apportioned to each of these sites following SNH (2018). In reality however, evidence gained from tracking during the breeding season has demonstrated that adjacent colonies do not have overlapping foraging areas (Wakefield *et al*, 2013). Based on these tracking data, it is unlikely that birds breeding at the Cote de Granit Rose-Sept Iles SPA will be present within the Proposed Development during the breeding bio-season, and therefore attributing predicted mortality to this SPA is highly precautionary.

7.5.157 Outside the migration-free breeding bio-season, when the population contains a mix of birds from UK breeding colonies and breeding colonies from further away, then a much lower percentage of birds can be attributed to any particular breeding colony SPA population. In the migratory bio-seasons, the information on populations contained in Furness (2015) has been applied for the purpose of apportionment.

7.5.158 A generic population age ratio of gannets has been used of 54.70% across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

Breeding

7.5.159 The total predicted collision resultant mortality from the operation of the Proposed Development in the migration-free breeding bio-season is approximately three (2.90) individuals. Mortality during the migration-free breeding bio-season was apportioned to the Cote de Granit Rose-Sept Iles SPA following the SNH (2018) method. Following this method, 36.9% of breeding age individuals subject to collision risk may be from the Cote de Granit Rose-Sept Iles SPA. On this basis and combined with the generic age ratio of 54.70%, less than a single (0.58) breeding adult per annum is predicted to be subject to collision mortality attributable to this SPA.

7.5.160 Using a baseline adult mortality rate of 8.1% (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)) and using the Cote de Granit Rose-Sept Iles SPA population size of 39,052 breeding adults, the annual background mortality for this SPA site is calculated as 3,163 breeding adults per annum. The prediction of less than a single (0.658) breeding adult being subject to collision mortality would therefore represent a 0.018% increase in mortality relative to baseline mortality.

Migration

7.5.161 In order to minimise repetition and provide a clear and concise approach, the impact from displacement risk on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.268** onwards). As per that

section, the number of mortalities apportioned to Cote de Granit Rose-Sept Iles SPA is 0.06, representing an increase in baseline mortality of 0.002%.

Conclusion

7.5.162 On an annual basis the level of collision consequent mortality apportioned to the gannet feature of Cote de Granit Rose-Sept Iles SPA is less than a single (0.65) breeding adult per annum, representing an increase in mortality relative to baseline mortality of 0.021% annually. This level of impact would be indistinguishable from natural fluctuations in the population.

7.5.163 There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Cote de Granit Rose-Sept Iles SPA in relation to collision effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from collision.

Disturbance and displacement

Gannet

7.5.164 In order to assess the potential impacts of displacement on gannet, an effect distance was determined of the array area and a 2 km buffer, as recommended within the joint SNCB interim displacement note (SNCBs, 2022). The percentage of birds displaced, and consequential mortality was determined (**Appendix 12.2: Offshore and intertidal ornithology displacement analysis, Volume 4** of the ES (Document Reference: 6.4.12.2)) across all bio-seasons as between 60% to 80% and the consequential mortality was set at 1%. Further details of how these displacement and mortality rates were derived is provided in **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12). In accordance with the SNCBs (2022) guidance on displacement, an annual displacement matrix for predicted impacts apportioned to the gannet feature of Cote de Granit Rose-Sept Iles SPA is presented within **Table** 7-3.

7.5.165 The Proposed Development array area is within the mean max foraging distance (+1SD) of 315.5±194.2km to the Cote de Granit Rose-Sept Iles SPA at 257.8km distant (Woodward *et al*., 2019). Accordingly, this species is assessed for both the migration-free breeding season and the non-breeding bio-seasons (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) for seasonal definitions). In the migration-free breeding bio-season the mean peak abundance of gannets estimated to occur in the array was 111 individuals. During the migratory non-breeding bio-seasons, the mean peak abundance of gannets during the return migration bio-season was 123 individuals and 102 in the post-breeding migration bio-season (there is no migration free winter bio-season).

7.5.166 The potential for impact on the Cote de Granit Rose-Sept Iles SPA will vary by season and accordingly the assessment is carried out on a seasonal basis. In the breeding season the maximum foraging distance and the mean max +1SD foraging distance from Woodward *et al.,* (2019) determine which breeding colonies the birds may be apportioned to using the SNH apportionment tool (SNH, 2018),

and in the non-breeding season the information on populations contained in Furness (2015) is applied for the same purpose of apportionment.

7.5.167 A generic population age ratio of gannets has been used of 54.70% across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

Breeding

7.5.168 During the migration-free breeding bio-season, a peak abundance of 111 individuals within the array area plus 2 km buffer are estimated to be at risk of displacement. Using displacement rates between 60% to 80% and a mortality rate of 1% would result in less than a single (0.67 – 0.89) individual being subject to mortality. Mortality during the breeding season was apportioned to the Cote de Granit Rose-Sept Iles SPA following the SNH (2018) method. Following this method, 36.9% of breeding age individuals subject to displacement may be from the Cote de granit Rose-Sept Iles SPA. On this basis and combined with the generic age ratio of 54.70%, less than a single (0.14 – 0.19) breeding adult per annum would be predicted to be subject to displacement mortality would be attributable to this SPA.

7.5.169 When considering the Cote de Granit Rose-Sept Iles SPA population size of 39,052 breeding adults with an annual background mortality of 3,163 breeding adults (**Table 12.16** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)) per annum, then the prediction of less than a single (0.13 – 0.18) breeding adult subject to displacement mortality per annum would represent a 0.004% – 0.006% increase mortality relative to in baseline mortality.

Migration

7.5.170 In order to minimise repetition and provide a clear and concise approach, the impact from displacement risk on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.268** onwards). As per that section, the number of mortalities apportioned to Cote de Granit Rose-Sept Iles SPA is 0.05 – 0.07, representing an increase in baseline mortality of 0.002%.

Conclusion

7.5.171 On an annual basis the level of displacement consequent mortality apportioned to the gannet feature of Cote de Granit Rose-Sept Iles SPA is less than a single (0.18 – 0.25) breeding adult per annum, representing an increase in mortality relative to baseline mortality of 0.006% – 0.008% annually. This level of impact would be indistinguishable from natural fluctuations in the population.

7.5.172 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Cote de Granit Rose-Sept Iles SPA in relation to displacement effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from displacement**.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table 7-3 Gannet operation and maintenance phase displacement matrix for annual impacts apportioned to Cote de Granit Rose-Sept Iles SPA

Displacement (%)	Mortality Rates (%)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.06	0.09	0.12	0.15	0.18	0.22	0.25	0.28	0.31
10	0.00	0.03	0.06	0.09	0.12	0.15	0.31	0.62	0.92	1.23	1.54	1.85	2.16	2.46	2.77	3.08
20	0.00	0.06	0.12	0.18	0.25	0.31	0.62	1.23	1.85	2.46	3.08	3.70	4.31	4.93	5.54	6.16
30	0.00	0.09	0.18	0.28	0.37	0.46	0.92	1.85	2.77	3.70	4.62	5.54	6.47	7.39	8.32	9.24
40	0.00	0.12	0.25	0.37	0.49	0.62	1.23	2.46	3.70	4.93	6.16	7.39	8.62	9.86	11.09	12.32
50	0.00	0.15	0.31	0.46	0.62	0.77	1.54	3.08	4.62	6.16	7.70	9.24	10.78	12.32	13.86	15.40
60	0.00	0.18	0.37	0.55	0.74	0.92	1.85	3.70	5.54	7.39	9.24	11.09	12.94	14.78	16.63	18.48
70	0.00	0.22	0.43	0.65	0.86	1.08	2.16	4.31	6.47	8.62	10.78	12.94	15.09	17.25	19.40	21.56
80	0.00	0.25	0.49	0.74	0.99	1.23	2.46	4.93	7.39	9.86	12.32	14.78	17.25	19.71	22.17	24.64
90	0.00	0.28	0.55	0.83	1.11	1.39	2.77	5.54	8.32	11.09	13.86	16.63	19.40	22.17	24.95	27.72
100	0.00	0.31	0.62	0.92	1.23	1.54	3.08	6.16	9.24	12.32	15.40	18.48	21.56	24.64	27.72	30.80

© WSP UK Limited

Page intentionally blank

Combined Collision risk and Disturbance and displacement

7.5.173 Due to gannet being screened in for both displacement and collision risk assessment during the O&M phase, there is a potential for these two potential impacts to adversely affect gannet populations combined.

7.5.174 Based on the separate assessments above for the gannet feature of Cote de Granit Rose-Sept Iles SPA, the combined predicted annual impact from collision risk and displacement is less than a single (0.83 – 0.90) breeding adult annually. This represents an increase in mortality relative to baseline mortality of 0.026% – 0.028% annually. This level of impact would be indistinguishable from natural fluctuations in the population.

7.5.175 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Cote de Granit Rose-Sept Iles SPA in relation to combined collision risk and displacement effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from collision and displacement combined.**

Alderney West Coast and Burhou Islands Ramsar

Features and effects for assessment

7.5.176 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Alderney West Coast and Burhou Islands Ramsar:

- gannet (breeding and migratory bio-season), operation and maintenance phase, collision risk; and
- gannet (breeding and migratory bio-seasons), operation and maintenance phase, displacement.

Operation and maintenance

Collision risk

Gannet

7.5.177 Gannet has been screened into the assessment of the operation and maintenance phase based on the density of birds in flight in the array area and its flight behaviour that places it at risk of collision with the turning blades of the WTGs. Gannet has been screened in for both the migration-free breeding and migratory bio-seasons (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) for seasonal definitions) in relation to the Alderney West Coast and Burhou Islands Ramsar since birds breeding at this colony may pass through the Proposed Development during their post-breeding migration as they follow a potential clockwise loop migration around the UK (Fort *et al*., 2012; Furness *et al*., 2018).

7.5.178 During the migration-free breeding bio-season, when birds are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, it can be expected that the area in and around the Proposed Development will contain a high proportion of adult birds that can be attributed to those designated sites within foraging range. The Alderney West Coast and Burhou Islands Ramsar lies within the mean max foraging distance (+1SD) of gannet (315.5±194.2km Woodward *et al*., 2019), along with two other designated sites. Predicted collision mortality has therefore been apportioned to each of these sites following SNH (2018).

7.5.179 Outside the migration-free breeding bio-season, when the population contains a mix of birds from UK breeding colonies and breeding colonies from further away, then a much lower percentage of birds can be attributed to any particular breeding colony SPA population. In the migratory bio-seasons the information on populations contained in Furness (2015) is applied for the same purpose of apportionment.

7.5.180 A generic population age ratio of gannets has been used of 54.70% across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

Breeding

7.5.181 The predicted collision resultant mortality from the operation of the Proposed Development in the migration-free breeding bio-season is approximately three (2.90) individuals per annum. Mortality during the migration-free breeding bio-season was apportioned to the Alderney West Coast and Burhou Islands Ramsar following the SNH (2018) method. Following this method, 63.1% of individuals subject to collision may be apportioned to the Alderney West Coast and Burhou Islands Ramsar. On this basis and combined with the generic age ratio of 54.7%, approximately one breeding adult would be attributable to this Ramsar.

7.5.182 Using a baseline adult mortality rate of 8.1% (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)) and using the Ramsar population of 18,850 breeding adults, the annual background mortality for this Ramsar site is calculated as 1,527 breeding adults per annum. Therefore, this prediction of one (1.0) breeding adult subject to collision mortality per annum would represent a 0.066% increase in mortality relative to baseline mortality.

Migration

7.5.183 In order to minimise repetition and provide a clear and concise approach, the impact from collision risk on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.268** onwards). As per that section, the number of mortalities apportioned to the Alderney West Coast and Burhou Islands Ramsar is 0.03, representing an increase in baseline mortality of 0.002%.

Conclusion

7.5.184 On an annual basis the level of collision consequent mortality apportioned to the gannet feature of Alderney West Coast and Burhou Islands Ramsar is a single

(1.03) breeding adult per annum, representing an increase in mortality relative to baseline mortality of 0.07% annually. This level of impact would be indistinguishable from natural fluctuations in the population.

7.5.185 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Alderney West Coast and Burhou Islands Ramsar in relation to collision effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from collision**.

Disturbance and displacement

Gannet

7.5.186 In order to assess the potential impacts of displacement on gannet, an effect distance was determined of the array area and a 2 km buffer, as recommended within the joint SNCB interim displacement note (SNCBs, 2022). The percentage of birds displaced, and consequential mortality was determined (**Appendix 12.2: Offshore and intertidal ornithology displacement analysis, Volume 4** of the ES (Document Reference: 6.4.12.2)) across all bio-seasons as between 60% to 80% and the consequential mortality was set at 1%. Further details of how these displacement and mortality rates were derived is provided in **Chapter 12: Offshore and intertidal ornithology, Volume 2** (Document Reference: 6.2.12). In accordance with the SNCBs (2022) guidance on displacement, an annual displacement matrix for predicted impacts apportioned to the gannet feature of Alderney West Coast and Burhou Islands Ramsar is presented within **Table 7-4**.

7.5.187 The Proposed Development array area is within the mean max foraging distance (+1SD) of 315.5±194.2km to the Alderney West Coast and Burhou Islands Ramsar at 148.1km distant (Woodward *et al*., 2019). Accordingly, this species is assessed for both the migration-free breeding bio-season and the migratory non-breeding bio-seasons (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) for seasonal definitions). In the migration-free breeding bio-season the mean peak abundance of gannets estimated to occur in the array was 111 individuals. During the migratory non-breeding bio-seasons, the mean peak abundance of gannets during the return migration bio-season was 123 individuals and 102 in the post-breeding migration bio-season (there is no migration free winter bio-season).

7.5.188 The potential for impact on the Alderney West Coast and Burhou Islands Ramsar will vary by season and accordingly the assessment is carried out on a seasonal basis. In the breeding bio-season the maximum foraging distance and the mean max foraging distance (+1SD) foraging distance from Woodward *et al*., (2019) determine which breeding colonies the birds may be apportioned to using the SNH apportionment tool (SNH, 2018), and in the migratory bio-season the information on populations contained in Furness (2015) is applied for the same purpose of apportionment.

7.5.189 A generic population age ratio of gannets has been used of 54.70% across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

Breeding

7.5.190 During the migration-free breeding bio-season, a peak abundance of 111 gannets within the array area plus 2 km buffer are estimated to be at risk of displacement. Using displacement rates between 60% to 80% and a mortality rate of 1% would result in less than a single (0.67 – 0.89) individual being subject to mortality. Mortality during the migration-free breeding bio-season was apportioned to the Alderney West Coast and Burhou Islands Ramsar following the SNH (2018) method. Following this method, 63.1% of breeding age individuals from the Alderney West Coast and Burhou Islands Ramsar may be subject to displacement. On this basis and combined with the generic age ratio of 54.70%, less than a single (0.22 – 0.30) breeding adult per annum would be predicted to be subject to displacement mortality would be attributable to this SPA.

7.5.191 When considering the Alderney West Coast and Burhou Islands Ramsar population size of 18,850 breeding adults with an annual background mortality of 1,383 breeding adults (**Table 12.16** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)) per annum, then the prediction of less than a single (0.23 – 0.31) breeding adult subject to displacement mortality per annum would represent a 0.015% – 0.020% increase mortality relative to in baseline mortality.

Migration

7.5.192 In order to minimise repetition and provide a clear and concise approach, the impact from displacement risk on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.268** onwards). As per that section, the number of mortalities apportioned to the Alderney West Coast and Burhou Islands Ramsar is 0.02 – 0.03, representing an increase in baseline mortality of 0.002%.

Conclusion

7.5.193 On an annual basis the level of displacement consequent mortality apportioned to the gannet feature of Alderney West Coast and Burhou Islands Ramsar is less than a single (0.25 – 0.34) breeding adult per annum, representing an increase in mortality relative to baseline mortality of 0.017% – 0.022% annually. This level of impact would be indistinguishable from natural fluctuations in the population.

7.5.194 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Alderney West Coast and Burhou Islands Ramsar in relation to displacement effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from displacement.**

© WSP UK Limited

Table 7-4 Gannet operation and maintenance phase displacement matrix for annual impacts apportioned to Alderney West Coast and Burhou Islands Ramsar

Displacement (%)	Mortality (%)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.01	0.01	0.02	0.02	0.04	0.08	0.13	0.17	0.21	0.25	0.30	0.34	0.38	0.42
10	0.00	0.04	0.08	0.13	0.17	0.21	0.42	0.85	1.27	1.70	2.12	2.54	2.97	3.39	3.82	4.24
20	0.00	0.08	0.17	0.25	0.34	0.42	0.85	1.70	2.54	3.39	4.24	5.09	5.94	6.78	7.63	8.48
30	0.00	0.13	0.25	0.38	0.51	0.64	1.27	2.54	3.82	5.09	6.36	7.63	8.90	10.18	11.45	12.72
40	0.00	0.17	0.34	0.51	0.68	0.85	1.70	3.39	5.09	6.78	8.48	10.18	11.87	13.57	15.27	16.96
50	0.00	0.21	0.42	0.64	0.85	1.06	2.12	4.24	6.36	8.48	10.60	12.72	14.84	16.96	19.08	21.20
60	0.00	0.25	0.51	0.76	1.02	1.27	2.54	5.09	7.63	10.18	12.72	15.27	17.81	20.35	22.90	25.44
70	0.00	0.30	0.59	0.89	1.19	1.48	2.97	5.94	8.90	11.87	14.84	17.81	20.78	23.75	26.71	29.68
80	0.00	0.34	0.68	1.02	1.36	1.70	3.39	6.78	10.18	13.57	16.96	20.35	23.75	27.14	30.53	33.92
90	0.00	0.38	0.76	1.14	1.53	1.91	3.82	7.63	11.45	15.27	19.08	22.90	26.71	30.53	34.35	38.16
100	0.00	0.42	0.85	1.27	1.70	2.12	4.24	8.48	12.72	16.96	21.20	25.44	29.68	33.92	38.16	42.40

© WSP UK Limited

Page intentionally blank

Combined Collision risk and Disturbance and displacement

7.5.195 Due to gannet being screened in for both displacement and collision risk assessment during the O&M phase, there is a potential for these two potential impacts to adversely affect gannet populations combined.

7.5.196 Based on the separate assessments above for the gannet feature of Alderney West Coast and Burhou Islands Ramsar, the combined predicted annual impact from collision risk and displacement is less than two (1.35 – 1.45) breeding adults annually. This represents an increase in mortality relative to baseline mortality of 0.098% – 0.105% annually. This level of impact would be indistinguishable from natural fluctuations in the population.

7.5.197 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Alderney West Coast and Burhou Islands Ramsar in relation to combined collision risk and displacement effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from collision and displacement combined.**

Grassholm SPA

Features and effects for assessment

7.5.198 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Grassholm SPA:

- gannet (migratory), operation and maintenance phase, collision risk; and
- gannet (migratory), operation and maintenance phase, displacement.

Operation and maintenance

Collision risk

Gannet (migratory)

7.5.199 In order to minimise repetition and provide a clear and concise approach, the impact from collision risk on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.320 'Migratory Gannet – English, Welsh, French SPAs and Channel Island Ramsar** and onwards). As per that section, no mortality was found as a result of collision risk for the gannet feature of Grassholm SPA from the Proposed Development alone.

7.5.200 There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of Grassholm SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the gannet feature of Grassholm SPA will be maintained as a feature in the long term with respect to potential for adverse effects.

Disturbance and displacement

Gannet (migratory)

7.5.201 In order to minimise repetition and provide a clear and concise approach, the impact from disturbance and displacement on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.267** onwards). As per that section, no AEoI was found as a result of disturbance/displacement for the gannet feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.202 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of Grassholm SPA in relation to disturbance / displacement from the Proposed Development alone and therefore, subject to natural change, the gannet tern feature of Grassholm SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Flamborough and Filey Coast SPA

Features and effects for assessment

7.5.203 The potential for LSEs from the Proposed Development acting alone has been identified for the following for *Flamborough and Filey Coast* SPA:

- guillemot and razorbill (migratory), construction phase, displacement;
- gannet, kittiwake and herring gull (migratory), operation and maintenance phase, collision risk;
- gannet, guillemot and razorbill (migratory/non-breeding), operation and maintenance phase, displacement;
- gannet (breeding), operation and maintenance phase, collision risk;
- gannet (breeding), operation and maintenance phase, displacement; and
- guillemot and razorbill (migratory), decommissioning phase, displacement.

Construction

Disturbance and displacement

Overview

7.5.204 Activities in the offshore ECC associated with export cable laying, and activities within the array area associated within the construction of WTGs and other infrastructure, may disturb and displace species within the array area and potentially within surrounding buffers to a lower extent. This in effect represents indirect habitat loss, which would potentially reduce the area available to those seabirds to forage, loaf and / or moult that currently occur within and around the Proposed Development and may be susceptible to displacement from such a development. Displacement may contribute to individual birds experiencing fitness

consequences, which at an extreme level could lead to the mortality of individuals. The MDS used for assessment is given in **Table** 3-2.

Gannet (migratory)

7.5.205 In order to minimise repetition and provide a clear and concise approach, the impact from disturbance/displacement on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.268** onwards). As per that section, no AEoI was found as a result of disturbance / displacement for the gannet feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.206 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of Flamborough and Filey Coast SPA in relation to disturbance/displacement from the Proposed Development alone and therefore, subject to natural change, the gannet feature of Flamborough and Filey Coast SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Guillemot (non-breeding)

7.5.207 In order to minimise repetition and provide a clear and concise approach, the impact from disturbance/displacement on non-breeding guillemots to all relevant SPAs have been considered together below (**paragraph 7.5.308** onwards). As per that section, no AEoI was found as a result of disturbance / displacement for the guillemot feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.208 **There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Flamborough and Filey Coast SPA in relation to disturbance/displacement from the Proposed Development alone and therefore, subject to natural change, the guillemot feature of Flamborough and Filey Coast SPA will be maintained as a feature in the long term with respect to potential for adverse effects.**

Razorbill (migratory & non-breeding)

7.5.209 In order to minimise repetition and provide a clear and concise approach, the impact from disturbance/displacement on migratory and non-breeding razorbills to all relevant SPAs have been considered together below (**paragraph 7.5.308** onwards). As per that section, no AEoI was found as a result of disturbance / displacement for the razorbill feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.210 **There is, therefore, no potential for an AEoI to the conservation objectives of the razorbill feature of Flamborough and Filey Coast SPA in relation to disturbance / displacement from the Proposed Development alone and therefore, subject to natural change, the razorbill feature of Flamborough and Filey Coast SPA will be maintained as a feature in the long term with respect to potential for adverse effects.**

Operation and maintenance

Collision risk

Overview

7.5.211 Seabirds flying through the array area during the operation and maintenance phase of the Proposed Development may be at risk of collision with WTGs. It is assumed that any such collision would be fatal. This risk would be present throughout the array area, and for the entire period of operation of the Proposed Development. The MDS used for the assessment is given in **Table 3-2**. In order to assess the risk resulting from potential collisions, CRM has been carried out as described in **Appendix 12.3: Offshore and intertidal ornithology collision risk modelling, Volume 4** of the ES (Document Reference: 6.4.12.3).

7.5.212 The Applicant is committed to minimising environmental impacts, and has made the following commitments to minimise the risk of collision:

- C-89: There will be a minimum blade tip clearance of at least 22m above MHWS.

7.5.213 As described in **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12), for each pathway discussed in this section, it was concluded that there will be no significant effect from the Proposed Development alone at the EIA level.

Gannet (migratory)

7.5.214 In order to minimise repetition and provide a clear and concise approach, the impact from collision risk on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.267** onwards). As per that section, no AEoI was found as a result of collision risk for the gannet feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.215 There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of Flamborough and Filey Coast SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the gannet feature of Flamborough and Filey Coast SPA will be maintained as a feature in the long term with respect to potential for adverse effects.

Gannet (breeding)

7.5.216 During the migration-free breeding bio-season, when birds are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, it can be expected that the area in and around the Proposed Development will contain a high proportion of adult birds that can be attributed to those designated sites within foraging range. Although the Proposed Development is within the mean-max + 1 Standard Deviation (SD) foraging range of gannets from Flamborough and Filey Coast SPA as the crow flies, foraging gannets would take an at-sea route and, by this route, the Proposed Development is beyond the mean-max + 1 SD foraging range of gannets. Therefore, there is not

likely to be any connectivity between breeding gannets from Flamborough and Filey Coast SPA and the Proposed Development and therefore no potential impact from collision risk.

Kittiwake (migratory)

7.5.217 In order to minimise repetition and provide a clear and concise approach, all migratory gulls have been considered together below in **paragraph 7.5.284.** As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.218 **There is, therefore, no potential for an AEoI to the conservation objectives of the kittiwake feature of Flamborough and Filey Coast SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the kittiwake feature of Flamborough and Filey Coast SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Herring gull (migratory)

7.5.219 In order to minimise repetition and provide a clear and concise approach, all migratory gulls have been considered together below in **paragraph 7.5.284.** As per that section, no AEoI was found for any gull feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.220 **There is, therefore, no potential for an AEoI to the conservation objectives of the herring gull feature of Flamborough and Filey Coast SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the herring gull feature of Flamborough and Filey Coast SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Disturbance and displacement

Overview

7.5.221 Activities associated with the operation and maintenance of WTGs and the presence of WTGs themselves may disturb and displace species within the array area and potentially within surrounding buffers to a lower extent. This in effect represents indirect habitat loss, which would potentially reduce the area available to those seabirds to forage, loaf and / or moult that currently occur within and around the Proposed Development and may be susceptible to displacement from such a development. Displacement may contribute to individual birds experiencing fitness consequences, which at an extreme level could lead to the mortality of individuals. The MDS used for assessment is given in **Table 3-2**.

Gannet (migratory)

7.5.222 In order to minimise repetition and provide a clear and concise approach, the impact from disturbance and displacement on migratory gannets to all relevant SPAs have been considered together below (**paragraph 7.5.267** onwards). As per

that section, no AEoI was found as a result of disturbance/displacement for the gannet feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.223 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of Flamborough and Filey Coast SPA in relation to disturbance/displacement from the Proposed Development alone and therefore, subject to natural change, the gannet tern feature of Flamborough and Filey Coast SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Decommissioning

Disturbance and displacement

7.5.224 Decommissioning activities associated with removing foundations and WTGs and decommissioning the offshore export cable may lead to disturbance and displacement of species within the array area and offshore cable corridor, and different degrees of buffers surrounding it.

7.5.225 The impacts from the decommissioning phase are expected to be equal to or lower than the impacts from the construction phase.

7.5.226 As no AEoI is expected for any feature during the construction phase, it follows that no AEoI is expected for any feature during the decommissioning phase.

7.5.227 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet, guillemot or razorbill features of Flamborough and Filey Coast SPA in relation to disturbance and displacement effects from the Proposed Development alone during the decommissioning phase and therefore, subject to natural change, the gannet, guillemot and razorbill features will be maintained in the long term with respect to the potential for disturbance and displacement.**

Northumbria Coast SPA and Ramsar

Features and effects for assessment

7.5.228 The potential for LSEs to result from the Proposed Development acting alone has been identified for the following for Northumbria Coast SPA and Ramsar:

- Arctic tern (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Arctic tern (migratory)

7.5.229 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300: Migratory Terns – English SPAs and Ramsar sites'** onwards). As per that

section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.230 **There is, therefore, no potential for an AEoI to the conservation objectives of the Arctic tern feature of Northumbria Coast SPA or Ramsar in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Arctic tern feature of Northumbria Coast SPA and Ramsar will be maintained as a feature in the long term with respect to potential for adverse effects**.

Coquet Island SPA

Features and effects for assessment

7.5.231 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Coquet Island SPA:

- Sandwich tern, Arctic tern, common tern, herring gull, lesser black-backed gull and kittiwake (migratory), operation and maintenance phase, collision risk.

Operation and maintenance

Collision risk

Arctic tern (migratory)

7.5.232 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300: Migratory Terns – English SPAs and Ramsar sites'** onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.233 **There is, therefore, no potential for an AEoI to the conservation objectives of the Arctic tern feature of Coquet Island SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Arctic tern feature of Coquet Island SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Sandwich tern (migratory)

7.5.234 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300: Migratory Terns – English SPAs and Ramsar sites'** onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.235 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Coquet Island SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature of Coquet Island SPA will be maintained as a feature in the long term with respect to potential for adverse effects.**

Common tern (migratory)

7.5.236 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300: Migratory Terns – English SPAs and Ramsar sites'** onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.237 There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Coquet Island SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Coquet Island SPA will be maintained as a feature in the long term with respect to potential for adverse effects.

Herring gull (migratory)

7.5.238 In order to minimise repetition and provide a clear and concise approach, all migratory gulls have been considered together below (**paragraph 7.5.284: 'Migratory Gulls – English SPAs and Ramsar'** onwards). As per that section, no AEoI was found for any gull feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.239 **There is, therefore, no potential for an AEoI to the conservation objectives of the herring gull feature of Coquet Island SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the herring gull feature of Coquet Island SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Lesser black-backed gull (migratory)

7.5.240 In order to minimise repetition and provide a clear and concise approach, all migratory gulls have been considered together below (**paragraph 7.5.284: 'Migratory Gulls – English SPAs and Ramsar'** onwards). As per that section, no AEoI was found for any gull feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.241 There is, therefore, no potential for an AEoI to the conservation objectives of the lesser black-backed gull feature of Coquet Island SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the lesser black-backed gull feature of Coquet Island SPA will be maintained as a feature in the long term with respect to potential for adverse effects.

Kittiwake (migratory)

7.5.242 In order to minimise repetition and provide a clear and concise approach, all migratory gulls have been considered together below (**paragraph 7.5.284: 'Migratory Gulls – English SPAs and Ramsar'** onwards). As per that section, no AEoI was found for any gull feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.243 **There is, therefore, no potential for an AEoI to the conservation objectives of the kittiwake feature of Coquet Island SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change,**

the kittiwake feature of Coquet Island SPA will be maintained as a feature in the long term with respect to potential for adverse effects.

Farne Islands SPA

Features and effects for assessment

7.5.244 The potential for LSEs from the Proposed Development acting alone has been identified for the following for Farne Islands SPA:

- guillemot (non-breeding), construction phase, disturbance and displacement;
- Sandwich tern, Arctic tern, common tern and kittiwake (migratory), operation and maintenance phase, collision risk;
- guillemot (non-breeding), operation and maintenance phase, disturbance and displacement; and
- guillemot (non-breeding), decommissioning phase, disturbance and displacement.

Construction

Disturbance and displacement

Guillemot (non-breeding)

7.5.245 In order to minimise repetition and provide a clear and concise approach, the impact from disturbance / displacement on non-breeding guillemots to all relevant SPAs have been considered together below (**paragraph 7.5.308: 'Migratory and non-breeding auks – English SPAs'** onwards). As per that section, no AEoI was found as a result of disturbance/displacement for the guillemot feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.246 **There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Farne Islands SPA in relation to disturbance/displacement from the Proposed Development alone and therefore, subject to natural change, the guillemot feature of Farne Islands SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Operation and maintenance

Collision risk

Arctic tern (migratory)

7.5.247 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300**: **'Migratory Terns – English SPAs and Ramsar sites'** onwards). As per that

section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.248 **There is, therefore, no potential for an AEoI to the conservation objectives of the Arctic tern feature of Farne Islands SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Arctic tern feature of Farne Islands SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Sandwich tern (migratory)

7.5.249 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300**: **'Migratory Terns – English SPAs and Ramsar sites'** onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.250 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of Farne Islands SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the Sandwich tern feature of Farne Islands SPA will be maintained as a feature in the long term with respect to potential for adverse effects.**

Common tern (migratory)

7.5.251 In order to minimise repetition and provide a clear and concise approach, all migratory terns have been considered together below (**paragraph 7.5.300**: **'Migratory Terns – English SPAs and Ramsar sites'** onwards). As per that section, no AEoI was found for any tern feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.252 **There is, therefore, no potential for an AEoI to the conservation objectives of the common tern feature of Farne Islands SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the common tern feature of Farne Islands SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Kittiwake (migratory)

7.5.253 In order to minimise repetition and provide a clear and concise approach, all migratory gulls have been considered together below (**paragraph 7.5.284: 'Migratory Gulls – English SPAs and Ramsar sites'** onwards). As per that section, no AEoI was found for any gull feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.254 **There is, therefore, no potential for an AEoI to the conservation objectives of the kittiwake feature of Farne Islands SPA in relation to collision risk from the Proposed Development alone and therefore, subject to natural change, the kittiwake feature of Farne Islands SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Disturbance and displacement

Guillemot (non-breeding)

7.5.255 In order to minimise repetition and provide a clear and concise approach, the impact from disturbance / displacement on non-breeding guillemots to all relevant SPAs have been considered together below (**paragraph 7.5.308** onwards). As per that section, no AEoI was found as a result of disturbance / displacement for the guillemot feature of any SPA or Ramsar site from the Proposed Development alone.

7.5.256 **There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Farne Islands SPA in relation to disturbance / displacement from the Proposed Development alone and therefore, subject to natural change, the guillemot feature of Farne Islands SPA will be maintained as a feature in the long term with respect to potential for adverse effects**.

Decommissioning

Disturbance and displacement

7.5.257 Decommissioning activities associated with removing foundations and WTGs and decommissioning the offshore export cable may lead to disturbance and displacement of species within the array area and offshore ECC, and different degrees of buffers surrounding it.

7.5.258 The impacts from the decommissioning phase are expected to be equal to or lower than the impacts from the construction phase.

7.5.259 As no AEoI is expected for any feature during the construction phase, it follows that no AEoI is expected for any feature during the decommissioning phase.

7.5.260 There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Farne Islands SPA in relation to disturbance and displacement effects from the Proposed Development alone during the decommissioning phase and therefore, subject to natural change, the guillemot feature will be maintained in the long term with respect to the potential for disturbance and displacement.

Migratory Waterbirds – English South Coast SPAs and Ramsar sites

Features and effects for assessment

7.5.261 The potential for LSEs from the Proposed Development acting alone has been identified for the following migratory waterbirds from four English south coast SPAs / Ramsar sites (listed below) during the operation and maintenance phase of the Proposed Development for collision risk:

- dark-bellied brent goose (Pagham Harbour SPA/Ramsar, Portsmouth Harbour SPA / Ramsar, Chichester & Langstone Harbours SPA/Ramsar and Solent & Southampton Water SPA / Ramsar);

- shelduck (Chichester & Langstone Harbours SPA/Ramsar);
- shoveler (Chichester & Langstone Harbours SPA);
- wigeon (Chichester & Langstone Harbours SPA);
- pintail (Chichester & Langstone Harbours SPA);
- teal (Chichester & Langstone Harbours SPA & Solent & Southampton Water SPA / Ramsar);
- red-breasted merganser (Portsmouth Harbour SPA and Chichester & Langstone Harbours SPA);
- ringed plover (Chichester & Langstone Harbours SPA / Ramsar & Solent & Southampton Water SPA / Ramsar);
- grey plover (Chichester & Langstone Harbours SPA / Ramsar);
- curlew (Chichester & Langstone Harbours SPA);
- bar-tailed godwit (Chichester & Langstone Harbours SPA);
- black-tailed godwit (Portsmouth Harbour SPA, Chichester & Langstone Harbours Ramsar & Solent & Southampton Water SPA/Ramsar);
- turnstone (Chichester & Langstone Harbours SPA);
- ruff (Pagham Harbour SPA);
- sanderling (Chichester & Langstone Harbours SPA);
- dunlin (Portsmouth Harbour SPA & Chichester & Langstone Harbours SPA / Ramsar); and
- redshank (Chichester & Langstone Harbours SPA/Ramsar).

Operation and maintenance

Collision risk on migration

Overview

7.5.262 The migrant waterbird populations of the four SPA / Ramsars are considered in this assessment together. They have been screened into the assessment of the operation and maintenance phase on a precautionary basis as a result of the potential for a proportion of their twice-yearly migratory flights over the English Channel (to spend the non-breeding season at the SPA / Ramsar) which may pass across the array area and at a height that places them at risk of collision with the turning blades of the WTGs. The waterbird species concerned are listed above. They have been screened in for the migratory non-breeding bio-seasons and are designated features.

7.5.263 The aerial digital surveys completed to date recorded only two of the species screened in for assessment, dark-bellied brent goose and shelduck, within the full survey area, whilst they did not record any of the other migratory waterbird

species. Given the limitations of aerial digital surveys for recording migratory non-seabird species due in particular to many being nocturnal migrants, modelling of such migratory non-seabirds has been carried out using Migropath (**Appendix 12.3: Offshore Ornithology Migratory Collision Risk Modelling, Volume 4** of the ES (Document Reference: 6.4.12.3). This approach is in line with Natural England's guidance on best practice for Offshore Wind Marine Environmental Assessments (Parker et al., 2022). Migropath was the first modelling tool, developed by APEM, to estimate the number of migrant birds passing through an OWF, based on the work carried out by the British Trust for Ornithology (BTO) as part of the SOSS-05 project (Wright *et al.*, 2012). For species which the Migropath modelling indicated potential connectivity to the Proposed Development (i.e. >1% of the migratory population modelled to pass the Proposed Development array area), the results from this modelling were then fed into the Band (2011) CRM to inform potential collision mortality using Band Option 2 (BO2). The annual total migrant estimate and subsequent collision mortality (where applicable) at a range of possible avoidance rates is given in **Table 7-5**. The basis of those assessments was to base potential impacts on waterbirds from collision risk on the use of an avoidance rate of 98%.

Table 7-5 Summary of migration modelling and CRM results

Species	Annual migrant passage estimate	Annual Collisions (BO2)		
		98% Avoidance	99% Avoidance	99.5% Avoidance
Dark-bellied brent goose	0.3	N/A		
Shelduck	0.7	N/A		
Shoveler	730	0.11	0.06	0.03
Wigeon	13,938	2.18	1.09	0.54
Pintail	722	0.12	0.06	0.03
Teal	6,189	0.94	0.47	0.23
Red-breasted merganser	0	N/A		
Ringed plover	1,404 (breeding) 1,320 (non-breeding)	0.04	0.02	0.01
Grey plover	890	0.23	0.11	0.06
Curlew	13,739 (breeding) 4,171 (non-breeding)	4.88	2.44	1.22

© WSP UK Limited

Species	Annual migrant passage estimate	Annual Collisions (BO2)		
		98% Avoidance	99% Avoidance	99.5% Avoidance
Bar-tailed godwit	307	0.08	0.04	0.02
Black-tailed godwit	5 (breeding) 2,773 (Icelandic)	0.72	0.36	0.18
Turnstone	1,193	0.30	0.15	0.07
Ruff	29	0.01	0.00	0.00
Sanderling	275	0.07	0.03	0.02
Dunlin	257 – 277	0.06 – 0.07	0.03	0.03
Redshank	1,383 (breeding) 3,593 (non-breeding)	1.28	0.64	0.32

© WSP UK Limited

Table 7-6 Summary of increase in baseline mortality as a result of estimated collision mortality rates

Species	UK Population	Adult Baseline Mortality (Robinson, 2005)	UK Baseline Mortality	Avoidance Rate	Increase in Baseline Mortality (%)
Wigeon	440,000	0.470	206,800	98.0%	0.00
Teal	210,000	0.470	98,700	98.0%	0.00
Pintail	29,000	0.337	9,773	98.0%	0.00
Shoveler	18,000	0.420	7,560	98.0%	0.00
Ringed plover	44,876	0.228	10,232	98.0%	0.00
Grey plover	43,000	0.270	11,610	98.0%	0.00
Curlew	120,000	0.101	12,120	98.0%	0.04
Sanderling	16,000	0.170	2,720	98.0%	0.00
Dunlin	18,300	0.260	4,758	98.0%	0.00
Ruff	800	0.476	381	98.0%	0.00
Black-tailed godwit	43,000	0.060	2,580	98.0%	0.03
Bar-tailed godwit	38,000	0.285	10,830	98.0%	0.00

© WSP UK Limited

Species	UK Population	Adult Baseline Mortality (Robinson, 2005)	UK Baseline Mortality	Avoidance Rate	Increase in Baseline Mortality (%)
Redshank	120,000	0.260	31,200	98.0%	0.00
Turnstone	48,000	0.140	6,720	98.0%	0.01

7.5.264 The Migropath modelling produced predictions of annual flight rates through the Proposed Development array area for each species listed in **Table 7-6**. For species with annual flight rates exceeding 1% of the UK population, the Band (2011) CRM results are also given in **Table 7-5**. The increase in baseline mortality relative to the UK population is given in **Table 7-5**. For birds not included in **Table 7-5**, the annual flight rates are low and therefore the annual collision rate would be negligible.

7.5.265 The Migropath modelling approach assumes that the impacts on populations associated with designated sites are proportional to impacts on the UK population as a whole. As shown in **Table 7-6**, the increase in baseline mortality is well under 0.01% for all species. The increase in mortality in total and as an increase relative to baseline mortality an annual basis is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for any species.

7.5.266 **On this basis there is, therefore, no potential for an AEoI to the conservation objectives of waterbird features and assemblages to any of the SPAs / Ramsars in relation to potential collision risk effects from the Proposed Development alone and therefore, subject to natural change, all waterbird species and assemblages will be maintained as a feature in the long term with respect to the potential for adverse effect.**

Migratory Gannets – English, Welsh, French SPAs and Channel Island Ramsar

Features and effects for assessment

7.5.267 In order to provide a more concise review of more distant sites, the following potential for LSEs from the Proposed Development acting alone has been identified and assessed in this section together for the gannet (migratory) features from the following SPAs / Ramsars:

- Grassholm SPA, operation and maintenance phase, collision risk and displacement risk;
- Flamborough and Filey Coast SPA, operation and maintenance phase, collision risk and displacement risk;
- Côte de Granit Rose-Sept Iles SPA, operation and maintenance phase, collision risk and displacement risk; and
- Alderney West Coast & Burhou Islands Ramsar, operation and maintenance phase, collision risk and displacement risk.

© WSP UK Limited

Operation and Maintenance

Collision Risk

Gannet

7.5.268 Gannet has been screened into the assessment of the operation and maintenance phase based on the density of birds in flight in the array area and its flight behaviour that places it at risk of collision with the turning blades of the WTGs. Gannet has been screened in for the non-breeding migratory bio-seasons (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) for seasonal definitions) in relation to the Grassholm SPA, the Flamborough and Filey Coast SPA, Côte de Granit Rose-Sept Iles SPA and Alderney West Coast & Burhou Islands Ramsar, since birds breeding at these colonies may pass through the Proposed Development during their post-breeding and return migrations (Fort *et al*., 2012; Furness *et al*., 2018).

7.5.269 Outside of the migration-free breeding season, when the population contains a mix of birds from UK breeding colonies and breeding colonies from further away, a much lower percentage of birds can be attributed to any particular breeding colony SPA population. Information on non-breeding gannet populations contained in Furness (2015) has been applied for the purpose of apportionment.

7.5.270 The predicted collision resultant mortality as a result of the operation of the Proposed Development in the return migration bio-season is less than one (0.61) individual and in the post-breeding migration bio-season is less than two (1.41) individuals (there is no migration free winter bio-season). In total, two (2.02) individuals are predicted to be subject to collision related mortality during the non-breeding bio-seasons.

7.5.271 According to Furness (2015) differing percentages of each species from each SPA remain in the UK North Sea and English Channel in their constituent non-breeding bio-seasons, which are presented in **Table 7-7**. Accordingly, the proportion of birds in the UK North Sea and English Channel that can be attributed to each SPA/Ramsar is the remaining population as a proportion of the entire population during this period, for which each SPA/Ramsar screened in for assessment is presented as a percentage. On that basis the number of breeding adults gannets that may potentially be subject to consequent mortality from collision can be attributed to an individual SPA / Ramsar (**Table 7-7**).

© WSP UK Limited

Table 7-7 Apportionment of potential migratory gannet consequent mortality from collision apportioned to the sites during the non-breeding bio-seasons.

SPA	Bio-season	SPA breeding adult population (Furness, 2015)	Proportion of SPA adult population remaining in North Sea & English Channel	Proportioned breeding adult population of SPA remaining in UK North Sea & English Channel	SPA population as a percentage of the North Sea and English Channel	Proportioned collision mortality rate for each SPA (breeding adults per year)
Grassholm	Return migration	66,000	0%	0	0.00%	0.00
	Post-breeding migration	66,000	0%	0	0.00%	0.00
Flamborough and Filey Coast	Return migration	16,938	100%	16,938	3.71%	0.03
	Post-breeding migration	16,938	70%	11,857	4.77%	0.05
Cote de Granit Rose-Sept Iles SPA	Return migration	39,052	30%	11715.6	2.57%	0.04
	Post-breeding migration	39,052	30%	11715.6	4.72%	0.03

© WSP UK Limited

SPA	Bio-season	SPA breeding adult population (Furness, 2015)	Proportion of SPA adult population remaining in North Sea & English Channel	Proportioned breeding adult population of SPA remaining in UK North Sea & English Channel	SPA population as a percentage of the North Sea and English Channel	Proportioned collision mortality rate for each SPA (breeding adults per year)
Alderney West Coast and Burhour Islands Ramsar	Return migration	18,850	30%	5655	1.24%	0.02
	Post-breeding migration	18,850	30%	5655	2.28%	0.01

7.5.272 The estimated collision mortality rates (see **Table 7-7**) for gannet are so low that this level of effect would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species at each colony.

7.5.273 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of any of the listed SPAs / Ramsar sites in relation to collision impacts from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained in the long term with respect to the potential for adverse effects from collision with WTGs**.

Displacement

Gannet

7.5.274 Gannet has been screened in to consider the potential for disturbance and displacement during the operation and maintenance phase due to presence of the WTGs and the activities which will take place within the array area. Gannet has been screened in for the non-breeding bio-seasons in relation to the Grassholm SPA and the Flamborough and Filey Coast SPA, Côte de Granit Rose-Sept Iles SPA and Alderney West Coast & Burhou Islands Ramsar, since birds breeding at these colonies may pass through the Proposed Development during their post-breeding and return migrations (Fort *et al*., 2012; Furness *et al*., 2018).

7.5.275 Outside of the migration-free breeding bio-season, when the population contains a mix of birds from UK breeding colonies and breeding colonies from further away, a much lower percentage of birds can be attributed to any particular breeding colony SPA population. Information on non-breeding gannet populations contained in Furness (2015) has been applied for the purpose of apportionment.

7.5.276 Displacement rates of 60 – 80% have been used and a mortality rate of 1% of displaced individuals. The predicted displacement resultant mortality as a result of the operation of the Proposed Development in the return migration bio-season is less than one (0.74 – 0.98) individual and in the post-breeding migration bio-season is less than one (0.82 – 0.61) individual (there is no migration free winter bio-season). In total, less than two (1.35 – 1.80) individuals are predicted to be subject to displacement related mortality during the non-breeding season.

7.5.277 According to Furness (2015) differing percentages of each species from each SPA remain in the UK North Sea and English Channel in their constituent non-breeding bio-seasons, which are presented in **Table 7-8**. Accordingly, the proportion of birds in the UK North Sea and English Channel that can be attributed to each SPA / Ramsar is the remaining population as a proportion of the entire population during this period, for which each SPA/Ramsar screened in for assessment is presented as a percentage. On that basis the number of breeding adults gannets that may potentially be subject to consequent mortality from displacement can be attributed to an individual SPA / Ramsar (**Table 7-8**).

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table 7-8 Apportionment of potential migratory gannet consequent mortality from displacement apportioned to the sites during the non-breeding bio-seasons

SPA	Bio-season	Site breeding adult population (Furness, 2015)	Proportion of population remaining in North Sea & English Channel	Breeding adult population remaining in UK North Sea & English Channel	SPA population as a percentage of the North Sea and English Channel (%)	Apportioned displacement mortality rate (breeding adults) (60 – 80% displacement, 1% mortality)	Apportioned displacement mortality rate (breeding adults) (60 – 80% displacement, 10% mortality)
Grassholm	Return migration	66,000	0%	0	0.00%	0.00	0.00
	Post-breeding migration	66,000	0%	0	0.00%	0.00	0.00
Flamborough and Filey Coast	Return migration	16,938	100%	16,938	3.71%	0.02 – 0.03	0.23 – 0.30
	Post-breeding migration	16,938	70%	11,857	4.77%	0.04 – 0.05	0.35 – 0.47
Cote de Granit Rose-Sept Iles SPA	Return migration	39,052	30%	11715.6	2.57%	0.02	0.16 – 0.21
	Post-breeding migration	39,052	30%	11715.6	4.72%	0.03 – 0.05	0.35 – 0.46
Alderney West Coast	Return migration	18,850	30%	5655	1.24%	0.01	0.08 – 0.10

© WSP UK Limited

SPA	Bio-season	Site breeding adult population (Furness, 2015)	Proportion of population remaining in North Sea & English Channel	Breeding adult population remaining in UK North Sea & English Channel	SPA population as a percentage of the North Sea and English Channel (%)	Apportioned displacement mortality rate (breeding adults) (60 – 80% displacement, 1% mortality)	Apportioned displacement mortality rate (breeding adults) (60 – 80% displacement, 10% mortality)
and Burhour Islands Ramsar	Post-breeding migration	18,850	30%	5655	2.28%	0.02	0.17 – 0.22

7.5.278 The estimated displacement mortality rates (see **Table 7-8**) for gannet are so low that this level of effect would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species at each colony.

7.5.279 Consideration has also been given to a range of displacement and mortality rates (**Table 7-8**). However, even considering the upper end of this range (which is considered to be overly precautionary), the increase in baseline mortality is still under 1% for all sites considered, which is a level of mortality which will not affect the achievements of the conservation objectives for any site and as a result the Proposed Development will not have an adverse effect on the integrity of the gannet feature of any site.

7.5.280 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of any of the listed SPAs / Ramsar sites in relation to displacement effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained in the long term with respect to the potential for adverse effects from displacement**.

Combined Collision risk and Disturbance and displacement

7.5.281 Due to gannet being screened in for both displacement and collision risk assessment during the operation and maintenance phase, there is a potential for these two potential impacts to adversely affect gannet populations combined.

7.5.282 Based on the separate assessments of migratory gannets in **Table 7-7** and **Table 7-8** above, the combined predicted annual impact from collision risk and displacement are so low that this level of effect would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species at each colony.

7.5.283 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of any of the listed SPAs / Ramsar sites in relation to combined collision impacts and displacement effects from the Proposed Development alone and therefore, subject to natural change, gannet will be maintained in the long term with respect to the potential for adverse effects from combined collision and displacement**.

Migratory Gulls – English SPAs and Ramsar

Features and effects for assessment

7.5.284 In order to provide a more concise review of more distant sites, the following potential for LSEs from the Proposed Development acting alone has been identified and assessed in this section together for migratory gull species from the following English SPAs and Ramsar during the operation and maintenance phase of the Proposed Development for collision risk:

- Alde-Ore Estuary SPA – migratory lesser black-backed gull;
- Alde-Ore Estuary Ramsar – migratory lesser black-backed gull;
- Flamborough and Filey Coast SPA – migratory kittiwake and herring gull;

- Coquet Island SPA - migratory herring gull, lesser black-backed gull and kittiwake; and
- Farne Islands SPA – migratory kittiwake.

Operation and maintenance

Collision risk

Overview

7.5.285 Three English SPAs and a single English SPA/Ramsar were screened in for assessment of the potential of an adverse effect from collision risk associated with the Proposed Development on a precautionary basis based on the species flight behaviour that places them at risk of collision with the turning blades of the WTGs during the migratory and non-breeding bio-seasons.

7.5.286 The Proposed Development array area is beyond the mean max foraging distance (+1SD) for kittiwake of 156.1km (plus 144.5km), lesser black-backed gull of 127km (plus 109km) and herring gull of 58.8km (plus 26.8km) to all English SPAs screened in (Woodward *et al*. 2019). Accordingly, the three gull species are only assessed for the migratory and the non-breeding bio-seasons for each of the SPAs screened in.

7.5.287 In the non-breeding bio-seasons (see **Table 12.17** within **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) (Document Reference: 6.2.12) for seasonal definitions) the number of kittiwakes, lesser black-backed gulls and herring gulls potentially at risk of collision with WTGs within the Proposed Development array area is presented in **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12).

7.5.288 In the non-breeding bio-seasons these birds will have come from a wide range of seabird breeding colonies in the UK and overseas. From that mortality estimate for the Proposed Development, the number can be attributed to each of the North Sea SPAs based on knowledge of the wider BDMPS and the contribution of different colonies to the BDMPS. Furness (2015) provides the overall population data and SPA colony data from which those calculations can be carried out. It must be noted that the colony counts in Furness (2015) may differ from the SPA citation populations for some species, but in order to provide a level of consistency within this assessment the same source is used for both the colony counts and the wider UK North Sea and English Channel population estimates.

7.5.289 According to Furness (2015) differing percentages of each species from each SPA remain in the UK North Sea and English Channel in their constituent non-breeding bio-seasons, which are presented in **Table 7-9**. Accordingly, the proportion of birds in the UK North Sea and English Channel that can be attributed to each SPA/Ramsar is the remaining population as a proportion of the entire population for each species during this period, for which each SPA/Ramsar screened in for assessment is presented as a percentage for each gull species. On that basis the number of breeding adults for each species that may potentially be subject to

consequent mortality from collision can be attributed to an individual SPA/Ramsar (**Table 7-9**).

7.5.290 It should be noted that no data is within Furness (2015) for kittiwake, lesser black-backed gulls and herring gulls associated with Coquet Island SPA, as they are only a named feature of the breeding bird assemblage. The latest Seabird Monitoring Programme (Shoreline Management Plan (SMP); Natural England, 2015) colony data was used instead for apportionment against the North Sea and English Channel BDMPS with a precautionary assumption that all breeding adults associated with the colony remain in UK waters.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table 7-9 Apportionment of potential migratory gull consequent mortality from collision apportioned to the English sites during the non-breeding bio-seasons

SPA	Species	Bio-season	SPA breeding adult population (Furness, 2015)	Proportion of SPA adult population remaining in North Sea & English Channel	Proportioned breeding adult population of SPA remaining in UK North Sea & English Channel	SPA population as a percentage of the North Sea and English Channel (%)	Proportioned collision mortality rate for each SPA (breeding adults per year)
Alde-Ore SPA/ Ramsar	Lesser black-backed gull	Return migration	1,280	100%	1,280	0.65%	0.01
		Post-breeding migration	1,280	100%	1,280	0.61%	0.01
		Migration-free Winter	1,280	50%	640	1.63%	0.00
Flamborough and Filey Coast	Kittiwake	Return migration	75,234	30%	22,570	3.26%	0.56
		Post-breeding migration	75,234	20%	15,047	1.65%	0.16
	Herring gull	Non-breeding	990	99%	980	0.21%	0.06
Coquet Island SPA*	Kittiwake	Return migration	426	30%	426	0.06%	0.01
		Post-breeding migration	426	20%	426	0.05%	0.00

© WSP UK Limited

SPA	Species	Bio-season	SPA breeding adult population (Furness, 2015)	Proportion of SPA adult population remaining in North Sea & English Channel	Proportioned breeding adult population of SPA remaining in UK North Sea & English Channel	SPA population as a percentage of the North Sea and English Channel (%)	Proportioned collision mortality rate for each SPA (breeding adults per year)
	Lesser black-backed gull	Return migration	52	100%	52	0.03%	0.00
		Post-breeding migration	52	100%	52	0.02%	0.00
		Migration-free Winter	52	100%	52	0.13%	0.00
	Herring gull	Non-breeding	4	100%	4	0.00%	0.00
Farne Islands SPA	Kittiwake	Return migration	6,886	30%	2,066	0.30%	0.05
		Post-breeding migration	6,886	20%	1,377	0.15%	0.01

Table Note: * Values taken from The Coquet Island SPA Departmental brief (Natural England, 2015) colony data.

Kittiwake

7.5.291 The estimated collision mortality rates in **Table 7-9** for kittiwake are so low that this level of effect would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species at each colony.

7.5.292 The impact of collision that would occur throughout the operational life of the Proposed Development is a prediction of consequent mortality of less than a single breeding adult per annum associated with each SPA assessed. Based on these mortality rates the increase in mortality relative to baseline mortality is well under 0.1%, which will not affect the achievements of the conservation objectives for any SPA and as a result the Proposed Development will not have an adverse effect on the integrity of the kittiwake feature of any English SPA.

7.5.293 **There is, therefore, no potential for an AEoI to the conservation objectives of the kittiwake feature of any English SPAs in relation to collision impacts from the Proposed Development alone and therefore, subject to natural change, kittiwake will be maintained as a feature in the long term with respect to the potential for adverse effects from collision with WTGs**.

Lesser black-backed gull

7.5.294 The estimated collision mortality rates (see **Table 7-9**) for lesser black-backed gull are so low that this level of effect would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species at each colony.

7.5.295 The impact of collision that would occur throughout the operational life of the Proposed Development is a prediction of consequent mortality of less than a single breeding adult per annum associated with each site assessed. Based on these mortality rates the increase in mortality relative to baseline mortality is well under 0.1%, which will not affect the achievements of the conservation objectives for any site and as a result the Proposed Development will not have an adverse effect on the integrity of the kittiwake feature of any English SPA and Ramsar.

7.5.296 **There is, therefore, no potential for an AEoI to the conservation objectives of the lesser black-backed gull feature of any English SPA and Ramsar in relation to collision impacts from the Proposed Development alone and therefore, subject to natural change, lesser black-backed gull will be maintained as a feature in the long term with respect to the potential for adverse effects from collision with WTGs**.

Herring gull

7.5.297 The estimated collision mortality rates in **Table 7-9** for herring gull are so low that this level of effect would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species at each colony.

7.5.298 The impact of collision that would occur throughout the operational life of the Proposed Development is a prediction of consequent mortality of less than a

single breeding adult per annum associated with each SPA assessed. Based on these mortality rates the increase in mortality relative to baseline mortality is well under 0.1%, which will not affect the achievements of the conservation objectives for any SPA and as a result the Proposed Development will not have an adverse effect on the integrity of the herring gull feature of any English SPA.

7.5.299 **There is, therefore, no potential for an AEoI to the conservation objectives of the herring gull feature of any English SPAs in relation to collision impacts from the Proposed Development alone and therefore, subject to natural change, herring gull will be maintained as a feature in the long term with respect to the potential for adverse effects from collision with WTGs.**

Migratory Terns – English SPAs and Ramsar sites

Features and effects for assessment

7.5.300 In order to provide a more concise review of more distant sites, the following potential for LSEs from the Proposed Development acting alone has been identified and assessed in this section together for migratory tern species from the following English SPAs and Ramsar sites during the operation and maintenance phase of the Proposed Development for collision risk:

- Dungeness, Romney Marsh & Rye Bay SPA – Sandwich tern and common tern;
- Medway Estuary & Marshes SPA – common tern;
- Foulness (Mid-Essex) Coast Phase 5 SPA – Sandwich tern and common tern;
- Alde-Ore Estuary SPA – Sandwich tern;
- The Wash SPA – common tern;
- Breydon Water SPA – common tern;
- Greater Wash SPA - Sandwich tern and common tern;
- North Norfolk Coast SPA – Sandwich tern and common tern;
- North Norfolk Coast Ramsar – Sandwich tern and common tern;
- Northumbria Coast SPA – Arctic tern;
- Northumbria Coast Ramsar – Arctic tern;
- Coquet Island SPA – Sandwich tern, common tern and Arctic tern; and
- Farne Islands SPA – Sandwich tern, common tern and Arctic tern.

© WSP UK Limited

Operation and maintenance

Collision risk

Common & Arctic terns (migratory)

7.5.301 Due to difficulty distinguishing common and Arctic terns from aerial digital survey imagery, these two species are often considered together as 'commic' terns for the purpose of CRM. As such, taking a precautionary approach the migrant population estimate considered for Arctic tern was also applied to common tern, despite the former being slightly more abundant passing through UK North Sea and English Channel waters (Furness, 2015).

7.5.302 The total estimated number of Arctic tern collisions during the return migration and post-breeding migration bio-seasons was 3.89 individuals (**Appendix 12.4: Offshore and intertidal ornithology migratory collision risk modelling, Volume 4** of the ES (Document Reference: 6.4.12.4)). Therefore, an estimated collision mortality rate of 3.89 individuals per annum was also assumed for common tern during the return migration and post-breeding migration bio-seasons also.

7.5.303 With an annual total of less than 3.89 individual Arctic and common terns subject to mortality from collision, this level of effect that would not be considered to be significant when split between the designated sites screened in for these two species and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species across all relevant SPAs and Ramsar sites for both common tern and Arctic terns.

7.5.304 **There is, therefore, no potential for an AEoI to the conservation objectives of the common or Arctic tern features of any site in relation to migratory collision effects from the Proposed Development alone and therefore, subject to natural change, the common and Arctic tern features will be maintained in the long term with respect to the potential for migratory collision effects.**

Sandwich tern (migratory)

7.5.305 The total estimated number of Sandwich tern collisions during the return migration and post-breeding bio-seasons combined was 1.21 individuals per annum (**Appendix 12.4: Offshore and intertidal ornithology migratory collision risk modelling, Volume 4** of the ES (Document Reference: 6.4.12.4)).

7.5.306 With an annual total of just over one bird (1.21 individuals) subject to mortality from collision, this level of effect that would not be considered to be significant when split between the designated sites screened in for this species and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species across all relevant SPAs and Ramsar sites for Sandwich tern.

7.5.307 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern features of any site in relation to migratory collision effects from the Proposed Development alone and therefore, subject to**

natural change, the Sandwich tern feature will be maintained in the long term with respect to the potential for migratory collision effects.

Migratory and non-breeding auks – English SPAs

Features and effects for assessment

7.5.308 In order to provide a more concise review of more distant sites, the following potential for LSEs from the Proposed Development acting alone has been identified and assessed in this section together for migratory and non-breeding auk species from English SPAs during the operation and maintenance phase of the Proposed Development for disturbance and displacement:

- Flamborough and Filey Coast SPA - guillemot during non-breeding bio-seasons;
- Flamborough and Filey Coast SPA – razorbill during the migratory and migration-free winter bio-seasons; and
- Farne Islands SPA - guillemot during the non-breeding bio-season.

Construction and decommissioning

Disturbance and displacement

7.5.309 Contextual information on the assessment of displacement effects for migratory and non-breeding auk species are provided below in the operation and maintenance phase assessment and for conciseness are not repeated here.

7.5.310 Due to the impacts from construction and decommissioning being spatially and temporally limited, it is recognised that the potential for impacts from disturbance and displacement during these phases are less than that of an active OWF.

7.5.311 Therefore, on the basis that the potential impacts attributed to English SPAs (**Table 7-10**) during the operation and maintenance phase are deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species, the potential impacts during the construction and decommissioning phase can also be considered to have no material contribution.

7.5.312 **There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot and razorbill feature of English SPAs in relation to construction and decommissioning disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, the guillemot and razorbill features will be maintained as a feature in the long term with respect to the potential for adverse effects from disturbance and displacement**.

Operation and maintenance

Disturbance and displacement

Overview

7.5.313 Two English SPAs were screened in for assessment to consider the potential for disturbance and displacement during the operation and maintenance phase due to presence of the WTGs and the activities which will take place within the array area during maintenance.

7.5.314 The Proposed Development array area is beyond the mean max foraging distance (+1SD) for guillemot of 73.2km (plus 80.5km) and razorbill of 88.7km (plus 75.9km) to either of the SPAs screened in (Woodward *et al*. 2019). Accordingly, the two auk species are only assessed for the non-breeding bio-seasons for each of the SPAs screened in.

7.5.315 In the non-breeding bio-seasons the number of guillemot and razorbill estimated to occur within the array area and 2km buffer have been estimated from site-specific data (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4** of the ES (Document Reference: 6.4.12.41). For guillemot the mean peak abundance estimate for the non-breeding bio-season was calculated to be 5,723 individuals. For razorbill the abundance estimates were 6,303 individuals in the return migration bio-season, 26 individuals in the post-breeding migration bio-season and 1,193 individuals in the migration-free winter bio-season.

7.5.316 Following an evidence-led approach the number of guillemots estimated to be subject to mortality due to displacement (using a 50% displacement and 1% mortality rate as described in **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) in the non-breeding bio-season is 29 (28.62) individuals. Using the same approach for razorbill the number estimated to be subject to mortality due to displacement is 32 (31.51) individuals in the return migration, less than a single (0.13) individual in the post-breeding migration and six (5.96) individuals in the migration-free winter bio-season.

7.5.317 In the non-breeding bio-seasons these birds will have come from a wide range of seabird breeding colonies in the UK and overseas. From that consequent mortality estimate the number which can be attributed to each of the SPAs has to be calculated. Furness (2015) provides the overall population data and SPA colony data from which those calculations can be carried out. It must be noted that the colony counts in Furness (2015) may differ from the SPA citation populations for some species, but in order to provide a level of consistency within this assessment the same source is used for both the colony counts and the wider UK North Sea and English Channel population estimates. For guillemot the UK North Sea and English Channel population during the non-breeding season is 1,617,306 individuals. For razorbill the UK North Sea and English Channel population for the migration-free winter bio-season is 218,622 individuals and during the migratory bio-seasons is 591,874 individuals.

7.5.318 According to Furness (2015) differing percentages of each species from each SPA remain in the UK North Sea and English Channel in their constituent non-breeding bio-seasons, which are presented in **Table 7-10**. Accordingly, the proportion of

birds in the UK North Sea and English Channel that can be attributed to each SPA is the remaining population as a proportion of the entire population for each auk species during this period, for which each SPA screened in for assessment is presented as a percentage for each auk species. On that basis the number of breeding adults for each auk species that may potentially be subject displacement consequent mortality can be attributed to SPA (**Table 7-11**).

© WSP UK Limited

Table 7-10 Apportionment approach for potential auk mortality from operation and maintenance displacement and disturbance apportioned to English SPAs during the non-breeding bio-seasons

SPA	Species	Bio-season	SPA breeding adult population (Furness, 2015)	Proportion of SPA adult population remaining in North Sea & English Channel	Proportioned breeding adult population of SPA remaining in UK North Sea & English Channel	SPA population as a percentage of the North Sea and English Channel (%)
Flamborough and Filey Coast	Guillemot	Non-breeding	79,282	90%	71,354	4.41%
	Razorbill	Return migration	20,002	100%	20,002	3.38%
		Post-breeding migration	20,002	100%	20,002	3.38%
		Migration-free Winter	20,002	30%	6,001	2.74%
Farne Islands	Guillemot	Non-breeding	67,064	90%	60,358	3.73%

© WSP UK Limited

Table 7-11 Apportioned potential auk mortality from operation and maintenance displacement and disturbance apportioned to English SPAs during the non-breeding bio-seasons

SPA	Species	Bio–season	Apportioned displacement mortality rate for each SPA (breeding adults; 50% displacement, 1% mortality)	Apportioned displacement mortality rate range (30% displacement, 1% mortality – 70% displacement, 10% mortality)	Increase in baseline mortality (50% displacement, 1% mortality)	Increase in baseline mortality range (30% displacement, 1% mortality – 70% displacement, 10% mortality)
Flamborough and Filey Coast	Guillemot	Non–breeding	1.26	0.8 – 17.7	0.03%	0.02% – 0.37%
	Razorbill	Return migration	1.06	0.6 – 14.9	0.05%	0.03% – 0.71%
		Post–breeding migration	0.00	0 – 0.1	0.00%	0.00% – 0.00%
		Migration–free Winter	0.16	0.1 – 2.3	0.01%	0.00% – 0.11%
Farne Islands	Guillemot	Non–breeding	1.07	0.6 – 15	0.03%	0.02% – 0.37%

Guillemot

7.5.319 The estimated displacement mortality rates in **Table 7-11** for guillemot are so low as to be considered no material contribution to the natural baseline mortality rates at each colony.

7.5.320 The impact of displacement from the array area and buffer that would occur throughout the operational life of the Proposed Development is a prediction of consequent mortality of less than two (1.26) breeding adults associated with the Flamborough and Filey Coast SPA and approximately one (1.07) breeding adult per annum associated with the Farne Islands SPA in the non-breeding bio-season. This is a level of effect that would not be considered to be significant at either SPA and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. Based on these mortality rates the increase in mortality relative to baseline mortality is well under 0.1%, which will not affect the achievements of the conservation objectives for either SPA and as a result the Proposed Development will not have an adverse effect on the integrity of the guillemot feature of either SPA.

7.5.321 Consideration has also been given to a range of displacement and mortality rates (**Table 7-11**). However, even considering the upper end of this range (which is considered to be overly precautionary), the increase in baseline mortality is still under 0.5% for both the Flamborough and Filey Coast SPA and the Farne Islands SPA, which is a level of mortality which will not affect the achievements of the conservation objectives for either SPA and as a result the Proposed Development will not have an adverse effect on the integrity of the guillemot feature of either SPA.

7.5.322 There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot features of any English SPAs in relation to operation and maintenance disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, guillemot will be maintained as a feature in the long term with respect to the potential for adverse effects from disturbance and displacement.

Razorbill

7.5.323 The estimated displacement mortality rates in **Table 7-11** for razorbill are so low as to be considered no material contribution to the natural baseline mortality rates at each colony.

7.5.324 The impact of displacement from the array area and buffer that would occur throughout the operational life of the Proposed Development is a prediction of consequent mortality of approximately one (1.23) breeding adult per annum associated with the Flamborough and Filey Coast SPA for all non-breeding bio-seasons combined. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. Based on this mortality rates the increase in mortality relative to baseline mortality is well under 0.1%, which will not affect the achievements of the conservation objectives for the Flamborough and Filey Coast SPA and as a result the Proposed Development will

not have an adverse effect on the integrity of the razorbill feature of the Flamborough and Filey Coast SPA.

7.5.325 Consideration has also been given to a range of displacement and mortality rates (**Table** 7-11). However, even considering the upper end of this range (which is considered to be overly precautionary), the increase in baseline mortality is still under 1% for both the Flamborough and Filey Coast SPA and the Farne Islands SPA, which is a level of mortality which will not affect the achievements of the conservation objectives for either SPA and as a result the Proposed Development will not have an adverse effect on the integrity of the razorbill feature of either SPA.

7.5.326 There is, therefore, no potential for an AEoI to the conservation objectives of the razorbill feature of the Flamborough and Filey Coast SPA in relation to operation and maintenance disturbance and displacement effects from the Proposed Development alone and therefore, subject to natural change, razorbill will be maintained as a feature in the long term with respect to the potential for adverse effects from disturbance and displacement.

© WSP UK Limited

8. Appraisal of potential AEoI (Proposed Development in-combination)

8.1 Introduction

8.1.1 Where the potential for LSEs on a relevant site has been identified, there is a requirement to consider whether those effects will adversely affect the integrity of the site in view of its conservation objectives. The conclusion on the potential for LSEI to result from the Proposed Development is presented in **Table 5-1** with the conservation objectives for all relevant sites provided in **Appendix F**. The information is presented below according to the following receptor groupings:

- terrestrial ecology (including wildfowl and waders);
- migratory fish;
- benthic habitats; and
- offshore ornithology.

8.1.2 The working assumption made is where potential for LSEs has been identified alone, the effect should also be considered in-combination – in light of relevant external plans and projects. In addition, it is recognised that where potential for effect alone would be considered *de minimis* or in-consequential (with a conclusion of no LSEs alone), there is the possibility that LSEI could apply. Only sites and features with no pathway for effect have not been considered for LSEI.

8.2 Appraisal of potential AEoI in-combination for terrestrial ecology

8.2.1 Information to inform the assessment alone for terrestrial ecology is provided in **Section 7.2**. The potential for LSEI as regards terrestrial ecology is summarised in **Section 5.11**, with the Stage Two (AA) presented below.

Arun Valley Ramsar site

Features and effects for assessment

8.2.2 The potential for LSEI from the Proposed Development has been identified for the following:

- northern pintail during the construction and decommissioning phases due to land take/land cover change, fragmentation of habitats and disturbance due to noise and vibration; and
- assemblage of wintering waterfowl during the construction and decommissioning phases due to land take / land cover change, fragmentation of habitats and disturbance due to noise and vibration.

Relevant external plans and projects

8.2.3 There is a single external project that could result in in-combination effects should its schedule overlap with the Proposed Development. This is the construction and operation (if it is operational during the installation of the transmission cables) on the A27 Arundel by-pass as the delivery of this Proposed Development overlaps with the functionally linked land in the Arun Valley that is used by designated features of the Arun Valley Ramsar site.

8.2.4 However, during field survey for the A27 Arundel bypass project (as reported in the A27 Arundel Bypass Preliminary Environmental Information report Volume 4c Technical Appendices 11 January 2022 – 8 March 2022) the only species listed on the designation noted was teal which was seen on only two occasions (~8% of the 24 survey visits). This demonstrates that the route of the bypass is not used regularly by birds of the Arun Valley Ramsar site, which is in keeping with the findings from surveys of adjacent areas undertaken as part of the Rampion 2 project.

8.2.5 Therefore, although the Proposed Development and the A27 Arundel Bypass will result in loss of coastal and floodplain grazing marsh (temporary loss for the proposed development and permanent loss for the A27 Arundel bypass) the number and distribution of the designated features in this locale is limited and no in-combination effects are expected.

8.2.6 **There is, therefore, no potential for an AEoI to the conservation objectives of the northern pintail and wintering assemblage of waterfowl of the Arun Valley Ramsar site in relation to all effects from the Proposed Development in-combination and therefore, subject to natural change, the features will be maintained in the long term**.

Arun Valley SPA

Features and effects for assessment

8.2.7 The potential for LSEI from the Proposed Development has been identified for the following:

- Bewick's swan during the construction and decommissioning phases due to land take / land cover change, fragmentation of habitats and disturbance due to noise and vibration; and
- non-breeding assemblage of waterfowl during the construction and decommissioning phases due to land take / land cover change, fragmentation of habitats and disturbance due to noise and vibration.

Relevant external plans and projects

8.2.8 The potential for in-combination effects for the Arun Valley SPA mirrors that for the Arun Valley Ramsar site, as detailed in **paragraphs 8.2.3** to **8.2.6**.

8.2.9 **There is, therefore, no potential for an AEoI to the conservation objectives of the Bewick's swan and non-breeding assemblage of waterfowl of the Arun Valley SPA in relation to all effects from the Proposed Development in-**

combination and therefore, subject to natural change, the features will be maintained in the long term.

The Mens SAC

Features and effects for assessment

8.2.10 The potential for LSEI from the Proposed Development has been identified for the following:

- Barbastelle bat during the operation and maintenance phases due to land take / land cover change (functionally linked land), habitat fragmentation, increased light levels, pollution effects and spread of non-native species.

Relevant external plans and projects

8.2.11 No potential for in-combination effects for the Proposed Development has been identified for The Mens SAC. This is because no other plans or projects have been identified in the area where the Proposed Development overlaps with the 12km buffer around The Mens SAC.

8.3 Appraisal of potential AEoI in-combination for migratory fish

8.3.1 Information to inform the assessment alone for migratory fish is provided in **Section 7.3**. The potential for LSEI from the Proposed Development as regards migratory fish is summarised in **Section 5.12**, with the Stage Two (AA) presented below.

River Itchen SAC

Features and effects for assessment

8.3.2 The potential for LSE from the Proposed Development has been identified for the following:

- Atlantic salmon, construction, and decommissioning; cumulative mortality and injurious effects from exposure to underwater noise; and
- Atlantic salmon, construction, and decommissioning; behavioural disturbances (barrier to migration) from exposure to underwater noise.

Assessment information

8.3.3 The conservation objectives for the site, with additional data specific to the Proposed Development, are summarised in **paragraph 7.3.36** for the Proposed Development alone and are not repeated here.

Construction and decommissioning

External plans and projects

8.3.4 The potential for additional changes caused by the Proposed Development in conjunction with external projects (or as a combined effect) is addressed in **Section 8.12** of **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8). A short list of external projects that may interact with the Proposed Development ZoIs during their construction is presented in **ES Appendix 5.4: Cumulative effects assessment shortlisted developments, Volume 4** of the ES (Document Reference: 6.4.5.5) and summarised below. The potential for interactive effects from underwater noise associated with construction and OWF piling activities is considered within a representative 100km buffer of the Proposed Development array area. This buffer was chosen as underwater noise effects are expected to occur over a wider area. The tiering structure discussed in **Section 5.10** was used for the assessment.

8.3.5 On current information, with respect to mortality, injury, behavioural changes and auditory masking arising from noise and vibration the following external projects have been considered within the assessment:

- Tier 1a:
  - planned Perpetuus Tidal Energy Centre (PTEC) (construction phase) – anticipated to commence in 2023 (PTEC, 2021a) – 2027;
  - planned AQI (construction phase) - offshore installation indicated as 2025 – 2026 (following MDS considering a 2 year delay from available information);
- Tier 2:
  - no Tier 2 external projects identified; and
- Tier 3: the operation of PTEC's tidal-energy demonstration / test facilities.

Perpetuus Tidal Energy Centre

8.3.6 PTEC is a proposed tidal-stream energy project expected to take 47-months to install and to have a 25-year operational lifespan (PTEC, 2021b). PTEC would be a commercial venture (the largest tidal array consented in England (Isle of Wight Council, 2022)) with the capability to produce over up to 30MW using 60 turbines (BBC, 2020), 6 export cables and onshore substation (PTEC, 2021a). PTEC would be located 47.8km from the Proposed Development's array.

8.3.7 Once PTEC is complete with commercial deployments, the facility could lease berths (already constructed within the 5km^2 development site) and Grid connection to facilitate testing /development of tidal technologies. PTEC has signed agreements with European Marine Energy Centre regarding optimisation activities. As the timeframe, scale, nature, and duration of effects of the demonstration facility are uncertain, with nothing material available within the public domain, the demonstration project is Tier 3. Notwithstanding, the final PTEC facility (Tier 1a) is considered to be immaterial to this consideration of in-combination effects (which are considered to be limited to the construction phase) given the infrastructure is

already provided for by PTEC by the demonstration facility that must precede the full PTEC development.

Underwater noise (mortality / injurious effect)

Atlantic Salmon

8.3.8 The 'Indicative worst-case construction programme' for AQI is for a 2024 (Q2) end-date, with cable-related works ending 2023 (Q3) (AQUIND, 2019). Therefore, any UXO clearance (the only underwater noise source that is considered to have the potential to cause in-combination impacts on migratory fish) will be completed prior to the construction of the Proposed Development. As construction for the Proposed Development would not begin until 2025/26, temporal overlap with AQI's construction phase is unlikely. In any case, the HRA of AQI found that standard mitigation would reduce effects to negligible levels (AQUIND, 2019) so that there is no pathway to the River Itchen SAC based on distance to the site (approximately 53km).

8.3.9 Injury or mortality of fish from piling noise associated with the Proposed Development will not occur within the same spatial limit as PTEC due to the small range within which potential injury effects would be expected (see **Table 7-1**). Similarly, combined mortality or injurious impacts are unlikely to occur as a result of the Proposed Development and AQI, given their expected lack of temporal overlap. Impacts to the same SAC population could therefore not reasonably be considered to cumulate. Furthermore, it is considered that since fish injury or mortality as a result of piling noise would only be expected within the immediate vicinity of piling operations, even if spatial or temporal overlap was to occur (if, for instance, construction timeframes changed for any projects assessed) the combined impacts are not expected to be significant, especially given the relatively short duration of the noise sources.

8.3.10 **There is, therefore, no potential for an AEoI to the conservation objectives of the Atlantic salmon feature of River Itchen SAC in relation to mortality or injury from underwater noise from the Proposed Development in-combination and therefore, subject to natural change, the Atlantic salmon feature will be maintained in the long term with respect to the potential for underwater noise**.

Underwater noise (behavioural changes / barrier to migration)

Atlantic Salmon

8.3.11 Impacts from PTEC are predicted to be highly localised, temporary in nature and unlikely to greatly exceed background underwater noise levels (PTEC, 2014). As evidenced by McCauley *et al*. (2000) (in relation to PTEC), it is expected that fish will resume to normal behaviour and distribution within a short time period and as such, significant effects (in EIA terms) are not expected to occur in terms of cumulative duration of exposure. As such, the cumulative impact (PTEC and the Proposed Development) of underwater noise on fish is predicted to be limited in extent and duration, intermittent and reversible. The magnitude of the cumulative impact is therefore considered to be low and of minor adverse significance.

8.3.12 **There is, therefore, no potential for an AEoI to the conservation objectives of the Atlantic salmon feature of River Itchen SAC in relation to effects (mortality, injury or behavioural changes) from underwater noise from the Proposed Development in-combination and therefore, subject to natural change, the Atlantic salmon feature will be maintained in the long term with respect to the potential for underwater noise**.

8.4 Appraisal of potential AEoI in-combination for benthic habitats and communities

Introduction

8.4.1 Information to inform the assessment alone for benthic habitats is provided in **Section 7.4**. Potential for LSEs in-combination as regards benthic habitats is summarised in **Section 5.14**, with the Stage Two (AA) presented below.

Features and effects for assessment

8.4.2 The potential for a LSE in-combination was identified for the benthic habitats of the following sites with respect to suspended sediment and deposition, pollution and MINNS:

- Solent Maritime SAC;
- South Wight Maritime SAC; and
- Solent and Isle of Wight Lagoons SAC.

Assessment information

8.4.3 The conservation objectives for the sites, as well as additional data on the Proposed Development, as summarised in **paragraph 7.4.4, paragraph 7.4.91**, and **paragraph 7.4.119** are provided for the assessment of the Proposed Development acting alone and are not repeated here.

Construction and decommissioning

8.4.4 Although there are a number of developments that fall within the benthic subtidal and intertidal ecology ZOI (and therefore cited on the short list for the CEA of the Proposed Development - see **Table 9.27** of **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)) only one (AQI) could affect the subject SACs within the ZOI at the same time as the Proposed Development (although this scenario is considered unlikely). Two SACs were considered in the HRAs undertaken for AQI and the Proposed Development:

- Solent Maritime SAC (overlaps with AQI cable corridor for 163.4m^2); and
- South Wight Maritime SAC (reefs 3.3km from AQI cable corridor).

8.4.5 In addition, there are a small number of active aggregate dredging license areas sufficiently close to the Proposed Development project (within one tidal excursion distance). The aggregate dredging sites are located immediately to the north of the

Western Offshore Array Area and immediately to the east of the ECC. The orientation of the tidal axis means that interaction between plumes created by aggregate dredging and activities in the Offshore Array Areas are very unlikely. Some overlap of plumes might occur in relation to export cable burial in the offshore end of the ECC only, however, as assessed in **Section 2.6** of **Appendix 6.3: Coastal processes technical report: Impact assessment, Volume 4** of the ES (Document Reference: 6.4.6.3), the extent and duration of sediment plumes from cable burial are very limited. Therefore, it is considered that no overlapping plume effect is at all likely.

8.4.6 Any cumulative increase in either the spatial footprint or peak concentration of sediment plumes are therefore likely to be indistinguishable from background levels. Any associated cumulative changes in bed level (different to that already assessed for the Proposed Development alone) are also unlikely to be measurable in practice.

8.4.7 With respect to MINNS, the risk of introduction and or spread of MINNS from AQI is linked to vessel movements only (installation followed by any maintenance vessels), with any such risk to be assessed by that project and an expectation of appropriate mitigation to be identified (if required). It is therefore considered that AQI is highly unlikely to represent an in-combination risk for the introduction or spread of MINNS and is therefore of negligible significance in practice.

8.4.8 **With reference to the conclusions of the alone assessments, it is determined there is no realistic potential for in-combination effects on Solent Maritime SAC, South Wight Maritime SAC or Solent and Isle of Wight Lagoons SAC from the Proposed Development together with other plans or projects for any of the three pathways considered**.

8.5 Appraisal of potential AEoI in-combination for offshore ornithology

8.5.1 Information to inform the assessment alone for offshore ornithology is provided in **Section 7.5**. The potential for LSEs from the Proposed Development in-combination as regards offshore ornithology is summarised in **Section 5.15**, with the Stage Two (AA) presented below.

Construction and decommissioning

8.5.2 The HRA Screening identified the potential for an LSE for OWFs from disturbance and displacement in-combination with the Proposed Development to the following designated sites and the relevant features:

- Dungeness, Romney Marsh & Rye Bay SPA – Sandwich tern during the breeding bio-season;
- Solent and Dorset Coast SPA – common tern, little tern and Sandwich tern during the breeding bio-season;
- Flamborough and Filey Coast SPA – guillemot and razorbill during the non-breeding bio-season; and
- Farne Islands SPA – guillemot during the non-breeding bio-season.

8.5.3 For the assessment alone for the three cited tern species (Sandwich, common and little tern) as designated SPA features it is estimated that zero birds would be subject to mortality resulting from displacement during the construction or decommissioning phases. There is, therefore, no adverse effect as a result of disturbance / displacement to these species and no adverse effect on the integrity of these designated sites as a consequence of potential displacement to tern species. Therefore, it can be concluded that the Proposed Development will have no adverse effect alone or in-combination on tern species as it will not contribute to any in-combination effect resulting from disturbance / displacement of tern species at these designated sites and so not be the cause of any potential adverse effect on the integrity of these species or designated sites.

8.5.4 For the assessment alone for the two cited auk species (guillemot and razorbill) as designated SPA features it is estimated that a level of effect would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for these species at each designated site resulting from disturbance / displacement during the construction or decommissioning phases. There is, therefore, no adverse effect as a result of displacement to these species and no adverse effect on the integrity of these designated sites as a consequence of potential disturbance / displacement to auk species. Therefore, it can be concluded that the Proposed Development will have no adverse effect on auk species alone or in-combination as it will not contribute materially to any in-combination effect resulting from disturbance / displacement of auk species at these designated sites and so not be the cause of any potential adverse effect on the integrity of these species or designated sites.

8.5.5 **There is, therefore, no potential for an AEoI to the conservation objectives of any features of the SPAs listed above in relation to potential effects in the construction or decommissioning phases from the Proposed Development in-combination and therefore, subject to natural change, all these bird features will be maintained as a feature(s) in the long term with respect to the potential for adverse effects from disturbance and displacement**.

Operation and maintenance

Direct disturbance and displacement

~~8.5.6 The potential for direct disturbance and displacement impacts to result in an AEoI in combination with the Proposed Development relates to the following designated site and the relevant features:~~

~~8.5.6~~ ~~Alderney West Coast and Burhou Islands Ramsar; gannet during all bio-seasons.~~Within the original RIAA (i.e. the RIAA at the time of submission [**APP-038**]), the Applicant's assessment for guillemot and razorbill concluded no Adverse Effect on Integrity (AEoI) with respect to the level of predicted impact from the project alone. Due to the level of impact predicted for the Proposed Development alone apportioned to the auk features of the FFC SPA and Farne Islands being approximately a single breeding adult per annum, the Applicant concluded that such a level of effect would not materially contribute to any in-combination effect, hence why no in-combination assessments for these features were presented within the original RIAA [**APP-038**].

8.5.7 However, Natural England provided Relevant Representations [**RR-265**] for the RIAA within the examination process and made requests for the following:

- "*The Applicant should carry out a full in-combination assessment of impacts for guillemot and razorbill at FFC SPA, to allow NE to advice further regarding the risks of adverse effects in-combination*"; and
- "*The Applicant should carry out a full in-combination assessment of impacts of guillemot at the Farne Islands SPA, to allow NE to advise further regarding the risks of adverse effects in-combination".*

8.5.8 Considering the concerns raised through Natural England's Relevant Representations, additional in-combination assessments to those presented in the original RIAA [**APP-038**] have been conducted. The potential for direct disturbance and displacement impacts to occur in-combination with the Proposed Development has been assessed for the following designated site and relevant features:

- Alderney West Coast and Burhou Islands Ramsar; gannet during all bio-seasons.
- Flamborough and Filey Coast SPA – guillemot and razorbill during the migratory and non-breeding bio-seasons; and
- Farne Islands SPA- guillemot during the non-breeding bio-season.

~~8.5.7~~8.5.9 The~~se~~~~is~~ site~~s~~ are~~is~~ assessed in more detail in this section.

~~8.5.8~~8.5.10 The remaining sites and features screened in for potential LSEs during operation and maintenance phase are as follows:

- Dungeness, Romney Marsh & Rye Bay SPA – Sandwich tern during the breeding bio-season;
- Solent and Dorset Coast SPA – Sandwich tern during the breeding bio-season;
- Chichester and Langstone Harbours SPA – Sandwich tern during the breeding bio-season;
- Solent and Southampton Water SPA – Sandwich tern during the breeding bio-season;
- Côte de Granit Rose-Sept Iles SPA – Gannet during all bio-seasons;
- Grassholm SPA – Gannet during the migratory bio-seasons; and
- Flamborough and Filey Coast SPA – gannet~~, guillemot and razorbill~~ during the migratory and non-breeding bio-seasons.~~; and~~
- ~~Farne Islands SPA – guillemot during the non-breeding bio-season.~~

~~8.5.9~~8.5.11 For the assessment alone for the cited tern species (Sandwich tern) as a designated SPA feature it is estimated that zero birds would be subject to mortality resulting from displacement during the operation and maintenance phase. There is, therefore, no adverse effect as a result of disturbance / displacement to Sandwich tern and no adverse effect on the integrity of these designated sites as a consequence of potential displacement to this species. Therefore, it can be

concluded that the Proposed Development will have no adverse effect alone or in-combination on Sandwich tern as it will not contribute to any in-combination effect resulting from disturbance / displacement of this species at these designated sites and so not be the cause of any potential adverse effect on the integrity of this species or these designated sites.

~~8.5.10~~8.5.12 For the assessment alone for the cited feature of gannet as a designated feature of the three SPAs it is estimated (see **Table 7-10**) that zero or less than 0.1 birds per annum would be subject to mortality resulting from displacement during the operation and maintenance phase. There is, therefore, no adverse effect as a result of disturbance / displacement to gannet and no adverse effect on the integrity of these designated sites as a consequence of potential displacement to this species. Therefore, it can be concluded that the Proposed Development will have no adverse effect alone or in-combination on gannet as it will not contribute to any in-combination effect resulting from disturbance / displacement of this species at these designated sites and so not be the cause of any potential adverse effect on the integrity of this species or those designated sites.

~~8.5.11 For the assessment alone for the two cited auk species (guillemot and razorbill) as designated SPA features, the estimated level of effect (as set out in **Table 7-10**) would amount to a level of change that is so small it would not be detectable against baseline mortality rates for these species at each designated site. Therefore, the Proposed Development will not contribute materially to any in-combination effect from the disturbance / displacement of auk species from these designated sites.~~

~~8.5.12~~8.5.13 **On the assessments presented in this RIAA, there is, therefore, no potential for an AEoI to the conservation objectives of any features of the SPAs or Ramsar sites listed above in relation to potential effects in the operation and maintenance phase from the Proposed Development alone or in-combination and therefore, subject to natural change, all these bird features will be maintained as a feature(s) in the long term with respect to the potential for adverse effects from disturbance and displacement.**

Collision risk

~~8.5.13~~8.5.14 The potential for collision risk from OWFs to result in an AEoI in-combination with the Proposed Development relates to the following designated site and the relevant features:

- Alderney West Coast and Burhou Islands Ramsar; gannet (during all bio-seasons);
- Alde-Ore Estuary Ramsar; lesser black-backed gull (during migratory and non-breeding bio-seasons); and
- Flamborough and Filey Coast SPA; kittiwake (during migratory and non-breeding bio-seasons).

~~8.5.14~~8.5.15 These sites are assessed in more detail later in this section.

~~8.5.15~~8.5.16 The remaining sites and features screened in for potential LSEs during operation and maintenance phase are as follows:

- Pagham Harbour SPA – migratory dark-bellied brent goose, ruff. Common tern during the breeding bio-season;
- Pagham Harbour Ramsar – migratory dark-bellied brent goose;
- Portsmouth Harbour SPA – migratory black-tailed godwit, dark-bellied brent goose, dunlin and red-breasted merganser;
- Portsmouth Harbour Ramsar – migratory dark-bellied brent goose;
- Dungeness, Romney Marsh & Rye Bay SPA – migratory common tern and Sandwich tern during the breeding and migratory bio-seasons;
- Chichester and Langstone Harbours SPA –migratory bar-tailed godwit, curlew, dark-bellied brent goose, dunlin, grey plover, Northern pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone, wigeon and the waterbird assemblage. Common tern and Sandwich tern during the breeding bio-season;
- Chichester and Langstone Harbours Ramsar – migratory ringed plover, black-tailed godwit, redshank, dark-bellied brent goose, shelduck, grey plover, dunlin and the waterbird assemblage;
- Solent and Southampton Water SPA –migratory black-tailed godwit, dark-bellied brent goose, ringed plover, teal and the waterbird assemblage. Sandwich tern during the breeding bio-season;
- Solent and Southampton Water Ramsar – migratory ringed plover, dark-bellied brent goose, teal, black-tailed godwit and the waterbird assemblage;
- Medway Estuary and Marshes SPA – migratory common tern;
- Littoral seino-marin SPA – lesser black-backed gull and kittiwake during the breeding bio-season;
- Foulness (Mid-Essex Coast Phase 5) SPA – migratory Sandwich tern and common tern;
- Falaise du Bessin Occidental SPA – kittiwake during the breeding bio-season;
- Alde-Ore Estuary SPA – migratory Sandwich tern;
- The Wash SPA – migratory common tern;
- Breydon Water SPA – migratory common tern;
- Greater Wash SPA – migratory Sandwich tern and common tern;
- North Norfolk Coast SPA – migratory Sandwich tern and common tern;
- North Norfolk Coast Ramsar – migratory Sandwich tern and common tern;
- Côte de Granit Rose-Sept Iles SPA – Gannet during the breeding bio-season;
- Grassholm SPA – migratory gannet;
- Flamborough and Filey Coast SPA – migratory gannet and herring gull;
- Northumbria Coast SPA – migratory Arctic tern;

- Northumbria Coast Ramsar – migratory Arctic tern;
- Coquet Island SPA – migratory Sandwich tern, Arctic tern, common tern, herring gull, lesser black-backed gull and kittiwake; and
- Farne Islands SPA – migratory Sandwich tern, Arctic tern, common tern and kittiwake.

~~8.5.16~~8.5.17 For the assessment of all 17 cited waterbird species, as features of nine of the designated sites listed above, it was concluded that there would be no effect or no detectable change to baseline mortality as a result of the Proposed Development alone, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that the Proposed Development will have no adverse effect on these waterbird species and make no detectable contribution to an in-combination effect resulting from collision risk to these 17 waterbird species as features of the nine designated sites listed above and so not be the cause of any potential adverse effect on the integrity of these species or designated sites.

~~8.5.17~~8.5.18 Following the Natural England and the RSPB's S42 comments, consideration has been provided in **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12) regarding the combined impact of Rampion 1 together with the Proposed Development for migratory waterbirds (see **Section 12.13**). It was concluded that there would be no effect or no detectable change to baseline mortality as a result of Rampion 1 and the Proposed Development together, with all impacts being less than one bird per annum or equivalent to less than a 0.1% increase in baseline mortality, which would amount to a level of change that is so small it would not be detectable against baseline mortality rates for these species at each designated site. Therefore, it can be concluded that the Proposed Development in combination with Rampion 1 will have no adverse effect on all 17 waterbird species and make no detectable contribution to an effect resulting from collision risk to these 17 waterbird species as features of the nine designated sites screened in for assessment and listed above.

~~8.5.18~~8.5.19 For the assessment of gannet, as a feature of Côte de Granit Rose-Sept Iles, Grassholm and Flamborough & Filey Coast SPAs, it was concluded that there would be no effect or no detectable change to baseline mortality as a result of the Proposed Development alone (see **paragraph 7.5.267** and onwards), therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that the Proposed Development will have no adverse effect on the gannet feature of these two designated sites and make no detectable contribution to an in-combination effect resulting from collision risk to this species as features of these two designated sites and so not be the cause of any potential adverse effect on the integrity of this species or either designated site.

~~8.5.19~~8.5.20 For the assessment of guillemot and razorbill, as features of Flamborough & Filey Coast SPA, it was concluded that there would be no effect or no detectable change to baseline mortality as a result of the Proposed Development alone (see **paragraph 7.5.308** and onwards), therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that the Proposed Development will have no adverse effect on the guillemot and razorbill features of these two designated sites and make no detectable contribution to an

in-combination effect resulting from collision risk to this species as features of these two designated sites and so not be the cause of any potential adverse effect on the integrity of this species for this designated site.

8.5.208.5.21 For the assessment of gull species (kittiwake, herring gull and lesser black-backed gull), as features of the seven designated sites listed in **paragraph 8.5.16**, the CRM predicted mortality rates for the Proposed Development acting alone (as set out in **Table 7-9**) that are so small there would be no effect or no detectable change that could be distinguished from baseline mortality. Therefore, no detectable change to any in-combination effect could occur also. On the assessments presented in this RIAA, it can be concluded that the Proposed Development will have no LSE on a standalone basis on the gull features of any of the seven designated sites listed above and make no detectable contribution to an in-combination effect resulting from collision risk to these species as features of the seven designated sites listed. However, following Natural England's S42 responses and advice through the ETG, further consideration is given within this section to the potential for an AEoI in-combination with other plans and projects of kittiwake at Flamborough and Filey Coast SPA and of lesser black-backed gull at the Alde-Ore SPA.

8.5.218.5.22 For the assessment of tern species (common, Sandwich and little tern), as features of the 16 designated sites listed above, it was concluded that there would be no effect or no detectable change to baseline mortality as a result of the Proposed Development alone, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that the Proposed Development will have no adverse effect on the tern features of any of the 16 designated sites listed above and make no detectable contribution to an in-combination effect resulting from collision risk to these species as features of the 16 designated sites listed above and so not contribute to any potential adverse effect on the integrity of these species or designated sites.

8.5.228.5.23 On the assessments presented above, the estimated level of effect would amount to a level of change that is so small it would not be detectable against baseline mortality rates for these species at each designated site. Therefore, the Proposed Development will not contribute materially to any in-combination effect from the collision risk to any species from these designated sites.

8.5.238.5.24 **On the assessments presented in this RIAA, there is, therefore, no potential for an AEoI to the conservation objectives of any features of the SPAs or Ramsar sites listed above in relation to potential effects in the operation and maintenance phase from the Proposed Development alone or in-combination with respect to the potential for adverse effects from collision risk.**

Barrier effect

8.5.248.5.25 The following designated sites and features were screened in for potential LSEs during the operation and maintenance phase:

- Chichester and Langstone Harbours SPA – Sandwich tern during the breeding bio-season; and

- Solent and Southampton Water SPA – Sandwich tern during the breeding bio-season.

8.5.258.5.26 For the assessment alone for Sandwich tern as designated feature of the two designated sites listed above it is estimated that zero birds would be subject to mortality resulting from a barrier effect during the operation and maintenance phase. There is, therefore, no adverse effect as a result of a barrier effect to this species and no adverse effect on the integrity of these designated sites as a consequence of potential barrier effects to Sandwich tern. Therefore, it can be concluded that the Proposed Development will have no adverse effect alone or in-combination on Sandwich tern as it will not contribute to any in-combination effect resulting from a barrier effect on Sandwich tern at these designated sites and so not be the cause of any potential adverse effect on the integrity of this species or designated sites.

8.5.268.5.27 **There is, therefore, no potential for an AEoI to the conservation objectives of the Sandwich tern feature of the SPAs listed above in relation to potential effects in the operation and maintenance phase from the Proposed Development in-combination and therefore, subject to natural change, the Sandwich tern feature will be maintained as a feature in the long term with respect to the potential for adverse effects from a barrier effect.**

Flamborough and Filey Coast SPA

Features and effects for assessment

8.5.278.5.28 As per **paragraph 8.5.14**, the potential for LSEs from the Proposed Development in-combination has been identified as requiring further assessment for the following qualifying feature associated with the Flamborough and Filey Coast SPA:

- Kittiwake (migratory bio-season), operation and maintenance phase, collision risk.
- Guillemot (non-breeding bio-season), operational and maintenance phase, disturbance and displacement.
- Razorbill (migratory and non-breeding bio-season), operational and maintenance phase, disturbance and displacement.

Flamborough and Filey Coast SPA - Operation and maintenance (collision risk)

Assessment

Kittiwake

8.5.288.5.29 As shown in **Table 7-9**, the contribution from the Proposed Development to collision mortality of kittiwakes associated with Flamborough and Filey Coast SPA is 0.56 birds in the return migration bio-season and 0.16 birds in the post-breeding bio-season (annual total 0.72 birds).

8.5.298.5.30 The Applicant recognises recent decisions from the SoS for East Anglia One North (SoS, 2022a) and East Anglia Two (SoS, 2022b) that there is a potential AEoI for the kittiwake feature of the Flamborough and Filey Coast SPA as a result of the cumulative impact of other projects. The latest in-combination totals for kittiwake collision mortality apportioned to the Flamborough and Filey Coast SPA, following advice from Natural England, are those submitted at Deadline 2 of the examination for Sheringham and Dudgeon Extension Projects (Equinor, 2023). It is noted that the collision values presented (Equinor, 2023) apply a new avoidance rate based on Ozsanlev-Harris et al. (2023) following the advice of Natural England in their Relevant Representation (Natural England, 2022). The values presented by Sheringham and Dudgeon Extension (Equinor, 2023) have been further updated with the Rampion 2 latest values with additional impact values from the Green Volt floating OWF RIAA (Green Volt, 2023). Following this approach, the total collision risk from projects in-combination for kittiwake apportioned to Flamborough and Filey Coast SPA was 174.5 birds in the breeding season, 58.0 birds in the post-breeding migration bio-season and 61.0 birds in the return migration bio-season, giving an annual total of 293.4 birds.

8.5.308.5.31 The contribution from the Proposed Development of 0.72 birds per annum, therefore, represents a very small contribution to the in-combination total of just 0.25%. In this instance, it is clear that the collision risk from the Proposed Development to the overall in-combination total is of no material contribution. Therefore, it can be concluded that whilst the most precautionary estimates of collision risk in-combination may pose an AEoI to the kittiwake feature of the Flamborough and Filey Coast SPA, the extremely low contribution of the Proposed Development is so small that it would not materially affect the overall effect.

8.5.318.5.32 **There is, therefore, no potential for an increased risk of an AEoI to the conservation objectives of the kittiwake feature of the Flamborough and Filey Coast SPA in relation to collision effects from the Proposed Development in-combination with other OWFs and therefore, subject to natural change, kittiwake will be maintained as a feature in the long term with respect to the potential for adverse effects from collision**.

Flamborough and Filey Coast SPA - Operation and maintenance (disturbance and displacement)

Assessment

Guillemot

8.5.328.5.33 The in-combination tables below (**Table 8-1** and **Table 8-2**) provide values from all consented and planned projects apportioned to the FFC SPA. Totals are provided for the following scenarios:

- Rampion 2 plus all consented projects;
- Rampion 2~~,~~ plus all consented projects (excluding Dudgeon and Sheringham Shoal Extension Projects);
- Rampion 2 plus all consented projects (excluding Hornsea Four);

- All projects; and
- All projects (excluding Hornsea Four).

8.5.34 Following the latest conclusions from the Secretary of State in relation to the guillemot feature of the FFC SPA requiring compensation for predicted impacts from Hornsea Four, this project has been removed from the in-combination assessment of guillemot in line with previous advice for consideration of projects where compensation is required. Hence, scenarios including and excluding Hornsea Four impacts have been presented.

8.5.35 The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to consent for those projects being issued during Rampion 2's Examination Period. Splitting out these projects in the manner presented accounts for any consent conclusions, such as removal of impact predictions from in-combination assessment in line with previous advice for consideration of projects where compensation is required. Therefore, scenarios including and excluding these two projects have been provided.

8.5.36 Due to the different values for mean max plus one SD foraging ranges for guillemot (Woodward *et al.*, 2019) two in-combination tables are provided as the use of the different foraging ranges will include or exclude different projects within the breeding season. The Applicant considers that as recommended by the author, the mean max plus one SD excluding Fair Isle data (95.2 km) is most appropriate for identifying theoretical breeding season connectivity (Woodward *et al.*, 2019).

8.5.37 Displacement matrices for all displacement rate and mortality rate scenarios are provided for the annual totals in **Appendix K In-combination assessment update for guillemot and razorbill**.

© WSP UK Limited

Table 8-1 In-combination abundance totals for guillemot attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 153.7 km)

Project	Breeding	Non-breeding	Annual	Tier
Beatrice	0	121	121	1a
Blyth Demonstration Site	0	58	58	1a
Dudgeon	0	24	24	1a
EOWDC	0	10	10	1a
Galloper	0	26	26	1a
Greater Gabbard	0	24	24	1a
Gunfleet Sands	0	16	16	1a
Humber Gateway	99	6	105	1a
Hywind 2 Demonstration	0	94	94	1a
Kentish Flats Extension	0	0	0	1a
Kentish Flats	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	36	36	1a
London Array	0	17	17	1a
Methil	0	0	0	1a
Race Bank	0	31	31	1a
Rampion	0	684	684	1a
Scroby Sands	-	-	0	1a
Sheringham Shoal	0	32	32	1a
Teesside	267	40	307	1a
Thanet	0	6	6	1a
Westermost Rough	347	21	368	1a

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
East Anglia One	0	28	28	1a
Hornsea Project One	4,554	356	4,910	1a
Hornsea Project Two	3,581	579	4,160	1a
Moray East	0	24	24	1b
Triton Knoll	425	33	458	1b
Kincardine	0	0	0	1b
Dogger Bank A	1,893	270	2,163	1c
Dogger Bank B	3,318	467	3,785	1c
Dogger Bank C	0	100	100	1c
East Anglia Three	0	126	126	1c
Inch Cape	0	140	140	1c
Moray West	0	1,680	1,680	1c
Neart na Gaoithe	0	166	166	1c
Seagreen Alpha	0	206	206	1c
Seagreen Bravo	0	181	181	1c
Sofia	0	163	163	1c
Hornsea Three	0	782	782	1c
Norfolk Boreas	0	606	606	1c
Norfolk Vanguard	0	210	210	1c
East Anglia ONE North	0	83	83	1c
East Anglia TWO	0	74	74	1c
Hornsea Four (Natural England's Bespoke Approach)	9,382	22,927	32,309	1c
Pentland	-	29	29	1c
Forth Wind	-	18	18	1c

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Dudgeon Extension Project (DEP)	0	655	655	1c
Sheringham Shoal Extension Project (SEP)	0	48	48	1c
Rampion 2	0	252	252	1d
Total (Rampion 2 plus all consented projects except DEP & SEP)	**23,866**	**30,745**	**54,611**	
Total (Rampion 2 plus all consented projects except Hornsea Four)	**14,484**	**8,520**	**23,004**	
Total (Rampion 2 plus all consented projects)	**23,866**	**31,447**	**55,313**	
Green Volt	0	710	710	1d
West of Orkney	-	189	189	1d
Berwick Bank	-	1,948	1,948	1d
Dogger Bank South	0	0	0	2
Outer dowsing (PEIR)	12,284	982	13,266	2
Five Estuaries (PEIR)	0	163	163	2
North Falls (PEIR)	0	198	198	2
Total (All Projects)	**36,150**	**35,637**	**71,787**	
Total (All Projects except Hornsea Four)	**26,768**	**12,710**	**39,478**	

© WSP UK Limited

Table 8-2 In-combination abundance totals for guillemot attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 95.2 km)

Project	Breeding	Non-breeding	Annual	Tier
Beatrice	0	121	121	1a
Blyth Demonstration Site	0	58	58	1a
Dudgeon	0	24	24	1a
EOWDC	0	10	10	1a
Galloper	0	26	26	1a
Greater Gabbard	0	24	24	1a
Gunfleet Sands	0	16	16	1a
Humber Gateway	99	6	105	1a
Hywind 2 Demonstration	0	94	94	1a
Kentish Flats Extension	0	0	0	1a
Kentish Flats	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	36	36	1a
London Array	0	17	17	1a
Methil	0	0	0	1a
Race Bank	0	31	31	1a
Rampion	0	684	684	1a
Scroby Sands	-	-	0	1a
Sheringham Shoal	0	32	32	1a
Teesside	267	40	307	1a
Thanet	0	6	6	1a
Westermost Rough	347	21	368	1a

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
East Anglia One	0	28	28	1a
Hornsea Project One	0	356	356	1a
Hornsea Project Two	0	579	579	1a
Moray East	0	24	24	1b
Triton Knoll	425	33	458	1b
Kincardine	0	0	0	1b
Dogger Bank -A	0	270	270	1c
Dogger Bank -B	0	467	467	1c
Dogger Bank C	0	100	100	1c
East Anglia Three	0	126	126	1c
Inch Cape	0	140	140	1c
Moray West	0	1,680	1,680	1c
Neart na Gaoithe	0	166	166	1c
Seagreen Alpha	0	206	206	1c
Seagreen Bravo	0	181	181	1c
Sofia	0	163	163	1c
Hornsea Three	0	782	782	1c
Norfolk Boreas	0	606	606	1c
Norfolk Vanguard	0	210	210	1c
East Anglia ONE North	0	83	83	1c
East Anglia TWO	0	74	74	1c
Hornsea Four (Natural England's Bespoke Approach)	9,382	22,927	32,309	1c
Pentland	-	29	29	1c
Forth Wind	-	18	18	1c

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Dudgeon Extension Project (DEP)	0	655	655	1c
Sheringham Shoal Extension Project (SEP)	0	48	48	1c
Rampion 2	0	252	252	1d
Total (Rampion 2 plus all consented projects except DEP & SEP)	**10,520**	**30,745**	**41,265**	
Total (Rampion 2 plus all consented projects except Hornsea Four)	**1,138**	**8,520**	**9,658**	
Total (Rampion 2 plus all consented projects)	**10,520**	**31,447**	**41,967**	
Green Volt	0	710	710	1d
West of Orkney	-	189	189	1d
Berwick Bank	-	1,948	1,948	1d
Dogger Bank South	0	0	0	2
Outer dowsing (PEIR)	12,284	982	13,266	2
Five Estuaries (PEIR)	0	163	163	2
North Falls (PEIR)	0	198	198	2
Total (All Projects)	**22,804**	**35,637**	**58,441**	
Total (All Projects except Hornsea Four)	**13,422**	**12,710**	**26,132**	

© WSP UK Limited

Table 8-3 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 153.7 km mean max plus one SD foraging range (Applicant's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Annual	Rampion 2 plus all consented projects only	55,313	83,214	5,076	276.6	5.45%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			115	2.27%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	54,611			273.1	5.38%
	All projects	71,787			358.9	7.07%
	All projects (excluding Hornsea Four)	39,478			197.4	3.89%
	Rampion 2 plus all consented projects only	55,313	141,815	8,651	276.6	3.20%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			115	1.33%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	54,611			273.1	3.16%
	All projects	71,787			358.9	4.15%
	All projects (excluding Hornsea Four)	39,478			197.4	2.28%

© WSP UK Limited

Table 8-4 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 95.2 km mean max plus one SD foraging range (Applicant's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Annual	Rampion 2 plus all consented projects only	41,967	83,214	5,076	209.8	4.13%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			48.3	0.95%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	41,265			206.3	4.06%
	All projects	58,441			292.2	5.76%
	All projects (excluding Hornsea Four)	26,132			130.7	2.57%
	Rampion 2 plus all consented projects only	41,967	141,815	8,651	209.8	2.43%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			48.3	0.56%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	41,265			206.3	2.39%
	All projects	58,441			292.2	3.38%
	All projects (excluding Hornsea Four)	26,132			130.7	1.51%

© WSP UK Limited

Table 8-5 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 153.7 km mean max plus one SD foraging range (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
Annual	Rampion 2 plus all consented projects only	55,313	83,214	5,076	165.9 – 3,871.9	774.4	1,936.00	3.27 – 76.28%	15.26%	38.14%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			69.0 – 1.610.3	322.1	805.2	1.36 – 31.72%	6.34%	15.86%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	54,611			163.8 – 3,822.7	764.6	1,911.40	3.23 – 75.31%	15.06%	37.65%
	All projects	71,787			215.4 – 5,025.1	1,005.00	2,512.50	4.24 – 99.00%	19.80%	49.50%
	All projects (excluding Hornsea Four)	39,478			118.4 – 2,763.4	552.7	1,381.70	2.33 – 54.55%	10.89%	27.22%
	Rampion 2 plus all consented projects only	55,313	141,815	8,651	165.9 – 3,871.9	774.4	1,936.00	1.92 – 44.76%	8.95%	22.38%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			69.0 – 1.610.3	322.1	805.2	0.80 – 18.61%	3.72%	9.31%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	54,611			163.8 – 3,822.7	764.6	1,911.40	1.89 – 44.19%	4.98%	12.44%
	All projects	71,787			215.4 – 5,025.1	1,005.00	2,512.50	2.49 – 58.09%	11.62%	29.04%
	All projects (excluding Hornsea Four)	39,478			118.4 – 2,763.4	552.7	1,381.70	1.37 – 31.94%	6.39%	15.97%

© WSP UK Limited

Table 8-6 FFC SPA guillemot in-combination operation and maintenance phase displacement using the 95.2 km mean max plus one SD foraging range (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
Annual	Rampion 2 plus all consented projects only	41,967	83,214	5,076	125.9 – 2,937.7	587.5	1,468.90	2.48 – 57.87%	11.57%	28.94%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			29.0 – 676.1	135.2	338	0.57 – 13.32%	2.66%	6.66%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	41,265			123.8 – 2,888.5	577.7	1,444.30	2.44 – 56.90%	11.38%	28.45%
	All projects	58,441			175.3 – 4,090.8	818.2	2,045.40	3.45 – 80.59%	16.12%	40.30%
	All projects (excluding Hornsea Four)	26,132			78.4 – 1,829.2	365.8	914.6	01.54 – 36.04%	7.21%	18.02%
	Rampion 2 plus all consented projects only	41,967	141,815	8,651	125.9 – 2,937.7	587.5	1,468.90	1.46 – 33.96%	6.79%	16.98%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			29.0 – 676.1	135.2	338	0.33 – 7.82%	1.56%	3.91%
	Rampion 2 plus all consented projects (excluding SEP & DEP)	41,265			123.8 – 2,888.5	577.7	1,444.30	1.43 – 33.39%	6.68%	16.70%
	All projects	58,441			175.3 – 4,090.8	818.2	2,045.40	2.03 – 47.29%	9.46$	23.64%
	All projects (excluding Hornsea Four)	26,132			78.4 – 1,829.2	365.8	914.6	0.91 – 21.15%	4.23%	10.57%

© WSP UK Limited

8.5.38 The impact assessments for disturbance and displacement for the guillemot feature of FFC SPA are provided in **Table 8-3** to **Table 8-6**. The assessments illustrate an increase in mortality relative to baseline mortality exceeding the 1% threshold and so population viability analysis (PVA) has been conducted.

8.5.39 The full methods for PVA undertaken for the guillemot feature of the FFC SPA are outlined within **Appendix K In-combination assessment update for guillemot and razorbill**, which was submitted as part of the Rampion 2 examination process. This included a description of the modelling approach; an overview of the demographic parameters used within the model; and PVA validation. The outputs of the PVA are provided in **Table 8-7**.

© WSP UK Limited

Table 8-7 PVA results using Seabird PVA Tool for impacts apportioned to the Flamborough and Filey Coast SPA guillemot population showing displacement in-combination outputs for various scenarios

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
153.7	Applicant	Rampion 2 plus all consented projects only	277	0.998 (<0.001)	0.933 (0.004)	0.20%	6.70%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	115	0.999 (<0.001)	0.973 (0.004)	0.10%	2.70%
		Rampion 2 plus all consented projects (excluding SEP & DEP)	273	0.998 (<0.001)	0.936 (0.004)	0.20%	6.40%
		All projects	359	0.997 (<0.001)	0.917 (0.004)	0.30%	8.30%
		All projects (excluding Hornsea Four)	197	0.998 (<0.001)	0.953 (0.004)	0.20%	4.70%
	Secretary of State	Rampion 2 plus all consented projects only	774	0.994 (<0.001)	0.826 (0.003)	0.60%	17.40%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	322	0.997 (<0.001)	0.923 (0.004)	0.30%	7.70%
		Rampion 2 plus all consented projects (excluding SEP & DEP)	765	0.994 (<0.001)	0.829 (0.003)	0.60%	17.10%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		All projects	1,005	0.992 (<0.001)	0.781 (0.003)	0.80%	21.90%
		All projects (excluding Hornsea Four)	553	0.996 (<0.001)	0.873 (0.004)	0.40%	12.70%
	Natural England	Rampion 2 plus all consented projects only	1,936	0.985 (<0.001)	0.619 (0.003)	1.50%	38.10%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	805	0.994 (<0.001)	0.820 (0.003)	0.60%	18.00%
		Rampion 2 plus all consented projects (excluding SEP & DEP)	1,911	0.985 (<0.001)	0.624 (0.003)	1.50%	37.60%
		All projects	2,513	0.980 (<0.001)	0.538 (0.002)	2.00%	46.20%
		All projects (excluding Hornsea Four)	1,382	0.989 (<0.001)	0.713 (0.003)	1.10%	28.70%
95.2 km	Applicant	Rampion 2 plus all consented projects only	210	0.998 (<0.001)	0.949 (0.004)	0.20%	5.10%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	48	1.000 (<0.001)	0.990 (0.004)	0.00%	1.00%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented projects (excluding SEP & DEP)	206	0.998 (<0.001)	0.949 (0.004)	0.20%	5.10%
		All projects	292	0.998 (<0.001)	0.930 (0.004)	0.20%	7.00%
		All projects (excluding Hornsea Four)	131	0.999 (<0.001)	0.969 (0.004)	0.10%	3.10%
	Secretary of State	Rampion 2 plus all consented projects only	598	0.995 (<0.001)	0.867 (0.003)	0.50%	13.30%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	135	0.999 (<0.001)	0.966 (0.004)	0.10%	3.40%
		Rampion 2 plus all consented projects (excluding SEP & DEP)	578	0.995 (<0.001)	0.867 (0.004)	0.50%	13.30%
		All projects	818	0.994 (<0.001)	0.817 (0.004)	0.60%	18.30%
		All projects (excluding Hornsea Four)	366	0.997 (<0.001)	0.913 (0.004)	0.30%	8.70%
	Natural England	Rampion 2 plus all consented projects only	1,469	0.988 (<0.001)	0.695 (0.003)	1.20%	30.50%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented projects (excluding Hornsea Four)	338	0.997 (<0.001)	0.920 (0.004)	0.30%	8.00%
		Rampion 2 plus all consented projects (excluding SEP & DEP)	1444	0.989 (<0.001)	0.700 (0.003)	1.10%	30.00%
		All projects	2,045	0.984 (<0.001)	0.604 (0.003)	1.60%	39.60%
		All projects (excluding Hornsea Four)	915	0.993 (<0.001)	0.800 (0.003)	0.70%	20.00%

8.5.40 Following analysis of the range of outputs from the in-combination PVAs for the guillemot feature of the Flamborough and Filey Coast SPA they are largely indicative of minimal reductions (**Table 8-7**). The maximum predicted impact is when Hornsea Four is included in the in-combination assessments (that incorporate the 153.7 km foraging range) following the 70% Displacement and 5% Mortality of Natural England's preferred approach. This PVA predicts a potential 46.2% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a decrease in growth rate of 2.0%. However, this uppermost prediction is viewed as highly precautionary, as evidence from operational OWFs indicate that displacement rates for auks are significantly lower than those advocated for use in Natural England's preferred approach (MacArthur Green, 2023 and APEM, 2022). Therefore, the Applicant considers the more realistic scenario following the Applicant's Approach, which predicts a maximum potential for all modelled scenarios of 8.3% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a reduction in growth rate of 0.3% to be most appropriate for concluding assessments.

8.5.41 Colony-specific population growth trends for guillemot show a high degree of variability, likely associated with prey resources (Wanless et al., 2005) (**Table 8-8**). With the projected growth rate not expected to vary significantly from that of the baseline population in all modelling scenarios, the PVA model outputs fall within the high level of natural variation of population growth, indicating little to no true impact is likely.

Table 8-8 Average annual colony growth rate for guillemot colony for Flamborough and Filey Coast SPA between 2000 and 2022

Species	2000-2022	2008-2022	2017-2022
Guillemot	3.74%	4.16%	4.57%

8.5.42 When considering the displacement impacts from the Project in-combination with other plans and projects on the guillemot feature of the Flamborough to Filey Coast SPA, regardless of the impact scenario chosen the colony would still increase in size. This is due to the favourable condition of the colony as demonstrated by the consistent increasing growth rate from both historic and recent colony counts (**Table 8-8**). The favourable condition of the colony suggests strong resilience to any apparent change such as any potential displacement effect, and so the integrity of the guillemot feature of the FFC SPA will be maintained.

8.5.43 There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Flamborough to Filey Coast SPA in relation to displacement effects in the operation and maintenance phase from the project in-combination and, therefore, subject to natural change guillemot will be maintained as a feature in the long term.

Razorbill

8.5.44 The in-combination tables below (**Table 8-9** and **Table 8-10**) provide values from all consented and planned projects apportioned to the Flamborough and Filey Coast SPA. Totals are provided for the following scenarios:

- Rampion 2 plus all consented projects;
- Rampion 2 plus all consented projects (excluding Dudgeon and Sheringham Shoal Extension Projects); and
- All projects.

8.5.45 The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to consent for those projects being discussed during Rampion 2's Examination period. Splitting out in the manner presented accounts for any consent conclusions, such as removal of impact predictions from in-combination assessment in line with previous advice for consideration of projects where compensation is required. Therefore, scenarios including and excluding these projects have been provided.

8.5.46 Due to the different values for mean max plus one SD foraging range for razorbill (Woodward *et al.*, 2019) two in-combination tables are provided as the use of the different foraging ranges will include or exclude different projects within the breeding season.

8.5.47 Displacement matrices for all displacement rate and mortality rate scenarios are provided for the annual totals in **Appendix K In-combination assessment update for guillemot and razorbill**.

© WSP UK Limited

Table 8-9 In-combination abundance totals for razorbill attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 164.6 km)

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Beatrice	0	28	15	28	72	1a
Blyth Demonstration Site	0	3	2	3	8	1a
Dudgeon	0	12	20	12	44	1a
EOWDC	0	2	0	1	3	1a
Galloper	0	2	3	13	18	1a
Greater Gabbard	0	0	11	3	13	1a
Gunfleet Sands	0	0	1	0	1	1a
Humber Gateway	0	1	0	1	2	1a
Hywind 2 Demonstration	0	24	0		25	1a
Kentish Flats	-	-	-	-	0	1a
Kentish Flats Extension	-	-	-	-	0	1a

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Lincs, Lynn & Inner Dowsing	0	1	1	1	3	1a
London Array	0	1	0	1	2	1a
Methil	0	0	0	0	0	1a
Race Bank	0	1	1	1	4	1a
Rampion	0	2	34	113	149	1a
Scroby Sands	-	-	-	-	0	1a
Sheringham Shoal	0	46	6	1	52	1a
Teesside	0	2	0	1	3	1a
Thanet	0	0	0	1	1	1a
Westermost Rough	91	4	4	3	102	1a
East Anglia One	0	1	4	11	17	1a
Hornsea Project One	535	164	41	61	800	1a
Hornsea Project Two	1,210	144	19	57	1,430	1a
Moray East	0	38	1	6	44	1b

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Triton Knoll	0	9	23	4	36	1b
Kincardine	0	0	0	0	0	1b
Dogger Bank- A	375	54	47	141	616	1c
Dogger Bank -B	461	71	58	174	764	1c
Dogger Bank C	250	11	26	65	352	1c
East Anglia Three	0	38	41	52	130	1c
Inch Cape	0	98	18	-	115	1c
Moray West	0	121	5	122	247	1c
Neart na Gaoithe	0	187	14	-	200	1c
Seagreen Alpha	0	0	30	-	30	1c
Seagreen Bravo	0	0	34	-	34	1c
Sofia	346	20	39	100	505	1c
Hornsea Three	0	69	99	72	240	1c
Norfolk Boreas	0	9	29	12	49	1c
Norfolk Vanguard	0	30	23	31	84	1c

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
East Anglia ONE North	0	3	2	7	11	1c
East Anglia TWO	0	2	4	8	13	1c
Pentland	0	1	1	1	3	1c
Hornsea Four (Natural England's Bespoke Approach)	386	2,845	13	15	3,259	1c
Forth Wind	-	3	2	3	7	1c
Dudgeon Extension Project (DEP)	0	31	23	11	65	1c
Sheringham Shoal Extension Project (SEP)	0	11	19	5	35	1c
Rampion 2	0	1	33	213	247	1d
Total (Rampion 2 plus all consented projects except DEP & SEP)	**3,653**	**4,044**	**699**	**1,338**	**9,735**	

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Total (Rampion 2 plus all consented projects only)	**3,653**	**4,086**	**741**	**1,354**	**9,835**	
Green Volt	0	-	-2	-	2	1d
West of Orkney	0	-	5	-	5	1d
Berwick Bank	0	301	38	254	593	1d
Dogger Bank South	-	-	-	-	-	2
Outer dowsing (PEIR)	2,737	80	23	178	3,017	2
Five Estuaries (PEIR)	0	10	10	26	46	2
North Falls (PEIR)	0	9	726	1,304	2,039	2
Total (All Projects)	**6,390**	**4,485**	**1,545**	**3,117**	**15,537**	

© WSP UK Limited

Table 8-10 In-combination abundance totals for guillemot attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 122.2 km)

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Beatrice	0	28	15	28	72	1a
Blyth Demonstration Site	0	3	2	3	8	1a
Dudgeon	0	12	20	12	44	1a
EOWDC	0	2	0	1	3	1a
Galloper	0	2	3	13	18	1a
Greater Gabbard	0	0	11	3	13	1a
Gunfleet Sands	0	0	1	0	1	1a
Humber Gateway	0	1	0	1	2	1a
Hywind 2 Demonstration	0	24	0		25	1a
Kentish Flats	-	-	-	-	0	1a
Kentish Flats Extension	-	-	-	-	0	1a
Lincs, Lynn & Inner Dowsing	0	1	1	1	3	1a
London Array	0	1	0	1	2	1a

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Methil	0	0	0	0	0	1a
Race Bank	0	1	1	1	4	1a
Rampion	0	2	34	113	149	1a
Scroby Sands	-	-	-	-	0	1a
Sheringham Shoal	0	46	6	1	52	1a
Teesside	0	2	0	1	3	1a
Thanet	0	0	0	1	1	1a
Westermost Rough	91	4	4	3	102	1a
East Anglia One	0	1	4	11	17	1b
Hornsea Project One	535	164	41	61	800	1b
Hornsea Project Two	1,210	144	19	57	1,430	1b
Moray East	0	38	1	6	44	1b
Triton Knoll	0	9	23	4	36	1b
Kincardine	0	0	0	0	0	1b
Dogger Bank A	0	54	47	141	241	1c

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Dogger Bank B	0	71	58	174	303	1c
Dogger Bank C	0	11	26	65	102	1c
East Anglia Three	0	38	41	52	130	1c
Inch Cape	0	98	18	-	115	1c
Moray West	0	121	5	122	247	1c
Neart na Gaoithe	0	187	14	-	200	1c
Seagreen Alpha	0	0	30	-	30	1c
Seagreen Bravo	0	0	34	-	34	1c
Sofia	0	20	39	100	159	1c
Hornsea Three	0	69	99	72	240	1c
Norfolk Boreas	0	9	29	12	49	1c
Norfolk Vanguard	0	30	23	31	84	1c
East Anglia ONE North	0	3	2	7	11	1c
East Anglia TWO	0	2	4	8	13	1c
Pentland	0	1	1	1	3	1c

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Hornsea Four (Natural England's Bespoke Approach)	386	2,845	13	15	3,259	1c
Forth Wind	-	3	2	3	7	1c
Dudgeon Extension Project (DEP)	0	31	23	11	65	1c
Sheringham Shoal Extension Project (SEP)	0	11	19	5	35	1c
Rampion 2	0	1	33	213	247	1d
Total (Rampion 2 plus all consented projects only)	**2,221**	**4,086**	**741**	**1,354**	**8,403**	
Total (Rampion 2 plus all consented projects except DEP & SEP)	**2,221**	**4,044**	**699**	**1,338**	**8,303**	
Green Volt	0	-	2	-	2	1d
West of Orkney	0	-	5	-	5	1d
Berwick Bank	0	301	38	254	593	1d
Dogger Bank South	-	-	-	-	-	2
Outer dowsing (PEIR)	2,737	80	23	178	3,017	2
Five Estuaries (PEIR)	0	10	10	26	46	2

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
North Falls (PEIR)	0	9	726	1,304	2,039	2
Total (All Projects)	**4,958**	**4,485**	**1,545**	**3,117**	**14,105**	

© WSP UK Limited

Table 8-11 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the 164.6 km mean max plus one SD foraging range (Applicant's approach)

Bio-season	Projects included within seasonal totals	Seasonal abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	9,735	21,140	2,220	48.7	2.19%
	Rampion 2 plus all consented projects only	9,835			49.2	2.22%
	All projects	15,537			77.7	3.50%
	Rampion 2 plus all consented projects (except DEP & SEP)	9,735	59,055	6,201	48.7	0.78%
	Rampion 2 plus all consented projects only	9,835			49.2	0.79%
	All projects	15,537			77.7	1.25%

Table 8-12 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the 122.2 km mean max plus one SD foraging range (Applicant's approach)

Bio-season	Projects included within seasonal totals	Seasonal abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	8,303	21,140	2,220	41.5	1.87%
	Rampion 2 plus all consented projects only	8,403			42.0	1.89%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
	All projects	14,105			70.5	0.50%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,303	59,055	6,201	41.5	0.67%
	Rampion 2 plus all consented projects only	8,403			42.0	0.68%
	All projects	14,105			70.5	0.18%

© WSP UK Limited

Table 8-13 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the mean max plus one SD foraging range of 164.6 km (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1% Mort - 10	70% Disp 2% Mort	70% Disp 5% Mort
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	9,735	21,140	2,220	29.2 – 681.4	136.3	340.7	1.32 – 30.70%	6.14%	15.35%
	Rampion 2 plus all consented projects only	9,835			29.5 – 688.4	137.7	344.2	1.33 – 31.01%	6.20%	15.51%
	All projects	15,537			46.6 – 1,087.6	217.5	543.8	2.10 – 49.00%	9.80%	24.50%
	Rampion 2 plus all consented projects (except DEP & SEP)	9,735	59,055	6,201	29.2 – 681.4	136.3	340.7	0.47 – 10.99%	2.20%	5.49%
	Rampion 2 plus all consented projects only	9,835			29.5 – 688.4	137.7	344.2	0.48 – 11.10%	2.22%	5.55%
	All projects	15,537			46.6 – 1,087.6	217.5	543.8	0.75 – 17.54%	3.51%	8.77%

Table 8-14 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the mean max plus one SD foraging range of 122.2 km (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1% Mort - 10	70% Disp 2% Mort	70% Disp 5% Mort
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	8,303	21,140	2,220	24.9 – 581.2	116.2	290.6	1.12 – 26.18%	5.24%	13.09%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1% Mort - 10	70% Disp 2% Mort	70% Disp 5% Mort
	Rampion 2 plus all consented projects only	8,403			25.2 – 588.2	117.6	294.1	1.14 – 26.50%	5.30%	13.25%
	All projects	14,105			42.3 – 987.3	197.5	493.7	1.91 – 44.48%	8.90%	22.24%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,303	59,055	6,201	24.9 – 581.2	116.2	290.6	0.40 – 9.37%	1.87%	4.69%
	Rampion 2 plus all consented projects only	8,403			25.2 – 588.2	117.6	294.1	0.41 – 9.49%	1.90%	4.74%
	All projects	14,105			42.3 – 987.3	197.5	493.7	0.68 – 15.92%	3.18%	7.96%

© WSP UK Limited

8.5.48 The impact assessments for disturbance and displacement for the razorbill feature of FFC SPA are provided in **Table 8-11** to **Table 8-14**. The assessments illustrate an increase in mortality relative to baseline mortality exceeding the 1% threshold and so population viability analysis (PVA) has been conducted.

8.5.49 The full methods for PVA undertaken for the razorbill feature of the FFC SPA are outlined **Appendix K In-combination assessment update for guillemot and razorbill**, which was submitted as part of the Rampion 2 examination process. This included a description of the modelling approach; an overview of the demographic parameters used within the model; and PVA validation. The outputs of the PVA are provided in **Table 8-15**.

© WSP UK Limited

Table 8-15 PVA results using Seabird PVA Tool for impacts to the Flamborough and Filey Coast SPA razorbill population showing displacement in-combination outputs for various scenarios

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
164.6	Applicant	Rampion 2 plus all consented projects (except DEP & SEP)	49	0.999 (<0.001)	0.971 (0.012)	0.1%	2.9%
		Rampion 2 plus all consented projects only	49	0.999 (<0.001)	0.971 (0.012)	0.1%	2.9%
		All projects	78	0.998 (<0.001)	0.953 (0.012)	0.2%	4.7%
	Secretary of State	Rampion 2 plus all consented projects (except DEP & SEP)	136	0.997 (<0.001)	0.919 (0.012)	0.3%	8.1%
		Rampion 2 plus all consented projects only	138	0.997 (<0.001)	0.919 (0.012)	0.3%	8.1%
		All projects	218	0.996 (<0.001)	0.873 (0.011)	0.4%	12.7%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
	Natural England	Rampion 2 plus all consented projects (except DEP & SEP)	341	0.993 (<0.001)	0.808 (0.011)	0.7%	19.2%
		Rampion 2 plus all consented projects only	344	0.993 (<0.001)	0.808 (0.011)	0.7%	19.2%
		All projects	544	0.989 (<0.001)	0.713 (0.010)	1.1%	28.7%
122.2	Applicant	Rampion 2 plus all consented projects (except DEP & SEP)	42	0.999 (<0.001)	0.975 (0.012)	0.1%	2.5%
		Rampion 2 plus all consented projects only	42	0.999 (<0.001)	0.975 (0.012)	0.1%	2.5%
		All projects	71	0.999 (<0.001)	0.957 (0.012)	0.1%	4.3%
	Secretary of State	Rampion 2 plus all consented projects (except DEP & SEP)	116	0.998 (<0.001)	0.930 (0.012)	0.2%	7.0%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented projects only	118	0.998 (<0.001)	0.930 (0.012)	0.2%	7.0%
		All projects	198	0.996 (<0.001)	0.886 (0.011)	0.4%	11.4%
	Natural England	Rampion 2 plus all consented projects (except DEP & SEP)	291	0.994 (<0.001)	0.836 (0.011)	0.6%	16.4%
		Rampion 2 plus all consented projects only	294	0.994 (<0.001)	0.833 (0.011)	0.6%	16.7%
		All projects	494	0.990 (<0.001)	0.734 (0.010)	1.0%	26.6%

8.5.50 Following analysis of the range of outputs from the in-combination PVAs for the razorbill feature of the Flamborough and Filey Coast SPA they are largely indicative of minimal reductions (**Table 8-15**). The maximum predicted impact is reached when a foraging range of 164.6 km is used to assess in-combination projects and the 70% Displacement and 5% Mortality of Natural England's preferred approach is used. This PVA predicts a potential 28.7% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a decrease in growth rate of 1.1%. However, this uppermost prediction is viewed as highly precautionary, as evidence from operational OWFs indicate that displacement rates for auks are significantly lower than those advocated for use in Natural England's preferred approach (MacArthur Green, 2023 and APEM, 2022). Therefore, the Applicant considers the more realistic scenario following the Applicant's Approach, which predicts a maximum potential for all modelled scenarios of 4.7% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a reduction in growth rate of 0.2% to be most appropriate for concluding assessments.

8.5.51 Colony -specific population growth trends for razorbill show a high degree of variability (**Table 8-16**). With the projected growth rate not expected to vary significantly from that of the baseline population in all modelling scenarios, the PVA model outputs fall within the high level of natural variation of population growth, indicating little to no true impact is likely.

Table 8-16 Average annual colony growth rate for razorbill colony for Flamborough and Filey Coast SPA between 2000 and 2022

Species	2000-2022	2008-2022	2017-2022
Razorbill	7.79%	8.02%	9.52%

8.5.52 Regardless of the impact scenario chosen the colony would still increase in size. This is due to the favourable condition of the colony as demonstrated by the consistent increasing growth rate from both historic and recent colony counts (**Table 8-16**). The favourable condition of the colony suggests strong resilience to any apparent change such as any potential displacement effect, and so the integrity of the razorbill feature of the FFC SPA will be maintained.

8.5.53 There is, therefore, no potential for an Adverse Effect on Site Integrity (AEoSI) to the conservation objectives of the razorbill feature of Flamborough to Filey Coast SPA in relation to displacement effects in the operation and maintenance phase from the Project in-combination and, therefore, subject to natural change razorbill will be maintained as a feature in the long term.

© WSP UK Limited

Farne Islands SPA

Features and effects for assessment

8.5.54 As per **paragraph 8.5.14**, the potential for LSEs from the Proposed Development in-combination has been identified as requiring further assessment for the following qualifying feature associated with the Farne Islands SPA:

- Guillemot (non-breeding bio-season), operational and maintenance phase, disturbance and displacement.

Farne Islands SPA - Operation and maintenance (disturbance and displacement)

Assessment

Guillemot

8.5.55 3.3.1 The in-combination table below (**Table 8-17**) provides values from all consented and planned projects apportioned to the Farne Islands SPA. Totals are provided for the following scenarios:

- Rampion 2 plus all consented projects;
- Rampion 2 plus all consented projects (excluding Dudgeon and Sheringham Shoal Extension Projects-); and
- All projects.

8.5.56 The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to consent for those projects being decided within Rampion 2's Examination period. Splitting out in the manner presented accounts for any consent conclusions, such as removal of impact predictions from in-combination assessment in line with previous advice for consideration of projects where compensation is required. Therefore, scenarios including and excluding these projects have been provided.

8.5.57 Regardless of which of the two foraging ranges (95.2 km or 153.7 km) for guillemot is used (Woodward et al., 2019) to identify theoretical breeding season connectivity, the overall in-combination abundance total apportioned the Farne Islands SPA remains the same.

8.5.58 It should be noted that despite a number of Scottish OWF projects (Inch Cape, Nearte na Gaoithe and Seagreen) being within foraging range, and so having theoretical connectivity during the breeding season, predicted impacts during the breeding season were instead entirely apportioned to Scottish SPAs closer to the projects. Therefore, no abundance for such projects were attributed to the Farne Islands SPA during the breeding season.

8.5.59 Additionally, no quantitative Farne Islands SPA assessment information was available for Teeside OWF to be able to apportion abundance from the project during the breeding season.

8.5.60 Displacement matrices for all displacement rate and mortality rate scenarios are provided for the annual totals in **Appendix K In-combination assessment update for guillemot and razorbill**.

Table 8-17 In-combination abundance totals for guillemot attributed to the Farne Islands SPA

Project	Breeding	Non-breeding	Annual	Tier
Beatrice	0	103	103	1a
Blyth Demonstration Site	-	49	49	1a
Dudgeon	0	20	20	1a
EOWDC	0	8	8	1a
Galloper	0	22	22	1a
Greater Gabbard	0	20	20	1a
Gunfleet Sands	0	14	14	1a
Humber Gateway	0	5	5	1a
Hywind 2 Demonstration	0	80	80	1a
Kentish Flats Extension	0	0	0	1a
Kentish Flats	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	30	30	1a
London Array	0	14	14	1a
Methil	0	0	0	1a
Race Bank	0	26	26	1a
Rampion	0	579	579	1a
Scroby Sands	0	-	0	1a
Sheringham Shoal	0	27	27	1a
Teesside	0	34	34	1a
Thanet	0	5	5	1a

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Westermost Rough	0	18	18	1a
East Anglia One	0	24	24	1b
Hornsea Project One	0	302	302	1b
Hornsea Project Two	0	491	491	1b
Moray East	0	20	20	1b
Triton Knoll	0	28	28	1b
Kincardine	0	0	0	1b
Dogger Bank A	0	229	229	1c
Dogger Bank B	0	396	396	1c
Dogger Bank C	0	85	85	1c
East Anglia Three	0	107	107	1c
Inch Cape	0	119	119	1c
Moray West	0	1,424	1,424	1c
Neart na Gaoithe	0	140	140	1c
Seagreen Alpha	0	175	175	1c
Seagreen Bravo	0	153	153	1c
Sofia	0	138	138	1c
Hornsea Three	0	663	663	1c
Norfolk Boreas	0	514	514	1c
Norfolk Vanguard	0	178	178	1c
East Anglia ONE North	0	70	70	1c
East Anglia TWO	0	62	62	1c
Pentland	0	24	24	1c
Forth Wind	0	15	15	1c

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Hornsea Four (Natural England's Standard Approach)	0	1,379	1,379	1c
Dudgeon Extension Project (DEP)	-	555	555	1c
Sheringham Shoal Extension Project (SEP)	-	41	41	1c
Rampion 2	0	214	214	1d
Total (Rampion 2 plus all consented projects except DEP & SEP)	**0**	**8,005**	**8,005**	
Total (Rampion 2 plus all consented projects only)	**~~0~~**	**8,601**	**8,601**	
Green Volt	0	601	601	1d
West of Orkney	0	160	160	1d
Berwick Bank	2,949	1,648	4,597	1d
Dogger Bank South	0	-	-	2
Outer dowsing	0	830	830	2
Five Estuaries (PEIR)	-	138	138	2
North Falls (PEIR)	-	168	168	2
Total (All Projects)	**2,949**	**12,145**	**15,094**	

© WSP UK Limited

Table 8-18 Farne Islands SPA guillemot in-combination operation and maintenance phase displacement estimates (Applicant's approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	Farne Islands SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	65,751	4,011	40.0	1.00%
	Rampion 2 plus all consented projects only	8,601			43.0	1.07%
	All projects	15,094			75.5	1.88%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	62,085	3,787	40.0	1.06%
	Rampion 2 plus all consented projects only	8,601			43.0	1.14%
	All projects	15,094			75.5	1.99%

© WSP UK Limited

Table 8-19 Farne Islands SPA guillemot in-combination operation and maintenance phase displacement estimates (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	Farne Islands SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	65,751	4,011	24.0 – 560.4	112.1	280.2	0.60 – 13.97%	2.79%	6.99%
	Rampion 2 plus all consented projects only	8,601			25.8 – 602.1	120.4	301.0	0.64 – 15.01%	3.00%	7.51%
	All projects	15,094			43.3 – 1,056.6	211.3	528.3	1.13 – 26.34%	5.27%	13.17%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	62,085	3,787	24.0 – 560.4	112.1	280.2	0.63 – 14.80%	2.96%	7.40%
	Rampion 2 plus all consented projects only	8,601			25.8 – 602.1	120.4	301.0	0.68 – 15.90%	3.18%	7.95%
	All projects	15,094			43.3 – 1,056.6	211.3	528.3	1.20 – 27.90%	5.58%	13.95%

© WSP UK Limited

8.5.61 The impact assessments for disturbance and displacement for the guillemot feature of the Farne Islands SPA are provided in **Table 8-18** and **Table 8-19**. The assessments illustrate an increase in mortality relative to baseline mortality exceeding the 1% threshold and so population viability analysis (PVA) has been conducted.

8.5.62 The full methods for PVA undertaken for the guillemot feature of the Farne Islands SPA are outlined within **Appendix K In-combination assessment update for guillemot and razorbill**, which was submitted as part of the Rampion 2 examination process. This included a description of the modelling approach; an overview of the demographic parameters used within the model; and PVA validation. The outputs of the PVA are provided in **Table 8-15**

© WSP UK Limited

Table 8-20 PVA results using Seabird PVA Tool for impacts to the Farne Islands SPA guillemot population showing displacement in-combination outputs for various scenarios

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
153.7	Applicant	Rampion 2 plus all consented projects (except DEP & SEP)	40	0.999 (<0.001)	0.979 (0.005)	0.1%	2.1%
		Rampion 2 plus all consented projects only	43	0.999 (<0.001)	0.976 (0.005)	0.1%	2.4%
		All projects	76	0.999 (<0.001)	0.959 (0.005)	0.1%	4.1%
	Secretary of State	Rampion 2 plus all consented projects (except DEP & SEP)	112	0.998 (<0.001)	0.939 (0.005)	0.2%	6.1%
		Rampion 2 plus all consented projects only	120	0.998 (<0.001)	0.936 (0.005)	0.2%	6.4%
		All projects	211	0.996 (<0.001)	0.888 (0.005)	0.4%	11.2%
	Natural England	Rampion 2 plus all consented projects (except DEP & SEP)	280	0.995 (<0.001)	0.855 (0.005)	0.5%	14.5%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented projects only	301	0.995 (<0.001)	0.846 (0.005)	0.5%	15.4%
		All projects	528	0.990 (<0.001)	0.743 (0.004)	1.0%	25.7%

8.5.63 Following analysis of the range of outputs from the in-combination PVAs for the guillemot feature of the Farne Islands SPA they are largely indicative of minimal reductions (**Table 8-20**). The maximum predicted impact is reached when using a 70% Displacement and 5% Mortality of Natural England's preferred approach. This PVA predicts a potential 23.6% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a decrease in growth rate of 0.9% per annum. However, this uppermost prediction is viewed as highly precautionary, as recent evidence from operational OWFs indicate that displacement rates for auks are significantly lower than those advocated for use in Natural England's preferred approach (MacArthur Green, 2023 and APEM, 2022 & 2023). Therefore, the Applicant considers the more realistic scenario following the Applicant's Approach, which predicts a maximum potential for all modelled scenarios of 4.1% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a reduction in growth rate of 0.1% to be most appropriate for concluding assessments.

8.5.64 Colony -specific population growth trends for guillemot show a high degree of variability, likely associated with prey resources (Wanless et al., 2005) (**Table 8-21**). With the projected growth rate not expected to vary significantly from that of the baseline population in all modelling scenarios, the PVA model outputs fall within the high level of natural variation of population growth, indicating little to no true impact is likely.

Table 8-21 Average annual colony growth rate for guillemot colony for Farne Islands SPA between 1990 and 2023

Species	1990-2023	1997-2023	2004-2023	2011-2023	2018-2023
Guillemot	3.01%	1.08%	0.31%	-0.29%	-1.50%

8.5.65 When considering the displacement impacts from the Project in-combination with other plans and projects on the guillemot feature of the Farne Islands SPA, the variability in colony growth and the Project's minimal contribution, it is not expected that any scenario would significantly affect the predicted population trend. When considering the annual colony growth rates (**Table 8-21**) the guillemot feature at the Farne Islands SPA has shown reductions since the early 2000's. The reductions in colony growth are a 'natural' occurrence in many guillemot colonies, with mass mortality events occurring sporadically within non-breeding seasons. This has been described in 2013 – 2014 and 2018 – 2019 (Burnell et al., 2023). In addition, recent surveys on the effects of the Highly Pathogenic Avian Influenza (HPAI) on seabird colonies around the UK have shown declines in guillemots at the Farne Islands SPA since the outbreak of the virus (Tremlett et al., 2024), further aiding in the represented colony growth reduction.

8.5.66 A consideration needs to be had for the in-combination results that are being modelled within the PVA tool. When considering only consented projects and the Proposed Development, there are currently no in-combination values apportioned to the Farne Islands SPA within the breeding season. It is expected that if the

presence of OWFs were to effect guillemots then the greatest level of effect would be expected during the breeding season where birds foraging is restricted, and birds are under additional stressors from breeding. As connectivity is therefore limited to the non-breeding season, the Applicant therefore considers a displacement rate of 50% displacement and 1% mortality to be most appropriate, which at most predicts a reduction in growth rate of 0.1% per annum. Regardless of the current status of the population such a reduction in growth rate would almost certainly be indistinguishable from natural fluctuations in the population. Furthermore the Applicant's maintains the position that the project's contribution to any in-combination effect can be considered non material given the highly limited connectivity and minimal level of predicted impact.

8.5.67 There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Farne Islands SPA in relation to displacement effects in the operation and maintenance phase from the Project in-combination and, therefore, subject to natural change guillemot will be maintained as a feature in the long term.

Alde-Ore Estuary SPA

Features and effects for assessment

8.5.338.5.68 The potential for LSEs from the Proposed Development in-combination has been identified by Natural England as requiring further assessment for the following qualifying feature associated with the Alde-Ore Estuary SPA:

- Lesser black-backed gull (migratory bio-season), operation and maintenance Phase, collision risk.

Assessment

8.5.348.5.69 The collision mortality from the Proposed Development apportioned to lesser black-backed gulls from the Alde-Ore Estuary SPA is approximately zero individuals in any given bio-season (**Table 7-9**) and a total of 0.018 birds annually. This rate of collision mortality is so small as to be entirely negligible, as it would most likely not equate to a single actual incidence of mortality of a bird associated with the Alde-Ore Estuary SPA within the entire lifespan of the Proposed Development (up to 0.54 collisions in a 30-year period). Therefore, the Proposed Development makes no meaningful contribution to any potential in-combination effects on this species at the Alde-Ore Estuary SPA.

8.5.358.5.70 The Applicant recognises recent decisions from the SoS that there is a potential AEoI for the lesser black-backed gull feature of the Alde-Ore Estuary SPA as a result of other plans and projects in-combination (SoS, 2022a). However, for the reasons presented in this RIAA the Proposed Development is not contributing any detectable impact or effect on lesser black-backed gulls from the Alde-Ore Estuary SPA and therefore is not contributing in any way to this potential AEoI.

Conclusion

8.5.368.5.71 **There is, therefore, no potential for an increased risk of an AEoI to the conservation objectives of the lesser black-backed gull feature of the Alde-Ore Estuary SPA in relation to collision effects from the Proposed Development in-combination with other OWFs and therefore, subject to natural change, lesser black-backed gull will be maintained as a feature in the long term with respect to the potential for adverse effects from collision**.

Alderney West Coast and Burhou Islands Ramsar

Features and effects for assessment

8.5.378.5.72 The potential for LSEs from the Proposed Development in-combination as has been identified for the following for Alderney West Coast and Burhou Islands Ramsar:

- gannet (breeding and migratory bio-season), operation and maintenance Phase, collision risk; and
- gannet (breeding and migratory bio-seasons), operation and maintenance Phase, disturbance / displacement.

Relevant external plans and projects

8.5.388.5.73 During the migratory bio-seasons, in-combination effects are considered for all OWFs within the relevant BDMPS for the feature. During the breeding season, in-combination effects are considered for OWFs within the mean-max foraging range of the feature from colonies within Alderney West Coast and Burhou Islands Ramsar (or from the site as a whole if the location of breeding colonies is uncertain).

Alderney West Coast and Burhou Islands Ramsar - Operation and maintenance (Collision risk)

~~Collision risk~~

Overview

8.5.398.5.74 Seabirds flying through the array area during the operation and maintenance phase of the Proposed Development may be at risk of collision with WTGs. It is assumed that any such collision would be fatal. This risk would be present throughout the array area, and for the entire period of operation of the Proposed Development. The MDS used for assessment is given in **Table 3-2**. In order to assess the risk resulting from potential collisions, CRM has been carried out as described in **Appendix 12.3: Offshore and intertidal ornithology collision risk modelling, Volume 4** of the ES (Document Reference: 6.4.12.3).

8.5.408.5.75 The Applicant is committed to minimising environmental impacts, and has made the following commitments to minimise the risk of collision:

- C – 89: There will be a minimum blade tip clearance of at least 22m above MHWS.

8.5.418.5.76 As described in **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12), for each pathway discussed in this section, it was concluded that there will be no significant effect from the Proposed Development alone at the EIA level.

Gannet

8.5.428.5.77 Gannet has been screened into the assessment of the operation and maintenance phase based on the density of birds in flight in the array area and its flight behaviour that places it at risk of collision with the turning blades of the WTGs. Gannet has been screened in for both the breeding and migratory bio-seasons (there is no migration free winter bio-season for this species) in relation to the Alderney West Coast and Burhou Islands Ramsar since birds breeding at this colony may forage within the Proposed Development array area during the breeding bio-season or pass through it during migratory bio-seasons as they follow a potential clockwise loop migration around the UK (Fort *et al*., 2012; Furness *et al*., 2018).

8.5.438.5.78 During the breeding bio-season, when birds are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, it can be expected that the area in and around the Proposed Development will potentially contain a higher proportion of adult birds that can be attributed to those designated sites within foraging range. The Alderney West Coast and Burhou Islands Ramsar lies within the mean max foraging distance (+1SD) of gannet (315.5±194.2 km Woodward *et al*., 2019), along with two other designated sites. Predicted collision mortality for the Proposed Development alone has therefore been apportioned to each of these sites following SNH guidance (2018).

8.5.448.5.79 Outside the breeding bio-season, when the population contains a mix of birds from UK breeding colonies and breeding colonies from further away, then a much lower percentage of birds can be attributed to any particular breeding colony SPA population. In the migratory bio-season the information on populations contained in Furness (2015) is applied for the same purpose of apportionment.

8.5.458.5.80 A generic population age ratio of gannets has been used of 0.547 adults across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

8.5.468.5.81 The collision totals for all OWFs within the relevant area[35] are presented in **Table 8-22**. The latest values for collision mortality are those submitted at Deadline 2 of the examination for Sheringham and Dudgeon Extension Projects (Equinor, 2023). It is noted that the collision values presented (Equinor, 2023) apply a new avoidance rate based on Ozsanlev-Harris et al. (2023) and also a 70% macro-avoidance rate, following the advice of Natural England in their

[35] These OWFs were identified following a review of gannet distribution in the non-breeding / migratory bio-seasons, with Furness (2015) apportionment applied for the first time for this Ramsar.

Relevant Representation (Natural England, 2022). The values presented by Sheringham and Dudgeon Extension (Equinor, 2023) have been further updated with the Rampion 2 latest values with additional impact values from Berwick Bank OWF (SSE Renewables, 2022), Green Volt floating OWF (Green Volt, 2023) and ForthWind OWF (ForthWind Ltd., 2022) and Five Estuaries OWF (Five Estuaries Wind Farm Ltd, 2023).

Table 8-22 Gannet: In-combination collision mortality estimates after accounting for macro-avoidance from projects across all bio-seasons with connectivity to Alderney West Coast and Burhou Islands Ramsar (pre-apportionment)

External project	Migration-free breeding	Post-breeding migration	Return migration	Total
Beatrice	-	10.6	2.1	12.7
Blyth Demonstration Site	-	0.5	0.6	1.1
Dudgeon	-	8.5	4.2	12.7
East Anglia One	-	28.6	1.4	30
EOWDC	-	1.1	0	1.1
Galloper	-	6.7	2.7	9.4
Greater Gabbard	-	1.9	1	2.9
Gunfleet Sands	-	-	-	0.0
Hornsea Project One	-	7.0	4.9	11.9
Humber Gateway	-	0.2	0.3	0.5
Hywind 2 Demonstration	-	0.2	0.2	0.4
Kentish Flats	-	0.2	0.2	0.4
Kentish Flats Extension	-	-	-	0.0
Kincardine	-	0.0	0.0	0.0
Lincs, Lynn & Inner Dowsing	-	0.3	0.5	0.8
London Array	-	0.3	0.4	0.7
Methil	-	0.0	0.0	0
Race Bank	-	2.6	0.9	3.5

© WSP UK Limited

External project	Migration-free breeding	Post-breeding migration	Return migration	Total
Rampion	7.9	13.9	0.5	22.3
Scroby Sands	-	-	-	0
Sheringham Shoal		0.8	0.0	0.8
Teesside		0.4	0.0	0.4
Thanet	-	0.0	0.0	0.0
Westermost Rough	-	0.0	0.0	0.0
Hornsea Project Two	-	3.1	1.3	4.4
Moray East	-	7.7	1.9	9.6
Neart na Gaoithe	-	10.3	5	15.3
Seagreen Alpha & Bravo	-	10.8	14.4	25.2
Triton Knoll	-	14	6.6	20.6
Dogger Bank A & B	-	18.2	11.9	30.1
Dogger Bank C & Sofia	-	2.2	2.4	4.6
East Anglia Three	-	7.3	2.1	9.4
Hornsea Three	-	1.1	0.9	2
Inch Cape	-	6.4	1.1	7.5
Moray West	-	0.4	0.2	0.6
Norfolk Vanguard	-	4.1	1.2	5.3
Norfolk Boreas	-	2.8	0.9	3.7
East Anglia ONE North	-	2.4	0.2	2.6
East Anglia TWO	-	5.0	0.9	5.9
Total excluding Rampion 2 (Consented Projects)	**7.9**	**179.6**	**70.9**	**258.4**
Rampion 2	2.9	1.4	0.6	4.9
Total (Rampion 2 & Consented Projects)	**10.8**	**181.0**	**71.5**	**263.3**

External project	Migration-free breeding	Post-breeding migration	Return migration	Total
Berwick Bank	-	3.9	0.7	4.6
Green Volt	-	0.1	0.6	0.7
ForthWind Offshore Wind Demonstration Project - phase 1	-	0.0	0.0	0.0
Five Estuaries	-	2.3	0.2	2.5
Total (All Projects)	**10.8**	**189.1**	**73.2**	**273.1**

Breeding

~~8.5.47~~8.5.82 The predicted collision resultant mortality from the operation of all relevant OWFs in the breeding bio-season is approximately 11 individuals, of which approximately 6 are assumed to be breeding adults. Mortality during the breeding bio-season was apportioned to the Alderney West Coast and Burhou Islands Ramsar following the SNH (2018) method for the Proposed Development. As the Proposed Development is immediately adjacent to Rampion 1, the same result has been used for apportionment. Following this method, 63.1% of breeding age individuals subject to collision risk may be attributed to Alderney West Coast and Burhou Islands Ramsar. On this basis, of the approximately 6 adult birds predicted to be subject to collision mortality, 3.7 breeding adults would be attributable to this site. Given the annual background mortality for this site is 1,527 individuals (based on an adult survival rate of 0.919; see **Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)) then this prediction of 3.7 adult birds subject to collision mortality would represent a 0.24% increase in mortality relative to baseline mortality.

Non-breeding

~~8.5.48~~8.5.83 The predicted collision resultant mortality as a result of the operation of all relevant OWFs in the Return migration bio-season is 73 individuals and in the post-breeding migration bio-season is 189 individuals (there is no migration free winter bio-season). In total, 262 birds are predicted to be subject to collision related mortality during the migratory bio-season.

~~8.5.49~~8.5.84 In the non-breeding season these birds will have come from a range of seabird breeding colonies in the UK and overseas. The UK North Sea and Channel population during the post-breeding season is estimated to be 456,298 individuals (Furness, 2015). During the return migration, an estimated 248,385 individuals are present in the UK North Sea and Channel (Furness, 2015). Breeding adults from the Alderney West Coast and Burhou Islands Ramsar are considered to contribute to 1.24% of the UK North Sea and Channel population during the post-breeding migration and 2.28% during the return migration. On that basis approximately 4 breeding adults subject to collision consequent mortality can

be attributed to the site. This represents a potential 0.26% increase in mortality relative to baseline mortality.

Conclusion

~~8.5.50~~8.5.85 The increase in mortality relative to baseline mortality of 0.24% in the breeding bio-season and 0.26% in the non-breeding season (totalling 0.51% annually) is below the 1% threshold typically used as a benchmark for further population modelling.

~~8.5.51~~8.5.86 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Alderney West Coast and Burhou Islands Ramsar in relation to collision effects from the Proposed Development in combination with other OWFs and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from collisions.**

Alderney West Coast and Burhou Islands Ramsar - Operation and maintenance (Disturbance and displacement)

~~Disturbance and displacement~~

Gannet

~~8.5.52~~8.5.87 For external projects, the data on seasonal population estimates have been collated where available. The subsequent bio-season and annual abundance estimates for gannet associated with each of the relevant external projects are presented in **Table 8-23**. As it is difficult to split the collated data from these external projects between the array area and 2km buffer, a standardised approach has been taken for estimating displacement at the cumulative level. This approach considers gannet displacement within the array area plus 2km buffers for all external projects, despite the Applicant's preferred approach considering that gannet displacement should only be assessed from within the array area only.

Table 8-23 Gannet cumulative bio-season and total abundance estimates from all Tier 1 & 2 external projects

External project	Migration-free Breeding	Post-breeding migration	Return migration	Annual Total
Beatrice	-	0	0	0
Blyth Demonstration Site	-			0
Dudgeon	-	25	11	36
East Anglia One	-	3,638	76	3714

© WSP UK Limited

External project	Migration -free Breeding	Post-breeding migration	Return migration	Annual Total
European Offshore Wind Development Centre (EOWDC)	-	5	0	5
Galloper	-	907	276	1183
Greater Gabbard	-	69	105	174
Gunfleet Sands	-	12	9	21
Hornsea Project One	-	694	250	944
Humber Gateway	-			0
Hywind 2 Demonstration	-	0	4	4
Kentish Flats	-			0
Kentish Flats Extension	-	13	0	13
Kincardine	-	0	0	0
Lincs	-			0
London Array	-			0
Lynn and Inner Dowsing	-			0
Methil	-	0	0	0
Race Bank	-	32	29	61
Rampion	0	590	0	590
Scroby Sands	-			0
Sheringham Shoal	-	31	2	33
Teesside	-	0	0	0
Thanet	-			0
Westermost Rough	-			0
Hornsea Project Two	-	1,140	124	1264

© WSP UK Limited

External project	Migration -free Breeding	Post-breeding migration	Return migration	Annual Total
Moray East	-	292	27	319
Neart na Gaoithe	-	552	281	833
Triton Knoll	-	15	24	39
Seagreen Alpha	-	296	138	434
Seagreen Bravo	-	368	194	562
Dogger Bank A	-	916	176	1092
Dogger Bank B	-	1,132	218	1350
Dogger Bank C	-	379	226	605
East Anglia Three	-	1,269	524	1793
Hornsea Three	-	984	524	1508
Inch Cape	-	703	212	915
Moray West	-	439	144	583
Norfolk Vanguard	-	2,453	437	2890
Norfolk Boreas	-	1,723	526	2249
Sofia	-	508	238	746
East Anglia ONE North	-	468	44	512
East Anglia TWO	-	891	192	1083
Total consented	**0**	**20,544**	**5,011**	**25,555**
Rampion 2	111	102	123	336
Total Rampion 2 plus consented	**111**	**20,646**	**5,134**	**25,891**
Hornsea Four	-	790	401	1,191
Sheringham Shoal Extension	-	295	11	306

External project	Migration -free Breeding	Post-breeding migration	Return migration	Annual Total
ForthWind Offshore Wind Demonstration Project - phase 1	-	26	44	70
Five Estuaries	-	640	67	707
Total All Projects	**111**	**24,256**	**6,022**	**30,389**

~~8.5.53~~8.5.88 The potential for impact on the Alderney West Coast and Burhou Islands Ramsar will vary by season and accordingly the assessment is carried out on a seasonal basis.

~~8.5.54~~8.5.89 Outside the breeding bio-season, when the population contains a mix of birds from UK breeding colonies and breeding colonies from further away, then a much lower percentage of birds can be attributed to any particular breeding colony SPA population. In the breeding bio-season the maximum foraging distance and the mean max foraging distance (+1SD) from Woodward *et al*., (2019) determine which breeding colonies the birds may be apportioned to using the SNH apportionment tool (SNH, 2018), and in the migratory bio-season the information on populations contained in Furness (2015) is applied for the same purpose of apportionment.

~~8.5.55~~8.5.90 A generic population age ratio of gannets has been used of 0.547 adults across all months of the year (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)).

~~8.5.56~~8.5.91 During the migration-free breeding bio-season, a peak abundance of 111 gannets within the array plus 2km buffer area are estimated to be at risk of displacement. Using displacement rates between 60 to 80% and a mortality rate of 1% would result in approximately one gannet (0.7 to 0.9 gannets) being subject to mortality, or 0.4 to 0.5 breeding adults. Mortality during the breeding bio-season was apportioned to the Alderney West Coast and Burhou Islands Ramsar following the SNH (2018) method. Following this method, 63.1% of breeding age individuals subject to displacement from the Proposed Development may be attributed to Alderney West Coast and Burhou Islands Ramsar. Zero birds from Rampion 1 and no other windfarms require assessment during the breeding bio-season. On this basis, of the 0.4 to 0.5 adult birds predicted to be subject to displacement mortality, 0.2 to 0.3 breeding adults would be attributable to this SPA. Given the annual background adult mortality for this SPA is 1,527 individuals (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)) then this prediction of 0.2 to 0.3 adult birds subject to displacement mortality would represent 0.015 to 0.020% increase in mortality relative to baseline mortality.

Migration

8.5.578.5.92 The predicted displacement resultant mortality as a result of the operation of all relevant OWFs in the return migration bio-season is 36 to 48 individuals and in the post-breeding migration bio-season is approximately 146 to 194 individuals (there is no migration free winter bio-season). In total, 182 to 242 birds are predicted to be subject to displacement related mortality during the migratory bio-season or three breeding adults.

8.5.588.5.93 In the migratory bio-season, birds will have come from a range of seabird breeding colonies in the UK and overseas. The UK North Sea and Channel population during the post-breeding season is estimated to be 456,298 individuals (Furness, 2015). During the return migration, an estimated 248,385 individuals are present in the UK North Sea and Channel (Furness, 2015). Breeding adults from the Alderney West Coast and Burhou Islands Ramsar are considered to contribute to 1.24% of the UK North Sea and Channel population during the post-breeding migration and 2.28% during the return migration. On that basis approximately 3 to 4 adult birds subject to displacement consequent mortality during the migratory bio-seasons can be attributed to the site. This represents a 0.17 to 0.23% increase in mortality relative to baseline mortality.

Conclusion

8.5.598.5.94 The maximum increase in mortality relative to baseline mortality of 0.02% in the breeding bio-season and 0.23% in the migratory bio-season will not affect the achievement of the conservation objectives for the SPA, as they are both well under the 1% threshold typically used as a benchmark for further population modelling and as a result will not have an adverse effect on the integrity of the SPA.

8.5.608.5.95 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Alderney West Coast and Burhou Islands Ramsar in relation to displacement effects from the Proposed Development in-combination with other OWFs and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from displacement**.

In combination Disturbance and Collision

8.5.618.5.96 Due to gannet being screened in for both collision risk and displacement assessments, it is possible that these two impacts could cumulatively adversely affect gannet populations when they are combined.

8.5.628.5.97 Based on the collision mortality rates presented in **Table 8-22** and the abundance estimates presented in **Table 8-23** and applying displacement rates of 60 – 80% and mortality rates of 1%, the cumulative total number of gannets subject to mortality is estimated to be between 455 and 516 individuals per annum. Applying the generic age ratio of 0.547 and apportioning to colonies as described in **Section 7.5**, this would result in the mortality of 15.9 to 17.6 breeding adults apportioned to the Alderney West Coast and Burhou Islands Ramsar site.

8.5.638.5.98 Given the annual background adult mortality for this SPA is 1,527 individuals (**Table 12.18** of **Chapter 12: Offshore and intertidal ornithology, Volume 2** of

the ES (Document Reference: 6.2.12)) then this prediction of 10.6 to 11.6 adult birds subject to displacement mortality would represent 0.69 to 0.76% increase in mortality relative to baseline mortality.

~~8.5.64~~8.5.99 Although under 1%, as a precautionary measure, additional PVA was carried out to understand the effect that this impact may have on the colony. The methods and results of the PVA are detailed in full in **Appendix G**. Using an additional mortality of 15 (the closest value modelled above the predicted mortality of 10.6 – 11.6), the results of the PVA showed that the gannet population within the Alderney West Coast and Burhou Islands Ramsar is expected to continue to grow despite the predicted in-combination and cumulative impact, and that the growth rate will be only 0.08% less than the counterfactual (no impact) scenario, resulting in a population size that is 3.16% smaller than the counterfactual scenario after 30 years. The impact from the estimated mortality rate of 10.6 – 11.6 will be lower still. This is a level of impact that is considered to be very low, and of no risk of creating an AEoI to the gannet feature of the Alderney West Coast and Burhou Islands Ramsar site.

~~8.5.65~~8.5.100 **There is, therefore, no potential for an AEoI to the conservation objectives of the gannet feature of the Alderney West Coast and Burhou Islands Ramsar in relation to in-combination collision and displacement effects from the Proposed Development cumulatively with other OWFs and therefore, subject to natural change, gannet will be maintained as a feature in the long term with respect to the potential for adverse effects from displacement and collision**.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

9. Transboundary statement

9.1.1 Notwithstanding the UK's exit from the EU, the RIAA has assumed that the - existing (pre-EU Exit) requirement to consider the potential for transboundary impacts from the Proposed Development to any other European Economic Area State, continues to apply to HRA.

9.1.2 The consideration of transboundary effects relevant to the Habitats Regulations (2017) (as amended) is evidenced in part, in the HRA Screening Report (RED, 2020a) (the outcomes of which are since updated, as summarised in **Appendix B** and documented in the updated Screening matrices at **Appendix E**. 54 European sites in five non-UK countries (Belgium, The Netherlands, Denmark, Ireland and France) were considered for transboundary impacts.

9.1.3 The potential for transboundary effects was found to be limited to foraging and migratory seabirds. The potential for LSEI were identified to three sites in France:

- Littoral seino-marin (FR) SPA – Lesser black-backed gull and kittiwake;
- Falaise du Bessin Occidental (FR) SPA – Kittiwake; and
- Côte de Granit Rose-Sept Iles SPA (FR) – Gannet.

9.1.4 It is understood that the Planning Inspectorate has notified France of potential transboundary impacts from the Proposed Development (Planning Inspectorate, 2021). Sites for breeding seabird features are considered in **Section 7.5** and **Section 8.5**. At the conclusion of these assessments, it is considered that there is no potential for significant transboundary effects on site integrity either alone, or in-combination.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

10. Conclusions of the assessment

10.1.1 A summary providing the conclusions for the Stage Two (AA) both alone and in-combination is provided in **Table** 10-1.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table 10-1 Summary of the potential for adverse effects from the Proposed Development alone and in-combination during the construction (C), operation and maintenance (O&M), and decommissioning (D) phases

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
UK11004 Arun Valley (UK) Ramsar	Northern pintail Assemblage of wintering waterfowl of international importance	Land take / cover change	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Fragmentation of habitats	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Noise and vibration	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Pollution effects and spread of non-native species	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Water neutrality	NA	No AEoI	NA	NA	NA	NA
UK9020281 Arun Valley (UK) SPA	Bewick's swan Non-breeding waterfowl assemblage	Land take / cover change	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Fragmentation of habitats	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Noise and vibration	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
		Pollution effects and spread of non-native species	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Water neutrality	NA	No AEoI	NA	NA	NA	NA
UK0030366 Arun Valley (UK) SAC	Ramshorn snail	Water neutrality	NA	No AEoI	NA	NA	NA	NA
UK0012716 The Mens (UK) SAC	Barbastelle	Land take / cover change	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Fragmentation of habitats	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Pollution effects and spread of non-native species	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Disturbance by light	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
UK11052 Pagham Harbour	Dark-bellied brent goose	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
(UK) Ramsar								
UK9012041 Pagham Harbour (UK) SPA	Dark-bellied brent goose Common tern Ruff	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
UK0012716 The Mens (UK) SAC	Barbastelle bat	Land take / cover change	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Fragmentation of habitats	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
		Noise and vibration	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
UK9011051 Portsmouth Harbour (UK) SPA	Dark-bellied brent goose Black-tailed godwit Dunlin Red-breasted merganser	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
UK11055 Portsmouth Harbour (UK) Ramsar	Dark-bellied brent goose	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
UK0012599 River Itchen (UK) SAC	Atlantic salmon	Underwater noise	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
UK0030059 Solent Maritime (UK) SAC	Estuaries Atlantic salt meadows *Spartina* swards *Salicornia* and other annuals colonizing mud and sand Mudflats and sandflats not covered by seawater at low tide Coastal lagoons Sandbanks slightly covered by sea water all the time	Suspended sediment and deposition	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
		MINNS	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
		Physical processes	NA	No AEoI	NA	NA	No AEoI	NA
		Pollution	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
UK0030061	Reefs	Suspended sediment and deposition	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
South Wight Maritime (UK) SAC	Submerged or partially submerged sea caves	MINNS	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
		Physical processes	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
		Pollution	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
UK0017073 Solent and Isle of Wight lagoons SAC	Coastal lagoons	Suspended sediment and deposition	NA	No AEoI	NA	NA	No AEoI	NA
		MINNS	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
		Physical processes	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
		Pollution	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
UK9012091 Dungeness, Romney Marsh & Rye Bay (UK) SPA	Common tern Sandwich tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
	Sandwich tern	Disturbance / displacement	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
UK9020330 Solent and Dorset Coast (UK) SPA	Common tern Little tern Sandwich tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
	Common tern Little tern	Disturbance / displacement	No AEoI	NA	No AEoI	No AEoI	NA	No AEoI
	Sandwich tern	Disturbance / displacement	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
Chichester & Langstone Harbours (UK) SPA	Common tern Sandwich tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
	Sandwich tern	Disturbance / displacement	NA	No AEoI	NA	NA	No AEoI	NA
	Bar-tailed godwit Curlew Dark-bellied B goose Dunlin Grey plover Pintail Red-b. merganser Redshank Ringed plover Sanderling Shelduck	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
	Shoveler Teal Turnstone Wigeon Waterbird assemblage							
UK11013 Chichester & Langstone Harbours (UK) Ramsar	Ringed plover Black-tailed godwit Redshank Dark-bellied B goose Shelduck Grey plover Dunlin Waterbird assemblage	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA
UK9011061 Solent and Southampton Water SPA	Sandwich tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
	Black-tailed godwit Dark-bellied brent goose Ringed plover Teal Waterbird assemblage	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
UK11063 Solent and Southampton Water Ramsar	Ringed plover Dark-bellied brent goose Teal Black-tailed godwit Waterbird assemblage	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA
UK9012031 Medway Estuary & Marshes SPA	Common tern	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA
FR2310045 Littoral seino-marin (FR) SPA	Lesser black-backed gull Kittiwake	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
UK9009246 Foulness (Mid-Essex Coast) Phase 5 (UK) SPA	Sandwich tern Common tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
FR2510099	Kittiwake	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
Falaise du Bessin Occidental (FR) SPA								
UK9009112 Alde-Ore Estuary (UK) SPA	Sandwich tern Lesser black-backed gull	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
UK11002 Alde-Ore Estuary (UK) Ramsar	Lesser black-backed gull	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
UK9008021 The Wash (UK) SPA	Common tern	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA
UK9009181A Breydon Water (UK) SPA	Common tern	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA
UK9020329 Greater (UK) Wash SPA	Common tern Sandwich tern	Collision risk on migration	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
UK9009031 North Norfolk Coast SPA	Common tern Sandwich tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
7UK011 North Norfolk Coast Ramsar	Common tern Sandwich tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
FR5300009 Côte de Granit Rose-Sept Iles SPA	Gannet	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
	Gannet	Disturbance / displacement	NA	No AEoI	NA	NA	No AEoI	NA
UK22002 Alderney West Coast & Burhou Islands Ramsar	Gannet	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
	Gannet	Disturbance / displacement	NA	No AEoI	NA	NA	No AEoI	NA
UK9014041 Grassholm SPA	Gannet	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
UK9006101 Flamborough and Filey Coast SPA	Gannet Kittiwake Herring gull	Collision risk	NA	No AEoI	NA	NA	No increased risk of AEoI	NA
	Gannet	Disturbance / displacement	NA	No AEoI	NA	NA	No AEoI	NA
	Guillemot Razorbill	Disturbance / displacement	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI
UK9006131A Northumbria Coast SPA	Arctic tern	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
UK9006031 Coquet Island SPA	Sandwich tern Arctic tern Common tern Herring gull Lesser black-backed gull Kittiwake	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA
UK9006021 Farne Islands SPA	Common tern Arctic tern Sandwich tern Kittiwake	Collision risk	NA	No AEoI	NA	NA	No AEoI	NA

© WSP UK Limited

Designated Site Name Site ID	Relevant Feature(s)	Effect	Conclusion Alone			Conclusion In-combination		
			C	O&M	D	C	O&M	D
	Guillemot	Disturbance / displacement	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI	No AEoI

© WSP UK Limited

11. Acronyms

Abbreviation	Term
AA	Appropriate Assessment
AEoI	Adverse Effect on Integrity
AfL	Agreement for Lease
AL	Centre for Environment, Fisheries and Aquaculture Science (Cefas) Action Level
AQI	Aquind Interconector
B	Breeding (season)
BAC	Background Assessment Concentration
BEIS	Department for Business, Energy & Industrial Strategy
BDMPS	Biologically Defined Minimum Population Scale
BTO	British Trust for Ornithology
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science.
CoCP	Code of Construction Practice
CJEU	Court of Justice of the European Union
CRM	Collision Risk Modelling
cSAC	Candidate SAC
CSQG	Canadian sediment quality guideline
DEFRA	Department for Environment, Food and Rural Affairs
dML	Deemed Marine Licence
DCO	Development Consent Order
DECC	Former Department of Energy and Climate Change (now DESNZ)
DESNZ	Department for Energy Security & Net Zero
Defra	Department for Environment Food & Rural Affairs

Abbreviation	Term
RIAA	Draft Report to Inform Appropriate Assessment
EIA	Environmental Impact Assessment
EC	European Commission
EEA	European Economic Area
ERL	Effective Range Low
ETG	Expert Topic Group
ES	Environmental statement
EU	European Union
FFC SPA	Flamborough and Filey Coast SPA
FOB	French Office for Biodiversity
FR	France
GW	Gigawatts
ha	Hectares
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
IAMMWG	Inter-Agency Marine Mammal Working Group
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
kV	kilovolt
LAT	Lowest Astronomical Tide
LSEs	Likely Significant Effect
LSEI	Likely Significant Effect In-combination
M	Migratory (season)
MDS	Maximum Design Scenario
MINNS	Marine Invasive Non-Native Species

Abbreviation	Term
MMO	The Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
MMMP	Marine Mammal Mitigation Protocol
MU	Management units (species)
MW	Megawatts
MHWS	Mean High Water Springs
NB	Non-breeding (season)
NNR	National Nature Reserve
NSIP	Nationally Significant Infrastructure Project
OWEP	Offshore Wind Extensions Plan
OWF	Offshore Wind Farm
PA 2008	The Planning Act 2008 (as amended)
PAH	Polycyclic Aromatic Hydrocarbons
Preliminary Environmental Information Report (PEIR)	The written output of the Preliminary Environmental Impact Assessment as required under The Infrastructure Planning 'Environmental Impact Assessment' Regulations 2017. It was developed to support the first Statutory Consultation exercise which ran from 14 July to 16 September 2021 and presented the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, draw preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
PEL	Probable Effect Level
PEMP	Project Environmental Management Plan
PINS	Planning Inspectorate
pSPA	proposed Special Protected Area (SPA)
PTEC	Perpetuus Tidal Energy Centre
PVA	Population Viability Analysis
RED	Rampion Extension Development ('the Applicant')

© WSP UK Limited

Abbreviation	Term
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCI	Sites of Community Importance
SCOS	Special Committee on Seals
sCRM	stochastic Collision Risk Model
SD	Standard Deviation
SNH	Scottish Natural Heritage
SNCB	Statutory Nature Conservation Body
SMP	Shoreline Management Plan
SMU	Seal Management Unit
SoS	Secretary of State
SoS DESNZ	Secretary of State for the Department for Energy Security and Net Zero
SOS	Sussex Ornithological Society
SPA	Special Protection Area
SSC	Suspended Sediment Concentrations
SWT	Sussex Wildlife Trust
TEL	Threshold Effect Level
TTS	Temporary Threshold Shift
TWT	The Wildlife Trust
UK	United Kingdom
UXO	Unexploded ordnance
WSCC	West Sussex County Council
WTG	Wind turbine generators
ZoI	Zone of Influence

© WSP UK Limited

12. Species Glossary

Species	Latin name
Ornithology Species	
Aquatic warbler	*Acrocephalus paludicola*
Arctic tern	*Sterna paradisaea*
Avocet	*Recurvirostra avosetta*
Puffin	*Fratercula arctica*
Bar-tailed godwit	*Limosa lapponica*
Bewick's swan	*Cygnus columbianus bewickii*
Black-headed gull	*Chroicocephalus ridibundus*
Black-tailed godwit	*Limosa limosa*
Cormorant	*Phalacrocorax carbo*
Common gull	*Larus canus*
Common pochard	*Aythya ferina*
Common sandpiper	*Actitis hypoleucos*
Common scoter	*Melanitta nigra*
Common shelduck	*Tadorna tadorna*
Common tern	*Sterna hirundo*
Curlew	*Numenius arquata*
Dark-bellied brent goose	*Branta bernicla*
Dunlin	*Calidris alpinatea*
European nightjar	*Caprimulgus europaeus*
European shag	*Phalacrocorax aristotelis*
European storm petrel	*Hydrobates pelagicus*
Gadwall	*Anas strepera*
Gannet	*Morus bassanus*

© WSP UK Limited

Species	Latin name
Golden plover	*Pluvialis apricaria*
Great bittern	*Botaurus stellaris*
Great black-backed gull	*Larus marinus*
Great skua	*Stercorarius skua*
Greenland white-fronted goose	*Anser albifrons flavirostris*
Greylag goose	*Anser anser*
Grey plover	*Pluvialis squatarola*
Guillemot	*Uria aalge*
Hen harrier	*Circus cyaneus*
Herring gull	*Larus argentatus*
Kentish plover	*Charadrius alexandrinus*
Kittiwake	*Rissa tridactyla*
Lesser black-backed gull	*Larus fuscus*
Little grebe	*Tachybaptus ruficollis*
Little gull	*Hydrocoloeus mintus*
Little tern	*Sternula albifrons*
Manx shearwater	*Puffinus puffinus*
Marsh harrier	*Circus aeruginosus*
Mediterranean gull	*Larus melanocephalus*
Northern pintail	*Anas acuta*
Pink-footed goose	*Anser brachyrhynchus*
Razorbill	*Alca torda*
Red-breasted merganser	*Mergus serrator*
Red-throated diver	*Gavia stellata*
Redshank	*Tringa totanus*
Ringed plover	*Charadrius hiaticula*

© WSP UK Limited

Species	Latin name
Roseate tern	*Sterna dougallii*
Ruff	*Philomachus pugnax*
Sanderling	*Calidris alba*
Sandwich tern	*Thalasseus sandvicensis*
Shoveler	*Anas clypeata*
Teal	*Anas crecca*
Turnstone	*Arenaria interpres*
Whimbrel	*Numenius phaeopus*
Wigeon	*Anas penelope*
Marine Mammal Species	
Bottlenose dolphin	*Tursiops truncatus*
Harbour Porpoise	*Phocoena phocoena*
Grey seal	*Halichoerus grypus*
Harbour seal	*Phoca vitulina*
Migratory fish	
Atlantic salmon	*Salmo salar*
Terrestrial ecology	
Barbastelle bat	*Barbastella barbastellus*
MINNS	
Chinese mitten crab	*Eriocheir sinensis*
Leathery sea squirt	*Styela clava*
Pacific oyster	*Crassostrea (Magallana) gigas*
Slipper limpet	*Crepidula fornicata*

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

13. References

ABPmer Ltd (2014*). Habitats Regulations Appraisal for the Wave and Tidal Further Leasing.* Reports for The Crown Estate, ABP Marine Environmental Research Ltd, Report No: R.2160a-c. April 2014.

ABPmer Ltd. (2005). *Atlantic Salmon (Salmo salar L.) Literature Review*, ABP Marine Environmental Research Ltd, Report No. R.1229A.

APEM Ltd. (2013). Waterbirds Migration Modelling in Relation to the Rampion Offshore Wind Farm. (APEM Report 512773-01). APEM Ltd., Stockport.
Apportioning and Habitats Regulations Assessment Updates Technical Note (Revision B). Document Reference: 13.3. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-001103-13.3%20Apportioning%20and%20Habitats%20Regulations%20Assessment%20Updates%20Technical%20Note%20(Revision%20B)%20(Clean%20Version).pdf [Accessed 07 June 2023]

APEM (2022) *Hornsea Project Four: Auk Displacement and Mortality Evidence Review*. (Online) Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010098/EN010098-001044-Hornsea%20Project%20Four%20-%20G1.47%20Auk%20Displacement%20and%20Mortality%20Evidence%20Review.pdf [Accessed: 01 February 2024]

Bamber, R., Robbins, S. 2010. *Consultancy Report for Client: Natural England. Condition Monitoring if The Lymington To Keyhaven Coastal Saline Lagoons*, 2010 Contract Reference No. FST20/63/062-22479.

Band, W. (2011). *Using a Collision Risk Model to Assess Bird Collision Risks for Offshore Wind Farms. The Crown Estate Strategic Ornithological Support Services (SOSS) report SOSS-02.* Originally published Sept 2011, extended to deal with flight height distribution data March 2012.

Bash, J., Berman, C., Bolton, S. (2001). *Effects of Turbidity and Suspended Solids on Salmonids.* [Online] Available at: https://www.wsdot.wa.gov/research/reports/fullreports/526.1.pdf [Accessed 07 June 2023].

Bashir I, Lone FA, Bhat RA, Mir SA, Dar ZA, Dar SA. (2020). *Concerns and Threats of Contamination on Aquatic Ecosystems. Bioremediation and Biotechnology*. 2020;1-26. Published2020. doi:10.1007/978-3-030-35691-0_1.

Betts M.W., Jardine D.C. & Grundy D.S., (2007). *The Birds of Scotland*. Aberlady: The Scottish Ornithologists' Club. Fort, J., Pettex, E., Tremblay, T., Lorentsen,S-H., Garthe S., Votier, S.C., Pons, J-B., Siorat, F., Furness, R.W., and Grecian, W.J. (2012). *Meta-population evidence of oriented chain migration in northern gannets (Morus bassanus).*

Frontiers in Ecology and the Environment, Ecological Society of America, 2012, 10 (5). [Online]

[redacted]

[Accessed 07 June 2023].

Bowers-Marriott, B. (1997). *Practical Guide to Environmental Impact Assessment: A Practical Guide*. McGraw-Hill Professional.
Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W. and Hume, D., (2014). *Mapping seabird sensitivity to offshore wind farms*. PloS one, 9(9).

British Broadcasting Corporation (BBC), (2020). *Isle of Wight tidal energy scheme 'needs investors to survive'*. [Online]. Available at: https://www.bbc.co.uk/news/uk-england-hampshire-54331391 [Accessed 07 June 2022].

Bunker, F., Mercer, T. and Howson, C. (2005). *South Wight European Marine Site Sublittoral Monitoring 2003-2004*. Aquatic Survey & Monitoring Ltd.

Burnell,D., Perkins, A.J., Newton. S.F., Bolton. M., Tierney. T.D. & Dunn, T.E. (2023) *Seabirds Count: A census of breeding seabirds in Britain and Ireland (2015-2021).* Lynx Nature Books, Barcelona.

Canadian Council of Ministers of the Environment (CCME), (2001). *Canadian environmental quality guidelines for the protection of aquatic life*, CCME water quality index: technical report, 1.0. CCME.
characterisation report. Report reference: OEL_ GBERAM0919_TCR.

Collins MB., Shimwell SJ., Gao S., Powell H., Hewitson C., Taylor JA. (1995). *Water and sediment movement in the vicinity of linear sand banks: the Norfolk Banks, southern North Sea*. Marine Geology, 123, 125-142.

Cooper, N. J., D. J. Leggett, N. I. Pontee & C. R. Elliott, (2004). *The role of physical processes in the design of 'managed retreat' schemes*. Littoral 2004: 1–6

Cutts, N.D., Phelps, A., & Burdon, D., (2009). *Construction and waterfowl: Defining sensitivity, response, impacts and guidance. Report to Humber INCA*. Institute of Estuarine & Coastal Studies, University of Hull.

Davies-Colley, Robert & Smith, D. (2007). *Turbidity, Suspended Sediment, and Water Clarity: A Review*. JAWRA Journal of the American Water Resources Association. 37. 1085 - 1101. 10.1111/j.1752-1688.2001.tb03624.x

Department for Business, Energy & Industrial Strategy and Department for Energy Security & Net Zero, (2022). *British Energy Security Strategy*. [Online] Available at: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy [Accessed 07 June 2023].

Department for Environment Food & Rural Affairs (Defra), (2021). *Policy paper Changes to the Habitats Regulations 2017*. [Online] Available at: https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017 [Accessed 07 June 2023].

Department of Energy and Climate Change (DECC) (2011), *Overarching National Policy Statement for Energy (EN-1).* [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf [Accessed 07 June 2023].,

Department of Energy and Climate Change (DECC), (2015). *Guidelines on the assessment of transboundary impacts of energy developments on Natura 2000 sites outside the UK.* [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/408465/transboundary_guidelines.pdf [Accessed 07 June 2023].

Department of Energy and Climate Change (DECC), (2016). *Guidance on when new marine Natura 2000 sites should be taken into account in offshore renewable energy consents and licences*. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/525765/Final-Guidance_on_when_new_marine_Natura_2000_sites_should_be_taken_into_account_in_offshore_renewable_energy_consents_and_licences.pdf [Accessed 07 June 2023].

Dierschke, V., Furness, R.W. and Garthe, S. (2016). *Seabirds and offshore wind farms in European waters: Avoidance and attraction. Biological Conservation*, 202, pp.59-68.

E.On, (2012). *Rampion Environmental Statement*. [Online] Available at: https://www.rampionoffshore.com/environmental-statement/ [Accessed 07 June 2023].

EMU Limited (2009). *Area 435/396 Seabed Monitoring Survey*, Report No. 09/1/02/1377/0899

EMU Limited (2011). *Rampion Offshore Wind Farm Benthic Ecology Baseline Characterisation*.

EMU Limited. (2012). *South Coast Marine Aggregate Regional Environmental Assessment, Volume 1 and 2.* Report for the South Coast Dredging Association.

English Nature, (2001). *South Wight Maritime European marine site English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994.* [Online] Available at: http://publications.naturalengland.org.uk/file/3981317 [Accessed 25 May 2023]. English

Eno. N. C, Clark. R. A and Sanderson. W. G, (1997). *Non-native marine species in British waters: a review and directory*. Joint Nature Conservation Committee (JNCC), Peterborough.

Equinor, (2023). *Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects.*

European Commission (1992). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206/7 22.7.1992) (the Habitats Directive)*. [online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0043 [Accessed 07 June 2023].

European Commission (2009). *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20/7 26.1.2010) (the Birds Directive)*. [online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147 [Accessed 07 June 2023].

European Commission, (2000). *Commission communication on the precautionary principle*. [Online] Available at: https://op.europa.eu/en/publication-detail/-/publication/21676661-a79f-4153-b984-aeb28f07c80a/language-en [Accessed 07 June 2023].

European Commission, (2011). *Guidelines on the implementation of the birds and habitats directives in estuaries and coastal zones with particular attention to port development and dredging.* [Online] Available at: https://tethys.pnnl.gov/sites/default/files/publications/EU2011.pdf [Accessed 07 June 2023].

European Commission, (2018). *Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. [Online] Available at: https://op.europa.eu/en/publication-detail/-/publication/2c9f4a14-8f97-43ac-a274-4946c142b541 [Accessed 07 June 2023].

European Commission, (2020*). Commission notice Guidance document on wind energy developments and EU nature legislation. C5-0143/2000*. [Online] Available at: https://ec.europa.eu/environment/nature/natura2000/management/docs/wind_farms_en.pdf [Accessed 07 June 2023].

European Commission. (2001). *Assessment of plans and projects significantly affecting Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC - November 2001. OFFICE FOR OFFICIAL PUBLICATIONS OF THE EUROPEAN COMMUNITIES*. [Online] Available at: https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf [Accessed 07 June 2023].

Five Estuaries Wind Farm Ltd (2023). *Draft Report to Inform Appropriate Assessment.* [Online] Available at https://fiveestuaries.co.uk/wp-content/uploads/2023/05/0144_VE_Draft_RIAA_Final.pdf [Accessed 07 June 2023].

Fliessbach, K.L., Borkenhagen, K., Guse, N., Markones, N., Schwemmer, P. and Garthe, S., (2019). *A ship traffic disturbance vulnerability index for Northwest European seabirds as a tool for marine spatial planning*. Frontiers in Marine Science.

Forrester R.W., Andrews I.J., McInerny C.J., Murray R.D., McGowan R.Y., Zonfrillo B., B., Betts M.W., Jardine D.C. & Grundy D.S., (2007). *The Birds of Scotland*. Aberlady: The Scottish Ornithologists' Club.

Forthwind Ltd, (2022). *Environmental Impact Assessment Report – Forthwind Offshore Wind Demonstration Project – Methil, Fife*. [Online] Available at: https://marine.gov.scot/data/environmental-impact-assessment-report-forthwind-offshore-wind-demonstration-project-methil [Accessed 07 June 2023].

Furness, R.W., Hallgrimsson, G.T., Montevecchi, W.A., Fifield, D., Kubetzki, U., Mendel, B. and Garthe, S., (2018). *Adult Gannet migrations frequently loop clockwise around Britain and Ireland.* Ringing & Migration, 33(1), pp.45-53.

Garthe, S. and Hüppop, O., (2004). *Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index*. Journal of Applied Ecology 2004, 41, 724-734.

Garwood, P., & Foster-Smith, R. (1991). '*Intertidal survey from Rhos Point to New Brighton'.* Nature Conservancy Council (CSD Report no: 1,194).
Grace v An Bord Pleanala. (2018). *Gace v An Bord Pleanala (C-164/17)*. Available at: https://curia.europa.eu/juris/fiche.jsf?id=C%3B164%3B17%3BRP%3B1%3BP%3B1%3BC2017%2F0164%2FJ&nat=or&mat=or&pcs=Oor&jur=C%2CT%2CF&num=C-164%252F17&for=&jge=&dates=&language=en&pro=&cit=none%252CC%252CCJ%252CR%252C2008E%252C%252C%252C%252C%252C%252C%252C%252C%252C%252Ctrue%252Cfalse%252Cfalse&oqp=&td=%3BALL&avg=&lgrec=en&lg=&cid=15812139 [Accessed 07 June 2023].

Green Volt (2023). Green Volt Offshore Windfarm. Report to Inform Appropriate Assessment. [Online] Available at: https://marine.gov.scot/sites/default/files/2301261_1.pdf [Accessed 07 June 2023].

Harris, M.P., Baillie, S.R. and Dudley, C., (1997). *Ringing recoveries and colony attendance of Isle of May Guillemots*, Seabird, 19, pp. 31-39.

Hawkins, A.D., Roberts, L. and Cheesman, S. (2014). *Responses of free-living coastal pelagic fish to impulsive sounds*. Journal of the Acoustic Society of America, 135(5), pp. 3101–3116.

Hendrick VJ, Hutchison ZL, Last KS (2016) *Sediment Burial Intolerance of Marine Macroinvertebrates*. PLoS ONE 11(2).

Henry, E., and Hammill, M. O. *Impact of small boats on the haul-out activity of harbour seals (Phoca vitulina) in Metis Bay, Saint Lawrence Estuary, Quebec, Canada*. Aquatic Mammals 27, pp140-148.

Inter-Agency Marine Mammal Working Group, (IAMMWG). (2015). *Management Units for cetaceans in UK waters (January 2015)*. JNCC Report No. 547, JNCC Peterborough.

Isle of Wight Council and Royal Haskoning, (2010). *Isle of Wight Shoreline Management Plan 2 Appendix C: Baseline Process Understanding C1: Assessment of Shoreline Dynamics December 2010*. [Online] Available at: https://www.bing.com/ck/a?!&&p=873575fec473d8e6JmltdHM9MTY4NjA5NjAwMCZpZ3VpZD0xNzBlYzQ1OC1lMjEzLTYzOTItMGZiYy1kNWFkZTNkODYyNWEmaW5zaWQ9NTE4NQ&ptn=3&hsh=3&fclid=170ec458-e213-6392-0fbc-d5ade3d8625a&psq=Isle+of+Wight+Shoreline+Management+Plan+2+Appendix+C%3a+Baseline+Process+Understanding+C1%3a+Assessment+of+Shoreline+Dynamics+December+2010&u=a1aHR0cHM6Ly93d3cuaW93Lmdvdi51ay9kb2N1bWVudGxpYnJhcnkvZG93bmxvYWQvaW93LXNob3JlbGluZS1tYW5hZ2VtZW50LXBsYW4tMi1hcHBlbmRpeC1jMS1jb

2FzdGFsLXByb2Nlc3Nlcy1hbmQtY2xpbWF0ZS1jaGFuZ2U&ntb=1 [Accessed 07 June 2023].

Isle of Wight Council, (2022). *Home page*. [Online]. Available at: https://www.iow.gov.uk/ [Accessed 07 June 2023].

Johnson, A. & Acevedo-Gutierrez, A., (2007). *Regulation compliance by vessels and disturbance of harbour seals (Phoca vitulina).* Canadian Journal of Zoology-Revue Canadienne De Zoologie, 85, pp290-294.
Johnson, W.P., Schmidt, P,M. Taylor, D, (2014) *Foraging flight distances of wintering ducks and geese: A review*. December 2014 Avian Conservation and Ecology 9 (2): pp1-19

Joint Nature Conservation Committee (JNCC), (2022). *Statutory Nature Conservation Body Interim Displacement Advice Note*. Available at: https://data.jncc.gov.uk/data/9aecb87c-80c5-4cfb-9102-39f0228dcc9a/joint-sncb-interim-displacement-advice-note-2022.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee, (JNCC) (2021). *Description and ecological characteristics: 1130 Estuaries - Marine, coastal and halophytic habitats*. [online] Available at: https://sac.jncc.gov.uk/habitat/H1130/ [Accessed 07 June 2023].

Kubetzki, U., Garthe, S., Fifield, D., Mendel, B. and Furness, R.W., (2009). *Individual migratory schedules and wintering areas of northern gannets*. Marine Ecology Progress Series, 391, pp. 257-265.

MacArthur Green (2023) *Beatrice Offshore Wind Farm: Year 2 post-construction ornithology monitoring report*. (Online) Available at: https://marine.gov.scot/sites/default/files/bowl_2021_post_construction_ornithology_monitoring_report_25_07_2023.pdf (Accessed: February 2024).

MacKenzie, K.M., Trueman, C.N., Palmer, M.R., Moore, A., Ibbotson, A.T., Beaumont, W.R., and Davidson, I.C. (2012). *Stable isotopes reveal age-dependent trophic level and spatial segregation during adult marine feeding in populations of salmon.* ICES J. Mar. Sci. 69: pp1637–1645.

Maclean, I.M.D., Wright, L.J., Showler, D.A. and Rehfisch, M.M. (2009). *A review of assessment methodologies for offshore windfarms.* British Trust for Ornithology Report Commissioned by Cowrie Ltd.

Malcolm I. A., Godfrey J., Youngson A. F. (2010). *Review of Migratory Routes and Behaviour of Atlantic Salmon, Sea Trout and European Eel in Scotland's Coastal Environment: Implications for the Development of Marine Renewables*. Scottish Marine and Freshwater Science Vol 1 No 14. Edinburgh: Scottish Government.

Marine Ecological Surveys Limited, (MESL). (2015*). A report prepared for Natural England By Marine Ecological Surveys Limited: SOLENT MARITIME EUROPEAN MARINE SITE SANDBANK HABITAT MAPPING PROJECT Solent Maritime SAC—2015*.

McCauley, R. D., Fewtrell, J., Duncan, A. J., Jenner, C., Jenner, M-N., Penrose, J. D., Prince, R. I. T., Adhitya, A., Murdoch, J. and McCabe, K. (2000). *Marine Seismic Surveys – A Study of Environmental Implications*. The APPEA Journal, 40(1), pp.692–707.

McSorley, C.A., Dean, B.J., Webb, A. and Reid, J.B. (2003). *Seabird use of waters adjacent to colonies: implications for seaward extensions to existing breeding seabird colony Special Protection Areas*. JNCC Report, No. 329. JNCC, Aberdeen.

Mevenkamp Lisa, Stratmann Tanja, Guilini Katja, Moodley Leon, van Oevelen Dick, Vanreusel Ann, Westerlund Stig, Sweetman Andrew K., (2017). *Impaired Short-Term Functioning of a Benthic Community from a Deep Norwegian Fjord Following Deposition of Mine Tailings and Sediments.* Frontiers in Marine Science. Volume 4. 2017. pp 169.

Mitchell PI, Newton SF, Ratcliffe N & Dunn TE. (2004). *Seabird populations of Britain and Ireland*. Results of the Seabird 2000 Census (1998-2002). T&AD Poyser, London.
Mueller-Blenkle, C., McGregor, P.K., Gill, A.B., Andersson, M.H., Metcalfe, J., Bendall, V., Sigray, P., Wood, D.T. and Thomsen, F., (2010). *Effects of Pile-driving Noise on the Behaviour of Marine Fish.* COWRIE Ref: Fish 06-08, Technical Report.

Natural England, (2013). *England Coast Path Stretch: Isle of Wight. Overview to Natural England's compendium of statutory reports to the Secretary of State for this stretch of coast (Reports IOW 2 – IOW 10).* [Online] Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872292/isle-of-wight-overview.PDF [Accessed 07 June 2023].

Natural England, (2013). *Test and Itchen Catchment Summary (CSF065)*. [Online]. Available at: http://publications.naturalengland.org.uk/publication/11307713 [Accessed 07 June 2023].

Natural England, (2014). *European Site Conservation Objectives for Solent and Isle of Wight Lagoons Special Area of Conservation Site Code: UK0017073 (version 3).* [Online]. Available at: http://publications.naturalengland.org.uk/publication/5646122018144256 [Accessed 07 June 2023].

Natural England, (2015). *Commissioned Report NECR185. The status of Habitats Directive Annex I saltmarsh habitats, transition zones and Spartina species in England*. [Online] Available at: https://publications.naturalengland.org.uk/publication/6231291483652096 [Accessed 07 June 2023].

Natural England, (2016). *Guidance on Marine Protected Areas: how to use conservation advice packages*. [Online] Available at: https://www.gov.uk/guidance/conservation-advice-for-marine-protected-areas-how-to-use-site-advice-packages [Accessed 07 June 2023].

Natural England, (2018). *Designated Sites View: South Wight Maritime SAC*. [online] Available at: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030061&SiteName=solent&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&HasCA=1&NumMarineSeasonality=0&SiteNameDisplay=South%20Wight%20Maritime%20SAC [Accessed 07 June 2023].

Natural England, (2018b). *Condition Assessment Solent Maritime Special Area of Conservation (SAC)*. [Online] Available at: http://www.solentems.org.uk/sems/Condition_assessments/Natural_England_Condition%20Assessment_Summary_Report_for_Solent_Maritime_SAC.PDF [Accessed 07 June 2023].

Natural England, (2018c). *Designated Sites View: South Wight Maritime SAC. Supplementary Advice*. [Online] Available at: https://publications.naturalengland.org.uk/publication/3194758 [Accessed 07 June 2023].

Natural England, (2019). *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features*. [Online]. Available at: http://publications.naturalengland.org.uk/publication/5130124110331904 [Accessed 07 June 2023].
Natural England, (2019a). *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features River Itchen Special Area of Conservation (SAC) Site Code: UK0012599*. [Online] Available at: https://publications.naturalengland.org.uk/publication/6005400246943744 [Accessed 07 June 2023].

Natural England, (2022). *Relevant Representations of Natural England For: The construction and operation of the Sheringham Shoal Extension and Dudgeon Extension Offshore Wind Farms located approximately 16km and 27km respectively from the Norfolk Coast in the Southern North Sea*.
Planning Inspectorate Reference: EN010109. Document Reference: RR-063. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-000540-Natural%20England%20-%20Relevant%20Representation.pdf [Accessed 07 June 2023].

Natural England, Joint Nature Conservation Committee (JNCC), and Countryside Council for Wales (CCW), (2010) *The protection of marine European Protected Species from injury and disturbance. Guidance for the marine area in England and Wales and the UK offshore marine area.* JNCC, Peterborough, pp119.

Natural England. (2018a). European Site Conservation Objectives for River Itchen Special Area of Conservation Site Code: UK0012599. [Online] Available at: http://publications.naturalengland.org.uk/publication/5130124110331904 [Accessed 07 June 2023].

Natural England. (2020a). Letter dated 09 October 2020. Natural England to RWE provided under the Discretionary Advice Service in response to RWE's Habitat Regulations Assessment (HRA) Report to Inform Screening.

Natural England. (2020b*). Natural England Designated Sites View: Solent Maritime SAC. Conservation Objectives*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030059&SiteName=solent&countyCode=&responsiblePerson&HasCA=1&NumMarineSeasonality=0&SiteNameDisplay=Solent%20Maritime%20SAC#hlco [Accessed 07 June 2023].

Natural England. (2020c). *Natural England Designated Sites View: Solent Maritime SAC. Supplementary Advice: Updated: 13 March 2020*. Available at: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030059&SiteName=solent&countyCode=&responsiblePerson&HasCA=1&NumMarineSeasonality=0&SiteNameDisplay=Solent%20Maritime%20SAC#hlco [Accessed 07 June 2023].

Natural England. (2020d). *Natural England Designated Sites View: Solent Maritime SAC. Advice on operations: Updated: 13 March 2020. Viewing Advice on Operations for Offshore wind: construction, decommissioning and cables*. [Online] Available at: https://publications.naturalengland.org.uk/publication/5762436174970880 [Accessed 07 June 2023].
Natural England. (2021a). *Research Report NERR090. Condition review of Chichester Harbour sites intertidal, subtidal and bird features. Dr L. Bardsley*. [Online] Available at: http://nepubprod.appspot.com/file/6013760784564224 [Accessed 07 June 2023].

Nature. (2005). *Citation for Special Area of Conservation (SAC) River Itchen SAC UK0012599 under EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora.*

Nedwell, J.R. Parvin, S.J. Edwards, B. Workman, R. Brooker, A.G. and Kynoch, J.E. (2007). *Measurement and Interpretation of Underwater Noise During Construction and Operation of Wind farms in UK waters.* Subacoustech Report No. 544R0738 to COWRIE Ltd.

Ocean Ecology Limited, (OEL). (2021). Rampion 2 subtidal benthic ecology
OSPAR. (2008). *CEMP Assessment Manual: Co-ordinated Environmental Monitoring Programme Assessment Manual for contaminants in sediment and biota*. OSPAR Publication 2008-379.

Orsted, (2020). *Hornsea Project Three: Response to the Secretary of State's Minded to Approve Letter. Appendix 2: Kittiwake Compensation Plan*. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003246-HOW03-30Sep_Appendix%202%20Kittiwake%20Compensation%20Plan%20(06543754_A).pdf [Accessed 08 June 2023].

Ozsanlav-Harris, L., Inger, R. & Sherley, R. (2023). Review of data used to calculate avoidance rates for collision risk modelling of seabirds. JNCC Report 732 (Research & review report), JNCC, Peterborough, ISSN 0963-8091. https://hub.jncc.gov.uk/assets/de5903fe-81c5-4a37-a5bc-387cf704924d

Parker, J., Fawcett, A., Banks, A., Rowson, T., Allen, S., Rowell, H., Harwood, A., Ludgate, C., Humphrey, O., Axelsson, M., Baker, A. & Copley, V. (2022). *Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase III: Expectations for data analysis and presentation at examination for offshore wind applications*. Natural England. Version 1.2. pp.140.

People Over Wind, 2018. People Over Wind, Peter Sweetman v Coillte Teoranta (C-323/17). [Online] Available at: https://curia.europa.eu/juris/fiche.jsf;jsessionid=7AFFC0A6320965FA2A7FC76BADECC9E0?id=C%3B323%3B17%3BRP%3B1%3BP%3B1%3BC2017%2F0323%2FJ&nat=or&mat=or&pcs=Oor&jur=C%2CT%2CF&num=C-323%252F17&for=&jge=&dates=&language=en&pro=&cit=none%252CC%252CCJ%252CR%252C2008E%252C%252C%252C%252C%252C%252C%252C%252C%252C%252Ctrue%252Cfalse%252Cfalse&oqp=&td=%3BALL&avg=&lgrec=en&lg=&cid=15811773 [Accessed 07 June 2023].

Percival, S.M. 2013b. Rampion Offshore Wind Farm: collision risk assessment update for migrant waterfowl. Ecology Consulting report to E.ON Climate and Renewables. October 2013.

Perpetuus Tidal Energy Centre (2014). *Perpetuus Tidal Energy Centre Environmental Statement – Non-Technical Summary*. Royal HaskoningDHV, November 2014.

Perpetuus Tidal Energy Centre (2021a). Consultation. [Online]. Available at: https://perpetuustidal.com/consultation/ [Accessed 07 June 2023].

Perpetuus Tidal Energy Centre (2021b). About. [Online]. Available at: https://perpetuustidal.com/about/ [Accessed 07 June 2023].

Petersen, I.K. & Fox, A., (2007). *Changes in bird habitat utilisation around the Horns Rev 1 Offshore wind farm, with particular emphasis on common scoter.* Report commissioned by Vattenfall A/S.

Planning Inspectorate, (2015). *Report on the Implications for European sites Proposed Navitus Bay Wind Park*. [Online] Available at: https://tethys.pnnl.gov/sites/default/files/publications/Report_on_the_Implications_for_European_Sites_Navitus_Bay_2015.pdf [Accessed 07 June 2023].

Planning Inspectorate, (2018). *Advice Note Nine: Rochdale Envelope. July 2018. Version 3*. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/ [Accessed 07 June 2023].

Planning Inspectorate, (2020). *Scoping Opinion: Proposed Rampion 2 Offshore Wind Farm Case Reference: EN010117.* [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010117/EN010117-000045-EN010117%20Scoping%20Opinion.pdf [Accessed 07 June 2023].

Planning Inspectorate, (2021). *Advice Note Twelve: Transboundary Impacts and Process*. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-twelve-transboundary-impacts-and-process/ [Accessed 08 June 2023].

Planning Inspectorate (2022). *Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects (version 9).* [Online] Available at:

https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-ten/ [Accessed 07 June 2023].

Planning Inspectorate, (2022a). Planning Act 2008: Application for Development Consent for the East Anglia ONE North Offshore Wind Farm. Available online at: https://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-one-north-offshore-windfarm/?ipcsection=docs&stage=6&filter1=Secretary+of+State+Decision+letter+and+Statement+of+Reasons+%28approved%29 [Accessed 07 June 2023].

Planning Inspectorate, (2022b). Planning Act 2008: Application for Development Consent for the East Anglia TWO Offshore Wind Farm. Available online at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010078/EN010078-010064-EA2%20-%20Decision%20Letter%20Signed.pdf [Accessed 07 June 2023].

Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D., Bartol, S., Carlson, Th., Coombs, S., Ellison, W. T., Gentry, R., Hal vorsen, M.B., Lokkeborg, S., Rogers, P., Southall, B.L., Zeddies, D.G. and Tavolga, W.N., (2014). *ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI.* Springer and ASA Press, Cham, Switzerland. pp. 1–21.

Rampion Extension Development Limited (RED), (2022). Preliminary Environmental Information Report: Supplementary Information Report 2022. [Online] Available at: https://rampion2.com/consultation-2022/documents/ [Accessed 07 June 2023].

Rampion Extension Development Ltd (RED), (2020a). *Information to Support Habitats Regulations Assessment Stage One Screening*. Unpublished.

Rampion Extension Development Ltd (RED), (2020b). *Rampion 2 Offshore Wind Farm Environmental Impact Assessment Scoping Report*. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010117/EN010117-000006-EN010117%20-%20Scoping%20Report.pdf [Accessed 07 June 2023].

Rampion Extension Development Ltd (RED), (2021). *Preliminary Environmental Information Report*. [Online] Available at: https://rampion2.com/formal-consultation-detailed-documents/ [Accessed 07 June 2023].

Rampion Extension Development Ltd (RED), (2023b). *Preliminary Environmental Information – Bolney Substation Extension Works*. [Online] Available at: https://rampion2.com/wp-content/uploads/2023/04/2304-Bolney-Substation-Extension-Preliminary-EnvironmentalInformation-Full-Report.pdf [Accessed 07 June 2023].

Rampion Extension Development Limited (RED), (2023a). Preliminary Environmental Information Report: Further Supplementary Information Report 2023. [Online] Available at: https://rampion2.com/consultation-2023/consultation-2023-documents/ [Accessed 07 June 2023].

Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. [Online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014R1143 [Accessed 07 June 2023].

Roberts, D. (2012). *Causes and ecological effects of resuspended contaminated sediments (RCS) in marine environments*. Environment international. 40. 230-43. 10.1016

Robinson, J.A., K. Colhoun, J.G. McElwaine & E.C. Rees (2004*). Bewick's Swan Cygnus columbianus bewickii (Northwest Europe population) in Britain and Ireland 1960/61 – 1999/2000*. Waterbird Review Series, The Wildfowl & Wetlands Trust/Joint Nature Conservation Committee, Slimbridge.

Russell, D. J. F., Jones, E. L. and Morris, C. D. 2017. *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25. pp. 25. DOI: 10.7489/2027-1.

Scottish National Heritage (SNH), (2018). *Interim guidance on apportioning impacts from marine renewable developments to breeding seabird populations in special protection areas.* [Online] Available at: https://tethys.pnnl.gov/sites/default/files/publications/Guidance-Apportioning-impacts-from-marine-renewable-developments.pdf [Accessed 07 June 2023].

South Downs National Park Authority (SDNPA) and Natural England, (2018). *Draft Sussex Bat Special Area of Conservation: Planning and Landscape Enhancement Protocol.* [Online] Available at: https://www.southdowns.gov.uk/wp-content/uploads/2018/04/TLL-15-Draft-Sussex-Bat-SAC-Protocol.pdf [Accessed 07 June 2023].

Special Committee on Seals (SCOS), (2016). *Scientific Advice on Matters Related to the Management of Seal Populations: 2016* [Online]. Available at: http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf [Accessed 07 June 2023].
SSE Renewables, (2022). *Environmental Impact Assessment Report - Volume 2 – Chapter 11 – Offshore and Intertidal Ornithology*. [Online] Available at: https://marine.gov.scot/node/23315 [Accessed 07 June 2023].

Summers, R., and Critchley, C., (1990). *Use of grassland and field selection by brent geese Branta bernicla*. Journal of Applied Ecology 27, pp834 – 846.

Suryan, R. M. & Harvey J. T. 1999. *Variability in reactions of Pacific harbour seals, Phoca vitulina richardsii, to disturbance*. Fisheries Bulletin 97, 332 – 339.

Thaxter, C. B., Lascelles, B., Sugar, K., Cook A., Roos, S., Bolton, M., Langston, R. and Burton, N., (2012). *Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas*. Biological Conservation 156: pp53-61.
The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. [Online] Available at: https://www.legislation.gov.uk/ukdsi/2019/9780111176573 [Accessed 07 June 2023].

The Conservation of Habitats and Species Regulations 2017. [Online] Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made [Accessed 07 June 2023].

The Crown Estate. (2019a). *2.8 GW of offshore wind extension projects to progress*. [Online] Available at: https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2019-28-gw-of-offshore-wind-extension-projects-to-progress-following-completion-of-plan-level-habitats-regulations-assessment/ [Accessed 07 June 2023].

The Prime Minister's Office, 10 Downing Street and Department for Business, Energy & Industrial Strategy, (2020). *New plans to make UK world leader in green energy.* [Online] Available at: https://www.gov.uk/government/news/new-plans-to-make-uk-world-leader-in-green-energy [Accessed 07 June 2023].

Tremlett, C.J., Morley, N. & Wilson, L.J. (2024) *UK seabird colony counts in 2023 following the 2021-22 outbreak of highly pathogenic avian influenza*. Research report 76.
Tyldesley, D and Chapman, C. (2013). *The Habitats Regulations Assessment Handbook*. DTA Publications Limited, UK.
UK Government (2017). *The Conservation of Offshore Marine Habitats and Species Regulations 2017.* [Online] Available at: https://www.legislation.gov.uk/uksi/2017/1013/contents/made [Accessed 07 June 2023].

United Nations, (1991). *Convention on Environmental Impact Assessment in a Transboundary Context.* [Online] Available at: https://unece.org/fileadmin/DAM/env/eia/documents/legaltexts/Espoo_Convention_authentic_ENG.pdf [Accessed 07 June 2023].

Wallingford, H. (2010). *Thames Estuary Dredging Association. MAREA: High-level Plume Study. Technical Note DDR4318-03*. Available online: http://marine-aggregate-rea.info/sites/www.marine-aggregate-rea.info/files/private/appendix-3plume-study.pdf [Accessed 07 June 2023].

Wanless, S., Harris, M.P., Calladine, J., & Rothery, P. (1996). *Modelling responses of Herring Gull and Lesser Black-Backed Gull populations to reduction of reproductive output: implications for control measures.* Journal of Applied Ecology, 33, pp.1420-1432.
Wildfowl and Wetlands Trust (WWT & MacArthur Green), (2024). *Strategic assessment of collision risk of Scottish offshore wind farms to migrating birds. Scottish Marine and Freshwater Science Report*. Vol 5 No 12. Marine Scotland Science.

Wanless, S., Harris, M.P., Redmand, P. & Speakman, J.R. (2005) *Low energy values of fish as a probable cause of a major seabird breeding failure in the North Sea*. Mar. Ecol. Prog. Ser. Vol 294: 1-8.

Wilson L. J., Black J., Brewer, M. J., Potts, J. M., Kuepfer, A., Win I., Kober K., Bingham C., Mavor R. & Webb A. (2014). *Quantifying usage of the marine environment by terns Sterna sp. around their breeding colony SPAs*. JNCC Report No. 500.

Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. (2019). *Desk-based revision of seabird foraging ranges used for HRA screening, Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate*, ISBN 978-1-912642-12-0.

Wright, E.M., Aonghais S. Cook, L, Niall H. Burton, K. (2013). *Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines.* Journal of Applied Ecology. Volume51, Issue1 February 2014 pp 31-41.

Wright, L et al (2012). British Trust for Ornithology Research Report No. 592. *Assessing the risk of offshore wind farm development to migratory birds designated as features of UK Special Protection Areas*. [Online]. Available at: https://www.bto.org/sites/default/files/u28/downloads/Projects/final-report-soss05.pdf [Accessed 06 June 2023].

Wright, L.J., Ross-Smith, V.H., Massimino, D., Dadam, D., Cook, A.S.C.P. and Burton, N.H.K., (2012). *Assessing the risk of offshore wind farm development to migratory birds designated as features of UK Special Protection Areas (and other Annex 1 species).* BTO Research Report, 592.

Zabarte-Maeztu, I., Matheson, F. E., Manley-Harris, M., Davies-Colley, R. J., Oliver, M., & Hawes, I. (2020). *Effects of fine sediment on seagrass meadows: A case study of Zostera muelleri in pāuatahanui inlet, New Zealand*. Journal of Marine Science and Engineering, 8(9), 645.

Zeale, M. (2009). *Barbastelles in the landscape: ecological research and conservation in Dartmoor National Park*. SITA Trust.

Zeale, M. R. K., Davidson-Watts, I., & Jones, G., (2012). *Home range use and habitat selection by barbastelle bats (Barbastella barbastellus): implications for conservation.* Journal of Mammalogy, 93(4): pp.1110-1118

© WSP UK Limited

Appendix A
Record of Consultation Responses on Screening

© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix A

Summary of consultation responses



© WSP UK Limited

Appendix A
Summary of consultation responses

© WSP UK Limited

Contents

1.	**Introduction**	**3**
1.1	Background	3
1.2	Written responses	3
1.3	Structure of Appendix A	4
1.4	Modifications to this document	5
2.	**General comments on Screening Report of September 2020**	**7**
3.	**Terrestrial ecology (including wildfowl and waders)**	**11**
4.	**Marine mammals**	**18**
5.	**Benthic habitats and communities**	**21**
6.	**In-combination assessment**	**26**
7.	**Migratory non-sea birds**	**33**
8.	**Offshore ornithology**	**36**
9.	**References**	**51**

List of Tables

Table A-1 General comments (comments #1 - #5) on the HRA Screening Report (RED, 2020) 7
Table A-2 Terrestrial ecology comments #6 - #17 on the HRA Screening Report (RED, 2020) 11
Table A-3 Marine mammal (comments #18 - #23) comments on the HRA Screening Report (RED, 2020) 18
Table A-4 Benthic habitats and communities (comments #24 - #33) comments on the HRA Screening Report (RED, 2020) 21
Table A-5 In-combination assessment (comments #34 - #39) comments on the HRA Screening Report (RED, 2020) 26
Table A-6 Migratory non-seabirds (comments #40 - #44) comments on the HRA Screening Report (RED, 2020) 33
Table A-7 Offshore ornithology (comments #47 - #71) comments on the HRA Screening Report (RED, 2020) 36

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

1. Introduction

A Habitats Regulations Assessment (HRA) Stage One Screening exercise was undertaken by Rampion Extension Development Limited ('RED') ('the Applicant') in September 2020. Findings were shared with consultees in the Screening Report (RED, 2020). This appendix of the **Report to Inform Appropriate Assessment** (**RIAA**) provides a Record of Consultation with respect to the responses provided by consultees during the September / October 2020 consultation and the answers provided by the Applicant.

1.1 Background

1.1.1 The Applicant completed a HRA Screening exercise for Rampion 2 (the Proposed Development) to determine whether and how, Likely Significant Effects (LSEs) on European sites might result from the construction, operation or decommissioning of the Proposed Development. The outcomes of this exercise were reported in the Applicant's Report to Inform HRA Screening (RED, 2020) (the Screening Report). The Screening Report set out the European sites and qualifying features considered during the HRA Screening, exercise the Applicant's findings on the potential for LSEs and the proposed methods for Screening and assessment.

1.1.2 The Applicant shared the Screening Report (RED, 2020), together with Screening matrices with consultees on 11 September 2020. Comments were invited during a consultation period from late September 2020 to mid-October 2020. This four-week consultation period was extended for an undefined duration to facilitate the restrictions placed on responders during the Covid-19 pandemic. The Screening Report (approach and conclusions) was also discussed at Expert Technical Group (ETG) meetings held on the 18 September 2020 and 10 October 2020.

1.1.3 This Appendix reports the responses (and the Applicant's answers) submitted with respect to the September 2020 Screening Report (RED, 2020) only and hereafter, and in this Appendix only, referred to 'the consultation.

1.2 Written responses

1.2.1 Natural England and the following non-statutory consultees responded during the consultation period:

- Natural England - letter dated 09 October 2020;
- The Wildlife Trusts - joint letter with Sussex Wildlife Trust dated 14 October 2020;
- Sussex Wildlife Trust -joint letter with The Wildlife Trusts dated 14 October 2020;
- West Sussex County Council – letter (WSCC Ecology) dated 2 October 2020;
- Whale & Dolphin Conservation – email stating unable to provide comment dated 15 September 2020;

- Arun District Council – email response dated 8 October 2020;
- Sussex Ornithological Society – paper detailing concerns 20 September 2020; and
- Horsham District Council letter (WSCC Ecology) dated 2 October 2020.

1.2.2 No responses were received from the following during the consultation period (although some have joined later ETG meetings):

- The Planning Inspectorate;
- The Marine Management Organisation (MMO);
- Royal Society for the Protection of Birds (RSPB);
- The Environment Agency;
- East Sussex County Council (ESCC);
- Sussex Inland Fisheries Conservation Authority;
- South Downs National Park (SDNP);
- Adur District Council and Worthing;
- Brighton and Hove City Council;
- Lewes and Eastbourne Councils;
- Mid Sussex District Council (MSDC);
- East Sussex County Council;
- Hampshire County Council;
- Isle of Wight Council;
- Chichester City Council; and
- Centre for Environment Fisheries and Aquaculture Science (Cefas) (made aware by a third party as direct requests for consultation do not accord with the organisation's policies).

1.3 Structure of Appendix A

1.3.1 Responses (and the Applicant's answers) to the consultation are presented in this document by receptor group as follows:

- general comments (#1-5) - **Section 2**;
- terrestrial ecology (#6-17) - **Section 3**;
- marine mammals (#18-23) - **Section 4**;
- subtidal and benthic ecology (#24-33) - pages 11, 12 and 13 (**Section 5**)
- the in-combination assessment (#34-39) - pages 14 and 15 (**Section 6**);
- birds during migration (#40-44) - pages 16 and 17 (**Section 7**); and

© WSP UK Limited

- seabirds – (#47-71) - pages 18 – 23 (**Section 8**).

1.4 Modifications to this document

1.4.1 This document was originally issued to consultees invited to the ETG meeting of March 2021. It was provided as Appendix A of the ETG materials (and had three appendices B, C, and D).

1.4.2 To accommodate the presentation of this material in the **RIAA** the changes listed below have been made to the original (as issued) version of Appendix A. Otherwise, the tables that comprised Appendix were those provided to consultees invited to the ETG meeting and the material presented here is identical to that provided to the ETG.

- Section 1 is new and was not provided to the ETG;
- Document name updated from '*Appendix A: HRA Summary of Screening Consultation'* to '*Appendix A to the Report to Inform Appropriate Assessment';*
- Appendices A, B and C removed. The items removed are now presented (unaltered) as Appendices B, C and D of the **RIAA**;
- So as not to confuse navigation, documents referenced in the table columns titled: "*Evidence of Applicant's response*" have been updated in this document to refer to the correct appendices in this submission;
- As above regarding references to Screening matrices, which are since updated; and
- Receptor group names updated to refer to those used in the **RIAA** e.g.
  - Terrestrial Ecology (including wetland wildfowl) is now Terrestrial ecology (including wildfowl and waders);
  - 'Subtidal and intertidal benthic ecology' now 'benthic habitats and communities';
  - Migratory birds now 'migratory non-seabirds'; and
  - Ornithology now 'offshore ornithology'.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

2. General comments on Screening Report of September 2020

Table A-1 General comments (comments #1 - #5) on the HRA Screening Report (RED, 2020)

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#1	**9 October 2020**	Natural England	Letter by email	It would be helpful to include a summary table of which sites have been screened in and out.	Conclusions on LSEs for all sites have been review and post-consultation updates identified.	A complete account of the HRA Screening (post-consultation updates) was produced and provided to the ETG meeting of 26 March. This is now **Appendix B** of the **RIAA**.
#2	**2 October 2020**	Horsham District Council	Letter by email	Satisfied with the methodology applied for HRA screening. The site selection process for this initial screening is highly precautionary. Agree a full Appropriate Assessment is required.	Noted. No action required.	No action required.
#3	**9 October 2020**	Natural England	Letter by email	Generally satisfied with the screening decisions made at this stage.	Noted. No action required.	No action required.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#4	**9 October 2020**	Natural England	Letter by email	Sites included in the screening for Rampion 1 have not been included in Screening for Rampion 2. These include Portsmouth Harbour SPA and Ramsar site, Forth Islands SPA, Wight-Barfleur Reef SAC, Dungeness SAC, Hastings Cliff SAC, Lyme Bay and Torbay SAC, Margate and Long Sands SAC, Bassurelle Sandbank SAC. It would be useful if the applicant could detail why possible impact pathways to these sites were considered as part of Rampion 1, but they are not considered relevant to Rampion 2.	The differences are explained by the different Screening methodologies applied to Rampion 1 and 2 to identify sites for marine and coastal habitats (regarding potential impacts from sediment plumes during construction and alteration of the hydrodynamic regime during operation). Rampion 1 identified potential LSEs for all sites within the coastal "cell" extending from Beachy Head to Selsey Bill. This resulted in the identification of a large number of SACS ranging 42km up to 170km from Rampion 1. Rampion 2 has been able to adopt a more informed approach to the Screening, employing data resulting	Portsmouth Harbour SPA and Ramsar site have been captured under the 'migratory species updates.' Updates made in response to consultation are captured in: **Section 5** of the **RIAA** (**Table 5-1**) **Appendix B** of the **RIAA** (account of post-consultation HRA Screening) **Appendix E** of the **RIAA** (revised HRA Screening matrices) And the approach to Screening migratory collision risk: **Appendix C** of the **RIAA** (Technical note: migratory non-seabirds)

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
					from Rampion 1 concerning realistic sediment dispersal and hydrodynamic effects and applied a range of 30km, beyond which it is considered effects are not likely to occur. This is considered to represent a more refined method, that excludes sites to which there are no viable pathways. It is noted negligible effects were concluded for the SACs listed from Rampion 1.	
#5	18 September 2020	Natural England	ETG meeting	HRA Screening parameters – the Applicant presented criteria used in the European site selection process and the parameters used to determine connectivity between sites. For cetaceans (Species Management Units	The HRA Screening Report was sent out for consultation (w/c 14 September 2020) shortly before this meeting. It is noted that consultees have requested more time to consider the Screening and return comments.	No action required.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				(MU) and seals (ranges of145km and 120km for grey and harbour seal). There were no questions about the screening parameters proposed for birds and marine mammal HRA Screening.		

© WSP UK Limited

3. Terrestrial ecology (including wildfowl and waders)

Table A-2 Terrestrial ecology comments #6 - #17 on the HRA Screening Report (RED, 2020)

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#6	**9 October 2020**	Natural England	Letter by email	**The Mens SAC** - Matrix 4 impacts due to increased light levels during the decommissioning phase appear to have been incorrectly screened out for Barbastelle bats as they are marked by "✗i" this should be screened in with an "✓i" as is stated in the ✓i text below the table.	The Applicant can confirm that potential LSE was / is identified for increased light levels during decommissioning for the Barbastelle bat features of the Mens SAC. Updates to Screening made are logged in the upfront sections of the **RIAA**, in Appendix B of the **RIAA** and are apparent in the HRA Screening Matrices (as revised). A complete record of Screening is provided at Appendix A of this document.	**Section 5** of the **RIAA** (**Table 5-1**) **Appendix B** of the **RIAA** (account of post-consultation HRA Screening) **Appendix E** of the **RIAA** (revised HRA Screening matrices) See Matrix 4
#7	**9 October 2020**	Natural England	Letter by email	**Pevensey Levels Ramsar** and **Pevensey Levels SAC** - Advise that the applicant consider if there are possible pathways for effects on Pevensey Levels Ramsar and Pevensey Levels SAC.	These sites have been considered as requested. Both are located 28.8km from the onshore cable corridor. The SAC is designated for inland water bodies, humid grassland, mesophile grassland and Ramshorn snail. The	Response provided to ETG meeting of 26 March 2021 as reported here (now **Appendix A** of the **RIAA**)

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
					Ramsar is designated for criterion 1 and 2 - nationally important species invertebrates. There is considered to be no potential for interactions with the project and no effect pathways are identified.	
#8	**9 October 2020**	Natural England	Letter by email	**The Mens SAC** - assessment makes no specific reference to potential impacts of habitat restoration activities, which could also result in fragmentation of functionally linked land.	The restoration of habitats will not result in any effects beyond those already accounted for the construction phase. Habitats will be dug up and restored in a linked fashion. After which, the land will be drilled with a crop or re-seeded if grassland. It is acknowledged that before the land recovers, there will be a period of time when the habitat is degraded. The implications of this are accounted for in the assessment of land cover change during construction, with reference to the amount and location of alternative habitat.	Response provided to ETG meeting of 26 March 2021 as reported here (Now **Appendix A** of the **RIAA**)
#9	**9 October 2020**	Natural England	Letter by email	It is unclear what has been assessed under the land take / land cover change category and what has been assessed under	Land take / land cover change was associated with the direct loss (or change to) land from designated sites within the HRA Screening	General clarification provided in ES and RIAA submissions.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				the fragmentation of habitats category. It is our understanding that potential impacts relating to functionally linked land of SPA/Ramsar species has been considered under the fragmentation of habitats category.	Report due to the nature of the functionally linked land in question (i.e. a farmland resource changing on an annual basis). However, for clarity all assessments of land take of functionally linked land in the Environmental Statement (ES) and RIAA have been considered as a stand-alone effect.	
#10	**9 October 2020**	Natural England	Letter by email	**Pagham Harbour SPA/Ramsar** - Natural England agree that a LSE on Pagham Harbour SPA/Ramsar during construction can be ruled out.	The Applicant would like to clarify if this comment refers to both the onshore and offshore receptors (considered separately), notably, the potential for changes in prey availability and behaviour to affect common tern (for which potential LSE was identified).	Point of clarification. Resolved as reported in the minutes of the ETG meeting of 26 March 2021.
#11	**9 October 2020**	Natural England	Letter by email	**Arun Valley Ramsar** - table 8.1 does not include fragmentation of habitats of the assemblage of wintering waterfowl and northern pintail. This should be taken forward to appropriate assessment.	The Applicant agrees this should be covered and can confirm Potential LSE has been identified for the northern pintail and assemblage features of this site, as reported in Screening Matrix 1.	**Section 5** of the **RIAA** (**Table 5-1**) **Appendix B** of the **RIAA** (account of post-consultation HRA Screening)

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
						Appendix E of the **RIAA** (revised HRA Screening matrices) Screening Matrix 1
#12	**9 October 2020**	Natural England	Letter by email	**Arun Valley SPA -** Potential for LSE in relation to the potential fragmentation or severance of habitats of the non-breeding water fowl assemblage and Bewick's swan during construction and decommissioning has been omitted from table 8.1. This should be taken forward to appropriate assessment	The Applicant agrees this should be covered and can confirm Potential LSE has been identified for the Bewick's swan and assemblage features of this site, as reported in Screening Matrix 2.	**Section 5** of the **RIAA** (**Table 5-1**) **Appendix B** of the **RIAA** (account of post-consultation HRA Screening) **Appendix E** of the **RIAA** (revised HRA Screening matrices) Screening Matrix 2
#13	**9 October 2020**	Natural England	Letter by email	**Arun Valley SPA/Ramsar** is in identified under criteria 2 (sites with mobile species whose foraging ranges interact with the scoping boundary) when it is identified under criteria 1b (sites with functionally linked land in the scoping boundary).	More than one criteria can apply in respect different pathways. This site qualifies under both categories as the range of the species interacts with the site (Criteria 2) and there is functionally linked land within the scoping boundary (Criteria 1). These sites also now qualify under Criteria	Explanation provided. No further action required.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
					4, where connectivity is established to features on migration.	
#14	**9 October 2020**	Natural England	Letter by email	**Arun Valley SPA** - habitats that may be used by Bewick's swan from the Arun Valley for foraging are present within the Scoping Boundary. However, it makes no specific reference to potential impacts of habitat restoration activities, which could also fragment the habitat resulting in displacement of foraging individuals.	The restoration of habitats will not result in any effects beyond those already accounted for the construction phase. Habitats will be dug up and restored in a linked fashion. After which, the land will be drilled with a crop or re-seeded if grassland. It is acknowledged that before the land recovers, there will be a period of time when the habitat is degraded. The implications of this are accounted for in the assessment of land cover change during construction works, with reference to the amount and location of alternative habitat.	Explanation provided. No action taken.
#15	**9 October 2020**	Natural England	Letter by email	Natural England applies a foraging range of 5km for brent geese to identify potentially functionally linked land, based on the review of cropped habitat usage in the JNCC[1] 3rd SPA	Noted.	No action required.

[1]Joint Nature Conservation Committee

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				Review. However, we welcome the 10km foraging ranged used in the table as precautionary.		
#16	**9 October 2020**	Natural England	Letter by email	**Pagham Harbour SPA/Ramsar** - The onshore Pagham Harbour Ramsar matrix includes Dark-bellied brent goose and Black-tailed godwit as the features of the site which are screened. The offshore Pagham Harbour Ramsar matrix considers common tern, Dark-bellied brent goose, little tern and Ruff. We would advise the applicant needs to ensure the correct features for the Ramsar site are used.	Designated features Pagham Harbour Ramsar been reviewed and updated for the site screening matrix.	**Appendix B** of the **RIAA** (account of post-consultation HRA Screening) **Appendix E** of the **RIAA** (revised HRA Screening matrices) Screening Matrix 1
#17	**9 October 2020**	Natural England	Letter by email	**Pagham SPA/Ramsar** has been split into onshore and offshore. It is unclear why this approach has been taken for this site. It is important that any possible cumulative and in combination effects are considered in relation to impacts on the site as a whole.	The site was presented this way for clarity and to ensure that effects that were relevant to the features were addressed. As the effects differ for these receptor groups, combined matrices would need to accommodate a large number of effects. The Applicant will ensure any and all impacts to site integrity as a whole are addressed at Stage 2.	A full revised Screening is set out in the **RIAA** (in particular, **Appendix B** of the **RIAA**). Screening Matrix 17 and 18

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
						(Updated Screening matrices are provided at **Appendix E** of the **RIAA**)

© WSP UK Limited

4. Marine mammals

Table A-3 Marine mammal (comments #18 - #23) comments on the HRA Screening Report (RED, 2020)

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#18	**9 October 2020**	Natural England	Letter by email	For grey seals and harbour seals, receptor ranges of 145km and 120km have been used respectively. Natural England would advise that seal management units should be used.	Screening was revisited. The relevant Seal MU (South England – Unit 10) were applied to the site identification process. This indicated that there are no SACs for either seal species that share the management unit with Rampion 2. Therefore, no sites for seals have been identified (or screened).	A full revised Screening is set out in the **RIAA** (in particular, **Appendix B** of the **RIAA**).
#19	**9 October 2020**	Natural England	Letter by email	Section 4.37 of the Screening Report (RWE, 2020) suggests there are low numbers of harbour seal present in the Solent and whilst we agree that there are relatively low numbers here compared to other areas, the numbers in the Solent are increasing annually	Noted. However, on the application of the relevant Seal MU (South England – unit 10) provided by Special Committee on Seals (SCOS) (2016), no SACs for seals have been identified (or screened).	No action required. Screening is set out in the **RIAA** (in particular, **Appendix B** of the **RIAA**).

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				and therefore we would advise the applicant looks for more recent data sources than SCOS, 2016.		
#20	**9 October 2020**	Natural England	Letter by email	Given the distance of this site from the array Natural England are satisfied with the decision to screen Southern North Sea SAC out in relation to Harbour porpoise.	Noted. No response required.	Point of agreement.
#21	**14 October 2020**	The Wildlife Trusts and Sussex Wildlife Trust	Letter by email	The Wildlife Trusts request to be named as a consultee on documents such as Marine Mammal Mitigation Protocols.	Noted. As no European sites for marine mammals have been identified for inclusion in the HRA, this comment has been noted with respect to the development of the ES (as well as with respect to any updates made to the HRA Screening outcomes for marine mammals as part of the iterative process of HRA).	Noted.
#22	**14 October 2020**	The Wildlife Trusts and Sussex	Letter by email	The Wildlife Trusts agree with the designated sites screened in with regards to marine mammals.	Noted. However, following Screening no European sites for marine mammals have been	Point of clarification. Addressed in the minutes of the

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
					identified for inclusion in the HRA.	ETG meeting of 26 March 2021
#23	**15 September 2020**	Whale and Dolphin conservation	Email	Unfortunately, due to furlough and subsequently increased workloads, we are unable to provide a comment at this time.	Noted. No response required.	No action required or undertaken.

© WSP UK Limited

5. Benthic habitats and communities

Table A-4 Benthic habitats and communities (comments #24 - #33) comments on the HRA Screening Report (RED, 2020)

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#24	**9 October 2020**	Natural England	Letter by email	Suspended sediment and deposition has been screened out during the operation stage. Without an understanding of the maintenance that may be required and further information to clarify the likely disposition rates on the intertidal areas of this site, we would suggest that this impact should be screened in for the following sites until this is better understood. - Solent and Isle of Wight Lagoons SAC (30.6km to Array) - South Wight Maritime SAC (20.5 km to Array) - Solent Maritime SAC (15.7km to array	The scale of operation and maintenance activities has been further clarified in **Chapter 22: Terrestrial ecology and nature conservation, Volume 2**. We do not anticipate that these sites would be affected by such activities, given that the activities will be much reduced from construction and the distance of these sites from the offshore cable corridor and array. However, potential LSEs will be identified for this pathway (to all three sites) pending further information and discussion.	Screening Matrix 8, 9 and 9A. (Updated Screening matrices are provided at **Appendix E** of the **RIAA**) A complete account of the HRA Screening (post-consultation updates) was provided to the ETG meeting of 26 March 2021. This is now **Appendix B** of the **RIAA**.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#25	**9 October 2020**	Natural England	Letter by email	We would suggest that the risk of pollution can be reduced using appropriate construction techniques and good environmental practice, but where measures are considered necessary to mitigate against an impact the applicability and suitability of the mitigation measures needs to be explored at the appropriate assessment stage 2. Comment relates to the following sites: - Solent and Isle of Wight Lagoons SAC (30.6km to Array) - South Wight Maritime SAC (20.5 km to Array) - Solent Maritime SAC (15.7km to array)	Mitigation was not relied upon to discount a potential LSE. LSE was discounted with reference to the distance between the Proposed Development and these sites, the limited capacity for the Proposed Development to cause a major pollution event and the significant dilution and dispersal capacity of the open coast. Effects are considered likely to be negligible. However, the Applicant is happy to identify potential LSE for this pathway (to all three sites) and to set out the pollution control measures within the **RIAA**.	Screening Matrix 8, 9 and 9A. (Updated Screening matrices are provided at **Appendix E** of the **RIAA**) A complete account of the HRA Screening (post-consultation updates) was provided to the ETG meeting of 26 March 2021. This is now **Appendix B** of the **RIAA**.
#26	**9 October 2020**	Natural England	Letter by email	We question the conclusion of no LSE for this pressure as it has been made based on the assertion that existing offshore wind farms provide no evidence for the viability of providing a pathway for non-native species.	Potential LSE is identified during construction for these sites due to the measures and best practice approaches that will be implemented to reduce the potential risk and consequences of invasive non-native species (INNS) introduction and spread. The same finding will be	Screening Matrix 8, 9 and 9A. (Updated Screening matrices are provided at **Appendix E** of the **RIAA**)

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				Comment relates to the following sites: - Solent and Isle of Wight Lagoons SAC (30.6km to Array) - South Wight Maritime SAC (20.5km to Array) - Solent Maritime SAC (15.7km to array)	applied to the operation and maintenance phase during which, control measures will present the potential colonisation of and transfer from new hard substrate by marine INNS.	A complete account of the HRA Screening (post-consultation updates) was provided to the ETG meeting of 26 March 2021. This is now **Appendix B** of the **RIAA**.
#27	**9 October 2020**	Natural England	Letter by email	Solent Maritime SAC - Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") have not been listed as a feature for which potential spatial connectivity exists, but they have been screened in for LSE in combination in matrix 8. It is therefore unclear if the applicant is suggesting there is an impact pathway for effects on this feature or not. We would question the reasoning for suggesting there is not an impact pathway.	The Applicant is not suggesting there is a pathway to the dune feature of this site, and it is not considered that a pathway exists. The Applicant questioned the nature of a potential pathway at the ETG of the 18 September 2020. Natural England confirmed that this comment was to be interpretated as a request to check the outcomes for this site. These are considered by the Applicant to be confirmed in the revised Screening reported in **Appendix B** of the **RIAA** (a copy of which is provided with the ETG materials)	**Screening Matrix 8** (Updated Screening matrices are provided at **Appendix E** of the **RIAA**) A complete account of the HRA Screening (post-consultation updates) was provided to the ETG meeting of 26 March 2021. This is now **Appendix B** of the **RIAA**.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#28	**9 October 2020**	Natural England	Letter by email	Solent Maritime SAC - Annual vegetation of drift lines and Perennial vegetation of stony banks features of the SAC have been omitted from the screening matrix 8.	No pathway for effects is anticipated. Clarification provided in Screening Matrix 8.	See Screening Matrix 8 (Updated Screening matrices are provided at **Appendix E** of the **RIAA**)
#29	**9 October 2020**	Natural England	Letter by email	Loss/disturbance due to the installation of the piles themselves also needs to also be mentioned here. It should be noted that any activities that involve the disposal or relocation of sediments may lead to permanent habitat loss. Scour and cable protection could also result in permanent habitat loss, particularly if they are not removed at the decommissioning stage.	Noted. However, it is not clear what European site or features this comment relates to. There is no spatial overlap with the Proposed Development and any European site.	Point of clarification for ETG meeting. Outcome reported in the minutes of the ETG meeting of 26 March 2021.
#30	**14 October 2020**	The Wildlife Trusts and Sussex Wildlife Trust	Letter by email	It should be demonstrated within the assessment that lessons have been learned from previous cable installation and associated cable protection requirements from Rampion 1	Noted. However, it is not clear what European site this comment relates to. There is no spatial overlap with the Proposed Development and any European site.	Point of clarification for ETG meeting. Outcome reported in the minutes of the ETG meeting of 26 March 2021.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#31	**14 October 2020**	The Wildlife Trusts and Sussex Wildlife Trust	Letter by email	Welcome the routing of the cable outside of Kingmere Marine Conservation Zone (MCZ).	Noted. However, MCZs are outside the scope of the Habitats Directive. The Applicant will follow a separate assessment process to ensure it complies with its statutory obligations, including in relation the MCZs under Section 125 of Marine & Coastal Access Act 2009.	Explanation provided. No action taken.
#32	**14 October 2020**	The Wildlife Trusts and Sussex Wildlife Trust	Letter by email	Cable installation requirements and cable burial methodology should be outlined in greater detail as part of the future assessment	Noted. Further information is provided in the **HRA** and in the ES. However, it is not clear what European site this comment relates to as there is no direct spatial overlap with the offshore export cable corridor and any European sites.	Covered above see response to #29 and #30
#33	**14 October 2020**	The Wildlife Trusts and Sussex Wildlife Trust	Letter by email	The expectation of cable maintenance and additional cable protection requirements during the lifetime of the project should be clearly explained to determine operational habitat disturbance and loss.	Noted. Further information is provided in the **HRA** and in the ES. However, it is not clear what European site this comment relates to as there is no direct spatial overlap with the offshore export cable corridor and any European sites.	Covered above see response to #29 and #30

© WSP UK Limited

6. In-combination assessment

Table A-5 In-combination assessment (comments #34 - #39) comments on the HRA Screening Report (RED, 2020)

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#34	**9 October 2020**	Natural England	Letter by email	Pagham SPA/Ramsar has been split into onshore and offshore. It is unclear why this approach has been taken for this site. It is important that any possible cumulative and in combination effects are considered in relation to impacts on the site as a whole.	See response to comment #17. The Applicant will ensure any and all impacts to site integrity as a whole are addressed at Stage 2.	See response to comment #17.
#35	**9 October 2020**	Natural England	Letter by email	It is important that any impacts of the project during operation are considered in combination with impacts from other projects including	Noted. For all sites at risk of LSE and Likely Significant Effects In-combination (LSEI), effects in-combination with other offshore	The in-combination assessment will be provided in the **RIAA**.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				Rampion 1 and other offshore windfarms. It is key that effects in-combination with other offshore windfarms are considered, particularly those which will be under construction or operational.	wind farms have been assessed at Stage 2.	
#36	**9 October 2020**	Natural England	Letter by email	It is unclear if the projects listed in table 3.3 of the Screening Report (RWE, 2020) (Potentially relevant external projects in the English Channel") represent a comprehensive list of projects identifiable at this stage and therefore if the LSE in-combination decisions made in this assessment have been made taking into	The projects listed in Table 3.3 of the Screening Report (RWE, 2020) represent a comprehensive list of projects that were identifiable at the time the Screening was undertaken. The Screening method is precautionary so that additional sites are very unlikely to be captured following an appraisal against the	The in-combination assessment will be provided in the **RIAA**.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				account all relevant projects.	current development landscape. A large number of pathways resulting from effects acting in-combination have been identified with reference to the potential for interactions, rather than quantification at this stage. **Appendix A** clarifies which pathways resulted from effects in-combination.	
#37	**9 October 2020**	Natural England	Letter by email	Expected the applicant to have identified a comprehensive list of projects based on the information currently available. We acknowledge that further information is likely to become	The Applicant did not identify any plans or projects other than the "Potentially relevant external projects in the English Channel" set out in the report, which was the best account possible at the time.	The in-combination assessment is provided in the **RIAA**.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				available throughout the application process, however we expect the applicant to make all efforts to consider a comprehensive list of plans or projects with the potential to result in in-combination effects at this stage.	The Screening method is so precautionary that additional sites are very unlikely to be captured following an appraisal against the current development landscape. A large number of pathways resulting from effects acting in-combination have been identified with reference to the potential for interactions, rather than quantification at this stage. **Appendix A** clarifies which pathways resulted from effects in-combination. A comprehensive list of projects will be provided in the **RIAA**.	
#38	**9 October 2020**	Natural England	Letter by email	It is key that effects in-combination with	Noted. This is part of the methodology for	The in-combination assessment is

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				other offshore windfarms are considered, particularly those which will be under construction or operational.	the in-combination assessment set out in the Screening report. The **RIAA** presents a comprehensive assessment of the potential impacts of other offshore windfarms within relevant (sensitive) species range for all project phases. The offshore windfarms considered as part of this assessment will be set out within the **RIAA**.	provided in the **RIAA**.
#39	**9 October 2020**	Natural England	Letter by email	It is important that any impacts of the project during operation are considered in combination with impacts from other projects including Rampion 1 and other offshore wind farms.	Noted. This is part of the methodology for the in-combination assessment set out in the Screening report. A large number of pathways resulting from effects acting in-combination have been identified with	The in-combination assessment will be provided in the **RIAA**.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
					reference to the potential for interactions, rather than quantification at this stage. **Appendix A** clarifies which pathways resulted from effects in-combination. The **RIAA** will present a comprehensive assessment of the potential impacts of other offshore wind farms within relevant (sensitive) species range using Collision Risk Modelling (CRM) (including migratory CRM) to consider the collective magnitude of such impacts during operation and apportionment to allocation such impacts to individual sites. The offshore	

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
					windfarms considered as part of this assessment will be set out within the **RIAA**.	

© WSP UK Limited

7. Migratory non-sea birds

Table A-6 Migratory non-seabirds (comments #40 - #44) comments on the HRA Screening Report (RED, 2020)

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
#40	**9 October 2020**	Natural England	Letter by email	The screening matrices do not acknowledge the potential pathway for impact from collision risk to migratory waterbirds. It would be helpful if the collision risk was added and the reasoning why this has been ruled out for waterbirds when on migration.	Migratory seabirds have been re-considered under Criterion 4. Migratory waterbirds that may have connectivity with Rampion 2 have been considered and a number of additional sites drawn into the HRA. The full process and outputs of the updates are documented in a Technical Appendix to the **RIAA**, available at **Appendix C**. Updates made are logged in the upfront sections of the **RIAA** and apparent in the HRA Screening Matrices (as revised).	**Appendix B** of the **RIAA**. Updates to Screening. **Appendix E** of the **RIAA**) Updates to Screening matrices **Appendix C** of the **RIAA** Technical note
#41	**9 October 2020**	Natural England	Letter by email	The Medway and wider Thames Estuary - Matrix 25, 26, 27, 28, 29 - The Medway and wider Thames Estuary tern sites are identified under	Migratory seabirds have been re-considered under Criterion 4. Migratory waterbirds that may have connectivity with Rampion 2 have been considered	**Appendix B** of the **RIAA**. Updates to Screening.

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				criteria 4, and the only pathway for impact is during migration. Therefore, why are only the terns and no other migratory birds considered?	and a number of additional sites drawn into the HRA. The full process and outputs of the updates are documented in a Technical Appendix to the **RIAA**, available at **Appendix B**. Updates made are logged in the upfront sections of the **RIAA** and apparent in the HRA Screening Matrices (as revised).	**Appendix E** of the **RIAA**) Updates to Screening matrices **Appendix C** of the **RIAA** Technical note
#42	**9 October 2020**	Natural England	Letter by email	5.5.2 – 5.5.3 of the Screening Report (RWE, 2020). If collision risk mortality has been ruled out for migratory birds, it is unclear why common and sandwich terns associated with the east coast SPAs have been included in the matrices.	Collision risk mortality has not been ruled out for migratory birds. Common and sandwich terns associated with the east coast SPAs to be revisited along with other seabird species recorded at Rampion 2 array area during site specific surveys have been included in Criterion 4.	**Appendix C** of the **RIAA** Technical note
#43	**9 October 2020**	Natural England	Letter by email	5.5.2 – 5.5.3 the Screening Report (RWE, 2020) states that quantitative assessments have been made for other OWF (and simpler quantitative assessment for Rampion OWF) that concluded predicted mortality from	To date, migratory seabird apportionment has only undertaken for Rampion 1. Seabird sites to the east (for migratory species) have been identified for migratory seabirds recorded during site specific surveys	**Appendix E** of the **RIAA**) Updates to Screening matrices

© WSP UK Limited

ID	Date	Consultee	Nature	Consultee comment	Applicant's response	Evidence of Applicant's response
				collision risk for migratory birds is below that for LSE. Therefore, collision risk for migratory birds from Rampion 2 is screened out. Can the applicants confirm whether any quantitative CRM assessment has been carried out for Rampion 2, and whether this included an in-combination assessment?	undertaken at Rampion 2. This has been undertaken under Criterion 4 and provided in full on a site-by-site basis in the screening matrices. CRM for migratory species will be undertaken for Rampion 2 and reported in the **RIAA**.	**Appendix C** of the **RIAA** Technical note
#44	**9 October 2020**	Natural England	Letter by email	Dungeness, Romney Marsh and Rye Bay Ramsar appears to have been excluded from the screening, again we advise this site is included in this assessment	Ramsar site is designated for wintering and passage species. There is therefore no connectivity during the breeding season. The site was not identified during the migratory waterbird screening exercise due to distance from the Rampion 2 array boundary (exceeding 55km to the east). Therefore, there is no impact pathway for this Ramsar site.	Explanation provided. No action taken.

Note: Comment numbers #45 & #46 were duplicated comments and have not been repeated in the tables below

© WSP UK Limited

8. Offshore ornithology

Table A-7 Offshore ornithology (comments #47 - #71) comments on the HRA Screening Report (RED, 2020)

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
#47	13/10/20	Natural England RSBP SMRU	Expert Topic Group Meeting (online)	For breeding seabirds, the standard deviation range should be applied to the foraging ranges of seabirds (Woodward et al., 2019) for the identification of European sites.	The standard deviation range has been applied in the revised Screening. This exercise has been undertaken in a separate report (see **Appendix C** of the **RIAA**) for all breeding seabirds listed in Woodward *et al.*, 2019. This approach forms the basis of the Stage one Screening completed for Rampion 2 with respect to offshore ornithological features during the breeding season. The full process and outputs of the updates are documented in a Technical Appendix to the **RIAA**, available at **Appendix C.** Updates made are logged in the upfront sections of the **RIAA** and apparent in the HRA Screening Matrices.	**Appendix B** of the **RIAA**. Updates to Screening. **Appendix E** of the **RIAA**) Updates to PINS Screening matrices **Appendix D** of the **RIAA** Technical Note: European Site Identification for Breeding Seabirds

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
#48	**9 October 2020**	Natural England	Letter by email	Ramsar sites are frequently screened for the same features as the corresponding SPA. Ramsar sites have their own features and all of these need to be included when a Ramsar site is screened.	All SPA and Ramsar sites have been reviewed to ensure designated features are correct for each site. English SPA designated features have been based on those listed on the Natural England Designated Sites portal. For English Ramsar sites, the JNCC Citation documents have been used. It is important to note that noteworthy fauna have not been included as they are not designated features. Other countries SPAs are based on the relevant SNCB designated site portals, with Ramsar site information gleaned from JNCC Citation documents. Updates made are logged in the upfront sections of the **RIAA** and apparent in the HRA Screening Matrices (as revised).	**Appendix B** of the **RIAA**. Updates to Screening. **Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices.
#49	**9 October 2020**	Natural England	Letter by email	Assemblages are frequently omitted from the Screening matrices.	Assemblages for each designated site has been reviewed and updated for each designated site Screening matrix. Updates made are logged in the upfront sections of the **RIAA**, Appendix A of this report and are apparent in the HRA Screening Matrices.	**Appendix B** of the **RIAA**. Updates to Screening. **Appendix E** of the **RIAA**).

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
						Updates to Planning Inspectorate Screening matrices.
#50	**9 October 2020**	Natural England	Letter by email	We advise that the features of all of the designated sites screened are checked by the applicant with reference to the Natural England Designated Sites System. There are some reoccurring inaccuracies and omissions.	All SPA and Ramsar sites have been reviewed to ensure designated features are correct for each site. English SPA designated features have been based on those listed on the Natural England Designated Sites portal. For English Ramsar sites, the JNCC Citation documents have been used. It is important to note that noteworthy fauna have not been included as they are not designated features. Other countries SPAs are based on the relevant SNCB designated site portals, with Ramsar site information gleaned from JNCC Citation documents. Updates made are logged in the upfront sections of the **RIAA** and apparent in the HRA Screening Matrices.	**Appendix B** of the **RIAA**. Updates to Screening. **Appendix E** of the **RIAA**) Updates to PINS Screening matrices.
#51	**9 October 2020**	Natural England	Letter by email	Where a LSE has been ruled out and part of the justification given for no LSE is "previous	The Applicant has provided more explicit references to the evidence relied upon in the Screening matrices.	**Appendix B** of the **RIAA**. Updates to Screening.

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
				experience of other offshore wind farms/projects is of no LSE being concluded". We would welcome further discussions with the applicant to understand the evidence behind decisions that have used this reasoning.		**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices
#52	**9 October 2020**	Natural England	Letter by email	Alde-Ore Estuary SPA and Ramsar - We would advise the applicant needs to ensure the correct features have been screened.	Alde-Ore Estuary SPA and Ramsar have been included within the matrices based on the information provided via the Natural England Designated Sites portal. We welcome further discussion as to the specific concerns of Natural England with regard to this site. For reference, the features considered are set out below: • **SPA** - Lesser black-backed gull, Sandwich tern, Ruff, Redshank, Avocet, Marsh Harrier, Little tern; and • **Ramsar** - Lesser black-backed gull, Avocet, Redshank, wintering waterbird assemblage and	Point of clarification for ETG meeting. reported in the minutes of the ETG meeting of 26 March 2021.

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
					wetland bird assemblage (breeding).	
#53	**9 October 2020**	Natural England	Letter by email	Medway Estuary and Marshes SPA and Ramsar - Table 7.1 of the Screening Report (RWE, 2020) for Matrix 25 and 26, disturbance / displacement is in the table twice once screened out for LSE alone, and the next line is blank.	The Applicant can confirm that potential LSE is identified for Medway Estuary and Marshes (UK) SPA with respect to collision risk to common tern on migration. No LSE is identified for any features of these sties regarding disturbance / displacement on the rationale provided in Screening Matrices 25 and 26.	**Appendix B** of the **RIAA**. Updates to Screening. **Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices See Screening Matrix 25 and 26.
#54	**9 October 2020**	Natural England	Letter by email	Outer Thames Estuary SPA - Why is a LSE in combination ruled out for common terns from the Outer Thames SPA when it is screened in for other nearby common tern SPAs (e.g., Medway and Foulness)? Is it because the Outer Thames is a foraging SPA, with the	The Outer Thames Estuary SPA has been revisited to ensure the correct feature and impact combinations have been addressed. As the SPA is a foraging SPA, the features have not been included due to a lack of impact pathway. However, breeding tern species have been fully considered at their respective breeding colony SPAs. Updates made are logged in the upfront sections of the **RIAA** and apparent in the HRA Screening Matrices.	**Appendix B** of the **RIAA**. Updates to Screening. See Screening Matrix 27. **Appendix E** of the **RIAA**) Updates to PINS Screening matrices. **Appendix D**

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
				terns breeding at sites within the nearby SPAs?		of the **RIAA** Technical Note: European Site Identification for Breeding Seabirds.
#55	**9 October 2020**	Natural England	Letter by email	The distance to the scoping boundary from the Solent and Dorset Coast SPA is less relevant in terms of foraging distances. This SPA is for foraging habitat, therefore, the species it is designated for will be flying from nest sites within the Solent harbours SPAs.	The Solent and Dorset Coast SPA has been revisited to ensure the correct feature and impact combinations have been addressed. As the SPA is a foraging SPA, the features have not been included in relation to foraging distances during the breeding season (Criterion 2). Breeding tern species have been fully considered at their respective breeding colony SPAs. However, the Solent and Dorset Coast SPA are screened in under Criterion 3. Updates to Screening made are logged in the upfront sections of the **RIAA**, Appendix B of the **RIAA** and are apparent in the HRA Screening Matrices.	**Appendix B** of the **RIAA**. Updates to Screening. See Screening Matrix 27. **Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. **Appendix D** of the **RIAA** Technical Note: European Site Identification for Breeding Seabirds. Screening Matrix 16.

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
#56	**9 October 2020**	Natural England	Letter by email	Chichester and Langstone Harbours SPA. The non-breeding features have been omitted from the Screening matrix. Applicant needs to ensure the correct features have been screened.	The Chichester and Langstone Harbours SPA has been reviewed to ensure the correct feature and impact combinations have been addressed. Updates to Screening made are logged in the upfront sections of the **RIAA**, summarised in **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices (as updated) Appendix E/.	**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. See Screening Matrix 19 and 20. **Appendix B** of the **RIAA**. Updates to Screening.
#57	**9 October 2020**	Natural England	Letter by email	Solent and Southampton Water SPA - waterbird assemblage, non-breeding feature has been omitted from the screening matrix. Applicant needs to ensure the correct features have been screened.	The Solent and Southampton Water SPA has been reviewed to ensure the correct feature and impact combinations have been addressed. Updates to Screening made are logged in the upfront sections of the **RIAA**, **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices.	**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. See Screening Matrix 21 and 22. **Appendix B** of the **RIAA**. Updates to Screening.
#58	**9 October 2020**	Natural England	Letter by email	Dungeness, Romney Marsh and Rye Bay SPA, - The waterbird assemblage,	Waterbird Assemblage for Dungeness, Romney Marsh and Rye Bay SPA has been reviewed and updated for the site	**Appendix E** of the **RIAA**)

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
				non-breeding feature has been omitted from the screening matrix. needs to ensure the correct features have been screened.	screening matrix. Updates to Screening are logged in the upfront sections of the **RIAA**, **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices.	Updates to Planning Inspectorate Screening matrices. See Screening Matrix 23. **Appendix B** of the **RIAA**. Updates to Screening.
#59	**9 October 2020**	Natural England	Letter by email	Medway Estuary and Marshes SPA and SPA - The waterbird assemblage, non-breeding feature has been omitted from the screening matrix. needs to ensure the correct features have been screened.	The waterbird assemblage for Medway Estuary and Marshes SPA has been reviewed and updated for the site screening matrix. Updates to Screening are logged in the upfront sections of the **RIAA**, Appendix B of the **RIAA** and are apparent in the HRA Screening Matrices.	**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. See Screening Matrix 2 **Appendix B** of the **RIAA**. Updates to Screening.
#60	**9 October 2020**	Natural England	Letter by email	Farne Islands SPA is listed in table 7.2 of the Screening Report (RWE, 2020) as having a LSE in	The Applicant can confirm that potential LSE alone has been discounted for all pathways. Potential LSE in-combination is identified for the following features of	**Appendix E** of the **RIAA**)

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
				combination but is also in the next line of the table listed as having LSE alone and in-combination ruled out.	this site with respect to collision risk non-breeding season: Common tern, Arctic tern, Sandwich tern and Kittiwake. Potential LSE is identified for guillemot regarding disturbance/displacement (all phases of the Proposed Development). Updates to Screening are logged in the upfront sections of the **RIAA**, **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices.	Updates to Planning Inspectorate Screening matrices. See: Screening Matrix 7 **Appendix B** of the **RIAA**. Updates to Screening.
#61	**9 October 2020**	Natural England	Letter by email	Flamborough and Filey Coast SPA - We would advise the applicant needs to ensure the correct features have been screened.	Designated features of the Flamborough and Filey Coast SPA have been included within the matrix based on the information provided via the Natural England Designated Sites portal. We welcome further discussion as to the specific concerns of Natural England with regard to this site.	Point of clarification for ETG meeting. reported in the minutes of the ETG meeting of 26 March 2021.
#62	**9 October 2020**	Natural England	Letter by email	Flamborough and Filey Coast SPA - Natural England would agree that effects in combination - collision risk during	Potential LSE in-combination (collision risk) is identified for Kittiwake, Herring gull and Gannet.	Point of agreement.

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
				operation should be listed as potential for LSEI.		
#63	**9 October 2020**	Natural England	Letter by email	Why is a LSE in combination ruled out for sandwich terns from the Alde-Ore Estuary but screened in for common and sandwich terns from The Wash and N Norfolk Coast, which are further away from Rampion 2?	This site has been revisited to ensure the correct site and species combinations have been included under Criterion 4 – Migratory connectivity. Updates to Screening made are logged in the upfront sections of the **RIAA**, **Appendix B** of the **RIAA** and apparent in the HRA Screening Matrices. A full account of updates is provided as **Appendix A**.	**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. See: Screening Matrix 31 and 32 **Appendix B** of the **RIAA**. Updates to Screening.
#64	**9 October 2020**	Natural England	Letter by email	Solent and Southampton Water - We would advise the applicant needs to ensure the correct features have been screened for the Ramsar site.	Solent and Southampton Water Ramsar Site has been updated within the matrices based on the information provided via the JNCC Ramsar Site information portal. Updates to Screening are logged in the upfront sections of the **RIAA**, in **Appendix B** of the **RIAA** and are	**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. See: Screening Matrix 22.

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
					apparent in the HRA Screening Matrices (as updated) at Appendix E of the **RIAA**	**Appendix B** of the **RIAA**. Updates to Screening.
#65	**9 October 2020**	Natural England	Letter by email	Solent and Southampton Water SPA - waterbird assemblage, non-breeding feature has been omitted from the screening matrix.	Waterbird Assemblage for Solent and Southampton Water SPA has been reviewed and updated for the site screening matrix. Updates to Screening are logged in the upfront sections of the **RIAA**, in **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices (as updated) in **Appendix E**	See: Screening Matrix 22. **Appendix B** of the **RIAA**. Updates to Screening.
#66	**9 October 2020**	Natural England	Letter by email	Chichester and Langstone Harbours - We would advise the applicant needs to ensure the correct features have been screened for the Ramsar site.	Features for Chichester and Langstone Harbours Ramsar have been reviewed and updated for the site screening matrix. Updates to Screening are logged in the upfront sections of the **RIAA**, in **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices (as updated) in **Appendix E**	**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. See: Screening Matrix 19. **Appendix B** of the **RIAA**. Updates to Screening.

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
#67	**9 October 2020**	Natural England	Letter by email	Chichester and Langstone Harbours SPA - The waterbird assemblage, non-breeding feature has been omitted from the screening matrix.	Waterbird Assemblage for Chichester and Langstone Harbours SPA has been reviewed and updated for the site screening matrix. Updates to Screening are logged in the upfront sections of the **RIAA**, in **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices (as updated) in **Appendix E.**	**Appendix E** of the **RIAA**) Updates to Planning Inspectorate Screening matrices. See: Screening Matrix 20 **Appendix B** of the **RIAA**. Updates to Screening.
#68	**9 October 2020**	Natural England	Letter by email	Solent and Dorset Coast SPA (and also other Solent tern sites) LSE from displacement during construction is screened out as Fliessbach (2019) found that terns were not significantly affected by boat activity. However, this study was of the impact of shipping lanes, and so does not take account of the additional noise	A review of evidence has been made with regard to disturbance and displacement during construction to tern species. The Fliessbach et al., (2019) reference has been replaced by Furness *et al*., 2018 which showed all tern species have low sensitivity to ship and helicopter traffic (and therefore the associated nose disturbance). Furness *et al*., 2018 is the standard referenced used in HRA screening for this impact.	No further action required.

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
				disturbance associated with construction activity.		
#69	**9 October 2020**	Natural England	Letter by email	Solent and Dorset Coast SPA should be included in Table 5-5 (criteria 3) of the Screening Report (RWE, 2020). It is identified in figure 5.9 and is within 4km of the cable route scoping boundary.	Noted. This has been acknowledged in the Screening updates. Updates to Screening are logged in the upfront sections of the **RIAA**, in **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices (as updated) in **Appendix E.**	**Appendix B** of the **RIAA** **Appendix A** of this document HRA Screening Matrix 16
#70	**9 October 2020**	Natural England	Letter by email	Solent and Dorset Coast SPA - Ruff is mistakenly listed as a breeding species.	Noted. This has been acknowledged in the Screening updates. Updates to Screening are logged in the upfront sections of the **RIAA**, in **Appendix B** of the **RIAA** and are apparent in the HRA Screening Matrices (as updated) in **Appendix E.**	**Appendix B** of the **RIAA** **Appendix A** of this document HRA Screening Matrix 16
#71	**9 October 2020**	Natural England	Letter by email	Based on abundance recorded in the first year of surveys, kittiwake and common gull should be added to the list of species of interest for offshore	Noted. Kittiwake and common gull added to the list of species of interest for offshore ornithology.	

© WSP UK Limited

ID	Date of comment	Consultee	Nature of contact	Consultee comment	Applicant's response	Evidence of Applicant's response
				ornithology, even if the peak counts were influenced by the weather.		

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

9. References

Fliessbach, K.L., Borkenhagen, K., Guse, N., Markones, N., Schwemmer, P. and Garthe, S., (2019). *A ship traffic disturbance vulnerability index for Northwest European seabirds as a tool for marine spatial planning*. Frontiers in Marine Science.

Furness, R.W., Hallgrimsson, G.T., Montevecchi, W.A., Fifield, D., Kubetzki, U., Mendel, B. and Garthe, S., (2018). *Adult Gannet migrations frequently loop clockwise around Britain and Ireland*. Ringing & Migration, 33(1), pp.45-53.

Marine & Coastal Access Act 2009. [Online] Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents [Accessed 26 May 2023].

Rampion Extension Development Ltd (RED). September (2020). I*nformation to Support Habitats Regulations Assessment Stage One Screening*. Unpublished.

Special Committee on Seals (SCOS), (2016). *Scientific Advice on Matters Related to the Management of Seal Populations.* [Online] Available at: https://biology.st-andrews.ac.uk/smru/wp-content/uploads/sites/12/2017/04/SCOS-2016.pdf [Accessed 25 May 2023].

Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. (2019). *Desk-based revision of seabird foraging ranges used for HRA screening,* Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate, ISBN 978-1-912642-12-0.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Appendix B
Full Account of Screening Updates

© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix B

HRA Screening updates



© WSP UK Limited

Appendix B
HRA Screening Updates

© WSP UK Limited

Contents

1. Introduction 3
1.2 Modifications to this document 3

2. Terrestrial ecology (inc. wildfowl and waders) 4

3. Migratory fish 13

4. Marine mammals 15
4.1 Grey seal 15
4.2 Harbour seal 15
4.3 Harbour porpoise 17
4.4 Bottlenose dolphin 19

5. Benthic habitats and communities 22

6. Offshore ornithology 27

7. References 47

List of Tables

Table B-1 European sites designated for terrestrial ecology considered during Screening updates (Feb 2021) 4
Table B-2 Terrestrial ecology full account of Screening updates 7
Table B-3 European sites designated for migratory fish considered during the updated Screening exercise for Rampion 2 (February 2021) 13
Table B-4 Migratory fish: full account of Screening updates 14
Table B-5 European sites for grey seal considered in Screening updates 15
Table B-6 European sites for harbour seal considered in Screening updates 15
Table B-7 Harbour porpoise: European sites considered in Screening 17
Table B-8 Bottlenose dolphin: European sites considered in Screening 19
Table B-9 Cetaceans: full account of Screening updates 21
Table B-10 European sites for benthic habitats and communities considered during Screening updates (Feb 2021) 22
Table B-11 Benthic: full account of Screening updates 23
Table B-12 Offshore ornithology: European sites considered during updates 27
Table B-13 Offshore ornithology: full account of Screening updates 35

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

1. Introduction

1.1.1 A Habitats Regulations Assessment (HRA) Stage One Screening exercise was undertaken by Rampion Extension Development Limited ('RED') ('the Applicant') in September 2020. Findings were shared with consultees in the Screening Report (RED, 2020).

1.1.2 This Appendix provides a full account of the updates subsequently made to the Rampion 2 HRA Screening in response to comments received, including from Natural England. This document was produced in response to a comment from Natural England, as follows:

1.2 Modifications to this document

1.2.1 This document was originally issued to consultees invited to the Expert Topic Group (ETG) meeting of March 2021. It was provided as Appendix B of the ETG materials (and had 3 appendices B, C, and D).

1.2.2 To accommodate the presentation of this material in the draft Report to Inform Appropriate Assessment (RIAA) the changes listed below have been made to the original (as issued) version of **Appendix A**. Otherwise, the tables that comprised **Appendix A** were those provided to consultees invited to the ETG meeting and the material presented here is identical to that provided to the ETG.

- **Section 1** is new and was not provided to the ETG.
- Document name updated from:
  - 'Appendix B: HRA Summary of Screening Consultation' to
  - 'Appendix B to the Draft Report to Inform Appropriate Assessment – HRA Screening updates
- Site codes inconsistently applied and therefore, universally removed.
- Cross references to comments have been updated to refer to the relevant comment in Appendix A to the draft RIAA 'Summary of Consultation'.
- Table of seal sites originally Screened now deleted to avoid confusion over current conclusion.
- **Highlight added** to indicate feature that has had the Screening conclusion reported here, changed since March 2021.
- Table headings altered to account for new dates and receptor group names that are updated to refer to those used in the draft RIAA eg.
  - 'Subtidal and intertidal benthic ecology' now 'benthic habitats and communities'

© WSP UK Limited

2. Terrestrial ecology (inc. wildfowl and waders)

Table B-1 European sites designated for terrestrial ecology considered during Screening updates (Feb 2021)

No.	European sites considered	Relevant qualifying features	Finding	IN/OUT
1	Arun Valley (UK) Ramsar	Northern pintail, Assemblage wintering waterfowl	Potential for Likely Significant Effects (LSEs)	IN
2	Arun Valley (UK) Special Protection Area (SPA)	Bewick's swan, Assemblage of wintering waterfowl	Potential for LSEs	IN
3	Arun Valley (UK) Special Area of Conservation (SAC)	Lesser whirlpool ram's-horn snail	No potential for LSEs	OUT
4	Pagham Harbour (UK) Ramsar	Dark bellied brent goose, **Common tern**	Potential for LSEs	IN
5	Pagham Harbour (UK) SPA	Dark bellied brent goose, Common tern, Ruff	Potential for LSEs	IN
6	Portsmouth Harbour (UK) Ramsar	Dark-bellied brent goose	Potential for LSEs	IN
7	Portsmouth Harbour (UK) SPA	Black-tailed godwit, Dark-bellied brent goose, Dunlin Red-breasted merganser	Potential for LSEs	IN
8	The Mens (UK) SAC	Barbastelle bat	Potential for LSEs	IN

© WSP UK Limited

No.	European sites considered	Relevant qualifying features	Finding	IN/OUT
9	Duncton to Bignor Escarpment SAC	Asperulo-Fagetum beech forests	No potential for LSEs	OUT

	European sites considered for LSE at Screening for terrestrial ecology			IN/OUT
1	Arun Valley (UK) Ramsar UK11004	Northern pintail, Assemblage wintering waterfowl	Potential for LSE	IN
2	Arun Valley (UK) SPA UK9020281	Bewick's swan, Assemblage of wintering waterfowl	Potential for LSE	IN
3	Arun Valley (UK) SAC UK0030366	Lesser whirlpool ram's-horn snail	Potential for LSE	IN
4	Pagham Harbour (UK) Ramsar UK11052	Dark bellied Brent geese, Common tern	Potential for LSE	IN
5	Pagham Harbour (UK) SPA	Dark bellied Brent geese, Common tern, Ruff	Potential for LSE	IN
6	Portsmouth Harbour Ramsar	Dark-bellied brent goose	Potential for LSE	IN
7	Portsmouth Harbour (UK) SPA	Black-tailed godwit, Dark-bellied brent goose, Dunlin Red-breasted merganser	Potential for LSE	IN
8	The Mens (UK) SAC UK0012716	Barbastelle bat	Potential for LSE	IN
9	Duncton to Bignor Escarpment AC	Asperulo-Fagetum beech forests	No potential for LSE	OUT

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table B-2 Terrestrial ecology full account of Screening updates

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on for LSE and outcome
Construction	Arun Valley Ramsar	Northern pintail Waterbird assemblage	Land take / land cover change	No LSE	Potential LSE	Yes – new pathway	NE sought clarity regarding whether habitat loss within functionally linked land was covered within the "fragmentation of habitats" pathway. For clarity loss of functionally linked land will be considered separately	Potential LSE. AA required
			Fragmentation of habitats	Potential LSE	Potential LSE	Minor updates	NE requested pathway is addressed at AA. Therefore, included. Resulting in minor updates to summary table and Matrix to standardise reporting.	Potential LSE. AA required
			Changes in hydrology	Potential LSE	No LSE	Yes – pathway discounted	Further assessment information published as Preliminary Environmental Information demonstrated that the pathway of effect could be discounted	No LSE – AA not required
			Noise and vibration Pollution effects Invasive non-native species spread Effects in-combination	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Increased light levels	No LSE	No LSE	No Change	N/A	No LSE – AA not required
			Emissions to air	No LSE	No LSE	No Change	N/A	No LSE – AA not required
Operation	Arun Valley Ramsar	Northern pintail Waterbird assemblage	Water neutrality	No assessment included	Potential LSE	Yes – pathway included	Design and operational requirements of the substation demonstrate water use	Potential LSE – AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on for LSE and outcome
Construction	Arun Valley SPA	Bewick's swan Assemblage wintering waterfowl	Land take / land cover change	No LSE	Potential LSE	Yes – new pathway	NE sought clarity regarding whether habitat loss within functionally linked land was covered within the "fragmentation of habitats" pathway. For clarity loss of functionally linked land will be considered separately	Potential LSE. AA required
			Fragmentation of habitats	Potential LSE	Potential LSE	Minor updates	NE requested pathway is addressed at AA. Therefore, included. Resulting in minor updates to summary table and Matrix to standardise reporting.	Potential LSE. AA required
			Changes in hydrology	Potential LSE	No LSE	Yes – pathway discounted	Further assessment information published as Preliminary Environmental Information demonstrated that the pathway of effect could be discounted	No LSE – AA not required
			Noise and vibration Changes in hydrology Pollution effects Invasive non-native species spread	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Increased light levels	No LSE	No LSE	No Change	N/A	No LSE – AA not required
			Emissions to air	No LSE	No LSE	No Change	N/A	No LSE – AA not required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on for LSE and outcome
Operation	Arun Valley SPA	Assemblage of wintering waterfowl Bewick's swan	Water neutrality	No assessment included	Potential LSE	Yes – pathway included	Design and operational requirements of the substation demonstrate water use	Potential LSE – AA required
Operation	Arun Valley SAC	Lesser whirlpool ram's-horn snail	Water neutrality	No assessment included	Potential LSE	Yes – pathway included	Design and operational requirements of the substation demonstrate water use	Potential LSE – AA required
Construction	The Mens SAC	Barbastelle bat	Hydrology Pollution events Emissions to air Invasive Non Native Species (INNS) Land take/ cover change Noise and vibration	No LSE	No LSE	No change	N/A	No LSE No AA required
			Effects in-combination	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Fragmentation of habitats Increased light levels Noise and vibration Changes in hydrology Pollution events Emissions to air INNS Land take/ cover change	No LSE	No LSE	No change	N/A	No LSE No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on for LSE and outcome
Operation	The Mens SAC	Barbastelle bat	Changes in hydrology Pollution events Emissions to air INNS Land take / cover change Fragmentation or severance of habitats Noise and vibration Increased light levels In-combination effects	No LSE	No LSE	Minor update	*Species list amended. As Black-tailed godwit is listed on the citation "for possible future consideration under criterion 6" this species has been removed from Screening.	No LSE No AA required
Construction	Pagham Harbour Ramsar	Dark bellied Brent. geese	Changes in hydrology Pollution events Emissions to air INNS Land take / cover change Fragmentation or severance of habitats Noise and vibration Increased light levels Effects in-combination	No LSE	No LSE	No change	*Species list amended as recommended in Natural England's comment #16	No LSE No AA required
Operation	Pagham Harbour Ramsar	Dark bellied Brent. geese	Prey availability and behaviour	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Migration - Collision risk (alone and in-combination)	No LSE	Potential LSE	Yes – new pathway	Included at Stage 2 on Natural England's advice and due to revised approach to Screening migratory non-seabirds. APEM will carry out collision risk modelling for migratory species.	Potential LSE. AA required
	Pagham Harbour (UK) SPA	Dark bellied Brent. geese	Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE No AA required
Construction		Common tern	Migration - Collision risk (alone and in-combination)	No LSE	Potential LSE	Yes – new pathway	Included at Stage 2 on Natural England's advice and due to revised approach to Screening migratory non-seabirds. Applicant to carry out	Potential LSE. AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on for LSE and outcome
							collision risk modelling for migratory species.	
		Common tern	Collision during breeding season Indirect: impacts on prey	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
	Pagham Harbour (UK) SPA	Dark bellied Brent. geese	Disturbance/displacement Barrier	No LSE	No LSE	No change	N/A	No LSE. No AA required.
		Common tern	Migration - Collision risk (alone and in-combination)	No LSE	Potential LSE	Yes – new pathway	On advice from Natural England regarding the features of this site (#16) and in relation to collision risk on migration (e.g. #40)	Potential LSE. AA required
		Common tern	Hydrology Pollution events Emissions to air INNS Land take/ cover change	No LSE	No LSE	No change	N/A	No LSE. No AA required.
Operation		Ruff	Hydrology Pollution events Emissions to air INNS Land take/ cover change	No LSE	No LSE	No change	N/A	No LSE. No AA required.
Construction	Duncton to Bignor Escarpment SAC	Beech forests *Asperulo-Fagetum*	Changes in hydrology Pollution events Emissions to air INNS Land take /cover change Effects in-combination	No LSE	No LSE	No change	N/A	No LSE. No AA required.
Operation	Duncton to Bignor Escarpment SAC	Beech forests *Asperulo-Fagetum*	Changes in hydrology Pollution events Emissions to air INNS Land take /cover change Effects in-combination	No LSE	No LSE	No change	N/A	No LSE. No AA required.

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on for LSE and outcome
Construction	Arun Valley (UK) SAC	Ramshorn snail						
Operation	Arun Valley (UK) SAC	Ramshorn snail						

© WSP UK Limited

3. Migratory fish

Table B-3 European sites designated for migratory fish considered during the updated Screening exercise for Rampion 2 (February 2021)

European sites considered				IN/OUT
1	River Itchen SAC	Atlantic Salmon	Potential for LSE	IN
2	Littoral Cauchois (FR) SAC	Sea lamprey, River lamprey	No Potential for LSE	OUT

© WSP UK Limited

Table B-4 Migratory fish: full account of Screening updates

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on for LSE and outcome
Construction	River Itchen SAC	Atlantic Salmon	Underwater noise	Potential LSE	Potential LSE	No change	NA	Potential LSE. AA required
			Suspended sediment/ deposition Effects on prey Pollution Physical disturbance Barriers	No LSE	No LSE	No change	N/A	No LSE. No AA required.
Operation	River Itchen SAC	Atlantic Salmon	Underwater noise Suspended sediment/ deposition Effects on prey Pollution Physical disturbance Barriers EMF	No LSE	No LSE	No change	N/A	No LSE. No AA required.
Construction	Littoral Cauchois (FR) SAC	Sea lamprey River lamprey	Underwater noise Suspended sediment/ deposition Effects on prey Pollution Physical disturbance Barriers EMF	No LSE	No LSE	No change	N/A	No LSE. No AA required.
Operation				No LSE	No LSE	No change	N/A	No LSE. No AA required.

© WSP UK Limited

4. Marine mammals

4.1 Grey seal

Table B-5 European sites for grey seal considered in Screening updates

European sites considered	Finding	IN/OUT
On the application of Seal Management Unit (South England – Unit 10) to the site identification process (SCOS, 2016)*.	No sites identified	OUT
On the application of Seal Management Unit (MU 9 – South East England) to the site identification process (SCOS, 2016).	No sites identified	OUT
Consideration of connectivity with Humber Estuary SAC	No connectivity established	OUT

*Prompted by comment #18 (see **Appendix A to** the draft RIAA)

4.2 Harbour seal

Table B-6 European sites for harbour seal considered in Screening updates

European sites considered	Finding	IN/OUT
On the application of Seal Management Unit (South England – Unit 10) to the site identification process (SCOS, 2016)*.	No sites identified	OUT
On the application of Seal Management Unit (MU 9 – South East England) to the site identification process (SCOS, 2016)*.	No sites identified	OUT
Consideration of connectivity with The Wash and North Norfolk SAC	No connectivity established	OUT

*Prompted by comment #18 (see Appendix A to the draft RIAA)

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

4.3 Harbour porpoise

Table B-7 Harbour porpoise: European sites considered in Screening

No.	European site considered (FR - France, BE - Belgium, NL - Netherlands, DE - Denmark)	Finding	IN/OUT
1	Southern North Sea SAC UK (UK)	No Potential for LSE	OUT
2	Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire (FR)	No Potential for LSE	OUT
3	Recifs Griz-Nez Blanc-Nez SAC (FR)	No Potential for LSE	OUT
4	Baie de Canche et Couloir des trois estuaries SAC (FR)	No Potential for LSE	OUT
5	Baie de Seine occidentale SAC (FR)	No Potential for LSE	OUT
6	Baie de Seine orientale SAC (FR)	No Potential for LSE	OUT
7	Bancs de Flandres SAC/SCI (FR)	No Potential for LSE	OUT
8	Vlaamse Banken SAC (BE)	No Potential for LSE	OUT
9	SBZ 1 / ZPS 1 (BE)	No Potential for LSE	OUT
10	SBZ 2 / ZPS 2 (BE)	No Potential for LSE	OUT
11	SBZ 3 / ZPS 3 (BE)	No Potential for LSE	OUT
12	Vlakte van de Raan SAC (BE)	No Potential for LSE	OUT
13	Noordzeekustzone SAC (NL)	No Potential for LSE	OUT

© WSP UK Limited

No.	European site considered (FR - France, BE - Belgium, NL - Netherlands, DE - Denmark)	Finding	IN/OUT
14	Klaverbank SAC (NL)	No Potential for LSE	OUT
15	Doggerbank SAC (UK)	No Potential for LSE	OUT
16	Doggersbank SAC (NL)	No Potential for LSE	OUT
17	Borkum-Riffgrund SCI (DE)	No Potential for LSE	OUT
18	Nationalpark Niedersachsisches Wattenmeer SAC (DE)	No Potential for LSE	OUT
19	Sylter Aussenriff SCI (DE)	No Potential for LSE	OUT
20	Helgoland mit Helgoländer Felssockel SAC (DE)	No Potential for LSE	OUT
21	Steingrund SAC (DE)	No Potential for LSE	OUT
22	Hamburgisches Wattenmeer SAC (DE)	No Potential for LSE	OUT
23	NTP S-H Wattenmeer und angrenzende Kustengebiete SAC (DE)	No Potential for LSE	OUT
24	Kosterfjorden-Väderöfjorden SAC (DE)	No Potential for LSE	OUT

*All 24 sites within North Sea Species Management Unit ((Inter-Agency Marine Mammal Working Group (IAMMWG, 2015).

© WSP UK Limited

4.4 Bottlenose dolphin

Table B-8 Bottlenose dolphin: European sites considered in Screening

No.	European site considered (FR - France)	Finding	IN/OUT
1	Falaises du Cran aux Oeufs du Cap Gris-Nez, Marais de Tardinghen et Dunes de Wissan SAC (FR)	No Potential for LSE	OUT
2	Récifs et landes de la Hague SAC/SCI (FR)	No Potential for LSE	OUT
3	Baie de Seine orientale SAC (FR)	No Potential for LSE	OUT
4	Anse de Vauville (FR) SAC/SCI (FR)	No Potential for LSE	OUT
5	Banc et récifs de Surtainville SAC (FR)	No Potential for LSE	OUT
6	Chausey SAC (FR)	No Potential for LSE	OUT
7	Nord Bretagne DH SAC/SCI (FR)	No Potential for LSE	OUT
8	Cap d'Erquy-Cap Fréhel SAC (FR)	No Potential for LSE	OUT
9	Côte de Cancale à Paramé SAC (FR)	No Potential for LSE	OUT

© WSP UK Limited

No.	European site considered (FR - France)	Finding	IN/OUT
10	Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SAC (FR)	No Potential for LSE	OUT
11	Côte de Granit rose-Sept-Iles SAC (FR)	No Potential for LSE	OUT
12	Abers - Côtes des légendes SAC (FR)	No Potential for LSE	OUT
13	Ouessant-Molène SAC/ SCI (FR)	No Potential for LSE	OUT
14	Chaussée de Sein SAC (FR)	No Potential for LSE	OUT
15	Mers Celtiques - Talus du golfe de Gascogne SAC (FR)	No Potential for LSE	OUT

*All 15 sites designated for bottlenose dolphin within Offshore Channel, Celtic Sea, and South West England SMU (Inter-Agency Marine Mammal Working Group (IAMMWG), 2015).

© WSP UK Limited

Table B-9 Cetaceans: full account of Screening updates

	Designated site name	Relevant feature(s)*	Pathway	Conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on for LSE
Constructio	Southern North Sea (UK) SAC (UK0030395)	Harbour porpoise	Underwater noise Vessel disturbance Collision risk Effects on prey Pollution Suspended sediment	No LSE given the distance of the site from the array (>127km)	No LSE	No change	N/A	No LSE. No AA required
Opera			As above, and also Electro Magnetic Field (EMF)	No LSE	No LSE	No change	N/A	No LSE. No AA required
	Plus, the additional 23 sites listed in the harbour porpoise overview above		European sites were identified for Screening through the application of the relevant SMU. This identified 24 sites for harbour porpoise and 15 for bottlenose dolphin. These European sites were considered for potential LSE with respect to the effects listed above for the construction and operation and maintenance phases. All SACs considered for marine mammals (including transboundary sites) are at least 101km from the Proposed Development. Most SACs within the relevant MUs are considerably more distant. Given the dissipation of potential effects over distance (and weak connectivity), and after apportionment there is considered to be no potential for the Proposed Development to contribute to measurable effects on any of these sites, either alone or in-combination.			No change	N/A	No LSE. No AA required
	Plus, the 15 European sites for bottlenose dolphin listed above in the bottlenose dolphin overview					No change	N/A	

© WSP UK Limited

5. Benthic habitats and communities

Table B-10 European sites for benthic habitats and communities considered during Screening updates (Feb 2021)

No.	European sites	Feature	Finding	IN/OUT
1	Solent Maritime (UK) SAC (UK0030059)	Estuarine habitats	Potential for LSE	IN
2	South Wight Maritime (UK) SAC (UK0030061)	Reefs, Submerged/partially submerged sea caves	Potential for LSE	IN
3	Solent and Isle of Wight lagoons SAC (UK) (UK0017073)	Coastal lagoons	Potential for LSE	IN

© WSP UK Limited

Table B-11 Benthic: full account of Screening updates

**On Natural England's advice regarding mitigation – see comments #24-26 OF Appendix A of the draft RIAA*

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on LSE and outcome
Construction	Solent Maritime (UK) SAC (UK0030059) (15.7km to Array)	Estuaries Spartina swards Atlantic salt meadows Sandbanks[1] Mudflats and sandflats[2]	SS deposition INNS (intro/spread)	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Pollution	No LSE	Potential LSE	Yes – new pathway	On Natural England advice*	Potential LSE. AA required
		Coastal lagoons Salicornia[3]	Habitat loss /disturbance	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Solent Maritime (UK) SAC (UK0030059) (15.7km to Array)	All features, as above	SS deposition INNS (hard substrate) Pollution	No LSE	Potential LSE	Yes – 3 new pathways	On Natural England advice*	Potential LSE. AA required
			Physical processes	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required

[1] slightly covered by sea water all the time
[2] not covered by seawater
[3] and other annuals colonizing mud/ sand

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on LSE and outcome
Construction	South Wight Maritime SAC (UK) (UK0030061) 20.5 km to Array	(UK0017073)z	SS and deposition INNS (intro/spread)	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Pollution	No LSE	Potential LSE	Yes – new pathway	On Natural England advice*	Potential LSE. AA required
			Physical habitat loss and disturbance	No LSE	No LSE	No change	N/A	No LSE. No AA required
			SS and deposition INNS (intro/spread)	Potential LSE	No LSE	Pathways removed	Mis-reported	No LSE. No AA required
Operation	South Wight Maritime SAC (UK) (UK0030061) 20.5 km to Array	Reefs Submerged or partially submerged sea caves	SS and deposition INNS (hard substrate) Pollution	No LSE	Potential LSE	Yes – new pathways	On Natural England advice*	Potential LSE. AA required
			Physical processes	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
		Vegetated sea cliffs	Physical processes	Potential LSE	No LSE	Pathways removed	Mis-reported	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion?	Basis for change	Conclusion on LSE and outcome
Construction	Solent and Isle of Wight lagoons SAC (UK) (UK0017073) 30.0 km to Array	Costal lagoons* priority feature	SS and deposition INNS (intro/spread)	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Pollution	No LSE	Potential LSE	Yes – new pathway	On Natural England advice*	Potential LSE. AA required
			Physical habitat loss and disturbance	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Solent and Isle of Wight lagoons SAC (UK) (UK0017073) 30.0 km to Array	Costal lagoons* priority feature	SS and deposition INNS (hard substrate) Pollution	No LSE	Potential LSE	Yes – new pathways	On Natural England advice*	Potential LSE. AA required
			Physical processes	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

6. Offshore ornithology

6.1.1 For all sites at risk of LSE, all potential pathways to effect are set out in the full account of Screening below. Where no LSE is recorded here, the site will only feature in the full account of Screening if that finding is materially different from the one initially reported (the 'number cell' of these sites is coloured turquoise)

Table B-12 Offshore ornithology: European sites considered during updates

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
1	Ailsa Craig (UK) SPA	Gannet	No Potential for LSE	OUT
2	Alde-Ore Estuary (UK) Ramsar	Lesser black-backed gull	Potential LSEI	IN
3	Alde-Ore Estuary (UK) SPA	Sandwich tern, Lesser black-backed gull	Potential LSEI	IN
4	Alderney West Coast & Burhou Islands (GG) Ramsar	Gannet	Potential LSE	IN
5	Auskerry (UK) SPA	European storm petrel, Arctic tern	No potential for LSE	OUT
6	Blasket Island (IE) SPA	Manx shearwater	No potential for LSE	OUT
7	Breydon Water (UK) SPA	Common tern	Potential LSEI	IN
8	Breydon Water (UK) Ramsar	Common tern	Potential LSEI	IN
9	Buchan Ness to Collieston Coast (UK) SPA	Fulmar, Herring gull, Kittiwake, Guillemot	No potential for LSE	OUT
10	Caithness and Sutherland Peatlands (UK) SPA	Red-throated diver	No potential for LSE	OUT
11	Caithness and Sutherland Peatlands (UK) d Ramsar	Red-throated diver	No potential for LSE	OUT

© WSP UK Limited

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
12	Calf of Eday (UK) SPA	Great black-backed gull, Fulmar, Kittiwake, Guillemot	No potential for LSE	OUT
13	Camaret (FR) SPA	Fulmar	No potential for LSE	OUT
14	Cap d'Erquy-Cap Fréhel (FR) SPA	Fulmar	No potential for LSE	OUT
15	Cap Sizun (FR) SPA	Manx shearwater, Fulmar	No potential for LSE	OUT
16	Chausey (FR) SPA	Gannet	No potential for LSE	OUT
17	Chichester and Langstone Harbours (UK) Ramsar	Bar-tailed godwit, Dark-bellied B goose, Dunlin , Grey plover, Pintail, Red-b. merganser, Redshank, Ringed plover, Sanderling, Shelduck, Shoveler, Teal, Turnstone, Wigeon, Waterbird assemblage, Sandwich tern, Common tern	Potential LSE	IN
18	Chichester and Langstone Harbours (UK) SPA```	Ringed plover, Black-tailed godwit, Redshank, Dark-bellied B goose, Shelduck, Grey plover, Dunlin, Waterbird assemblage Sandwich tern, Common tern	Potential LSE	IN
19	Copeland Islands (UK) SPA	Manx shearwater, Arctic tern	No potential for LSE	OUT
20	Copinsay (UK) SPA	Great black-backed gull, Fulmar, Kittiwake, Guillemot	No potential for LSE	OUT
21	Coquet Island (UK) SPA	Sandwich tern, Arctic tern, Common tern, Herring gull, Lesser black-backed gull, Kittiwake	Potential LSEI	IN

© WSP UK Limited

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
22	Côte de Granit Rose-Sept Iles (FR) SPA	Gannet	Potential LSE	IN
23	Cromarty Firth (UK) SPA	Common tern	No potential for LSE	OUT
24	Cromarty Firth (UK) Ramsar	Common tern	No potential for LSE	OUT
25	Cruagh Island (IE) SPA	Manx shearwater	No potential for LSE	OUT
26	Deenish Island and Scariff Island (IE) SPA	Manx shearwater	No potential for LSE	OUT
27	Dungeness, Romney Marsh and Rye Bay (UK) SPA	Sandwich tern, Common tern	Potential LSE	IN
28	East Caithness Cliffs (UK) SPA	Great black-backed gull, Fulmar, Herring gull, Kittiwake, Guillemot Razorbill	No potential for LSE	OUT
29	Fair Isle (UK) SPA	Kittiwake, Guillemot, Razorbill, Fulmar, Gannet, Arctic tern	No potential for LSE	OUT
30	Falaise du Bessin Occidental (FR) SPA	Kittiwake	Potential LSE	IN
31	Farne Islands (UK) SPA	Kittiwake, Common tern, Arctic tern, Sandwich tern	Potential LSEI	IN
32	Fetlar (UK) SPA	Fulmar, Arctic tern	No Potential for LSE	OUT
33	Flamborough & Filey Coast (UK) SPA	Guillemot, Razorbill, Kittiwake, herring gull, gannet	Potential LSEI	IN
34	Foula (UK) SPA	Red-throated diver, Arctic tern, Kittiwake, Razorbill , Guillemot, Fulmar, Leach's storm petrel	No potential for LSE	OUT

© WSP UK Limited

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
35	Foulness (Mid-Essex Coast Phase 5 SPA	Kittiwake, Common tern, Arctic tern, Sandwich tern	Potential LSEI	IN
36	Fowlsheugh (UK) SPA	Fulmar, Herring gull, Kittiwake, Guillemot Razorbill	No potential for LSE	OUT
37	Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island (UK) SPA	Manx shearwater	No potential for LSE	OUT
38	Grassholm (UK) SPA	Gannet	Potential LSE	IN
39	Greater Wash (UK) SPA	Common tern, Sandwich tern	Potential LSEI	IN
40	Hermaness, Saxa Vord and Valla Field (UK) SPA	Kittiwake, Guillemot, Fulmar, Gannet	No potential for LSE	OUT
41	Hoy (UK) SPA	Fulmar, Kittiwake, Guillemot	No potential for LSE	OUT
42	Iles Houat-Hoëdic (FR) SPA	Manx shearwater	No potential for LSE	OUT
43	Imperial Dock Lock, Leith (UK) SPA	Common tern	No potential for LSE	OUT
44	Inner Moray Firth (UK) SPA	Common tern	No potential for LSE	OUT
45	Inner Moray Firth (UK) Ramsar	Common tern	No potential for LSE	OUT
46	Isles of Scilly (UK) SPA	Manx shearwater, Fulmar	No potential for LSE	OUT
47	Isles of Scilly (UK) Ramsar	Manx shearwater, Fulmar	No potential for LSE	OUT
48	Littoral seino-marin (FR) SPA	Lesser black-backed gull, Kittiwake	Potential LSE	IN

© WSP UK Limited

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
49	Loch of Strathbeg (UK) SPA	Sandwich tern	No potential for LSE	OUT
50	Loch of Strathbeg (Ramsar	Sandwich tern	No potential for LSE	OUT
51	Marwick Head (UK) SPA	Kittiwake, Guillemot	No potential for LSE	OUT
52	Medway Estuary & Marshes (UK) SPA	Common tern	Potential LSEI	IN
53	Medway Estuary & Marshes Ramsar	Common tern	Potential LSEI	IN
54	Mousa (UK) SPA	European storm petrel, Arctic tern	No potential for LSE	OUT
55	North Norfolk Coast (UK) Ramsar	Sandwich tern, Common tern	Potential LSEI	IN
56	North Norfolk Coast (UK) SPA	Sandwich tern, Common tern	Potential LSEI	IN
57	North Rona and Sula Sgeir (UK) SPA	Gannet	No potential for LSE	OUT
58	Northumberland Marine (UK) SPA	Arctic tern, Sandwich tern, Common tern, Kittiwake, Guillemot	Potential for LSE	OUT
59	Northumbria Coast (UK) Ramsar	Arctic tern	Potential LSE	IN
60	Northumbria Coast SPA	Arctic tern	Potential LSE	IN
61	Noss (UK) SPA	Fulmar, Gannet, Kittiwake, Guillemot	No potential for LSE	OUT
62	Orkney Mainland Moors (UK) SPA	Red-throated diver	No potential for LSE	OUT
63	Otterswick and Graveland (UK) SPA	Red-throated diver	No potential for LSE	OUT
64	Ouessant-Molène (FR) SPA	Manx shearwater, Fulmar	No potential for LSE	OUT

© WSP UK Limited

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
65	Outer Firth of Forth and St Andrews Bay Complex (UK) pSPA	Lesser black-backed gull Gannet Herring gull Common tern, Arctic tern, Sandwich tern, Kittiwake, Guillemot, Razorbill, Manx shearwater	No potential for LSE	OUT
66	Outer Thames Estuary (UK) SPA	Common tern	No potential for LSE	OUT
67	Papa Stour (UK) SPA	Arctic tern	No potential for LSE	OUT
68	Papa Westray (North Hill and Holm) (UK) SPA	Arctic tern	No potential for LSE	OUT
69	Pentland Firth Islands (UK) SPA	Arctic tern	No potential for LSE	OUT
70	Portsmouth Harbour (UK) SPA	Black-tailed godwit, Dark-bellied brent goose, Dunlin, Red-breasted merganser	Potential LSE	IN
71	Portsmouth Harbour (UK0 Ramsar	Dark-bellied brent goose	Potential LSE	IN
72	Puffin Island (IE) SPA	Manx shearwater	No potential for LSE	OUT
73	Ramna Stacks and Gruney (UK) SPA	Leach's storm petrel	No potential for LSE	OUT
74	Ronas Hill - North Roe and Tingon (UK) SPA	Red-throated diver	No potential for LSE	OUT
75	Ronas Hill - North Roe and Tingon (UK) Ramsar	Red-throated diver	No potential for LSE	OUT
76	Rousay (UK) SPA	Fulmar, Kittiwake, Guillemot, Artic tern	No potential for LSE	OUT
77	Rum (UK) SPA	Manx shearwater	No potential for LSE	OUT
78	Skelligs (IE) SPA	Manx shearwater	No potential for LSE	OUT

© WSP UK Limited

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
79	Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a moroedd Benfro (UK) SPA	Manx shearwater, European storm petrel	No potential for LSE	OUT
80	Solent and Dorset Coast (UK) SPA	Common tern, Little tern, Sandwich tern	Potential LSE	IN
81	Solent and Southampton Water (UK) Ramsar	Ringed plover, Dark-bellied brent goose, Teal, Black-tailed godwit Waterbird assemblage	Potential LSE	IN
82	Solent and Southampton Water (UK) SPA	Black-tailed godwit, Dark-bellied, brent goose, Ringed plover, Teal, Waterbird assemblage Sandwich tern	Potential LSE	IN
83	St Abb's Head to Fast Castle (UK) SPA	Kittiwake, Herring gull, Guillemot	No potential for LSE	OUT
84	St Kilda (UK) SPA	Manx shearwater	No potential for LSE	OUT
85	Sule Skerry and Sule Stack (UK) SPA	European storm petrel, Leache's storm petrel, Guillemot, Gannet	No potential for LSE	OUT
86	Sumburgh Head (UK) SPA	Fulmar, Kittiwake, Guillemot, Artic tern	No potential for LSE	OUT
87	The Wash Ramsar	Common tern	Potential LSEI	IN
88	The Wash (UK) SPA	Common tern	Potential LSEI	IN
89	Tips of Corsemaul and Tom Mor (UK) SPA	Common gull	No potential for LSE	OUT
90	Tregor Goëlo (FR) SPA	Fulmar	No potential for LSE	OUT

© WSP UK Limited

	European sites considered for LSE at Screening	Relevant feature	Finding	IN/ OUT
91	Troup, Pennan and Lion's Head (UK) SPA	Kittiwake, Herring gull, Fulmar, Guillemot	No potential for LSE	OUT
92	West Westray (UK) SPA	Fulmar, Kittiwake, Guillemot, Artic tern	No potential for LSE	OUT
93	Ythan Estuary, Sands of Forvie and Meikle Loch (UK) SPA	Sandwich tern Common tern	No potential for LSE	OUT
94	Ythan Estuary, Sands of Forvie and Meikle Loch (UK) \Ramsar	Sandwich tern Common tern	No potential for LSE	OUT

© WSP UK Limited

Table B-13 Offshore ornithology: full account of Screening updates

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
Construction	Dungeness, Romney Marsh Rye Bay SPA	Common tern	Prey availability & behaviour Disturbance / displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Sandwich tern	Prey availability & behaviour	No LSE	No LSE	No change	N/A	No LSE. No AA required
	36.1km to Array	Sandwich tern	Disturbance / displacement	No LSE	Potential LSE	Yes	The Applicant; reconsidered this finding in light of background advice.	Potential LSE. AA required
	Dungeness, Romney Marsh Rye Bay SPA	Common tern	Indirect: impacts on prey Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Common tern	Collison risk non-breeding season	No LSE	Potential LSE	Yes – new pathway	On advice from Natural England in relation to collision risk of migration (e.g. #40)	Potential LSE. AA required
		Sandwich tern	Indirect: impacts on prey	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation		Sandwich tern	Collision risk breeding season Collison risk non-breeding season Disturbance/displacement	No LSE	Potential LSE	Yes – new pathways	On advice from Natural England in relation to collision risk of migration (e.g. #40	Potential LSE. AA required
		Waterbird assemblage- Non-breeding: Including Bewick's swan, bittern, hen harrier, golden plover, ruff, aquatic warbler, shoveler, European white-fronted goose, wigeon, gadwall, pochard, little grebe, great crested grebe, cormorant, coot, sanderling, whimbrel and common sandpiper.	Collision risk prey availability and behaviour Indirect impacts through the effects on prey species Barrier effect Disturbance/displacement In-combination effects	No LSE	No LSE	Site updates	Species list amended on advice from Natural England (see comment #58\0 to account for waterbird assemblage	No LSE. No AA required
Construction	Solent and Dorset Coast (UK) pSPA	Common tern Little tern Sandwich tern	Prey availability & behaviour	Potential LSE	Potential LSE	Minor update	Ruff not listed as a feature	Potential LSE. AA required
			Disturbance / displacement	No LSE	Potential LSE	Yes	The Applicant; reconsidered this finding	Potential LSE. AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
							in light of background advice	
Operation	Solent and Dorset Coast (UK) pSPA 0.63km from Offshore cable corridor	Common tern	Collision risk	Potential LSE	No LSE	Pathway removed	As SPA is designated for foraging birds from nearby breeding colonies, Screening has been updated to discount collision for common terns. Breeding SPAs have been considered for these impacts.	No LSE. No AA required
		Common tern Little tern Sandwich tern	Indirect: impacts on prey	Potential LSE	Potential LSE	No change		Potential LSE. AA required
		Sandwich tern	Disturbance / displacement	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
		Sandwich tern	Barrier effect Collision risk	Potential LSE	No LSE	Updates	As SPA is designated for foraging birds from nearby breeding colonies, Screening has been updated to discount collision and barrier effect s for sandwich terns. Breeding SPAs have been considered for these impacts.	No LSE. No AA required
		Little tern	Collision risk	No LSE	No LSE	No change	N/A	No LSE. No AA required
Construction	Chichester and Langstone Harbours SPA 15.6km from Offshore cable corridor	Common tern	**Prey availability & behaviour** **Disturbance/displacement**	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Chichester and Langstone Harbours SPA	Common tern	Collision risk	No LSE	Potential LSE	Yes – new pathway	N/A	Potential LSE. AA required
			Indirect: impacts on prey Barrier Disturbance /displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
	22.3 km to array	Sandwich tern	Collision risk Barrier Disturbance /displacement	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
			Indirect: impacts on prey	Potential LSE	No LSE	Yes – pathway removed	The Applicant; reconsidered this finding in light of developing information about the Proposed Development.	No LSE. No AA required
		Bar-tailed godwit Curlew DBB goose Dunlin Grey plover Pintail Red-breasted. merganser Redshank Ringed plover Sanderling Shelduck Shoveler Teal Turnstone Wigeon Waterbird assemblage	Collision risk	No LSE	Potential LSE	Yes – new pathway	Natural England comment #67 regarding inclusion of wintering waterbird assemblage. Also, with reference to Natural England's advice on the approach to Screening migratory non-seabirds. see Comment #40	Potential LSE. AA required
		supporting (intertidal) habitat within potential range of a project-related effect	SS deposition					
Construction	Chichester and Langstone Harbours Ramsar	Common tern Sandwich tern	**Prey availability & behaviour** **Disturbance/displacement**	No LSE	No LSE	Yes - Pathways excluded	Common tern is listed as noteworthy fauna of the Ramsar and therefore, not considered to be a listed feature. Sandwich tern is not listed on the citation. These pathways were identified in error and have been excluded. Species list amended	No LSE. No AA required
Operation	Chichester and Langstone	Common tern	Collision risk	No LSE	No LSE	Yes - Pathways excluded		No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
	Harbours Ramsar	Common tern	**Indirect: impacts on prey** Barrier Disturbance /displacement	No LSE	No LSE	Yes - Pathways excluded		No LSE. No AA required
		Sandwich tern	Collision risk Barrier Disturbance /displacement	Potential LSE	No LSE	Yes - Pathways excluded		No LSE. No AA required
		Sandwich tern	**Indirect: impacts on prey**	No LSE	No LSE	Yes - Pathways excluded		No LSE. No AA required
		Ringed plover Black-tailed godwit Redshank Dark-bellied Brent goose Shelduck Grey plover Dunlin Waterbird assemblage	Collison risk on migration	No LSE	Potential LSE	Yes – new pathways identified	Species list amended in response to comment #56 regarding non-breeding features.	Potential LSE. AA required
Construction	Solent and Southampton Water SPA	Sandwich tern	**Prey availability & behaviour** Disturbance/displacement	No LSE	No LSE	Minor updates	Species list updated - matrices based on the information provided via the Joint Nature Conservation Committee (JNCC) Ramsar Site information portal	No LSE. No AA required
Operation	Solent and Southampton Water (UK) SPA	Sandwich tern	Collision risk Barrier effect Disturbance/displacement	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
		Black-tailed godwit Dark-bellied brent goose Ringed plover Teal Waterbird assemblage	Collison risk on migration	No LSE	Potential LSE	Yes – new pathways identified	Species list amended in response to comment #57 regarding non-breeding features and assemblage.	Potential LSE. AA required
Construction	Solent and Southampton Water (UK) Ramsar	Sandwich tern	**Prey availability & behaviour** Disturbance/displacement	No LSE	No LSE	No change	Sandwich tern is listed as noteworthy fauna on the Ramsar citation and is therefore not considered as a feature. These	No LSE. No AA required
Operation		Sandwich tern	Collision risk	Potential LSE	No LSE	No change		No LSE.

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
	Solent and Southampton Water (UK) Ramsar		Disturbance/displacement Barrier					No AA required
Operation		Ringed plover Dark-bellied brent goose Teal Black-tailed godwit Waterbird assemblage	Collison risk on migration	No LSE	Potential LSE	New pathway	Species list amended in response to comment #57 regarding non-breeding features and assemblage.	Potential LSE. AA required
Operation	Portsmouth Harbour (UK) SPA	Black-tailed godwit Dark-bellied brent goose Dunlin Red-breasted merganser	Collison risk on migration	No LSE	Potential LSE	New site	Included at Stage 2 on Natural England's advice and due to revised approach to Screening migratory non-seabirds.	Potential LSE. AA required
Operation	Portsmouth Harbour Ramsar	Dark-bellied brent goose	Collison risk on migration	No LSE	Potential LSE	New site	Included at Stage 2 on Natural England's advice and due to revised approach to Screening migratory non-seabirds.	Potential LSE. AA required
Construction	Medway Estuary & Marshes SPA 91.5km to Array	Common tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	Minor update	Species list amended. Waterbird Assemblage has been reviewed and updated for the site screening matrix.	No LSE. No AA required
Operation	Medway Estuary & Marshes SPA	Common tern	Prey availability and behaviour Indirect: Impacts on prey Barrier Disturbance/displacement	No LSE	No LSE	No change	The Applicant confirms in response to comment ~#53 that no LSE is identified for disturbance.	No LSE. No AA required
Operation		Common tern	Collision risk alone	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation		Common tern	In-combination collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Construction	Littoral seino-marin (FR) SPA 72.2km to Array	Fulmar Lesser black-backed gull Great black-backed gull Kittiwake	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
Operation	Littoral seino-marin (FR) SPA	Fulmar Kittiwake	Collision during breeding season (alone)	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
		Fulmar Kittiwake Lesser Black backed gull Great black backed gull	Indirect: Impacts on prey Barrier Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Construction	Foulness (Mid-Essex Coast) SPA	Common tern Sandwich tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Foulness (Mid-Essex Coast Phase 5 SPA	Common tern Sandwich tern	Collision risk Indirect: Impacts on prey Barrier effects Disturbance/displacement	No LSE	No LSE	Minor update	Species list amended	No LSE. No AA required
			Collision during breeding non-season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
			In-combination collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Construction	Falaise du Bessin Occidental SPA	Fulmar Kittiwake	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Falaise du Bessin Occidental SPA	Fulmar Kittiwake	Indirect: Impacts on prey Barrier effects Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Fulmar	Collision risk	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Kittiwake	Collision during breeding season	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
Construction	Alde-Ore Estuary (UK) SPA	Sandwich tern Lesser black-backed gull	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Alde-Ore Estuary (UK) SPA	Lesser black-backed gull Sandwich tern	Indirect: Impacts on prey Barrier effects Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
		Sandwich tern Lesser black-backed gull	Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Lesser black-backed gull	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
		Sandwich tern	In combination - collision risk	No LSE	Potential LSEI	Yes	Included at Stage 2 on Natural England's advice and due to revised approach to Screening migratory non-seabirds.	Potential LSEI. AA required
Construction	Alde-Ore Estuary (UK) Ramsar	Lesser black-backed gull	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	Minor updates	Species list amended	No LSE. No AA required
Construction	Alde-Ore Estuary (UK) Ramsar	Sandwich tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	Minor updates – feature removed	Sandwich tern is listed as noteworthy fauna on the Ramsar citation and therefore not considered as a listed feature.	No LSE. No AA required
Operation	Alde-Ore Estuary (UK) Ramsar	Lesser black-backed gull	Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation		Lesser black-backed gull Sandwich tern	Indirect: Impacts on prey Barrier effects Disturbance/displacement	No LSE	No LSE	Minor updates	Feature removed from Matrix	No LSE. No AA required
Operation		Lesser black-backed gull	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSE. AA required
Construction	The Wash SPA	Common tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	The Wash SPA	Common tern	Indirect: Impacts on prey Barrier effects Disturbance/displacement Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
Operation	The Wash SPA	Common tern	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Construction	Breydon Water SPA	Common tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Breydon Water SPA	Common tern	Indirect: Impacts on prey Barrier effects Disturbance/displacement Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Common tern	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Construction	Greater Wash SPA	Common tern Sandwich tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Greater Wash SPA	Common tern Sandwich tern	Indirect: Impacts on prey Barrier effects Disturbance/displacement Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Common tern Sandwich tern	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSE. AA required
Construction	North Norfolk Coast SPA	Common tern Sandwich tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	North Norfolk Coast SPA	Common tern Sandwich tern	Indirect: Impacts on prey Barrier effects Disturbance/displacement Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Common tern Sandwich tern	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
Construction	North Norfolk Coast Ramsar	Common tern Sandwich tern	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	North Norfolk Coast Ramsar	Common tern Sandwich tern	Indirect: Impacts on prey Barrier effects Disturbance/displacement Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Common tern Sandwich tern	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Construction	Côte de Granit Rose-Sept Iles SPA	Manx shearwater Fulmar European storm petrel	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Gannet	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Côte de Granit Rose-Sept Iles SPA	Gannet	Collison risk Disturbance/displacement	Potential LSE	Potential LSE	No change	N/A	Potential LSEI. AA required
		Manx shearwater Fulmar European storm petrel	Indirect: Impacts on prey Barrier effects Disturbance/displacement Collision risk	No LSE	No LSE	No change	N/A	No LSE. No AA required
Construction	Alderney West Coast & Burhou Islands Ramsar	Gannet	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Operation	Alderney West Coast & Burhou Islands Ramsar	Gannet	Disturbance/displacement	No LSE	Potential LSE	Yes	The Applicant believes this pathway should have been identified at the outset.	Potential LSEI. AA required
		Gannet	Collison risk	Potential LSE	Potential LSE	No change	N/A	Potential LSEI. AA required
		Fulmar Gannet	Indirect: Impacts on prey Barrier effects Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
Construction	Grassholm SPA	Gannet	Prey availability and behaviour Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Both phases	Grassholm SPA	Gannet	Disturbance/displacement Collison risk on migration	Potential LSE	Potential LSE	No change	N/A	Potential LSE. AA required
		Gannet	Indirect: Impacts on prey Barrier effects Disturbance/displacement	No LSE	No LSE	No change	N/A	No LSE. No AA required
Construction	Flamborough and Filey Coast SPA	Guillemot Razorbill	Disturbance/displacement alone	No LSE	No LSE	No change	N/A	No LSE. No AA required
			In-combination - disturbance/displacement	Potential LSEI	Potential LSEI	No change	N/A	Potential LSE. AA required
Operation	Flamborough & Filey Coast SPA	Guillemot Razorbill	Disturbance/displacement alone	No LSE	No LSE	No change	N/A	No LSE. No AA required
			In-combination - disturbance/displacement	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
		Kittiwake Herring gull	Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
			In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
		Gannet	Disturbance/displacement (B) Collision during breeding season	Potential LSE	Potential LSE	No change	N/A	Potential LSEI. AA required
Operation	Northumbria Coast SPA	Arctic tern	Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Arctic tern	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Operation	Northumbria Coast Ramsar	Arctic tern	Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
		Arctic tern	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Operation	Coquet Island SPA	Sandwich tern Arctic tern	Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
		Common tern Herring gull Lesser black-backed gull Kittiwake	In combination - collision risk	Potential LSEI	Potential LSEI	No change	N/A	Potential LSEI. AA required
Construction	Farne Islands SPA	Guillemot	Collision	Potential LSE	No LSE	Removed pathway	This species is not vulnerable to collision risk.	No LSE. No AA required
			Disturbance/displacement alone	No LSE	No LSE	No change	N/A	No LSE. No AA required
			In-combination - disturbance/displacement	Potential LSEI	Potential LSEI	No change	N/A	Potential LSE. AA required
Operation	Farne Islands SPA	Common tern Arctic tern Sandwich tern Kittiwake	Collision during non-breeding season (alone)	No LSE	No LSE	No change	N/A	No LSE. No AA required
			In combination - collision risk	Potential LSEI	Potential LSEI	Update to summary table	To address confusion over these conclusions as reported in table 7.2 of the Screening report	Potential LSEI. AA required
Operation	Breydon Water (UK) Ramsar	Common tern	In combination - collision risk	Potential LSEI	No LSE	Yes – removal of pathway and stie	Common tern is a “noteworthy species” at this site, but not a listed feature. The HRA will therefore not progress the assessment of this pathway.	No LSE. No AA required
Operation	Medway Estuary & Marshes Ramsar	Common tern	In combination - collision risk	Potential LSEI	No LSE	Yes – removal of pathway and stie	Common tern is a “noteworthy species” at this site, but not a listed feature. The HRA will therefore not progress the assessment of this pathway.	No LSE. No AA required
Operation	The Wash Ramsar	Common tern	In combination - collision risk	Potential LSEI	No LSE	Yes – removal of pathway and stie	Common tern is a “noteworthy species” at this site, but not a listed feature. The HRA will therefore not progress the assessment of this pathway.	No LSE. No AA required

© WSP UK Limited

	Designated site name	Relevant feature(s)*	Pathway	Screening conclusion Sept. 2020	Current Screening conclusion	Material change to conclusion	Basis for change	Conclusion on LSE and outcome
Operation	Northumberland Marine (UK) SPA	Sandwich tern Common tern Arctic tern Guillemot Kittiwake	In combination - collision risk	Potential LSEI	No LSE	Yes – removal of pathway and stie	The Applicant will focus on the water/ foraging area around the breeding SPAs – these a have been considered elsewhere.	No LSE. No AA required

© WSP UK Limited

7. References

Inter-Agency Marine Mammal Working Group (IAMMWG). (2015). Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough. [Online] Available at: https://hub.jncc.gov.uk/assets/f07fe770-e9a3-418d-af2c-44002a3f2872 [Accessed 26 May 2023].

Rampion Extension Development Ltd (RED). September (2020). Information to Support Habitats Regulations Assessment Stage One Screening. Unpublished.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Appendix C
Technical note: Screening migratory species

© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix C

Technical Note: Screening migratory non-seabirds



© WSP UK Limited

1. European site identification for migratory non-seabirds

1.1.1 This Technical Note provides an update to the Rampion 2 Habitats Regulations Assessment (HRA) Screening Report (RED, 2020) in response to comments received by Natural England during consultation regarding the consideration of migratory non-seabird species. The comment is as follows:

"The screening matrices do not acknowledge the potential pathway for impact from collision risk to migratory waterbirds. It would be helpful if the collision risk were added and the reasoning why this has been ruled out for waterbirds when on migration"

1.2 Background

1.2.1 In September 2020, the Applicant submitted a Habitats Regulations Assessment (HRA) Screening Report of European Designated Sites for Rampion 2, to relevant interested stakeholders[1].

1.2.2 This report has been prepared by GoBe Consultants Ltd (GoBe) on behalf of RED to incorporate updates associated with the responses received from stakeholders with specific regard to ornithological aspects of the Screening Report (RED, 2020). It is submitted for approval by the offshore ornithology Evidence Plan Expert Topic Group, with the anticipation that this document will form the basis for Stage 1 of the Rampion 2 HRA (with regards offshore ornithological features during the breeding season[2]).

1.3 Introduction

1.3.1 At this HRA Screening stage, collision risk modelling for migratory waterbirds has not been undertaken. Therefore, following the response from Natural England, and on precautionary basis, a number of Special Protection Areas (SPAs) and Ramsar sites have been screened into stage two (the Appropriate Assessment) for further consideration with respect to potential collision effects using migratory pathways provided in Wright *et al*. (2012). It is important to note that some of the designated sites included below may have also been screened in under additional screening criteria for other potential impacts, within the HRA Screening Report. However, to ensure clarity, and additional impacts such as collision risk to species during migration have been considered, the sites have been included in this document.

[1] Including Statutory Nature Conservation Bodies, RSPB, Local Authorities, Wildlife Trust, and Regulators.

[2] As this is an update to incorporate a change in metric relevant only to breeding seabirds, other ornithological features are considered in alternative documents (Rampion 2 HRA Screening Report and Screening Update Migratory Non-seabirds).

© WSP UK Limited

1.3.2 This process focusses primarily on migratory waterbirds (i.e., wildfowl and waders). Tern and gull species of the associated designated sites presented below have been assessed for breeding season and non-breeding season connectivity as part of the offshore HRA Screening process presented elsewhere and are screened out of this process.

1.3.3 SPA designated features have been determined from the Natural England Designated Sites portal, as directed by Natural England in their response to HRA Screening. Ramsar site designations have been identified from the JNCC Ramsar Site Portal. As per previous discussions with SNCBs during the consultation of other English offshore wind farm projects, Ramsar sites included in the below table include on species included under the appropriate Ramsar Criterion and will not include Noteworthy Fauna.

1.3.4 **Table C-1** below therefore provides an overview of the designated sites, relevant designated features and distance to the Rampion proposed DCO Order Limits.

© WSP UK Limited

Table C-1 Additional SPAs and Ramsar sites identified

Site Code	SPA/ Ramsar site[3]	Designated features (with those in BOLD screened into Stage 2)	Distance from array (km)	Potential impact
UK9012041	Pagham Harbour SPA	Common tern, *Sterna hirundo* - Breeding **Dark-bellied Brent goose, *Branta bernicla bernicla* – Wintering** Little tern, *Sterna albifrons* – Breeding **Ruff, *Philomachus pugnax* - Wintering**	15.3	Collision risk to features during migration
UK11052	Pagham Harbour Ramsar	**Dark-bellied Brent goose - Wintering**	15.3	Collision risk to features during migration
UK9011011	Chichester and Langstone Harbours SPA	**Bar-tailed godwit, *Limosa lapponica* - Wintering** Common tern, *Sterna hirundo* - Breeding **Curlew, *Numenius arquata* – Wintering** **Dark-bellied Brent goose – Wintering** **Dunlin, *Calidris alpina alpina* - Wintering** **Grey plover, *Pluvialis squatarola* - Wintering** Little tern - Breeding **Pintail, *Anas acuta* - Wintering** **Red-breasted merganser, *Mergus serrator* - Wintering** **Redshank, *Tringa totanus* - Wintering** **Ringed plover, *Charadrius hiaticula* - Wintering** **Sanderling, *Calidris alba* - Wintering** Sandwich tern, *Sterna sandvicensis* - Breeding **Shelduck, *Tadorna tadorna* - Wintering**	23.1	Collision risk to features during migration

[3] Note: A number of Ramsar sites linked to the SPAs identified by NRW have been included in this report.

© WSP UK Limited

Site Code	SPA/ Ramsar site[3]	Designated features (with those in BOLD screened into Stage 2)	Distance from array (km)	Potential impact
		Shoveler, *Anas clypeata* - Wintering **Teal, *Anas crecca* - Wintering** **Turnstone, *Arenaria interpres* - Wintering** **Wigeon, *Anas penelope* - Wintering** **Waterbird assemblage – Wintering**		
UK11013	Chichester and Langstone Harbours Ramsar	**Ringed plover - Passage** **Black-tailed godwit, *Limosa limosa* - Passage** **Redshank - Passage** **Dark-bellied Brent goose – Wintering** **Shelduck - Wintering** **Grey plover - Wintering** **Dunlin - Wintering** **Waterbird assemblage – Wintering** Little tern breeding - breeding	23.1	Collision risk to features during migration
UK9020330	Solent & Southampton Water SPA	**Black-tailed godwit - Wintering** Common tern – Breeding **Dark-bellied Brent goose - Wintering** Little tern - Breeding Mediterranean gull – Breeding **Ringed plover - Wintering** Roseate tern - Breeding Sandwich tern - Breeding **Teal – Non-breeding** **Waterbird assemblage – Wintering**	29.6	Collision risk to features during migration

© WSP UK Limited

Site Code	SPA/ Ramsar site[3]	Designated features (with those in BOLD screened into Stage 2)	Distance from array (km)	Potential impact
UK11063	Solent & Southampton Water Ramsar	**Ringer plover – Passage** **Dark-bellied Brent goose – Wintering** **Teal – Wintering** **Black-tailed godwit – Wintering** **Waterfowl assemblage - Wintering**	29.6	Collision risk to features during migration
UK9011051	Portsmouth Harbour SPA	**Black-tailed godwit - Wintering** **Dark-bellied Brent goose - Wintering** **Dunlin - Wintering** **Red-breasted merganser - Wintering**	36.1	Collision risk to features during migration
UK11055	Portsmouth Harbour Ramsar	**Dark-bellied Brent goose - Wintering**	36.1	Collision risk to features during migration

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

2. References

Rampion Extension Development Ltd (RED). September (2020a). Information to Support Habitats Regulations Assessment Stage One Screening. Unpublished.

Wright, L.J., Ross-Smith, V.H., Austin, G.E., Massimino, D., Dadam, D., Cook, A.S.C.P., Calbrade, N.A. and Burton, N.H.K., 2012. Assessing the risk of offshore wind farm development to migratory birds designated as features of UK Special Protection Areas (and other Annex 1 species). BTO Research Report, 592.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Appendix D
Technical note: Screening breeding seabirds

© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix D

Technical note: Screening breeding seabirds



© WSP UK Limited

1. European site identification for breeding seabirds

This note provides an update to the Rampion 2 Habitats Regulations Assessment (HRA) Screening Report in response to comments received by Natural England during consultation regarding the consideration of breeding seabird species.

1.1 Background

1.1.1 In September 2020, the Applicant submitted a Habitats Regulations Assessment (HRA) Screening Report (Rampion Extension Development Limited (RED), 2020a) of European Designated Sites for Rampion 2, to relevant interested stakeholders[1].

1.1.2 This report has been prepared by GoBe Consultants Ltd (GoBe) on behalf of RED to incorporate updates associated with the responses received from stakeholders with specific regard to ornithological aspects of the Screening Report. It was submitted for approval by the offshore ornithology Evidence Plan Expert Technical Group, with the anticipation that this document will form the basis for Stage 1 of the Rampion 2 HRA on 26 March 2021 (with regards offshore ornithological features during the breeding season[2]).

1.1.3 The Statutory Nature Conservation Bodies (SNCBs) have recommended use of species-specific mean maximum foraging range + 1 standard deviation (Mean Max +1SD), as presented in Woodward *et al*., (2019). This Technical Note therefore seeks to address the comments regarding mean-maximum foraging ranges for Criterion 2. An outline of methods and approaches are presented in these upfront sections, with a list of SPAs and Ramsar sites considered.

1.2 Introduction

1.2.1 The Rampion 2 HRA Screening Report used a series of criteria to identify impact pathways and screen SPAs and Ramsar sites into Stage 2 of the HRA process (the Appropriate Assessment). Criterion 2 focused on identifying potential connectivity between breeding seabird colonies at SPAs and Ramsar sites and Rampion 2. Foraging ranges presented in Woodward *et al*., (2019) were used to identify those colonies within range of the Proposed Development, based on a multi-colony analysis of species-specific values.

1.2.2 The mean-maximum range was used from the Woodward *et al.*, (2019) review as it provides the average across the maximum foraging distance for each colony

[1] Including Statutory Nature Conservation Bodies, Royal Society for the Protection of Birds (RSPB), Local Authorities, Wildlife Trust, and Regulators.

[2] As this is an update to incorporate a change in metric relevant only to breeding seabirds, other ornithological features are considered in alternative documents (Rampion 2 HRA Screening Report and Screening Update Migratory Non-seabirds).

included within the study. This is therefore highly precautionary as it used the maximum range as a basis of the calculation for each species and, was deemed appropriate in identifying potential for likely significant effects (LSEs).

1.2.3 During consultation, SNCBs advised that in the absence of official guidance on how to interpret the values presented in Woodward *et al.,* (2019), the standard deviation of the mean-maximum foraging ranges should be used. This Technical Note therefore sets out the methods used to update the HRA Screening outcomes as a result of including the standard deviation during the process.

1.3 Foraging ranges

1.3.1 The Rampion 2 HRA Screening Report employed the Woodward *et al.,* (2019) publication to inform foraging ranges for breeding seabirds. Foraging ranges allow assessments to evaluate potential connectivity between a project and a seabird colony based on species specific foraging ranges during the breeding season. Ranges can only be used to inform foraging ranges of birds during the breeding season as this is the only occasion a reliable metric can be determined (as seabirds are central place foragers and must return the nest site to provision young).

1.3.2 Woodward *et al*., (2019) provides the most up-to-date collation of seabird foraging ranges based on multiple individuals from numerous study colonies. The report updates the previous resource, Thaxter *et al.,* (2012). The recent publication includes an increased number of tracking studies (over double the number of records) in comparison to the previous publication. This has enabled a more robust assessment of foraging ranges to be undertaken by the authors and an overall improvement in confidence for many of the species assessed. Woodward *et al*., (2019) also include estimates from great black-backed gull which were not included previously (in Thaxter *et al.,* (2012)).

1.3.3 The publication presented multiple foraging range values for each species; mean, mean-maximum and maximum, along with the associated standard deviation for each value. The mean-maximum foraging range was used as it is it takes the mean across all maximum foraging ranges considered for that species. This therefore presents a highly precautionary approach to screening of European designated sites for breeding seabirds and is deemed appropriate for establishing where LSEs may exist.

1.3.4 If a more precautionary method of employing the standard deviation is incorporated a higher number of designated sites will be considered, but their inclusion within the Stage 2 assessment of the HRA will still depend on the likelihood of an LSE. The Applicant agrees entirely with the precautionary principle, and identifying relevant effect-receptor pathways for consideration, but also considers it important to consider pathways where an LSE may exist, rather than all potential pathways, in order to focus the assessment appropriately and to present a proportionate volume of information.

1.3.5 Some key differences between Thaxter *et al*., (2012) and Woodward *et al*., (2019) are highlighted below:

- revised data provides evidence for the following species' foraging range estimates more than doubling; fulmar, Manx shearwater, kittiwake, razorbill, puffin and great skua;
- revised data provides evidence for the following species' foraging range estimates being very similar; gannet, herring gull, guillemot, and four of the five tern species;
- lesser black-backed gull and roseate tern have seen a significant reduction in foraging range estimates; and
- two species with the largest mean-maximum foraging ranges include Manx shearwater and fulmar.

1.3.6 Standard deviation shows users how spread data is by expressing by how much values differ from the mean. To apply the standard deviation to the already precautionary mean-maximum foraging ranges vastly inflates the level of precaution and therefore the number of SPAs (or Ramsar sites) which are within a species foraging range.

1.3.7 below provides an overview of Woodward *et al.*, (2019) foraging ranges with and without the addition of standard deviation.

Table D-1 Mean-maximum foraging range, standard deviation and mean-max foraging range +1SD of UK breeding seabird species (Woodward *et al.*, 2019)

Species	Mean-max foraging range (km)	Standard deviation (km)	Mean-max +1SD (km)
Common eider	21.5	-	21.5
Red-throated diver	9	-	9
European storm-petrel	336	-	336
Northern fulmar	542.3	657.9	1200.2
Manx shearwater	1346.8	1018.7	2365.5
Northern gannet	315.2	194.2	509.4
European shag	13.2	10.5	23.7
Cormorant	25.6	8.3	33.9
Black-legged kittiwake	156.1	144.5	300.6
Black-headed gull	18.5	-	18.5
Mediterranean gull	20	-	20

© WSP UK Limited

Species	Mean-max foraging range (km)	Standard deviation (km)	Mean-max +1SD (km)
Common gull	50	-	50
Great black-backed gull	73	-	73
Herring gull	58.8	26.8	85.6
Lesser black-backed gull	127	109	236
Sandwich tern	34.3	23.2	57.5
Little tern	5	-	5
Roseate tern	12.6	10.6	23.2
Common tern	18.0	8.9	26.9
Arctic tern	25.7	14.8	40.5
Common guillemot	73.2	80.5	153.7
Razorbill	88.7	75.9	164.6
Atlantic puffin	137.1	128.3	265.4
Great skua	443.3	487.9	931.2

1.4 Method

1.4.1 To allow an initial overview of potential new sites to be screened in as a result of the foraging ranges plus standard deviation, Criterion 2 (connectivity during the breeding season) was re-screened using the new values presented in **Table D-1**.

1.4.2 **Table D-3** presents the screening table which lists all UK SPAs and Ramsar sites designated for breeding seabirds. As mentioned above, foraging ranges in Woodward *et al.,* (2019) can only be applied to birds from their nest site (usually the SPA or Ramsar sites land boundary) during the breeding season as this is the only period where a reliable metric can be determined. Potential connectivity during migration for seabirds was screened in under Criterion 4 in the Rampion 2 HRA Screening Report, with migratory waterbirds assessed in and additional document (see **Appendix B**) and has not been assessed in this document.

1.4.3 Each SPA and Ramsar site were considered in turn according to its designated features being within the mean-maximum foraging approach or the mean-maximum foraging approach plus standard deviation. This was conducted using a GIS distance screening exercise, with the shortest distance provided in the tables below. However, most seabird species are highly unlikely to travel large distances across land and therefore despite Rampion 2 being within foraging range as the

crow flies, the coastal route is a significant distance beyond foraging range (which has been considered on a site-by-site basis.

1.4.4 A rationale has also been provided to describe whether the site has been screened in or out for each designated feature. Site specific maximum foraging ranges referenced in the below tables were obtained from Woodward *et al*., (2019). Tracking data referred to for gannet and Manx shearwater referenced for certain sites below was obtained from Wakefield *et al*., (2013) and Dean *et al*., (2015), respectively.

1.4.5 Information on designated features of English SPAs were obtained from the Natural England (n.d.) Designated Sites portal. Scottish SPA information from NatureScot's SiteLink (n.d.). Northern Ireland SPAs from each SPA citation hosted by the Department of Agriculture, Environment and Rural Affairs (Daera)(e.g. Daera, 2015), and Welsh SPA information from the designated site viewer (Natural Resources Wales (NRW), 2023). Ramsar information was obtained from the JNCC Ramsar information webpage.

1.4.6 It is important that transboundary Designated Sites (which are part of the Natura 2000 network) are also given due consideration during the screening process. As a result, Irish SPAs and Ramsar sites were also considered under the same methods as UK sites (with SPA information obtained from the National Parks and Wildlife Service (NPWS) SPA spreadsheet (NPWS, n.d.), and Ramsar site information from the Ramsar Sites Information Service (n.d.))

1.4.7 Transboundary sites (i.e. in rest of Europe not including the Republic of Ireland) have not been revisited in this screening update (transboundary sites can be found in the Rampion 2 HRA Screening Report).

1.5 Results

1.5.1 The result of including standard deviation within the foraging range values have been highlighted in **Table D-3**, with the results of the site screening presented in the following sections. It is important to note that for species such as fulmar and Manx shearwater, almost every SPA in the UK where either species is a designated feature was within mean-maximum plus standard deviation. This included colonies on the north and west coast of Scotland and the coast of Wales where birds could in theory travel along the coast to Rampion 2.

1.5.2 A key outcome of the screening update is the number of SPAs within foraging range when using the standard deviation approach. Many of these SPAs were beyond the mean-maximum value used for each species in the Rampion 2 HRA Screening Report (RED, 2020). However, many of these sites were within the mean-maximum foraging range for the species with the most extensive foraging ranges, such as fulmar, Manx shearwater, and gannet. For fulmar and Manx shearwater, their sensitivity to the impacts of offshore wind farms are relatively low (Bradbury *et al*, 2014, Furness *et al*., 2013, Diershke *et al.,* 2016, Fliessbach *et al*., 2019) and based on their wide-ranging behaviour, are considered to be relatively low risk in HRA terms.

1.5.3 Nevertheless, each SPA has been considered in turn and screened in or out based on the potential for LSE. The results of this can be seen in **Table D-2**

© WSP UK Limited

below, where SPAs and Ramsar sites where LSE cannot be discounted at this stage are presented. The full process is provided in **Table D-3**.

Table D-2 Summary of all SPAs and Ramsar sites where LSE could not be discounted following update to screening.

Designated site	Species where LSE could not be discounted at this stage
Pagham Harbour SPA	Common tern
Chichester and Langstone Harbours SPA	Common tern Sandwich tern
Solent and Southampton Water SPA	Sandwich tern
Dungeness, Romney Marsh and Rye Bay SPA	Sandwich tern
Flamborough and Filey Coast SPA	Gannet

© WSP UK Limited

Table D-3 Full screening update results to incorporate Woodward *et al.*, 2019 mean-maximum foraging ranges plus standard deviation

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9020330	Solent and Dorset Coast	UK	pSPA	14.7	Foraging terns	N/A	Out under Criterion 2	SPA is designated for at sea foraging areas for terns. Birds foraging in SPA are likely to be from breeding SPAs considered in the SPAs included below (Solent and Southampton Water). Based on Criterion 2 focusing on distances from breeding locations, this SPA can be screened out for this Criterion.
UK9012041	Pagham Harbour	UK	SPA	15.3	Breeding terns and wintering waterbirds	Common tern	In under Criterion 2 for: Common tern	SPA may have connectivity with Rampion 2 during the breeding season for common tern based on mean-maximum +1SD foraging range. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for other designated seabird species and therefore has no breeding season connectivity.
UK9011011	Chichester and Langstone Harbours	UK	SPA	23.1	Breeding terns and wintering waterbirds	Sandwich tern Common tern	In under Criterion 2 for: Sandwich tern Common tern	SPA may have connectivity with Rampion 2 during the breeding season for Sandwich tern and common tern based on mean-maximum +1SD foraging range. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for other designated seabird species and therefore has no breeding season connectivity.
UK9011061	Solent and Southampton Water	UK	SPA	29.6	Breeding seabirds including terns and wintering waterbirds	Sandwich tern	In under Criterion 2 for: Sandwich tern	SPA may have connectivity with Rampion 2 during the breeding season for Sandwich tern based on mean-maximum +1SD foraging range. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for other designated seabird species and therefore has no breeding season connectivity.
UK9012091	Dungeness, Romney Marsh and Rye Bay	UK	SPA	39.2	Breeding seabirds including terns and breeding and wintering waterbirds	Sandwich tern	In under Criterion 2 for: Sandwich tern	SPA may have connectivity with Rampion 2 during the breeding season for Sandwich tern based on mean-maximum +1SD foraging range. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for other designated seabird species and therefore has no breeding season connectivity.
UK9010111	Poole Harbour	UK	SPA	89.4	Breeding seabirds including terns and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK11054	Poole Harbour	UK	Ramsar	89.4	Breeding seabirds including terns and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9012031	Medway Estuary and Marshes	UK	SPA	91.5	Breeding terns and breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9012011	The Swale	UK	SPA	94.9	Breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020309	Outer Thames Estuary	UK	SPA	103.5	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK11066	Stodmarsh	UK	Ramsar	107.7	Breeding, passage and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9012071	Thanet Coast and Sandwich Bay	UK	SPA	109.7	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9012121	Stodmarsh	UK	SPA	109.8	Breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009246	Foulness (Mid-Essex Coast Phase 5)	UK	SPA	109.9	Breeding seabirds and	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
					breeding and wintering waterbirds			
UK9009245	Blackwater Estuary (Mid-Essex Coast Phase 4)	UK	SPA	125.9	Breeding seabirds and breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9010091	Chesil Beach and The Fleet	UK	SPA	127.3	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009243	Colne Estuary (Mid-Essex Coast Phase 2)	UK	SPA	141.3	Breeding seabirds and breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009131	Hamford Water	UK	SPA	158.9	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009121	Stour and Orwell Estuaries	UK	SPA	161.3	Breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009112	Alde-Ore Estuary	UK	SPA	181.5	Breeding seabirds and breeding and wintering waterbirds	Lesser black-backed gull	Out under Criterion 2	Rampion 2 is beyond the colony specific maximum foraging range for lesser black-backed gull (and mean-maximum +1SD for all other features).

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK11002	Alde-Ore Estuary	UK	Ramsar	181.5	Breeding seabirds and wintering waterbirds	Lesser black-backed gull	Out under Criterion 2	Rampion 2 is beyond the colony specific maximum foraging range for lesser black-backed gull (and mean-maximum +1SD for all other features).
UK9009101	Minsmere-Walberswick	UK	SPA	208.4	Breeding seabirds and breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9008021	The Wash	UK	SPA	235.4	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009181	Breydon Water	UK	SPA	239.3	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020329	Greater Wash	UK	SPA	249.1	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009271	Great Yarmouth North Denes	UK	SPA	250.3	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9009031	North Norfolk Coast	UK	SPA	256.6	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK11048	North Norfolk Coast	UK	Ramsar	256.6	Breeding seabirds and passage and	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
					wintering waterbirds			
UK9008022	Gibraltar Point	UK	SPA	267.6	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9006111	Humber Estuary	UK	SPA	297.3	Breeding seabirds and breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9014051	Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro	UK	SPA	311.6	Breeding seabirds	Storm petrel Manx shearwater	Out under Criterion 2	Site is located on the west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9013011	The Dee Estuary	UK	SPA	329.8	Wintering waterbirds and breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020294	Liverpool Bay / Bae Lerpwl	UK	SPA	343.3	Wintering marine birds and breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020287	Mersey Narrows and North Wirral Foreshore	UK	SPA	347.8	Wintering waterbirds and	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
					breeding seabirds			
UK9005103	Ribble and Alt Estuaries	UK	SPA	354.5	Wintering waterbirds and breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK11057	Ribble and Alt Estuaries	UK	Ramsar	354.5	Passage and wintering waterbirds and breeding and non-breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9014041	Grassholm	UK	SPA	355.3	Breeding seabirds	Gannet	Out under Criterion 2	Site is located on the west coast of UK. Tracking data of gannet from SPA suggests no connectivity with Rampion 2 during breeding season, therefore gannet has been screened out under Criterion 2.
UK9013121	Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island	UK	SPA	360.1	Breeding seabirds and wintering waterbirds	Manx shearwater	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is a significant distance beyond the colony specific maximum foraging range for Manx shearwater (and mean-maximum +1SD for all other features).
UK9013061	Anglesey Terns / Morwenoliaid Ynys Môn	UK	SPA	376.0	Breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9006101	Flamborough and Filey Coast	UK	SPA	376.4	Breeding seabirds	Fulmar Gannet	In under Criterion 2 for: Gannet	SPA may have connectivity with Rampion 2 during the breeding season for gannet based on mean-maximum +1SD foraging range. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for other designated seabird species and therefore has no breeding season connectivity. For fulmar, the significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
								the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9020285	Ynys Seiriol/ Puffin Island	UK	SPA	378.3	Breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK11045	Morecambe Bay	UK	Ramsar	389.7	Passage and wintering waterbirds, breeding seabirds and non-breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020326	Morecambe Bay and Duddon Estuary	UK	SPA	389.7	Wintering waterbirds and breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020288	Isles of Scilly	UK	SPA	403.3	Breeding seabirds	Manx shearwater Fulmar	Out under Criterion 2	Site is located on the south west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK11033	Isles of Scilly	UK	Ramsar	403.3	Breeding seabirds	-	Out under Criterion 2	Site is located on the south west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9006061	Teesmouth and Cleveland Coast	UK	SPA	437.1	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9006131	Northumbria Coast	UK	SPA	453.8	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK11049	Northumbria Coast	UK	Ramsar	453.8	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9006031	Coquet Island	UK	SPA	522.8	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK12021	Strangford Lough	UK	Ramsar	525.2	Breeding seabirds and passage and wintering waterbirds	-	Out under Criterion 2	Site is located in Northern Ireland. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020111	Strangford Lough	UK	SPA	525.3	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located in Northern Ireland. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020271	Outer Ards	UK	SPA	526.5	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK12004	Carlingford Lough	UK	Ramsar	526.8	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located in Northern Ireland. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020161	Carlingford Lough	UK	SPA	526.9	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located in Northern Ireland. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9006021	Farne Islands	UK	SPA	555.0	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9006011	Lindisfarne	UK	SPA	555.0	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020291	Copeland Island	UK	SPA	557.0	Breeding seabirds	Manx shearwater	Out under Criterion 2	Site is located in Northern Ireland. Tracking data of Manx shearwater from SPA suggests no connectivity with Rampion 2 during breeding season (Dean *et al.*, 2015).
UK9020042	Larne Lough	UK	SPA	573.0	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located in Northern Ireland. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK12013	Larne Lough	UK	Ramsar	573.0	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located in Northern Ireland. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9003091	Ailsa Craig	UK	SPA	590.6	Breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9004271	St Abb's Head to Fast Castle	UK	SPA	591.1	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9020316	Outer Firth of Forth and St Andrews Bay Complex	UK	pSPA	593.1	Breeding and non-breeding seabirds and wintering waterbirds	Manx shearwater	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9004171	Forth Islands	UK	SPA	615.8	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9004451	Imperial Dock Lock, Leith	UK	SPA	617.2	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9020011	Rathlin Island	UK	SPA	632.7	Breeding seabirds	Fulmar	Out under Criterion 2	Site is located off the west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9020021	Sheep Island	UK	SPA	639.7	Breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9004121	Firth of Tay and Eden Estuary	UK	SPA	649.8	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9003057	Rinns of Islay	UK	SPA	682.7	Breeding, passage and	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
					wintering waterbirds			
UK9003057	Rinns of Islay	UK	SPA	684.4	Breeding, passage and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002271	Fowlsheugh	UK	SPA	700.5	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9003171	North Colonsay and Western Cliffs	UK	SPA	706.6	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9003211	Glas Eileanan	UK	SPA	732.7	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002221	Ythan Estuary, Sands of Forvie and Meikle Loch	UK	SPA	744.0	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK13061	Ythan Estuary and Meikle Loch	UK	Ramsar	744.0	Breeding seabirds and passage and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002491	Buchan Ness to Collieston Coast	UK	SPA	745.4	Breeding seabirds	Fulmar	Out under Criterion 2	Rampion 2 is a significant distance beyond the colony specific maximum foraging range for fulmar (and mean-maximum +1SD for all other features).
UK13056	Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	UK	Ramsar	766.8	Breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is a significant distance beyond the colony specific maximum foraging range for fulmar (and mean-maximum +1SD for all other features).

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9003032	Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	UK	SPA	766.8	Breeding and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002211	Loch of Strathbeg	UK	SPA	776.3	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001341	Rum	UK	SPA	786.3	Breeding seabirds and breeding waterbirds	Manx shearwater	Out under Criterion 2	Site is located on the west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002471	Troup, Pennan and Lion's Heads	UK	SPA	786.3	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9001624	Inner Moray Firth	UK	SPA	795.3	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001431	Canna and Sanday	UK	SPA	806.1	Breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9001623	Cromarty Firth	UK	SPA	809.5	Breeding seabirds and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001121	Mingulay and Berneray	UK	SPA	819.6	Breeding seabirds	Fulmar	Out under Criterion 2	Site is located on the west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9001082	South Uist Machair and Lochs	UK	SPA	849.0	Breeding waterbirds, breeding seabirds and passage and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK13058	South Uist Machair and Lochs	UK	Ramsar	849.0	Breeding waterbirds and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001182	East Caithness Cliffs	UK	SPA	852.1	Breeding seabirds	Fulmar	Out under Criterion 2	Rampion 2 is a significant distance beyond the colony specific maximum foraging range for fulmar (and mean-maximum +1SD for all other features).
UK9001151	Caithness and Sutherland Peatlands	UK	SPA	856.7	Breeding waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK13003	Caithness and Sutherland Peatlands	UK	Ramsar	856.7	Breeding waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9001261	Priest Island (Summer Isles)	UK	SPA	872.6	Breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001051	North Uist Machair and Islands	UK	SPA	879.4	Breeding waterbirds and passage and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK13050	North Uist Machair and Islands	UK	Ramsar	879.4	Breeding waterbirds and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001041	Shiant Isles	UK	SPA	882.7	Breeding seabird and passage and wintering waterbirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001181	North Caithness Cliffs	UK	SPA	894.3	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9001131	Pentland Firth Islands	UK	SPA	905.1	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001241	Handa	UK	SPA	905.7	Breeding seabirds	Fulmar	Out under Criterion 2	Site is located on the west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
								English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002141	Hoy	UK	SPA	917.1	Breeding seabirds and breeding waterbirds	Fulmar Great skua	Out under Criterion 2	Rampion 2 is beyond the colony specific maximum foraging range for Great skua. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For fulmar, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9001231	Cape Wrath	UK	SPA	922.5	Breeding seabirds	Fulmar	Out under Criterion 2	Site is located on the west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002151	Copinsay	UK	SPA	922.5	Breeding seabirds	Fulmar	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is a significant distance beyond the colony specific maximum foraging range for fulmar (and mean-maximum +1SD for all other features).
UK9002381	Auskerry	UK	SPA	938.5	Breeding seabirds	-	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001031	St Kilda	UK	SPA	939.7	Breeding seabirds	Manx shearwater Fulmar	Out under Criterion 2	Site is located on the west coast of UK. Rampion 2 is beyond the colony specific maximum foraging range for fulmar. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For Manx shearwater, the

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
								likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002121	Marwick Head	UK	SPA	954.4	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9001021	Flannan Isles	UK	SPA	956.4	Breeding seabirds	-	Out under Criterion 2	Site is located off the west coast of UK. Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002371	Rousay	UK	SPA	956.6	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002431	Calf of Eday	UK	SPA	960.2	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002181	Sule Skerry and Sule Stack	UK	SPA	961.9	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002101	West Westray	UK	SPA	968.3	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
								species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002111	Papa Westray (North Hill and Holm)	UK	SPA	976.6	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002091	Fair Isle	UK	SPA	982.0	Breeding seabirds	Fulmar	Out under Criterion 2	Rampion 2 is a significant distance beyond the colony specific maximum foraging range for fulmar (and mean-maximum +1SD for all other features).
UK9001011	North Rona and Sula Sgeir	UK	SPA	995.7	Breeding seabirds	Fulmar	Out under Criterion 2	Site is located on the west coast of UK. The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002511	Sumburgh Head	UK	SPA	1018.7	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002361	Mousa	UK	SPA	1035.8	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9002081	Noss	UK	SPA	1048.9	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.
UK9002061	Foula	UK	SPA	1051.4	Breeding seabirds and breeding waterbirds	Fulmar	Out under Criterion 2	Rampion 2 is a significant distance beyond the colony specific maximum foraging range for fulmar (and mean-maximum +1SD for all other features).
UK9002051	Papa Stour	UK	SPA	1074.8	Breeding seabirds and breeding waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002041	Ronas Hill – North Roe and Tingon	UK	SPA	1094.7	Breeding seabirds and breeding waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002941	Otterswick and Graveland	UK	SPA	1095.5	Breeding waterbirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002031	Fetlar	UK	SPA	1096.3	Breeding seabirds and breeding waterbirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.

© WSP UK Limited

Site code	Site name	MS	TYPE	Distance from Array Area (km)	Category of Relevant Interest Feature	Array within Mean-maximum +1SD foraging range of:	Screening decision	Rationale
UK9002021	Ramna Stacks and Gruney	UK	SPA	1109.8	Breeding seabirds	-	Out under Criterion 2	Rampion 2 is beyond the mean-maximum +1SD foraging ranges for designated seabird species and therefore has no breeding season connectivity.
UK9002011	Hermaness, Saxa Vord and Valla Field	UK	SPA	1116.2	Breeding seabirds	Fulmar	Out under Criterion 2	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these species, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in The English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and impacts have been apportioned to all SPAs within foraging range.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

2. References

Department for Business, Energy and Industrial Strategy, (BEIS), (2020). *Draft Review of Consents for Major Infrastructure Projects and Special Protection Areas*. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/912429/spa-roc-for-energy-developments-in-england-and-wales-draft-for-consultation.pdf [Accessed 26 May 2023].

Bradbury G, Trinder M, Furness B, Banks AN, Caldow RWG and Hume D, (2014). Mapping seabird sensitivity to offshore wind farms. PloS ONE 9: e106366.

Dean, B., Kirk, H., Fayet, A., Shoji, A., Freeman, R., Leonard, K., Perrins, C.M. and Guilford, T, (2015). Simultaneous multi-colony tracking of a pelagic seabird reveals cross-colony utilization of a shared foraging area. Marine Ecology Progress Series, 538, pp.239-248.

Department of Agriculture, Environment and Rural Affairs (DAERA), (2015). *Copeland Islands SPA Guidance and Literature*. [Online] Available at: https://www.daera-ni.gov.uk/publications/special-protection-area-copeland-islands [Accessed 26 May 2023].

Dierschke V, Furness RW and Garthe S (2016). Seabirds and offshore wind farms in European waters: Avoidance and attraction. Biological Conservation 202: 59-68.

Fliessbach KL, Borkenhagen K, Guse N, Markones N, Schwemmer P and Garthe S (2019). A Ship Traffic Disturbance Vulnerability Index for Northwest European Seabirds as a Tool for Marine Spatial Planning. Frontiersin Marine Science 6: 192, doi: 10.3389/fmars.2019.00192.

Furness RW, Wade HM and Masden EA (2013). Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management 119: 56-66.

Joint Nature Conservation Committee (JNCC), (2022). *Ramsar Sites in the UK and the UK's Overseas Territories & Crown Dependencies*. [Online] Available at: https://jncc.gov.uk/our-work/ramsar-sites/ [Accessed 26 May 2023].

National Parks and Wildlife Service (NPWS), (n.d.). *Protected Sites in* Ireland. [Online] Available at: https://www.npws.ie/protected-sites [Accessed 26 May 2023].

Natural England, (n.d.). *Designated Sites* View. [Online] Available at: https://designatedsites.naturalengland.org.uk/SiteSearch.aspx [Accessed 26 May 2023].

Natural Resources Wales (NRW), (2023). *Find protected areas of land and sea.* [Available at: https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/protected-areas-of-land-and-seas/find-protected-areas-of-land-and-sea/?lang=en [Accessed 26 May 2023].

NatureScot, (n.d.). *SiteLink*. [Online] Available at: https://sitelink.nature.scot/home [Accessed 26 May 2023].

Ramsar Sites Information Service, (n.d.). *Ramsar Sites Information Service*. [Online] Available at: https://rsis.ramsar.org/ris-search/?f[0]=regionCountry_en_ss%3AIreland [Accessed 26 May 2023].

© WSP UK Limited

Rampion Extension Development Ltd (RED). September (2020a). Information to Support Habitats Regulations Assessment Stage One Screening. Unpublished.

Thaxter, C., Lascelles, B., Sugar, K., Cook, A., Roos, S., Bolon, M., Langston, R. and Burton, N. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation 156: 53-61.

Wakefield, E.D., Bodey, T.W., Bearhop, S., Blackburn, J., Colhoun, K., Davies, R., Dwyer, R.G., Green, J.A., Grémillet, D., Jackson, A.L. and Jessopp, M.J., (2013). Space partitioning without territoriality in gannets. Science, 341(6141), pp.68-70.

Woodward, I., Thaxter, C., Owen, E. and Cook, A. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. BTO Research Report No. 724. December 2019.

© WSP UK Limited

Appendix E
HRA Screening matrices (updated)

© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix E

HRA Stage One Screening matrices



© WSP UK Limited

1. Introduction

This Appendix presents Screening matrices completed for 106 European sites in relation to Habitats Regulations Assessment (HRA) Screening exercise for the proposed Rampion 2 Offshore Wind Farm (hereafter 'Rampion 2'). These matrices are provided by Rampion Extension Development Limited (RED) (hereafter 'the Applicant') at the request of and in accordance with the structure and format specified in Planning Inspectorate's Advice Note Ten (November 2017) (version 8) (Planning Inspectorate, 2022) for Nationally Significant Infrastructure developments.

1.1 Index of matrices

Table E-1 Index to the matrices with hyprlinks to matrices locations within the document

Matrix no. hyperlink	European site considered at Screening	Screening Determination
Transboundary site		
LSE: Likely Significant Effect LSEI: Likely Significant Effect in-combination		
Matrix 1	River Itchen Special Area of Conservation (SAC)	**LSE**
Matrix 2	Arun Valley (UK) Ramsar	**LSE**
Matrix 3	Arun Valley (UK) Special Protection Area (SPA)	**LSE**
Matrix 4	Arun Valley (UK) SAC	No LSE
Matrix 5	The Mens (UK) SAC	**LSE**
Matrix 6	Duncton to Bignor Escarpment (UK) SAC	No LSE
Matrix 7	Pagham Harbour (UK) SPA	**LSE**
Matrix 8	Pagham Harbour (UK) Ramsar	**LSE**
Matrix 9	Portsmouth Harbour (UK) SPA	**LSE**
Matrix 10	Portsmouth Harbour (UK) Ramsar	**LSE**
Matrix 11	Solent Maritime (UK) SAC	**LSE**

© WSP UK Limited

Matrix no. hyperlink	European site considered at Screening	Screening Determination
Matrix 12	South Wight Maritime (UK) SAC	**LSE**
Matrix 13	Solent and Isle of Wight lagoons (UK) SAC	**LSE**
Matrix 14	Littoral Cauchois (UK) SAC	No LSE
Matrix 15	Southern North Sea (UK) SAC	No LSE
Matrix 16a	Transboundary sites - harbour porpoise (1-10)	No LSE
Matrix 16b	Transboundary sites - harbour porpoise (11-20	No LSE
Matrix 16c	Transboundary sites - harbour porpoise (21-24)	No LSE
Matrix 17a	Transboundary sites - bottlenose dolphin (sites 1- 7)	No LSE
Matrix 17b	Transboundary sites - bottlenose dolphin (sites 8 – 15)	No LSE
Matrix 18	Solent and Dorset Coast (UK) SPA	**LSE**
Matrix 19	Chichester and Langstone Harbours (UK) SPA	**LSE**
Matrix 20	Chichester and Langstone Harbours (UK) Ramsar	**LSE**
Matrix 21	Solent and Southampton Water (UK) SPA	**LSE**
Matrix 22	Solent and Southampton Water (UK) Ramsar	**LSE**
Matrix 23	Dungeness, Romney Marsh and Rye Bay (UK) SPA	**LSE**
Matrix 24	Littoral seino-marin (FR) SPA	**LSEI**
Matrix 25	Medway Estuary and Marshes (UK) SPA	**LSEI**
Matrix 26	Outer Thames Estuary (UK) SPA	No LSEs
Matrix 27	Foulness (Mid-Essex Coast Phase 5) (UK) SPA	**LSEI**
Matrix 28	Alderney West Coast and the Burhou Islands Ramsar	**LSEI**
Matrix 29	Falaise du Bessin Occidental (FR) SPA	**LSEI**

© WSP UK Limited

Matrix no. hyperlink	European site considered at Screening	Screening Determination
Matrix 30	Alde-Ore Estuary (UK) SPA	**LSEI**
Matrix 31	Alde-Ore Estuary (UK) Ramsar	**LSEI**
Matrix 32	Chausey (FR) SPA	No LSEs
Matrix 33	Cap d'Erquy-Cap Fréhel (FR) SPA	No LSEs
Matrix 34	The Wash (UK) SPA	**LSEI**
Matrix 35	Breydon Water (UK) SPA	**LSEI**
Matrix 36	Tregor Goëlo (FR) SPA	No LSEs
Matrix 37	Greater Wash (UK) SPA	**LSEI**
Matrix 38	North Norfolk Coast (UK) SPA	**LSEI**
Matrix 39	North Norfolk Coast (UK) Ramsar	**LSEI**
Matrix 40	Côte de Granit Rose-Sept Iles (FR) SPA	**LSEI**
Matrix 41	Skomer, Skokholm the Seas off Pembrokeshire SPA	No LSEs
Matrix 42	Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island (UK) SPA	No LSEs
Matrix 43	Flamborough and Filey Coast (UK) SPA	**LSEI**
Matrix 44	Ouessant-Molène (FR) SPA	No LSEs
Matrix 45	Camaret (FR) SPA	No LSEs
Matrix 46	Iles Houat-Hoëdic (FR) SPA	No LSEs
Matrix 47	Cap Sizun (FR) SPA	No LSEs
Matrix 48	Isles of Scilly (UK) SPA	No LSEs
Matrix 49	Isles of Scilly (UK) Ramsar	No LSEs

© WSP UK Limited

Matrix no. hyperlink	European site considered at Screening	Screening Determination
Matrix 50	Northumbria Coast (UK) SPA	**LSEI**
Matrix 51	Northumbria Coast (UK) Ramsar	**LSEI**
Matrix 52	Coquet Island (UK) SPA	**LSEI**
Matrix 53	Farne Islands (UK) SPA	**LSEI**
Matrix 54	St Abb's Head to Fast Castle (UK) SPA	No LSEs
Matrix 55	Outer Firth of Forth & St Andrews Bay Complex SPA	No LSEs
Matrix 56	Imperial Dock Lock, Leith (UK) SPA	No LSEs
Matrix 57	Deenish Island and Scariff Island (UK) SPA	No LSEs
Matrix 58	Fowlsheugh (UK) SPA	No LSEs
Matrix 59	Puffin Island (UK) SPA	No LSEs
Matrix 60	Skelligs (UK) SPA	No LSEs
Matrix 61	Blasket Island (UK) SPA	No LSEs
Matrix 62	Cruagh Island (UK) SPA	No LSEs
Matrix 63	Ythan Estuary, Sands of Forvie Meikle Loch SPA	No LSEs
Matrix 64	Ythan Estuary, Sands of Forvie Meikle Loch Ramsar	No LSEs
Matrix 65	Buchan Ness to Collieston Coast (UK) SPA	No LSEs
Matrix 66	Loch of Strathbeg (UK) SPA	No LSEs
Matrix 67	Loch of Strathbeg (UK) Ramsar	No LSEs
Matrix 68	Troup, Pennan and Lion's Head (UK) SPA	No LSEs
Matrix 69	Rum (UK) SPA	No LSEs
Matrix 70	Inner Moray Firth (UK) SPA	No LSEs

© WSP UK Limited

Matrix no. hyperlink	European site considered at Screening	Screening Determination
Matrix 71	Inner Moray Firth (UK) Ramsar	No LSEs
Matrix 72	Cromarty Firth (UK) SPA	No LSEs
Matrix 73	Cromarty Firth (UK) Ramsar	No LSEs
Matrix 74	East Caithness Cliffs (UK) SPA	No LSEs
Matrix 75	North Caithness Cliffs (UK) SPA	No LSEs
Matrix 76	Pentland Firth Islands (UK) SPA	No LSEs
Matrix 77	Hoy (UK) SPA	No LSEs
Matrix 78	Copinsay (UK) SPA	No LSEs
Matrix 79	Auskerry (UK) SPA	No LSEs
Matrix 80	St Kilda (UK) SPA	No LSEs
Matrix 81	Marwick Head (UK) SPA	No LSEs
Matrix 82	Rousay (UK) SPA	No LSEs
Matrix 83	Calf of Eday (UK) SPA	No LSEs
Matrix 84	Sule Skerry and Sule SPA Stack (UK) SPA	No LSEs
Matrix 85	West Westray (UK) SPA	No LSEs
Matrix 86	Papa Westray (North Hill and Holm) (UK) SPA	No LSEs
Matrix 87	Fair Isle (UK) SPA	No LSEs
Matrix 88	Sumburgh Head (UK) SPA	No LSEs
Matrix 89	Noss (UK) SPA	No LSEs
Matrix 90	Foula (UK) SPA	No LSEs
Matrix 91	Papa Stour (UK) SPA	No LSEs

© WSP UK Limited

Matrix no. hyperlink	European site considered at Screening	Screening Determination
Matrix 92	Ronas Hill North Roe and Tingon (UK) SPA	No LSEs
Matrix 93	Ronas Hill - North Roe and Tingon (UK) Ramsar	No LSEs
Matrix 94	Otterswick and Graveland (UK) SPA	No LSEs
Matrix 95	Fetlar (UK) SPA	No LSEs
Matrix 96	Ramna Stacks and Gruney (UK) SPA	No LSEs
Matrix 97	Hermaness, Saxa Vord & Valla Field (UK) SPA	No LSEs
Matrix 98	Copeland Islands (UK) SPA	No LSEs
Matrix 99	Caithness and Sutherland Peatlands (UK) SPA.	No LSEs
Matrix 100	Caithness and Sutherland Peatlands (UK) Ramsar	No LSEs
Matrix 101	Orkney Mainland Moors (UK) SPA	No LSEs
Matrix 102	Mousa Special (UK) SPA	No LSEs
Matrix 103	Tips of Corsemaul and Tom Mor (UK) SPA	No LSEs
Matrix 104	North Rona and Sula Sgeir (UK) SPA	No LSEs
Matrix 105	Ailsa Craig (UK) SPA	No LSEs
Matrix 106	Grassholm (UK) SPA	**LSE**

© WSP UK Limited

1.2 Effects considered

1.2.1 The potential effects on European sites considered within the submitted Information to support the HRA of Rampion 2 are set out in table below

Table E-2 Potential effects on the European site considered in the matrices

Designations	Effects considered in matrices
River Itchen SAC	Underwater noise (injury / mortality) Underwater noise (disturbance / barriers to migration) Suspended sediment Effects on prey Pollution Physical disturbance Electromagnetic fields In-combination
Arun Valley Ramsar **Arun Valley SPA**	Changes in hydrology Pollution events Emissions to air Invasive non-native species Land take / cover change Fragmentation of habitats Noise and vibration Increased light-levels In-combination
Duncton to Bignor Escarpment SAC	Changes in hydrology Pollution events Emissions to air Invasive non-native species Land take / cover change
Pagham Harbour Ramsar **Portsmouth Harbour SPA** **Portsmouth Harbour Ramsar** **Chichester Langstone Harbours Ramsar** **Solent and Southampton Water Ramsar** **Medway Estuary and Marshes SPA**	Collision risk (on migration) In-combination
Pagham Harbour Ramsar **Portsmouth Harbour SPA** **Portsmouth Harbour Ramsar** **Chichester and Langstone Harbours Ramsar** **Solent and Southampton Water Ramsar**	Collision risk (on migration) In-combination

© WSP UK Limited

Designations	Effects considered in matrices
Pagham Harbour SPA	Collision risk (on migration) Collision risk (breeding) Barrier effects Prey availability & behaviour Indirect: effects on prey Disturbance/displacement Changes in hydrology Pollution events Emissions to air Invasive non-native species Land take / cover change Fragmentation of habitats Noise and vibration Increased light levels In-combination
Southern North Sea SAC **23 transboundary sites harbour porpoise** **15 transboundary sites bottlenose dolphin**	Underwater noise Vessel disturbance Vessel collision risk Prey availability / behaviour Pollution Suspended sediments Physical loss of habitat Electromagnetic fields In-combination
The Mens SAC	Changes in hydrology Pollution events Emissions to air Invasive non-native species Land take / cover change Fragmentation of habitats Noise and vibration Increased light levels In-combination
Solent Maritime (UK) SAC **South Wight Maritime (UK) SAC** **Solent and Isle of Wight lagoons SAC**	Suspended sediment /deposition Habitat loss and disturbance Invasive non-native species Coastal processes Pollution In-combination

© WSP UK Limited

Designations	Effects considered in matrices
Solent and Dorset Coast SPA **Isles of Scilly Ramsar** **Isles of Scilly SPA**	Collision risk (breeding) Prey availability & behaviour Indirect: effects on prey Barrier effect Disturbance/ displacement In-combination
Farne Islands SPA **Grassholm SPA**	Collison risk (migration) Disturbance/displacement (migration)
Alderney W. Cst &Burhou Islands Ramsar **Falaise du Bessin Occidental (FR) SPA** **Tregor Goëlo (FR) SPA** **Côte de Granit Rose-Sept Iles (FR) SPA** **Skomer, Skokholm the Seas off Pembrokeshire SPA** **Aberdaron Coast& Bardsey Island SPA** **Flamborough and Filey Coast SPA** **Ouessant-Molène (FR) SPA** **Camaret (FR) SPA** **Iles Houat-Hoëdic (FR) SPA**	Collision risk (breeding) Collision risk (on migration) Prey availability & behaviour Indirect: effects on prey Barrier effect Disturbance/displacement (breeding) Disturbance/displacement (migration) In-combination
Chichester Langstone Harbours SPA **Solent S.hamtn Water SPA** **Dungeness, Romney Marsh and Rye Bay SPA** **Littoral seino-marin SPA** **Ottr. Thames Estuary SPA** **North Norfolk Coast SPA** **N. Norfolk Coast Ramsar** **Northumbria Coast SPA** **Breydon Water SPA** **Greater Wash SPA Foulness (MEC phs5) SPA**	Collision risk (breeding) Collision risk (migration) Prey availability & behaviour Indirect: effects on prey Barrier effect Disturbance/ displacement In-combination

© WSP UK Limited

Table E-3 Potential effects on the European site considered in the matrices (Cont.)

Effects considered in the matrices	**Barrier effect** **Collision risk (migration)** **Prey availability & behaviour** **Disturbance/ displacement** **In-combination** **Indirect: effects on prey**	
Designations	**Designations**	**Designations**
Buchan Ness to Collieston Coast SPA **Coquet Island SPA** **Cruagh Island (SPA** **Deenish Island & Scariff Island SPA** **Imperial Dock Leith SPA** **Loch of Strathbeg SPA** **North Norfolk Coast Ramsar** **North Norfolk Coast SPA** **Northumbria Coast Ramsar** **Northumbria Coast SPA** **Outer Firth of Forth and St Andrews Bay Complex SPA** **Puffin Island SPA** **Skelligs SPA** **St Abb's Hd -Fast Castle SPA** **The Wash SPA** **Ythan Estuary, Sands of Forvie Meikle Loch Ramsar** **Caithness &Sutherland SPA**	Cromarty Firth Ramsar Cromarty Firth SPA East Caithness Cliffs SPA Inner Moray Firth Ramsar Loch of Strathbeg Ramsar North Caithness Cliffs SPA Papa Westray (North Hill Holm) SPA Pentland Firth Islands SPA Ronas Hill North Roe Tingon Sule Skerry Sule SPA Stack SPA Caithness and Sutherland Peatlands SPA. Sumburgh Head SPA Troup, Pennan Lion's Head SPA Orkney Mainland Moors SPA Otterswick and Graveland SPA North Rona Sula Sgeir SPA Ramna Stacks and Gruney SPA Ronas Hill - North Roe and Tingon Ramsar Tips of Corsemaul and Tom Mor SPA Copeland Islands SPA Ythan Estuary, Sands of Forvie Meikle Loch SPA	Ailsa Craig SPA Peatlands Ramsar Fetlar SPA Grassholm SPA Mousa Special SPA West Westray SPA Rousay SPA Rum SPA St Kilda SPA Marwick Head SPA Moray Firth SPA Noss SPA Papa Stour SPA Farne Islands SPA Fowlsheugh SPA Fair Isle SPA Foula SPA Hoy SPA Auskerry SPA Calf of Eday SPA Copinsay SPA Blasket Island SPA Breydon Water SPA Greater Wash SPA Hermaness, Saxa Vord & Valla Field SPA

© WSP UK Limited

2. Matrix 1: River Itchen Special Area of Conservation - HRA Screening for Rampion 2

Name of European site:	**River Itchen (UK) SAC**
EU Code:	**UK0012599**
Distance to Proposed Development	**49.2 km from the closest point of the DCO Order Limit (western extent of the Array) to the mouth of the Southampton Water (estuary connecting the River Itchen to the marine environment)**

Likely Effects of Proposed Development

	Underwater noise			Suspended sediment			Effects on prey			Pollution			Physical disturbance			Electromagnetic fields (EMF)			In-combination		
Stage of Proposed Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Atlantic Salmon	✓a	✕b	✓c	✕d	✕e	✕f	✕g	✕g	✕g	✕h	✕h	✕h	✕i	✕i	✕i		✕j		✓k	✕l	✓k
Otter																					
White-clawed crayfish																					
Brook lamprey																					
Bullhead																					
Southern damselfly																					
Water courses plain to montane levels																					

Evidence Supporting Conclusions

✓a Mortality, injury, behavioural changes, and auditory masking could arise from exposure to underwater noise for migratory fish from this SAC during their upstream or downstream migration. Although, auditory injury and lethal effects would only be expected at very close range. The Zone of Influence (ZOI) for noise arising from the Proposed development will be defined by modelling (a semi-empirical underwater noise propagation model (INSPIRE)). Pending the outcomes, the risk of injury or disruption (a noise barrier)' to migratory routes cannot be discounted. Pathway requires consideration at HRA Stage Two. **Potential LSE** identified.

Cont. on next page

© WSP UK Limited

Matrix 1: River Itchen SAC (Cont.)

Evidence Supporting Conclusions

×b	Underwater noise would be considerably less during operations. As the Planning Inspectorate has agreed that underwater noise during operation can be scoped out of the Environmental Impact Assessment for fish receptors (see **Table 8-7** in **ES Volume 2, Chapter 8: Fish and Shellfish Ecology**) and the Marine management Organisation (MMO) also stated it had no major objections to scoping out this effect (see MMO response RED, 2021), the HRA concludes no LSE.
√c	Potential impacts during decommissioning are considered to be similar of potentially less than those outlined for construction. A finding of potential LSE is appropriate.
×d	Sandwave clearance, cable trenching (array and export cables), drilling for foundations and spoil dispersal will cause sediment plumes. Migrating salmon that encounter high levels of suspended sediment (SS) can be disrupted from foraging (Madej *et al*. 2007) or may display avoidance and displacement behaviour (although assume prior distribution shortly thereafter) (Carlson *et al*. (2001). The secondary ZOI for SS is 15km. As the Southampton water (pathway to the River Itchen) is 50km from the Proposed Development, there is no pathway for effect based on the lack of spatial overlap. Any short-term behavioural effects would not amount to LSE.
×e	The potential for sediment release during operation and maintenance is considerably less than for construction. Migrating salmon may encounter elevated levels of SS, however, these elevations would be localised and intermittent. Given the limited extent and duration of any increases in SS, effects would be negligible, no LSE applies.
×f	Increases in SS from the decommissioning works will be similar to that for the construction phase and of a similar magnitude. No LSE therefore applies.
×g	Minor adverse effects are predicted for prey species within (and around) the Proposed Development (as identified by the findings reported in the Proposed Development's **ES Volume 2, Chapter 8: Fish and Shellfish** during the construction and operational phases. This far-ranging species is unlikely to be sensitive to indirect effects on foraging resource in the context noting the vast resources in the wider habitat available. No LSE is identified.
×h	Accidental pollution events are not considered to result in a significant effect on benthic subtidal and intertidal (and therefore fish) receptors. The magnitude of an accidental spill will be limited by the size of chemical or oil inventory on construction vessels. In addition, released hydrocarbons would be subject to rapid dilution, weathering and dispersion and would be unlikely to persist in the marine environment. No LSE applies.
×i	No physical habitat loss within the SAC boundary would result from the Proposed Development, nor any loss of important or functionally linked habitat. Habitat loss and or disturbance would be insignificant to this species over these scales. No LSE applies.
×j	EMF comprise both the electric (E) fields, measured in volts per metre (Vm-1) and the magnetic (B) fields, measured in tesla (T). Species for which there is evidence of a response to E- and B-fields include Atlantic salmon (Gill *et al*., 2005). Salmonids may encounter EMF along their coastal migration routes where these overlap with sub-sea cable networks. However, after the burial of cables, EMFs are scarcely detectable in the water column (Russell *et al*., 2018). The potential for salmon to encounter/ be exposed to EMF is limited to the immediate vicinity of the cable (a small area of habitat within metres of the buried cable) and therefore, exposure is likely to be short-lived. This would not be a significant impediment to migration, or species health. No LSE is identified.
√k	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.
×l	Potential (non-significant) effects are limited to the extent they would not amount to LSE in-combination with other plans and Proposed Developments

End of Matrix one

© WSP UK Limited

3. Matrix 2: Arun Valley (UK) Ramsar - HRA Screening for Rampion 2

Name of European site	**Arun Valley (UK) Ramsar**
European site code	**UK9020281**
Distance to Development	**4.7km from Onshore Cable Corridor. 26.8km from Array**

Likely Effects of Proposed Development

Effects	Changes in hydrology			Pollution events			Emissions to air			Invasive non-native species			Land take / land cover change			Collision risk (on migration)			Fragmentation or severance of habitats			Noise and vibration			Increased light levels			Water Neutrality			In-combination		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Ramsar criterion 6 Northern pintail	✕a	✕b	✕c	✓d	✕d	✓d	✕e	✕e	✕e	✓f	✓q	✓q	✓q	✕g	✓g		✕h		✓i	✕j	✓k	✓l	✕m	✓k	✕n	✕o	✕n		✓p		✓q	✕r	✓q
Ramsar criterion 5 Assemblage of wintering waterfowl of international importance	✕a	✕b	✕c	✓d	✕d	✓d	✕e	✕e	✕e	✓f	✓q	✓q	✓q	✕g	✓g		✕h		✓i	✕j	✓k	✓l	✕m	✓k	✕n	✕o	✕n		✓p		✓q	✕r	✓q
Ramsar criterion 2 Seven wetland invertebrate species listed in British Red Data Book											✕s	✕s	✕s																✓p		✕s	✕s	✕s
Ramsar criterion 2 Four nationally rare and four nationally scarce plant species											✕t	✕t	✕t																✓p		✕t	✕t	✕t
Ramsar criterion 3 Particularly diverse and rich ditch flora											✕u	✕u	✕u																✓p		✕u	✕u	✕u

Cont. on next page

© WSP UK Limited

Matrix 2: Arun Valley Ramsar (Cont.)

Evidence Supporting Conclusions

×a	A reduction in water availability to, or quality of ground or surface water could degrade habitats supporting over-wintering bird features. Dewatering excavations, ground disturbance (e.g., for compounds), and fuel spillages are potential source activities. However, as subsurface works will be limited to the coastal area and the local water table will be connected to sea levels, no impacts on freshwater groundwater levels are anticipated**.** The indicative onshore construction corridor has, where possible, been routed to avoid designated sites and relevant water supplies. Given that there are no such features in the vicinity of the proposed works, the HRA finds that neither the landfall nor cable laydown works would result in LSE due to changes in hydrology during construction, alone or in-combination. No LSE identified.
×b	Potential effects on hydrology during the operation and maintenance phase are expected to be considerably reduced and limited in scale in comparison to the construction phase. Activities will not involve dewatering works and therefore no impact on groundwater levels is anticipated. The HRA has further considered the potential for water availability and quality to groundwater or surface water supporting designated sites and features (i.e., the habitats supporting of over-wintering birds), which could result during isolated repairs, vehicles onsite or the presence of limited below ground concrete-lined joint bays and backfilled material around cable circuits. With reference to the limited scope of these activities, there is only the potential for localised ground disturbance and contamination, the HRA finds that neither the landfall nor cable laydown works would result in LSE due to changes in hydrology during construction, alone or in-combination. No LSE identified.
×c	The decommissioning of the wind farm is anticipated to be restricted to the removal and reinstatement of the onshore substation site. Electrical cables will be left in-situ onshore to minimise environmental impacts associated with removal. Decommissioning effects will be similar to construction phase effects, albeit in reverse and of a lower magnitude as sub-surface cable infrastructure will be left in-situ. A finding of no LSE (alone or in-combination) is determined.
✓d	The ZOI associated with potential pollution during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Arun Valley Ramsar site, therefore no direct effects on the designated site are predicted. However, functionally linked land could be affected during the construction and decommissioning phases, although the areas would be highly localised and small in extent and would represent only a small fraction of available foraging habitat within the Arun Valley. Potential for LSE identified.
×e	The Arun Valley Ramsar site is not within 200m of the proposed DCO Order Limit and is therefore outside the ZOI for emissions associated with vehicles or plant installing, maintaining or decommissioning the proposed infrastructure. The Arun Valley Ramsar site is also not within 200m of roads that are likely to be used by traffic associated with construction or decommissioning activity. Any vehicles on roads within 200m that are associated with the Proposed Development will be small in number, will take place over a temporary period and will not result in an effect that would be considered irreversible. No LSE is concluded on this basis.
✓f	The ZOI associated with the spread of invasive non-native species during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Arun Valley Ramsar site. However, construction and decommissioning works could potentially spread any invasive species within functionally linked land, although the areas would be highly localised and occupy only a small fraction of the foraging habitat available within the Arun Valley. Potential for LSE identified.
✓g	The Arun Valley Ramsar site is over 4.7km away from any location that may be subject to permanent or temporary land take associated with the Proposed Development. Although functionally linked land may be within the onshore Cable Corridor it will only be affected temporarily during construction and will only represent a small fraction of the grass and cropland available within the Arun Valley. This pathway is advanced to Stage Two, however, with regards to the restoration of habitats. The restoration works themselves will not result in any effects beyond those already accounted for, as habitats excavated will be restored in a linked fashion. After which, the land will be drilled with a crop (or re-seeded if grassland). It is acknowledged, however, that before the land recovers, there will be a period of time when the habitat is degraded. Such habitats could represent supporting (functionally linked) habitat for features of this site. The implications of this will accounted for at HRA Stage Two with reference to the amount and location of alternative habitat. Potential for LSE identified.
×h	This site is located 26km from the Array. The waterbirds for which the Ramsar site is designated tend to travel east to their arctic breeding grounds, therefore, the potential for LSE due to collision risk during migration is negligible. The Strategic Ornithological Support Services Proposed Development SOSS-05: Review of bird migration routes in relation to offshore wind farm development zones is considered to provide sufficient evidence to conclude no LSE.

Cont. on next page

© WSP UK Limited

Matrix 2: Arun Valley Ramsar (Cont.)

Evidence Supporting Conclusions

✓i	Habitats that may be used by waterbirds from the Arun Valley Ramsar site for foraging are present within the DCO Order Limit. The activities during the construction phases could fragment the habitat, resulting in displacement of foraging individuals. In light of this, and on the advice of Natural England (Natural England, 2020), this pathway advanced to Stage Two. Potential for LSE identified.
×j	Habitats that may be used by waterbirds from the Arun Valley Ramsar site for foraging are present within the DCO Order Limit, however during the operational period all infrastructure within functionally linked land will be below the surface; thereby avoiding fragmentation. Therefore, **no LSE applies**.
✓k	Construction and decommissioning activities may result in the fragmentation of foraging habitats within areas of functionally linked land. **Potential for LSE**.
✓l	Construction and decommissioning activities will result in increases in noise and vibration across functionally linked land of the designated features of the Arun Valley Ramsar site. This could potentially result in the disturbance and displacement of foraging individuals. **Potential LSE** identified.
×m	Operational activities will not result in increases in noise and vibration across functionally linked land of the designated features as the infrastructure will be buried. N**o LSE** identified.
×n	Lighting of construction and decommissioning activities will not result in a likely significant effect on the designated features of the Arun Valley Ramsar site as it will be highly localised (the widest effects associated with vehicle headlights) in an area with an abundance of potential foraging areas. No LSE.
×o	The cable route will not be lit during the operational phase, and the substation location (which will have security lighting) will be in excess of 10km from the Arun Valley Ramsar site and therefore not in an area that could be considered functionally linked. No LSE.
✓p	Water consumption at the substation will result in a likely significant effect on the designated features of the Arun Valley Ramsar site as although usage will be limited, additional abstraction will be required. Therefore, the potential for LSE is identified. No additional in-combination issues are identified as to be water neutral at the level of an individual project ensures this is negated.
✓q	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.
×r	The Proposed Development will not contribute towards in-combination effects on the Arun Valley Ramsar site (for habitat, flora and invertebrate features) due to the nature of the designated feature and the geographic separation between any Proposed Development infrastructure and the Ramsar boundary. No LSE.
×s	The Proposed Development will not contribute towards in-combination effects on the Arun Valley Ramsar site (for habitat, flora and invertebrate features) due to the nature of the designated feature and the geographic separation between any Proposed Development infrastructure and the Ramsar boundary. No LSE.
×t	The Proposed Development will not contribute towards in-combination effects on the Arun Valley Ramsar site (for habitat, flora and invertebrate features) due to the nature of the designated feature and the geographic separation between any Proposed Development infrastructure and the Ramsar boundary. No LSE.
×u	Habitats that may be used by northern pintail for foraging are within the DCO Order Limit, although are remote from all cable route and substation options as shallow inland waters are avoided by the cable route options. No LSE

End of Matrix 2

© WSP UK Limited

4. Matrix 3: Arun Valley Special Protection Area - HRA Screening for Rampion 2

Name of European site:	**Arun Valley (UK) SPA**																														
EU Code:	**UK9020281**																														
Distance to Development	**4.7 km from Onshore Cable Corridor. 26km from Array**																														
Likely Effects of Proposed Development																															
Effects	**Changes in hydrology**			**Pollution events**			**Emissions to air**			**Invasive non-native species**			**Land take / land cover change**			**Collision risk (on migration)**			**Fragmentation or severance of habitats**			**Noise and vibration**			**Increased light levels**			**Water Neutrality**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Bewick's swan	×a	×b	×c	√d	×d	√d	×e	×e	×e	√f	×f	√f	√g	×g	√g		×h		√i	×j	√k	√l	× m	√k	×n	×o	×n		√p		√q	×r	√q
Non-breeding waterfowl assemblage Shoveler, teal, wigeon, Bewick's swan.	×a	×b	×c	√d	×d	√d	×e	×e	×e	√f	×f	√f	√g	×g	√g		×h		√i	×j	√k	√l	× m	√k	×n	×o	×n		√p		√q	×r	√q

Evidence Supporting Conclusions

×a A reduction in water availability to, or quality of ground or surface water could degrade habitats supporting over-wintering bird features. Dewatering excavations, ground disturbance (e.g., for compounds), and fuel spillages are potential source activities. However, as subsurface works will be limited to the coastal area and the local water table will be connected to sea levels, no impacts on freshwater groundwater levels are anticipated. The indicative onshore construction corridor has, where possible, been routed to avoid designated sites and relevant water supplies. Given that there are no such features in the vicinity of the proposed works, the HRA finds that neither the landfall nor cable laydown works would result in LSE due to changes in hydrology during construction, alone or in-combination. No LSE identified.

×b Potential effects on hydrology during the operation and maintenance phase are expected to be considerably reduced and limited in scale in comparison to the construction phase. Activities will not involve dewatering works and therefore no impact on groundwater levels is anticipated. The HRA has further considered the potential for water availability and quality to groundwater or surface water supporting designated sites and features (i.e., the habitats supporting of over-wintering birds), which could result during isolated repairs, vehicles onsite or the presence of limited below ground concrete-lined joint bays and backfilled material around cable circuits. With reference to the limited scope of these activities, there is only the potential for localised ground disturbance and contamination, , the HRA finds that neither the landfall nor cable laydown works would result in LSE due to changes in hydrology during construction, alone or in-combination. No LSE identified.

Cont. on next page

© WSP UK Limited

Matrix 3: Arun Valley SPA (Cont.)

Evidence Supporting Conclusions

×c	The decommissioning of the wind farm is anticipated to be restricted to the removal and reinstatement of the onshore substation site. Electrical cables will be left in-situ onshore to minimise environmental impacts associated with removal. Decommissioning effects will be similar to construction phase effects, albeit in reverse and of a lower magnitude as sub-surface cable infrastructure will be left in-situ. A finding of no LSE (alone or in-combination) is determined.
×d	The ZOI associated with potential pollution during the construction or decommissioning phases of the Proposed Development does not overlap with the Arun Valley SPA, therefore no direct effects on the designated site are predicted. However, functionally linked land could be affected during the construction and decommissioning phases, although the areas would be highly localised and small in extent and would represent only a small fraction of available foraging habitat within the Arun Valley. Potential for LSE identified.
×e	The Arun Valley SPA is not within 200m of the proposed DCO Order Limit and is therefore outside the ZOI for emissions associated with vehicles or plant installing, maintaining or decommissioning the proposed infrastructure. The Arun Valley SPA is also not within 200m of roads that are likely to be used by traffic associated with construction or decommissioning activity. Any vehicles on roads within 200m that are associated with the Proposed Development will be small in number, will take place over a temporary period and will not result in an effect that would be considered irreversible. No LSE is concluded on this basis.
×f	The ZOI associated with the spread of invasive non-native species during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Arun Valley Ramsar site. However, construction and decommissioning works could potentially spread any invasive species within functionally linked land, although the areas would be highly localised and occupy only a small fraction of the foraging habitat available within the Arun Valley. Potential for LSE identified.
✓g	The Arun Valley SPA is over 4.7km away from any location that may be subject to permanent or temporary land take associated with the Proposed Development. Although functionally linked land may be within the onshore Cable Corridor it will only be affected temporarily during construction and will only represent a small fraction of the grass and cropland available within the Arun Valley. This pathway is advanced to Stage Two, however, with regards to the restoration of habitats. The restoration works themselves will not result in any effects beyond those already accounted for, as habitats excavated will be restored in a linked fashion. After which, the land will be drilled with a crop (or re-seeded if grassland). It is acknowledged, however, that before the land recovers, there will be a period of time when the habitat is degraded. Such habitats could represent supporting (functionally linked) habitat for features of this site. The implications of this will accounted for at HRA Stage Two with reference to the amount and location of alternative habitat. Potential for LSE identified.
×h	This site is located 26km from the Array. Some designated species, notably Bewick's swan, travel east to their arctic breeding grounds (Wright *et al*., 2012 and Griffin *et al*., 2016) the potential for LSE due to collision risk during migration is therefore negligible. As this SPA is situated to the north of the Array, migrating birds that head east could not fly through the Array without flying south first for 26km. Such a scenario is very unlikely. The Strategic Ornithological Support Services Proposed Development SOSS-05: Review of bird migration routes in relation to offshore wind farm development zones is considered to provide sufficient evidence to conclude no LSE.
✓i	Habitats that may be used by waterbirds from the Arun Valley SPA for foraging are present within the DCO Order Limit. The activities during the construction phases could fragment the habitat, resulting in displacement of foraging individuals. In light of this, and on the advice of Natural England (within their EIA Scoping Opinion – Planning Inspectorate (2020)), this pathway advanced to Stage Two. Potential for LSE identified.
×j	Habitats that may be used by waterbirds from the Arun Valley SPA for foraging are present within the DCO Order Limit, however during the operational period all infrastructure within functionally linked land will be below the surface; thereby avoiding fragmentation. Therefore, no LSE applies.

Cont. on next page

© WSP UK Limited

Matrix 3: Arun Valley SPA (Cont.)

✓k	The impacts during decommissioning are considered to be similar and potentially less than those outlined in the construction phase. Therefore, a finding of potential LSE is appropriate.
✓l	Construction and decommissioning activities will result in increases in noise and vibration across functionally linked land of the designated features of the Arun Valley SPA. This could potentially result in the disturbance and displacement of foraging individuals. Potential LSE identified.
×m	Operational activities will not result in increases in noise and vibration across functionally linked land of the designated features as the infrastructure will be buried. No LSE identified.
×n	Lighting of construction and decommissioning activities will not result in a likely significant effect on the designated features of the Arun Valley SPA as it will be highly localised (the widest effects associated with vehicle headlights) in an area with an abundance of potential foraging areas. No LSE.
×o	The cable route will not be lit during the operational phase, and the substation location (which will have security lighting) will be in excess of 10km from the Arun Valley SPA and therefore not in an area that could be considered functionally linked. No LSE.
✓p	Water consumption at the substation will result in a likely significant effect on the designated features of the Arun Valley SPA as although usage will be limited, additional abstraction will be required. Therefore, the potential for LSE is identified. No additional in-combination issues are identified as to be water neutral at the level of an individual project ensures this is negated.
✓q	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.
×r	The magnitude of non-significant effects alone is small, such that the contribution would not be discernible or meaning in-combination with other plans and projects, no LSE.

End of Matrix 3

© WSP UK Limited

5. Matrix 4: Arun Valley Special Area of Conservation. HRA Screening for Rampion 2

Name of European site:	**Arun Valley (UK) SAC**																													
EU Code:	**UK0030366**																													
Distance to Proposed Development	**4.7 km from Onshore Cable Corridor**																													
Effects	**Changes in hydrology**			**Pollution events**			**Emissions to air**			**Invasive non-native species**			**Land take / land cover change**			**Fragmentation or severance of habitats**			**Noise and vibration**			**Increased light levels**			**Water neutrality**			**In-combination effects**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D			
Ramshorn snail	×a	×a	×a	×b	×b	×b	×c	×c	×c	×d	×d	×d	×e	×e	×e											√f		×g	×g	×g

Evidence Supporting Conclusions

×a	The Arun Valley SAC is not within the ZOI associated with the potential changes in hydrology; the population of ramshorn snail associated with the SAC is also restricted in mobility and will therefore not access functionally linked land within the ZOI either. Therefore, no LSE is identified.
×b	The Arun Valley SAC is not within the ZOI associated with the potential pollution events; the population of ramshorn snail associated with the SAC is also restricted in mobility and will therefore not access functionally linked land within the ZOI either. No LSE.
×c	The Arun Valley SAC is not within 200m of the proposed DCO Order Limit and is therefore outside the ZOI for emissions associated with vehicles or plant installing, maintaining or decommissioning the proposed infrastructure. The Arun Valley SAC is also not within 200m of roads that are likely to be used by traffic associated with construction or decommissioning activity. Any vehicles on roads within 200m that are associated with the Proposed Development will be small in number, will take place over a temporary period and will not result in an effect that would be considered irreversible. A finding of no LSE is therefore appropriate.
×d	The ZOI associated with the spread of invasive non-native species during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Arun Valley SAC. No LSE identified.
×e	The Arun Valley SAC is over 3km away from any location that may be subject to permanent or temporary land take associated with the Proposed Development. This feature is therefore well outside the ZOI of the Proposed Development. As there is no pathway to effect, a finding of no LSE applies.
√f	Water consumption at the substation will result in a likely significant effect on the designated features of the Arun Valley SAC as although usage will be limited, additional abstraction will be required. Therefore, the potential for LSE is identified. No additional in-combination issues are identified as to be water neutral at the level of an individual project ensures this is negated.
×g	The Proposed Development will not contribute towards in-combination effects on the Arun Valley SAC due to the nature of the designated feature and the geographic separation between any Proposed Development infrastructure and the SAC boundary. Therefore, no LSE is identified.

End of Matrix 4

© WSP UK Limited

6. Matrix 5: The Mens Special Conservation Area . HRA Screening for Rampion 2

Name of European site:	**The Mens (UK) SAC**																										
EU Code:	**UK0012716**																										
Distance to Proposed Development	**11.2 km from Onshore Cable Corridor**																										
Effects	**Changes in hydrology**			**Pollution events**			**Emissions to air**			**Invasive non-native species**			**Land take / land cover change**			**Habitat fragmentation**			**Noise and vibration**			**Increased light levels**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Barbastelle bat	×a	×a	×a	×b	×b	×b	×c	×c	×c	×d	×d	×d	✓e		✓e	✓f	×g	✓f	×h	×h	×h	✓i	×j	✓i	✓l	✓m	✓l
Atlantic acidophilous beech forests with Ilex and sometimes Taxus in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*)																											

Evidence Supporting Conclusions

×a The Mens SAC lies outside of the ZOI. Potential changes to foraging habitat for barbastelle is discounted due to the wide range of habitats favoured (e.g., riparian zones, woodlands, hedgerow, field margins etc. (Zeal, Davidson-Watts & Jones, 2012), including those that are not Ground Water Dependent Terrestrial Ecosystems (GWDTE). Therefore, no LSE is identified.

×b The ZOI associated with the loss of pollutants during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Mens SAC, therefore no direct effects on the designated site are predicted. Although functionally linked land could be affected, the areas would be highly localised and small in extent and would represent only a small fraction of available foraging habitat for barbastelle in the area and would be towards the limits of their typical foraging range. No LSE identified.

×c The Mens SAC is not within 200m of the proposed DCO Order Limit. Roads within 200m of the SAC boundary includes the A272, however this is unlikely to carry construction traffic as it is on an east/west route on the opposite side of the Arun Valley than the cable route. Even should small amounts of construction traffic access these roads the emissions can be discounted as the increase in traffic will be temporary and limited ensuring that the extent of the effect will be low, temporary, and reversible. No LSE.

×d The ZOI associated with the spread of invasive non-native species during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Mens SAC. No LSE identified.

✓e There is 6.3ha of area within the proposed DCO Order Limit that may be subject to construction works which overlaps with the 12km buffer placed around The Mens SAC by the draft Sussex Bat Protocol (SDNPA & Natural England, 2018). This 6.3ha is dominated by habitats that are sub-optimal for barbastelle bat (e.g., improved pasture and open arable fields) and represents only a very small proportion of the habitat available to these wide-ranging bats. This pathway will be addressed at Stage Two AA, on the basis of advice received at consultation. Potential for LSE is therefore identified.

Cont. on next page

© WSP UK Limited

Matrix 5: The Mens SAC (Cont.)

Evidence Supporting Conclusions

√f	The Mens SAC is within 12km of areas that may be subject to construction and decommissioning activities; within this area are habitats that barbastelle from the SAC could forage across; these are therefore assumed to be functionally linked and could be fragmented by the works. Potential for LSE is identified.
Xg	Habitats that may be used by barbastelle for foraging are present within the proposed DCO Order Limit, however during the operational period all infrastructure within functionally linked land will be below the surface; thereby avoiding fragmentation. No LSE.
Xh	Noisy activities associated with the Proposed Development will not take place close to The Mens SAC and will therefore not disturb roosting barbastelle. The majority of construction and decommissioning activities will be undertaken during the daytime when bats are not present, and operational noise will be limited, and largely associated with the substation that is well in excess of 12km away from the SAC. A finding on No LSE is appropriate.
√i	Barbastelles are sensitive to lighting and could potentially forage across the areas that may require to be lit for construction and decommissioning purposes, leading to displacement. Therefore, a Stage Two assessment will be undertaken. Potential for LSE is identified.
Xj	Areas within 12km of the Mens SAC will not be lit during the operational phase, as all infrastructure will be below ground. No potential for LSE identified.
Xk	No likely significant effects are identified for the habitat feature of the Mens SAC due to the distance of the designation boundary from areas directly affected by the Proposed Development. Therefore, in-combination effects can be discounted.
√l	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.
√m	The extent of non-significant effects identified could act in-combination with other plans and Proposed Developments resulting in a greater level of impact than for the Proposed development acting alone. Potential for LSE in-combination.

End of Matrix 5

© WSP UK Limited

7. Matrix 6: Duncton to Bignor Escarpment Special Area of Conservation HRA Screening for Rampion 2

Name of European site:	**Duncton to Bignor Escarpment (UK) SAC**																										
EU Code:	**UK00301138**																										
Distance to Proposed Development	**7.2km from Onshore Cable Corridor**																										
Effects	**Changes in hydrology**			**Pollution events**			**Emissions to air**			**Invasive Non-native Species**			**Land take / land cover change**			**Fragmentation or severance of habitats**			**Noise and vibration**			**Increased light levels**			**In-combination effects**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Ramshorn snail	×a	×a	×a	×b	×b	×b	×c	×c	×c	×d	×d	×d	×e	×e	×e										×f	×f	×f

Evidence Supporting Conclusions

×a The Duncton to Bignor Escarpment SAC is not within the ZOI associated with the potential changes in hydrology. No potential for LSE identified.

×b The Duncton to Bignor Escarpment SAC is not within the ZOI associated with the potential pollution events. No potential for LSE identified.

×c The Duncton to Bignor Escarpment SAC is not within 200m of the proposed DCO Order Limit and is therefore, outside the ZOI for emissions associated with vehicles or plant installing, maintaining or decommissioning the proposed infrastructure. Roads within 200m of the SAC include the A285, however this is unlikely to carry construction traffic as it is a route into Chichester town centre. Even should small amounts of construction traffic access these roads the emissions can be discounted as the increase in traffic will be temporary and limited ensuring that the extent of the effect will be low, temporary and reversible. No LSE.

×d The ZOI associated with the spread of invasive non-native species during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Duncton to Bignor Escarpment SAC. No LSE identified.

×e The Duncton to Bignor Escarpment SAC is over 6km away from any location that may be subject to permanent or temporary land take associated with the Proposed Development. No LSE identified.

×f The Proposed Development will not contribute towards in-combination effects on the Duncton to Bignor Escarpment SAC due to the nature of the designated feature and the geographic separation between any Proposed Development infrastructure and the SAC boundary. No LSE identified.

End of Matrix 6

© WSP UK Limited

8. Matrix 7: Pagham Harbour Special Protection Area (SPA). HRA Screening for Rampion 2

Name of European site:	**Pagham Harbour (UK) SPA**																	
EU Code:	**UK9012041**																	
Distance to Proposed Development	**14.7km from Array to Landward Boundary**																	
Effects	**Collision risk (migration)**			**Collision risk (Breeding)**			**Barrier effects**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Direct disturbance and displacement**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					✓a			✗b		✗c		✗d		✗c		✗e	✗f	✗d
Ruff		✓g																
Little tern																		
Dark-bellied brent goose		✓g																

Effects	**Changes in hydrology**			**Pollution events**			**Emissions to air**			**Invasive Non-Native Species**			**Land take / land cover change**			**Fragmentation or severance of habitats**			**Noise and vibration**			**Increased light levels**			**In-combination effects**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern																									✗h	✓i	✗d
Ruff																										✓i	
Little tern																											
Dark-bellied brent goose	✗j	✗j	✗j	✗k	✗k	✗k	✗l	✗l	✗l	✗m	✗m	✗m	✗n	✗n	✗n	✗o	✗o	✗o	✗o	✗o	✗o	✗o	✗o	✗o	✗h	✓i	✗d

Cont. on next page

© WSP UK Limited

Matrix 7: Pagham Harbour SPA (Cont.)

Evidence Supporting Conclusions

✓a	Species has moderate vulnerability to collision risk (Bradbury *et al*. 2014) and array is located within mean-maximum foraging range plus 1 Standard Deviation (SD) of this SPA for this species (Woodbury *et al*. 2019). LSE can therefore not be discounted at this stage.
×b	These species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*. 2014) and evidence from previous project assessments have found no LSE. Consequently, LSE can be discounted.
×c	On the basis no tern species have been recorded foraging within the Rampion 2 array area from site-specific survey data during the breeding season there is considered to be no pathway to effect. LSE can be discounted.
×d	The impacts during decommissioning are considered to be similar and potentially less than those outlined in the construction phase. Therefore, a finding of no LSE is appropriate.
×e	This species has very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Furness *et al*., 2013). Therefore, LSE can be discounted.
×f	These species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*. 2014) and evidence from previous project assessments have found no LSE. Consequently, LSE can be discounted.
✓g	Potential collision risk to species during migration at an alone and in-combination level. Despite species not being recorded at Rampion 2 array and being likely to only result in negligible numbers passing through the Rampion 2 site during migration, there is a low risk of LSE. However, as a precautionary approach LSE cannot be discounted.
×h	For all effect pathways acting alone, the potential for impacts was found to be extremely limited, based on low species sensitivity and because the significance of potential effects at a population level is considered to decrease with distance. Over the relevant scales, there is considered to be no potential for a contribution to in-combination effects as a level detectable above natural variability. A finding of no LSEI therefore applies.
✓i	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.
×j	The Pagham Harbour SPA is not within the ZOI associated with the potential changes in hydrology; dark-bellied brent geese functionally linked land is unlikely to be affected as the proposed DCO Order Limit is at the edge of their foraging range, and any infrastructure is likely to be, at least several hundred metres, further away from the SPA boundary.
×k	The Pagham Harbour SPA is not within the ZOI associated with the potential pollution events; dark-bellied brent geese functionally linked land is unlikely to be affected as the proposed DCO Order Limit is at the edge of their foraging range, and any infrastructure is likely to be, at least several hundred metres, further away from the SPA boundary.
×l	The Pagham Harbour SPA is not within 200m of the proposed DCO Order Limit and is therefore beyond any ZOI for emissions associated with vehicles or plant installing, maintaining or decommissioning the proposed infrastructure. The Pagham Harbour SPA is also not within 200m of roads that are likely to be used by traffic associated with construction, operation or decommissioning activity. Any vehicles on roads within 200m that are associated with the Proposed Development will be small in number, will take place over a temporary period and will not result in an effect that would be considered irreversible. LSE can be discounted.
×m	The ZOI associated with the spread of invasive non-native species during the construction, operation or decommissioning phases of the Proposed Development does not overlap with the Pagham Harbour SPA. LSE can be discounted.
×m	The Pagham Harbour SPA is over 10km away from any location that may be subject to permanent or temporary land take associated with the Proposed Development. LSE can be discounted.
×o	Functionally linked land for dark-bellied brent geese is unlikely to be affected as the proposed DCO Order Limit is at the edge of their foraging range, and any infrastructure is likely to be at least several hundred metres further away from the SPA boundary.

End of Matrix 7

© WSP UK Limited

9. Matrix 8: Pagham Harbour Ramsar - HRA Screening for Rampion 2

Name of European site:	**Pagham Harbour (UK) Ramsar**																	
EU Code:	**UK11052**																	
Distance to Proposed Development	**14.6 km from Array**																	
Likely Effects of Proposed Development																		
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Dark-bellied brent goose		✓a															✓b	

Evidence Supporting Conclusions

✓a Potential collision risk to species during migration at an alone and in-combination level. Despite species not being recorded at Rampion 2 array and being likely to only result in negligible numbers passing through the Rampion 2 site during migration, there is a low risk of LSE. However, as a precautionary approach LSE cannot be discounted at this stage

✓b Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 8

© WSP UK Limited

10. Matrix 9: Portsmouth Harbour Ramsar HRA Screening for Rampion 2

Name of European site:	**Portsmouth Harbour (UK) Ramsar**																		
EU Code:	**UK11055**																		
Distance to Proposed Development	**38.1 km to Array**																		
Likely Effects of Proposed Development																			
Effect	**Collision risk (breeding)**			**Changes in prey availability and behaviour**			**Indirect impacts through the effects on prey species**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Dark-bellied brent goose		✓a															✓b	

Evidence Supporting Conclusions

✓a Potential collision risk to species during migration at an alone and in-combination level. Despite species not being recorded at Rampion 2 array and being likely to only result in negligible numbers passing through the Rampion 2 site during migration, there is a low risk of LSE. However, as a precautionary approach LSE cannot be discounted at this stage.

✓b Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 9

© WSP UK Limited

11. Matrix 10: Portsmouth Harbour Special Protection Area - HRA Screening for Rampion 2

Name of European site:	**Portsmouth Harbour (UK) SPA**																		
EU Code:	**UK9011051**																		
Distance to Proposed Development	**38.2 km to Array**																		
Likely Effects of Proposed Development																			
Effect	**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts through the effects on prey species**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-breasted merganser		✓a															✓b	
Black-tailed godwit		✓a															✓b	
Dunlin		✓a															✓b	
Dark-bellied brent goose		✓a															✓b	

Evidence Supporting Conclusions

✓a Potential collision risk to species during migration at an alone. Despite species not being recorded at Rampion 2 array there is a low potential for a small (negligible) number of the species to pass through the Rampion 2 site during migration, and as such a similarly low risk of potential LSE to arise. On a precautionary basis, therefore, LSE is not discounted at this stage. **Potential for LSE**.

✓b Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 10

© WSP UK Limited

12. Matrix 11: Solent Maritime Special Area of Conservation - HRA Screening for Rampion 2

Name of European site:	**Solent Maritime (UK) SAC**																		
EU Code:	**UK0030059**																		
Distance to Proposed Development	**23.3km to Array and 15.9km to Offshore Cable Corridor**																		
Likely Effects of Proposed Development																			
Effects	**Suspended sediment and deposition**			**Physical habitat loss and disturbance**			**Invasive Non-Native Species (INNS)**			**Physical processes**			**Pollution**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Estuaries	√a	√c	√a	×d	×d	×d	√a	√a	√a		√g		√a	√a	√a	√i	√i	√i
Atlantic salt meadows *(Glauco-Puccinellietalia maritimae)*	√b	√c	√b	×d	×d	×d	√e	√f	√e		√g		√h	√h	√h	√i	√i	√i
Spartina swards *(Spartinion maritimae)* (Cord-grass swards)	√b	√c	√b	×d	×d	×d	√e	√f	√e		√g		√h	√h	√h	√i	√i	√i
Salicornia and other annuals colonizing mud and sand	√b	√c	√b	×d	×d	×d	√e	√f	√e		√g		√h	√h	√h	√i	√i	√i
Mudflats and sandflats not covered by seawater at low tide	√b	√c	√b	×d	×d	×d	√e	√f	√e		√g		√h	√h	√h	√i	√i	√i
Coastal lagoons* priority feature	√b	√c	√b	×d	×d	×d	√e	√f	√e		√g		√h	√h	√h	√i	√i	√i
Sandbanks slightly covered by sea water all the time	√b	√c	√b	×d	×d	×d	√e	√f	√e		√g		√h	√h	√h	√i	√i	√i
Shifting dunes along the shoreline with *Ammophila arenaria*																		
Annual vegetation of drift lines																		
Perennial vegetation of stony banks (on shingle outside reach of waves)																		
Desmoulin's whorl snail																		

Evidence Supporting Conclusions on next page

© WSP UK Limited

Matrix 11: Solent Maritime SAC (Cont.)

Evidence Supporting Conclusions

✓a	This covers several types of estuaries as overarching habitat complexes containing certain marine and estuarine habitats with unique hydrographic regimes. The component habitats include habitats designated in in their own right (namely mudflats and sandflats, shallow subtidal sandbanks, saltmarsh but also seagrass beds). As potential LSE is identified on a precautionary Screening distance basis for component designated features and seagrass beds, a precautionary potential LSE is also identified for the complex.
✓b	This habitat and its communities are sensitive to changes in water clarity and siltation rates, smothering and exposure to sediment bound contaminants. Activities during construction and decommissioning would cause a temporary increase in suspended sediment concentrations (SSC). Fine material within the sediment could be more widely distributed and deposited. Noting the distance of this feature from the source of sediment disturbances, levels are not expected to exceed background SSC typical in estuaries. However, potential for LSE is identified on a precautionary basis.
✓c	Sediment mobilisation during operation and maintenance activities would be considerably less tha during construction, highly localised and intermittent in nature. Given the significant potential for dilution and dispersion in the open coastal environment, LSE are not expected. However, on advice from Natural England potential LSE is identified.
xd	There is no direct physical overlap with the proposed DCO Order Limit and this SAC. LSE is therefore discounted.
✓e	During construction / decommissioning, INNS could be imported by vessels or on/in material imported into the DCO Order Limit, then become established. The risk of new introductions is considered to be low due to incidental legislative controls and the high levels of INNS already on site (Natural England, 2018). A number of bio-security control measures will also be implemented. These measures are irrespective of potential effects on European sites, but could be regarded as mitigation under Sweetman 2, potential LSE is therefore identified.
✓f	During operation, new underwater substrates e.g., turbine foundations, cable protection could create habitat for INNS which could provide a sink for particles dispersing from an existing site/source and potentially serve as ‘stepping-stones’ for INNS to spread, thereby increasing the risk to habitats and ecosystems within this SAC. Given high levels of INNS have been recorded across the site (Natural England, 2018) and that the Construction Environmental Management Plan (CEMP) will include measures to reduce the risk of introduction, Rampion 2 is unlikely to heighten risks. However, with reference to the status of ‘mitigation’ during the screening stage of the HRA process, and on advice from Natural England at consultation, a precautionary potential LSE is identified.
✓g	Changes to physical processes associated with the presence of Rampion 2 during operation are expected to be small, localised and not capable of affecting this SAC given the distance between the Proposed development and site features. However, potential for LSE is identified on a precautionary basis and pending further information on physical processes and how array structures and/ or sub-surface cables could influence the rate of erosion and deposition of sediment and / or prompt changes in water movement (e.g., to wave action).
✓h	Accidental pollution is not considered likely to result in a significant effect as the scale of accidental spills will be limited by the size of the chemical or oil inventory on construction vessels. In addition, released hydrocarbons would be subject to rapid dilution, weathering and dispersion and would be unlikely to persist in the marine environment. The implementation of a Marine Pollution Contingency Plan (MPCP) would further negate any risks. These MPCP is irrespective of potential effects on European sites, but could be regarded as mitigation under Sweetman 2, potential LSE is therefore identified.
✓i	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 11

© WSP UK Limited

13. Matrix 12: South Wight Maritime Special Area of Conservation (SAC). HRA Screening for Rampion 2

Name of European site:	**South Wight Maritime (UK) SAC**																		
EU Code:	**UK0030061**																		
Distance to Proposed Development	**23.2 km to Array**																		
Likely Effects of Proposed Development																			
Effect	**Suspended sediment and deposition**			**Physical habitat loss and disturbance**			**Invasive Non-Native Species**			**Physical processes**			**Pollution**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Reefs	✓a	✓b	✓a	xc	xc	xc	✓d	✓e	✓d		✓f		✓g	✓g	✓g	✓h	✓h	✓h
Vegetated sea cliffs of the Atlantic and Baltic Coasts																		
Submerged or partially submerged sea caves	✓a	✓b	✓a	xc	xc	xc	✓d	✓e	✓d		✓f		✓g	✓g	✓g	✓h	✓h	✓h

Evidence Supporting Conclusions

✓a This habitats and its communities are sensitive to changes in water clarity and siltation rates, smothering and exposure to sediment bound contaminants. Activities during construction and decommissioning would cause a temporary increase in suspended sediment concentrations (SSC). Fine material within the sediment could be more widely distributed and deposited. Noting the distance of this feature from the source of sediment disturbances, levels are not expected to exceed background SSC typical in estuaries. However, a potential for LSE is identified on a precautionary basis.

✓b Sediment mobilisation during operation and maintenance activities would be considerably less than during construction, highly localised and intermittent in nature. Given the significant potential for dilution and dispersion in the open coastal environment, LSE are not expected. However, on a precautionary basis, and on advice from Natural England, potential LSE is identified.

xc There is no direct physical overlap with the proposed DCO Order Limit and this SAC. LSE is therefore discounted.

Cont. on next page

© WSP UK Limited

Matrix 12: South Wight Maritime SAC (Cont.)

Evidence Supporting Conclusions (cont.)

✓d	During construction / decommissioning, INNS could be imported by vessels or on/in material imported into the proposed DCO Order Limit, then become established. The risk of new introductions is considered to be low due to incidental legislative controls and the high levels of INNS already on site (Natural England, 2018). A number of bio-security control measures will also be implemented. These measures are irrespective of potential effects on European sites, but could be regarded as mitigation under Sweetman 2, potential LSE is therefore identified.
✓e	During operation, new underwater substrates e.g., turbine foundations, cable protection could create habitat for INNS which could provide a sink for particles dispersing from an existing site/source and potentially serve as 'stepping-stones' for INNS to spread, thereby increasing the risk to habitats and ecosystems within this SAC. Given high levels of INNS have been recorded across the site (Natural England, 2018) and that the CEMP will include measures to reduce the risk of introduction, Rampion 2 is unlikely to heighten risks. However, with reference to the status of 'mitigation' during the screening stage of the HRA process, and on advice from Natural England at consultation, a precautionary potential LSE is identified.
✓f	Changes to physical processes associated with the presence of Rampion 2 during operation are expected to be small and localised and not capable of affecting this SAC given the distance between the Proposed development and site features. However, potential for LSE is identified on a precautionary basis. .
✓g	Accidental pollution is not considered likely to result in a significant effect as the scale of accidental spills will be limited by the size of the chemical or oil inventory on construction vessels. In addition, released hydrocarbons would be subject to rapid dilution, weathering and dispersion and would be unlikely to persist in the marine environment. The implementation of a MPCP would further negate any risks. These MPCP is irrespective of potential effects on European sites, but could be regarded as mitigation under Sweetman 2, potential LSE is therefore identified.
✓h	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 12

© WSP UK Limited

14. Matrix 13: Solent and Isle of Wight lagoons Special Area of Conservation. HRA Screening for Rampion 2

Name of European site:	**Solent and Isle of Wight lagoons (UK) SAC**																		
EU Code:	**UK0017073**																		
Distance to Proposed Development	**33.20km to Array**																		
Likely Effects of Proposed Development																			
Effect	**Suspended sediment and deposition**			**Physical habitat loss and disturbance**			**Invasive Non-Native Species**			**Physical processes**			**Pollution**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Costal lagoon* priority feature	✓a	✓b	✓a	×c	×c	×c	✓d	✓e	✓d		✓f		✓g	✓g	✓g	✓h	✓h	✓h

Evidence Supporting Conclusions

✓a This habitat and its communities are sensitive to changes in water clarity and siltation rates, smothering and exposure to sediment bound contaminants. Activities during construction and decommissioning would cause a temporary increase in suspended sediment concentrations (SSC). Fine material within the sediment could be more widely distributed and deposited. Noting the distance of this feature from the source of sediment disturbances, levels are not expected to exceed background SSC typical in estuaries. However, potential for LSE is identified on a precautionary basis.

✓b Sediment mobilisation during operation and maintenance activities would be considerably less than during construction, highly localised and intermittent in nature. Given the significant potential for dilution and dispersion in the open coastal environment, LSE are not expected. However, on advice from Natural England potential LSE is identified.

×c There is no direct physical overlap with the proposed DCO Order Limit and this SAC. LSE is therefore discounted.

✓d During construction / decommissioning, INNS could be imported by vessels or on/in material imported into the proposed DCO Order Limit, then become established. The risk of new introductions is considered to be low due to incidental legislative controls and the high levels of INNS already on site (Natural England, 2018). A number of bio-security control measures will also be implemented. These measures are irrespective of potential effects on European sites, but could be regarded as mitigation under Sweetman 2, potential LSE is therefore identified.

Cont. on next page

© WSP UK Limited

Matrix 13: Solent and Isle of Wight SAC (Cont.)

Evidence Supporting Conclusions (cont.)

✓e	During operation, new underwater substrates e.g., turbine foundations, cable protection could create habitat for INNS which could provide a sink for particles dispersing from an existing site/source and potentially serve as 'stepping-stones' for INNS to spread, thereby increasing the risk to habitats and ecosystems within this SAC. Given high levels of INNS have been recorded across the site (Natural England, 2018) and that the CEMP will include measures to reduce the risk of introduction, Rampion 2 is unlikely to heighten risks. However, given the status of 'mitigation' in the HRA process, and on advice from Natural England at consultation, a precautionary potential LSE is identified.
✓f	Changes to physical processes associated with the presence of Rampion 2 during operation are expected to be small, localised and not capable of affecting this SAC given the distance between the Proposed development and site features. However, potential for LSE is identified on a precautionary basis and pending further information on physical processes and how array structures and/ or sub-surface cables could influence the rate of erosion and deposition of sediment and / or prompt changes in water movement (e.g., to wave action).
✓g	Accidental pollution is not considered likely to result in a significant effect as the scale of accidental spills will be limited by the size of the chemical or oil inventory on construction vessels. In addition, released hydrocarbons would be subject to rapid dilution, weathering and dispersion and would be unlikely to persist in the marine environment. The implementation of a MPCP would further negate any risks. These MPCP is irrespective of potential effects on European sites, but could be regarded as mitigation under Sweetman 2, potential LSE is therefore identified.
✓h	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 13

© WSP UK Limited

15. Matrix 14: Littoral Cauchois Special Area of Conservation (SAC) HRA Screening for Rampion 2

Name of European site:	**Littoral Cauchois (France) SAC**
EU Code:	**FR2310045**
Distance to Rampion 2	**99.5km to Array**

Effects	**Increase in underwater noise**			**Vessel disturbance**			**Disturbance (above surface)**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Barriers to migration**			**Suspended sediment deposition**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Grey seal	×a	×a	×a	×a	×a	×a	×a		×a	×a	×a	×a	×a	×a	×a	×a	×a	×a				×a	×a	×a		×a		×a	×a	×a
River lamprey	×b	×b	×b	×b	×b	×b							×b	×b	×b	×b	×b	×b	×b		×b	×b	×b	×b	×b	×b	×b	×b	×b	×b
Sea lamprey	×b	×b	×b	×b	×b	×b							×b	×b	×b	×b	×b	×b	×b		×b	×b	×b	×b	×b	×b	×b	×b	×b	×b
Shad	×b	×b	×b	×b	×b	×b							×b	×b	×b	×b	×b	×b	×b		×b	×b	×b	×b	×b	×b	×b	×b	×b	×b
Freshwater sculpin																														
Southern Coenagrion																														
Jersey tiger																														

Evidence Supporting Conclusions

×a The basis for site identification for grey seal was to apply the provisional seal management units (SCOS, 2017). SACs designated for grey seal that shared the South England Management Unit with Rampion 2 were considered to have a pathway to significant effects. This site is not within that Management Unit, noting this and the distance of the SAC from the Proposed development, it is concluded there is no potential for LSE (from pathway acting alone and in combination).

×b Given the extent of physical effects associated with the construction of the Proposed Development it is considered that the potential for significant effect to the habitats of the migratory fish is negligible.

Matrix cont. on next page

© WSP UK Limited

Littoral Cauchois SAC (cont.)

Name of European site:	**Littoral Cauchois (France) SAC**																														
EU Code:	**FR2310045**																														
Distance to Rampion 2	**99.5km to Array**																														
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Disturbance (above surface)**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Barriers to migration**			**Suspended sediment deposition**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D				C	O	D	C	O	D	C	O	D
Geoffroy's bat																														
Reefs																														
Perennial vegetation of stony banks																														
Vegetated sea cliffs of the Atlantic and Baltic Coasts																														
Oligotrophic waters few minerals of sandy plains																														
Hard oligo-mesotrophic waters with benthic vegetation of Chara																														
Natural eutrophic lakes with Magnopotamion or Hydrocharition																														
Old acidophilous oak woods with Quercus robur on sandy plains																														

Matrix cont. on next page

© WSP UK Limited

Littoral Cauchois SAC (cont.)

Name of European site:	**Littoral Cauchois (France) SAC**																														
EU Code:	**FR2310045**																														
Distance to Rampion 2	**99.5km to Array**																														
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Disturbance (above surface)**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Barriers to migration**			**Suspended sediment deposition**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D				C	O	D	C	O	D	C	O	D
Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix																														
European dry heaths																														
Geoffroy's bat																														
Reefs																														
Lowland hay meadows																														
Molinia meadows on calcareous, peaty or clayey-silt-laden soils																														
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels																														
Alluvial forests with Alnus glutinosa and Fraxinus excelsior																														

Matrix cont. on next page

© WSP UK Limited

Littoral Cauchois SAC (cont.)

Name of European site:	**Littoral Cauchois (France) SAC**																													
EU Code:	**FR2310045**																													
Distance to Rampion 2	**99.5km to Array**																													
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Disturbance (above surface)**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Barriers to migration**			**Suspended sediment deposition**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D				C	O	D	C	O	D	C	O	D
Petrifying springs with tufa formation																														
Alkaline fens																														
Caves not open to public																														
Atlantic acidophilous beech forests with Ilex Taxus in the shrublayer																														
Asperulo-Fagetum beech forests																														
Tilio-Acerion forests of slopes, screes and ravines																														
Bechstein' s bat																														
Great crested newt																														
Stag beetle																														
Barbastelle bat																														

End of Matrix 14

© WSP UK Limited

16. Matrix 15: Southern North Sea Special Area of Conservation. HRA Screening for Rampion 2

Name of European site:	Southern North Sea (UK) SAC																										
EU Code:	**UK0030395**																										
Distance to Rampion 2	**138.2km to Array**																										
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Temporary increases in suspended sediments**			**Physical loss of habitat**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Harbour porpoise	×a	×a	×a	×b	×b	×b	×b	×b	×b	×c	×c	×c	×d	×d	×d	×e	×e	×e	×f	×f	×f	×g	×g	×g	×h	×h	×h

Evidence Supporting Conclusions

×a The range applied to UK harbour porpoise sites for assessing this effect is 26 km. As this SAC does not fall within that range it is determined there is no potential for LSE.

×b The significance of effects at population level is considered to decrease with a) distance and b) the severity of the effect experienced locally. Given the high vessel density in the area surrounding the proposed DCO Order Limit, the relatively small increases in vessel movements during construction and operation and maintenance are not considered significant. As this site is located over 138km from the proposed DCO Order Limit, the risk of significant injury, mortality or disturbance from vessels is considered low. LSE is therefore discounted.

×c This pathway to indirect effects due to insufficient prey resource is weak for this highly-mobile receptor (with adaptive diet). Only temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, and in view of the considerable expanse of alternative habitat available, there would continue to be sufficient prey resource available to support harbour porpoise from this SAC. LSE (from pathway acting alone) is therefore discounted.

×d The Proposed Development has very low potential to generate emissions to the marine environment during the construction, operation and maintenance activities proposed. Further applying professional judgement about the nature of the receiving environment, it is anticipated that contamination would be subject to significant dilution and quickly dissipated to non-harmful levels in the open coastal environment. The risk of population level impacts to this SAC located over 138 km from the source of ay pollutants is negligible. LSE (from this pathway acting alone) is therefore discounted.

Cont. on next page

© WSP UK Limited

Southern North Sea SAC (cont.)

Evidence Supporting Conclusions

☒e	As cetaceans often reside in turbid waters, the potential level, extent and duration of any increase in suspended sediment would be negligible as regards the ecology of the species and the proximity of this designated site (from this pathway acting alone) is therefore discounted.
☒f	The small amount of direct habitat lost to accommodate Proposed Development infrastructure (seabed and water column) is considered *de minimis* to both the harbour porpoise within this SAC and its prey resources in the context of the vast extent of similar habitat still available. LSE (from this pathway acting alone) is therefore discounted.
☒g	EMF may be emitted from the submarine circuits into the water but is predicted to be of minor significance based on studies on the potential effects of EMF generated by wind farm submarine cables that have shown effects to be highly localised and non-significant. LSE (from this pathway acting alone) is therefore discounted.
☒h	No in-combination issues are identified. Project-related impacts to species from this site (over 138 km from the proposed DCO Order Limit) would not amount to a discernible contribution to adverse effects in-combination with other project activities, or external plans or projects.

End of Matrix 15

© WSP UK Limited

17. Matrix 16a: Transboundary sites - harbour porpoise (1-10 of 24). HRA Screening for Rampion 2

Name of European site:	**Transboundary harbour porpoise sites (24 sites) (all sites located in France unless otherwise indicated)**																										
EU Code:	**BE: Belgium**																										
Distance to Rampion 2	**Between 101.6km – 188km**																										
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Temporary increases in suspended sediments**			**Physical loss of habitat**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Recifs Griz-Nez Blanc-Nez SAC	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Baie de Canche et Couloir des trois estuaries SAC	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Baie de Seine occidentale SAC	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Baie de Seine orientale SAC	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Bancs de Flandres SAC/SCI	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Vlaamse Banken SAC (BE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
SBZ 1 / ZPS 1 (BE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
SBZ 2 / ZPS 2 (BE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
SBZ 3 / ZPS 3 (BE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c

Cont. on next page

© WSP UK Limited

18. Matrix 16b: Transboundary - harbour porpoise (11-20 of 24). HRA Screening for Rampion 2

Name of European site:	**Transboundary harbour porpoise sites (24 sites) (all sites located in France unless otherwise indicated)**																										
EU Code:	**BE: Belgium NL: Netherlands. DE: Denmark**																										
Distance to Rampion 2	**Between 206.20km - 454.9km**																										
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Temporary increases in suspended sediments**			**Physical loss of habitat**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Vlakte van de Raan SAC (BE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Noordzeekustzone SAC (NL)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Klaverbank SAC (NL) NL	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
SBZ 2 / ZPS 2 (BE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Dogger Bank SCI (UK)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Dogger Bank SAC (NL)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Steingrund SAC (DE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Hamburgisches Wattenmeer SAC (DE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Borkum-Riffgrund SCI (DE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c
Nationalpark Niedersachsisches Wattenmeer SAC (DE)	×a	×b	×a	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×b	×c	×d	×c

Cont. on next page

© WSP UK Limited

19. Matrix 16c: Transboundary sites - harbour porpoise (21-24 of 24). HRA Screening for Rampion 2

Name of European site:	Transboundary harbour porpoise sites (24 sites) (all sites located in France unless otherwise indicated)																										
EU Code:	DE: Denmark																										
Distance to Rampion 2	Between 206.20km - 454.9km																										
Effects	Increase in underwater noise			Vessel disturbance			Vessel collision risk			Changes in prey availability / behaviour			Pollution			Temporary increases uspended sediments			Physical loss of habitat			Electromagnetic fields (EMF)			In-combination		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sylter Aussenriff SCI (DE)	Xa	Xb	Xa	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xc	Xd	Xc
Helgoland mit Helgoländer Felssockel SAC (DE)	Xa	Xb	Xa	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xc	Xd	Xc
NTP S-H Wattenmeer und angrenzende Kustengebiete SAC (DE)	Xa	Xb	Xa	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xc	Xd	Xc
Kosterfjorden-Väderöfjorden SAC (DE)	Xa	Xb	Xa	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xb	Xc	Xd	Xc

Evidence Supporting Conclusions

Xa Drawing on literature associated with the Southern North Sea SAC/SCI e.g. (JNCC, 2015), the range applied to the Screening assessment, within which significant effects from underwater noise might occur, is 26 km. This value (range) encompasses risk of injury (onset of Permanent Threshold Shift) and extends to address risk of habitat loss due to underwater noise driven disturbance. As none of these SACs fall within that range it is determined there is no potential for LSE.

Cont. on next page

© WSP UK Limited

Transboundary sites - harbour porpoise

Evidence Supporting Conclusions (cont.)

×b	Each SAC is located over 100 km from the Array and Offshore cable corridor and well outside the Proposed Development's ZOI. Direct effects would not, therefore, result to harbour porpoise when present within their respective SACs. Due to the mobility of cetaceans, however, impacts could manifest on individuals associated with this SAC population that have left the confines of their host site and are present within the Proposed Development's sphere of influence. It is assumed that all SACs with potential connectivitity to the species known within the effect footprint of the Proposed Development have the theoretical potential to be affected. However, the likelihood that a feature from this SAC is a) present within Proposed Development's effect footprint and b) the significance of effects to this SAC at population level are considered to decrease with a) distance, b) the severity of the effect experienced locally and c) apportionment to the other SACs within the species range. For this pathway, the severity of the effect experienced locally is considered to be low to negligible. Effects would not therefore manifest on distant SACs after the likelihood and severity of effects on the SAC have been diluted over distance. The effect has therefore been considered and discounted for potential LSE from this pathway acting alone.
×c	No LSE in-combination are identified on current information. It is determined that Proposed Development-related impacts over these scales would be small to the extent that impacts would not be likely to amount to a discernible contribution to significant effects in-combination with other project related activities, or external plans or projects. This finding will be reviewed following detailed assessment of impacts at later stages of the application process.

End of Matrix 16 (a – c)

© WSP UK Limited

20. Matrix 17a: Transboundary sites - bottlenose dolphin. HRA Screening for Rampion 2 (sites 1- 7 of 15)

Name of European site:	**Transboundary bottlenose dolphin sites (15 sites) (all sites located in France unless otherwise indicated)**																										
EU Code:	**Various**																										
Distance to Rampion 2	**Between 115.km and 220.4km**																										
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Temporary increases in suspended sediments**			**Physical loss of habitat**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Récifs et landes de la Hague SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Baie de Seine orientale SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Anse de Vauville SAC/SCI	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Banc et récifs de Surtainville	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Chausey SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Nord Bretagne DH SAC/SCI	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Cap d'Erquy-Cap Fréhel	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa The broadscale marine mammal data available clearly shows that the eastern English Channel (east of the Isle of Wight to Dungeness) typically holds a relatively low density and diversity of cetacean species. While connectivity between Rampion 2 and these SACs is possible (via effects on a small number of individuals that enter the ZOI), the significance of effects at population level to this SAC population is considered to decrease to non-significant levels with distance and no LSE is concluded on this basis and the low risk of exposure. Proposed Development-related impacts to species from these sites (all over 100 km from the DCO Order Limit) would be small to the extent impacts would not amount to a discernible contribution to significant effects, alone or in-combination.

Cont. on next page

© WSP UK Limited

21. Matrix 17b: Transboundary bottlenose dolphin. HRA Screening for Rampion 2 (sites 8 – 15 of 15)

Name of European site:	**Transboundary bottlenose dolphin sites (15 sites) (all sites located in France unless otherwise indicated)**																											
EU Code:	**Various**																											
Distance to Rampion 2	**Between 115.km and 220.4km**																											
Effects	**Increase in underwater noise**			**Vessel disturbance**			**Vessel collision risk**			**Changes in prey availability / behaviour**			**Pollution**			**Temporary increases in suspended sediments**			**Physical loss of habitat**			**Electromagnetic fields (EMF)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissan SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Côte de Cancale à Paramé SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Côte de Granit rose-Sept-Iles SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Abers - Côtes des légendes SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Ouessant-Molène SAC/ SCI	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Chaussée de Sein SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa
Mers Celtiques Talus du golfe de Gascogne SAC	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa The broadscale marine mammal data available clearly shows that the eastern English Channel (east of the Isle of Wight to Dungeness) typically holds a relatively low density and diversity of cetacean species. While connectivity between Rampion 2 and these SACs is possible (via effects on a small number of individuals that enter the ZOI), the significance of effects at a population level to this SAC population is considered to decrease to non-significant levels with distance and no LSE is concluded on this basis and the low risk of exposure. Project-related impacts to species from these sites (all over 100 km from the DCO Order Limit) would be small to the extent impacts would not amount to a discernible contribution to significant effects, alone or in-combination.

End of Matrix 17 (a – b)

© WSP UK Limited

22. Matrix 18: Solent and Dorset Coast Special Protection SPA - HRA Screening for Rampion 2

Name of European site:	**Solent and Dorset Coast (UK) pSPA**																		
EU Code:	**UK9020330**																		
Distance to Proposed Development	**11.6km from Array to Landward Boundary**																		
Likely Effects of Proposed Development																			
Effect	**Collision risk (breeding)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern		×a		×b		×b		×b			×c		√d	×e	√f	√g	×h	√g
Sandwich tern		×a		×b		×b		×b			×c		√d	√d	√f	√g	√g	√g
Little tern		×a		×b		×b		×b			×c		√d	×e	√f	√g	×h	√g

Evidence Supporting Conclusions

×a This SPA is designated for foraging birds from nearby breeding colonies. Breeding SPAs have been considered for these impacts.

×b On the basis no tern species have been recorded foraging within the Rampion 2 array area from site-specific survey data during the breeding season (see **ES Appendix 12.1: Offshore and intertidal ornithology baseline technical report, Volume 4**) is considered to be no pathway to effect. LSE can be discounted.

×c Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*. (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted.

√d This species has moderate vulnerability to displacement by offshore wind farms (Bradbury *et al*. 2014) with some evidence of weak avoidance from post-Construction monitoring (Dierschke, Furness & Garth, 2016). The array is within the mean-maximum foraging range plus 1SD for this species (Woodward *et al*. 2019). Therefore, LSE cannot be discounted at this stage.

Cont. on next page

© WSP UK Limited

×e	Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*. (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted.
√f	The impacts during decommissioning are considered to be similar and potentially less than those outlined for construction. Potential for LSE.
√g	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.
×h	For all effect pathways acting alone, the potential for impacts was found to be extremely limited, based on low species sensitivity and because the significance of potential effects at a population level is considered to decrease with distance. Over the relevant scales, there is considered to be no potential for a contribution to in-combination effects as a level detectable above natural variability. A finding of no LSEI therefore applies.

End of Matrix 18

Solent and Southampton Water (UK) SPA (cont.)

© WSP UK Limited

23. Matrix 19: Chichester and Langstone Harbours Special Protection SPA - HRA Screening for Rampion 2

Name of European site:	**Chichester and Langstone Harbours (UK) SPA**																					
EU Code:	**UK9011011**																					
Distance to Proposed Development	**23.3km from Array to Landward Boundary**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					✓a		×b		×c		×d			×e		×f	×g	×c	×h	✓i	×h
Sandwich tern		✓a					×b		×c		×d			✓j		×f	✓j	×c	×h	✓i	×h
Little tern																					

Evidence Supporting Conclusions (terns)

✓a This species has moderate vulnerability to collision risk with turbines (Bradbury *et al*, 2014). Rampion 2 is located within the mean-maximum foraging range plus 1SD of this species (Woodward *et al*, 2019) from this SPA. Therefore, LSE cannot be discounted.

×b Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

×c The impacts during decommissioning are considered to be similar and potentially less than those outlined for construction. A finding of no LSE is appropriate.

×d Temporary and low-impact effects are anticipated for local fish and benthic ecology. As such, there would be sufficient alternative resource available to support the species population. Consequently, LSE can be discounted.

×e These species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*, 2014) and evidence from previous Proposed Development assessments have found no LSE. Consequently, LSE can be discounted.

Page 1 of 4. (Cont. on next page for additional features)

© WSP UK Limited

Matrix 19: Chichester and Langstone Harbours SPA (Cont.)

Evidence Supporting Conclusions

×f This species has very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Furness *et al*., 2013). Therefore, LSE can be discounted.

×g Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*, (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted.

×h Potential (non-significant) effects are limited to the extent they would not amount to LSE in-combination with other plans and projects

✓i Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

✓j This species has moderate vulnerability to displacement by offshore wind farms (Bradbury *et al*. 2014) with some evidence of weak avoidance from post-Construction monitoring (Dierschke, Furness & Garth, 2016). The array is within the mean-maximum foraging range plus 1SD for this species (Woodward *et al.* 2019). Therefore, LSE cannot be discounted.

Page 2 of 4. (Cont. on next page for additional features)

© WSP UK Limited

Matrix 19: Chichester and Langstone Harbours SPA (Cont.)

Name of European site:	**Chichester and Langstone Harbours (UK) SPA**																					
EU Code:	**UK9011011**																					
Distance to Proposed Development	**23.3km from Array to Landward Boundary**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	
Common shelduck					√j															√h		
Wigeon					√j															√h		
Teal					√j															√h		
Pintail					√j															√h		
Shoveler					√j															√h		
Red-breasted merganser					√j															√h		

Evidence Supporting Conclusions

√j Potential collision risk to species during migration at an alone and in-combination level. Despite species not being recorded at Rampion 2 array, there is a low potential for a small (negligible) number of the species to pass through the Rampion 2 site during migration. As such, there is a similarly low risk of potential LSE to arise. On a precautionary basis, therefore LSE is not discounted at this stage. Potential for LSE.

√h Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

Page 3 of 4. (Cont. on next page for additional features)

© WSP UK Limited

Matrix 19: Chichester and Langstone Harbours SPA (Cont.)

Name of European site:	**Chichester and Langstone Harbours (UK) SPA**																					
EU Code:	**UK9011011**																					
Distance to Proposed Development	**23.3km from Array to Landward Boundary**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	
Ringed plover					√j															√h		
Grey plover					√j															√h		
Sanderling					√j															√h		
Bar-tailed godwit					√j															√h		
Curlew					√j															√h		
Redshank					√j															√h		
Turnstone					√j															√h		
Dunlin					√j															√h		
Dark-bellied brent goose					√j															√h		

Page 4 of 4. (End of Matrix 19)

© WSP UK Limited

24. Matrix 20: Chichester & Langstone Harbours Ramsar - HRA Screening of Rampion 2

Name of European site:	**Chichester and Langstone Harbours (UK) Ramsar**																						
EU Code:	**UK11013**																						
Distance to Proposed Development	**23.1.2 km from Array**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Ringed plover					✓a															✓b	
Black-tailed godwit					✓a															✓b	
Redshank					✓a															✓b	
Dark-bellied brent goose					✓a															✓b	
Shelduck					✓a															✓b	
Grey plover					✓a															✓b	
Dunlin					✓a															✓b	
Waterbird assemblage- Wintering[1] Including bar-tailed godwit, curlew, dark-bellied Brent geese, dunlin, grey plover, pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone and wigeon.					✓a															✓b	

Evidence Supporting Conclusions

✓a Potential collision risk to species during migration. Species has not been recorded at Rampion 2 Array. Therefore, negligible numbers likely pass through the Rampion 2 site during migration equating to a very low risk of LSE. However, on a precautionary basis, this pathway will be advanced to the Stage Two assessment.

✓b Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 20

[1] (species not listed in Ramsar criteria).

© WSP UK Limited

25. Matrix 21: Solent and Southampton Water Special Protection Area - HRA Screening for Rampion 2

Name of European site:	**Solent and Southampton Water (UK) SPA**																							
EU Code:	**UK9011061**																							
Distance to Proposed Development	**30.9 km from Array to Landward Boundary**																							
Likely Effects of Proposed Development																								
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**				
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sandwich tern		✓a					✕b		✕b		✕b			✓c		✕d	✓e	✕d	✕f	✓g	✕f			
Ringed plover					✓h															✓g				
Teal					✓h															✓g				
Black-tailed godwit					✓h															✓g				
Dark-bellied brent goose					✓h															✓g				
Waterbird assemblage. Wintering: black-tailed godwit, dark-bellied Brent goose, ringed plover, teal.					✓h															✓g				
Mediterranean gull																								
Roseate tern																								
Common tern																								
Little tern																								

Evidence Supporting Conclusions on next page

© WSP UK Limited

Evidence Supporting Conclusions

✓a This species has moderate vulnerability to collision risk with turbines (Bradbury *et al*, 2014). Rampion 2 is located within the mean-maximum foraging range plus 1SD of this species (Woodward *et al*, 2019) from this SPA. Therefore, LSE cannot be discounted at this stage.

×b Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

✓c Based on the proximity of Rampion 2 to the breeding colony and the number of foraging trips required by terns per day during the chick rearing period (Masden *et al*, 2010), an LSE cannot be discounted at this stage.

×d These species have very low vulnerability to disturbance from vessel movements associated with Construction activity (Fliessbach *et al*, 2019). Therefore, LSE can be discounted. The impacts during the decommissioning phase are considered to be similar to and potentially less than those outlined in the Construction phase.

✓e This species has moderate vulnerability to displacement by offshore wind farms (Bradbury *et al*, 2014) with some evidence of weak avoidance from post-Construction monitoring (Dierschke, Furness & Garth, 2016).

×f The magnitude of non-significant effects is small, such that the measure would not be discernible or meaning contributing in-combination with other plans and projects, no LSE.

✓g Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

✓h This species has not been recorded at Rampion 2 array and therefore only negligible numbers would pass through the Rampion 2 site during migration. there is considered to be a very risk of significant impacts. However, on a precautionary basis, LSE is identified, and further information will be provided in a Stage Two assessment.

End of Matrix 21

© WSP UK Limited

26. Matrix 22: Solent and Southampton Water Ramsar - HRA Screening for Rampion 2

Name of European site:	**Solent and Southampton Water (UK) Ramsar**																					
EU Code:	**UK11063**																					
Distance to Proposed Development	**30.8 km to Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Ringed plover					✓a															✓b	
Dark-bellied brent goose					✓a															✓b	
Teal					✓a															✓b	
Black-tailed godwit					✓a															✓b	
Waterbird assemblage-Wintering[2]					✓a															✓b	

Evidence Supporting Conclusions

✓a This species has not been recorded at Rampion 2 array and therefore only negligible numbers would pass through the Rampion 2 site during migration. there is considered to be a very risk of significant impacts. However, on a precautionary basis, LSE is identified, and further information will be provided in a Stage Two assessment.

✓b Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 22

[2] species not listed in Ramsar criteria).

© WSP UK Limited

27. Matrix 23: Dungeness, Romney Marsh and Rye Bay Special Protection Area - HRA Screening for Rampion 2

Name of European site:	**Dungeness, Romney Marsh and Rye Bay (UK) SPA**																					
EU Code:	**UK9012091**																					
Distance to Proposed Development	**46 km from Array to Landward Boundary**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					√a		×b		×b		×b			×c		×d	×e	×d	×f	√g	×f
Sandwich tern		√h			√h		×b		×b		×b			×i		√j	√j	√j	×f	√g	×f

Evidence Supporting Conclusions

√a Species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. However, species has been screened in on a precautionary basis. Potential for LSE.

×b Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

×c These species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*, 2014) and evidence from previous project assessments have found no LSE. Consequently, LSE can be discounted.

×d This species has very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Furness *et al*., 2013). Therefore, LSE can be discounted.

Cont. on next page

© WSP UK Limited

Matrix 23: Dungeness, Romney Marsh and Rye Bay (UK) SPA (Cont.)

Evidence Supporting Conclusions

×e	Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*, (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted.
×f	The magnitude of non-significant effects alone is small, such that the contribution would not be discernible or material in-combination with other plans and projects. No LSE.
✓g	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.
✓h	These species have moderate vulnerability to collision risk with turbines (Bradbury *et al*. 2014). Based on the proximity of the Array and the mean-maximum foraging range plus 1SD of these species (Woodward *et al.* 2019), potential connectivity during the breeding season has been established and LSE cannot therefore be discounted. Species may be sensitive to collision risk during the non-breeding bio-seasons and the potential for LSE is identified on a precautionary basis.
×i	Rampion 2 is located beyond the mean-maximum foraging range plus 1SD of this species (Woodward *et al*, 2019) from this SPA. Therefore, LSE can be discounted
✓j	This species has moderate vulnerability to displacement by offshore wind farms (Bradbury *et al*. 2014) with some evidence of weak avoidance from post-Construction monitoring (Dierschke, Furness & Garth, 2016). The array is within the mean-maximum foraging range plus 1SD for this species (Woodward *et al*. 2019). Therefore, LSE cannot be discounted.

Cont. on next page

© WSP UK Limited

Matrix 23: Dungeness, Romney Marsh and Rye Bay (UK) SPA (Cont.)

Name of European site:	**Dungeness, Romney Marsh and Rye Bay (UK) SPA**																						
EU Code:	**UK9012091**																						
Distance to Proposed Development	**46 km from Array to Landward Boundary**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Shoveler																							
Marsh harrier																							
Hen harrier																							
Avocet																							
Golden plover																							
Ruff																							
Mediterranean gull																							
Bittern																							
Bewick's swan																							
Little tern																							
Aquatic warbler																							
Waterbird assemblage- Non-breeding: Including Bewick's swan, bittern, hen harrier, golden plover, ruff, aquatic warbler, shoveler, European white-fronted goose, wigeon, gadwall, pochard, little grebe, great crested grebe, cormorant, coot, sanderling, whimbrel, common sandpiper																							

End of Matrix 23

© WSP UK Limited

28. Matrix 24: Littoral seino-marin Special Protection Area - HRA Screening for Rampion 2

Name of European site:	**Littoral seino-marin (FR) SPA**
EU Code:	**FR2310045**
Distance to Proposed Development	**72.2 km to Array**
Likely Effects of Proposed Development	

Effect	Collision risk (breeding)			Collision risk (migration)			Changes in prey availability & behaviour			Indirect impacts via effects on prey			Barrier effect			Direct disturbance and displacement			In-combination		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Kittiwake		√a					×c		×d		×c			×e		×f		×g	×h	√i	×h
Lesser black-backed		√a					×c		×d		×c			×e		×f		×g	×h	√i	×h
Great black-backed gull		×b					×c		×d		×c			×e		×f		×g	×h	×h	×h
Fulmar		×b					×c		×d		×c			×e		×f		×g	×h	×h	×h

Evidence Supporting Conclusions

√a This species has moderate to very high vulnerability to collision risk with turbines (Bradbury *et al*, 2014). Rampion 2 is located within the mean-maximum foraging range of this species (Woodward *et al*, 2019) from this site. LSE can therefore not be discounted.

×b This species has low vulnerability to collision risk with turbines (Bradbury *et al*, 2014). LSE can therefore be discounted at this stage.

×c Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

×d The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined in the construction phase. Therefore, a finding of no LSE is appropriate.

Cont. on next page (Page 1 of 5)

© WSP UK Limited

Matrix 24: Littoral seino-marin Special Protection Area SPA (Cont.)

Evidence Supporting Conclusions (cont.)

×e	This species has a significant mean-maximum foraging range with a high degree of habitat flexibility. As a result, any potential additional energetic expenditure as a result of barrier impacts will be trivial. Furthermore, experience of other offshore wind farms is of no LSE being concluded. Therefore, LSE can be discounted.
×f	This species has very low vulnerability to disturbance associated with vessel and helicopter activity and has a high degree of habitat flexibility (Furness *et al*, 2013). LSE can therefore be discounted.
×g	This species has very low vulnerability to displacement from offshore wind farms (Bradbury *et al,* 2014). Therefore, LSE can be discounted.
×h	The magnitude of non-significant effects alone is small, such that the contribution would not be discernible or measurable above natural variation in-combination with other plans and projects, no LSE.
✓i	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

Cont. on next page (Page 2 of 6)

© WSP UK Limited

Matrix 24: Littoral seino-marin (FR) SPA (cont.)

Name of European site:	**Littoral seino-marin (FR) SPA**																				
EU Code:	**FR2310045**																				
Distance to Proposed Development	**77.4 km to Array**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common sandpiper																					
Razorbill																					
Greenland white-fronted goose																					
Greylag goose																					
Short-eared owl																					
Purple sandpiper																					
Great skua																					
Hen harrier																					
Little egret																					
Merlin																					
Peregrine falcon																					
Red-throated diver																					

Cont. on next page (Page 3 of 6)

© WSP UK Limited

Matrix 25: Littoral seino-marin (FR) SPA (cont.)

Name of European site:	**Littoral seino-marin (FR) SPA**																					
EU Code:	**FR2310045**																					
Distance to Proposed Development	**77.4 km to Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Black-throated diver																					
Great northern diver																					
Gull-billed tern																					
European storm petrel																					
Herring gull																					
Mediterranean gull																					
Little gull																					
Sabine's gull																					
Woodlark																					
Velvet scoter																					
Common scoter																					
Gannet																					

Cont. on next page (Page 4 of 6)

© WSP UK Limited

Matrix 25: Littoral seino-marin (FR) SPA (cont.)

Name of European site:	**Littoral seino-marin (FR) SPA**																				
EU Code:	**FR2310045**																				
Distance to Proposed Development	**77.4 km to Array**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-breasted merganser																					
Leach's European storm petrel																					
Honey buzzard																					
Shag																					
Cormorant																					
Spoonbill																					
Slavonian grebe																					
Great crested grebe																					
Black-necked grebe																					
Manx shearwater																					
Balearic shearwater																					
Avocet																					

Cont. on next page (Page 5 of 6)

© WSP UK Limited

Matrix 25: Littoral seino-marin (FR) SPA (cont.)

Name of European site:	**Littoral seino-marin (FR) SPA**																				
EU Code:	**FR2310045**																				
Distance to Proposed Development	**77.4 km to Array**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Eider																					
Arctic skua																					
Pomarine skua																					
Little tern																					
Common tern																					
Arctic tern																					
Sandwich tern																					
Shelduck																					
Guillemot																					

End of Matrix 24 (Page 6 of 6)

© WSP UK Limited

29. Matrix 25: Medway Estuary and Marshes Special Protection Area - HRA Screening for Rampion 2

Name of European site:	**Medway Estuary and Marshes (UK) SPA**																						
EU Code:	**UK9012031**																						
Distance to Proposed Development	**97.5 km to Array**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern*					×a															✓b	
Shelduck																					
Pintail																					
Avocet																					

Evidence Supporting Conclusions

×a The common tern may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is therefore likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.

✓b The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and Proposed Developments resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms. Potential LSE identified.

End of Matrix 25

© WSP UK Limited

30. Matrix 26: Outer Thames Estuary Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Outer Thames Estuary (UK) SPA																					
EU Code:	UK9020309																					
Distance to Proposed Development	110.1 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern *Sterna hirundo* Red-throated diver																					
Red-throated diver *Gavia stellata*: Common tern		✕a			✕a		✕b	✕b	✕b	✕b	✕b	✕b	✕c	✕c	✕c	✕d	✕e	✕d	✕f	✕f	✕f
Little tern *Sternula albifrons*: Little tern																					

Evidence Supporting Conclusions

b These species have moderate vulnerability to collision risk with turbines (Bradbury *et al* . 2014). However, array is located beyond the mean maximum foraging range of these species (Woodward *et al* . 2019) from this site. Potential connectivity during the breeding season although species only recorded in low numbers at the Proposed Development site. LSE can therefore be discounted.

✕b Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

✕c Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*, (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted.

✕d This species has very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al* . 2019). Therefore, LSE can be discounted.

✕e This species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*, 2014) and evidence from previous project assessments have found no LSE. Consequently, LSE can be discounted.

© WSP UK Limited

×f	Unlikely for impacts to occur at an in-combination level due to lack of pathway for effect from Rampion 2 acting alone. No LSE identified.

End of Matrix 26

© WSP UK Limited

31. Matrix 27: Foulness (Mid-Essex Coast Phase 5) Special Protection Area - HRA Screening for Rampion 2

Name of European site:	**Foulness (Mid-Essex Coast Phase 5) (UK) SPA**																						
EU Code:	**UK9009246**																						
Distance to Proposed Development	**116.2 km to Array**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern		×a			×a		×b		×b		×b			×c		×d	×e	×d	×f	✓g	×f
Sandwich tern		×a			×a		×b		×b		×b			×c		×d	×e	×d	×f	✓g	×f
Avocet																					
Ringed plover																					
Grey plover																					
Red knot																					
Bar-tailed godwit																					
Redshank																					
Hen harrier																					
Oystercatcher																					
Little tern																					
Dark-bellied brent goose																					
Waterbird assemblage- Non-breeding: Including grey plover, knot, bar-tailed godwit, redshank, avocet, dark-bellied brent goose, dunlin, ringed plover, shelduck, oystercatcher and curlew.																					

Cont. on next page

© WSP UK Limited

Matrix 27: Foulness (Mid-Essex Coast Phase 5) SPA (Cont.)

Evidence Supporting Conclusions (cont.)

×a	These species have moderate vulnerability to collision risk with turbines (Bradbury *et al* . 2014). However, array is located beyond the mean maximum foraging range of these species (Woodward *et al* . 2019) from this site. Potential connectivity during the breeding season although species only recorded in low numbers at the Proposed Development site. LSE can therefore be discounted.
×b	Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.
×c	Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*, (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted.
×d	These species have very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al* . 2019). Therefore, LSE can be discounted.
×e	This species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*, 2014) and evidence from previous project assessments have found no LSE. Consequently, c
×f	Unlikely for impacts to occur at an in-combination level due to lack of pathway for effect from Rampion 2 acting alone. No potential for LSE identified.
✓g	The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.

End of Matrix 27

© WSP UK Limited

32. Matrix 28: Alderney West Coast and the Burhou Islands (UK) Ramsar - HRA Screening for Rampion 2

Name of European site:	Alderney West Coast and the Burhou Islands (UK) Ramsar																								
EU Code:	UK1587																								
Distance to Proposed Development	148.1 km from array																								
Likely Effects of Proposed Development																									
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement (breeding)**			**Direct disturbance and displacement (migration)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar		×a			×a		×b		×b		×b			×c								×f	×f	×f
Gannet		✓g			✓h		×b		×b		×b			×c			✓g		×d	✓i	×d	×f	✓j	×f
Lesser black-backed gull																								
Herring gull																								
Puffin																								
Ringed plover																								
Common tern																								
Great black-backed gull																								
Cormorant																								
European storm petrel																								

Cont. on next page

© WSP UK Limited

Matrix 28: Alderney West Coast and the Burhou Islands (UK) Ramsar (Cont.)

Evidence Supporting Conclusions (cont.)

×a	These species have moderate vulnerability to collision risk with turbines (Bradbury *et al* . 2014). However, array is located beyond the mean maximum foraging range of these species (Woodward *et al* . 2019) from this site. Potential connectivity during the breeding season although species only recorded in low numbers at the Proposed Development site. LSE can therefore be discounted.
×b	Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.
×c	Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*, (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted at this stage.
×d	These species have very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al* . 2019). Therefore, LSE can be discounted at this stage.
×e	This species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*, 2014) and evidence from previous Proposed Development assessments have found no LSE. Consequently, LSE can be discounted at this stage.
×f	Unlikely for impacts to occur at an in-combination level due to lack of pathway for effect from Rampion 2 acting alone
✓g	This species has high vulnerability to collision risk with turbines (Bradbury *et al*, 2014) and displacement from offshore wind farms (Bradbury *et al*, 2014). Rampion 2 is located within the mean-maximum foraging range of this species (Woodward *et al*, 2019) from this site. LSE can therefore not be discounted.
✓h	It cannot be discounted that this species could pass through the Rampion 2 site during migration. Further information will be provided in a Stage Two assessment.
✓i	This species has moderate to high vulnerability to displacement from offshore wind farms (Bradbury *et al*, 2014). Therefore, LSE cannot be discounted at this stage.
✓j	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 28

© WSP UK Limited

33. Matrix 29: Falaise du Bessin Occidental Special Protection Area. HRA Screening - Rampion 2

Name of European site:	**Falaise du Bessin Occidental (FR) SPA**																								
EU Code:	**FR2510099**																								
Distance to Proposed Development	**132.7 km to Array**																								
Likely Effects of Proposed Development																									
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement (breeding)**			**Direct disturbance and displacement (migration)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar		×a			×a		×b		×b		×b			×c		×d	×d	×d	×e	×e	×e	×f	×f	×f
Kittiwake		✓g					×b		×b		×b			×c		×h	×i	×h	×h	×i	×h	×f	✓j	×f
Razorbill																								
Short-eared owl																								
Peregrine falcon																								
Red-throated diver																								
Herring gull																								
Lesser black-backed gull																								
Red-breasted merganser																								
Shag																								
Cormorant																								
Guillemot																								
Dartford Warbler																								

Cont. on next page

© WSP UK Limited

Matrix 29: Falaise du Bessin Occidental (FR) (Cont.)

Evidence Supporting Conclusions (cont.)

×a	This species has low vulnerability to collision risk with turbines (Bradbury *et al*, 2014). LSE can therefore be discounted
×b	Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.
×c	Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*, (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted at this stage.
×d	These species have very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al* . 2019). Therefore, LSE can be discounted.
×e	This species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*, 2014) and evidence from previous project assessments have found no LSE. Consequently, LSE can be discounted.
×f	Unlikely for impacts to occur at an in-combination level due to lack of pathway for effect from Rampion 2 acting alone
✓g	This species has high vulnerability to collision risk with turbines (Bradbury *et al*, 2014). Rampion 2 is located within the mean-maximum foraging range of this species (Woodward *et al*, 2019) from this site. LSE can therefore not be discounted.
×h	This species has very low vulnerability to disturbance associated with vessel and helicopter activity and has a high degree of habitat flexibility (Furness *et al*, 2013). LSE can therefore be discounted at this stage
×i	This species has very low vulnerability to displacement from offshore wind farms (Bradbury *et al*, 2014). Therefore, LSE can be discounted at this stage
✓j	Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 29

© WSP UK Limited

34. Matrix 30: Alde-Ore Estuary Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Alde-Ore Estuary (UK) SPA
EU Code:	UK9009112
Distance to Proposed Development	188.1km to Array
Likely Effects of Proposed Development	

Effect	Collision risk (breeding)			Collision risk (migration)			Changes in prey availability & behaviour			Indirect impacts via effects on prey			Barrier effect			Direct disturbance and displacement			In-combination		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Lesser black-backed gull *Larus fuscus*		×a			×a		×b		×b		×b			×c		×d	×e	×d	×f	✓g	×f
Sandwich tern *Thalasseus sandvicensis*		×a			×a		×f		×f		×f			×f		×f	×f	×f	×f	✓g	×f
Ruff *Calidris pugnax*																					
Redshank Tringa totanus																					
Avocet *Recurvirostra avosetta*																					
Marsh harrier *Circus aeruginosus*																					
Little tern Sternula albifrons																					

Evidence Supporting Conclusions

×a Both of these species have very high vulnerability to collision risk with turbines (Bradbury *et al*, 2014). However, Rampion 2 is located a significant distance beyond the mean-maximum foraging range plus 1SD for the species (Woodward *et al*, 2019) from this site. Connectivity during the non-breeding season is limited as species is largely migratory, travelling south following the breeding season (Wright *et al*, 2012). Furthermore, an assessment of collision apportioned to this site outside of the breeding season by Percival 2013 for Rampion offshore wind farm found the impact to be negligible. Therefore, LSE can be discounted for the Proposed Development acting alone.

Cont. on next page

© WSP UK Limited

Matrix 30: Alde-Ore Estuary SPA (Cont.)

Evidence Supporting Conclusions (cont.)

✗b	Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.
✗c	Evidence suggests these species are neither displaced nor attracted from or to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al.* (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted at this stage.
✗d	These species have very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al* . 2019). Therefore, LSE can be discounted.
✗e	This species have low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al,* 2014) and evidence from previous project assessments have found no LSE. Consequently, LSE can be discounted.
✗f	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of these species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.
✓g	Potential for effect to operate at an in-combination level during the non-breeding bio-seasons. The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms. Additionally, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. However, both species have been screened in on a precautionary basis

End of Matrix 30

© WSP UK Limited

35. Matrix 31: Alde-Ore Estuary Ramsar - HRA Screening - Rampion 2

Name of European site:	Alde-Ore Estuary (UK) SPA																						
EU Code:	UK9009112																						
Distance to Proposed Development	188.1 km to Array																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Lesser black-backed gull		×a			×a		×b		×b		×b			×c		×d	×e	×d	×f	✓g	×f
Avocet																					
Redshank																					
Waterbird assemblage- Wintering (species not listed in Ramsar criteria)																					
Wetland bird assemblage- Breeding (species not listed in Ramsar criteria)																					

Evidence Supporting Conclusions

×a This species has very high vulnerability to collision risk with turbines (Bradbury *et al*, 2014), however, Rampion 2 is located a significant distance beyond the mean-maximum foraging range plus 1SD of this species (Woodward *et al*, 2019) from this site. Connectivity during the non-breeding season is limited as species is largely migratory, travelling south following the breeding season (Wright *et al,* 2012). Furthermore, an assessment of collision apportioned to this site outside of the breeding season by Percival 2013 for Rampion offshore wind farm found the impact to be negligible. Therefore, LSE can be discounted for the Proposed Development acting alone.

×b Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

Cont. on next page

© WSP UK Limited

Matrix 31: Alde-Ore Estuary Ramsar (Cont.)

Evidence Supporting Conclusions (cont.)

×c	Evidence suggests this species is attracted to offshore wind farms (Dierschke, Furness & Garth, 2016). Additionally, these species are classified by Bradbury *et al*, (2014) as having low vulnerability to displacement by offshore wind farms. Therefore, LSE can be discounted at this stage.
×d	These species have very low vulnerability to disturbance from vessel movements associated with construction and decommissioning activity (Fliessbach *et al* . 2019). Therefore, LSE can be discounted.
×e	This species has a low vulnerability to displacement (the result of avoidance behaviour) (Bradbury *et al*, 2014) and evidence from previous project assessments have found no LSE. Consequently, LSE can be discounted.
×f	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.
✓g	Potential for effect to operate at an in-combination level during the non-breeding bio-seasons. The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. However, species has been screened in on a precautionary basis

End of Matrix 31

© WSP UK Limited

36. Matrix 32: Chausey Special Protection Area (SPA). HRA Screening - Rampion 2

Name of European site:	**Chausey (FR) SPA**																					
EU Code:	**FR2510037**																					
Distance to Proposed Development	**188.8 km to Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Gannet							Xa		Xa		Xa					Xa	Xa	Xa	Xa	Xa	Xa
Turnstone																					
Purple sandpiper																					
Sanderling																					
Red-throated diver																					
Black-throated diver																					
Oystercatcher																					
European storm petrel																					
Herring gull																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

Cont. on next page

© WSP UK Limited

Matrix 31: Chausey (FR) SPA (Cont.)

Name of European site:	Chausey (FR) SPA																					
EU Code:	FR2510037																					
Distance to Proposed Development	188.8 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Black-headed gull																					
Common scoter																					
Red-breasted merganser																					
Common gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Shag																					
Cormorant																					
Grey plover																					
Slavonian grebe																					
Black-necked grebe																					
Manx shearwater																					
Balearic shearwater																					

Cont. on next page

© WSP UK Limited

Matrix 31: Chausey (FR) SPA (Cont.)

Name of European site:	Chausey (FR) SPA																				
EU Code:	FR2510037																				
Distance to Proposed Development	188.8 km to Array																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Eider																					
Common tern																					
Sandwich tern																					
Shelduck																					
Razorbill																					
Guillemot																					

End of Matrix 32

© WSP UK Limited

37. Matrix 33: Cap d'Erquy-Cap Fréhel Special Protection Area - HRA Screening – Rampion 2

Name of European site:	Cap d'Erquy-Cap Fréhel (FR) SPA																					
EU Code:	FR5310095																					
Distance to Proposed Development	229.1 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar		×a			×a		×b		×c		×b			×d		×e	×f	×c	×g	×g	×g
Dark-bellied brent goose																					
Dunlin																					
Nightjar																					
Ringed plover																					
Peregrine falcon																					
Razorbill																					
Oystercatcher																					
Herring gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Gannet																					

Cont. on next page

© WSP UK Limited

Matrix 33: Cap d'Erquy-Cap Fréhel (FR) SPA (Cont.)

Name of European site:	Cap d'Erquy-Cap Fréhel (FR) SPA																					
EU Code:	FR5310095																					
Distance to Proposed Development	229.1km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Shag																					
Cormorant																					
Balearic shearwater																					
Kittiwake																					
Dartford warbler																					
Shelduck																					
Guillemot																					

Evidence Supporting Conclusions (cont.)

×a Fulmar has a low vulnerability to collision risk with turbines (Bradbury *et al*, 2014). LSE can therefore be discounted.

×b Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

×c The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined in the construction phase.

×d This species has a significant mean-maximum foraging range with a high degree of habitat flexibility. As a result, any potential additional energetic expenditure as a result of barrier impacts will be trivial. Furthermore, experience of other offshore wind farms is of no LSE being concluded. Therefore, LSE can be discounted.

Cont. on next page

© WSP UK Limited

Matrix 33: Cap d'Erquy-Cap Fréhel (FR) SPA (Cont.)

Evidence Supporting Conclusions (cont.)

×e This species has very low vulnerability to disturbance associated with vessel and helicopter activity and has a high degree of habitat flexibility (Furness et al, 2013). LSE can therefore be discounted.

×f This species has very low vulnerability to displacement from offshore wind farms (Bradbury et al, 2014). Therefore, LSE can be discounted.

×g This species has a very high vulnerability to collision risk with turbines (Bradbury et al, 2014). However, Rampion 2 is located beyond the mean-maximum foraging range of this species (Woodward et al, 2019) from this SPA. Limited connectivity associated with this site during the breeding season. Therefore, LSE cannot be discounted

End of Matrix 33

© WSP UK Limited

38. Matrix 34: The Wash Special Protection Area - HRA Screening - Rampion 2

Name of European site:	The Wash (UK) SPA
EU Code:	UK9008021
Distance to Proposed Development	229.8 km from Offshore cable corridor
Likely Effects of Proposed Development	

Effect	Collision risk (breeding)			Collision risk (migration)			Changes in prey availability & behaviour			Indirect impacts via effects on prey			Barrier effect			Direct disturbance and displacement			In-combination		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Pink-footed goose																					
Shelduck																					
Wigeon																					
Gadwall																					
Northern pintail																					
Common scoter																					
Common Goldeneye																					
Oystercatcher																					
Grey plover																					
Knot																					
Sanderling																					
Bar-tailed godwit																					

Cont. on next page

© WSP UK Limited

Matrix 34: The Wash SPA (Cont.)

Name of European site:	The Wash (UK) SPA																					
EU Code:	UK9008021																					
Distance to Proposed Development	229.8km from Offshore cable corridor																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Curlew																					
Redshank																					
Turnstone																					
Bewick's swan																					
Little tern																					
Black-tailed godwit																					
Dunlin																					
Dark-bellied brent goose																					
Waterbird assemblage- Non-breeding: Including avocet, golden plover, lapwing, ringed plover, black-tailed godwit, bar-tailed godwit, oystercatcher, grey plover, dunlin, knot, sanderling, curlew, whimbrel, redshank, turnstone, little grebe, cormorant, whooper swan, white-fronted goose, pink-footed goose, dark-bellied brent goose, shelduck, pintail, wigeon, teal, mallard, eider, common scoter, black-headed gull, lesser black-headed gull, herring gull and great black-backed gull.																					

Cont. on next page

© WSP UK Limited

Matrix 34: The Wash SPA (Cont.)

Evidence Supporting Conclusions (cont.)

×a	Common tern may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.
×b	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.
✓c	The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.

End of Matrix 34

© WSP UK Limited

39. Matrix 35: Breydon Water Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Breydon Water (UK) SPA**																							
EU Code:	**UK9009181**																							
Distance to Proposed Development	**245.1 km to Array**																							
Likely Effects of Proposed Development																								
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**				
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					✕a		✕b		✕b		✕b			✕b		✕b	✕b	✕b	✕b	✓c	✕b			
Avocet																								
Golden plover																								
Lapwing																								
Ruff																								
Bewick's swan																								
Waterbird assemblage: Non-breeding cormorant, European white-fronted goose, Wigeon, Shoveler, black-tailed godwit Redshank, snipe.																								

Evidence Supporting Conclusions

✕a Common tern may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.

✕b The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

Cont. on next page

© WSP UK Limited

Matrix 35: Breydon Water (UK) SPA (Cont.)

Evidence Supporting Conclusions (cont.)

√c	The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.

End of Matrix 35

© WSP UK Limited

40. Matrix 36: Tregor Goëlo Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Tregor Goëlo (FR) SPA																					
EU Code:	FR5310070																					
Distance to Proposed Development	245.5 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar		×a			×a		×b		×c		×b			×d		×e	×f	×c	×g	×g	×g
Pintail																					
Teal																					
Wigeon																					
Grey heron																					
Turnstone																					
Dark-bellied brent goose																					
Sanderling																					
Dunlin																					
Knot																					
Kentish plover																					
Ringed-plover																					

Cont. on next page

© WSP UK Limited

Matrix 36: Tregor Goëlo (FR) SPA (Cont.)

Name of European site:	Tregor Goëlo (FR) SPA																					
EU Code:	FR5310070																					
Distance to Proposed Development	245.5 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Little egret																					
Merlin																					
Peregrine falcon																					
Kingfisher																					
Black-throated diver																					
Great northern diver																					
Oystercatcher																					
Herring gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Mediterranean gull																					
Bar-tailed godwit																					

Cont. on next page

© WSP UK Limited

Matrix 36: Tregor Goëlo (FR) SPA (Cont.)

Name of European site:	Tregor Goëlo (FR) SPA																					
EU Code:	FR5310070																					
Distance to Proposed Development	245.5 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-breasted- merganser																					
Curlew																					
Osprey																					
Shag																					
Cormorant																					
Golden plover																					
Grey plover																					
Slavonian grebe																					
Great-crested grebe																					
Black-necked grebe																					
Balearic shearwater																					
Avocet																					

Cont. on next page

© WSP UK Limited

Matrix 36: Tregor Goëlo (FR) SPA (Cont.)

Name of European site:	Tregor Goëlo (FR) SPA																					
EU Code:	FR5310070																					
Distance to Proposed Development	245.5 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Little tern																					
Common tern																					
Sandwich tern																					
Shelduck																					
Little grebe																					
Redshank																					
Lapwing																					

Evidence Supporting Conclusions (cont.)

×a Fulmar has low vulnerability to collision risk with turbines (Bradbury *et al,* 2014). LSE can therefore be discounted.

×b Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

×c The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined in the construction phase.

×d This species has a significant mean-maximum foraging range with a high degree of habitat flexibility. As a result, any potential additional energetic expenditure as a result of barrier impacts will be trivial. Furthermore, experience of other offshore wind farms is of no LSE being concluded. Therefore, LSE can be discounted.

Cont. on next page

© WSP UK Limited

Matrix 36: Tregor Goëlo (FR) SPA (Cont.)

Evidence Supporting Conclusions (cont.)

×e Fulmar has very low vulnerability to disturbance associated with vessel and helicopter activity and has a high degree of habitat flexibility (Furness et al, 2013). LSE can therefore be discounted.

×f This species has very low vulnerability to displacement from offshore wind farms (Bradbury et al, 2014). Therefore, LSE can be discounted.

×g This species has a very high vulnerability to collision risk with turbines (Bradbury et al, 2014). However, Rampion 2 is located beyond the mean-maximum foraging range of this species (Woodward et al, 2019) from this SPA. Limited connectivity associated with this site during the breeding season. Therefore, LSE cannot be discounted

End of Matrix 36

© WSP UK Limited

41. Matrix 37: Greater Wash Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Greater Wash (UK) SPA**																					
EU Code:	**UK9020329**																					
Distance to Proposed Development	**253.7 km from Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Sandwich tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Little gull																					
Red-throated diver																					
Common scoter																					
Little tern																					
Common tern																					

Evidence Supporting Conclusions

×a Both species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.

×b The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of these species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

Cont. on next page

© WSP UK Limited

Matrix 37: Greater Wash (UK) SPA (Cont.)

Evidence Supporting Conclusions (cont.)

√c	The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.

End of Matrix 37

© WSP UK Limited

42. Matrix 38: North Norfolk Coast Special Protection Area (SPA). HRA Screening - Rampion 2

Name of European site:	**North Norfolk Coast (UK) Special Protection Area**																							
EU Code:	**UK9009031**																							
Distance to Proposed Development	**260.7 km from Array**																							
Likely Effects of Proposed Development																								
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Sandwich tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Wigeon																					
Marsh harrier																					
Avocet																					
Knot																					
Bittern																					
Pink-footed goose																					
Little tern																					
Dark-bellied brent goose																					
Montagu's harrier																					
Waterbird assemblage - Non-breeding: Including pink-footed goose, dark-bellied brent goose, wigeon, knot, white-fronted goose, shelduck, pintail, oystercatcher, ringed plover, grey plover and redshank.																					

Cont. on next page

© WSP UK Limited

Matrix 38: North Norfolk Coast (UK) SPA (Cont.)

Evidence Supporting Conclusions

×a	Both species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.
×b	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of these species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.
✓c	The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.

End of Matrix 38

© WSP UK Limited

43. Matrix 39: North Norfolk Coast Ramsar - HRA Screening - Rampion 2

Name of European site:	**North Norfolk Coast (UK) Ramsar**																						
EU Code:	**UK11048**																						
Distance to Proposed Development	**260.7 km from Array**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Sandwich tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Wigeon																					
Pintail																					
Red knot																					
Pink-footed goose																					
Little tern																					
Dark-bellied brent goose																					
Waterbird assemblage - Wintering (species not listed in Ramsar criteria)																					

Cont. on next page

© WSP UK Limited

Matrix 39: North Norfolk Coast (UK) Ramsar (Cont.)

Evidence Supporting Conclusions

×a	Both species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.
×b	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of these species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.
✓c	The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.

End of Matrix 39

© WSP UK Limited

44. Matrix 40: Côte de Granit Rose-Sept Iles Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Côte de Granit Rose-Sept Iles (FR) SPA**
EU Code:	**FR5310011**
Distance to Proposed Development	**259.3km to Array**
Likely Effects of Proposed Development	

Effect	Collision risk (breeding)			Collision risk (migration)			Changes in prey availability & behaviour			Indirect impacts via effects on prey			Barrier effect			Direct disturbance and displacement (breeding)			Direct disturbance and displacement (migration)			In-combination		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Gannet		✓a			✓b		✕c		✕d		✕c			✕e		✕f	✓h	✕d	✕f	✓h	✕d	✕i	✓j	✕i
Manx shearwater		✕k			✕k		✕c		✕d		✕c			✕e		✕f	✕g	✕d	✕f	✕g	✕d	✕i	✕i	✕i
Fulmar		✕k			✕k		✕c		✕d		✕c			✕e		✕f	✕g	✕d	✕f	✕g	✕d	✕i	✕i	✕i
European storm petrel		✕k			✕k		✕c		✕d		✕c			✕e		✕f	✕g	✕d	✕f	✕g	✕d	✕i	✕i	✕i
Razorbill																								
Brent goose																								
Purple sandpiper																								
Ringed plover																								
Puffin																								
Oystercatcher																								

Cont. on next page

© WSP UK Limited

Matrix 40: Côte de Granit Rose-Sept Iles (FR) SPA (Cont.)

Evidence Supporting Conclusions

✓a This species has high vulnerability to collision risk with turbines (Bradbury *et al*, 2014). Rampion 2 is located within the mean-maximum foraging range of this species (Woodward *et al*, 2019) from this site. LSE can therefore not be discounted.

✓b Species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. However, LSE is identified on a precautionary basis.

×c Prey species could be affected by changes to water quality, suspended sediment underwater noise, direct habitat loss or damage, changes to physical processes and INNS. Indirect impacts on species could result due to displaced or reduced foraging resource. Temporary and low-impact effects are anticipated for local fish and benthic ecology. Given this and the capacity of this species to forage over vast areas, there would be sufficient alternative resource available to support the species population. The potential for significant effects is considered to be extremely limited for these highly-mobile receptors. Consequently, LSE can be discounted.

×d Potential impacts during decommissioning are considered to be similar of potentially less than those outlined for construction. A finding of no LSE is appropriate.

×e This species has a significant mean-maximum foraging range with a high degree of habitat flexibility. As a result, any potential additional energetic expenditure as a result of barrier impacts will be trivial. Furthermore, experience of other offshore wind farms is of no LSE being concluded. Therefore, LSE can be discounted

×f This species has very low vulnerability to disturbance associated with vessel and helicopter activity and has a high degree of habitat flexibility (Furness *et al*, 2013). LSE can therefore be discounted

×g This species has very low vulnerability to displacement from offshore wind farms (Bradbury *et al*, 2014). Therefore, LSE can be discounted at this stage.

✓h This species has moderate to high vulnerability to displacement from offshore wind farms (Bradbury *et al*, 2014) and potential connectivity is indicated by foraging range. Therefore, LSE cannot be discounted.

×i Potential (non-significant) effects are limited to the extent they would not amount to LSE in-combination with other plans and projects

✓j Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

×k This species has low vulnerability to collision risk with turbines (Bradbury *et al*, 2014). LSE can therefore be discounted

Cont. on next page

© WSP UK Limited

Matrix 40: Côte de Granit Rose-Sept Iles (FR) SPA (Cont.)

Name of European site:	**Côte de Granit Rose-Sept Iles (FR) SPA**																					
EU Code:	**FR5310011**																					
Distance to Proposed Development	**259.3 km to Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Herring gull																					
Common gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Mediterranean gull																					
Red-breasted merganser																					
Shag																					
Slavonian grebe																					
Great-crested grebe																					
Balearic shearwater																					

Cont. on next page

© WSP UK Limited

Matrix 40: Côte de Granit Rose-Sept Iles (FR) SPA (Cont.)

Name of European site:	**Côte de Granit Rose-Sept Iles (FR) SPA**																				
EU Code:	**FR5310011**																				
Distance to Proposed Development	**259.3 km to Array**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Kittiwake																					
Little tern																					
Roseate tern																					
Common tern																					
Sandwich tern																					
Shelduck																					
Guillemot																					

End of Matrix 40

© WSP UK Limited

45. Matrix 41: Skomer, Skokholm & the Seas off Pembrokeshire / Sgomer, Sgogwm a moroedd Benfro Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a moroedd Benfro (UK) SPA																					
EU Code:	UK9014051																					
Distance to Proposed Development	314 km from Offshore cable corridor																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater		×a			×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
European storm petrel		×a			×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Lesser black-backed gull																					
Puffin																					
Short-eared owl																					
Chough																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 41

© WSP UK Limited

46. Matrix 42: Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island Special Protection Area HRA Screening - Rampion 2

Name of European site:	**Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island (UK) SPA**																					
EU Code:	**UK9013121**																					
Distance to Proposed Development	**362 km from Offshore cable corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater		X[a]			X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Chough		X[a]			X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]

Evidence Supporting Conclusions

X[a] The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 42

© WSP UK Limited

47. Matrix 43: Flamborough and Filey Coast Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Flamborough and Filey Coast (UK) SPA**																					
EU Code:	**UK9006101**																					
Distance to Proposed Development	**366.4 km from Offshore cable corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement (migration)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar		×a			×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Kittiwake		×b			×c		×a		×a		×a			×a		×a	×a	×a	×a	✓d	×a
Guillemot		×a			×a		×a		×a		×a			×a		×e	×e	×e	×e	✓f	×e
Gannet		×g			×h		×a		×a		×a			×a		×a	×e	×a	×a	✓f	×a
Razorbill		×g			×h		×a		×a		×a			×a		×a	×e	×a	×a	✓f	×a
Herring gull		×b			×c		×a		×a		×a			×a		×a	×a	×a	×a	✓d	×a
Shag																					
Cormorant																					
Puffin																					
Breeding seabird assemblage																					

Cont. on next page

© WSP UK Limited

Matrix 43: Flamborough and Filey Coast (UK) SPA (Cont.)

Evidence Supporting Conclusions

×a	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context. No LSE for the Proposed Development acting alone.
×b	Rampion 2 is beyond the mean-maximum foraging range +1SD for this species (Woodward *et al.*, 2019). There is no potential for LSE from the Proposed Development.
×c	Species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.
√d	The magnitude of the potential (non-significant) effects (from collision risk in the non-breeding seasons) identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.
×e	Rampion 2 is within the mean-maximum foraging range +1SD for this species (Woodward *et al.*, 2019). This species has potential sensitivity to displacement and/or disturbance during the breeding season. This species may also be sensitive to displacement during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.
√f	The magnitude of the potential (non-significant) effects (from displacement during the non-breeding bio-seasons) identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms.
×g	Rampion 2 is within the mean-maximum foraging range +1SD for this species (Woodward *et al.*, 2019). This species has high sensitivity to collision during the breeding season (Bradbury *et al.*, 2014). However, connectivity is likely to be limited, any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone
×h	This species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone.

End of Matrix 43

© WSP UK Limited

48. Matrix 44: Ouessant-Molène Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Ouessant-Molène (FR) SPA																					
EU Code:	FR5310072																					
Distance to Proposed Development	377.71 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater		Xa			Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Fulmar		Xa			Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill																					
Turnstone																					
Purple sandpiper																					
Cory's shearwater																					
Great skua																					
Ringed plover																					
Hen harrier																					
Little egret																					
Peregrine falcon																					
Puffin																					
Red-throated diver																					

Cont. on next page

© WSP UK Limited

Matrix 44: Ouessant-Molène (FR) SPA (Cont.)

Name of European site:	Ouessant-Molène (FR) SPA																					
EU Code:	FR5310072																					
Distance to Proposed Development	377.7 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Black-throated diver																					
Great Northern diver																					
Oystercatcher																					
European storm petrel																					
Herring gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Gannet																					
Whimbrel																					
Leach's European storm petrel																					
Shag																					
Cormorant																					
Grey plover																					

Cont. on next page

© WSP UK Limited

Matrix 44: Ouessant-Molène (FR) SPA (Cont.)

Name of European site:	Ouessant-Molène (FR) SPA																					
EU Code:	FR5310072																					
Distance to Proposed Development	377.7km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Balearic shearwater																					
Sooty shearwater																					
Chough																					
Kittiwake																					
Pomarine skua																					
Common tern																					
Roseate tern																					
Little tern																					
Sandwich tern																					
Shelduck																					
Ringed plover																					
Guillemot																					

Cont. on next page

© WSP UK Limited

Matrix 44: Ouessant-Molène (FR) SPA (Cont.)

Evidence Supporting Conclusions

X	a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 44

© WSP UK Limited

49. Matrix 45: Camaret Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Camaret (FR) SPA																					
EU Code:	FR5312004																					
Distance to Proposed Development	386.8km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar		×a			×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Peregrine falcon																					
Raven																					
European storm petrel																					
Herring gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Shag																					
Cormorant																					
Chough																					
Kittiwake																					
Guillemot																					

Cont. on next page

© WSP UK Limited

Matrix 45: Camaret (FR) SPA (Cont.)

Evidence Supporting Conclusions

X	a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 45

© WSP UK Limited

50. Matrix 46: Iles Houat-Hoëdic Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Iles Houat-Hoëdic (FR) SPA																						
EU Code:	FR5312011																						
Distance to Proposed Development	390.7 km to Array																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater		×a			×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Great-northern diver																					
Black-throated diver																					
Fulmar																					
Herring gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Shag																					
Balearic shearwater																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 46

© WSP UK Limited

51. Matrix 47: Cap Sizun Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Cap Sizun (FR) SPA																						
EU Code:	FR5310055																						
Distance to Proposed Development	399.3km to Array																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater		Xa			Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Fulmar		Xa			Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
European storm petrel																					
Herring gull																					
Lesser black-backed gull																					
Great black-backed gull																					
Shag																					
Kittiwake																					
Shelduck																					
Guillemot																					
Razorbill																					
Chough																					

Cont. on next page

© WSP UK Limited

Matrix 47: Cap Sizun (FR) SPA (Cont.)

Evidence Supporting Conclusions

Xa	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 47

© WSP UK Limited

52. Matrix 48: Isles of Scilly Special Protection Area - HRA Screening- Rampion 2

Name of European site:	**Isles of Scilly (UK) SPA**																					
EU Code:	**UK9020288**																					
Distance to Proposed Development	**405.2 km to Array**																					
Likely Effects of Proposed Development																						
Effects	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
European storm petrel							Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Manx shearwater							Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Fulmar							Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Great black-backed gull																					
Herring gull																					
Guillemot																					
Kittiwake																					
Lesser black-backed gull																					
Razorbill																					
Common tern																					
Shag																					
Cormorant																					
Puffin																					

© WSP UK Limited

Isles of Scilly SPA (Cont.)

Evidence Supporting Conclusions

×a	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 48

© WSP UK Limited

53. Matrix 49: Isles of Scilly Ramsar - HRA Screening - Rampion 2 Offshore Windfarm

Name of European site:	**Isles of Scilly (UK) Ramsar**																						
EU Code:	**UK11033**																						
Distance to Proposed Development	**406.2km to Array**																						
Likely Effects of Proposed Development																							
EffectS	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
European storm petrel		Xa					Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Manx shearwater		Xa					Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Fulmar		Xa					Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Great black-backed gull																					
Herring gull																					
Guillemot																					
Kittiwake																					
Lesser black-backed gull																					
Razorbill																					
Common tern																					
Shag																					
Cormorant																					
Puffin																					

Cont. on next page

© WSP UK Limited

Isles of Scilly Ramsar (Cont.)

Evidence Supporting Conclusions

×a	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 51

© WSP UK Limited

54. Matrix 50: Northumbria Coast Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Northumbria Coast (UK) SPA**																						
EU Code:	**UK9006131**																						
Distance to Proposed Development	**439.7km from Offshore Cable Corridor**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Arctic tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Purple sandpiper																					
Little tern																					
Turnstone																					

Evidence Supporting Conclusions

×a Species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for Rampion 2 to cause LSE acting alone. **No LSE** is concluded.

×b The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

✓c Species may be sensitive to collision risk during the non-breeding bio-seasons. Connectivity is likely to be limited and any effect from the project alone, likely to be trivial and inconsequential. However, Rampion 2 could contribute to significant effects in-combination with other plans and projects, notably, other operational and planned offshore windfarms. A finding of potential LSE from effects acting in=combination is concluded.

End of Matrix 50

© WSP UK Limited

55. Matrix 51: Northumbria Coast Ramsar - HRA Screening - Rampion 2

Name of European site:	**Northumbria Coast (UK) Ramsar**																						
EU Code:	**UK9006131**																						
Distance to Proposed Development	**439.7km from Offshore Cable Corridor**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Arctic tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	√c	×b
Purple sandpiper																					
Little tern																					
Turnstone																					

Evidence Supporting Conclusions

×a Species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for Rampion 2 to cause LSE acting alone. **No LSE** is concluded.

×b The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

√c Species may be sensitive to collision risk during the non-breeding bio-seasons. Connectivity is likely to be limited and any effect from the project alone, likely to be trivial and inconsequential. However, Rampion 2 could contribute to significant effects in-combination with other plans and projects, notably, other operational and planned offshore winfarms. A finding of potential LSE from effects acting in=combination is concluded.

End of Matrix 51

© WSP UK Limited

56. Matrix 52: Coquet Island Special Protection Area (SPA). HRA Screening - Rampion 2 Offshore Windfarm

Name of European site:	**Coquet Island (UK) SPA**																						
EU Code:	**UK9006031**																						
Distance to Proposed Development:	**508.5 km from Offshore Cable Corridor**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sandwich tern (designated feature and seabird assemblage)					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Artic tern (designated feature and seabird assemblage)					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Common tern (designated feature and seabird assemblage)					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Herring gull (component of seabird assemblage only)					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Lesser black-backed gull (seabird assemblage only)					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Kittiwake (component of seabird assemblage only)					×a		×b		×b		×b			×b		×b	×b	×b	×b	✓c	×b
Fulmar (component of seabird assemblage only)					×b		×b		×b		×b			×b		×b	×b	×b	×b	×b	×b
Puffin (component of seabird assemblage only)																					
Black-headed gull (component of seabird assemblage only)	x																				
Roseate tern (designated feature and seabird assemblage)																					
Internationally important seabird assemblage of over 20,000 individuals Including the 4 qualifying species listed above plus: Atlantic puffin and black-headed gull as main components.																					

© WSP UK Limited

Coquet Island SPA (cont.)

Evidence Supporting Conclusions

×a	Species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for Rampion 2 to cause LSE acting alone. **No LSE** is concluded.
×b	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and/or species sensitivity means that the severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.
✓c	Species may be sensitive to collision risk during the non-breeding bio-seasons. Connectivity is likely to be limited and any effect from the project alone, likely to be trivial and inconsequential. However, Rampion 2 could contribute to significant effects in-combination with other plans and projects, notably, other operational and planned offshore windfarms. A finding of **potential LSE** from effects acting in=combination is concluded.

End of Matrix 52

© WSP UK Limited

57. Matrix 53: Farne Islands Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Farne Islands (UK) SPA**																						
EU Code:	**UK9006021**																						
Distance to Proposed Development	**555.0 km from Array**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sandwich tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	√c	×b
Kittiwake					×a		×b		×b		×b			×b		×b	×b	×b	×b	√c	×b
Guillemot																×d	×d	×d	√c	√c	√c
Common tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	√c	×b
Arctic tern					×a		×b		×b		×b			×b		×b	×b	×b	×b	√c	×b
Common shag																					
Cormorant																					
Puffin																					
Roseate tern																					
Internationally important seabird assemblage of over 20,000 individuals including Common tern Arctic tern, Roseate tern, Sandwich tern, Common guillemot, puffin cormorant, shag, kittiwake.																					

Evidence Supporting Conclusions (on next page)

© WSP UK Limited

Farne Islands SPA (cont.)

Evidence Supporting Conclusions

✗a	Species may be sensitive to collision risk during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for Rampion 2 to cause LSE acting alone. No LSE is concluded.
✗b	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination. No LSE is concluded.
✓c	The magnitude of the potential (non-significant) effects identified could act in-combination with other plans and projects resulting in a greater level of impact than for Rampion 2 acting alone. Based on evidence that this feature could potentially interact with Rampion 2, particularly during migration, LSE cannot be discounted on current information for Rampion 2 operating with other offshore wind farms. Potential for Likely Significant Effects In-combination (LSEI).
✗d	Species may be sensitive to displacement during the non-breeding bio-seasons. However, connectivity is likely to be limited and any effect is likely to be trivial and inconsequential. There is no potential for LSE from the Proposed Development acting alone

End of Matrix 53

© WSP UK Limited

58. Matrix 54: St Abb's Head to Fast Castle Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**St Abb's Head to Fast Castle (UK) SPA**																					
EU Code:	**UK9004271**																					
Distance to Proposed Development:	**576.3 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Razorbill					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Herring gull					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Kittiwake					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Guillemot					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Shag																					

Evidence Supporting Conclusions

X[a] The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 54

© WSP UK Limited

59. Matrix 55: Outer Firth of Forth & St Andrews Bay Complex Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Outer Firth of Forth and St Andrews Bay Complex (UK) pSPA**																					
EU Code:	**UK9020316**																					
Distance to Proposed Development:	**593.1 km to Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Gannet					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Guillemot					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Herring gull					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Kittiwake					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Manx shearwater																					
Eider																					
Arctic tern*																					
Goldeneye																					

*Breeding location in adjacent SPAs (in this instance, the Forth Islands SPA).

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

Cont. on next page

© WSP UK Limited

Matrix 55: Outer Firth of Forth and St Andrews Bay Complex (pSPA (cont.)

Name of European site:	**Outer Firth of Forth and St Andrews Bay Complex (UK) pSPA**
EU Code:	**UK9020316**
Distance to Proposed Development:	**593.1 km to Array**
Likely Effects of Proposed Development	

Effect	Collision risk (breeding)			Collision risk (migration)			Changes in prey availability & behaviour			Indirect impacts via effects on prey			Barrier effect			Direct disturbance and displacement			In-combination		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Long-tailed duck																					
Black-headed gull																					
Puffin																					
Razorbill																					
Red-breasted merganser																					
Red-throated diver																					
Shag																					
Slavonian grebe																					
Common gull																					
Common scoter																					
Common tern*																					
Little gull																					
Velvet scoter																					
Seabird assemblage- Non-breeding **																					
Seabird assemblage- Breeding **																					
Waterbird assemblage- Non-breeding**																					

**species not listed in SPA criteria

End of Matrix 55

© WSP UK Limited

60. Matrix 56: Imperial Dock Lock, Leith Special Protection Area (SPA). HRA Screening - Rampion 2

Name of European site:	**Imperial Dock Lock, Leith (UK) SPA**																					
EU Code:	**UK9004451**																					
Distance to Proposed Development	**602.1km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 56

© WSP UK Limited

61. Matrix 57: Deenish Island and Scariff Island Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Deenish Island and Scariff Island (IE) SPA																					
EU Code:	IE0004175																					
Distance to Proposed Development	680.3 km to Array																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Fulmar																					
European storm petrel																					
Lesser black-backed gull																					
Arctic tern																					

Evidence Supporting Conclusions

X[a] The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 57

© WSP UK Limited

62. Matrix 58: Fowlsheugh Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Fowlsheugh (UK) SPA**																						
EU Code:	**UK9002271**																						
Distance to Proposed Development	**686 km from Offshore Cable Corridor**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Herring gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 58

© WSP UK Limited

63. Matrix 59: Puffin Island Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Puffin Island (IE) SPA**																						
EU Code:	**UK11033**																						
Distance to Proposed Development	**406.2 km to Array**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Fulmar																					
European storm petrel																					
Lesser black-backed gull																					
Razorbill																					
Puffin																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 59

© WSP UK Limited

64. Matrix 60: Skelligs Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Skelligs (IE) SPA**																						
EU Code:	**IE0004007**																						
Distance to Proposed Development	**701 km to Array**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater					✕a		✕a		✕a		✕a			✕a		✕a	✕a	✕a	✕a	✕a	✕a
Fulmar																					
European storm petrel																					
Gannet																					
Kittiwake																					
Guillemot																					
Puffin																					

Evidence Supporting Conclusions

✕a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 60

© WSP UK Limited

65. Matrix 61: Blasket Island Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Blasket Island (IE) SPA**																					
EU Code:	**IE0004008**																					
Distance to Proposed Development:	**706km to Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater				Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa	Xa
Fulmar																					
European storm petrel																					
Shag																					
Lesser black-backed gull																					
Herring gull																					
Kittiwake																					
Arctic tern																					
Razorbill																					
Puffin																					
Chough																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 61

© WSP UK Limited

66. Matrix 62: Cruagh Island Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Cruagh Island (IE) SPA**																					
EU Code:	**IE0004170**																					
Distance to Proposed Development	**724km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Barnacle goose																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 62

© WSP UK Limited

67. Matrix 63: Ythan Estuary, Sands of Forvie & Meikle Loch Special Protection Area - HRA Screening - Rampion 2

Name of European site:																						
EU Code:																						
Distance to Proposed Development																						
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Sandwich tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Pink-footed goose																					
Little tern																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 63

© WSP UK Limited

68. Matrix 64: Ythan Estuary, Sands of Forvie and Meikle Loch Special Ramsar - HRA Screening - Rampion 2

Name of European site:	**Ythan Estuary and Meikle Loch (UK) Ramsar**																					
EU Code:	**UK13061**																					
Distance to Proposed Development	**729.8 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Sandwich tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Pink-footed goose																					
Little tern																					

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 64

© WSP UK Limited

69. Matrix 65: Buchan Ness to Collieston Coast Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Buchan Ness to Collieston Coast (UK) SPA																					
EU Code:	UK9002491																					
Distance to Proposed Development	731.2 km from Offshore cable corridor																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Herring gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Shag																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 65

© WSP UK Limited

70. Matrix 66: Loch of Strathbeg (UK) Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Loch of Strathbeg (UK) SPA																					
EU Code:	UK9002211																					
Distance to Proposed Development	762.4 km from Offshore cable corridor																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sandwich tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Pink-footed goose					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Greylag goose					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Barnacle goose					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Teal					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Goldeneye					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Whooper swan					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 66

© WSP UK Limited

71. Matrix 67: Loch of Strathbeg Ramsar - HRA Screening - Rampion 2

Name of European site:	**Loch of Strathbeg (UK) SPA**																					
EU Code:	**UK9002211**																					
Distance to Proposed Development	**762.5 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sandwich tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Pink-footed goose					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Greylag goose					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Barnacle goose					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Teal					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Goldeneye					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Whooper swan					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 67

© WSP UK Limited

72. Matrix 68: Troup, Pennan and Lion's Head Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Troup, Pennan and Lion's Head (UK) SPA**																					
EU Code:	**UK9002471**																					
Distance to Proposed Development	**772 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Herring gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 68

© WSP UK Limited

73. Matrix 69: Rum Special Protection Area - HRA Screening - Rampion 2

Name of European site:	Rum (UK) SPA																					
EU Code:	UK9001341																					
Distance to Proposed Development	772.8 km from offshore cable corridor																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-throated diver					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Manx shearwater					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Golden eagle																					

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 69

© WSP UK Limited

74. Matrix 70: Inner Moray Firth Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Inner Moray Firth (UK) SPA**																					
EU Code:	**UK9001624**																					
Distance to Proposed Development	**780.2 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Greylag goose																					
Wigeon																					
Teal																					
Greater scaup																					
Goldeneye																					
Red-breasted merganser																					
Goosander																					
Osprey																					
Oystercatcher																					
Curlew																					
Redshank																					
Cormorant																					

Evidence Supporting Conclusions (on next page)

© WSP UK Limited

Matrix 70: Inner Moray Firth (cont.)

Evidence Supporting Conclusions

×a	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 70

© WSP UK Limited

75. Matrix 71: Inner Moray Firth Ramsar - HRA Screening - Rampion 2

Name of European site:	**Inner Moray Firth (UK) Ramsar**																					
EU Code:	**UK13025**																					
Distance to Proposed Development	**780.2 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Greylag goose																					
Wigeon																					
Teal																					
Greater scaup																					
Goldeneye																					
Red-breasted merganser																					
Goosander																					
Osprey																					
Oystercatcher																					
Curlew																					
Redshank																					
Cormorant																					

Evidence Supporting Conclusions (on next page)

© WSP UK Limited

Inner Moray Firth (cont.)

Evidence Supporting Conclusions

X	a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 71

© WSP UK Limited

76. Matrix 72: Cromarty Firth Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Cromarty Firth (UK) SPA**																					
EU Code:	**UK9001623**																					
Distance to Proposed Development	**794.5 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Greylag goose																					
Wigeon																					
Pintail																					
Greater scaup																					
Common tern																					
Greylag goose																					
Wigeon																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

Cont. on next page

© WSP UK Limited

Cromarty Firth SPA (cont.)

Evidence Supporting Conclusions

Name of European site:	**Cromarty Firth (UK) SPA**																					
EU Code:	**UK9001623**																					
Distance to Proposed Development	**794.5 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Greater scaup																					
Osprey																					
Oystercatcher																					
Bar-tailed godwit																					
Curlew																					
Redshank																					
Whooper swan																					
Red knot																					
Dunlin																					
Pintail																					

End of Matrix 72

© WSP UK Limited

77. Matrix 73: Cromarty Firth Ramsar - HRA Screening - Rampion 2

Name of European site:	**Cromarty Firth (UK) Ramsar**																					
EU Code:	**UK13009**																					
Distance to Proposed Development	**794.5km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Greylag goose																					
Wigeon																					
Pintail																					
Greater scaup																					
Common tern																					
Greylag goose																					
Wigeon																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

Cont. on next page

© WSP UK Limited

Cromarty Firth Ramsar (cont.)

Evidence Supporting Conclusions

Name of European site:	**Cromarty Firth (UK) Ramsar**																					
EU Code:	**UK13009**																					
Distance to Proposed Development	**794.5km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Greater scaup																					
Osprey																					
Oystercatcher																					
Bar-tailed godwit																					
Curlew																					
Redshank																					
Whooper swan																					
Red knot																					
Dunlin																					
Pintail																					

End of Matrix 73

© WSP UK Limited

78. Matrix 74: East Caithness Cliffs Special Protection Area - HRA Screening – Rampion 2

Name of European site:	**East Caithness Cliffs (UK) SPA**																					
EU Code:	**UK9001182**																					
Distance to Proposed Development	**836.7km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Herring gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Great black-backed gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Peregrine falcon																					
Shag																					
Cormorant																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 74

© WSP UK Limited

79. Matrix 75: North Caithness Cliffs Special Protection Area (SPA). HRA Screening - Rampion 2

Name of European site:	**North Caithness Cliffs (UK) SPA**																					
EU Code:	**UK9001181**																					
Distance to Proposed Development	**879.5 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake																					
Herring gull																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 75

© WSP UK Limited

80. Matrix 76: Pentland Firth Islands Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Pentland Firth Islands (UK) SPA**																				
EU Code:	**UK9001131**																				
Distance to Proposed Development	**890.5 km from Offshore Cable Corridor**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Arctic tern					X a		X a		X a		X a			X a		X a	X a	X a	X a	X a	X a

Evidence Supporting Conclusions

X a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 76

© WSP UK Limited

81. Matrix 77: Hoy Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Hoy (UK) SPA**																					
EU Code:	**UK9002141**																					
Distance to Proposed Development	**902.2km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Red-throated diver					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Great black-backed gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Peregrine falcon																					
Arctic skua																					
Great skua																					
Puffin																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 77

© WSP UK Limited

82. Matrix 78: Copinsay Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Copinsay (UK) SPA**																					
EU Code:	**UK9002151**																					
Distance to Proposed Development	**908.2 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Great black-backed gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 78

© WSP UK Limited

83. Matrix 79: Auskerry Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Auskerry (UK) SPA**																				
EU Code:	**UK9002381**																				
Distance to Proposed Development	**924.2 km from Offshore Cable Corridor**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
European storm petrel					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 79

© WSP UK Limited

84. Matrix 80: St Kilda Special *Protection* Area - HRA Screening - Rampion 2

Name of European site:	**St Kilda (UK) SPA**																					
EU Code:	**UK9001031**																					
Distance to Proposed Development	**926.8 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Manx shearwater					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
European storm petrel					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Leach's storm petrel					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Gannet					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Great skua																					
Puffin																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 80

© WSP UK Limited

85. Matrix 81: Marwick Head Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Marwick Head (UK) SPA**																					
EU Code:	**UK9002121**																					
Distance to Proposed Development	**939.6 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 81

© WSP UK Limited

86. Matrix 82: Rousay Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Rousay (UK) SPA**																					
EU Code:	**UK9002371**																					
Distance to Proposed Development	**942 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic skua																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure and severity of effects that might occur at population level to this SPA. It is determined that significant effects would not therefore manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 82

© WSP UK Limited

87. Matrix 83: Calf of Eday Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Calf of Eday (UK) SPA**																					
EU Code:	**UK9002431**																					
Distance to Proposed Development	**945.9km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Great black-backed gull					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Cormorant																					

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 83

© WSP UK Limited

88. Matrix 84: Sule Skerry and Sule Stack Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Sule Skerry and Sule Stack (UK) SPA**																					
EU Code:	**UK9002181**																					
Distance to Proposed Development	**946.4 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
European storm petrel					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Leach's storm petrel					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Gannet					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Guillemot					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Shag																					
Puffin																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 84

© WSP UK Limited

89. Matrix 85: West Westray Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Sule Skerry and Sule Stack (UK) SPA**																					
EU Code:	**UK9002181**																					
Distance to Proposed Development	**946.4 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic skua																					

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 85

© WSP UK Limited

90. Matrix 86: Papa Westray (North Hill and Holm) Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Papa Westray (North Hill and Holm) (UK) SPA**																					
EU Code:	**UK9002111**																					
Distance to Proposed Development	**976.6 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Arctic tern					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Arctic Skua																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 86

© WSP UK Limited

91. Matrix 87: Fair Isle Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Fair Isle (UK) SPA**																					
EU Code:	**UK9002091**																					
Distance to Proposed Development	**969.2km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Gannet					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Shag																					
Arctic skua																					
Puffin																					
Fair Isle wren																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 87

© WSP UK Limited

92. Matrix 88: Sumburgh Head Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Sumburgh Head (UK) SPA**																					
EU Code:	**UK9002511**																					
Distance to Proposed Development	**1006.4 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 88

© WSP UK Limited

93. Matrix 89: Noss Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Noss (UK) SPA**																					
EU Code:	**UK9002081**																					
Distance to Proposed Development	**1037 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					✕a		✕a		✕a		✕a			✕a		✕a	✕a	✕a	✕a	✕a	✕a
Gannet					✕a		✕a		✕a		✕a			✕a		✕a	✕a	✕a	✕a	✕a	✕a
Guillemot					✕a		✕a		✕a		✕a			✕a		✕a	✕a	✕a	✕a	✕a	✕a
Kittiwake					✕a		✕a		✕a		✕a			✕a		✕a	✕a	✕a	✕a	✕a	✕a
Great skua					✕a		✕a		✕a		✕a			✕a		✕a	✕a	✕a	✕a	✕a	✕a
Puffin					✕a		✕a		✕a		✕a			✕a		✕a	✕a	✕a	✕a	✕a	✕a

Evidence Supporting Conclusions

✕a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 89

© WSP UK Limited

94. Matrix 90: Foula Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Foula (UK) SPA**																				
EU Code:	**UK9002061**																				
Distance to Proposed Development	**1038.1 km from Offshore Cable Corridor**																				
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Red-throated diver					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Leach's storm petrel					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Razorbill					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic skua																					
Great skua																					
Shag																					
Puffin																					

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 90

© WSP UK Limited

95. Matrix 91: Papa Stour Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Papa Stour (UK) SPA**																					
EU Code:	**UK9002051**																					
Distance to Proposed Development	**1075.5 km from Offshore Cable Corridor**																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Arctic tern					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Ringed plover																					

Evidence Supporting Conclusions

X[a] The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 91

© WSP UK Limited

96. Matrix 92: Ronas Hill North Roe and Tingon Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Ronas Hill - North Roe and Tingon (UK) SPA**																					
EU Code:	**UK9002041**																					
Distance to Proposed Development	**1082.2 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-throated diver					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Great skua																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 92

© WSP UK Limited

97. Matrix 93: Ronas Hill - North Roe and Tingon Ramsar - HRA Screening - Rampion 2

Name of European site:	**Ronas Hill - North Roe and Tingon (UK) Ramsar**																					
EU Code:	**UK13054**																					
Distance to Proposed Development	**1082.3 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-throated diver					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Great skua																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 93

© WSP UK Limited

98. Matrix 94: Otterswick and Graveland Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Otterswick and Graveland (UK) SPA**																					
EU Code:	**UK9002941**																					
Distance to Proposed Development	**1083.4 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-throated diver					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 94

© WSP UK Limited

99. Matrix 95: Fetlar Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Fetlar (UK) SPA**																					
EU Code:	**UK9002031**																					
Distance to Proposed Development	**1084.7 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Red-necked phalarope																					
Arctic skua																					
Great skua																					
Whimbrel																					
Dunlin																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 95

© WSP UK Limited

100. Matrix 96: Ramna Stacks and Gruney Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Ramna Stacks and Gruney (UK) SPA**																				
EU Code:	**UK9002021**																				
Distance to Proposed Development	**1097.6 km from Offshore Cable Corridor**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Leach's storm petrel					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 96

© WSP UK Limited

101. Matrix 97: Hermaness, Saxa Vord & Valla Field Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Hermaness, Saxa Vord and Valla Field (UK) SPA**																					
EU Code:	**UK9002011**																					
Distance to Proposed Development	**1104.4 km from Offshore Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Red-throated diver					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Gannet					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Kittiwake					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Guillemot					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Shag																					
Great skua																					
Puffin																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 97

© WSP UK Limited

102. Matrix 98: Copeland Islands Special Protection Area - HRA Screening Rampion 2

Name of European site:	**Copeland Islands (UK) SPA**																					
EU Code:	**UK9020291**																					
Distance to Proposed Development	**544.4 km to Export Cable Corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Manx shearwater					X a		X a		X a		X a			X a		X a	X a	X a	X a	X a	X a
Arctic tern																					

Evidence Supporting Conclusions

X a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 98

© WSP UK Limited

103. Matrix 99: Caithness and Sutherland Peatlands Special Protection Area - HRA Screening – Rampion 2

Name of European site:	**Caithness and Sutherland Peatlands (UK) SPA**																						
EU Code:	**UK9001151**																						
Distance to Proposed Development	**841.4km to offshore Export Cable Corridor**																						
Likely Effects of Proposed Development																							
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-throated diver					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Black-throated diver																					
Wigeon																					
Common scoter																					
Hen harrier																					
Golden eagle																					
Merlin																					
Golden plover																					
Greenshank																					
Wood sandpiper																					
Short-eared owl																					
Dunlin																					

© WSP UK Limited

Evidence Supporting Conclusions

Xa	The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 99

© WSP UK Limited

104. Matrix 100: Caithness and Sutherland Peatlands Ramsar - HRA Screening - Rampion 2

Name of European site:	**Caithness and Sutherland Peatlands (UK) Ramsar**																					
EU Code:	**UK13003**																					
Distance to Proposed Development	**841.3km to Export cable corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-throated diver					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Black-throated diver																					
Wigeon																					
Common scoter																					
Hen harrier																					
Golden eagle																					
Merlin																					
Golden plover																					
Greenshank																					
sandpiper																					
Short-eared owl																					
Dunlin																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 100

© WSP UK Limited

105. Matrix 101: Orkney Mainland Moors Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Orkney Mainland Moors (UK) SPA**																					
EU Code:	**UK9002311**																					
Distance to Proposed Development	**920.9 km to Offshore cable corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-throated diver					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a
Hen harrier																					
Short-eared owl																					

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 101

© WSP UK Limited

106. Matrix 102: Mousa Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Mousa (UK) SPA**																				
EU Code:	**UK9002361**																				
Distance to Proposed Development	**1023.6 km to Offshore export cable**																				
Likely Effects of Proposed Development																					
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
European storm petrel					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Arctic tern					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa

Evidence Supporting Conclusions

Xa — The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 102

© WSP UK Limited

107. Matrix 103: Tips of Corsemaul and Tom Mor Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Tips of Corsemaul and Tom Mor (UK) SPA**																					
EU Code:	**UK9002811**																					
Distance to Proposed Development	**754.4 km to Offshore export cable**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common gull					×a		×a		×a		×a			×a		×a	×a	×a	×a	×a	×a

Evidence Supporting Conclusions

×a The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 103

© WSP UK Limited

108. Matrix 104: North Rona and Sula Sgeir Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**North Rona and Sula Sgeir (UK) SPA**																					
EU Code:	**UK9001011**																					
Distance to Proposed Development	**980.8km from Offshore cable corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Gannet					X[a]		X[a]		X[a]		X[a]			X[a]		X[a]	X[a]	X[a]	X[a]	X[a]	X[a]
Fulmar																					
Leach's storm petrel																					
European storm petrel																					
Kittiwake																					
Great black-backed gull																					
Guillemot																					
Razorbill																					
Puffin																					

Evidence Supporting Conclusions

X[a] The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 104

© WSP UK Limited

109. Matrix 105: Ailsa Craig Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Ailsa Craig (UK) SPA**																					
EU Code:	**UK9003091**																					
Distance to Proposed Development	**577.6km from Offshore cable corridor**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Gannet					Xa		Xa		Xa		Xa			Xa		Xa	Xa	Xa	Xa	Xa	Xa
Herring gull																					
Lesser black-backed gull																					
Kittiwake																					
Guillemot																					
Gannet																					

Evidence Supporting Conclusions

Xa The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

End of Matrix 105

© WSP UK Limited

110. Matrix 106: Grassholm Special Protection Area - HRA Screening - Rampion 2

Name of European site:	**Grassholm (UK) SPA**																					
EU Code:	**UK9014041**																					
Distance to Proposed Development	**357.7 km from Array**																					
Likely Effects of Proposed Development																						
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Changes in prey availability and behaviour**			**Indirect impacts via effects on prey**			**Barrier effect**			**Direct disturbance and displacement (migration)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Gannet					✓a		×b		×b		×b			×b		×b	✓c	×b	×b	✓d	×b

Evidence Supporting Conclusions

✓a Species may be sensitive to collision risk during the non-breeding bio-seasons. Connectivity is likely to be limited and any effect trivial and inconsequential. However, the potential for LSE has been identified for this feature/site on a precautionary basis.

×b The significance of effects at a population level is considered to decrease with distance and the severity of the effect experienced locally. For these categories, the likelihood and or severity of the effect experienced locally is considered to be low and small to negligible. The relatively low densities of this species in the English Channel reduce the likelihood of exposure to and the severity of effects that might occur at population level. It is determined that LSE would not manifest on this distant SPA after the likelihood and severity of effects on the SPA have been diluted over distance and could only result in negligible effects in the wider environmental context either alone, or in-combination.

✓c Connectivity is likely to be limited and any effect trivial and inconsequential. However, the potential for LSE has been identified for this feature/site on a precautionary basis.

✓d Where potential for LSE has been concluded alone, potential for LSE has been concluded in-combination. Therefore, the potential for LSE is identified. No additional in-combination issues are identified.

End of Matrix 106

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

111. References

Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W.G. and Hume, D. (2014). Mapping seabird sensitivity to offshore wind farms. PLoS ONE 9:e106366.

British Trust for Ornithology (BTO), (2011). *Strategic Ornithological Support Services Proposed Development SOSS-05: Review of bird migration routes in relation to offshore wind farm development zones*. 592. BTO.

Carlson TJ, Ploskey G, Johnson RL, Mueller RP, Weiland MA, Johnson PN (2001) *Observations of the behavior and distribution of fish in relation to the Columbia River navigation channel and channel maintenance activities*. Pacific Northwest National Laboratory, Richland, p 35

Dierschke, V., Furness, R.W. & Garthe, S. (2016). Seabirds and offshore wind farms in European waters: Avoidance and attraction. Biological Conservation, 202, 59-68.

Furness. R. W, Wade. H. M, Masden. E. A, (2013). *Assessing vulnerability of marine bird populations to offshore wind farms*. Journal of Environmental Management. 119: 56-66.

Gill, A.B. and Kimber, J.A., 2005. The potential for cooperative management of elasmobranchs and offshore renewable energy development in UK waters. *Journal of the Marine Biological Association of the United Kingdom*, *85*(5), pp.1075-1081.

Griffin, L.R., Rees. E.C. & Hughes. B. (2016) Satellite-tracking of Bewick's swan migration in relation to offshore and onshore wind farm sites: final report. *The Wildfowl and Wetlands Trust, Slimbridge, Gloucestershire*.

Joint Nature Conservation Committee (JNCC), (2015). *Marine Habitat Classification for Britain and Ireland*. [Online] Available at: https://hub.jncc.gov.uk/assets/c1be5bce-e6d9-4584-97e4-6d5d189751a2 [Accessed 09 July 2024].

Madej MA, Wilzbach M, Cummins K, Ellis C, Hadden S (2007) *The significance of suspended organic sediments to turbidity, sediment flux, and fish-feeding behavior. USDA Forest Service General Technical Report* PSW–GTR–194, Albany, California, pp 383–385.

Natural England, (2018). *Natural England Offshore wind cabling: ten years experience and recommendations,* 24pp.

Planning Inspectorate (2020a). *Scoping Opinion: Proposed Rampion 2 Offshore Wind Farm.* [Online]. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010117/EN010117-000045-EN010117%20Scoping%20Opinion.pdf [Accessed 01 June 2023].

Planning Inspectorate, (2022). *Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects*. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-ten/ [Accessed 26 May 2023].

© WSP UK Limited

Rampion Extension Development, (2021). *Rampion 2 Offshore Wind Farm Environmental Impact Assessment Scoping Report*. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010117/EN010117-000006-EN010117%20-%20Scoping%20Report.pdf [Accessed 09 July 2024].

South Downs National Park Authority (SDNPA) and Natural England (2018). *Draft Sussex Bat Special Area of Conservation Planning and Landscape Scale Enhancement Protocol*. [Online]. Available at: https://www.southdowns.gov.uk/wp-content/uploads/2018/04/TLL-15-Draft-Sussex-Bat-SAC-Protocol.pdf [Accessed 01 June 2023].

South Downs National Park Authority (SDNPA) and Natural England (2018). *Draft Sussex Bat Special Area of Conservation Planning and Landscape Scale Enhancement Protocol*. [Online]. Available at: https://www.southdowns.gov.uk/wp-content/uploads/2018/04/TLL-15-Draft-Sussex-Bat-SAC-Protocol.pdf [Accessed 01 June 2023].

University of St Andrews and Natural Environment Research Council (2017). *Scientific Advice on Matters Related to the Management of Seal Populations: 2017*. [Online] Available at: https://www.smru.st-andrews.ac.uk/files/2018/01/SCOS-2017.pdf [Accessed: 09 July 2024].

Woodward, I, Thaxter, C.B., Owen, E. and Cook, A.S.C.P. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. BTO Research Report No. 724. December 2019. The British Trust for Ornithology.

Wright. J.L., Ross-Smith. V.H., Austin. G.E., Massimino. D., Dadam. D., Cook. A.S.C.P., Calbrade. N.A. & Burton. N.H.K. (2012) Assessing the risk of offshore wind farm development to migratory birds designated as features of UK Special Protection Areas (and other Annex 1 species). BTO Research Report no.592. Strategic Ornithological Support Services. Project SOSS-05.

Zeale, M. R. K., Davidson-Watts, I., & Jones, G. (2012). Home range use and habitat selection by barbastelle bats (Barbastella barbastellus): implications for conservation. Journal of Mammalogy, 93(4): 1110-1118

Rampion 2
WIND FARM



© WSP UK Limited

Appendix F
European sites information

© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix F

European site information



© WSP UK Limited

Contents

1.	**European Site Information**	**5**
1.1	The Arun Valley Ramsar	5
	Qualifying features	5
	The characteristics of the European site	6
	Conservation advice	6
1.2	The Arun Valley Special Protected Area (SPA)	7
	Qualifying features	7
	The characteristics of the European site	7
	Conservation advice	7
1.3	Pagham Harbour SPA	9
	Qualifying features	10
	The characteristics of the European site	11
	Conservation advice	11
1.4	Pagham Harbour Ramsar	12
	Qualifying features	12
	The characteristics of the European site	13
	Conservation advice	13
1.5	The Mens Special Area of Conservation (SAC)	13
	Qualifying features	14
	The characteristics of the European site	14
	Conservation advice	14
1.6	Solent and Isle of Wight lagoons SAC	15
	Qualifying features	16
	The characteristics of the European site	16
	Conservation advice	16
1.7	Portsmouth Harbour SPA	17
	Qualifying features	17
	The characteristics of the European site	18
	Conservation advice	18
1.8	Portsmouth Harbour Ramsar	19
	Qualifying features	19
	The characteristics of the European site	20
	Conservation advice	20
1.9	River Itchen SAC	21
	Qualifying features	21
	The characteristics of the European site	21
	Conservation advice	22
1.10	Solent Maritime SAC	23
	Qualifying features	23
	The characteristics of the European site	24

© WSP UK Limited

	Conservation advice	24
1.11	South Wight Maritime SAC	26
	Qualifying features	26
	The characteristics of the European site	26
	Conservation advice	26
1.12	Dungeness, Romney Marsh and Rye Bay SPA	27
	Qualifying features	28
	The characteristics of the European site	28
	Conservation advice	29
1.13	Solent and Dorset Coast SPA	30
	Qualifying features	31
	The characteristics of the European site	31
	Conservation advice	31
1.14	Chichester and Langstone Harbours SPA	32
	Qualifying features	33
	The characteristics of the European site	33
	Conservation advice	34
1.15	Chichester & Langstone Harbours Ramsar	35
	Qualifying features	35
	The characteristics of the European site	36
	Conservation advice	36
1.16	Solent and Southampton Water SPA	37
	Qualifying features	37
	The characteristics of the European site	38
	Conservation advice	38
1.17	Solent and Southampton Water Ramsar	39
	Qualifying features	40
	The characteristics of the European site	40
	Conservation advice	40
1.18	Medway Estuary and Marshes SPA	41
	Qualifying features	42
	The characteristics of the European site	42
	Conservation advice	42
1.19	Littoral seino-marin (FR) SPA	43
	Qualifying features	44
	The characteristics of the European site	45
	Conservation advice	46
1.20	Foulness (Mid-Essex Coast Phase 5) SPA	46
	Qualifying features	47
	The characteristics of the European site	47
	Conservation advice	48
1.21	Falaise du Bessin Occidental SPA	49
	Qualifying features	49
	The characteristics of the European site	50
	Conservation advice	50
1.22	Alderney West Coast and Burhou Islands Ramsar	51

© WSP UK Limited

	Qualifying features	52
	The characteristics of the European site	52
	Conservation advice	52
1.23	Alde-Ore Estuary (UK) SPA	53
	Qualifying features	53
	The characteristics of the European site	54
	Conservation advice	54
1.24	Alde-Ore Estuary (UK) Ramsar	55
	Qualifying features	56
	The characteristics of the European site	56
	Conservation advice	56
1.25	The Wash SPA	57
	Qualifying features	57
	The characteristics of the European site	58
	Conservation advice	58
1.26	Breydon Water SPA	60
	Qualifying features	60
	The characteristics of the European site	61
	Conservation advice	61
1.27	Greater Wash SPA	62
	Qualifying features	62
	The characteristics of the European site	63
	Conservation advice	63
1.28	North Norfolk Coast SPA	64
	Qualifying features	65
	The characteristics of the European site	65
	Conservation advice	66
1.29	North Norfolk Coast Ramsar	67
	Qualifying features	68
	The characteristics of the European site	68
	Conservation advice	69
1.30	Côte de Granit Rose-Sept Iles SPA	69
	Qualifying features	70
	The characteristics of the European site	71
	Conservation advice	71
1.31	Grassholm SPA	72
	Qualifying features	72
	The characteristics of the European site	73
	Conservation advice	73
1.32	Flamborough and Filey Coast SPA	74
	Qualifying features	75
	The characteristics of the European site	75
	Conservation advice	75
1.33	Northumbria Coast SPA	76
	Qualifying features	76
	The characteristics of the European site	77
	Conservation advice	77

© WSP UK Limited

1.34	Northumbria Coast Ramsar	78
	Qualifying features	79
	The characteristics of the European site	79
	Conservation advice	79
1.35	Coquet Island SPA	80
	Qualifying features	80
	The characteristics of the European site	81
	Conservation advice	81
1.36	Farne Islands SPA	82
	Qualifying features	82
	The characteristics of the European site	83
	Conservation advice	83
1.37	Glossary of terms and abbreviations	85
2.	**References**	**87**

© WSP UK Limited

1. European Site Information

This Appendix provides site-specific information for all of the designated sites considered in the draft Report to Inform Inappropriate Assessment (RIAA) at Stage Two (AA), including site characterisations, current conservation status and the conservation objectives.

1.1 The Arun Valley Ramsar

1.1.1 The Arun Valley Ramsar is of ornithological importance and also supports wetland invertebrate species that are listed as threatened or endangered, and four nationally rare and four nationally scarce plant species.

1.1.2 The site covers some 529ha (**Figure F-1**). The receptor groups *"wintering waterfowl*", "*breeding waders*" and "*wetland invertebrates*" are relevant to the Ramsar.

1.1.3 Key literature sources, including relevant project literature, are as follows:

- Arun Valley Ramsar Information Sheet on Ramsar Wetlands (dated December 1998) ;
- Ramsar Sites Information Service (dated December 1999);
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12); and
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22).

Qualifying features

1.1.4 The site is designated for the following Ramsar criteria:

- Criterion 2: The site holds seven wetland invertebrate species listed in the British Red Data Book as threatened. One of these, *Pseudamnicola confusa*, is considered to be endangered. The site also supports four nationally rare and four nationally scarce plant species.
- Criterion 3: In addition to the Red Data Book invertebrate and plant species, the ditches intersecting the site have a particularly diverse and rich flora. All five British duckweed *Lemna* species, all five water-cress Rorippa species, and all three British water milfoils (*Myriophyllum* species), all but one of the seven British water dropworts (*Oenanthe species*), and two-thirds of the British pondweeds (*Potamogeton species*) can be found on site.
- criterion 5: Species with peak counts in winter: 13,774 waterfowl (5-year peak mean 1998/99-2002/2003); and
- criterion 6: Species with peak counts in winter:

- Northern pintail, *Anas acuta*.

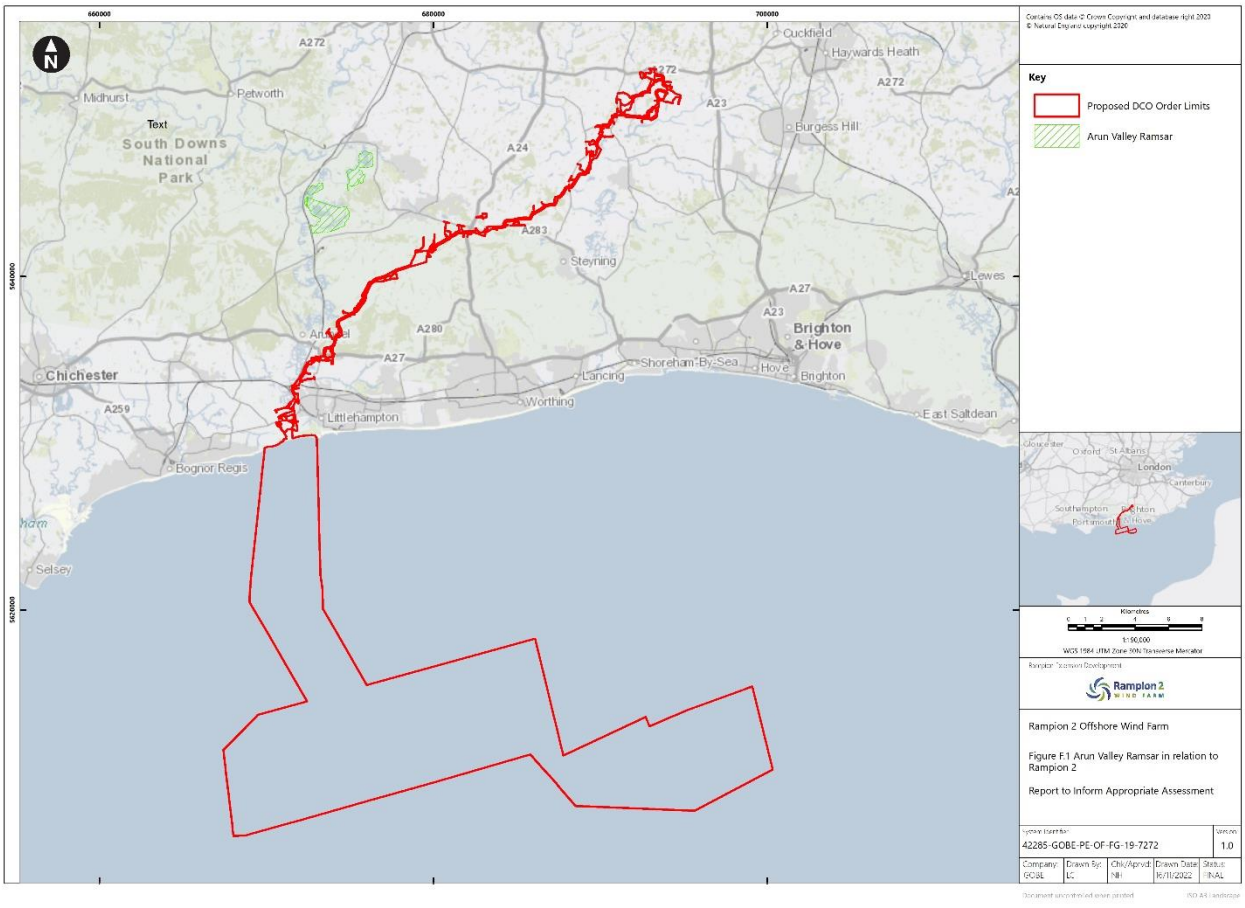
The characteristics of the European site

1.1.5 The Arun Valley Ramsar covers an area of wet meadows on the floodplain of the River Arun between Pulborough and Amberley. The area is subject to occasional flooding, dissected by a network of ditches, several of which support rich aquatic flora and invertebrate fauna. The site is of outstanding ornithological importance for wintering waterfowl and breeding waders. It supports seven wetland invertebrate species that are listed as threatened in Britain, one of which is endangered, and there are four nationally rare and four nationally scarce plant species.

Conservation advice

1.1.6 Much of the site is currently under appropriate management through organizations such as the Sussex Wildlife Trust and the Royal Society for the Protection of Birds, however, influencing private landowners on management issues will continue to be important.

Figure F-1 The Arun Valley Ramsar in relation to Rampion 2



© WSP UK Limited

1.2 The Arun Valley Special Protected Area (SPA)

1.2.1 The Arun Valley SPA is of ornithological importance and also supports wetland invertebrate species that are listed as threatened or endangered, and four nationally rare and four nationally scarce plant species.

1.2.2 The site covers some 529ha (**Figure F-2**). The receptor "wintering waterfowl", "breeding waders" and "wetland invertebrates" are relevant to the Ramsar.

1.2.3 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9);
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22).
- The Arun Valley SPA Citation (Natural England, 2014a) (dated May 2000); and
- The Arun Valley SPA Data Form (JNCC, 2015p) (dated December 2015).

Qualifying features

1.2.4 The site is designated for the following features:

- A037 *Cygnus columbianus bewickii*; Bewick's swan (non-breeding); and
- waterbird assemblages.

The characteristics of the European site

1.2.5 The Arun Valley SPA covers an area of wet meadows on the floodplain of the River Arun between Pulborough and Amberley. The area is subject to occasional flooding, dissected by a network of ditches, several of which support rich aquatic flora and invertebrate fauna. The site is of outstanding ornithological importance for wintering waterfowl and breeding waders. It supports seven wetland invertebrate species that are listed as threatened in Britain, one of which is endangered, and there are four nationally rare and four nationally scarce plant species.

Conservation advice

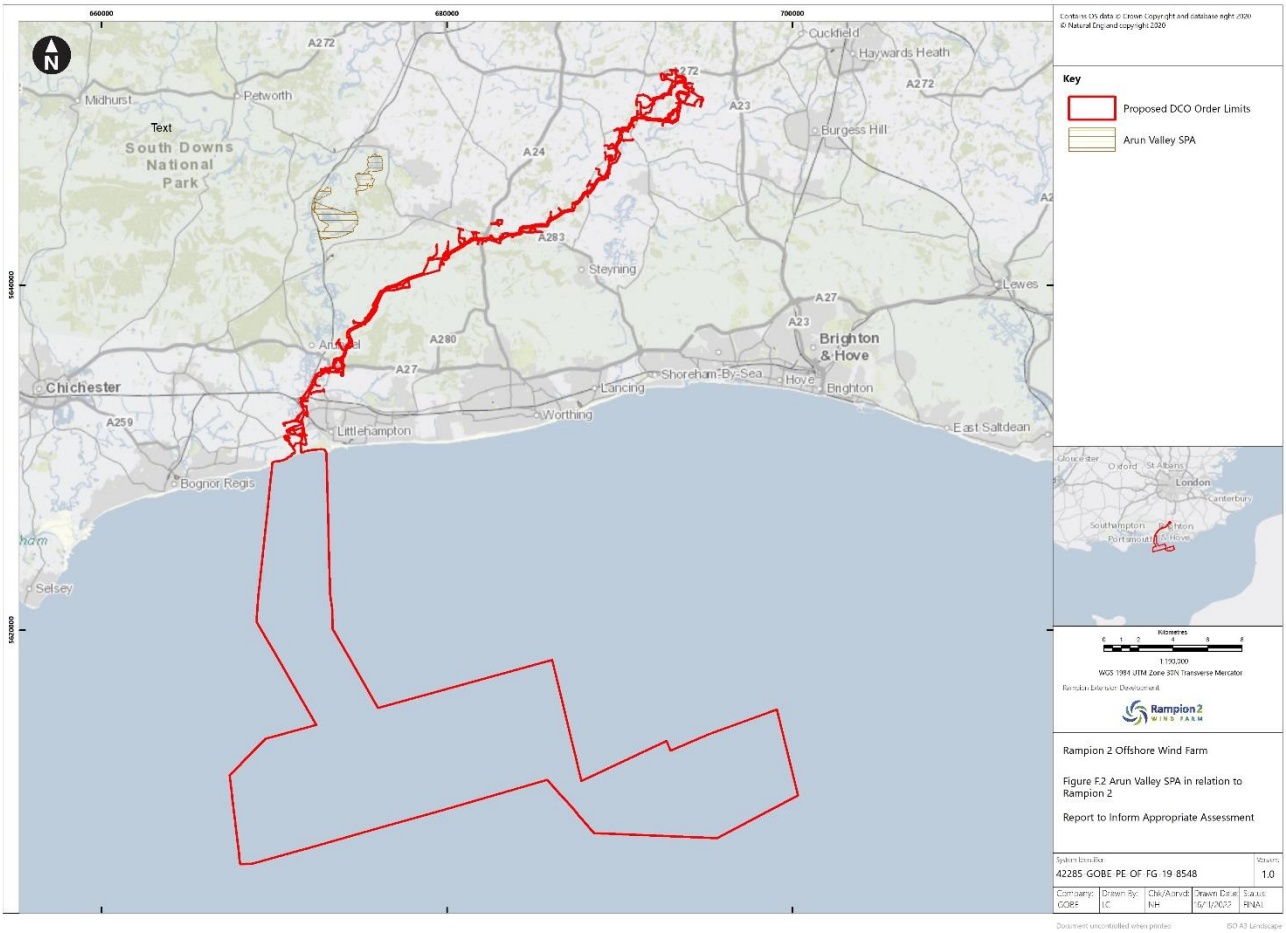
1.2.6 Advice on operations and Management measures can be found within:

- supplementary Advice on the Conservation Objectives (Natural England, 2014a) dated March 2019); and
- the Conservation Objectives (Natural England, 2014a) (dated February 2019).

1.2.7 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and,*
  - *the distribution of the qualifying features within the site."*

Figure F-2 The Arun Valley SPA in relation to Rampion 2



© WSP UK Limited

1.3 The Arun Valley Special Area of Conservation (SAC)

1.3.1 The Arun Valley SAC supports a range of habitats including inland waterbodies, bogs, marshes, water fringed vegetation and fens. These habitats are used by the lesser whirlpool ram's-horn snail *Anisus vorticulus* ('ramshorn snail').

1.3.2 The site covers some 529ha (**Figure F-2**). The receptor "ramshorn snail" is relevant to the SAC.

1.3.3 Key literature sources, including relevant project literature, are as follows:

- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22).
- The Arun Valley SPA Citation (Natural England, 2014a) (dated May 2000); and
- The Arun Valley SPA Data Form (JNCC, 2015p) (dated December 2015).

Qualifying features

1.3.4 The site is designated for the following features:

- A4056 *Anisus vorticulus*; ramshorn snail.

The characteristics of the European site

1.3.5 The Arun Valley SAC covers an area of wet meadows on the floodplain of the River Arun between Pulborough and Amberley. The area is subject to occasional flooding, dissected by a network of ditches, several of which support rich aquatic flora and invertebrate fauna. It supports seven wetland invertebrate species that are listed as threatened in Britain, one of which is endangered, and there are four nationally rare and four nationally scarce plant species.

Conservation advice

1.3.6 Advice on operations and Management measures can be found within:

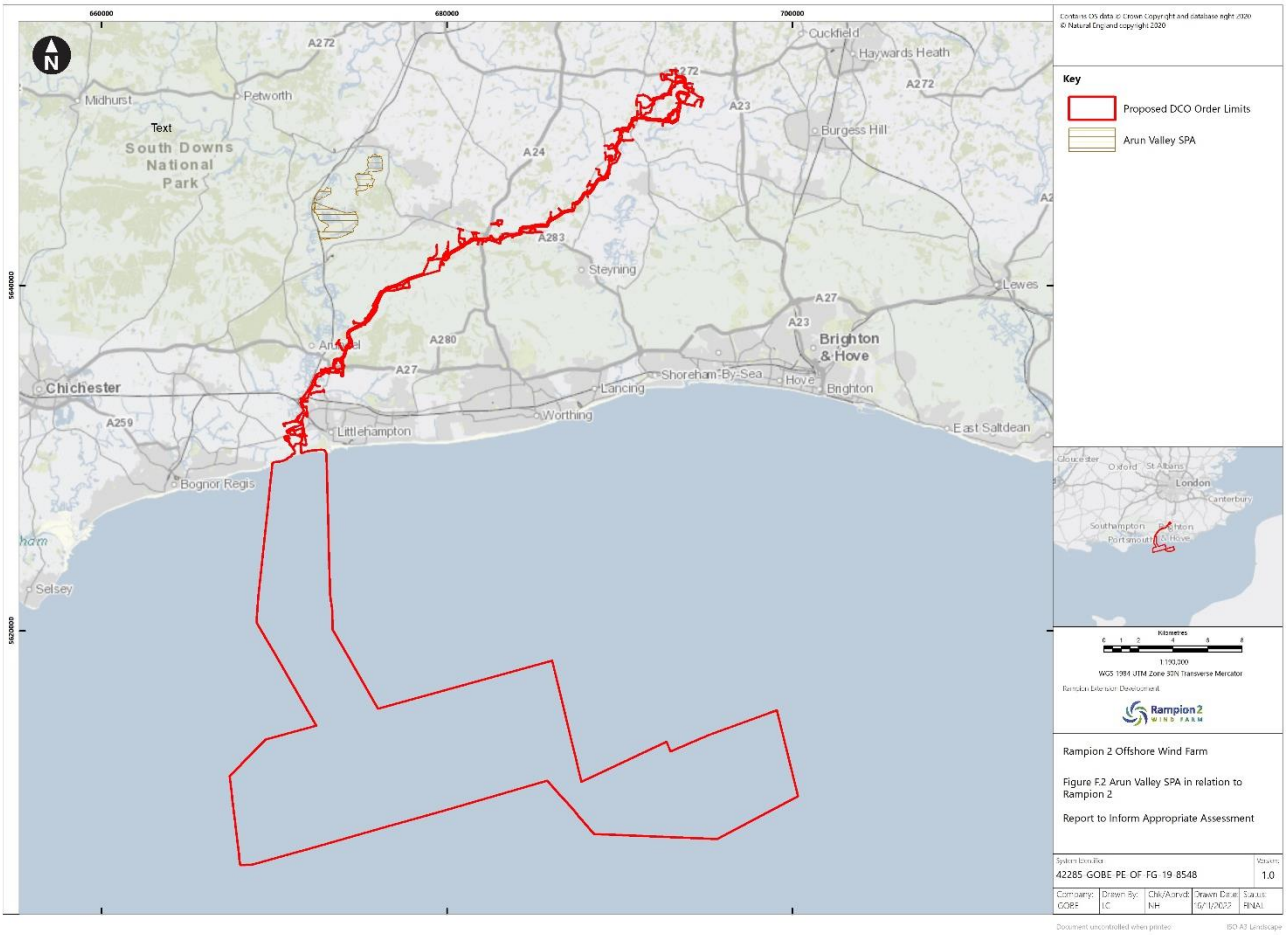
- supplementary Advice on conserving and restoring site features (Natural England, 2014a) dated March 2019); and
- the Conservation Objectives (Natural England, 2014a) (dated November 2018).

1.3.7 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining of restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and,*

- *the distribution of the qualifying features within the site."*

Figure F-3 The Arun Valley SAC in relation to Rampion 2



1.4 Pagham Harbour SPA

1.4.1 Pagham Harbour SPA is located South East of Chichester between Selsey and Bognor Regis and supports internationally important populations of regularly occurring Annex 1 bird species and regularly occurring migratory bird species. The site covers some 636.68ha (**Figure F-4**).

1.4.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- SPA Data form for Pagham Harbour SPA (dated February 1999) (Natural England, 2001); and
- Pagham Harbour SPA Citation (dated August 1998) (Natural England, 2014b)

Qualifying features

1.4.3 The Pagham Harbour SPA is designated for the following qualifying features:

- A046a *Branta bernicla bernicla*; Dark-bellied brent goose (non-breeding);
- A151 *Philomachus pugnax*; Ruff (non-breeding);
- A193 *Sterna hirundo*; Common tern (breeding); and
- A195 *Sterna albifrons*; Little tern (breeding).

The characteristics of the European site

1.4.4 Pagham Harbour SPA comprises an extensive central area of saltmarsh and tidal mudflats, with surrounding habitats including lagoons, shingle, open water, reed swamp and wet permanent grassland. All are supporting habitats for the breeding SPA bird species common tern and little tern and over-wintering brent goose and ruff. Species identified for possible future consideration include and Pintail and Black-tailed godwit.

Conservation advice

1.4.5 Advice on operations and Management measures can be found within:

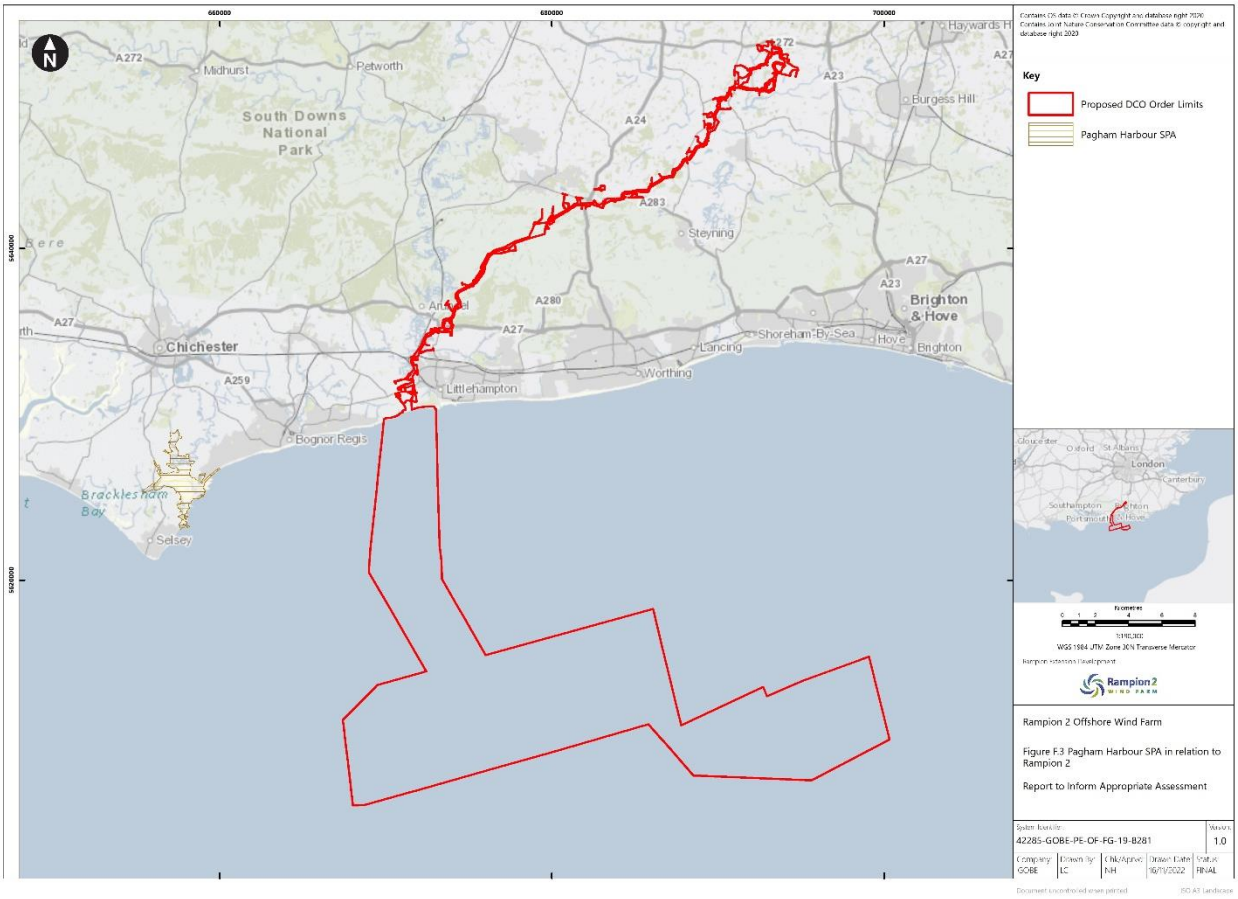
- the Supplementary Advice (Natural England, 2023a) (dated September 2019);
- the Site Improvement Plan (Natural England, 2014c) (dated November 2014);
- Pagham Harbour SPA Reg 33 Conservation advice Package (January 2001) (Natural England, 2001); and
- the Conservation Objectives (Natural England, 2014b) (dated February 2019).

1.4.6 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and*
  - *the distribution of the qualifying features within the site."*

© WSP UK Limited

Figure F-4 Pagham Harbour SPA in relation to Rampion 2



1.5 Pagham Harbour Ramsar

1.5.1 Portsmouth Harbour Ramsar is located on the south coast of England and supports internationally or nationally important wintering populations of migratory waterfowl. The site covers 637ha (**Figure F-5**).

1.5.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12;
- Pagham Harbour Ramsar Wetlands Information Sheet (Ramsar Sites Information Service, 1999a) (dated March 1998); and
- Pagham Harbour Information Sheet on Ramsar Wetlands (Joint Nature Conservation Committee (JNCC), 1998) (dated March 1998).

Qualifying features

1.5.3 The site is designated owing to the following criteria:

- Criteria 6: Species with peak counts in winter:
  - dark-bellied brent goose, *Branta bernicla bernicla*,

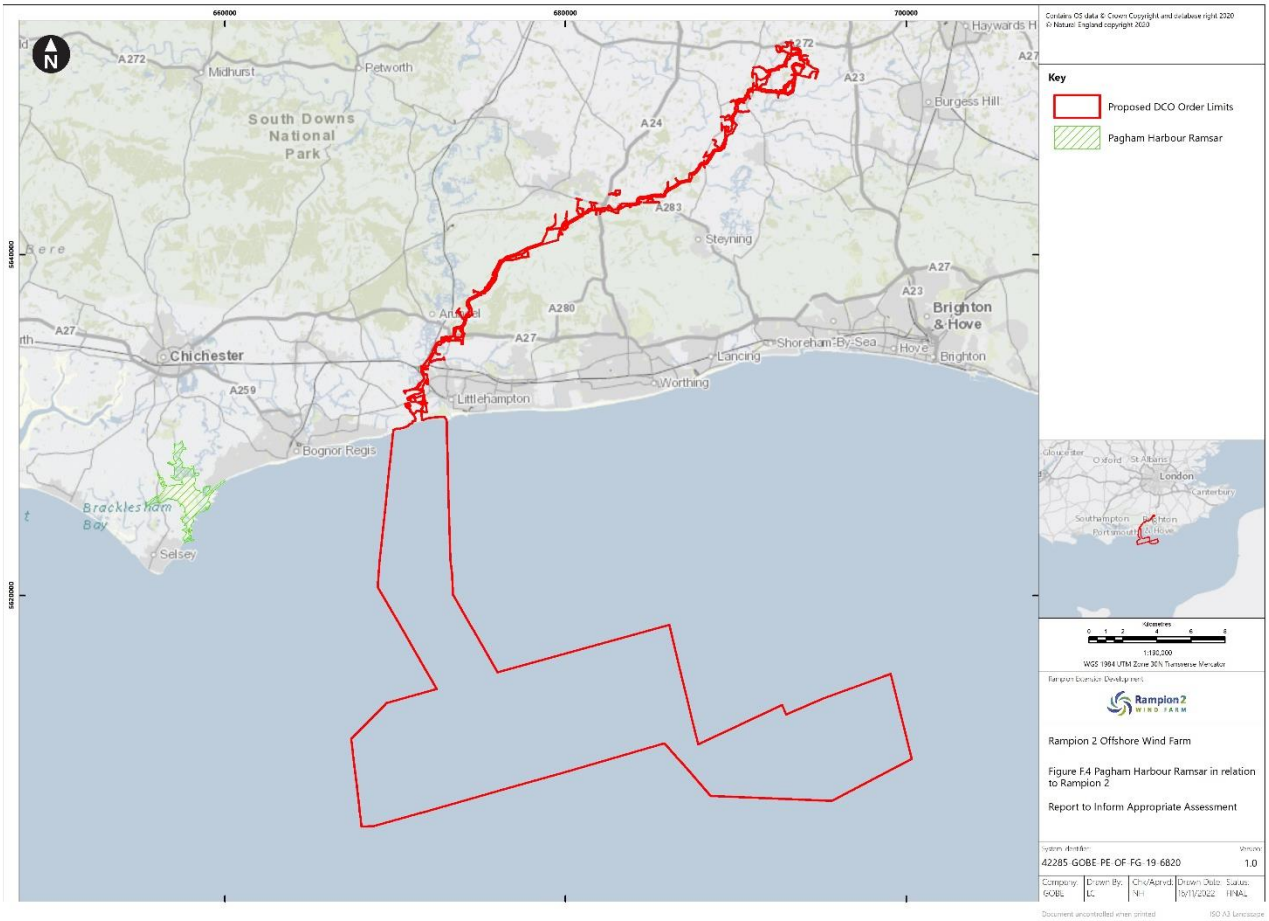
The characteristics of the European site

1.5.4 An estuarine harbour with shingle beaches, intertidal mudflats and saltmarsh, giving way to brackish marsh supporting reedbeds and damp pasture. The site includes a nationally important vegetation community and small amounts of ancient woodland. Nationally and internationally important numbers of wintering or breeding waterbirds or waders use the site.

Conservation advice

1.5.5 A management agreement and a site management statement/plan has been implemented for the site.

Figure F-5 Pagham Harbour Ramsar in relation to Rampion 2



1.6 The Mens Special Area of Conservation (SAC)

1.6.1 The Mens SAC is a terrestrial site in Sussex, designated for Annex I Beech forest habitat which features barbastelle bat maternity roosts (an Annex II species). The site covers some 203.2ha (**Figure F-6**). Key literature sources, including relevant project literature, are as follows:

- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the Mens SAC Citation(Natural England, 2014d) (dated June 2005); and
- the Mens SAC Data Form (JNCC, 2015a) (dated December 2012).

Qualifying features

1.6.2 The site is designated for the following Annex I habitat:

- atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*). (Beech forests on acid soils).

1.6.3 The site is also designated for the following Annex II species:

- Barbastelle bat *Barbastella barbastellus.*

The characteristics of the European site

1.6.4 The Mens is an extensive area of mature beech Fagus sylvatica woodland rich in lichens, bryophytes, fungi and saproxylic (dead wood) invertebrates. It is developing a near-natura high forest structure, in response to only limited silvicultural intervention over the 20th century, combined with the effects of natural events such as the 1987 great storm. The site also supports an important population of barbastelle bat *Barbastella barbastellus*.

Conservation advice

1.6.5 Advice on operations and Management measures can be found within:

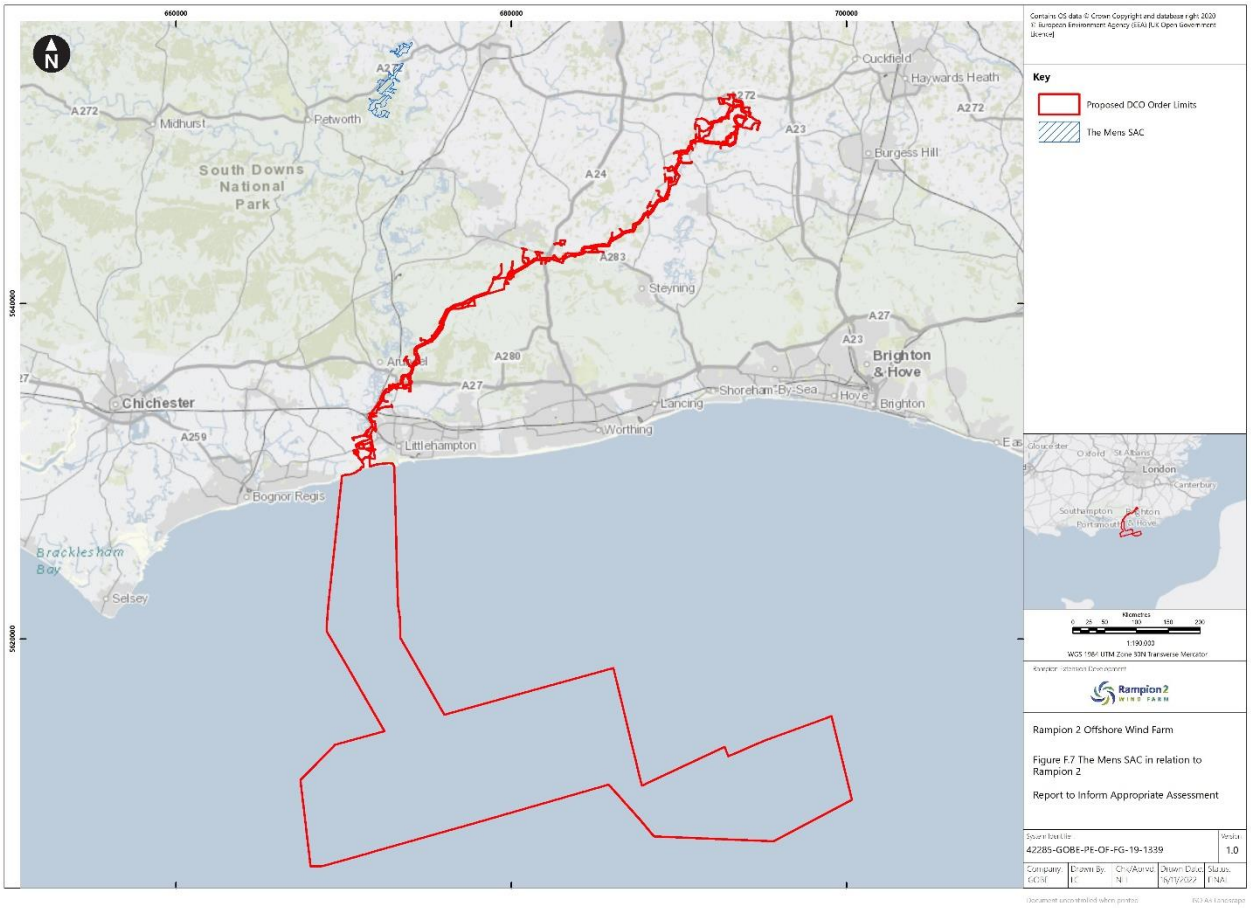
- the Site Improvement Plan (Natural England, 2015a) (dated March 2015);
- The Mens SAC Conservation Objectives Supplementary Advice (Natural England, 2019a) (dated February 2019); and
- the Conservation Objectives(Natural England, 2018) (dated November 2018).

1.6.6 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying features, by maintaining or restoring;*
  - *the extent and distribution of qualifying natural habitats and habitats of qualifying species;*
  - *the structure and function (including typical species) of qualifying natural habitats;*
  - *the structure and function of the habitats of qualifying species;*
  - *the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;*

- *the populations of qualifying species; and*
- *the distribution of qualifying species within the site."*

Figure F-6 The Mens SAC in relation to Rampion 2



1.7 Solent and Isle of Wight lagoons SAC

1.7.1 The Solent and Isle of Wight lagoons SAC on the south coast of England is designated for Annex I coastal lagoon habitat and supports a range of rare or scarce faunal lagoon species. The site covers 36.2ha (**Figure F-7**).

1.7.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9);
- The Solent and Isle of Wight lagoons SAC Citation (Natural England, 2005) (dated June 2005); and
- The Solent and Isle of Wight lagoons SAC Data Form(JNCC, 2015b) (dated December 2015).

© WSP UK Limited

Qualifying features

1.7.3 The site is designated for the following Annex I habitat:

- Coastal lagoons.

The characteristics of the European site

1.7.4 The Solent encompasses a series of coastal lagoons, including percolation, isolated and sluiced lagoons. The site includes a number of lagoons in the marshes in the Keyhaven – Pennington area, at Farlington Marshes in Langstone Harbour, behind the sea-wall at Bembridge Harbour and at Gilkicker, near Gosport. The lagoons show a range of salinities and substrates, ranging from soft mud to muddy sand with a high proportion of shingle, which support a diverse fauna including large populations of three notable species: the nationally rare foxtail stonewort *Lamprothamnium papulosum*, the nationally scarce lagoon sand shrimp *Gammarus insensibilis*, and the nationally scarce starlet sea anemone *Nematostella vectensis*. The lagoons in Keyhaven – Pennington Marshes are part of a network of ditches and ponds within the saltmarsh behind a sea-wall. Farlington Marshes is an isolated lagoon in marsh pasture that, although separated from the sea by a sea-wall, receives sea water during spring tides. Gilkicker Lagoon is a sluiced lagoon with marked seasonal salinity fluctuation and supports a high species diversity. The lagoons at Bembridge Harbour have formed in a depression behind the sea-wall and sea water enters by percolation and by man-made culverts. Species diversity in these lagoons is high and the fauna includes very high densities of *N. vectensis* and the nationally rare Bembridge water beetle *Paracymus aeneus*.

Conservation advice

1.7.5 Advice on operations and Management measures can be found within:

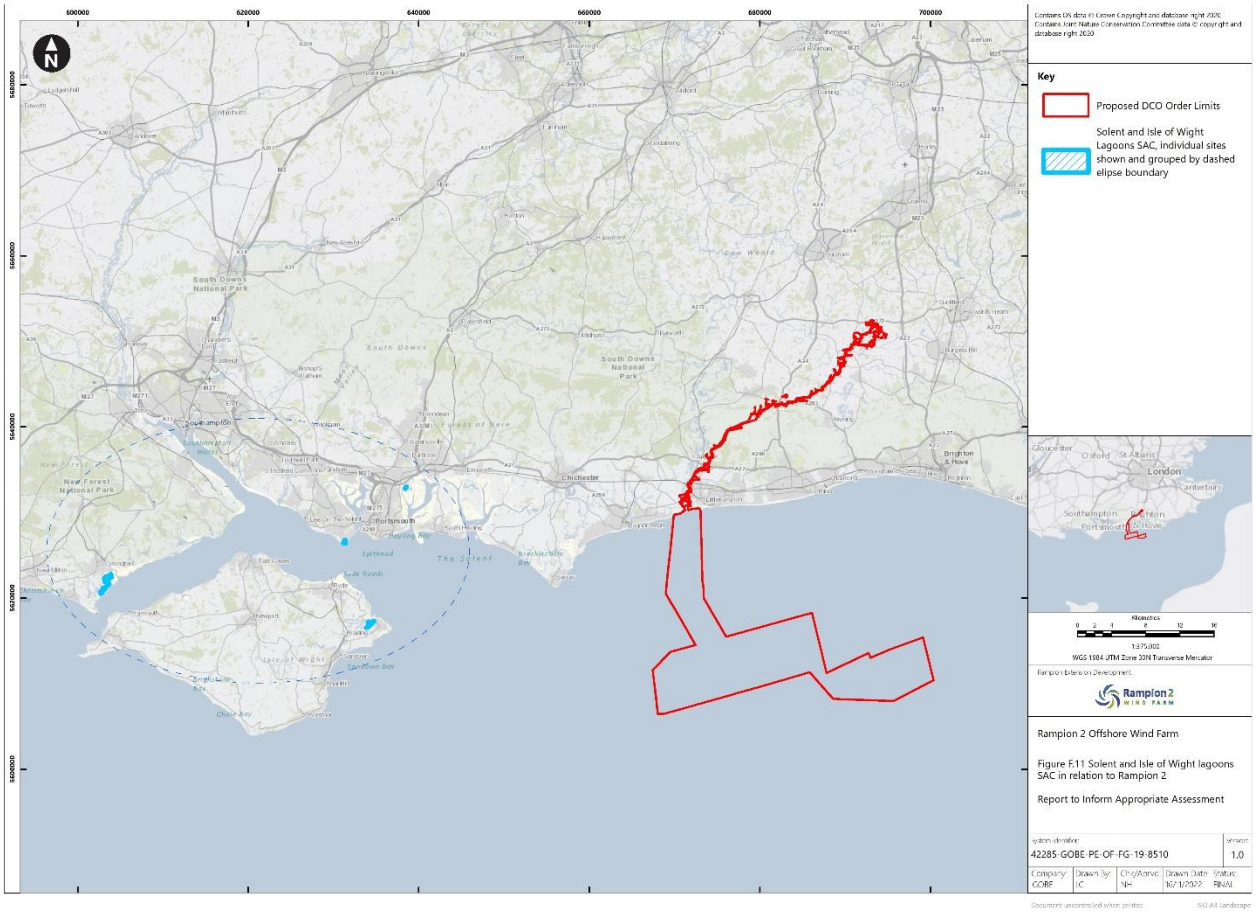
- advice on operations (Natural England, 2023b) (dated March 2020);
- the Site Improvement Plan (Natural England, 2014f) (dated November 2014); and
- the Conservation Objectives (Natural England, 2018b) (dated November 2018).

1.7.6 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying features, by maintaining or restoring;*
  - *the extent and distribution of qualifying natural habitats;*
  - *the structure and function (including typical species) of qualifying natural habitats; and*
  - *the supporting processes on which qualifying natural habitats rely."*

© WSP UK Limited

Figure F-7 Solent and Isle of Wight lagoons SAC in relation to Rampion 2



1.8 Portsmouth Harbour SPA

1.8.1 Portsmouth Harbour SPA is located on the south coast of England and supports internationally or nationally important wintering populations of migratory waterfowl. The site covers 1249.6ha (**Figure F-8**).

1.8.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- Portsmouth Harbour SAC Citation (Natural England, 1998) (dated August 1998); and
- Portsmouth Harbour SPA Data Form (JNCC, 2015c) (dated December 2015).

Qualifying features

1.8.3 The site is designated for the following qualifying features:

- A046a *Branta bernicla bernicla*; Dark-bellied brent goose (non-breeding);
- A069 *Mergus serrator*; Red-breasted merganser (non-breeding);

- A149 *Calidris alpina alpina*; Dunlin (non-breeding); and
- A156 *Limosa limosa islandica*; Black-tailed godwit (non-breeding).

The characteristics of the European site

1.8.4 Portsmouth Harbour is a large, industrialised estuary. Together with the adjacent Chichester and Langstone Harbours, it forms one of the most important sheltered intertidal areas on the south coast of England. Portsmouth Harbour SPA is composed of extensive intertidal mudflats and sandflats with seagrass beds, areas of saltmarsh, shallow coastal waters, coastal lagoons and coastal grazing marsh. There is comparatively little freshwater input to Portsmouth Harbour. The estuarine sediments support rich populations of intertidal invertebrates, which provide an important food source for overwintering birds.

1.8.5 There are approximately 77ha of seagrass beds in Portsmouth Harbour, and include both *Zostera marina* (found on the low shore) and *Zostera noltii* (on the upper to mid shore). The seagrass beds are amongst the most extensive in Britain and are an important food source for dark-bellied Brent goose. The saltmarsh areas are mainly comprised of cordgrass (*Spartina*) swards and provide feeding and roosting areas for overwintering birds.

1.8.6 Areas outside the SPA contain important supporting habitats for the birds that use the site, including coastal grazing marsh and agricultural land.

Conservation advice

1.8.7 Advice on operations and Management measures can be found within:

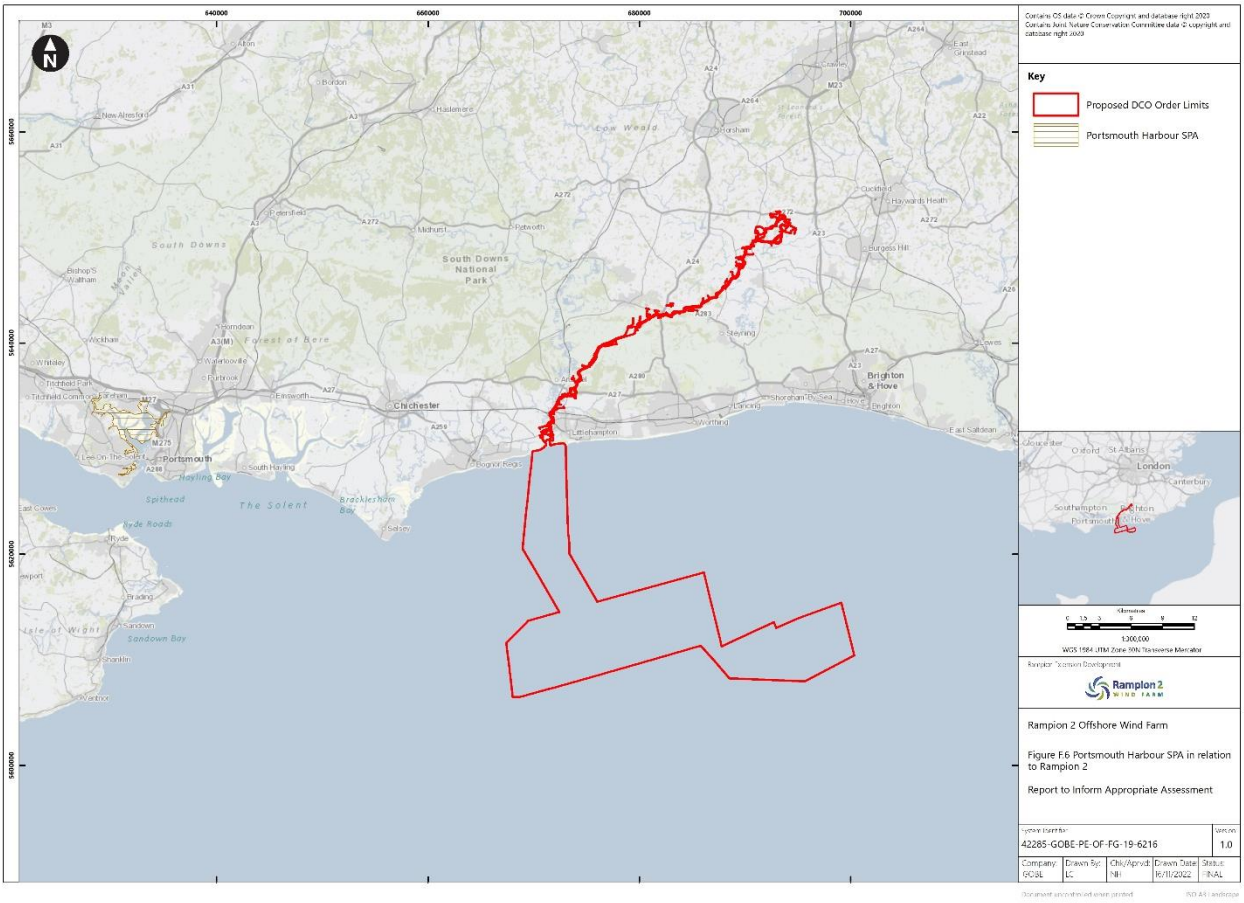
- the Site Improvement Plan (Natural England, 2014g) (dated November 2014); and
- the Conservation Objectives (Natural England, 2019b) (dated February 2019).

1.8.8 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and*
  - *the distribution of the qualifying features within the site."*

© WSP UK Limited

Figure F-8 Portsmouth Harbour SPA in relation to Rampion 2



1.9 Portsmouth Harbour Ramsar

1.9.1 Portsmouth Harbour Ramsar is located on the south coast of England and supports internationally or nationally important wintering populations of migratory waterfowl. The site covers 1249.6ha (**Figure F-9)**.

1.9.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- Portsmouth Harbour Ramsar Wetlands Information Sheet (JNCC, 1995) (dated February 1995); and
- Portsmouth Harbour Ramsar Sites Information Service(Ramsar Sites Information Service, 1999c) (dated February 1995).

Qualifying features

1.9.3 The site is designated for the following criteria:

- Criteria 6: Qualifying: Species with peak counts in winter:
  - dark-bellied brent goose, *Branta bernicla bernicla*.

The characteristics of the European site

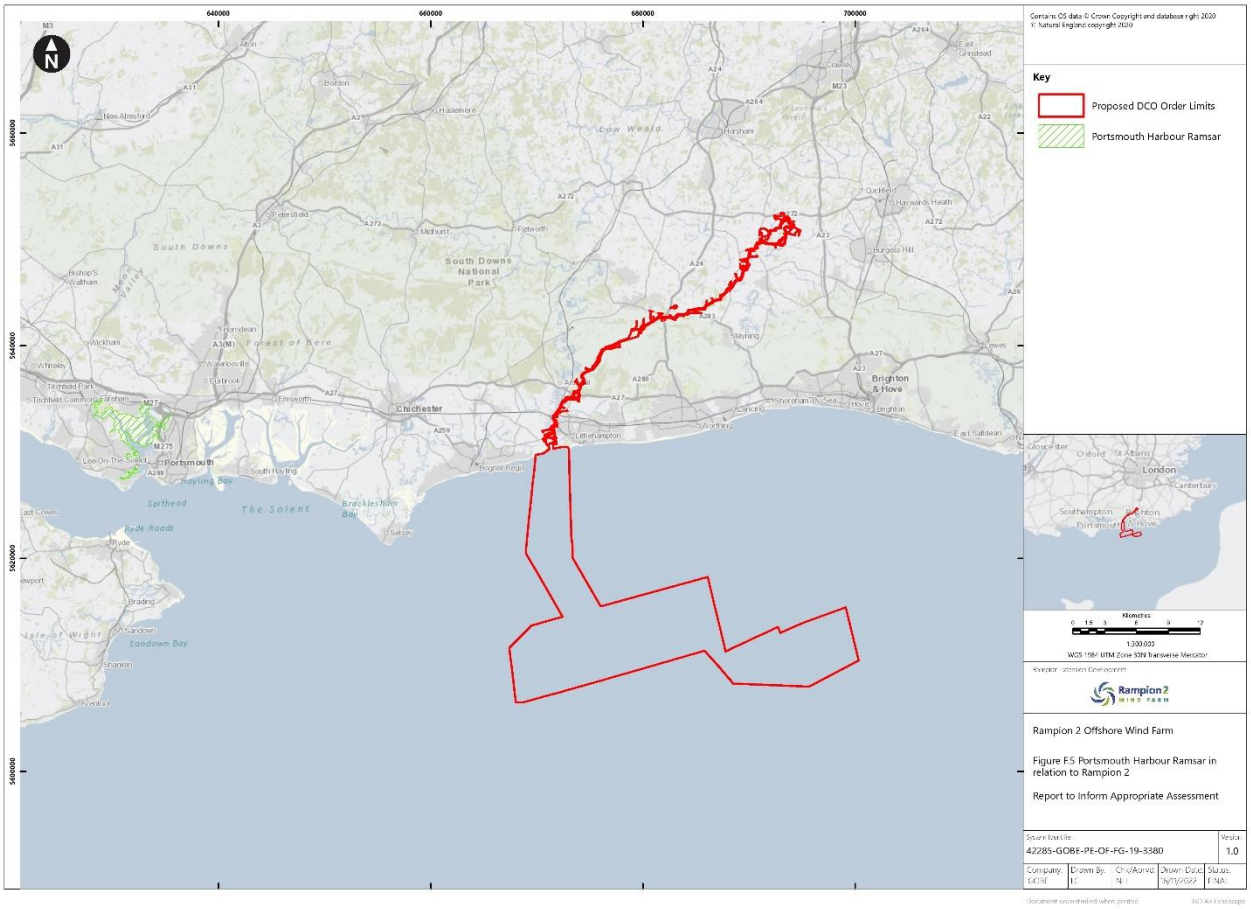
1.9.4 Portsmouth Harbour is a large industrialised estuary consisting of a saltmarsh, vast expanses of mudflats, and tidal creeks on the south coast. The mudflats, supporting extensive beds of eelgrass, green algae, and sea lettuce, provide feeding grounds for internationally important numbers of wintering Dark-bellied Brent Geese. A unique and high quality flora and fauna occur at the site. Nationally important numbers of Gray Plover, dunlin, and Black-tailed Godwit are supported. Set in an urban area, there is a major port facility, and large-scale military activities occur at the site.

Conservation advice

1.9.5 Land uses at the site include habitat/nature conservation and harbour use. There is a proposal for the development of 800 residential units at Priddy's Hard, immediately adjacent to an area of inter-tidal mudflats that has been proposed as an extension to the existing Portsmouth Harbour SSSI. The environmental effects of this proposal will be fully assessed before a decision is reached. A study is in preparation for a shoreline management plan.

1.9.6 A management agreement and a site management statement/plan has been implemented for the site.

Figure F-9 Portsmouth Harbour Ramsar in relation to Rampion 2



© WSP UK Limited

1.10 River Itchen SAC

1.10.1 The River Itchen SAC on the south coast of England is designated for the presence of the Annex I habitat "*Rivers with floating vegetation often dominated by water crowfoot*". The site covers 309.26ha (**Figure F-10)**.

1.10.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the River Itchen SAC Citation (Natural England, 2005b) (dated June 2005); and
- the River Itchen SAC Data Form (JNCC, 2015d) (dated December 2015).

Qualifying features

1.10.3 The site is designated for the following Annex I habitat:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. (Rivers with floating vegetation often dominated by watercrowfoot).

1.10.4 The site is also designated for hosting the following Annex II species:

- Atlantic salmon *Salmo salar*;
- Brook lamprey *Lampetra planeri;*
- Bullhead *Cottus gobio;*
- Otter *Lutra lutra;*
- Southern damselfly *Coenagrion mercurial;* and
- White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes.*

The characteristics of the European site

1.10.5 The Itchen typifies the classic chalk river and shows a greater uniformity in physical characteristics along its entire length than other rivers of this type. Since the river is mainly spring-fed, there is only a narrow range of seasonal variation in physical and chemical characteristics. The river's vegetation is dominated by higher plants, and the aquatic flora is exceptionally species rich with many of the typical chalk stream plants present in abundance. The majority of species are present throughout the system and downstream changes are less than in most other rivers. The river is dominated throughout by aquatic *Ranunculus* spp. The headwaters contain pond water-crowfoot *Ranunculus peltatus*, while two *Ranunculus* species occur further downstream: stream water-crowfoot *R. penicillatus ssp. pseudofluitans*, a species especially characteristic of calcium-rich rivers, and river water-crowfoot R. fluitans. The fish fauna of the Itchen is typical of lowland chalk rivers. Strong populations of bullhead *Cottus gobbio* and brook lamprey *Lampetra planeri* are notable elements of the natural fish fauna. The river's runs of Atlantic salmon *Salmo salar* fluctuate markedly. The upper and mid river provides much suitable habitat for otters. A localised population of Atlantic

stream crayfish *Austropotamobius pallipes* remains in a headwater of the river. Meadow ditches support strong populations of southern damselfly *Coenagrion mercuriale*. The numbers recorded place the site amongst the most important in Britain for this species.

Conservation advice

1.10.6 Advice on operations and Management measures can be found within:

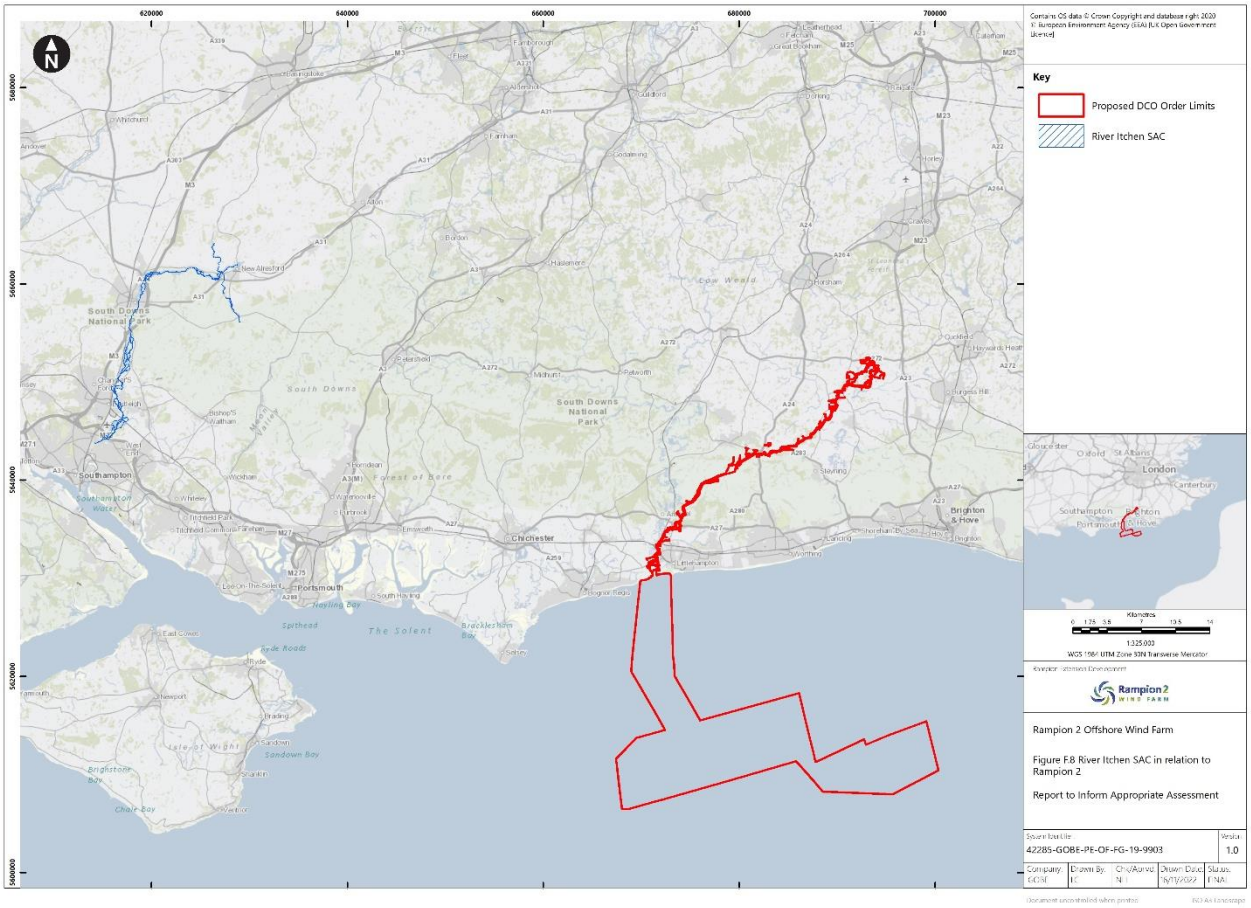
- the Supplementary Advice (Natural England, 2014i) (dated March 2019);
- the Conservation Objectives (Natural England, 2014j) (dated November 2018); and
- the Site Improvement Plan (Natural England, 2014k) (dated November 2014).

1.10.7 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying features, by maintaining or restoring;*
  - *the extent and distribution of qualifying natural habitats and habitats of qualifying species;*
  - *the structure and function (including typical species) of qualifying natural habitats;*
  - *the structure and function of the habitats of qualifying species;*
  - *the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;*
  - *the populations of qualifying species; and*
  - *the distribution of qualifying species within the site."*

© WSP UK Limited

Figure F-10 River Itchen SAC in relation to Rampion 2



1.11 Solent Maritime SAC

1.11.1 The Solent Maritime SAC is a major estuarine system on the south coast of England which hosts a wide range of coastal habitats as well as associated fauna. The site covers 11325.09ha (**Figure F-11**).

1.11.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9 Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9);
- **Chapter 22 Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the Solent Maritime SAC Citation (Natural England, 2014l) (dated June 2005); and
- the Solent Maritime SAC Data Form (JNCC, 2015e) (dated December 2015).

Qualifying features

1.11.3 The site is designated for the following Annex I habitats:

- estuaries;

- spartina swards (*Spartinion maritimae*);
- Atlantic Salt Meadows (*Glauco-Puccinellietalia maritimae*);
- annual vegetation of drift lines;
- coastal lagoons;
- mudflats and sandflats not covered by seawater at low tide (Intertidal mudflats and sandflats);
- perennial vegetation of stony banks. (Coastal shingle vegetation outside the reach of waves);
- salicornia and other annuals colonising mud and sand (Glasswort and other annuals colonising mud and sand);
- sandbanks which are slightly covered by sea water all the time (Subtidal sandbanks); and
- shifting dunes along the shoreline with *Ammophila arenaria* (white dunes). (Shifting dunes with marram).

1.11.4 The site is also designated for hosting the following Annex II species:

- Desmoulin's whorl snail *Vertigo moulinsiana.*

The characteristics of the European site

1.11.5 The Solent encompasses a major estuarine system with four coastal plain estuaries and four bar-built estuaries. The Solent and its inlets are unique in Britain and Europe for their hydrographic regime with its double tides, as well as for the complexity of the marine and estuarine habitats present within the area. Sediment habitats within the estuaries include extensive estuarine flats, intertidal areas, sand and shingle spits, natural shoreline transitions and sand dunes.

1.11.6 The site supports a number of coastal lagoons both on the Isle of Wight and along the Hampshire coast providing examples of a variety of successional stages and salinity regimes including quite brackish conditions.

1.11.7 Desmoulin's whorl snail *Vertigo moulinsiana*, which is rare in Great Britain and usually occurs within base-rich wetlands where there are long established swamps, fens and marshes, is found in reedbeds in Chichester Harbour.

Conservation advice

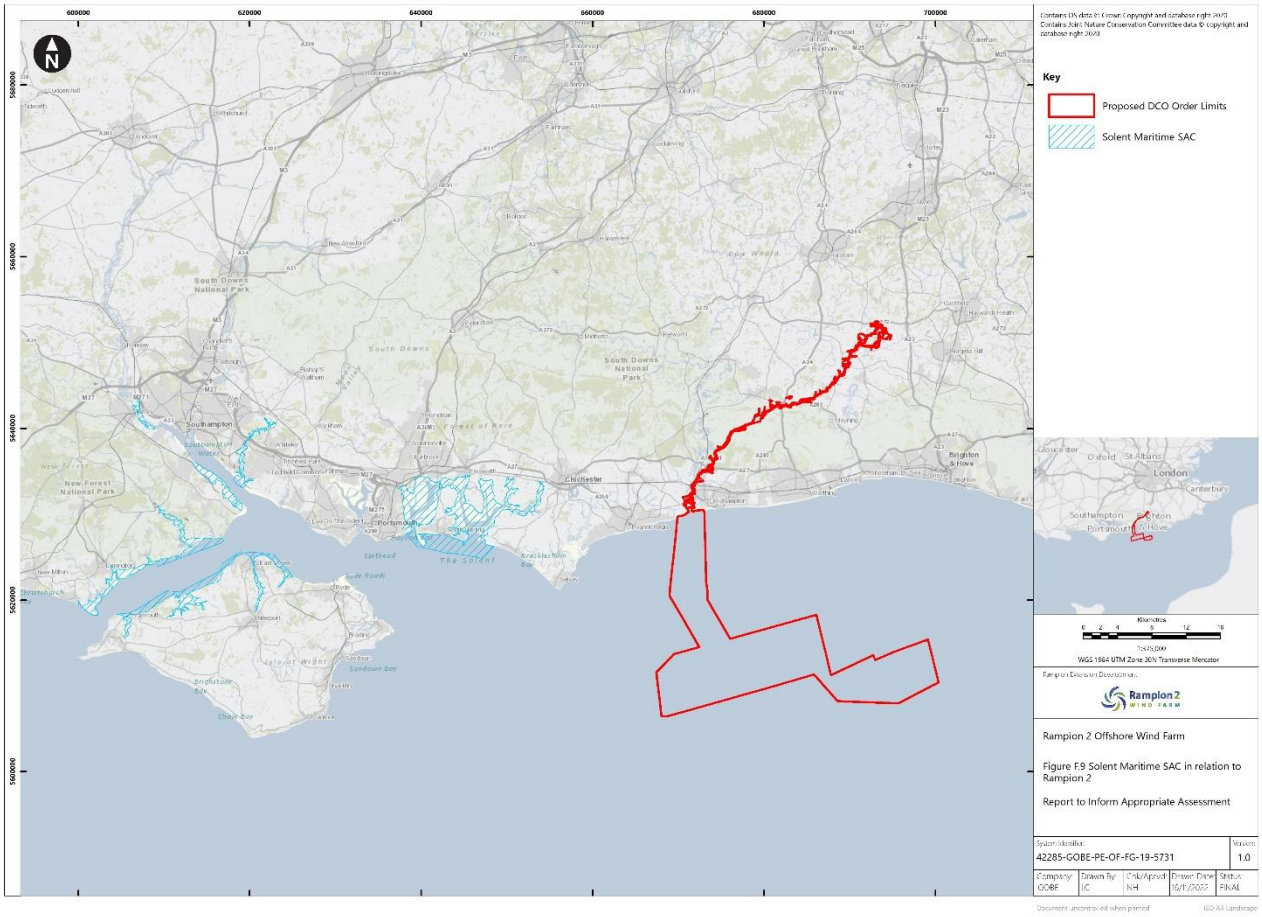
1.11.8 Advice on operations and Management measures can be found within:

- the Supplementary Advice (Natural England, 2023c) (dated March 2020);
- advice on Operations (Natural England, 2023d) (dated March 2020);
- the Conservation Objectives (Natural England, 2014l) (dated November 2018); and
- the Site Improvement Plan (Natural England, 2014g) (dated November 2014).

1.11.9 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying features, by maintaining or restoring;*
  - *the extent and distribution of qualifying natural habitats and habitats of qualifying species;*
  - *the structure and function (including typical species) of qualifying natural habitats;*
  - *the structure and function of the habitats of qualifying species;*
  - *the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;*
  - *the populations of qualifying species; and,*
  - *the distribution of qualifying species within the site."*

Figure F-11 Solent Maritime SAC in relation to Rampion 2



© WSP UK Limited

1.12 South Wight Maritime SAC

1.12.1 The South Wight Maritime SAC is located on the south coast of England and is characterised by contrasting Cretaceous hard cliffs, semi-stable soft cliffs and mobile soft cliffs. The site covers 19866.12ha (**Figure F-12**).

1.12.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the South Wight Maritime SAC Citation (Natural England, 2014m) (dated June 2005); and
- the Solent Maritime SAC Data Form (JNCC, 2015f) (dated December 2015).

Qualifying features

1.12.3 The site is designated for the following Annex I habitats:

- reefs;
- submerged or partially submerged sea caves; and
- vegetated sea cliffs of the Atlantic and Baltic coasts.

The characteristics of the European site

1.12.4 South Wight Maritime SAC contains contrasting Cretaceous hard cliffs, semi-stable soft cliffs and mobile soft cliffs. The western and eastern extremities of the site consist of high chalk cliffs with species-rich calcareous grassland vegetation, the former exposed to maritime influence and the latter comparatively sheltered.

1.12.5 The longest section is composed of slumping acidic sandstones and neutral clays with an exposed south-westerly aspect. These cliffs are minimally affected by sea defence works and together they form one of the longest lengths of naturally-developing soft cliffs on the UK coastline. The exposure of this coast to high wave energy has allowed the erosion of the cliffs to form sea caves. This site also contains the only known location of subtidal chalk caves in the UK. The large intertidal caves in the chalk cliffs are of ecological importance, with many hosting rare algal species, which are restricted to this type of habitat. To the west and south-west some of the most important subtidal chalk reefs in British waters occur, including the extensive tide-swept reef off the Needles and examples at Culver Cliff and Freshwater Bay. These support a diverse range of species in both the subtidal and intertidal. The bedrock is extensively bored by bivalves.

Conservation advice

1.12.6 Advice on operations and Management measures can be found within:

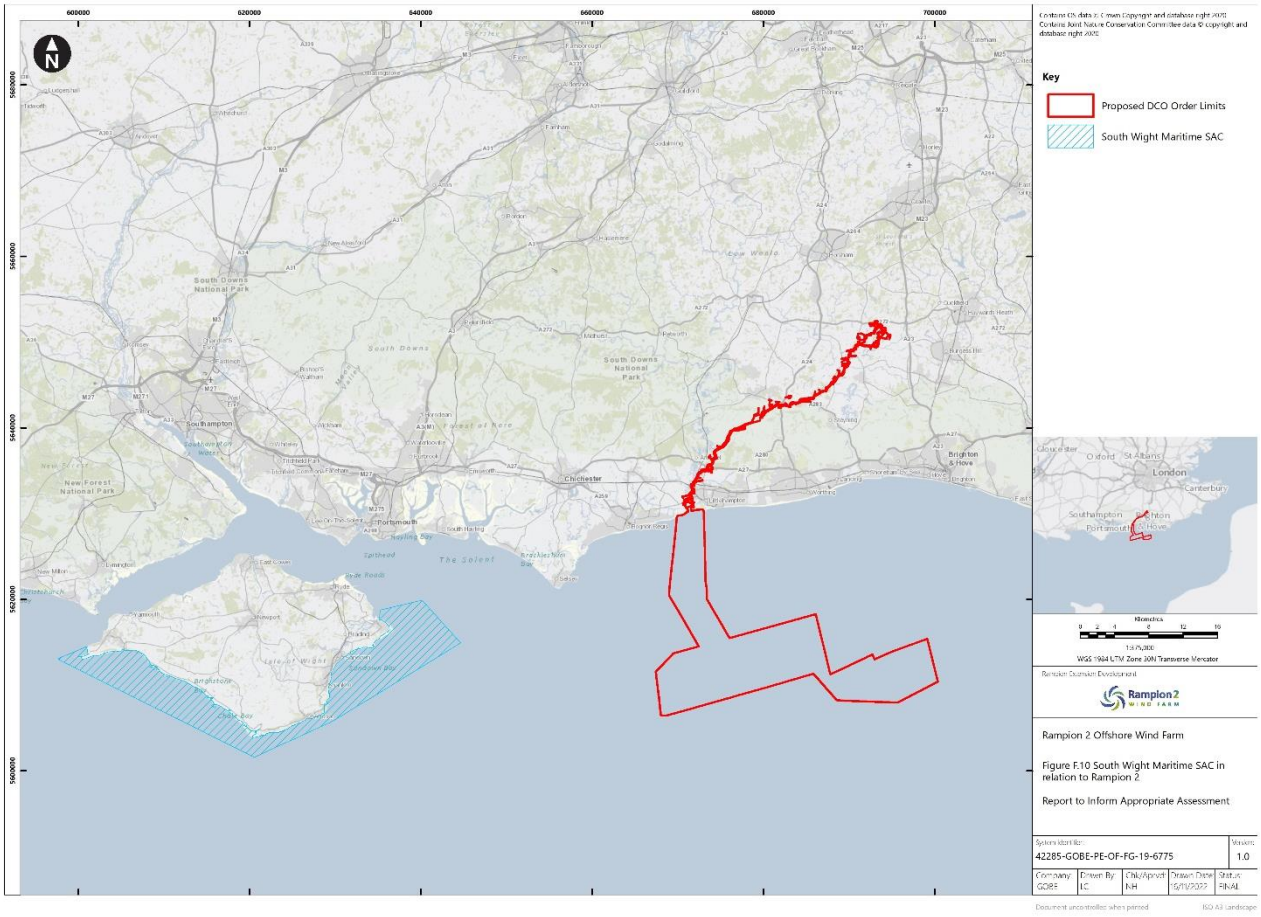
- the Supplementary Advice (Natural England, 2023e) (dated March 2020);

- advice on Operations (Natural England, 2023f) (dated March 2020);
- the Conservation Objectives (Natural England, 2014m) (dated November 2018); and
- the Site Improvement Plan (Natural England, 2014n) (dated November 2014).

1.12.7 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying features, by maintaining or restoring;*
  - *the extent and distribution of qualifying natural habitats;*
  - *the structure and function (including typical species) of qualifying natural habitats; and*
  - *the supporting processes on which qualifying natural habitats rely."*

Figure F-12 South Wight Maritime SAC in relation to Rampion 2



1.13 Dungeness, Romney Marsh and Rye Bay SPA

1.13.1 The Dungeness, Romney Marsh and Rye Bay SPA is a coastal site located in East Sussex, in Kent. The SPA protects intertidal and marine habitats for

internationally important breeding and wintering waterbirds, birds of prey, passage warblers and breeding seabirds. The site covers 42417.53ha (**Figure F-13**).

1.13.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9);
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the Dungeness, Romney Marsh and Rye Bay SPA Citation (Secretary of State for Environment, Food and Rural Affairs, 2016) (dated March 2016); and
- Dungeness, Romney Marsh and Rye Bay SPA Data Form (JNCC, 2017a) (dated November 2017).

Qualifying features

1.13.3 The site is designated for the following Annex I species:

- A021 *Botaurus stellaris*; Great bittern (non-breeding);
- A037 *Cygnus columbianus bewickii*; Bewick's swan (non-breeding);
- A056 *Anas clypeata*; Northern shoveler (non-breeding);
- A081 *Circus aeruginosus*; Eurasian marsh harrier (breeding);
- A082 *Circus cyaneus*; Hen harrier (non-breeding);
- A132 *Recurvirostra avosetta*; Pied avocet (breeding);
- A140 *Pluvialis apricaria*; European golden plover (non-breeding);
- A151 *Philomachus pugnax*; Ruff (non-breeding);
- A176 *Larus melanocephalus*; Mediterranean gull (breeding);
- A191 *Sterna sandvicensis*; Sandwich tern (breeding);
- A193 *Sterna hirundo*; Common tern (breeding);
- A195 *Sterna albifrons*; Little tern (breeding);
- A294 *Acrocephalus paludicola*; Aquatic warbler (non-breeding); and
- waterbird assemblage.

The characteristics of the European site

1.13.4 Dungeness, Romney Marsh and Rye Bay is a large area with a diverse coastal landscape comprising a number of habitats, which appear to be unrelated to each other. However, all of them exist today because coastal processes have formed and continue to shape a barrier of extensive shingle beaches and sand dunes

across an area of intertidal mud and sand flats. Today this area is still fringed by important intertidal habitats, and contains relict areas of saltmarsh, extensive grazing marshes and reedbeds. Human activities have further modified the site, resulting in the creation of extensive areas of wetland habitat due to gravel extraction. As a whole, Dungeness, Romney Marsh and Rye Bay is important for breeding and wintering waterbirds, birds of prey, passage warblers and breeding seabirds.

Conservation advice

1.13.5 Advice on operations and Management measures can be found within:

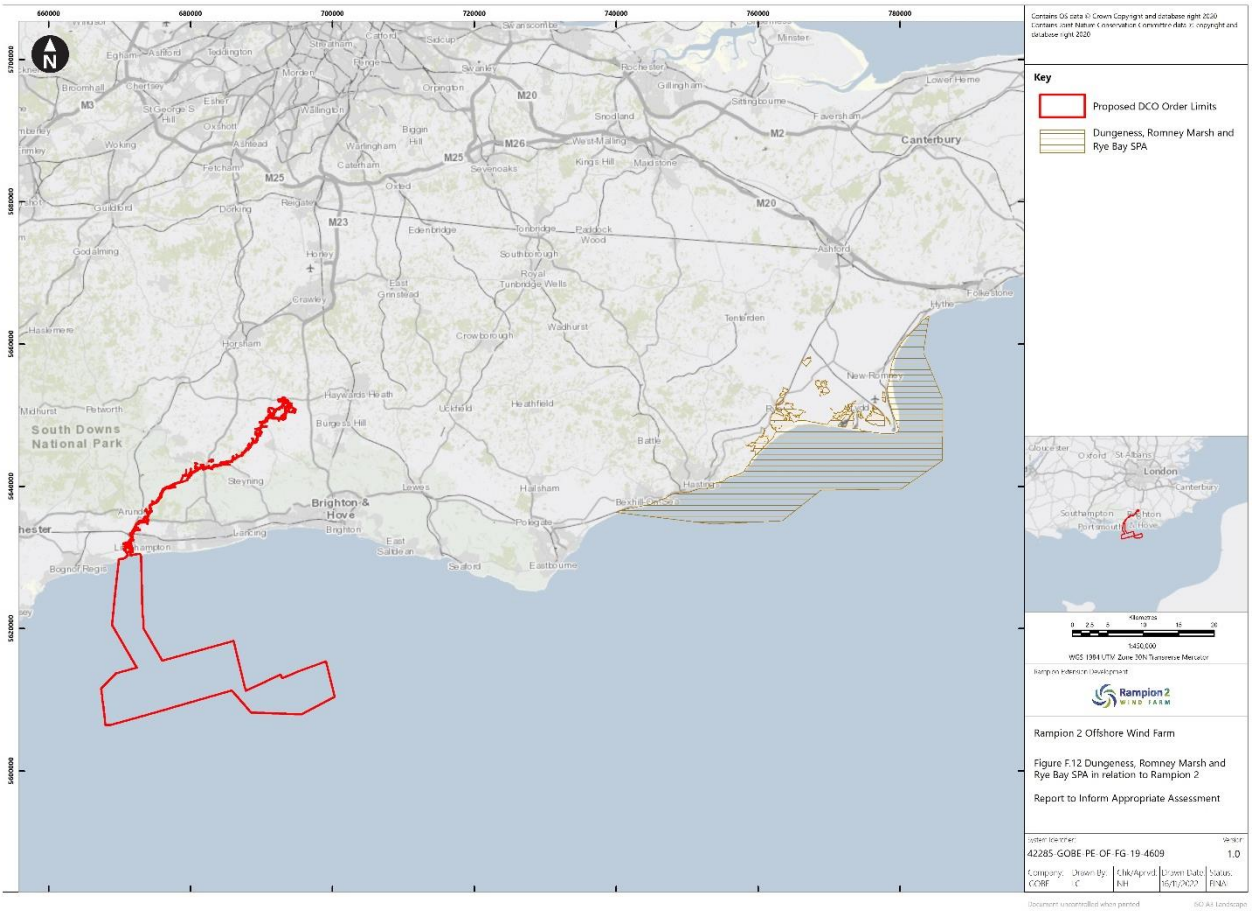
- the Supplementary Advice (Natural England, 2023g) (dated September 2019);
- advice on Operations (Natural England, 2023h) (dated March 2020); and
- the Conservation Objectives (Natural England, 2015b) (dated February 2019).

1.13.6 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and*
  - *the distribution of the qualifying features within the site. "*

© WSP UK Limited

Figure F-13 The Dungeness, Romney Marsh and Rye Bay SPA in relation to Rampion 2



1.14 Solent and Dorset Coast SPA

1.14.1 The Solent and Dorset Coast SPA stretches from the Isle of Purbeck in the West to Bognor Regis in the East, following the coastline on either side to the Isle of Wight and into Southampton Water. The site provides protection for internationally important birds (features) and their supporting habitats and covers 255.2nm^2 (**Figure F-14**).

1.14.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9);
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the Solent and Dorset Coast SPA Consultation Report (Natural England, 2017a) (dated June 2017); and

© WSP UK Limited

- the Solent and Dorset Coast SPA Departmental Brief (Natural England, 2016a) (dated January 2016).

Qualifying features

1.14.3 The site is designated for the following Annex I species:

- Sandwich tern (breeding) *Sterna sandvicensis;*
- Common tern (breeding) *Sterna hirundo*; and
- Little tern (breeding) *Sternula albifrons.*

The characteristics of the European site

1.14.4 The site boundary was established as a composite of the usage of the area within adjacent SPAs. From west to east, the adjacent SPAs with these tern species as qualifying interest features (in parentheses) are: Poole Harbour (common tern) Solent and Southampton Water SPA (common, Sandwich and little tern) and Chichester & Langstone Harbours SPA (common, Sandwich and little tern). In addition to these species at these sites, Sandwich terns at the Poole Harbour SPA are31ncludeed in determining the details of the pSPA.

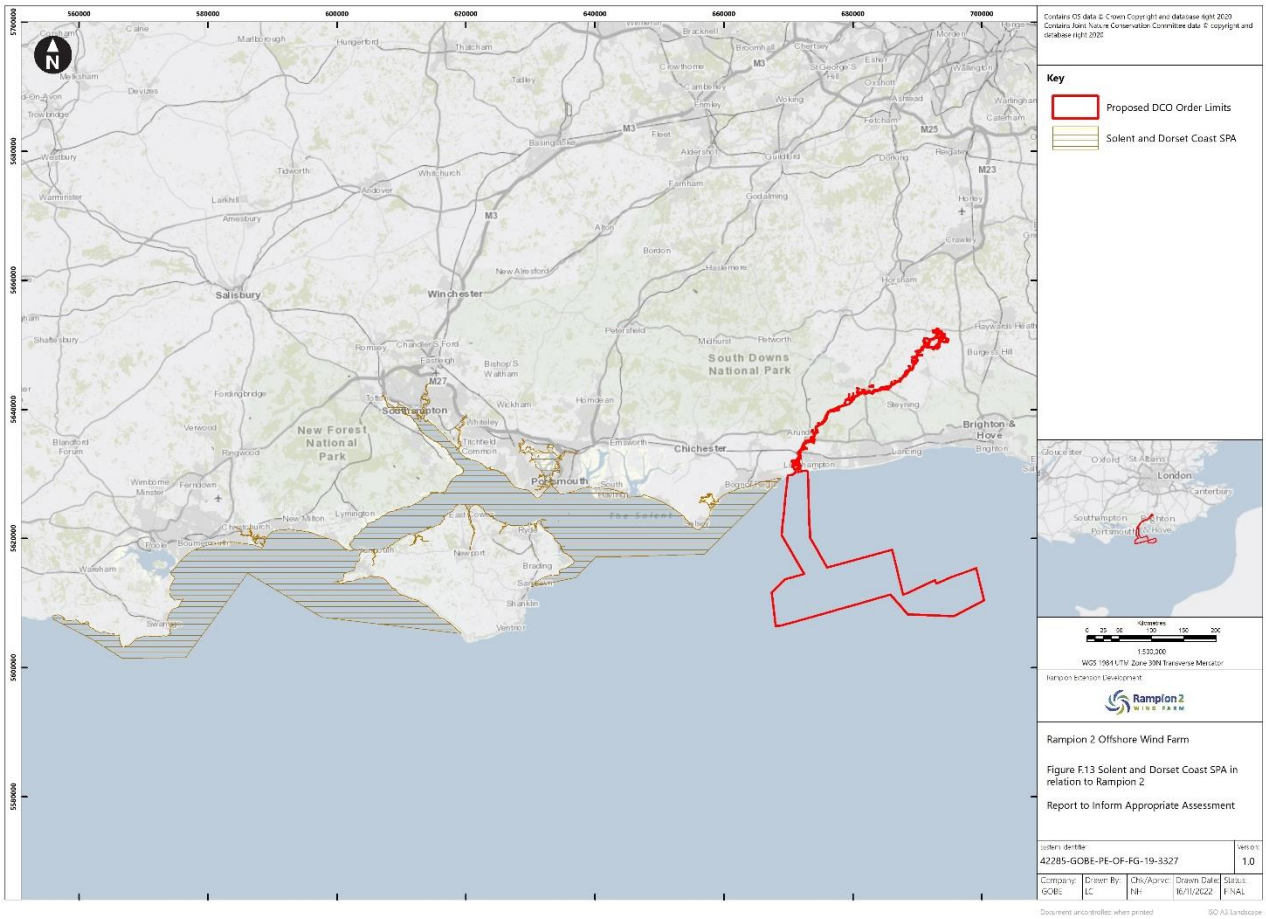
Conservation advice

1.14.5 Natural England is currently in the process of developing a Conservation advice package and advice on operations within the site.

1.14.6 The Solent Site Improvement Plan (Natural England, 2014g) (dated November 2014) covers the SPA.

© WSP UK Limited

Figure F-14 The Solent and Dorset Coast SPA in relation to Rampion 2



1.15 Chichester and Langstone Harbours SPA

1.15.1 The Chichester and Langstone Harbours SPA covers two large, estuarine basins. Together, with neighbouring Portsmouth Harbour, the area forms one of the most sheltered intertidal areas on the South Coast of England. These habitats support internationally and nationally important numbers of overwintering and breeding bird species. The site covers 5810.95ha (**Figure F-15**).

1.15.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22)**;**
- the Chichester and Langstone Harbours SPA Citation (Natural England, 2014o) (dated January 1996); and

© WSP UK Limited

- the Chichester and Langstone Harbours SPA Data Form (JNCC, 2015h) (dated December 2015).

Qualifying features

1.15.3 The site is designated for the following Annex I species:

- A046a *Branta bernicla bernicla*; Dark-bellied brent goose (non-breeding);
- A048 *Tadorna tadorna*; Common shelduck (non-breeding);
- A050 *Anas 33etanus33*; Eurasian wigeon (non-breeding);
- A052 *Anas crecca*; Eurasian teal (non-breeding);
- A054 *Anas acuta*; Northern pintail (non-breeding);
- A056 *Anas clypeata*; Northern shoveler (non-breeding);
- A069 *Mergus serrator*; Red-breasted merganser (non-breeding);
- A137 *Charadrius hiaticula*; Ringed plover (non-breeding);
- A141 *Pluvialis squatarola*; Grey plover (non-breeding);
- A144 *Calidris alba*; Sanderling (non-breeding);
- A149 *Calidris alpina alpina*; Dunlin (non-breeding);
- A157 *Limosa lapponica*; Bar-tailed godwit (non-breeding);
- A160 *Numenius arquata*; Eurasian curlew (non-breeding);
- A162 *Tringa 33etanus*; Common redshank (non-breeding);
- A169 *Arenaria interpres*; Ruddy turnstone (non-breeding);
- A191 *Sterna sandvicensis*; Sandwich tern (breeding);
- A193 *Sterna hirundo*; Common tern (breeding);
- A195 *Sterna albifrons*; Little tern (breeding); and
- waterbird assemblage.

The characteristics of the European site

1.15.4 Chichester and Langstone Harbours SPA covers two large, estuarine basins containing extensive intertidal mudflats and sandflats with areas of seagrass beds, saltmarsh, shallow coastal waters, coastal lagoons, coastal grazing marsh and shingle ridges and islands.

1.15.5 The sediments support rich populations of intertidal invertebrates, which together with 300 ha of seagrass beds provide an important food source for overwintering birds. Areas outside the SPA contain important supporting habitats for the birds, including coastal grazing marsh, amenity grassland and agricultural land.

© WSP UK Limited

Conservation advice

1.15.6 Chichester Harbour Conservancy manages the majority of Chichester Harbour whilst the Langstone Harbour Board manages Langstone Harbour. However, there are also numerous private ownerships of the intertidal area.

1.15.7 Advice on operations and management measures can be found within:

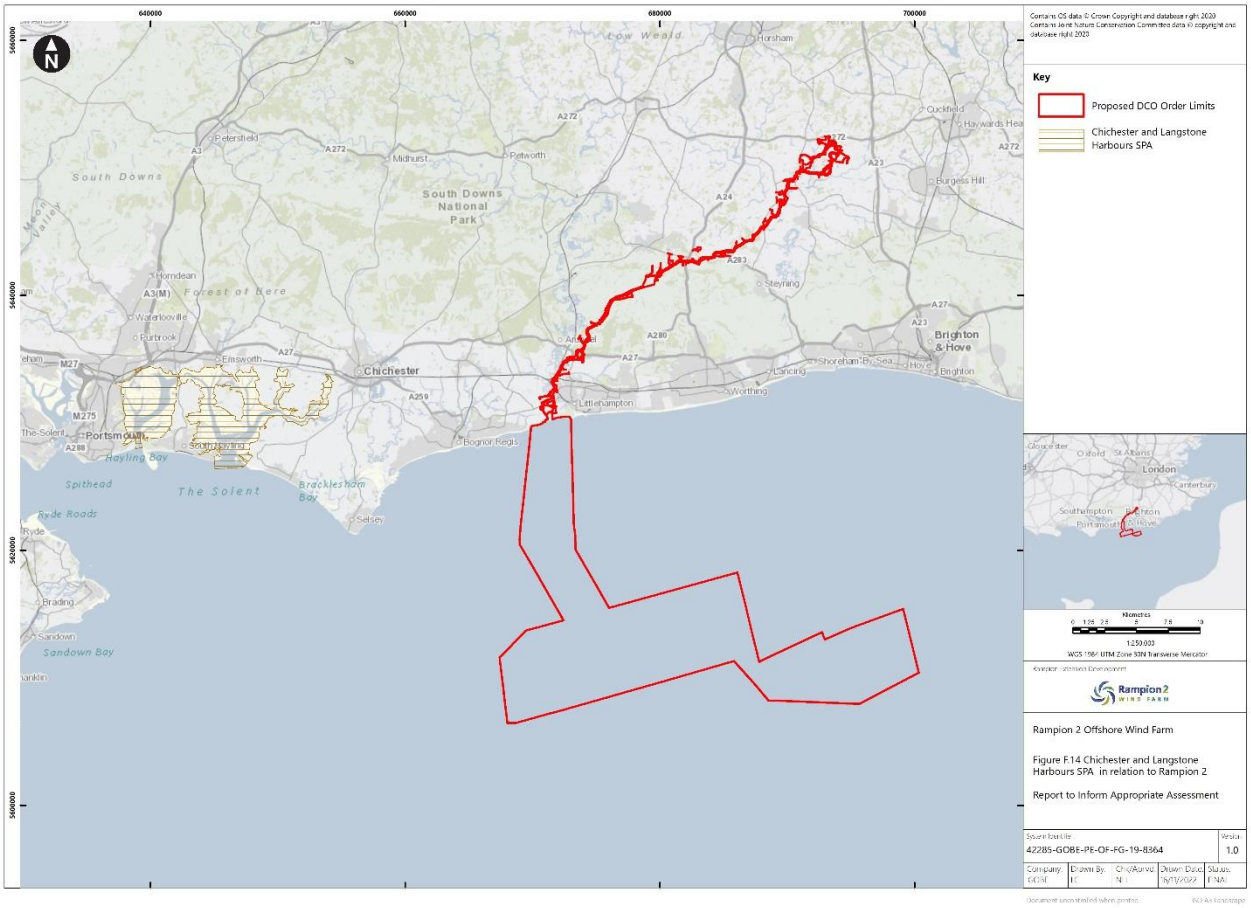
- the Solent Site Improvement Plan (Natural England, 2014g) (dated November 2014);
- advice on Operations (Natural England, 2023i) (dated March 2020);
- supplementary Advice on the Conservation Objectives (Natural England, 2023j) (dated September 2019); and
- the Conservation Objectives (Natural England, 2016b) (dated February 2019).

1.15.8 The conservation objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

© WSP UK Limited

Figure F-15 The Chichester and Langstone Harbour SPA in relation to Rampion 2



1.16 Chichester & Langstone Harbours Ramsar

1.16.1 The Chichester and Langstone Harbours Ramsar covers two large, estuarine basins. Together, with neighbouring Portsmouth Harbour, the area forms one of the most sheltered intertidal areas on the South Coast of England. These habitats support internationally and nationally important numbers of overwintering and breeding bird species. The site covers 5810.95 ha (**Figure F-16**).

1.16.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22); and
- the Chichester and Langstone Harbours Ramsar Site Information (RSIS, 1999d) (dated January 1999).

Qualifying features

1.16.3 The site is designated for the following species:

© WSP UK Limited

- *Branta bernicla bernicla*; Dark-bellied brent goose (non-breeding);
- *Charadrius hiaticula*; Ringed plover (non-breeding);
- *Pluvialis squatarola*; Grey plover (non-breeding);
- *Calidris alpina alpina*; Dunlin (non-breeding);
- *Limosa lapponica*; Bar-tailed godwit (non-breeding);
- *Tadorna tadorna*; Common shelduck (non-breeding);
- *Tringa 36etanus*; Common redshank (non-breeding);
- *Sterna hirundo*; Common tern (breeding);
- *Sterna albifrons*; Little tern (breeding); and
- waterbird assemblage.

The characteristics of the European site

1.16.4 Formed by two large estuarine basins linked by a channel and including extensive intertidal mudflats, saltmarsh, sand and shingle spits, and dunes supporting reedbeds and some grassland. Numbers of wintering waterbirds regularly exceed 20,000 individuals and include internationally and nationally important numbers of several species. Human activities include recreation and dredging for oysters and clams.

Conservation advice

1.16.5 Chichester Harbour Conservancy manages the majority of Chichester Harbour whilst the Langstone Harbour Board manages Langstone Harbour. However, there are also numerous private ownerships of the intertidal area.

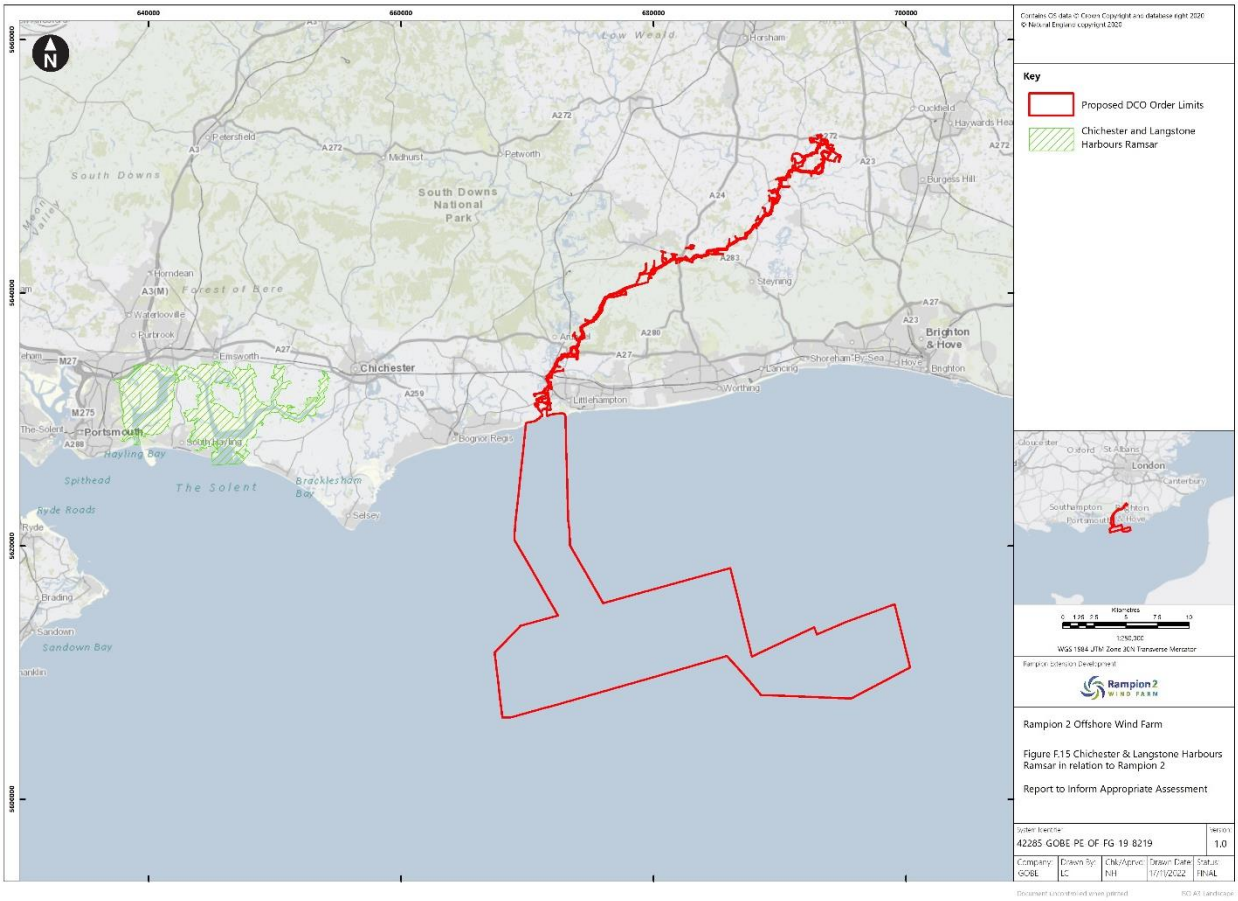
1.16.6 The 1990 UK National report provided information concerning recreational disturbance and pollution from sewage effluent. However, measures aimed at improving the site's water quality are under way; one major source of untreated sewage effluent has already been removed through the construction of a new off-shore outfall.

1.16.7 Langstone Harbour is subject to dredging for oysters and clams. The alien seaweed *Sargassum muticum* has colonised both harbours. It is thought that the species spread to southern England from France, following accidental introduction with Pacific oysters *Magallana gigas*.

1.16.8 Both a management agreement and site management statement/plan have been implemented for the site. The Solent Site Improvement Plan (Natural England, 2014g) (dated November 2014).

© WSP UK Limited

Figure F-16 The Chichester and Langstone Harbour Ramsar in relation to Rampion 2



1.17 Solent and Southampton Water SPA

1.17.1 The Solent and Southampton Water SPA is a coastal site characterised by a series of estuaries and adjacent coastal habitats important for breeding gulls and terns and wintering waterfowl. The site covers 5401.12ha (**Figure F-17**).

1.17.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22)**;**
- The Solent and Southampton Water SPA Citation (Natural England, 2014p) (dated November 1998); and
- The Solent and Southampton Water SPA Data Form (JNCC, 2015i) (dated December 2015).

Qualifying features

1.17.3 The site is designated for the following Annex I species:

- Black-tailed godwit *Limosa limosa islandica*, non-breeding;
- Common tern *Sterna hirundo*, Breeding;
- Dark-bellied brent goose *Branta bernicla bernicla*, non-breeding;
- Little tern *Sternula albifrons*, Breeding;
- Mediterranean gull *Ichthyaetus melanocephalus*, Breeding;
- Ringed plover *Charadrius hiaticula,* non-breeding;
- Roseate tern *Sterna dougallii*, Breeding;
- Sandwich tern *Thalasseus sandvicensis*, Breeding;
- Teal *Anas crecca*, non-breeding; and
- waterbird assemblage, non-breeding.

The characteristics of the European site

1.17.4 The Solent and Southampton Water is located in one of the only major sheltered channels in Europe, lying between the Isle of Wight and the mainland, on the south coast of England. This area is a complex major estuarine system consisting of coastal plain and bar-built estuaries. The Solent and its inlets are unique in Britain and Europe for their unusual tidal regime, including double tides and long periods of tidal stand at high and low tide. The Solent and Southampton Water is composed of extensive intertidal mudflats and sandbanks, inter- and subtidal rock, areas of saltmarsh, coastal lagoons, coastal reed beds, shingle banks, and grazing marsh. Estuarine sediments within the site support rich populations of invertebrates that provide an important food source for wintering birds.

Conservation advice

1.17.5 Advice on operations and Management measures can be found within:

- the Site Improvement Plan (Natural England, 2014g) (dated November 2014);
- the Supplementary Advice (Natural England, 2023k) (dated September 2019);
- advice on Operations (Natural England, 2023l) (dated March 2020); and
- the Conservation Objectives (Natural England, 2014p) (dated February 2019).

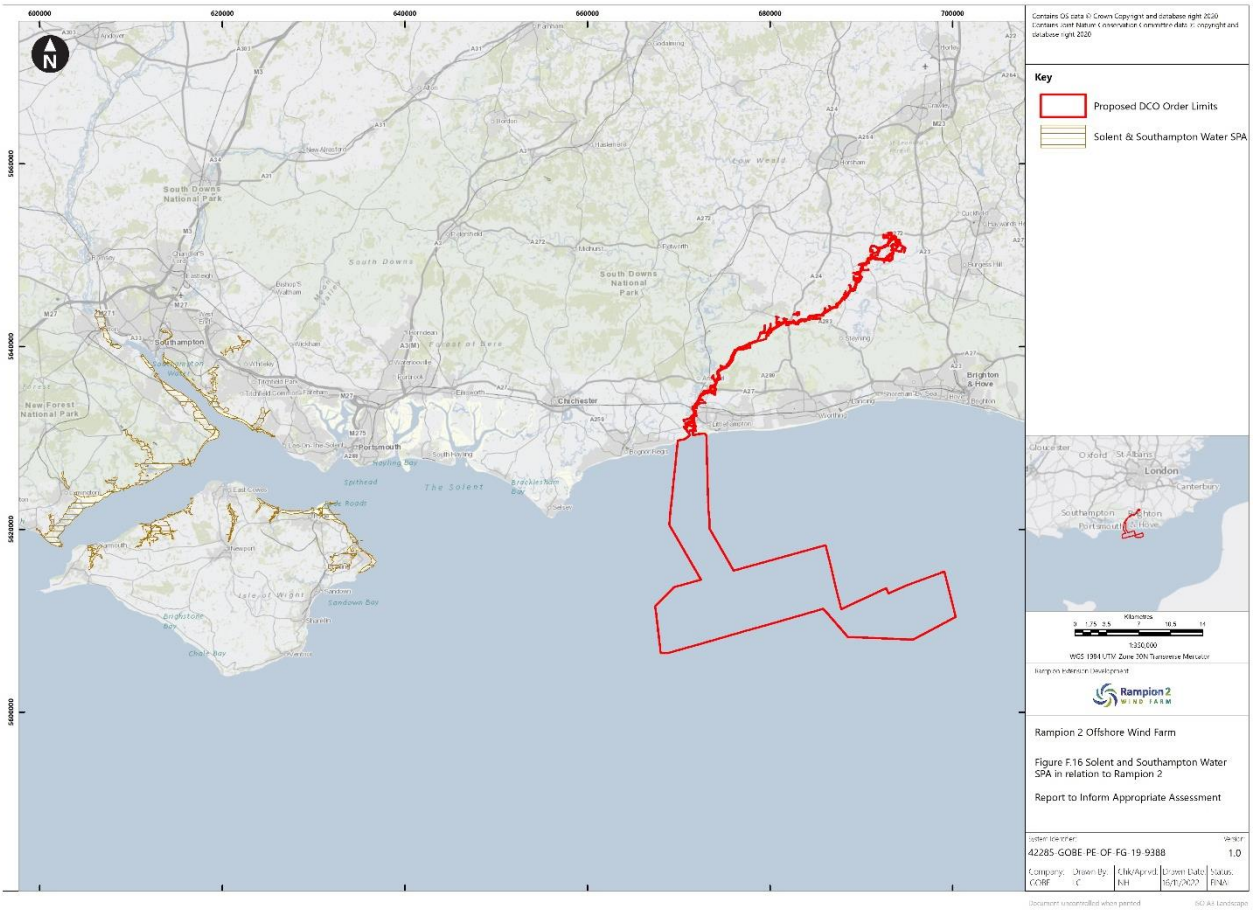
1.17.6 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*

© WSP UK Limited

- *the populations of each of the qualifying features; and*
- *the distribution of qualifying features within the site."*

Figure F-17 Solent and Southampton Water SPA in relation to Rampion 2



1.18 Solent and Southampton Water Ramsar

1.18.1 The Solent and Southampton Water SPA is a coastal site located characterised by a series of estuaries and adjacent coastal habitats important for breeding gulls and terns and wintering waterfowl. The site covers 5401.12ha (**Figure F-18).**

1.18.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)**;**
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22)**;**
- the Solent and Southampton Water Ramsar Site Information (RSIS, 2007) (dated January 1999); and

© WSP UK Limited

- the Solent Information Sheet on Ramsar Wetlands (JNCC, 1998) (dated October 1998)

Qualifying features

1.18.3 The site is designated for the following Ramsar criteria.

- Criterion 1 – the site is one of the few major sheltered channels between a substantial island and mainland in European waters, exhibiting an unusual strong double tidal flow and has long periods of slack water at high and low tide. It includes many wetland habitats characteristic of the biogeographic region: saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs.
- Criterion 2 – the site supports an important assemblage of rare plants and invertebrates. At least 33 British Red Data Book invertebrates and at least eight British Red Data Book plants are represented on site. The higher plants *Orobanche purpurea* and *Spartina maritima* are considered vulnerable and endangered, respectively, in the GB Red Book. The Mediterranean gull (*Larus melanocephalus*) is included in CITES Appendix I.
- Criterion 5 – assemblages of international importance: Species with peak counts in winter: 51,343 waterfowl (5 year peak mean 1998/99-2002/2003).
- Criterion 6 – species/populations occurring at levels of international importance. Species with peak counts in winter:
  - Black-tailed godwit, *Limosa limosa islandica*;
  - Dark-bellied brent goose, *Branta bernicla bernicla*; and
  - Eurasian teal, *Anas crecca*.

The characteristics of the European site

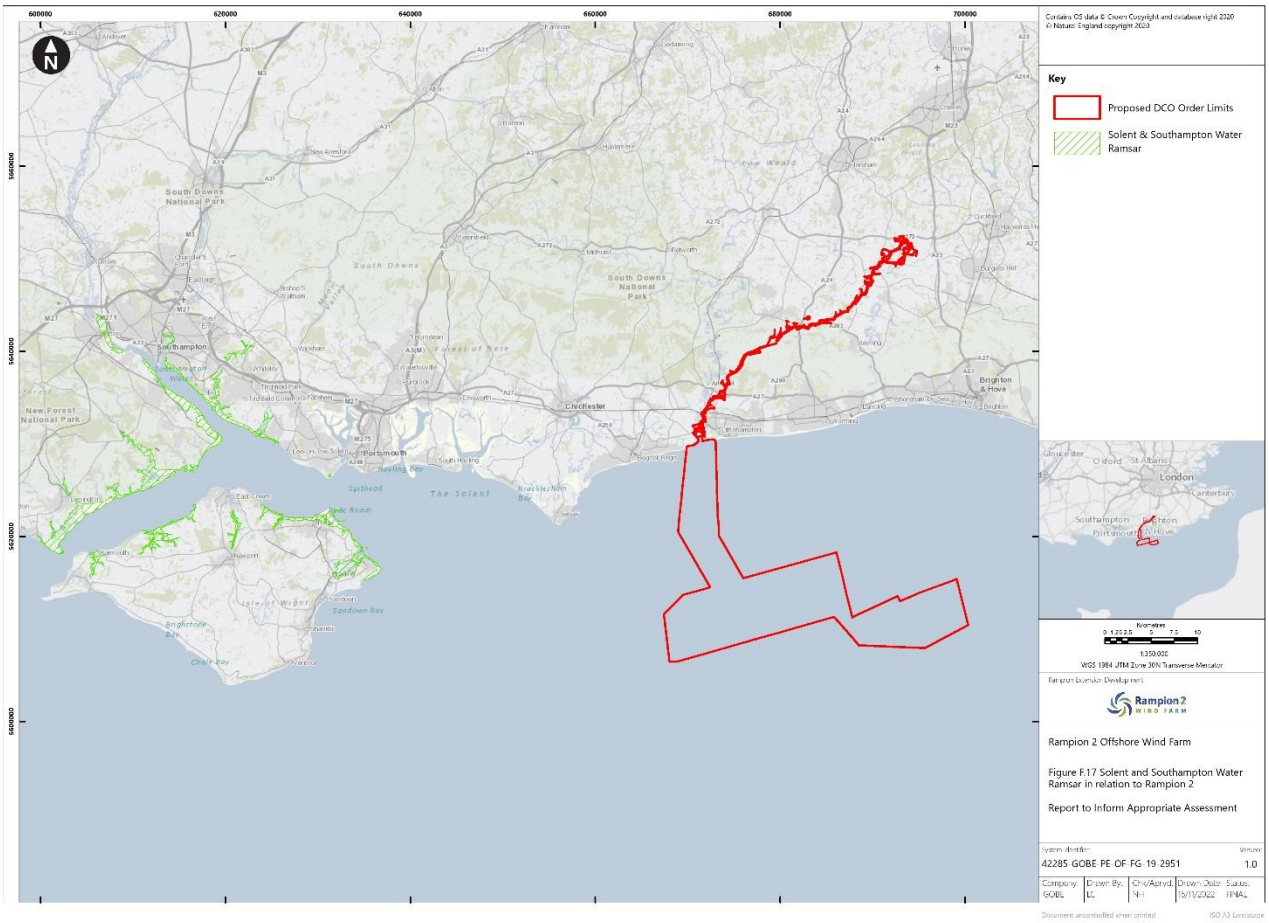
1.18.4 The Ramsar site extends from Hurst Spit to Gilkicker Point along the south coast of Hampshire and along the north coast of the Isle of Wight. The site comprises of estuaries and adjacent coastal habitats including intertidal flats, saline lagoons, shingle beaches, saltmarsh, reedbeds, damp woodland, and grazing marsh. The diversity of habitats support internationally important numbers of wintering waterfowl, important breeding gull and tern populations and an important assemblage of rare invertebrates and plants.

Conservation advice

1.18.5 A management agreement exists for the site whilst a management plan is in preparation.

© WSP UK Limited

Figure F-18 The Solent and Southampton Water Ramsar in relation to Rampion 2



1.19 Medway Estuary and Marshes SPA

1.19.1 The Medway Estuary and Marshes is a wetland of international importance in North Kent that provides breeding and wintering habitats for assemblages of bird species, particularly wildfowl and waders. The site covers 4686.32freplha (**Figure F-19**).

1.19.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the Medway Estuary and Marshes SPA Citation (Natural England, 2014q) (dated August 1999); and
- the Medway Estuary and Marshes SPA Data Form (JNCC, 2015g) (dated December 2015).

© WSP UK Limited

Qualifying features

1.19.3 The site is designated for the following Annex I species:

- A046a *Branta bernicla bernicla;* Dark-bellied brent goose (non-breeding);
- A048 *Tadorna tadorna*; Common shelduck (non-breeding);
- A054 Anas acuta; Northern pintail (non-breeding);
- A132 *Recurvirostra avosetta*; Pied avocet (breeding);
- A132 *Recurvirostra avosetta*; Pied avocet (non-breeding);
- A137 *Charadrius hiaticula*; Ringed plover (non-breeding);
- A141 *Pluvialis squatarola;* Grey plover (non-breeding);
- A143 *Calidris canutus*; Red knot (non-breeding);
- A149 *Calidris alpina alpina*; Dunlin (non-breeding);
- A162 *Tringa 42etanus;* Common redshank (non-breeding);
- A195 *Sterna albifrons;* Little tern (breeding);
- waterbird assemblage; and
- breeding bird assemblage.

The characteristics of the European site

1.19.4 The Medway Estuary forms a single tidal system with the Swale and joins the southern part of the Thames Estuary between the Isle of Grain and Sheerness. The site has a complex arrangement of tidal channels, which drain around large islands of salt marsh and peninsulas of grazing marsh. There are large areas of mudflat, which have high densities of invertebrates providing a good food source for wading birds. Grazing marsh can also be found landward of some sea walls in the area.

1.19.5 The complex and diverse mixes of coastal habitats support important numbers of waterbirds throughout the year. In summer, the estuary supports breeding waders and terns, whilst in winter it holds important numbers of geese, ducks, grebes, and waders. The middle and outer parts of the estuary represent the most important areas for the birds. The islands within the Medway also provide good habitat for SPA birds, in particular some of the breeding species.

Conservation advice

1.19.6 Advice on operations and Management measures can be found within:

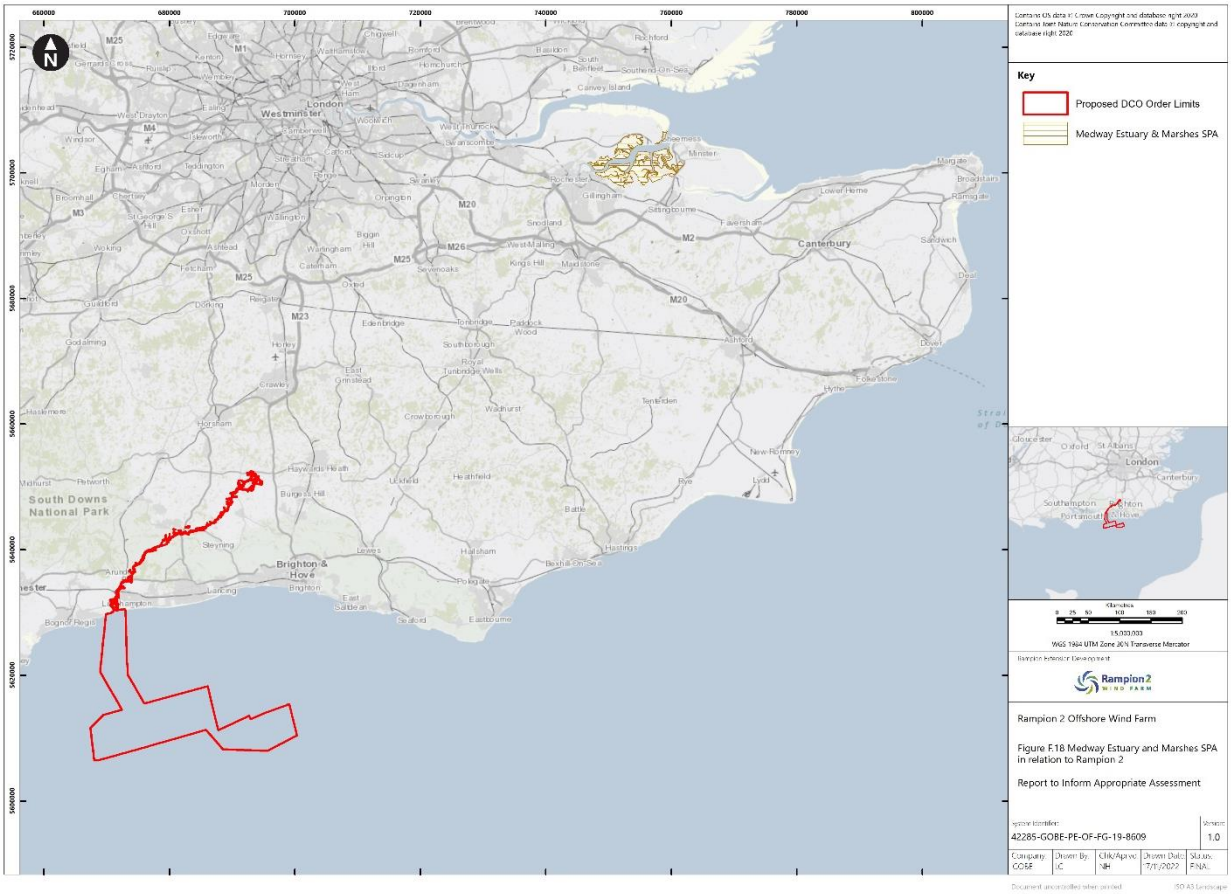
- greater Thames Complex Site Improvement Plan (Natural England, 2014r) (dated November 2014);
- the Supplementary Advice (Natural England, 2023m) (dated September 2019);
- advice on Operations (Natural England, 2023n) (dated March 2020); and

- the Conservation Objectives (Natural England, 2014q) (dated February 2019).

1.19.7 The conservation objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring.
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

Figure F-19 Medway Estuary and Marshes SPA in relation to Rampion 2



1.20 Littoral seino-marin (FR) SPA

1.20.1 The Littoral seino-marin SPA is a coastal site in France. The major ecological interest of the site is the presence of large numbers of migratory seabirds. The site covers 180050 ha (**Figure F-23**).

1.20.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, , Volume 2** of the ES (Document Reference: 6.2.22); and
- the Littoral seino-marin SPA Data Form (Ministère de la Transition écologique - DGALN/DEB/SDET/ET5, 2013) (dated August 2008).

Qualifying features

1.20.3 The site is designated for the following qualifying species:

- A168 Common Sandpiper *Actitis hypoleucos;*
- A200 Razorbill *Alca torda;*
- A394 Anser *albifrons albifrons;*
- A043 Greylag Goose *44etanu answer;*
- A222 Short-eared Owl *Asio flammeus;*
- A148 Purple Sandpiper *Calidris maritima;*
- A082 Hen Harrier *Circus cyaneus;*
- A026 Little Egret *Egretta garzetta;*
- A098 Merlin *Falco columbarius;*
- A103 Peregrine *Falco peregrinus;*
- A009 Fulmar *Fulmarus glacialis;*
- A002 Black-throated Diver *Gavia arctica;*
- A003 Great Northern Diver *Gavia immer;*
- A001 Red-throated Diver *Gavia stellate;*
- A189 Gull-billed Tern *Gelochelidon nilotica;*
- A014 Storm Petrel *Hydrobates pelagicus;*
- A184 Herring Gull *Larus argentatus;*
- A183 Lesser Black-backed Gull *Larus fuscus;*
- A187 Great Black-backed Gull *Larus marinus;*
- A176 Mediterranean Gull Larus melanocephalus;
- A177 Little Gull *Larus minutus;*
- A246 Woodlark *Lullula arborea;*
- A066 Velvet Scoter *Melanitta fusca;*

- A065 Common Scoter *Melanitta nigra;*
- A069 Red-breasted Merganser *Mergus serrator;*
- A016 Gannet *Morus bassanus;*
- A015 Leach's Storm-petrel *Oceanodroma leucorhoa;*
- A072 Honey Buzzard *Pernis apivorus;*
- A018 Shag *Phalacrocorax aristotelis;*
- A017 Cormorant *Phalacrocorax carbo;*
- A034 Spoonbill *Platalea leucorodia;*
- A007 Slavonian Grebe *Podiceps auratus;*
- A005 Great Crested Grebe *Podiceps cristatus;*
- A008 Black-necked Grebe *Podiceps nigricollis;*
- A013 Manx Shearwater *Puffinus puffinus;*
- A384 Manx Shearwater *Puffinus puffinus mauretanicus;*
- A132 Avocet *Recurvirostra avosetta;*
- A188 Kittiwake *Rissa tridactyla;*
- A063 Eider *Somateria mollissima;*
- A173 Artic Skua *Stercorarius parasiticus;*
- A172 Pomarine Skua *Stercorarius pomarinus;*
- A175 Great Skua *Stercorarius skua;*
- A195 Little Tern *Sterna albifrons;*
- A193 Common Tern *Sterna hirundo;*
- A194 Arctic Tern *Sterna paradisaea;*
- A191 Sandwich Tern *Sterna sandvicensis;*
- A048 Shelduck *Tadorna tadorna;*
- A199 Guillemot *Uria aalge;* and
- A178 Sabine's Gull *Xema sabini.*

The characteristics of the European site

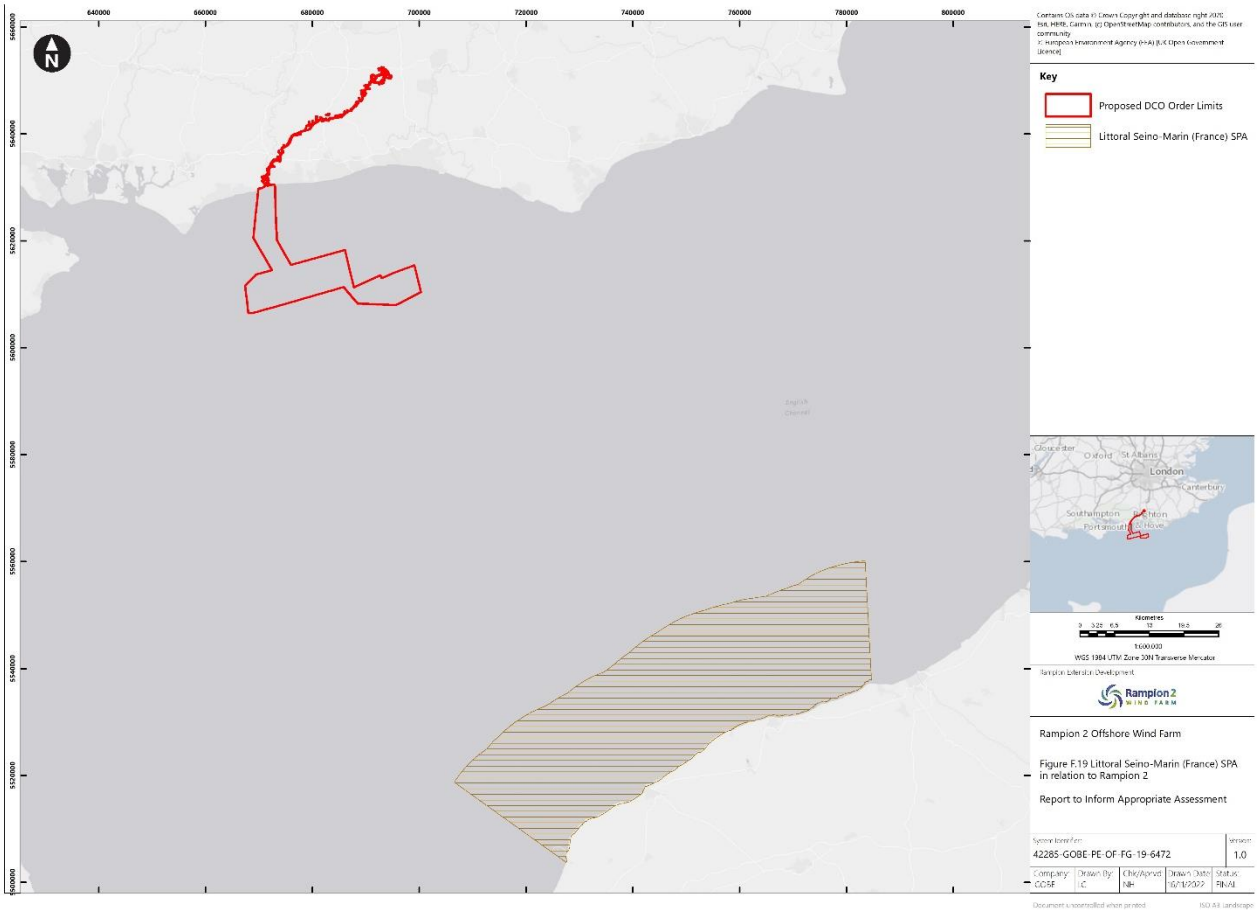
1.20.4 The majority of the site is with a small area of coast comprising beaches, cliffs and cliff tops. Very large numbers of migrating passerines can be observed making the area the most important point in France for the migration of passerines. The most common species are the Skylark, Chaffinch and Pipits. Off the cliffs, the SPA is also an important migration sector for seabirds, mainly Terns (sandwich and common), Northern Gannets, Brent Geese, Gulls (pygmies, kittiwakes,

melanocephali), 46etanus46 and shorebirds. The cliffs of Cap Fagnet are home to several interesting nesting populations including kittiwakes, fulmar, and peregrine falcons. Off the coast, the sea constitutes a wintering area for seabirds, including divers (mainly red-throated but also arctic) great crested grebe and kittiwakes.

Conservation advice

1.20.5 No conservation advice or objectives were found for this site.

Figure F-20 Littoral seino-marin (FR) SPA in relation to Rampion 2



1.21 Foulness (Mid-Essex Coast Phase 5) SPA

1.21.1 The Foulness (Mid-Essex Coast Phase 5) SPA is found on the Mid-Essex coast and comprises and extensive complex of estuaries that support internationally and nationally important bird species. The site also supports a diverse range of plants and invertebrates, including those that are nationally rare, scarce, or important. The site covers 10968.97 ha (**Figure F-21**).

1.21.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**

© WSP UK Limited

- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- the Foulness (Mid-Essex Coast Phase 5) SPA Citation (Natural England, 2014s) (dated September 1993); and
- the Foulness (Mid-Essex Coast Phase 5) (JNCC, 2015k) (dated November 2014).

Qualifying features

1.21.3 The site is designated for the following Annex I species:

- A046a Branta *bernicla bernicla*; Dark-bellied brent goose (non-breeding);
- A082 *Circus cyaneus*; Hen harrier (non-breeding);
- A130 *Haematopus ostralegus*; Eurasian oystercatcher (non-breeding);
- A132 *Recurvirostra avosetta*; Pied avocet (breeding);
- A137 *Charadrius hiaticula*; Ringed plover (breeding);
- A141 *Pluvialis squatarola*; Grey plover (non-breeding);
- A143 *Calidris canutus;* Red knot (non-breeding);
- A157 *Limosa lapponica;* Bar-tailed godwit (non-breeding);
- A162 *Tringa 47etanus*; Common redshank (non-breeding);
- A191 *Sterna sandvicensis*; Sandwich tern (breeding);
- A193 *Sterna hirundo*; Common tern (breeding);
- A195 *Sterna albifrons*; Little tern (breeding); and
- Waterbird assemblage.

The characteristics of the European site

1.21.4 Foulness SPA lies on the north shore of the Thames Estuary and is made up of extensive intertidal sand silt flats, saltmarsh, beaches, grazing marshes, rough grass and scrubland.

1.21.5 The site is of international importance for six species and national importance for three species of wintering wildfowl, with the islands, creeks and grazing land forming an integral part of the sheltered feeding and roosting sites. The shell banks support nationally important breeding colonies of little terns, common terns and sandwich terns. Avocets also breed on this site in nationally important numbers.

1.21.6 The complex matrix of habitats supports a diverse range of plants and invertebrates, including two nationally rare and twenty-one nationally scarce plants and seventy one nationally important invertebrates.

© WSP UK Limited

Conservation advice

1.21.7 Advice on operations and Management measures can be found within:

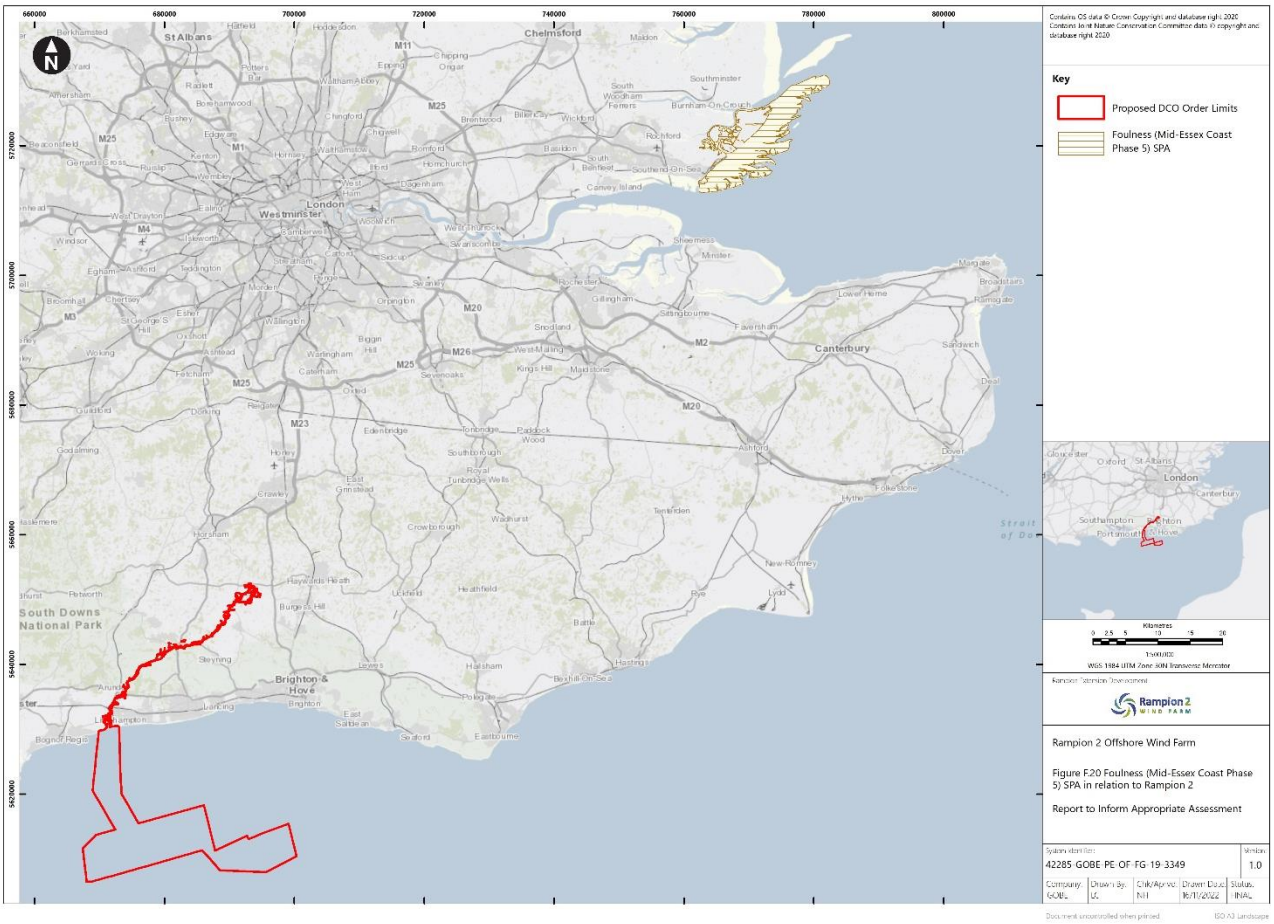
- The Supplementary Advice (Natural England, 2023o) (dated March 2020);
- Essex Estuaries Site Improvement Plan (Natural England, 2014t) (dated December 2014);
- Advice on Operations (Natural England, 2023p) (dated March 2020); and
- the Conservation Objectives (Natural England, 2014s) (dated February 2019).

1.21.8 The conservation objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of the habitats of the qualifying features.
  - the structure and function of the habitats of the qualifying features.
  - the supporting processes on which the habitats of the qualifying features rely.
  - the populations of each of the qualifying features; and
  - the distribution of qualifying features within the site.

© WSP UK Limited

Figure F-21 Foulness (Mid-Essex Coast Phase 5) SPA in relation to Rampion 2



1.22 Falaise du Bessin Occidental SPA

1.22.1 The Falaise du Bessin Occidental SPA is a coastal site on the north coast of France. The major ecological interest of the site is the presence of seabirds. The site covers 1,200ha (**Figure F-22**).

1.22.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- European Environment Agency (European Environment Agency, no date) (no date); and
- The Falaise du Bessin Occidental SPA Natura 2000 Data Form (Muséum national d'Histoire naturelle, 1993) (dated November 1993).

Qualifying features

1.22.3 The site is designated for the following qualifying species:

© WSP UK Limited

- A200 Razorbill *Alca torda;*
- A222 Short-eared Owl *Asio flammeus;*
- A103 Peregrine *Falco peregrinus;*
- A009 Fulmar *Fulmarus glacialis;*
- A001 Red-throated Diver *Gavia stellate;*
- A184 Herring Gull *Larus argentatus;*
- A183 Lesser Black-backed Gull *Larus fuscus;*
- A069 Red-breasted Merganser *Mergus serrator;*
- A018 Shag *Phalacrocorax aristotelis;*
- A017 Cormorant *Phalacrocorax carbo;*
- A188 Kittiwake *Rissa tridactyla;*
- A302 Dartford Warbler *Sylvia undata;* and
- A199 Guillemot *Uria aalge.*

The characteristics of the European site

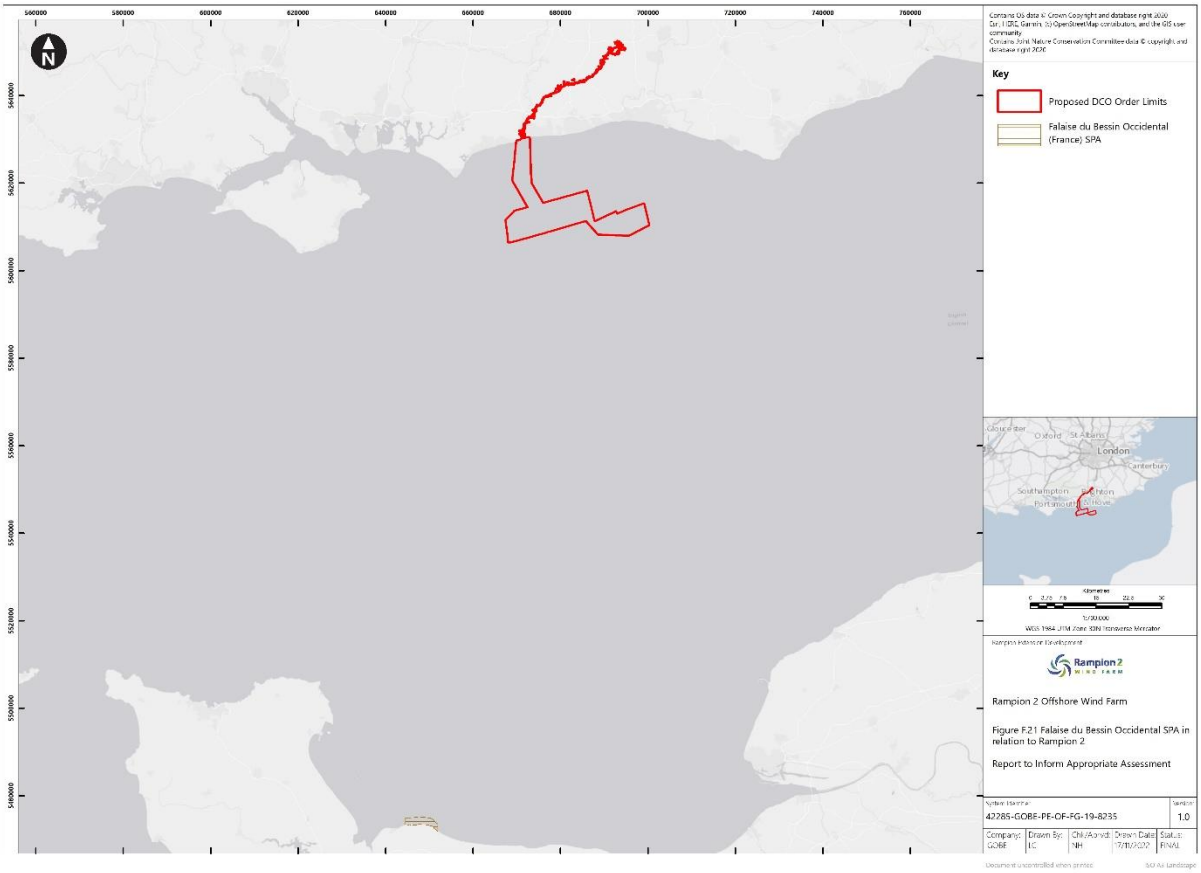
1.22.4 Information on the site is extremely limited. 95 percent of the site is marine with a small area of coast.

Conservation advice

1.22.5 No conservation advice or objectives were found for this site.

© WSP UK Limited

Figure F-22 Falaise du Bessin Occidental (FR) SPA in relation to Rampion 2



1.23 Alderney West Coast and Burhou Islands Ramsar

1.23.1 The Ramsar comprises the western coast of Alderney and adjacent shallow waters and islets in the strongly tidal, high-energy system of the northern Channel Islands that support important breeding bird assemblages. The site covers some 15,629ha (**Figure F-23**).

1.23.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)**;**
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation Volume 2** of the ES (Document Reference: 6.2.22);
- The Alderney West Coast and Burhou Islands Ramsar Information Sheet (JNCC, 2005) (dated August 2005); and
- The Alderney West Coast and Burhou Islands Ramsar Sites Information Service (RSIS, 2006) (January 1976).

© WSP UK Limited

Qualifying features

1.23.3 The site is designated owing to the following qualifying criterion:

- Criterion 1: among global priority habitats, seagrass beds occur at and below low water mark; there is also a small area of dune slack wet-grasslands at Platte Saline. These form part of a rich complex of habitats, including vegetated shingle banks, sand dunes, dune and coastal grassland, soft cliffs, sandy, gravelly and rocky shores (including the offshore islands of Burhou, Les Etacs and Ortac)
- Criterion 3: burhou island has a flora and fauna relatively little modified by man. Large nesting seabird populations, which include the only European storm-petrel *Hydrobates pelagicus* colony in the Channel Islands, Atlantic puffin *Fratercula arctica*, lesser black-backed gull *Larus fuscus* and great black-backed gull Larus marinus. Les Etacs and Ortac support the only northern gannet *Morus bassanus* colonies in the Channel Islands. The intertidal rocky shore supports many rare species of fauna including ormers *Haliotis tuberculata*, which, within the UK, are found only in the Channel Islands.
- Criterion 4: the site is an important breeding area for several bird species.
- Criterion 6: a large nesting population of northern gannets *Morus bassanus* are established on the Garden Rocks (Les Etacs) and Ortac. Here there are 11,900 breeding birds, about 1,000 non-breeding birds, and perhaps 5950 immature birds. This constitutes 1.5 percent of the world population.
- Criterion 7: many rare species, which include a representative sample of northwest European fish fauna, are found in the marine area of the site. Although ormers *Haliotis tuberculata* are the most significant, there is also a high diversity of fish and shellfish.

The characteristics of the European site

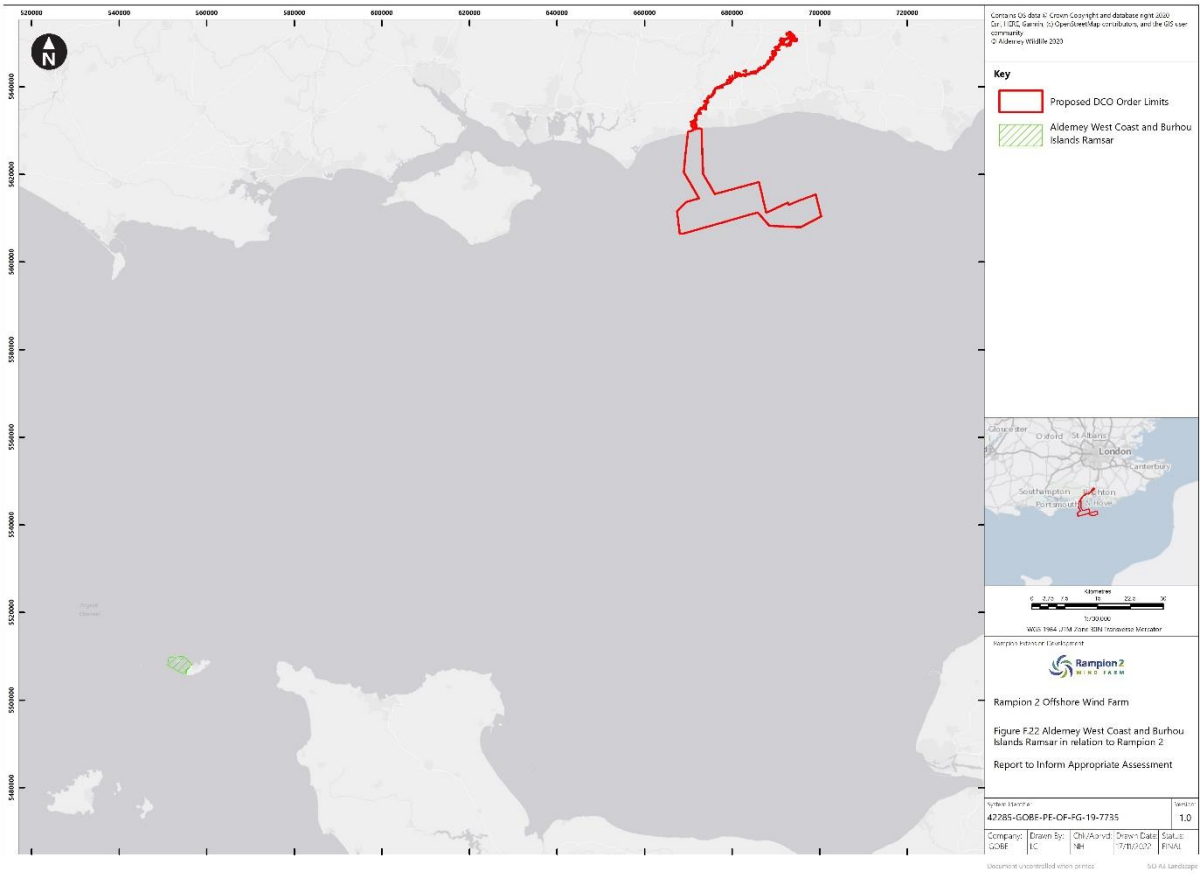
1.23.4 The SPA includes diverse and inter-related ecosystems such as sandy beaches with shingle banks, marine subtidal aquatic beds, rockpools, sandbars, and pebble beach and rocky marine shores, including sea cliff and rocky offshore islands. The rocky islets are a very important bird breeding place. A large nesting population of northern gannets are established. It also provides habitat for a seal colony and some fish and shellfish species such as e.g. lobsters, bass and plaice. The site hosts about 100 species of seaweeds, which play very an important role in supporting all the marine fauna and thus the large nesting bird population.

Conservation advice

1.23.5 A Land Use Plan protects the terrestrial part of the area within the site, including intertidal rock formations. Besides commercial and non-commercial fishing, tourism is the main activity: there is a visitor centre which provides both educational measures for children and information materials for the general public. Common visitor activities are birdwatching, walking and rockpooling over the summer months.

© WSP UK Limited

Figure F-23 Alderney West Coast and Burhou Islands Ramsar in relation to Rampion 2



1.24 Alde-Ore Estuary (UK) SPA

1.24.1 The Alde Ore and Butley SPA is a coastal site found on the east coast of Suffolk. The site comprises a complex of estuaries that support internationally and nationally important breeding and wintering birds. The site covers 2416.87ha (**Figure F-25**).

1.24.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- The Alde Ore and Butley SPA Citation (Natural England, 2014u) (dated August 1990); and
- The Alde Ore and Butley SPA Data Form (JNCC, 2001) (dated March 1998).

Qualifying features

1.24.3 The site is designated for the following qualifying features:

- Avocet *Recurvirostra avosetta*, Breeding;
- Avocet *Recurvirostra avosetta*, non-breeding;
- Lesser black-backed gull *Larus fuscus*, Breeding;
- Little tern *Sternula albifrons*, Breeding;
- Marsh harrier *Circus aeruginosus*, Breeding;
- Redshank *Tringa totanus*, non-breeding;
- Ruff *Calidris pugnax*, non-breeding; and
- Sandwich tern *Thalasseus sandvicensis*, Breeding.

The characteristics of the European site

1.24.4 The SPA is located on the Suffolk coast between Aldeburgh to the North and Bawdsey to the South. The site includes Havergate Island and Orford Ness, as well as the estuaries of the rivers Alde, Butley and Ore.

1.24.5 The Alde-Ore Estuary SPA is composed of Atlantic salt meadows Glauco-Puccinellietalia maritime, intertidal mudflats, shingle, coastal lagoons and estuarine fish communities. Bird usage of habitats within the SPA varies seasonally, with different areas being utilised for nesting and feeding at different times of the year.

1.24.6 As well as feeding habitat the site also provides good nesting habitat. The shingle areas around Orford Ness are important for nesting little and Sandwich tern. The saltmarsh that is particularly widespread at Havergate Island, Orford Ness and along the Butley and Alde rivers, is important for nesting marsh harrier, avocet and lesser black- backed gull.

Conservation advice

1.24.7 Advice on operations and Management measures can be found within:

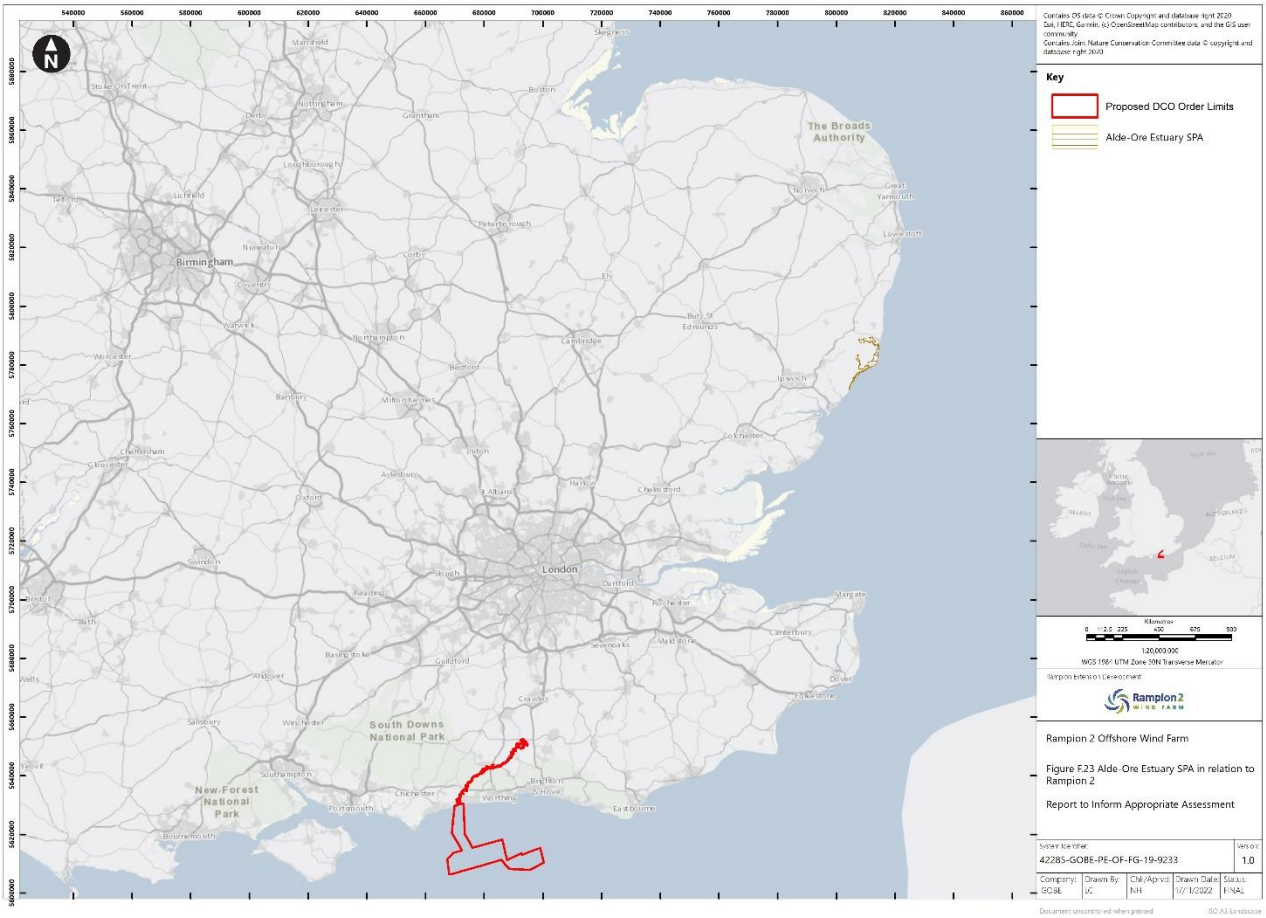
- The Supplementary Advice (Natural England, 2023q) (dated September 2019);
- Alde-Ore Estuaries Site Improvement Plan (Natural England, 2014v) (dated October 2014);
- Advice on Operations (Natural England, 2023r) (dated March 2020); and
- The Conservation Objectives (Natural England, 2014u) (dated February 2019).

1.24.8 The conservation objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of qualifying natural habitats and habitats of the qualifying species.

- the structure and function (including typical species) of qualifying natural habitats.
- the structure and function of the habitats of the qualifying species.
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely.
- the populations of each of the qualifying species; and
- the distribution of qualifying species within the site.

Figure F-24 Alde-Ore Estuary SPA in relation to Rampion 2



1.25 Alde-Ore Estuary (UK) Ramsar

1.25.1 The Alde Ore Estuary Ramsar is found on the east coast of Suffolk. The site comprises a complex of estuaries that support internationally and nationally important breeding and wintering birds. The site covers 2547ha (**Figure F-25**).

1.25.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**

© WSP UK Limited

- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- Ramsar Sites Information Service (RSIS, 1999e) (dated November 1996); and
- The Alde-Ore Estuary Information Sheet on Ramsar Wetlands (JNCC, 1996) (dated October 1996).

Qualifying features

1.25.3 The site is designated owing to the following qualifying criteria:

- Criterion 2: The site supports a number of nationally-scarce plant species and British Red Data Book invertebrates;
- Criterion 3: The site supports a notable assemblage of breeding and wintering wetland birds;
- Criterion 6: Species regularly supported during the breeding season:
  - Lesser black-backed gull, *Larus fuscus graellsii*
- Species with peak counts in winter:
  - Pied avocet, *Recurvirostra avosetta*; and
  - Common redshank, *Tringa totanus tetanus*.

The characteristics of the European site

1.25.4 The Ramsar is located on the Suffolk coast and is formed by an estuary complex of three rivers comprising various habitats including intertidal mudflats, saltmarsh, a vegetated shingle spit, saline lagoons, and semi-intensified grazing marsh. The site supports nationally scarce plants and invertebrates and notable assemblages of breeding and wintering wetland birds.

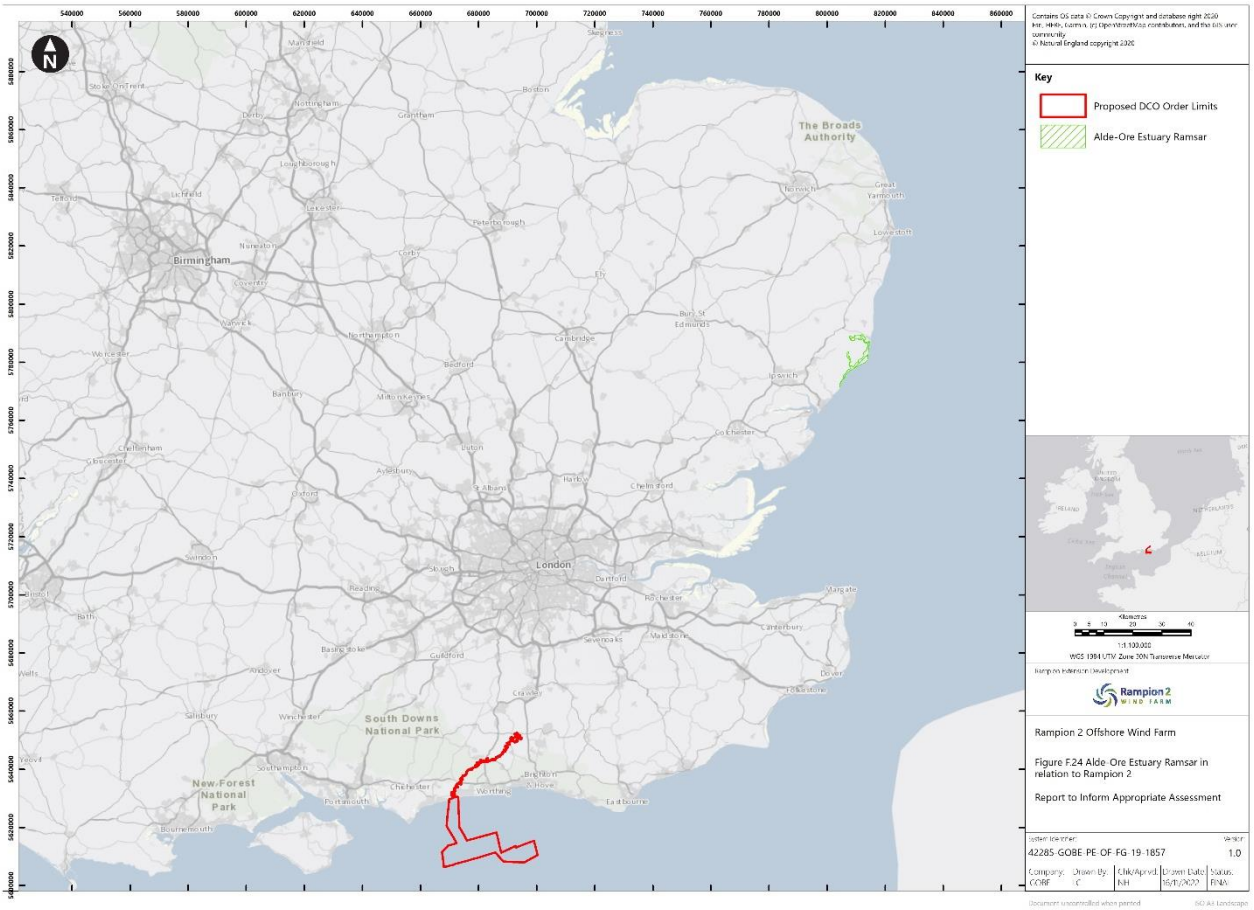
1.25.5 Human activities include recreation, fishing, livestock grazing, and hunting.

Conservation advice

1.25.6 A site management statement/plan has been implemented for the site whilst a management plan is in preparation.

© WSP UK Limited

Figure F-25 Alde-Ore Estuary Ramsar in relation to Rampion 2



1.26 The Wash SPA

1.26.1 The Wash SPA is a coastal site found on the east coast of England and is designated for its importance as a supporting habitat for nationally and internationally important bird assemblages. The site covers 62044.14ha (**Figure F-26**).

1.26.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- The Wash SPA Citation (Natural England, 2014w) (uploaded July 2014 – no date); and
- The Wash SPA Data Form (JNCC, 2015l) (dated November 2015).

Qualifying features

1.26.3 The site is designated for the following qualifying features:

- A037 *Cygnus columbianus bewickii*; Bewick's swan (non-breeding);
- A040 *Anser brachyrhynchus*; Pink-footed goose (non-breeding);
- A046a *Branta bernicla bernicla*; Dark-bellied brent goose (non-breeding);
- A048 *Tadorna tadorna*; Common shelduck (non-breeding);
- A050 *Anas penelope*; Eurasian wigeon (non-breeding);
- A051 *Anas strepera*; Gadwall (non-breeding);
- A054 *Anas acuta*; Northern pintail (non-breeding);
- A065 *Melanitta nigra*; Black (common) scoter (non-breeding);
- A067 *Bucephala clangula*; Common goldeneye (non-breeding);
- A130 *Haematopus ostralegus*; Eurasian oystercatcher (non-breeding);
- A141 *Pluvialis squatarola*; Grey plover (non-breeding);
- A143 *Calidris canutus*; Red knot (non-breeding);
- A144 *Calidris alba*; Sanderling (non-breeding);
- A149 *Calidris alpina alpina*; Dunlin (non-breeding);
- A156 *Limosa limosa islandica*; Black-tailed godwit (non-breeding);
- A157 *Limosa lapponica*; Bar-tailed godwit (non-breeding);
- A160 *Numenius arquata*; Eurasian curlew (non-breeding);
- A162 *Tringa totanus*; Common redshank (non-breeding);
- A169 *Arenaria interpres*; Ruddy turnstone (non-breeding);
- A193 *Sterna hirundo*; Common tern (breeding);
- A195 *Sterna albifrons*; Little tern (breeding); and
- waterbird assemblage.

The characteristics of the European site

1.26.4 The site encompasses the largest embayment in the UK, as well as extensive intertidal sand and mudflats, subtidal sandbanks, biogenic and geogenic reef, saltmarsh, and a barrier beach system unique in the UK.

1.26.5 The Wash is numerically the most important area in Britain for wintering waterfowl, taking waders and wildfowl together. It is also the most important area in Britain in early autumn for moulting waders. The Wash is important also to certain wintering passerines, to breeding waders and terns, and to certain seabirds.

Conservation advice

1.26.6 Advice on operations and Management measures can be found within:

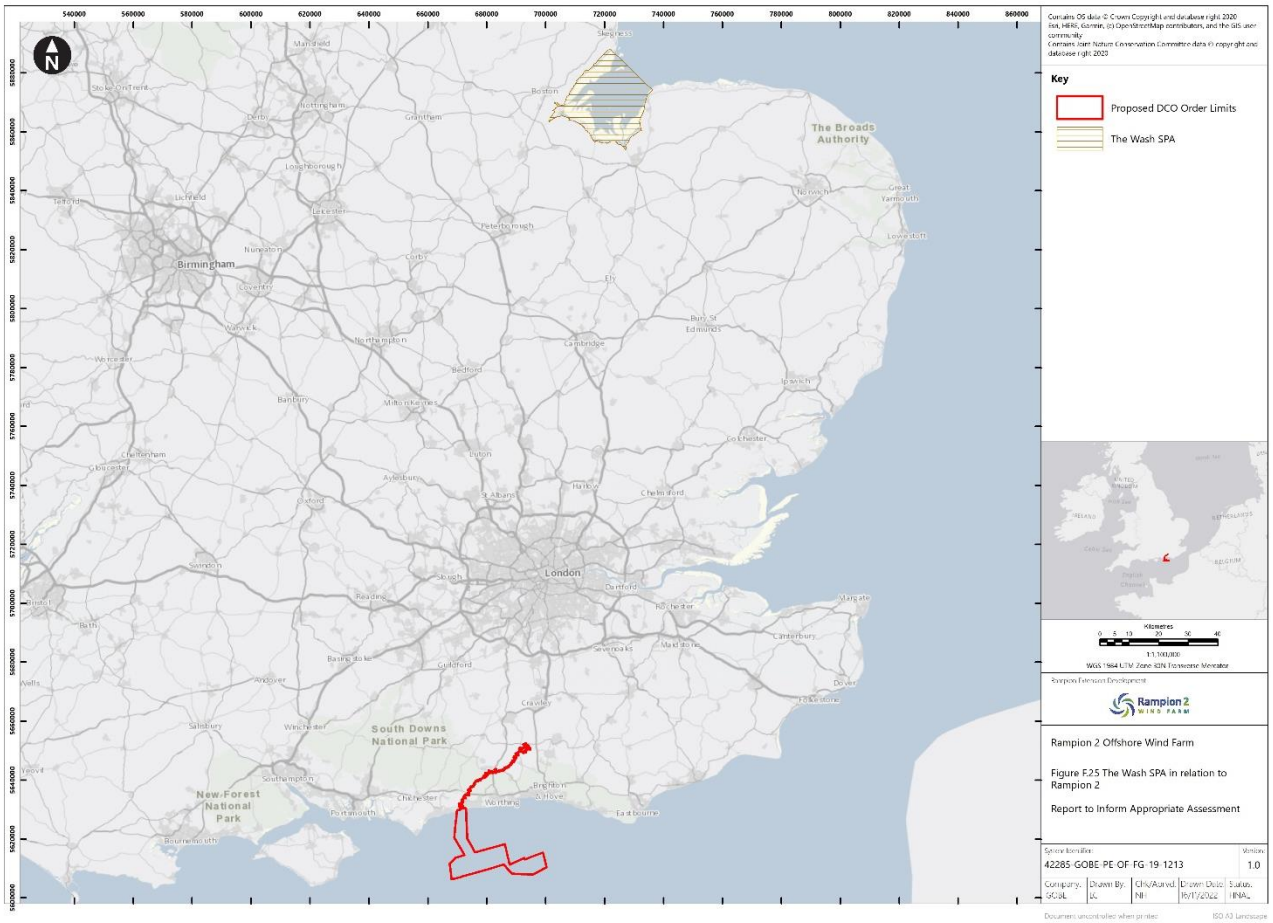
- The Supplementary Advice (Natural England, 2023s) (dated September 2019);
- Advice on Operations (Natural England, 2023t) (dated March 2020);
- The Wash and North Norfolk Coast Site Improvement Plan (2014x) (dated December 2014); and
- The Conservation Objectives (Natural England, 2014w) (dated February 2019).

1.26.7 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of qualifying natural habitats and habitats of the qualifying species;*
  - *the structure and function (including typical species) of qualifying natural habitats;*
  - *the structure and function of the habitats of the qualifying species;*
  - *the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;*
  - *the populations of each of the qualifying species; and*
  - *the distribution of qualifying species within the site."*

© WSP UK Limited

Figure F-26 The Wash SPA in relation to Rampion 2



1.27 Breydon Water SPA

1.27.1 The Breydon Water SPA is a coastal site found on the east coast of Norfolk. The site comprises estuarine habitats that support internationally and nationally important breeding and wintering birds. The site covers 1202.94ha (**Figure F-27**).

1.27.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation Volume 2** of the ES (Document Reference: 6.2.22)**;**
- The Breydon Water SPA Citation (Natural England, 2014y) (dated January 2000); and
- The Breydon Water SPA Data Form (JNCC, 2014m) (dated December 2014).

Qualifying features

1.27.3 The site is designated for the following qualifying features:

© WSP UK Limited

- A037 *Cygnus columbianus bewickii*; Bewick's swan (non-breeding);
- A132 *Recurvirostra avosetta*; Pied avocet (non-breeding);
- A140 *Pluvialis apricaria*; European golden plover (non-breeding);
- A142 *Vanellus vanellus*; Northern lapwing (non-breeding);
- A151 *Philomachus pugnax*; Ruff (non-breeding);
- A193 *Sterna hirundo*; Common tern (breeding); and
- waterbird assemblage.

The characteristics of the European site

1.27.4 The SPA incorporates a number of important supporting habitats such as, intertidal mudflats, saltmarsh and freshwater grazing marsh. Shallow tidal waters provide key feeding and roosting habitat for many of the bird species using this site. The extensive areas of intertidal mudflats support dense populations of marine invertebrate species which provide a food source for large populations of waterbirds (wildfowl and waders). As a result, Breydon Water is a key estuary in the UK for wintering waterfowl. Saltmarsh provides important high tide roost sites and nesting sites for many of the bird species.

Conservation advice

1.27.5 Advice on operations and Management measures can be found within:

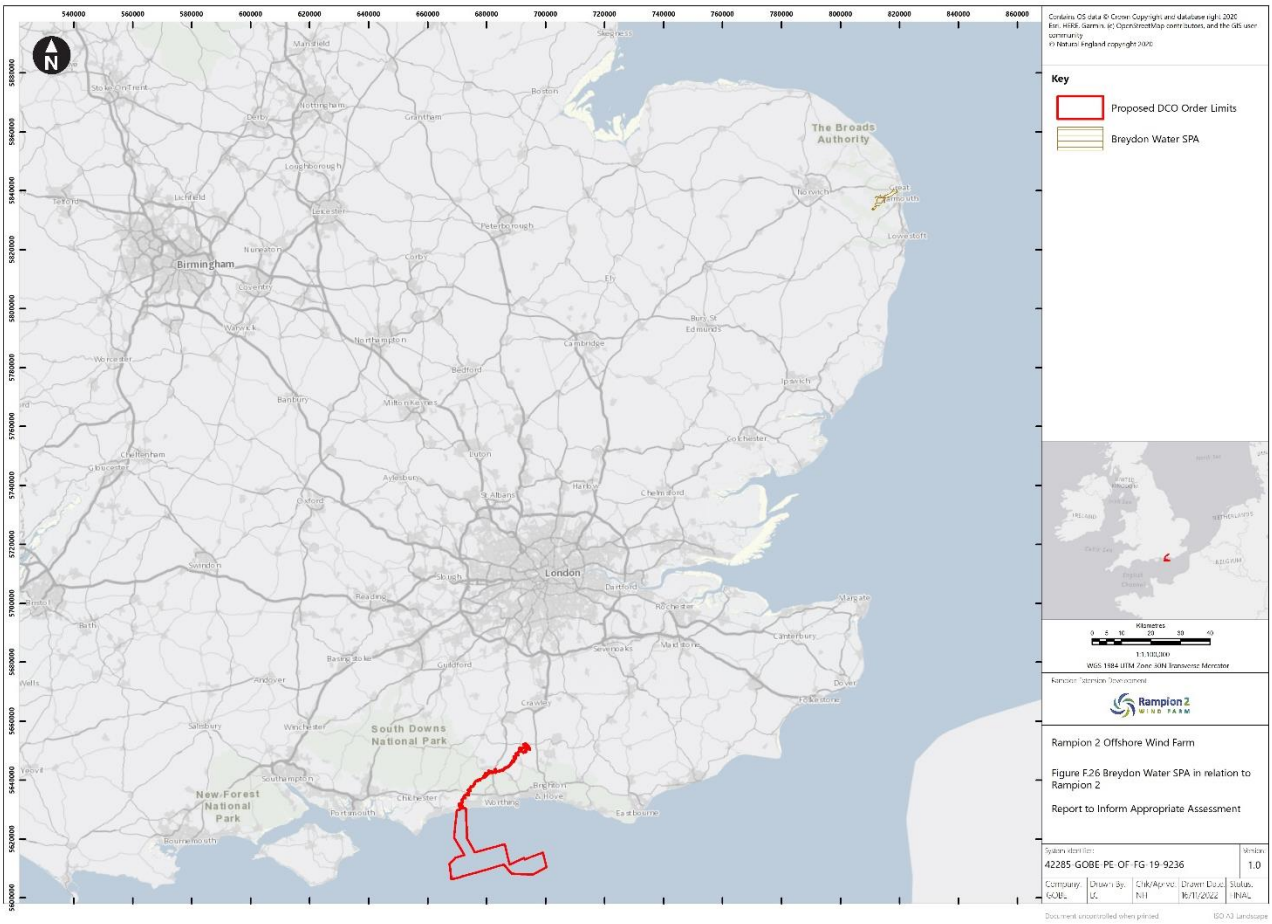
- The Supplementary Advice (Natural England, 2023u) (dated September 2019);
- Advice on Operations (Natural England, 2023v) (dated March 2020);
- Breydon Water Site Improvement Plan (Natural England, 2015c) (dated January 2015); and
- The Conservation Objectives (Natural England, 2014y) (dated February 2019).

1.27.6 The conservation objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

© WSP UK Limited

Figure F-27 Breydon Water SPA in relation to Rampion 2



1.28 Greater Wash SPA

1.28.1 The Greater Wash SPA is found on the east coast of England and its boundary extends beyond 12 nautical miles off the coast. It is designated for its importance as a supporting habitat for nationally and internationally important bird assemblages. The site covers 35,3600ha (**Figure F-28**).

1.28.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation Volume 2** of the ES (Document Reference: 6.2.22)**;**
- The Greater Wash SPA Citation (Natural England, 2018c) (dated March 2018); and
- The Greater Wash Data Form(JNCC, 2018a) (dated September 2018).

Qualifying features

1.28.3 The site is designated for the following qualifying features:

- A001 *Gavia stellata*; Red-throated diver (non-breeding);
- A065 *Melanitta nigra*; Common scoter (non-breeding);
- A177 *Hydrocoloeus minutus*; Little gull (non-breeding);
- A191 *Sterna sandvicensis*; Sandwich tern (breeding);
- A193 *Sterna hirundo*; Common tern (breeding); and
- A195 *Sternula albifrons*; Little tern (breeding).

The characteristics of the European site

1.28.4 The Greater Wash SPA is located in the mid-southern North Sea between Bridlington Bay in the north and the Outer Thames Estuary SPA in the south. To the north, seabed habitats primarily comprise coarse sediments, with occasional areas of sand, mud and mixed sediments. Subtidal sandbanks occur at the mouth of the Humber Estuary, primarily comprising sand and coarse sediments. Offshore, soft sediments dominate, with extensive areas of subtidal sandbanks off The Wash as well as north and east Norfolk coasts. Closer inshore at The Wash and north Norfolk coast, sediments comprise a mosaic of sand, muddy sand, mixed sediments and coarse sediments, as well as occasional Annex I reefs. The area off the Suffolk coast continues the mosaic habitats mostly dominated by soft sediment.

Conservation advice

1.28.5 Natural England is currently in the process of developing a Conservation advice package for the Greater Wash SPA, but limited information can be found within:

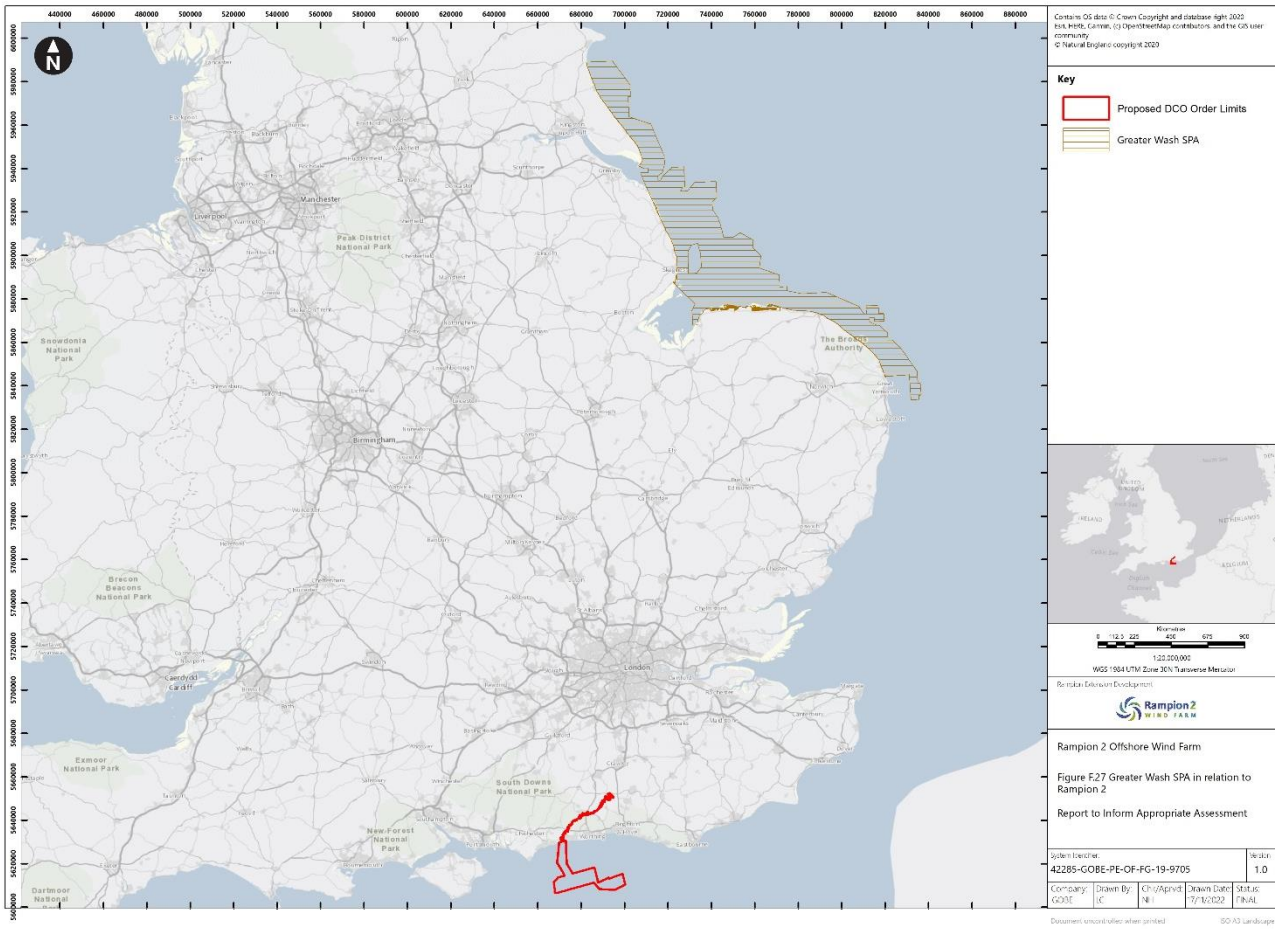
- The Conservation Objectives (Natural England, 2019c) (dated February 2019); and
- The Wash and North Norfolk Coast Site Improvement Plan(Natural England, 2014 (1)) (dated December 2014).

1.28.6 The Conservation Objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

© WSP UK Limited

Figure F-28 The Greater Wash SPA in relation to Rampion 2



1.29 North Norfolk Coast SPA

1.29.1 The North Norfolk Coast SPA is located east of The Wash on the northern coastline of Norfolk, eastern England and includes a great variety of coastal habitats. The site is the fourth most important wetland site for waterfowl in Britain and is also important for saltmarsh. The site covers 7886.79ha (**Figure F-30**).

1.29.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology Volume 2** of the ES (Document Reference: 6.2.9)**;**
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation Volume 2** of the ES (Document Reference: 6.2.22)**;**
- The North Norfolk Coast SPA Citation (Natural England, 1996) (dated January 1996); and
- The North Norfolk Coast SPA Data Form (JNCC, 2015n) (dated December 2015).

© WSP UK Limited

Qualifying features

1.29.3 The site is designated for the following qualifying features:

- A021 *Botaurus stellaris*; Great bittern (breeding);
- A040 *Anser brachyrhynchus*; Pink-footed goose (non-breeding);
- A046a *Branta bernicla bernicla*; Dark-bellied brent goose (non-breeding);
- A050 *Anas penelope*; Eurasian wigeon (non-breeding);
- A081 *Circus aeruginosus*; Eurasian marsh harrier (breeding);
- A084 *Circus pygargus*; Montagu's harrier (breeding);
- A132 *Recurvirostra avosetta*; Pied avocet (breeding);
- A143 *Calidris canutus*; Red knot (non-breeding);
- A191 *Sterna sandvicensis*; Sandwich tern (breeding);
- A193 *Sterna hirundo*; Common tern (breeding);
- A195 *Sterna albifrons*; Little tern (breeding); and
- waterbird assemblage.

The characteristics of the European site

1.29.4 The SPA comprises a great variety of coastal habitats including intertidal mudflats and sandflats, coastal waters, saltmarshes, shingle, sand dunes, freshwater grazing marshes and reedbeds. The site is important within Europe as one of the largest areas of undeveloped coastal habitat of its type. It is the fourth most important wetland site for waterfowl in Britain. The site is particularly important for saltmarsh containing some of the best examples of this habitat type in Europe. The intertidal mud and sand flats support high densities of invertebrates important for breeding birds and supporting high numbers of wading birds and wildfowl throughout the year. Large numbers of waterbirds use the site throughout the year. The site is of also important to migrating birds in the spring and autumn passage periods.

1.29.5 The pursuit of traditional activities, including those of common rights, and those embraced by the Longshore Economy such as samphire gathering, bait digging and wildfowling is widely recognised by Natural England and the other relevant authorities as a particularly important aspect of the local cultural heritage and economy at this site. Such activities are generally seasonal in nature, localised in their occurrence, employ traditional methods and place a strong emphasis on the principles of sustainability. The Wells, Boston and King's Lynn Advisory Groups' understanding of the levels of these activities since Regulation 33 advice was published in 2000, is that they have had no adverse effect on the sites condition and that there is evidence that some activities, particularly reed cutting and mussel cultivation, can make a positive contribution to the favourable condition of the site. It is thus agreed that such activities, including all the Common Rights on the north Norfolk coast between Holme and Holkham, as currently and historically practiced

under law relating to Commons and carried out using traditional methods, are compatible with the need to maintain condition of the site's features.

Conservation advice

1.29.6 Advice on operations and Management measures can be found within:

- The Supplementary Advice[1] (dated September 2019);
- Advice on Operations(Natural England, 2019d) (dated March 2020);
- The Wash and North Norfolk Coast Site Improvement Plan (Natural England, 2014 (1)) (dated December 2014); and
- The Conservation Objectives (Natural England, 2014aa) (dated February 2019).

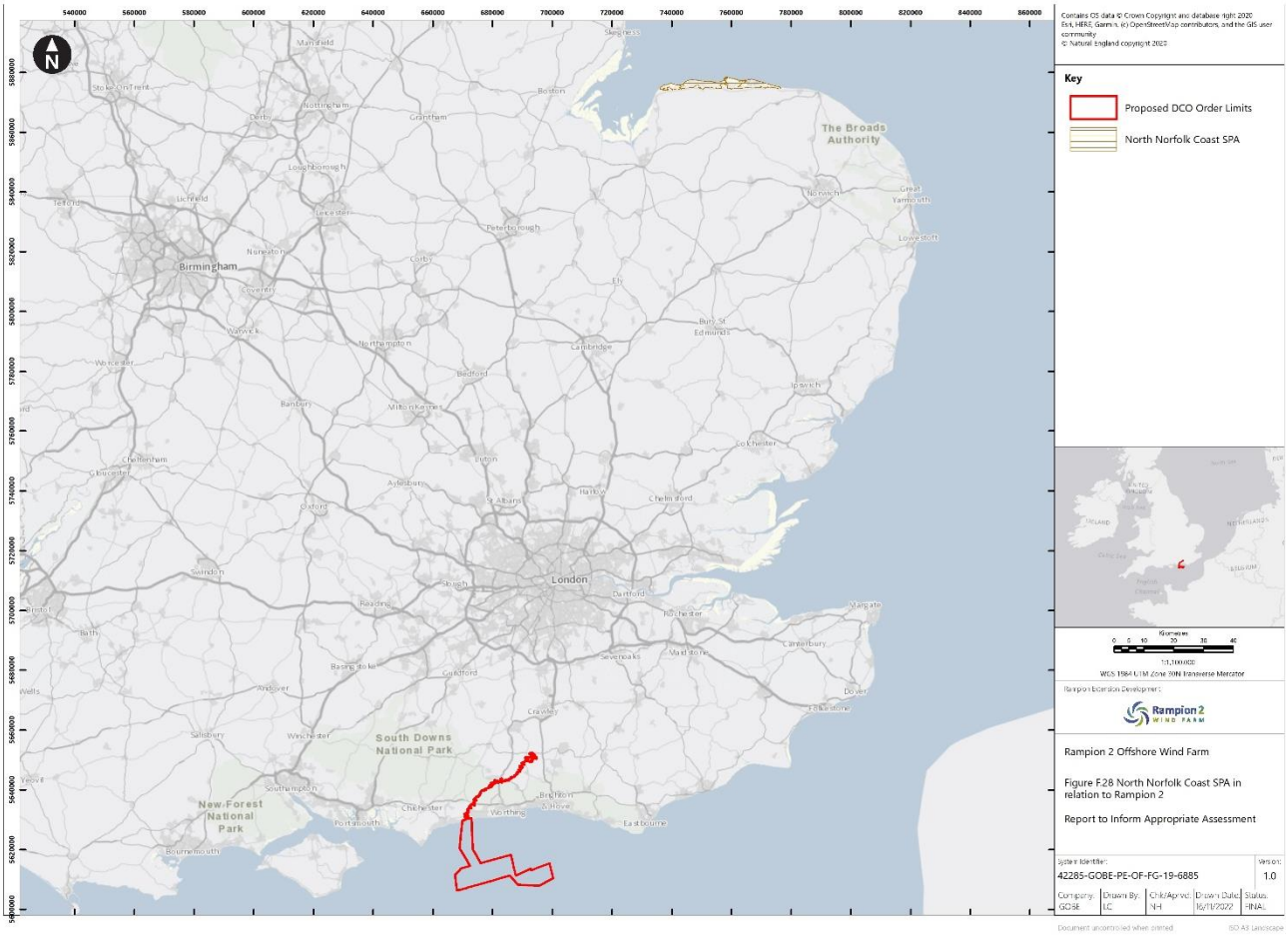
1.29.7 The Conservation Objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and*
  - *the distribution of the qualifying features within the site."*

[1] https://designatedsites.naturalenglandorg.uk/Marine/SupAdvice.aspx?SiteCode=UK9009031&SiteName=North%20norfolk%20coast%20spa&SiteNameDisplay=North+Norfolk+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=11

© WSP UK Limited

Figure F-29 North Norfolk Coast SPA in relation to Rampion 2



1.30 North Norfolk Coast Ramsar

1.30.1 The North Norfolk Coast Ramsar is located east of The Wash on the northern coastline of Norfolk, eastern England and includes a great variety of coastal habitats. The site is the fourth most important wetland site for waterfowl in Britain and is also important for saltmarsh. The site covers 7700 ha (**Figure F-30**).

1.30.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)**;**
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22)**;**
- The North Norfolk Coast Ramsar (Ramsar Site Information Service, 1976) (dated January 1976); and
- The North Norfolk Coast Ramsar Information Sheet (JNCC, 1976) (January 1976).

© WSP UK Limited

Qualifying features

1.30.3 The site is designated for the following qualifying criteria.

- Criterion 1: The site is one of the largest expanses of undeveloped coastal habitat of its type in Europe. It is a particularly good example of a marshland coast with intertidal sand and mud, saltmarshes, shingle banks and sand dunes. There are a series of brackish-water lagoons and extensive areas of freshwater grazing marsh and reed beds.
- Criterion 2: Supports at least three British Red Data Book and nine nationally scarce vascular plants, one British Red Data Book lichen and 38 British Red Data Book invertebrates.
- Criterion 5: Species with peak counts in winter: 98462 waterfowl (5 year peak mean 1998/99-2002/2003).
- Criterion 6: Species/populations occurring at levels of international importance.
- Criterion 6: Species regularly supported during the breeding season:
  - Sandwich tern, *Sterna (Thalasseus) sandvicensis sandvicensis*,
  - Common tern, *Sterna hirundo hirundo*,
  - Little tern, *Sterna albifrons albifrons*,
- Criterion 6: Species with peak counts in spring/autumn:
  - Red knot, *Calidris canutus islandica*
- Species with peak counts in winter:
  - Pink-footed goose, *Anser brachyrhynchus*
  - Dark-bellied brent goose, *Branta bernicla bernicla*,
  - Eurasian wigeon, *Anas penelope,*
  - Northern pintail, *Anas acuta*
- Species with peak counts in spring/autumn:
  - Ringed plover, *Charadrius hiaticula*,
  - Sanderling, *Calidris alba*,
  - Bar-tailed godwit, *Limosa lapponica lapponica*,

The characteristics of the European site

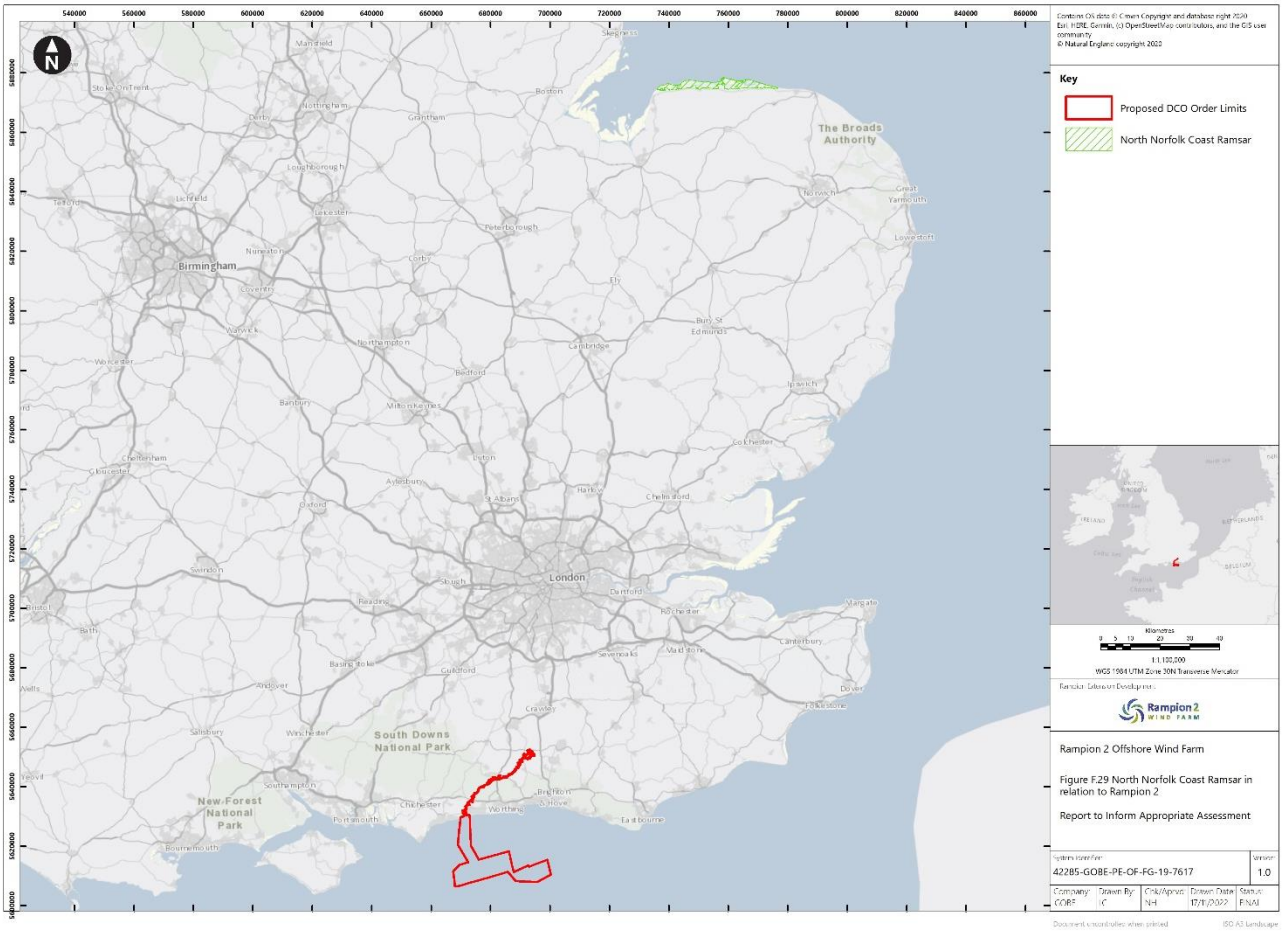
1.30.4 A stretch of coastline consisting of shingle beaches, dunes, saltmarsh, intertidal mud and sand flats, brackish lagoons, reedbeds, and grazing marshes. The site supports nationally and internationally important numbers of various species of breeding or wintering waterbirds. It also includes several important botanical areas and is a centre for tourism and general recreation; a visitors' centre, trails and hides are available.

© WSP UK Limited

Conservation advice

1.30.5 A site management statement/plan has been implemented for the site.

Figure F-30 North Norfolk Coast Ramsar in relation to Rampion 2



1.31 Côte de Granit Rose-Sept Iles SPA

1.31.1 The Côte de Granit Rose-Sept Iles SPA is a coastal site on the north coast of France. The site is designated owing to the presence of a wide range of coastal and marine habitats and associated fauna. The site covers 72140.36ha (**Figure F-31)**.

1.31.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 9: Benthic, subtidal and intertidal ecology, Volume 2** of the ES (Document Reference: 6.2.9)**;**
- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22); and
- European Environment Agency (no date. a).

© WSP UK Limited

Qualifying features

1.31.3 The site is designated for the following qualifying species:

- 1421 Killarney fern *Trichomanes speciosum;*
- 1102 Allis shad *Alosa alosa;*
- 1103 Shad *Alosa fallax;*
- 1095 Great sea lamprey *Petromyzon marinus;*
- 1106 Black salmon *Salmo salar;*
- 1441 Shore dock *Rumex rupestris;*
- 1007 Escargot snail *Elona quimperiana;*
- 1083 Stag beetle *Lucanus cervus;*
- 1364 Grey seal *Halichoerus grypus;*
- 1365 Common seal *Phoca vitulina;*
- 1351 Common Porpoise *Phocoena phocoena;*
- 1304 Greater horseshoe bat *Rhinolophus ferrumequinum;* and
- 1349 Bottlenose dolphin *Tursiops truncates.*

1.31.4 The site is designated for the following qualifying habitats:

- 1110 Sandbanks which are slightly covered by sea water all the time;
- 1140 Mudflats and sandflats not covered by seawater at low tide;
- 1150 Coastal lagoons;
- 1160 Large shallow inlets and bays;
- 1170 Reefs;
- 1210 Annual vegetation of drift lines;
- 1220 Perennial vegetation of stony banks;
- 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts;
- 1310 Salicornia and other annuals colonizing mud and sand;
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*);
- 1430 Halo-nitrophilous scrubs (*Pegano-Salsoletea*);
- 2110 Embryonic shifting dunes;
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ;
- 2130 Fixed coastal dunes with herbaceous vegetation ('grey dunes');
- 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*);

© WSP UK Limited

- 2190 Humid dune slacks;
- 3110 Oligotrophic waters containing very few minerals of sandy plains ;
- 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* -type vegetation;
- 4030 European dry heaths;
- 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils ;
- 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels;
- 8220 Siliceous rocky slopes with chasmophytic vegetation;
- 8230 Siliceous rock with pioneer vegetation of the *Sedo-Scleranthion* or of the Sedo albi-Veronicion dilleniid;
- 9130 *Asperulo-Fagetum* beech forests; and
- 9180 *Tilio-Acerion* forests of slopes, screes and ravines.

The characteristics of the European site

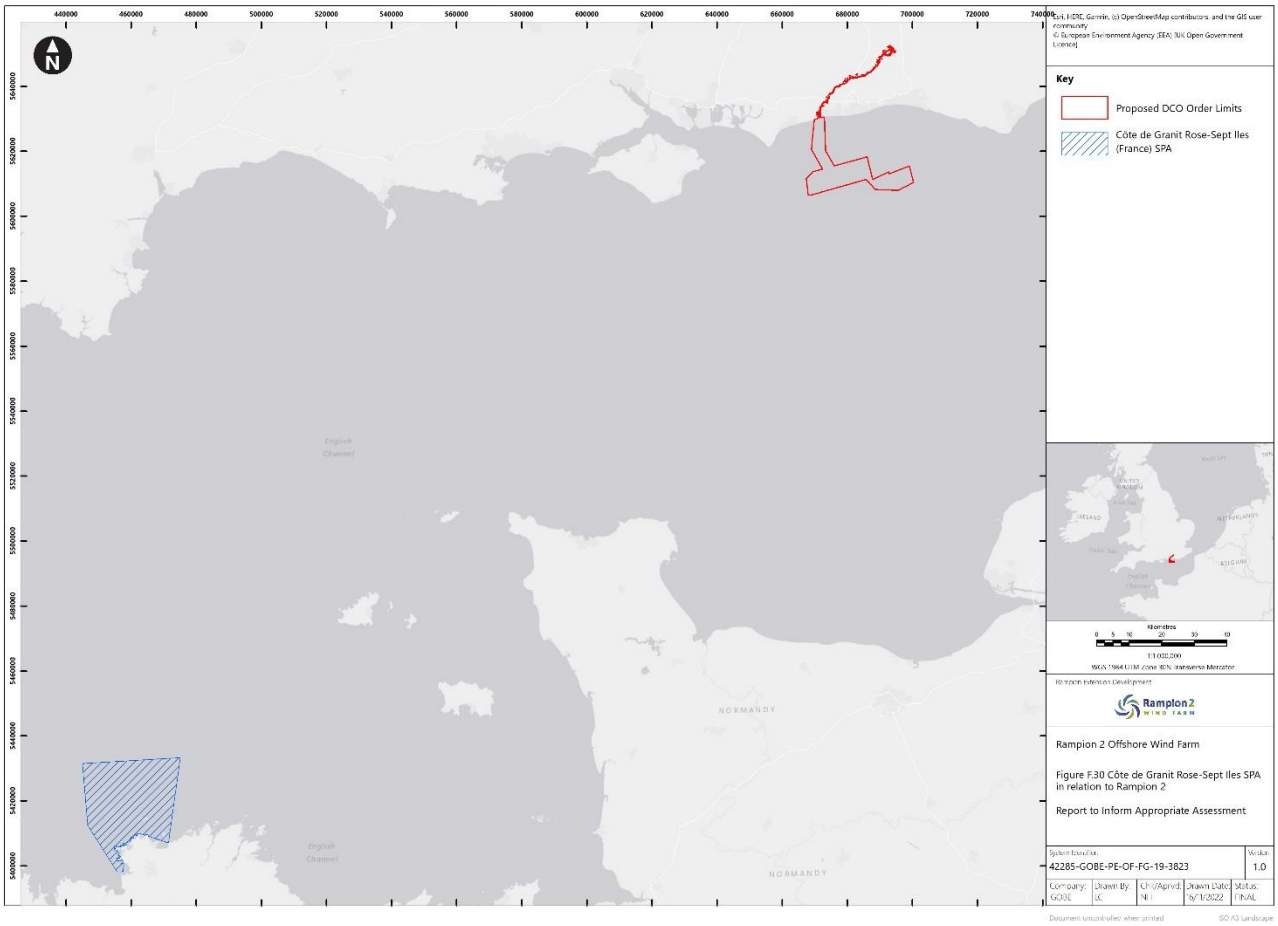
1.31.5 Information on the site is extremely limited. 99 percent of the site is marine with a small area of coast.

Conservation advice

1.31.6 No conservation advice or objectives were found for this site.

© WSP UK Limited

Figure F-31 Côte de Granit Rose-Sept Iles SPA (FR) SPA in relation to Rampion 2



1.32 Grassholm SPA

1.32.1 The Grassholm SPA is a remote offshore island about 10 miles west of the mainland coast of Pembrokeshire in south-west Wales, which supports breeding gannet. The site covers 1744ha **(Figure F-32**).

1.32.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation Volume 2** of the ES (Document Reference: 6.2.22);
- The Grassholm SPA Citation (Natural England, no date) (no date); and
- The Grassholm SPA Data Form (JNCC, 2015o) (dated December 2015).

Qualifying features

1.32.3 The site is designated for the following qualifying feature:

- Gannet *Sula bassana.*

© WSP UK Limited

The characteristics of the European site

1.32.4 Grassholm is a low-lying basalt island, situated approximately 18km off the south-west Wales coast. The island has limited terrestrial vegetation owing to the effects of the large number of breeding seabirds and the influence of salt spray and exposure, and its foreshore and sublittoral habitats are amongst the most wave and tide-exposed in Britain. From January to October Grassholm Island, supports the third largest breeding population of the north Atlantic gannet (*Morus bassanus*) in the world. Gannets use the marine waters immediately adjacent to the colony for a number of essential activities, such as preening, bathing, and displaying. The nesting seabirds using the site also feed both within and outside the SPA in surrounding marine areas, as well as more distantly.

Conservation advice

1.32.5 Advice on operations and Management measures can be found within:

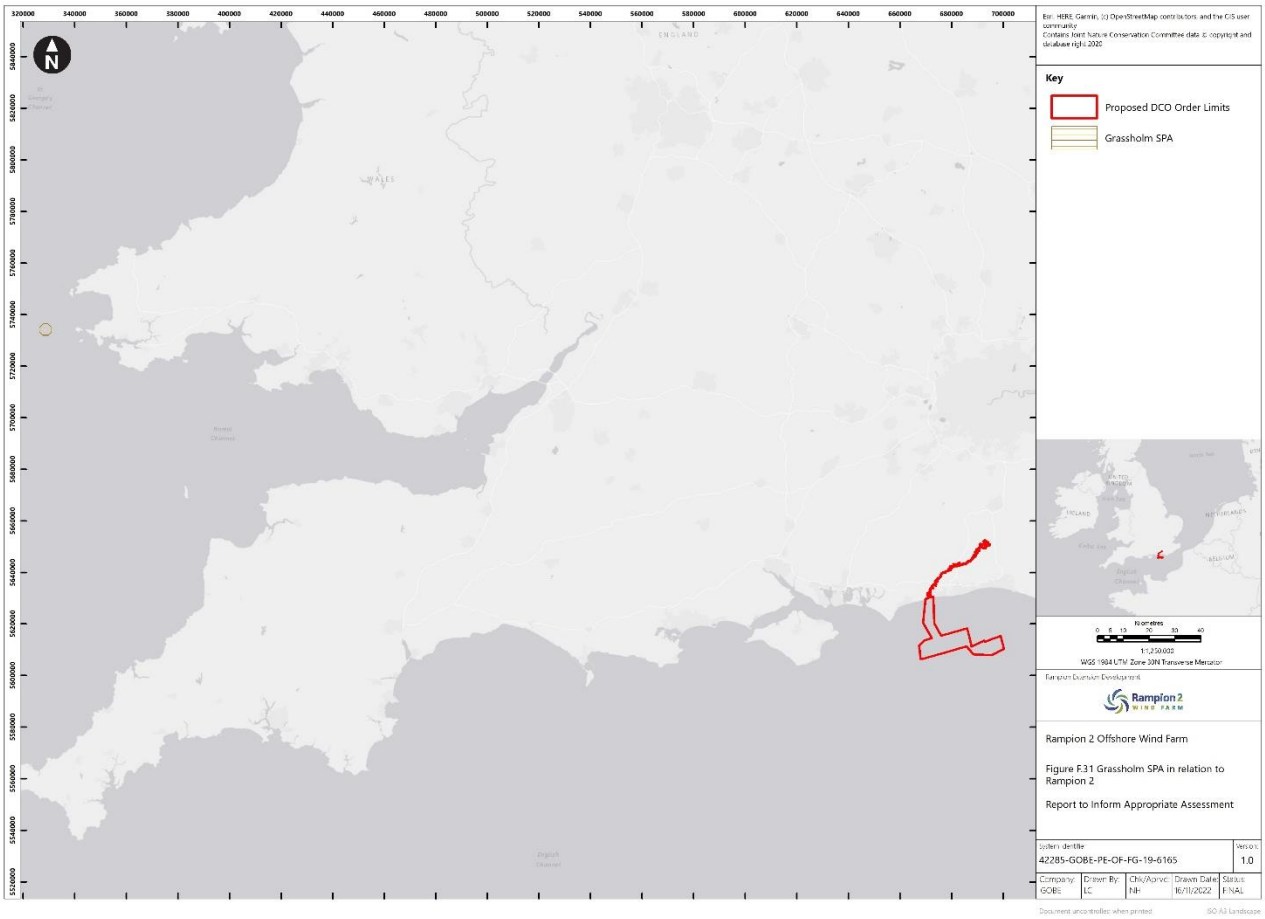
- Core Management Plan Including Conservation Objectives for Grassholm SPA (Natural Resource Wales, 2008) (dated April 2008).

1.32.6 The conservation objectives for the site are as follows:

- the vision for this feature (Gannet) is for it to be in a favourable conservation status, where all of the following conditions are satisfied:
- the population will not fall below 30,000 pairs in three consecutive years;
  - it will not drop by more than 25 percent of the previous year's figures in any one year; and
  - there will be no decline in this population significantly greater than any decline in the North Atlantic population as a whole.

© WSP UK Limited

Figure F-32 Grassholm SPA in relation to Rampion 2



1.33 Flamborough and Filey Coast SPA

1.33.1 Flamborough and Filey Coast SPA is located on the Yorkshire coast in northeast England. The site covers a slender strip of cliffs and hinterland along the coastline that support internationally and nationally important migratory, breeding and seabird assemblages. The site covers 7857.99ha (**Figure F-33**).

1.33.2 Key literature sources, including relevant project literature, are as follows:

- **Volume 2 12: Offshore and intertidal ornithology Volume 2** (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation Volume 2** of the ES Document Reference: 6.2.22);
- The Flamborough and Filey Coast SPA Citation (Natural England, (2018d) (dated August 2018); and
- The Flamborough and Filey Coast SPA Data Form (JNCC, (2018b) (dated September 2018).

© WSP UK Limited

Qualifying features

1.33.3 The site is designated for the following qualifying feature:

- A188 *Rissa tridactyla*; Black-legged kittiwake (breeding).

The characteristics of the European site

1.33.4 The SPA includes the cliffs of Flamborough Head which rise to 135 metres and are composed of chalk and other sedimentary rocks. These soft cliffs have been eroded into a series of bays, arches, pinnacles, and gullies with an extensive system of caves at sea-level. The cliffs from Filey Brigg to Cunstone Nab comprise a range of sedimentary rocks including shales and sandstones. The cliff top vegetation comprises maritime grassland vegetation growing alongside species more typical of chalk grassland. The intertidal area below the cliffs is predominantly rocky and part of a series of reefs that extend into the subtidal area. The adjacent sea out to 2km off Flamborough Head as well as Filey Brigg to Cunstone Nab is characterised by reefs supporting kelp forest communities in the shallow subtidal and faunal turf communities below 2 metre water depths. The southern side of Filey Brigg shelves off gently from the rocks to the sandy bottom of Filey Bay.

Conservation advice

1.33.5 Advice on operations and Management measures can be found within:

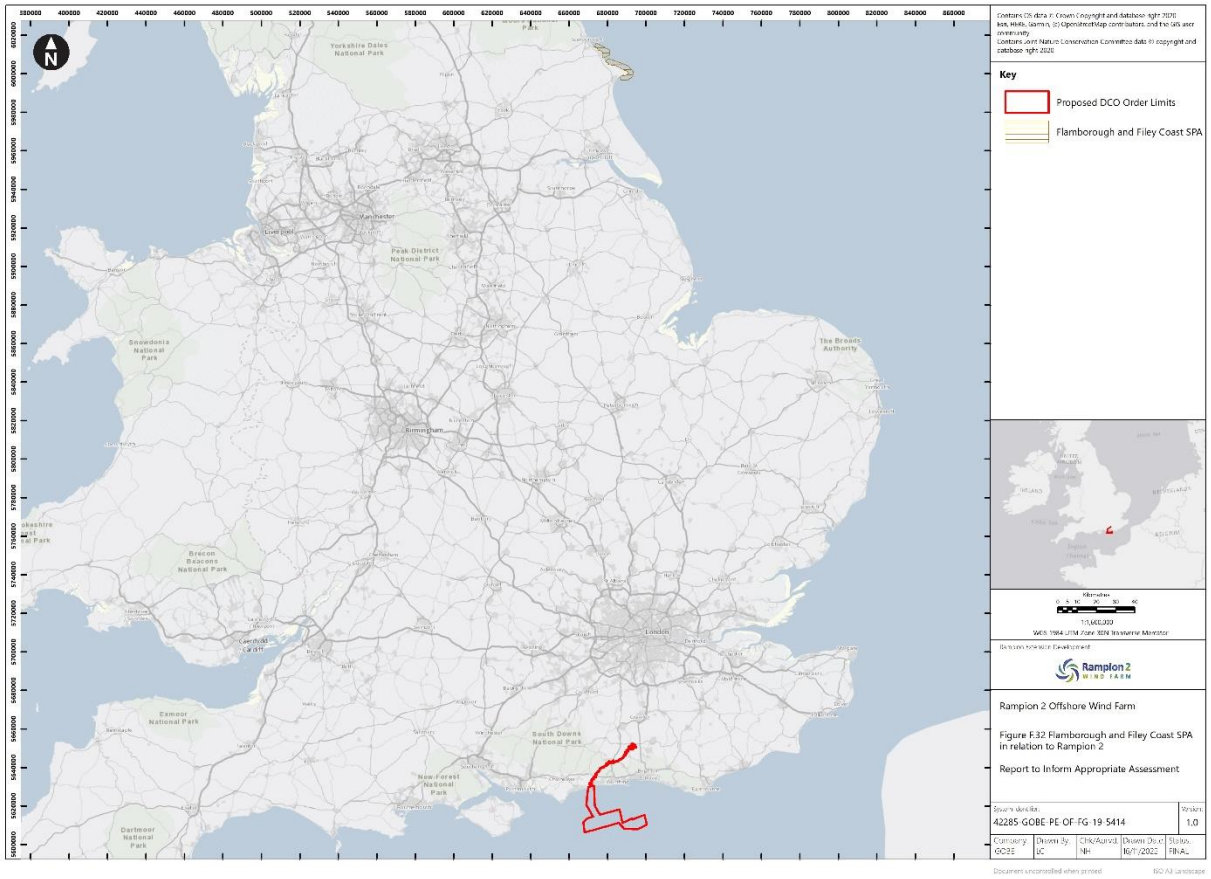
- The Supplementary Advice (Natural England, 2023x) (dated March 2020);
- Flamborough and Filey Coast SPA Site Improvement Plan(Natural England, 2015d) (dated February 2015);
- Advice on Operations (dated March 2020); and
- The Conservation Objectives (Natural England, 2014z) (dated February 2019).

1.33.6 The conservation objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

© WSP UK Limited

Figure F-33 Flamborough and Filey Coast SPA in relation to Rampion 2



1.34 Northumbria Coast SPA

1.34.1 The Northumbria Coast SPA is located in north-east England and includes much of the coastline between the Tees and Tweed Estuaries and supports internationally important populations of breeding birds and wintering waders. The site covers 1097.45ha (**Figure F-34**).

1.34.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- The Northumbria Coast SPA Citation (Natural England, 2018e) (dated January 2018); and
- The Northumbria Coast SPA Data Form (Natural England, 2013) (dated May 2006).

Qualifying features

1.34.3 The site is designated for the following qualifying features:

© WSP UK Limited

- A148 *Calidris maritima*; Purple sandpiper (non-breeding);
- A169 *Arenaria interpres*; Ruddy turnstone (non-breeding); and
- A195 *Sterna albifrons*; Little tern (breeding).

The characteristics of the European site

1.34.4 The Northumbria Coast SPA consists of mainly discrete sections of rocky shore with associated boulder and cobble beaches. The SPA also includes parts of three artificial pier structures which are used as high tide roosts and a small section of sandy beach. In summer, the site supports internationally important breeding populations, wintering waders also occur in internationally important numbers. The beaches of fine sand, vegetated banks of sea rocket and dunes of marram and lyme grass also provide good conditions for nesting.

Conservation advice

1.34.5 Advice on operations and Management measures can be found within:

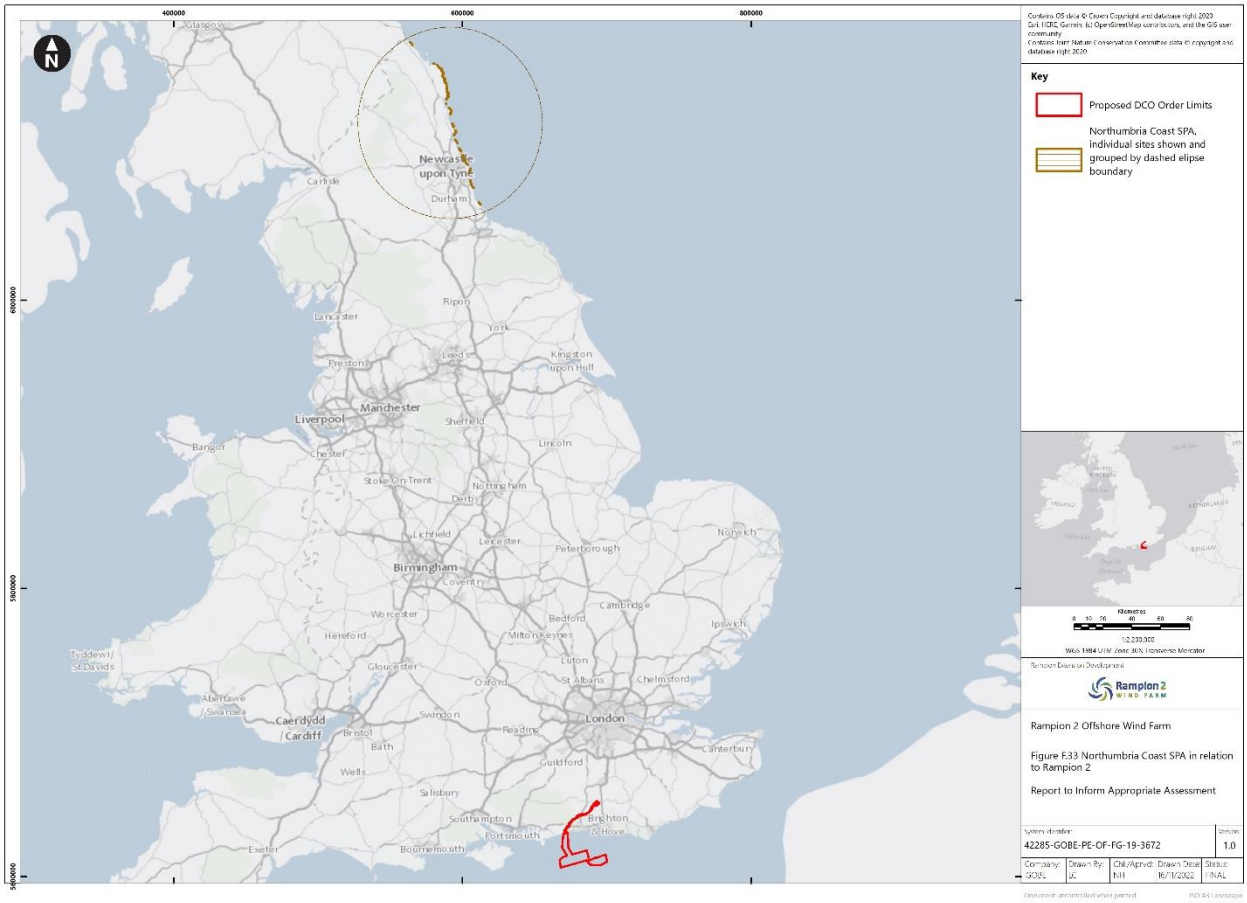
- The Supplementary Advice (Natural England, (2023aa) (dated September 2019);
- Site Improvement Plan (Natural England, 2015e) (dated April 2015);
- Advice on Operations (Natural England, 2023y) (dated March 2020); and
- The Conservation Objectives (Natural England, 20194aa) (dated February 2019).

1.34.6 "The conservation objectives for the site are as follows:

- *ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and*
  - *the distribution of the qualifying features within the site."*

© WSP UK Limited

Figure F-34 Northumbria Coast SPA in relation to Rampion 2



1.35 Northumbria Coast Ramsar

1.35.1 The Northumbria Coast Ramsar is located in north-east England and includes much of the coastline between the Tees and Tweed Estuaries and supports internationally important populations of breeding birds and wintering waders. The site covers 1108ha (**Figure F-35**).

1.35.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation Volume 2** of the ES (Document Reference: 6.2.22)**;**
- The Northumbria Coast Ramsar Site Information (Ramsar Sites Information Service, 2000) (dated February 2000); and
- The Northumbria Coast Ramsar Information Sheet (JNCC, 2000) (dated January 2000).

© WSP UK Limited

Qualifying features

1.35.3 The site is designated for the following qualifying criterion:

- Criterion 6: The site supports internationally important wintering populations of turnstone *Arenaria interpres* (2.6 percent of the Eastern Atlantic Flyway population) and purple sandpiper Calidris maritima (1.6 percent of the Eastern Atlantic Flyway population).

The characteristics of the European site

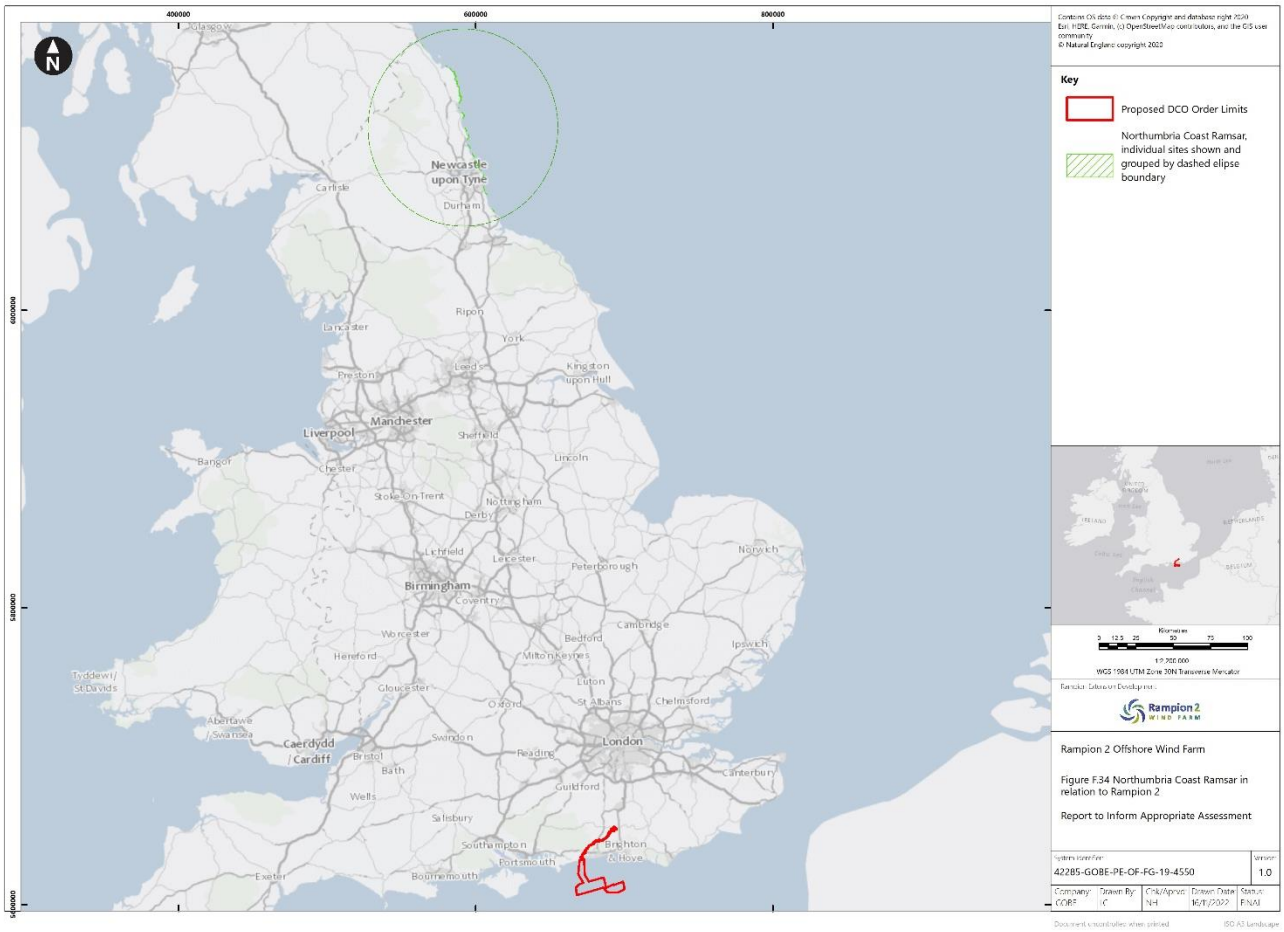
1.35.4 The Northumbria Coast Ramsar site comprises several discrete sections of rocky foreshore between Spittal, in the North of Northumberland, and an area just south of Blackhall Rocks in County Durham. These stretches of coast regularly support internationally important numbers of purple sandpiper and turnstone. The Ramsar site also includes an area of sandy beach at Low Newton, which supports a nationally important breeding colony of little tern, and parts of three artificial pier structures which form important roost sites for purple sandpiper.

Conservation advice

1.35.5 A site management statement/plan has been implemented for the site.

© WSP UK Limited

Figure F-35 Northumbria Coast Ramsar in relation to Rampion 2



1.36 Coquet Island SPA

1.36.1 Coquet Island SPA is located 1km off the coast of Northumberland in north-east England. It is a small flat-topped island with a plateau extent of approximately 7 hectares. The SPA covers 19.92ha (**Figure F-36**).

1.36.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology, Volume 2** of the ES (Document Reference: 6.2.12);
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22);
- The Coquet Island SPA Citation (Natural England, 2017b) (dated January 2018); and
- The Coquet Island SPA Data Form (JNCC, 2017b) (dated).

Qualifying features

1.36.3 The site is designated for the following qualifying features:

- A191 *Sterna sandvicensis*; Sandwich tern (breeding);
- A192 *Sterna dougallii*; Roseate tern (breeding);
- A193 *Sterna hirundo*; Common tern (breeding); and
- A194 *Sterna paradisaea*; Arctic tern (breeding).

The characteristics of the European site

1.36.4 The island consists of sandy soil and peat over a soft sandstone base. Low cliffs of approx. 2.4-3.7m high result from earlier quarrying. Surrounding the island is a rocky upper shore and intertidal covering 15ha when fully exposed. There is a sandy beach on the south west of the island and the southeast corner is shingle and rock. A small, shallow, man-made well lies in the centre of the plateau, which is fed by non-potable surface water. The peaty soil of the plateau supports short fescue, with docks and ragwort. Maritime species such as sea campion and thrift are scare. Where nutrient input from seabird colonies is greatest, there are dense stands of taller species, including nettles that provide cover for some of the nesting terns.

Conservation advice

1.36.5 Advice on operations and Management measures can be found within:

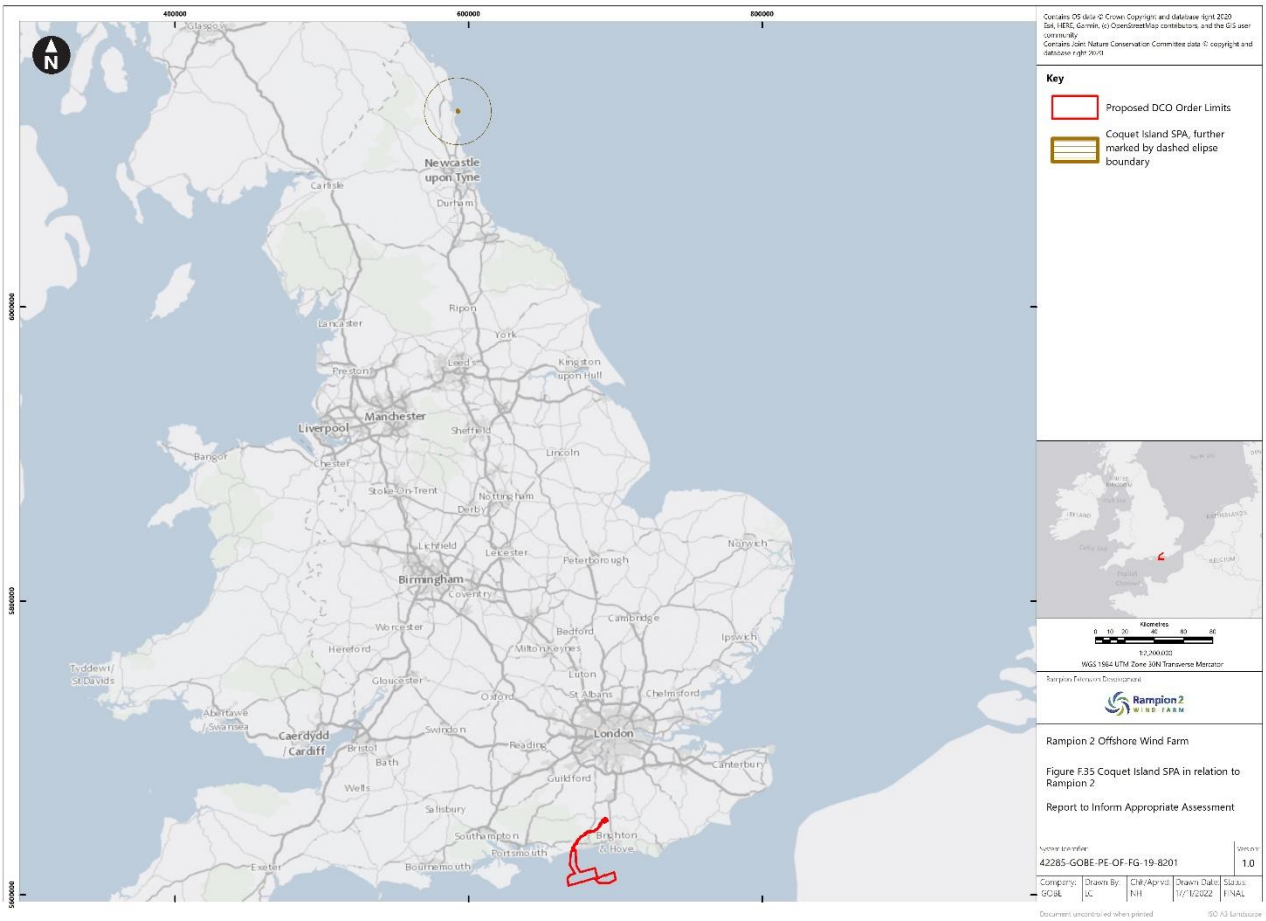
- The Supplementary Advice (Natural England, 2023w) (dated September 2019);
- Northumberland Coastal Site Improvement Plan (Natural England, 2015e) (dated January 2015);
- Advice on Operations (Natural England, 2023z) (dated March 2020); and
- The Conservation Objectives (Natural England, 2014bb) (dated February 2019).

1.36.6 The conservation objectives for the site are as follows:

- *"ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*
  - *the extent and distribution of the habitats of the qualifying features;*
  - *the structure and function of the habitats of the qualifying features;*
  - *the supporting processes on which the habitats of the qualifying features rely;*
  - *the population of each of the qualifying features; and*
  - *the distribution of the qualifying features within the site."*

© WSP UK Limited

Figure F-36 Coquet Island SPA in relation to Rampion 2



1.37 Farne Islands SPA

1.37.1 The Farne Islands are a group of low-lying islands 2-6km off the coast of Northumberland in northeast England. The site support internationally and nationally important breeding and seabird assemblages. The site covers 101.86ha (**Figure F-37**).

1.37.2 Key literature sources, including relevant project literature, are as follows:

- **Chapter 12: Offshore and intertidal ornithology Volume 2** of the ES (Document Reference: 6.2.12)**;**
- **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22)**;**
- The Farne Islands SPA Citation (Natural England, 2018f) (dated January 2018); and
- The Farne Islands SPA Data Form (JNCC, 2018c) (dated September 2018).

Qualifying features

1.37.3 The site is designated for the following qualifying features:

- A191 *Sterna sandvicensis*; Sandwich tern (breeding);
- A192 *Sterna dougallii*; Roseate tern (breeding);
- A193 *Sterna hirundo*; Common tern (breeding);
- A194 *Sterna paradisaea*; Arctic tern (breeding);
- A199 *Uria aalge*; Common guillemot (breeding); and
- seabird assemblage.

The characteristics of the European site

1.37.4 The islands form the easternmost outcroppings of the Great Whin Sill of quartz dolerite, and although some islands retain cappings of boulder clay or peaty deposits, vegetation is limited to pioneer communities. Vegetation is further affected by the maritime conditions and large numbers of seabirds. The islands are important as nesting areas for these birds, especially terns, gulls and auks. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.

Conservation advice

1.37.5 Advice on operations and Management measures can be found within:

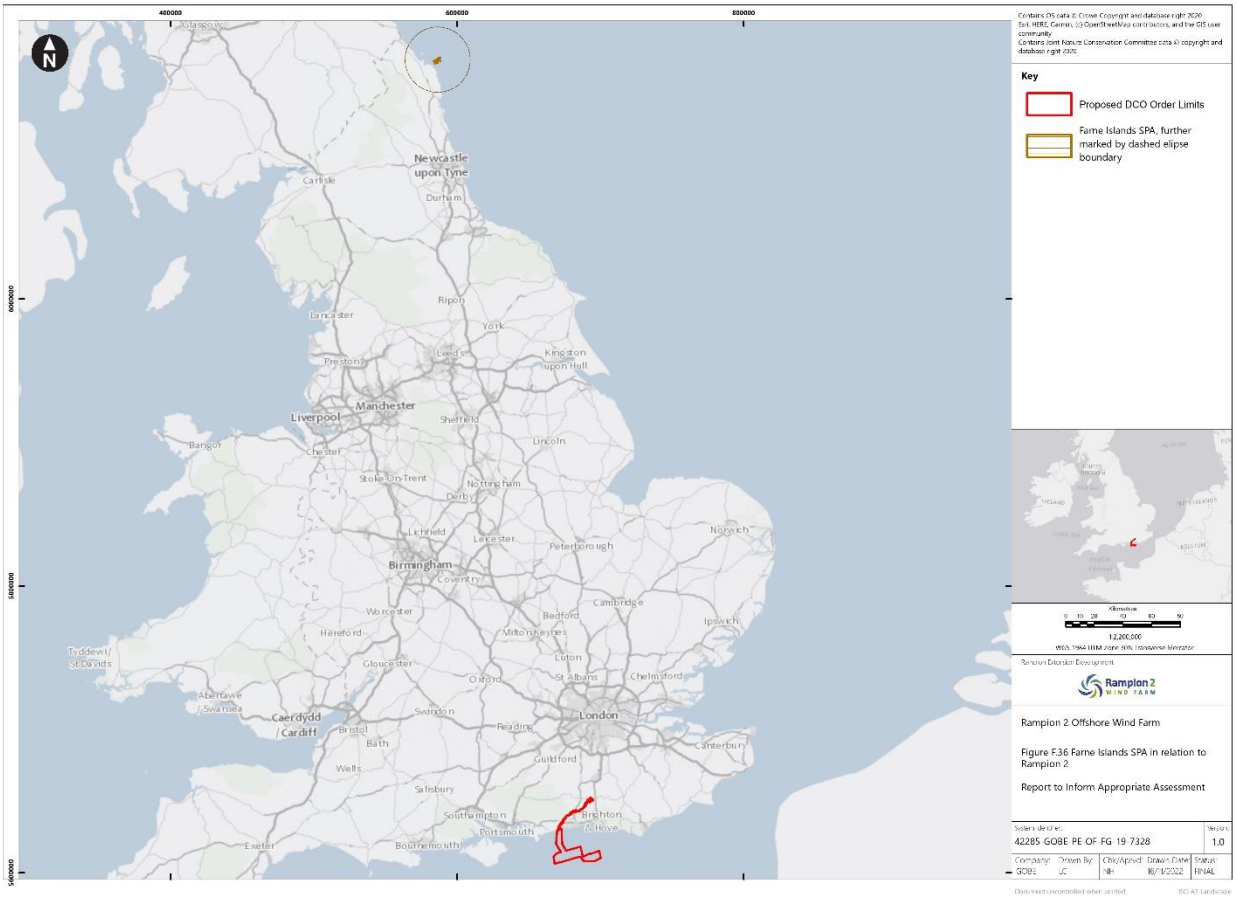
- Northumberland Coastal Site Improvement Plan (Natural England, 2015e) (dated January 2015);
- The Supplementary Advice (Natural England, 2023bb) (dated September 2019);
- Advice on Operations (Natural England, 2023cc) (dated March 2020); and
- The Conservation Objectives (Natural England, 2014cc) (dated February 2019).

1.37.6 The conservation objectives for the site are as follows:

- ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;
  - the extent and distribution of the habitats of the qualifying features;
  - the structure and function of the habitats of the qualifying features;
  - the supporting processes on which the habitats of the qualifying features rely;
  - the population of each of the qualifying features; and
  - the distribution of the qualifying features within the site.

© WSP UK Limited

Figure F-37 Farne Islands SPA in relation to Rampion 2



© WSP UK Limited

1.38 Glossary of terms and abbreviations

Table 1-1 Glossary of terms and abbreviations

Term (acronym)	Definition
European Protected Species (EPS)	European Protected Species are species of plants and animals (other than birds) protected by law throughout the European Union.
European Site	European sites are those that are designated through the Habitats Directive and Birds Directive (via national legislation as appropriate). Within England additional sites designated through international convention are given the same protection through policy – overall all of these are referred to as European sites. European sites in England are considered to be SPAs, SACs, candidate SACs and Sites of Community Importance (SCI). Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites (designated under international convention) and proposed Ramsar sites
Habitat Regulations Assessment (HRA)	The assessment of the impacts of implementing a plan or policy on a European Site, the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it will adversely affect the integrity of the site.
JNCC	Joint Nature Conservation Committee
Ramsar site	Areas designated by the UK Government under the International Ramsar Convention (the Convention on Wetlands of International Importance) 1971.
RED	Rampion Extension Development Ltd (the Applicant)
SAC	International designation implemented under the Habitats Regulations for the protection of habitats and (non-bird) species. Sites designated to protect habitats and species on Annexes I and II of the Habitats Directive. Sufficient habitat to

Term (acronym)	Definition
	maintain favourable conservation status of the particular feature in each member state needs to be identified and designated.Special Area of Conservation
SPASpecial Protection Area (SPA)	Special Protection AreaSites designated under EU Directive (79/409/EEC) to protect habitats of migratory birds and certain threatened birds under the Birds Directive (The Conservation of Habitats and Species Regulations 2017)
SSSISite of Special Scientific Interest (SSSI)	Site of Special Scientific InterestSites designated at the national level under the Wildlife & Countryside Act 1981 (as amended). They are a series of sites that are designated to protect the best examples of significant natural habitats and populations of species.

© WSP UK Limited

2. References

European Environment Agency, (no date). *Falaise du Bessin Occidental.* [Online]. Available at: https://eunis.eea.europa.eu/sites/FR2510099#tab-designations [Accessed 07 June 2023].

European Environment Agency, (no date. a). *Côte de Granit rose-Sept-Iles*. [Online] Available at: https://eunis.eea.europa.eu/sites/FR5300009 [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (1976). *Information Sheet on Ramsar Wetlands*. [Online] Available at: https://jncc.gov.uk/jncc-assets/RIS/UK11048.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (1995). *Information Sheet on Ramsar Wetlands (RIS).* [Online] Available at: https://jncc.gov.uk/jncc-assets/RIS/UK11055.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (1996). Information Sheet on Ramsar Wetlands (RIS) UK11002. [Online] Available at: https://jncc.gov.uk/jncc-assets/RIS/UK11002.pdf [Accessed 08 June 2023].

Joint Nature Conservation Committee (JNCC), (1998). Information Sheet on Ramsar Wetlands (RIS) UK11063. [Online] Available at: https://jncc.gov.uk/jncc-assets/RIS/UK11063.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (1999). *Information Sheet on Ramsar Wetlands (RIS) UK11004*. [Online] Available at: https://jncc.gov.uk/jncc-assets/RIS/UK11004.pdf [Accessed 06/06/2023].

Joint Nature Conservation Committee (JNCC), (2000). *Ramsar Information Sheet for Wetlands of International Importance 7UK148*. [Online] Available at: https://rsis.ramsar.org/RISapp/files/RISrep/GB1019RIS.pdf [Accessed 08 June 2023].

Joint Nature Conservation Committee (JNCC), (2001). *Natura 2000 – Standard Data Form UK0030076.* [Online] Available at: http://publications.naturalengland.org.uk/file/3765770 [Accessed 08 June 2023].

Joint Nature Conservation Committee (JNCC), (2005). *Information Sheet on Ramsar Wetlands (RIS) UK22002*. [Online] Available at: https://rsis.ramsar.org/RISapp/files/RISrep/GB1587RIS.pdf [Accessed 08 June 2023].

Joint Nature Conservation Committee (JNCC), (2015a). *Standard Data Form for sites within the 'UK national site network of European Sites'.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0012716.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015b). *Natura 2000 – Standard Data Form UK0017073*. [Online] Available at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0017073.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015c). *Natura 2000 – Standard Data Form UK9011051*. [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9011051.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015d). *Natural 2000 – Standard Data Form UK0012599*. [Online] Available at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0012599.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015e). *Natura 2000 – Standard Data Form UK0030059.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030059.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015f). *Natura 2000 – Standard Data Form UK0030061.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030061.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015g). *Natura 2000 – Standard State Form UK9012031.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9012031.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015h). *Natura 2000 – Standard Data Form UK9011011.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9011011.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015i). *Natura 2000 – Standard Data Form UK 9011061.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9011061.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015k). *Natura 2000 – Standard Data Form UK9009246.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9009246.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015l). *Natura 2000 – Standard Data Form UK9008021.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9008021.pdf [Accessed 08 June 2023].

Joint Nature Conservation Committee (JNCC), (2015m). *Natura 2000 – Standard Data Form UK 9009181.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9009181.pdf [Accessed 08 June 2023].

Joint Nature Conservation Committee (JNCC), (2015n). *Natura -2000 Standard Data Form UK9009031*. [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9009031.pdf [Accessed 07 June 2023].

JNCC, (2015o). *Natura 2000 – Standard Data Form UK9014041.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9014041.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2015p). *Natura 2000 – Standard Data Form UK9020281*. [Online] Available at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=UK9020281 [Accessed 06 June 2023].

Joint Nature Conservation Committee (JNCC), (2017a). *Natura 2000 – Standard Data Form UK9012091*. [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/uk9012091.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2017b). *Natura 2000 – Standard Data Form UK 9006031*. [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/uk9006031.pdf [Accessed 08 June 2023].

Joint Nature Conservation Committee (JNCC), (2018a). *Natura 2000 – Standard Data Form UK9020329.* [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9020329.pdf [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2018b). *Natura 2000 – Standard Data Form UK 9006101*. [Online] Available at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=UK9006101 [Accessed 07 June 2023].

Joint Nature Conservation Committee (JNCC), (2018c). *Natura 2000 – Standard Data Form UK9006021*. [Online] Available at: https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006021.pdf [Accessed 08 June 2023].

Ministère de la Transition écologique - DGALN/DEB/SDET/ET5, (2013). *Natura 2000 – Standard Data Form FR2310045*. [Online]. Available at: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=FR2310045#4 [Accessed 07 June 2023].

Muséum national d'Histoire naturelle, (1993). *Natura 2000 – Formulaire Standard de Donnees.* [Online] Available at: https://inpn.mnhn.fr/docs/natura2000/fsdpdf/FR2510099.pdf [Accessed 07 June 2023].

Natural England, (no date). *EC Directive 2009/147/EEC on the Conservation of Wild Birds Citation for Potential Changes to Special Protection Area (SPA)*. [Online] Available at: https://cdn.cyfoethnaturiol.cymru/media/1551/grassholm-potential-spa-citation.pdf?mode=pad&rnd=131625760790000000 [Accessed 07 June 2023].

Natural England, (1996). *EC Directive 791409 on the Conservation of Wild Birds: Special Protection Area*. [Online] Available at: https://publications.naturalengland.org.uk/file/4548204783730688 [Accessed 07 June 2023].

Natural England, (1998). *Portsmouth Harbour SPA Citation*. [Online] Available at: https://publications.naturalengland.org.uk/publication/4857883850178560 [Accessed 07 June 2023].

Natural England, (2001), *Pagham Harbour SPA (UK9012041A).* [Online] Available at: http://publications.naturalengland.org.uk/publication/3143422 [Accessed 06 June 2023].

Natural England, (2005a). *The Solent and Isle of Wight lagoons SAC Citation.* [Online] Available at: https://publications.naturalengland.org.uk/file/5821200185950208 [Accessed 07 June 2023].

Natural England, (2005b). *EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora Citation for Special Areas of Conservation (SAC).* [Online] Available at: https://publications.naturalengland.org.uk/file/6304246165143552 [Accessed 07 June 2023].Natural England, (2013). *Northumbria Coast SPA (UK9006131A).* [Online] Available at: https://publications.naturalengland.org.uk/publication/4528018 [Accessed 08 June 2023].

Natural England, (2014a). *European Site Conservation Objectives for Arun Valley SPA (UK9020281).* [Online] Available at http://publications.naturalengland.org.uk/publication/4567444756627456 [Accessed 06 June 2023].

Natural England, (2014b). *European Site Conservation Objectives for Pagham Harbour SPA (UK9012041).* [Online] Available at: http://publications.naturalengland.org.uk/publication/6147434560356352 [Accessed 06 June 2023].

Natural England, (2014c). *Site Improvement Plan: Pagham Harbour (SIP164).* [Online] *Available at:* http://publications.naturalengland.org.uk/publication/5799069091889152 [Accessed 07 June 2023].

Natural England, (2014d). *European Site Conservation Objectives for The Mens SAC (UK0012716)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/5642356338458624 [Accessed 07 June 2023].

Natural England, (2014e). *European Site Conservation Objectives for Solent & Isle of Wight Lagoons SAC (UK0017073)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/5646122018144256 [Accessed 07 June 2023].

Natural England, (2014f). *Site Improvement Plan Solvent and Isle of Wight Lagoons*. [Online] Available at: https://publications.naturalengland.org.uk/file/5979528484618240 [Accessed 07 June 2023].

Natural England, (2014g). *Site Improvement Plan: Solent (SIP043).* [Online] Available at: https://publications.naturalengland.org.uk/publication/4692013588938752 [Accessed 07 June 2023].

Natural England, (2014h). *European Site Conservation Objectives for River Itchen Special Area of Conservation Site Code: UK0012599*. [Online] Available at: https://publications.naturalengland.org.uk/file/4952120898093056 [Accessed 07 June 2023].

Natural England, (2014i). *European Site Conservation Objectives for River Itchen SAC (UK0012599).* [Online] Available at: http://publications.naturalengland.org.uk/file/6521108551696384 [Accessed 07 June 2023].

Natural England, (2014j). *European Site Conservation Objectives for River Itchen SAC (UK10012599).* [Online] Available at: http://publications.naturalengland.org.uk/publication/5130124110331904 [Accessed 07 June 2023].

Natural England, (2014k). *Site Improvement Plan: River Itchen (SIP193).* [Online] Available at: https://publications.naturalengland.org.uk/publication/5404054607888384 [Accessed 07 June 2023].

Natural England, (2014l). *European Site Conservation Objectives for Solent Maritime SAC (UK0030059).* [Online] Available at: https://publications.naturalengland.org.uk/publication/5762436174970880 [Accessed 07 June 2023].

Natural England, (2014m). *European Site Conservation Objectives for South Wight Maritime SAC (UK0030061)*. [Online] Available at: http://publications.naturalengland.org.uk/publication/6242150467502080 [Accessed 07 June 2023].

Natural England, (2014n). *Site Improvement Plan: South Wight Maritime (SIP271).* [Online]. Available at: http://publications.naturalengland.org.uk/publication/6628806274056192 [Accessed 07 June 2023].

Natural England, (2014o). *European Site Conservation Objectives for Chichester and Langstone Harbours SPA (UK9011011)*. [Online] Available at: http://publications.naturalengland.org.uk/publication/5789102905491456 [Accessed 07 June 2023].

Natural England, (2014p). *European Site Conservation Objectives for Solent & Southampton Water SPA (UK9011061)*. [Online] Available at: http://publications.naturalengland.org.uk/publication/6567218288525312 [Accessed 07 June 2023].

Natural England, (2014q). *European Site Conservation Objectives for Medway Estuary & Marshes SPA (UK9012031)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/6672791487119360 [Accessed 07 June 2023].

Natural England, (2014r). *Site Improvement Plan: Greater Thames Complex (SIP134)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/6270737467834368 [Accessed 07 June 2023].

Natural England, (2014s). *European Site Conservation Objectives for Foulness (Mid-Essex Coast Phase 5) SPA (UK9009246)*. [Online] Available at: http://publications.naturalengland.org.uk/publication/5131941422563328 [Accessed 07 June 2023].

Natural England, (2014t). *Site Improvement Plan: Essex Estuaries (SIP077).* [Online] Available at: http://publications.naturalengland.org.uk/publication/5459956190937088 [Accessed 07 June 2023].

Natural England, (2014u). *European Site Conservation Objectives for Alde-Ore Estuary SPA (UK9009112)*. [Online] Available at: http://publications.naturalengland.org.uk/publication/5170168510545920 [Accessed 08 June 2023].

Natural England, (2014v). *Site Improvement Plan: Alde-Ore Estuaries (SIP002).* [Online] Available at: https://publications.naturalengland.org.uk/publication/4884745984933888 [Accessed 08 June 2023].

Natural England, (2014w). *European Site Conservation Objectives for The Wash SPA (UK9008021).* [Online] Available at: https://publications.naturalengland.org.uk/publication/5747661105790976 [Accessed 08 June 2023].

Natural England, (2014x). *Site Improvement Plan: The Wash and North Norfolk Coast (SIP245).* [Online] Available at: https://publications.naturalengland.org.uk/publication/5327498292232192 [Accessed 08 June 2023].

Natural England, (2014y). *European Site Conservation Objectives for Breydon Water SPA (UK9009181).* [Online] Available at: http://publications.naturalengland.org.uk/publication/6376690053808128 [Accessed 08 June 2023].

Natural England, (2014z). *European Site Conservation Objectives for Flamborough and Filey Coast SPA (UK9006101)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/5400434877399040 [Accessed 07 June 2023].

Natural England, (2014aa). *European Site Conservation Objectives for North Norfolk Coast SPA UK9009031*. [Online] Available at: https://publications.naturalengland.org.uk/publication/4732349359063040 [Accessed 07 June 2023].

Natural England, (2014bb). *European Site Conservation Objectives for Coquet Island SPA (UK9006031)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/5446040786305024 [Accessed 08 June 2023].

Natural England, (2019cc). *European Site Conservation Objectives for Farne Island SPA (UK9006021).* [Online] Available at:

https://publications.naturalengland.org.uk/publication/4521874151178240 [Accessed 08 June 2023].

Natural England, (2015a). *Site Improvement Plan: The Mens (SIP242)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/5548316158853120 [Accessed 07 June 2023].

Natural England, (2015b*). European Site Conservation Objectives for Dungeness, Romney Marsh & Rye Bay SPA (UK9012091).* [Online]. Available at: http://publications.naturalengland.org.uk/publication/5208885390475264 [Accessed 7 June 2023].

Natural England, (2015c). Site Improvement Plan: Breydon Water (SIP028). [Online] Available at: http://publications.naturalengland.org.uk/publication/6364048115367936 [Accessed 08 June 2023].

Natural England, (2015d). *Site Improvement Plan Flamborugh and Filey Coast*. [Online] Available at: https://publications.naturalengland.org.uk/publication/6404364100960256 [Accessed 07 June 2023].

Natural England, (2015e). *Site Improvement Plan: Northumberland Coastal (SIP157).* [Online] Available at: https://publications.naturalengland.org.uk/publication/5340976100933632 [Accessed 07 June 2023].

Natural England, (2016a). *Departmental brief Solent and Dorset Coast potential Special Protection Area (pSPA).* [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/560622/solent-dorset-departmental-brief.pdf [Accessed 07 June 2023].

Natural England, (2016b). *European Site Conservation Objectives for Solent and Dorset Coast SPA (UK9020330).* [Online]. Available at: http://publications.naturalengland.org.uk/publication/5294923917033472 [Accessed 07 June 2023].

Natural England, (2017a). *Solent and Dorset Coast potential Special Protection Area (pSPA) Report of Consultation by Natural England*. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/866228/solent-dorset-coast-consultation-report.pdf [Accessed 07 June 2023].

Natural England, (2017b). *Annex 2 Special Protection Area (SPA) Citation EC Directive 2009/147/EC on the Conservation of Wild Birds*. [Online] Available at: https://publications.naturalengland.org.uk/file/6286141707255808 [Accessed 08 June 2023].

Natural England, (2018a). *European Site Conservation Objectives for the Mens Special Area of Conservation Site Code: UK0012716.* [Online] Available at: https://publications.naturalengland.org.uk/file/4643646439948288 [Accessed 07 June 2023].

Natural England, (2018b). *European Site Conservation Objectives for Solent and Isle of Wight Lagoons Special Area of Conservation Site Code: UK0017073*. [Online] Available at: https://publications.naturalengland.org.uk/file/5612650092560384 [Accessed 07 June 2023].

Natural England, (2018c). *Directive 2009/147/EC on the Conservation of Wild Birds Special Protection Area (SPA)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/4597871528116224 [Accessed 07 June 2023].

Natural England, (2018d). *EC Directive 2009/147/EC on the Conservation of Wild Birds Special Protection Area (SPA).* [Online] Available at: https://publications.naturalengland.org.uk/file/4690761199386624 [Accessed 07 June 2023].

Natural England, (2018e). *Annex 2 Special Protection Area (SPA) Citation*. [Online] Available at: https://publications.naturalengland.org.uk/file/5648449390772224 [Accessed 07 June 2023].

Natural England, (2018f (4)). *European Site Conservation Objectives for Farne Islands SPA (UK9006021)*. [Online] Available at: https://publications.naturalengland.org.uk/publication/4521874151178240 [Accessed 08 June 2023].

Natural England, (2019a). *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features The Mens Special Area of Conservation (SAC) UK0012716*. [Online] Available at: http://publications.naturalengland.org.uk/file/5113429933424640 [Accessed 08 June 2023].

Natural England, (2019b). *European Site Conservation Objectives for Portsmouth Harbour Special Protection Area Site Code: UK9011051*. [Online] Available at: https://publications.naturalengland.org.uk/file/4859370047537152 [Accessed 07 June 2023]

Natural England, (2019c). *European Site Conservation Objectives for Greater Wash Special Protection Area*. [Online] Available at: https://publications.naturalengland.org.uk/file/4597105251581952 [Accessed 07 June 2023].

Natural England, (2019d). *North Norfolk Coast SPA Advice on Operations*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9009031&SiteName=North%20norfolk%20coast%20spa&SiteNameDisplay=North+Norfolk+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=11 [Accessed 07 June 2023].

Natural England, (2023a). *Pagham Harbour SPA Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK90120

41&SiteName=pagham&SiteNameDisplay=Pagham+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 [Accessed 08 June 2023]

Natural England, (2023b). *Solent and Isle of Wight Lagoons SAC Advice on Operations*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0017073&SiteName=solent&SiteNameDisplay=Solent+and+Isle+of+Wight+Lagoons+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality= [Accessed 07 June 2023].

Natural England, (2023c). *Solent Maritime SAC Supplementary advice* [Online]. Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030059&SiteName=solent&SiteNameDisplay=Solent+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0 [Accessed 07 June 2023].

Natural England, (2023d). *Solent Maritime SAC Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030059&SiteName=solent%20maritime&SiteNameDisplay=Solent+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0 [Accessed 07 June 2023].

Natural England, (2023e). *South Wight Maritime SAC Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030061&SiteName=solent&SiteNameDisplay=South+Wight+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0 [Accessed 07 June 2023].

Natural England, (2023f). *South Wight Maritime SAC Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030061&SiteName=solent&SiteNameDisplay=South+Wight+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0 [Accessed 07 June 2023].

Natural England, (2023g). *Dungeness, Romney Marsh and Rye Bay SPA Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9012091&SiteName=dunge&SiteNameDisplay=Dungeness%2c+Romney+Marsh+and+Rye+Bay+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=13 [Accessed 07 June 2023].

Natural England, (2023h). *Dungeness, Romney Marsh and Rye Bay SPA Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9012091&SiteName=dunge&SiteNameDisplay=Dungeness%2c+Romney+Marsh+and+Rye+Bay

+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=13 [Accessed 07 June 2023].

Natural England, (2023i). *Chichester and Langstone Harbours SPA Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011011&SiteName=chichester%20and%20langstone&SiteNameDisplay=Chichester+and+Langstone+Harbours+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=18 [Accessed 07 June 2023].

Natural England, (2023j). *Chichester and Langstone Harbours SPA Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9011011&SiteName=chichester%20and%20langstone&SiteNameDisplay=Chichester+and+Langstone+Harbours+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=18 [Accessed 07 June 2023].

Natural England, (2023k). *Solent and Southampton Water SPA Supplementary advice*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9011061&SiteName=&SiteNameDisplay=Solent+and+Southampton+Water+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=9 [Accessed 07 June 2023].

Natural England, (2023l). *Solent and Southampton Water SPA Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011061&SiteName=&SiteNameDisplay=Solent+and+Southampton+Water+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=9 [Accessed 07 June 2023].

Natural England, (2023m). *Medway Estuary and Marshes SPA Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9012031&SiteName=medway%20estuary&SiteNameDisplay=Medway+Estuary+and+Marshes+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=11

Natural England, (2023n). *Medway Estuary and Marshes SPA Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9012031&SiteName=medway%20estuary&SiteNameDisplay=Medway+Estuary+and+Marshes+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=11

Natural England, (2023o). *Foulness (Mid-Essex Coast Phase 5) SPA Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9009246&SiteName=foulness&SiteNameDisplay=Foulness+(Mid-

Essex+Coast+Phase+5)+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=12 [Accessed 07 June 2023].

Natural England, (2023p). *Foulness (Mid-Essex Coast Phase 5) SPA Advice on Operations*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9009246&SiteName=foulness&SiteNameDisplay=Foulness+(Mid-Essex+Coast+Phase+5)+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=12 [Accessed 07 June 2023].

Natural England, (2023q). *Alde-Ore Estuary SPA Supplementary advice*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9009112&SiteName=alde-ore&SiteNameDisplay=Alde-Ore+Estuary+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 [Accessed 08 June 2023].

Natural England, (2023r). Alde-Ore Estuary SPA Advice on Operations. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9009112&SiteName=alde-ore&SiteNameDisplay=Alde-Ore+Estuary+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 [Accessed 08 June 2023].

Natural England, (2023s). *The Wash SPA Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9008021&SiteName=the%20wash%20spa&SiteNameDisplay=The+Wash+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=21 [Accessed 08 June 2023].

Natural England, (2023t). *The Wash SPA Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9008021&SiteName=the%20wash%20spa&SiteNameDisplay=The+Wash+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=21 [Accessed 08 June 2023].

Natural England, (2023u). *Breydon Water SPA Supplementary advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9009181&SiteName=breydon%20water&SiteNameDisplay=Breydon+Water+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=6 [Accessed 08 June 2023].

Natural England, (2023v). *Breydon Water SPA Advice on Operations.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9009181&SiteName=breydon%20water&SiteNameDisplay=Breydon+Water+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=6 [Accessed 08 June 2023].

Natural England, (2023w). *Coquet Island SPA Supplementary Advice*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9006031&SiteName=coquet&SiteNameDisplay=Coquet+Island+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 [Accessed 08 June 2023].

Natural England, (2023x). *Flamborough and Filey Coast SPA Supplementary Advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9006101&SiteName=flamb&SiteNameDisplay=Flamborough+and+Filey+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 [Accessed 07 June 2023].

Natural England, (2023y). *Northumbria Coast SPA Advice on Operations*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9006131&SiteName=Northumbr&SiteNameDisplay=Northumbria+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 [Accessed 07 June 2023].

Natural England, (2023z). *Coquet Island SPA Advice on Operations*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9006031&SiteName=coquet&SiteNameDisplay=Coquet+Island+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 [Accessed 08 June 2023].

Natural England, (2023aa). *Northumbria Coast SPA Supplementary Advice.* [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9006131&SiteName=Northumbr&SiteNameDisplay=Northumbria+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 [Accessed 07 June 2023].

Natural England, (2023bb). *Farne Islands SPA Supplementary Advice*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9006021&SiteName=farne%20island&SiteNameDisplay=Farne+Islands+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=5 [Accessed 08 June 2023].

Natural England, (2023 cc). *Farnse Islands SPA Advice on Operations*. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9006021&SiteName=farne%20island&SiteNameDisplay=Farne+Islands+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=5 [Accessed 08 June 2023].

Natural Resource Wales, (2008). *Core Management Plan Including Conservation Objectives for Grassholm SPA*. [Online] Available at; https://naturalresources.wales/media/674134/Grassholm%20SPA%20Management%20Plan%2021%5B1%5D.4.08%20(English).pdf [Accessed 07 June 2023].

Ramsar Sites Information Service, (1976). *North Norfolk Coast*. [Online] Available at: https://rsis.ramsar.org/ris/76 [Accessed 07 June 2023].

Ramsar Sites Information Service, (1999a). *Pagham Harbour*. [Online] Available at: https://rsis.ramsar.org/ris/396 [Accessed 07 June 2023].

Ramsar Sites Information Service, (1999b). *Ramsar Site Information Service.* [Online] Available at https://rsis.ramsar.org/ris/1011 [Accessed 06 June 2023].

Ramsar Sites Information Service, (1999c). *Portsmouth Harbour*. [Online] Available at: https://rsis.ramsar.org/ris/720 [Accessed 07 June 2023].

Ramsar Sites Information Service, (1999d). *Chichester and Langstone Harbours.* [Online] Available at: https://rsis.ramsar.org/ris/378 [Accessed 07 June 2023].

Ramsar Sites Information Service, (1999e). *Alde-Ore Estuary.* [Online] Available at: https://rsis.ramsar.org/ris/862 [Accessed 08 June 2023].

Ramsar Sites Information Service, (2000). *Northumbria Coast*. [Online] Available at: https://rsis.ramsar.org/ris/1019 [Accessed 08 June 2023].

Ramsar Sites Information Service, (2006). *Alderney West Coast and the Burhou Islands.* [Online] Available at: https://rsis.ramsar.org/ris/1587 [Accessed 08 June 2023].

Ramsar Site Information Service, (2007). *Solent and Southampton Water.* [Online]. Available at: https://rsis.ramsar.org/ris/965 [Accessed 07 June 2023].

Secretary of State for Environment, Food and Rural Affairs, (2016). *Register of European Sites, Register entry UK9012091 under Regulation 13 of The Conservation of Habitats and Species Regulations 2010.* [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/509225/dungeness-romney-rye-spa-documents.pdf [Accessed 07 June 2023].

© WSP UK Limited

Page intentionally blank



© WSP UK Limited

Appendix G
PVA for gannet of Alderney Wesr Coast and Burhou Islands Ramsar

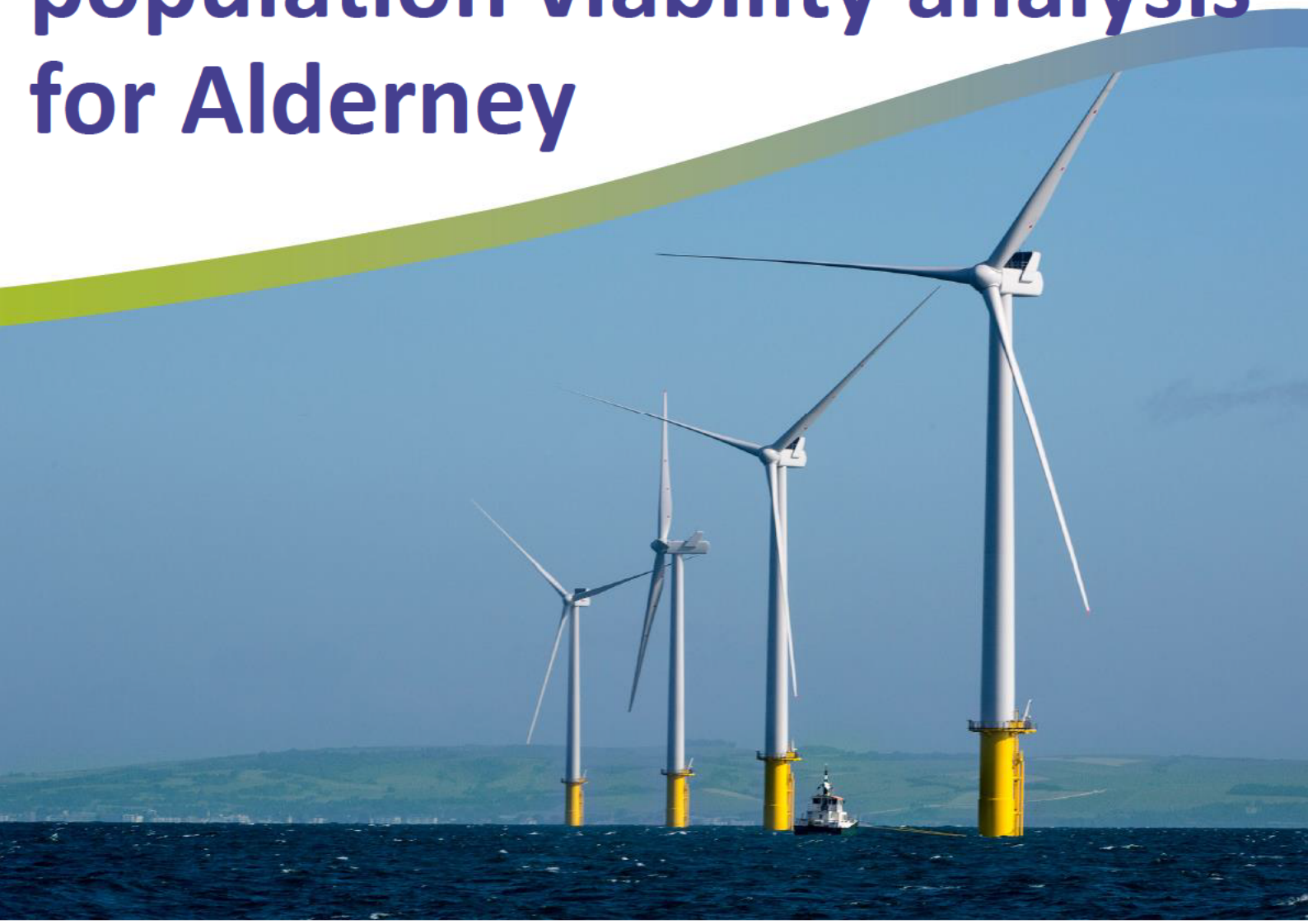
© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix G

Offshore ornithology population viability analysis for Alderney



GoBe

WSP

© WSP UK Limited

Contents

1.	**Introduction**	**3**
1.1	Purpose of this report	3
1.2	Project background	3
1.3	Population Viability Analysis	3
2.	**Methodology**	**5**
2.1	Guidance and models	5
	Overview	5
2.2	PVA demographic parameters	5
	Modelling approach	5
	Species demographics	6
2.3	Impact values assessed	11
3.	**Results**	**12**
4.	**Conclusion**	**13**
5.	**References**	**14**

List of Tables

Table G-1 Population demographic parameters selected for gannet. 9

Table G-2 Gannet PVA results using the Seabird PVA Tool. 12

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

1. Introduction

This section outlines the proposed development and the need for population viability analysis to inform the environmental impact assessment.

1.1 Purpose of this report

1.1.1 This report has been produced for the purpose of describing the methods and presenting the results of population viability analysis (PVA) run for the gannet, *Morus bassanus*, feature of the Alderney West Coast and Burhou Islands Ramsar Site, which forms part of the Report to Inform Appropriate Assessment (RIAA) for the proposed Rampion 2 offshore wind farm.

1.2 Project background

1.2.1 Rampion Extension Development (RED; "*the Applicant*") is proposing to develop the Rampion 2 Offshore Wind Farm ("*Rampion 2*"). Rampion 2 will be sited adjacent to the existing Rampion Offshore Wind Farm (OWF), located in the English Channel, 14km off the coast of Brighton & Hove and approximately 30km east of the Isle of Wight. For the purposes of clarification, in this document, the existing Rampion OWF is referred to as "*Rampion 1*" hereon in to enable clear differentiation with Rampion 2. Rampion 2 will comprise both offshore and onshore (landward of MHWS) infrastructure including offshore wind turbine generators (WTGs) and associated foundations and inter-array cabling, offshore substations, offshore export cables within a defined cable corridor, a landfall site, and an onshore substation for connection to the electricity transmission network. The offshore element of Rampion 2 will be located within an Area of Search adjacent to the west and south of the existing Rampion 1 project, together with a small link or "*bridge*" area between the two areas for cabling.

1.3 Population Viability Analysis

1.3.1 Renewable energy projects in the marine environment, such as OWFs, have the potential to effect seabirds through a number of processes such as collision with turbine blades resulting in mortality, or displacement from an area due to the presence of WTGs. These processes affect individuals, but when the Proposed Development alone effects are considered alongside and in-combination with any effects from other plans and projects on the same receptor, there is potential to affect the productivity or elevate the baseline mortality of a population to unsustainable levels.

1.3.2 The impact assessment process for Rampion 2 (**Report to Inform Appropriate Assessment**) provides the assessment of such potential effects as a consequence of Rampion 2 both alone and in-combination with other OWFs when considering collision risk to gannets from the Alderney West Coast and Burhou Islands Ramsar Site's colony, by considering effect levels against the colony's baseline mortality rate. A further method to estimate the effect that developments

© WSP UK Limited

alone or in-combination may have on a population is through PVA. PVA provides a robust framework using demographic parameters to predict changes in the population, using statistical population models to forecast future changes over a set period. Comparisons are made between "*baseline*" conditions, whereby conditions remain unaffected and under "*scenario*"conditions, where an effect is applied to a population by the alteration of demographic parameters.

1.3.3 This report provides PVAs to aid the analysis of Gannet in relation to the colony at Alderney West Coast and Burhou Islands Ramsar Site

1.3.4 This species is required to further assess the predicted effects from Rampion 2 in-combination with other plans and project only, due to the predicted effects at this scale exceeding a one percent increase relative to the baseline mortality to the colony. The one percent increase being the level which is regarded as the threshold for undertaking further assessments of potential effects through the use of PVA.

1.3.5 PVA was undertaken using the Seabird PVA Tool developed by Natural England (Searle et al. 2019). The Seabird PVA Tool was accessed via the "*Shiny App*" interface, which is a user-friendly graphical user interface accessible via a standard web-browser that uses the "*nepva*" R package to perform the modelling and analysis. The advantages of using an online platform for modelling and analysis purposes are that users are not required to use any R code, users are not required to install or maintain R, and updates to the model are made directly to the server. The tool is capable of assessing any type of effect in terms of change to demographic parameters, or as a cull or harvest of a fixed size per year (Searle et al. 2019).

© WSP UK Limited

2. Methodology

This section describes the method used for population viability analysis.

2.1 Guidance and models

Overview

2.1.1 The user guide for the Seabird PVA Tool provided by Natural England (Mobbs et al. 2020) has been followed for modelling and assessment of potential effects. The version of the tool used was v2.0, which was released in November 2022 to fix a previously identified bug that cause the model to fail in some circumstances.

2.1.2 The demographic parameters used for the PVA are presented in **Section 2.2**, whilst the input log and outputs from the Shiny App are included in **Annex A** of this report.

2.2 PVA demographic parameters

Modelling approach

2.2.1 The PVA model was undertaken using the "*Simulation*" run type, which is used to simulate population trajectories based on the specified demographic parameters, initial population sizes and scenarios the user inputs into the model.

2.2.2 The Seabird PVA Tool uses a Leslie matrix to construct a PVA model (Caswell 2000) based on the parameters provided by the user. Users can specify whether they wish the model to include demographic stochasticity, environmental stochasticity, density dependence, density independence or whether they want the model to run an entirely deterministic model.

2.2.3 A deterministic model translates the demographic parameters provided into actual numbers and provides a simplistic model, which can be used to generate average trends. Due to the lack of stochasticity, a deterministic model will produce the same result every time the simulation is run. In situations where little is known about how the population size has varied, or how the scale of the effect may vary, running a deterministic model might provide a more candid assessment of the population and how it may be affected.

2.2.4 A stochastic model produces probabilistic outputs to account for the effect of environmental and demographic stochasticity. Environmental stochasticity describes the effects random variation in factors such as weather can have on a population and is modelled by the incorporation of randomly generated values for the probability of survival from one-time step to the next. Demographic stochasticity refers to the effect of random variation in population structure on demographic rates and is modelled by generating random numbers of surviving individuals for any given survival probability. Demographic stochasticity can usually be ignored for populations greater than 100 individuals, however including

demographic stochasticity will not cause any penalty when simulating larger populations (WWT Consulting 2012).

2.2.5 All PVA modelling in this report was undertaken with environmental and demographic stochasticity. To ensure robust results, all simulations were set to run 5,000 times. All models were run for a 30-year time span, representing the likely lifespan of Rampion 2.

2.2.6 Demographic processes such as growth, survival, productivity and recruitment are density-dependent, as their rates change in relation to the number of individuals in a population. Density dependence can be described as being either compensatory or depensatory (Begon, Townsend & Harper 2005). Compensation is characterised by demographic changes that cause a stabilising effect on a populations long-term average. Depensation acts to further decrease the rate of population growth in declining populations and can delay the rate of recovery. This is typically exhibited in populations that have been significantly depleted in size and is caused by a reduction in the benefits associated with conspecific presence.

2.2.7 Density dependence is self-evident in the natural environment, as without density dependence, populations will grow exponentially. For seabird populations, the mechanisms as to how this operates are largely uncertain. If density dependence is mis-specified in an assessment, the modelled predictions may be unreliable. Therefore, it is more typical to use density independent models for seabird assessments, despite the lack of biologically necessary density dependence. As such, density independent models lack any means by which a population can recover once it has been reduced beyond a certain point, they are therefore appropriate for impact assessment purposes on the grounds of precaution (i.e. another source of precaution in the assessment process) (Ridge et al. 2019).

Species demographics

2.2.8 The Shiny App offers the users the choice of using pre-set demographic parameters or the ability to enter custom values. The pre-set demographic values are available for a total of 15 different species. The values are derived from previously reported national or colony specific demographic parameters sourced from the Joint Nature Conservation Committee (JNCC) Seabird Monitoring Programme (SMP 2020), divided into eight regional classifications (further information on the eight regional classifications can be found in Mobbs et al. (2020)) for breeding success data or Horswill and Robinson (2015) for survival rate. **Table G-1** summarises the species-specific values selected.

2.2.9 The initial population size inputted into the PVA was based on the most recent (2021) SMP colony counts for the colonies at Les Etacs and Ortac (the locations within the Alderney West Coast and Burhou Islands Ramsar Site where gannets nest), which were 5,842 and 2,698 Apparently Occupied Sites (AOS) respectively, totalling 8,540 AOS or 17,080 breeding adults.

2.2.10 The productivity rates for gannet used were the site-specific productivity rates for Les Etacs presented within the tool.

2.2.11 The survival rates for gannet were kept as the national values presented within the tool, which match the mean estimates presented in Horswill and Robinson (2015).

© WSP UK Limited

For age at first breeding and maximum brood size per pair parameters, the pre-formulated values within the tool were selected.

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

Table G-1 Population demographic parameters selected for gannet.

Species	Productivity rate + SD	Initial population size (breeding adults)	Mean adult survival rate + SD	Mean immature age class 0-1 survival rate + SD	Mean immature age class 1-2 survival rate + SD	Mean immature age class 2-3 survival rate + SD	Mean immature age class 3-4 survival rate + SD	Mean immature age class 4-5 survival rate + SD
Gannet	0.653 ± 0.087	17,080	0.919 ± 0.042	0.424 ± 0.045	0.829 ± 0.026	0.891 ± 0.019	0.895 ± 0.019	0.919 ± 0.042

© WSP UK Limited

Page intentionally blank

© WSP UK Limited

2.3 Impact values assessed

2.3.1 The potential effect from both displacement and collision together when assessed for Rampion 2 in-combination with other plans and projects apportioned to the Alderney West Coast and Burhou Islands Ramsar Site, was calculated as between 15.9 – 17.6 breeding adults per year. A range of relative harvest impact scenarios were ran within the PVA tool, of 10, 15, 16, 17, 18, 19, 20 and 25 adults impacts, with impacts attributed between 2030 and 2060. No impacts were attributed to immatures.

© WSP UK Limited

3. Results

This section provides the PVA outputs.

3.1.1 The outputs of the Seabird PVA Tool are set out in **Table G-2** below. The metrics used to summarise the PVA results are based on the counterfactual of population growth and counterfactual of population size.

Table G-2 Gannet PVA results using the Seabird PVA Tool.

Increase in mortality	Density independent counterfactual metric (after 30 years)		Reduction in growth rate	Reduction in population size
	Growth rate	Population size		
10	0.999	0.979	0.06%	2.14%
15	0.999	0.969	0.08%	3.16%
16	0.999	0.966	0.09%	3.38%
17	0.999	0.964	0.10%	3.57%
18	0.999	0.962	0.10%	3.77%
19	0.999	0.961	0.11%	3.96%
20	0.999	0.958	0.11%	4.21%
25	0.999	0.948	0.14%	5.20%

3.1.2 The PVA results show likely negligible impact on the gannet population of the Alderney West Coast and Burhou Islands Ramsar Site, with modelled reductions in the growth rate not expected to impact the population size significantly after 30 years.

© WSP UK Limited

4. Conclusion

4.1.1 The scenarios presented cover below and well above the expected number of collisions. PVA outputs indicate that the in-combination effects on the gannet populations remain well below a one percent change in growth rate over 30 years. This, therefore, provides evidence that the potential impact of both displacement and collision risk together, when assessed for Rampion 2 in-combination with other plans and projects will not cause any adverse effect on the integrity of the gannet feature of the Alderney West Coast and the Burhou Islands Ramsar site.

© WSP UK Limited

5. References

Begon, M., Townsend, C. R. and Harper John L. (2005) Ecology: From Individuals to Ecosystems. 4th Edition. Hoboken, New Jersey, USA: Wiley-Blackwell.

Caswell, H. (2000). Matrix Population Models. Sinauer Associates Inc., Sunderland.

Frederiksen, M., Harris, M. P. and Wanless, S. (2005a). Inter-Population Variation in Demographic Parameters: A Neglected Subject? Oikos Vol. 111, No. 2 (2005), pp. 209-214.

Furness, R.W. (2015). Non-breeding season populations of seabirds in UK waters; Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, Number 164.

Glutz von Blotzheim, U.N. & Bauer, K.M. (1982) Handbuchder Vögel Mitteleuropas. Band 8. Charadriiformes (3. Teil).Akademische Verlagsgesellschaft, Wiesbaden, Germany.

Horswill, C. & Robinson R. A. (2015). Review of seabird demographic rates and density dependence. JNCC Report No. 552. Joint Nature Conservation Committee, Peterborough.

Mobbs, D., Searle, K., Daunt, F. & Butler, A. (2020). A Population Viability Analysis Modelling Tool for Seabird Species: Guide for using the PVA tool (v2.0) user interface. Available at: https://github.com/naturalengland/Seabird_PVA_Tool/blob/master/Documentation/PVA_Tool_UI_Guidance.pdf (Downloaded: 11 June 2020).

Ridge, K., Jones, C., Jones, G. & Kean, G. (2019). Norfolk Vanguard Offshore Wind Farm Examing Authority's Report of Findings and Conclusions and Recommendations to the Secretary of State for Business, Energy and Industrial Strategy.

SMP (2020). JNCC UK Seabird Monitoring Programme. https://jncc.gov.uk/news/smp-database-launch/ and https://app.bto.org/seabirds/public/index.jsp

Searle, K., Mobbs, D., Daunt, F. & Butler, A. (2019). A Population Viability Analysis Modelling Tool for Seabird Species. Natural England Commissioned Reports, Number 274.

WWT Consulting (2012). SOSS-04 Gannet Population Viability Analysis: Developing guidelines on the use of Population Viability Analysis for investigating bird impacts due to offshore wind farms. Report to The Crown Estate.

© WSP UK Limited

Annex A
Seabird PVA Tool Input Log

Gannet parameter log

1. Set up

The log file was created on: 2023-05-18 14:03:27 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

2. Basic information

This run had reference name “Ramp2_Ald_GX_Range_”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5,000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

3. Baseline demographic rates

Species chosen to set initial values: Northern Gannet.

Region type to use for breeding success data: Site.

Available colony-specific survival rate: National. Sector to use within breeding success region: Alderney;Les Etacs.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

4. Population 1

Initial population values: Initial population 17080 in 2021

Productivity rate per pair: mean: 0.653 , sd: 0.087

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class zero to one - mean: 0.424 , sd: 0.045 , DD: NA

Age class one to two - mean: 0.829 , sd: 0.026 , DD: NA

Age class two to three - mean: 0.891 , sd: 0.019 , DD: NA

Age class three to four - mean: 0.895 , sd: 0.019 , DD: NA

Age class four to five - mean: 0.919 , sd: 0.042 , DD: NA

5. Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2023 to 2053

Impact on Demographic Rates

Scenario A - Name: 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000585 , se: NA

Scenario B - Name: 15

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000878 , se: NA

Scenario C - Name: 16

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000937 , se: NA

Scenario D - Name: 17

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000995 , se: NA

Scenario E - Name: 18

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001054 , se: NA

Scenario F - Name: 19

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001112 , se: NA

Scenario G - Name: 20

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001171 , se: NA

Scenario H - Name: 25

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001464 , se: NA

6. Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

© WSP UK Limited

Quasi-extinction threshold to use in calculating impact metrics: NA

Rampion 2
WIND FARM



GoBe

wsp

© WSP UK Limited

Appendix H
HRA integrity matrices

© WSP UK Limited

Page intentionally blank

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix H

HRA Stage Two PINS integrity matrices



© WSP UK Limited

Contents

1. Integrity matrices 4

1.1 Background and guidance 4

1.2 Matrix key 4

1.3 European sites 4

1.4 Effects considered 6

2. Matrix 1: Arun Valley Ramsar. HRA Integrity Matrix for Rampion 2 11

3. Matrix 2: Arun Valley SPA. HRA Integrity Matrix for Rampion 2 15

4. Matrix 3: Arun Valley SAC. HRA Integrity Matrix for Rampion 2 18

5. Matrix 4: Pagham Harbour SPA. HRA Integrity Matrix for Rampion 2 20

6. Matrix 5: Pagham Harbour (UK) Ramsar. HRA Integrity Matrix for Rampion 2 23

7. Matrix 6: The Mens SAC. HRA Integrity Matrix for Rampion 2 25

8. Matrix 7: Portsmouth Harbour Special Protection Area. HRA Integrity Matrix for Rampion 2 27

9. Matrix 8: Portsmouth Harbour Ramsar. HRA Integrity Matrix for Rampion 2 29

10. Matrix 9: River Itchen SAC. HRA Integrity Matrix for Rampion 2 31

11. Matrix 10: Solent Maritime Special Area Conservation. HRA Integrity Matrix for Rampion 2 33

12. Matrix 3: South Wight Maritime SAC. HRA Integrity Matrix for Rampion 2 36

13. Matrix 4: Solent and Isle of Wight lagoons Special Area Conservation (SAC). HRA Integrity Matrix for Rampion 2 39

14. Matrix 5: Dungeness, Romney Marsh & Rye Bay SPA. HRA Integrity Matrix for Rampion 2 41

© WSP UK Limited

15. Matrix 6: Solent and Dorset Coast SPA. HRA Integrity Matrix for Rampion 2 45

16. Matrix 7: Chichester and Langstone Harbours Ramsar. HRA Integrity Matrix for Rampion 2 48

17. Matrix 8: Chichester and Langstone Harbours SPA. HRA Integrity Matrix for Rampion 2 50

18. Matrix 9: Solent and Southampton Water SPA. HRA Integrity Matrix for Rampion 2 55

19. Matrix 10 Solent and Southampton Water Ramsar. HRA Integrity Matrix for Rampion 2 58

20. Matrix 11: Medway Estuary and Marshes SPA. HRA Integrity Matrix for Rampion 2 60

21. Matrix 20: Littoral seino-marin Special Protection Area. HRA Integrity Matrix for Rampion 2 63

22. Matrix 12: Foulness (Mid-Essex Coast Phase 5) SPA. HRA Integrity Matrix for Rampion 2 65

23. Matrix 13: Falaise du Bessin Occidental SPA. HRA Integrity Matrix for Rampion 2 67

24. Matrix 14: Alderney West Coast and Burhou Islands Ramsar. HRA Integrity Matrix for Rampion 2 70

25. Matrix 15: Alde-Ore Estuary Special Protection Area. HRA Integrity Matrix for Rampion 2 73

26. Matrix 16: Alde-Ore Estuary (UK) Ramsar. HRA Integrity Matrix for Rampion 2 75

27. Matrix 17: The Wash SPA. HRA Integrity Matrix for Rampion 2 77

28. Matrix 18: Breydon Water SPA. HRA Integrity Matrix for Rampion 2 81

29. Matrix 19: Greater Wash Special Protection Area (SPA). HRA Integrity Matrix for Rampion 2 83

30. Matrix 20 North Norfolk Coast Special Protection Area. HRA Integrity Matrix for Rampion 2 85

© WSP UK Limited

31. Matrix 30 North Norfolk Coast Ramsar. HRA Integrity Matrix for Rampion 2 87

32. Matrix 21: Côte de Granit Rose-Sept Iles SPA. HRA Integrity Matrix for Rampion 2 89

33. Matrix 22: Grassholm Special Protection Area (SPA). HRA Integrity Matrix for Rampion 2 93

34. Matrix 23: Flamborough and Filey Coast SPA. HRA Integrity Matrix for Rampion 2 95

35. Matrix 24: Northumbria Coast Special Protection Area. HRA Integrity Matrix for Rampion 2 99

36. Matrix 25: Northumbria Coast Ramsar. HRA Integrity Matrix for Rampion 2 101

37. Matrix 26: Coquet Island SPA. HRA Integrity Matrix for Rampion 2 103

38. Matrix 27: Farne Islands SPA. HRA Integrity Matrix for Rampion 2 106

39. References 110

List of Tables

Table 1-1 The potential effects on all the European sites considered 7

© WSP UK Limited

1. Integrity matrices

This document presents the 36 integrity matrices produced to support the Habitats Regulations Assessment (HRA) required for the proposed Rampion 2 offshore wind farm.

1.1 Background and guidance

1.1.1 The Planning Inspectorate (PINS (2022)) recommends that matrices are completed and submitted alongside Development Consent Order (DCO) applications. Such matrices are required for all European sites where a Likely Significant Effect could not be ruled out at the previous, Screening stage.

1.1.2 The Integrity Matrices presented in this document have been produced accordingly and should be read in conjunction with the **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** (RIAA) of the ES (Document Reference: 5.9) for the Proposed Development.

1.1.3 Evidence for Adverse Effects on the Integrity of European sites (AEOI) is detailed within the tables to the matrices.

1.1.4 The information provided is intended to assist the Examining Authority and Competent Authority by summarising assessment conclusions and signposting evidence contained in other application documents. No new assessment information is introduced in the matrices.

1.2 Matrix key

1.2.1 Evidence for the conclusions reached on integrity is detailed with reference to the key below.

	Key to the Integrity Matrices
✓	Adverse Effects on [European] Site Integrity (AEOI) cannot be excluded
✕a	Adverse Effects on [European] Site Integrity (AEOI) can be excluded
C	Construction
O	Operation (which refers to the Operational and Maintenance phase)
D	Decommissioning
	Where effects are not applicable to a particular feature they are greyed out.

1.3 European sites

1.3.1 In accordance with Advice Note 10 (PINS, 2022), the European sites included within the Appropriate Assessments are listed below.

© WSP UK Limited

Contents

Matrix / page no		European site	Matrix / page no		European site
1	p11	Arun Valley Ramsar	**20**	p63	Littoral seino-marin (FR) SPA
2	p12	Arun Valley Special Protection Area (SPA)	**21**	p65	Foulness (Mid-Essex Coast Phase 5 SPA
3	P16	Arun Valley Special Area of Conservation (SAC)	**22**	p67	Falaise du Bessin Occidental SPA
4	p21	Pagham Harbour SPA	**23**	p70	Alderney West Coast and Burhou Islands Ramsar
5	p18	Pagham Harbour Ramsar	**24**	p73	Alde-Ore Estuary (UK) SPA
6	p25	The Mens SAC	**25**	p75	Alde-Ore Estuary (UK) Ramsar
7	p279	Portsmouth Harbour SPA	**26**	p77	The Wash SPA
8	p29	Portsmouth Harbour Ramsar	**27**	p81	Breydon Water SPA
9	p31	River Itchen SAC	**28**	p83	Greater Wash SPA
10	p33	Solent Maritime SAC	**29**	p85	North Norfolk Coast SPA
11	p36	South Wight Maritime SAC	**30**	p87	North Norfolk Coast Ramsar
12	p39	Solent and Isle of Wight lagoons SAC	**31**	p89	Côte de Granit Rose-Sept Iles SPA
13	p39	Dungeness, Romney Marsh and Rye Bay SPA	**32**	p93	Grassholm SPA
14	p43	Solent and Dorset Coast SPA	**33**	p95	Flamborough and Filey Coast SPA

© WSP UK Limited

Matrix / page no		European site	Matrix / page no		European site
15	p48	Chichester &Langstone Harbours Ramsar	**34**	p99	Northumbria Coast SPA
16	p50	Chichester & Langstone Harbours SPA	**35**	p101	Northumbria Coast Ramsar
17	p58	Solent and Southampton Water SPA	**36**	p103	Coquet Island SPA
18	p58	Solent and Southampton Water Ramsar	**37**	p106	Farne Islands SPA
19	p60	Medway Estuary and Marshes SPA			

1.4 Effects considered

1.4.1 The potential effects on all the European sites considered, also need to be detailed within the submitted information to support the **Report to Inform the Appropriate Assessment** for the HRA as part of the ES (Document Reference: 5.9) of Rampion 2. These effects are set out in **Table 1-1**.

© WSP UK Limited

Table 1-1 The potential effects on all the European sites considered

Designation	Effects described in submission information	Presented in screening matrices as
Effects considered within the Integrity Matrices for wetland or over-wintering birds at the site		
Arun Valley Ramsar **Arun Valley SPA**	Effects associated with construction and decommissioning, and water neutrality during the operational phase.	Collison risk (migration) Noise and vibration Changes in hydrology Fragmentation of habitats Land take /cover change Water neutrality In-combination
Effects considered within the Integrity Matrices for water neutrality		
Arun Valley SAC	Effects associated with water neutrality during the operational phase.	Water neutrality
Effects considered within the Integrity Matrices for wetland birds to which potential connectivity is via species on migration only.		
Pagham Harbour Ramsar **Portsmouth Harbour Ramsar** **Portsmouth Harbour SPA** **Chichester and Langstone Harbours Ramsar** **Solent and Southampton Water Ramsar**	Additional mortality due to collisions with WTGs in offshore wind farm sites	Collison risk (migration) In-combination effects
Effects considered within the Integrity Matrices for Barbastelle bat		
The Mens SAC	Effects associated with construction and decommissioning	Fragmentation or severance of habitats Increased light levels

© WSP UK Limited

Designation	Effects described in submission information	Presented in screening matrices as
		In-combination effects
Effects considered within the Integrity Matrices for migratory fish		
River Itchen SAC	Interference to passage of migratory fish deflected away from migration routes. Behavioural disturbance /Physical injury Noise generated by the Proposed Development Together with noise sources generated by other plans and projects	Underwater noise In-combination effects
Effects considered within the Integrity Matrices for sites with both wetland and seabird features		
Pagham Harbour SPA		Collison risk (migration) Collision risk (breeding) Changes in prey availability and behaviour Indirect impacts through the effects on prey species In-combination
Chichester and Langstone Harbours SPA **Solent and Southampton Water SPA**	Additional mortality due to collisions with WTGs in offshore wind farm sites. Potential barrier effect as a consequence of array area being between breeding and foraging areas. Potential consequent mortality resulting from displacement due to activities associated with construction and demolition phases and from the array area during operation and maintenance phase.	Collision risk (breeding) Collison risk (migration) Barrier effects Disturbance/displacement
Effects considered within the Integrity Matrices for offshore ornithology within range of potential direct effects		
Solent and Dorset Coast SPA	Potential consequent mortality resulting from displacement due to activities associated with construction and demolition phases and from the array area during operation and maintenance phase.	Disturbance/displacement
Dungeness, Romney Marsh & Rye Bay SPA	Additional mortality due to collisions with WTGs in offshore wind farm sites. Potential consequent mortality resulting from displacement due to activities associated with construction and demolition phases and from the array area during operation and maintenance phase.	Collision risk (breeding) Collison risk (migration) Disturbance/displacement
Effects considered within the Integrity Matrices for offshore ornithology with potential pathway to LSE only in the breeding season		

© WSP UK Limited

Designation	Effects described in submission information	Presented in screening matrices as
Littoral seino-marin (FR) SPA **Falaise du Bessin Occidental SPA**	Additional mortality due to collisions with WTG in offshore wind farm sites.	Collision risk (breeding) In-combination
Effects considered within the Integrity Matrices for offshore ornithology with potential connectivity via migrating species only		
Medway Estuary and Marshes SPA **Foulness (Mid-Essex Coast Phase 5 SPA** **Alde-Ore Estuary (UK) SPA** **Alde-Ore Estuary (UK) Ramsar** **The Wash SPA** **Breydon Water SPA** **Greater Wash SPA** **North Norfolk Coast SPA** **North Norfolk Coast Ramsar** **Northumbria Coast SPA** **Northumbria Coast Ramsar** **Coquet Island SPA**	Additional mortality due to collisions with WTGs in offshore wind farm sites.	Collison risk (migration) In-combination
Effects considered within the Integrity Matrices for offshore ornithology with features vulnerable to collision and displacement		
Farne Islands SPA	Additional mortality due to collisions with WTGs in offshore wind farm sites. Potential consequent mortality resulting from displacement due to activities associated with construction and demolition phases and from the array area during operation and maintenance phase.	Collison risk (migration) Disturbance/displacement (migration)
Côte de Granit Rose-Sept Iles SPA **Alderney West Coast & Burhou Islands Ramsar**	Additional mortality due to collisions with WTGs in offshore wind farm sites. Potential consequent mortality resulting from displacement due to activities associated with construction and demolition phases and from the array area during operation and maintenance phase.	Collison risk (migration) Disturbance/displacement In-combination
Flamborough & Filey Coast SPA	Additional mortality due to collisions with WTGs in offshore wind farm sites. Potential consequent mortality resulting from displacement due to activities associated with construction and demolition phases and from the array area during operation and maintenance phase.	Collison risk (migration) Disturbance/displacement (migration) Disturbance/displacement (Breeding) Collision risk (breeding) In-combination

© WSP UK Limited

Designation	Effects described in submission information	Presented in screening matrices as
Grassholm SPA	Additional mortality due to collisions with WTGs in offshore wind farm sites.	Collison risk (migration) Disturbance/displacement (migration
Solent Maritime SAC **South Wight Maritime SAC** **Solent & Isle of Wight lagoons SAC**	Effects (e.g., erosion or accretion) on habitats or processes supporting habitats from changes in the hydrodynamic regime and/or coastal morphology (i.e., waves, currents and local sediment processes). Habitat modification and/ or smothering of benthic communities due to suspended sediment dispersion and deposition. Effects associated with non-native marine species anthropogenically introduced or spread around new habitats by the Proposed Development. Effects associated with introduction of hard substrates and man-made underwater structures that act as local vectors for the spread of marine introduced species. Changes to water quality associated with the introduction of harmful contaminants to the environment. The above effects combined with similar effects with other plans and projects acting in-combination.	Physical processes Suspended sediment and deposition Invasive Non-Native Species (INNS) Pollution In-combination

© WSP UK Limited

2. Matrix 1: Arun Valley Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:													**Arun Valley (UK) Ramsar**							
EU Code:													**UK11004**							
Distance to Proposed Development													**4.7km from onshore cable corridor**							
			Likely Effects of Proposed Development																	
Effect	**Land take / cover change**			**Fragmentation of habitats**			**Noise and vibration**			**Collision risk (migration)**			**Water neutrality**			**In-combination**				
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**		
Ramsar criterion 6 Northern pintail *Anas acuta*	×a		×b	×c		×b	×d		×b		Xe			×f		×g	×h	×b		
Ramsar criterion 5 Assemblage of wintering waterfowl of international importance	×a		×b	×c		×b	×d		×b		Xe			×f		×g	×h	×b		
Ramsar criterion 2 Seven wetland invertebrate species listed in British Red Data Book																				
Ramsar criterion 2 Four nationally rare and four nationally scarce plant species																				
Ramsar criterion 3 Particularly diverse and rich ditch flora																				

Cont. on next page

© WSP UK Limited

Matrix 1: Arun Valley Ramsar (cont.)

Evidence supporting conclusions

Evidence for Integrity Matrix 1, supporting conclusions for Arun Valley Ramsar

Matrix 1: Arun Valley Ramsar (cont. from previous page)	
✕a	**Northern pintail / wintering waterfowl – land take / land cover change – Construction.** Pintail was recorded above mean high water springs (MHWS) on a single occasion only during the survey period in a flooded field in the Adur Valley. Within the same area of the Adur Valley teal and wigeon were recorded relatively regularly; within the Arun Valley the majority of records of wigeon and teal were from in waterbodies to the north-west of the Church of St. Mary Magdelene, Lyminster (outside of the proposed Development Consent Order (DCO) Order Limits). No ruff were recorded above MHWS during the survey effort. The small extent of the active construction area (noting the cable ducts are installed in sections, as opposed to in a single operation across the whole cable route), the limited potential for temporal overlap due to the implementation of environmental measure C-117 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)), the reinstatement of the pasture and arable fields within which construction takes place (C-103 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)) and the trenchless crossing of the River Arun (thereby protecting bankside and foreshore habitats), provide assurance that any interactions between construction works with pintail and the wintering waterfowl assemblage from the Arun Valley Ramsar site will be limited and not great enough to alter the fitness of individual birds, and hence the population associated with the designation. No AEOI are therefore anticipated.
✕b	Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate.
✕c	**Northern pintail / wintering waterfowl - fragmentation of habitats – Construction**. Pintail was recorded above MHWS on a single occasion only during the survey period in a flooded field in the Adur Valley. Within the same area of the Adur Valley teal and wigeon were recorded relatively regularly; within the Arun Valley the majority of records of wigeon and teal were from in waterbodies to the north-west of the Church of St. Mary Magdelene, Lyminster (outside of the proposed DCO Order Limits). No ruff were recorded above MHWS during the survey effort. It is acknowledged that all species listed may be present within or close to the proposed DCO Order Limits on occasion. The presence of construction activity could result in pintail and the wintering waterfowl assemblage being prevented from crossing the working area to reach other available foraging habitat, thereby limiting resources available. However, the small extent of the active construction area (noting the cable ducts are installed in sections, as opposed to in a single operation across the whole cable route), the limited potential for temporal overlap due to the implementation of environmental measure C-117 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)), the reinstatement of the pasture and arable fields within which construction takes place (C-103 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)) and the presence of existing settlements and roads (i.e. other forms of disturbance) that are regularly crossed by these species provide assurance that any interactions between construction works and designated features of the Arun Valley Ramsar site will be limited and not great

© WSP UK Limited

	enough to alter the fitness of individual birds, and hence the population associated with the designation. Therefore, no potential for AEOI is identified.
✕d	**Northern pintail / wintering waterfowl – Noise and vibration (disturbance) – Construction.** Pintail was recorded above MHWS on a single occasion only during the survey period in a flooded field in the Adur Valley. Within the same area of the Adur Valley teal and wigeon were recorded relatively regularly; within the Arun Valley the majority of records of wigeon and teal were from in waterbodies to the north-west of the Church of St. Mary Magdelene, Lyminster (outside of the proposed DCO Order Limits). No ruff were recorded above MHWS during the survey effort. It is acknowledged that all species described may still be present within or close to the proposed DCO Order Limits on occasion. The presence of construction activity could result in individual birds being disturbed, but the small extent of the active construction area (noting the cable ducts are installed in sections, as opposed to in a single operation across the whole cable route) and the limited potential for temporal overlap due to the implementation of environmental measure C-117 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9) provide assurance that detectable changes in energy intake, energy expenditure and therefore deterioration of the fitness of individual birds would not be realised. This being due to the opportunity for any birds to relocate to other suitable foraging habitat with very short movements (both on foot and via short flights) to other suitable agricultural fields in the immediate vicinity. In conclusion, it is found there is no potential for an AEOI.

Cont. on next page

© WSP UK Limited

Matrix 1: Arun Valley Ramsar (cont.)

Evidence Supporting Conclusions

Evidence for Integrity Matrix 1, supporting conclusions for Arun Valley Ramsar

Xe	**Northern pintail / wintering waterfowl - Collision risk on migration – operation and maintenance.** The collision risk to all waterbird species is assessed in **Section 7.6** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9) It is predicted that no or very few individuals of any species per annum would be subject to collision consequent mortality from this SPA screened in for Rampion 2. Therefore, the loss of none or well under one individual of any species per annum represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for any waterbird species. There is, therefore, no adverse effect as a result of collision risk to these waterbird species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to any waterbird species. Therefore, no potential for AEOI is identified.
Xf	**Northern pintail / wintering waterfowl – water neutrality.** Water neutrality is assessed in **Section 7.2** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9) The delivery of mitigation will ensure that the Proposed Development will be water neutral during the operational phase. There is, therefore, no adverse effect as a result of additional water abstraction to these waterbird species and no adverse effect on the integrity of this designated site. Therefore, no potential for AEOI is identified.
Xg	**Northern pintail / wintering waterfowl - in-combination – Construction.** No in-combination effects associated with construction are expected as there are very limited other proposed plans or projects that lie within the floodplain of the Arun Valley. Works associated with the construction of the A-27 Arundel By-pass would result in the loss of functionally linked land within the floodplain of the Arun Valley. However, this would represent a small proportion of the available functionally linked land and the addition of some temporary losses associated with the Proposed Development would be negligible, particularly as the losses are both temporary and timed to occur (where practicable) outside of the winter period. Further, as neither project recorded regular use of the coastal and floodplain grazing marsh in the area by designated features a conclusion of no AEOI can be made on the available evidence.
Xh	**Northern pintail / wintering waterfowl Northern pintail - In-combination — operation and maintenance**. For the assessment of all waterbird species alone for this designated site and its features, it was concluded that there would be there would be no effect or no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on these waterbird species and make no detectable contribution to an in-combination effect resulting from collision risk to these waterbird species at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of no AEOI is appropriate.

End of Matrix 1

© WSP UK Limited

3. Matrix 2: Arun Valley SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Arun Valley (UK) SPA**														
EU Code:	**UK9020281**														
Distance to Proposed Development	**4.7km from onshore cable corridor**														
Likely Effects of Proposed Development															
Effect	**Land take/cover change**			**Fragmentation of habitats**			**Noise and vibration**			**Water neutrality**			**In-combination**		
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**			
Bewick's swan *Cygnus columbianus*	×a		×b	×c		×b	×d		×b		×e		×f		×f
Non-breeding waterfowl assemblage including Shoveler *Spatula clypeata,,* Eurasian teal *Anas crecca, Wigeon, Mareca penelope*, and Bewick's swan Cygnus *columbianus bewickii*	×a		×b	×c		×b	×d		×b		×e		×f		×f

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 2, supporting conclusions for Arun Valley SPA

Matrix 2: Arun Valley SPA

×a	**Bewick's swan / non-breeding waterbird assemblage – land take / land cover change – Construction.** No Bewick's swan have been recorded using functionally linked land within or close to the proposed DCO Order Limits as it crosses the Arun Valley floodplain; wigeon, teal and shoveler have been recorded using flooded fields in the Adur Valley, whilst wigeon and teal have been recorded on waterbodies at a single location approximately 100m from the proposed DCO Order Limits. It is acknowledged that all species may use habitats within the proposed DCO Order Limits on occasion. However, the small extent of the active construction area (noting the cable ducts are installed in sections, as opposed to in a single operation across the whole cable route), the limited potential for temporal overlap due to the implementation of environmental measure C-117 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)) the reinstatement of the pasture and arable fields within which construction takes place (C-103 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)) and the trenchless crossing of the River Arun (thereby protecting bankside and foreshore habitats), provide assurance that any interactions between construction works Bewick's swan and the non-breeding waterbird assemblage from the Arun Valley SPA will be limited and not great enough to alter the fitness of individual birds, and hence the population associated with the designation. Therefore, a finding of no AEOI is appropriate.
×b	Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate.
×c	**Bewick's swan / non-breeding waterbird assemblage - fragmentation of habitats – Construction**. No Bewick's swan have been recorded using functionally linked land within or close to the proposed DCO Order Limits as it crosses the Arun Valley floodplain; wigeon, teal and shoveler have been recorded using flooded fields in the Adur Valley, whilst wigeon and teal have been recorded on waterbodies at a single location approximately 100m from the proposed DCO Order Limits. It is acknowledged that all species may use habitats within the proposed DCO Order Limits on occasion. The presence of construction activity could result in Bewick's swan and the non-breeding waterbird assemblage being prevented from crossing the working area to reach other available foraging habitat, thereby limiting resources available. However, the small extent of the active construction area (noting the cable ducts are installed in sections, as opposed to in a single operation across the whole cable route), the limited potential for temporal overlap due to the implementation of environmental measure C-117 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)), the reinstatement of the pasture and arable fields within which construction takes place (C-103 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)) and the presence of existing settlements and roads (i.e. other forms of disturbance) that are regularly crossed by these species provide assurance that any interactions between construction works and designated features of the Arun Valley SPA will be limited and not great enough to alter the fitness of individual birds, and hence the population associated with the designation. No potential for an AEOI is identified.
×d	**Bewick's swan / non-breeding waterbird assemblage – Noise and vibration (disturbance) – Construction.** No Bewick's swan have been recorded using functionally linked land within or close to the proposed DCO Order Limits as it crosses the Arun Valley floodplain; wigeon, teal and shoveler have been recorded using flooded fields in the Adur Valley, whilst wigeon and teal have been recorded on waterbodies at a single location approximately 100m from the proposed DCO Order Limits. It is acknowledged that all species may use habitats within the proposed DCO Order Limits on occasion. The presence of construction activity could result in individual birds being disturbed, but the small extent of the active construction area (noting the cable ducts are installed in sections, as opposed to in a single operation across the whole cable route) and the limited potential for temporal overlap due to the implementation of environmental measure C-117 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)) provide assurance that detectable changes in energy intake, energy expenditure and therefore deterioration of the fitness of individual birds would not be realised. This being due to the opportunity for any birds to relocate to other suitable foraging habitat with very short movements (both on foot and via short flights) to other suitable agricultural fields in the immediate vicinity. On this evidence, a finding that no AEOI would result is determined.
Xe	**Bewick's swan / non-breeding waterbird assemblage – Water neutrality – Operation.** Water neutrality is assessed in **Section 7.2** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). The delivery of mitigation will ensure that the Proposed Development will be water neutral during the operational phase. There is, therefore, no adverse effect as a result of additional water abstraction to these waterbird species and no adverse effect on the integrity of this designated site. Therefore, no potential for AEOI is identified.
×f	**Bewick's swan / non-breeding waterbird assemblage - in-combination – Construction.** No in-combination effects associated with construction are expected as there are very limited other proposed plans or projects that lie within the floodplain of the Arun Valley. Works associated with the construction of the A-27 Arundel By-pass would result in the loss of functionally linked land

© WSP UK Limited

within the floodplain of the Arun Valley. However, this would represent a small proportion of the available functionally linked land and the addition of some temporary losses associated with the Proposed Development would be negligible, particularly as the losses are both temporary and timed to occur (where practicable) outside of the winter period. Further, as neither project recorded regular use of the coastal and floodplain grazing marsh in the area by designated features a conclusion of no AEOI can be made on the available evidence.

End of Matrix 2

© WSP UK Limited

4. Matrix 3: Arun Valley SAC. HRA Integrity Matrix for Rampion 2

Name of European site:	**Arun Valley (UK) SPA**					
EU Code:	**UK9020281**					
Distance to Proposed Development	**4.7km from onshore cable corridor**					
Likely Effects of Proposed Development						
Effect		**Water neutrality**			**In-combination**	
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**
Lesser whirpool ram's-horn snail *Anisus vorticulus*		aX				

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 3, supporting conclusions for Arun Valley SPA

Matrix 3: Arun Valley SAC

×a	**Lesser whirpool ram's-horn snail – Water neutrality – Operation.** Water neutrality is assessed in **Section 7.2** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). The delivery of mitigation will ensure that the Proposed Development will be water neutral during the operational phase. There is, therefore, no adverse effect as a result of additional water abstraction to this ramshorn snail and no adverse effect on the integrity of this designated site. Therefore, no potential for AEOI is identified.

End of Matrix 3

© WSP UK Limited

5. Matrix 4: Pagham Harbour SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Pagham Harbour (UK) SPA**
EU Code:	**UK9012041**
Distance to Proposed Development	**14.74km from array, 9.5km to offshore cable route and 11.5km to onshore cable route**
Likely Effects of Proposed Development	

	Collision risk (breeding)			**Collision risk (migration)**			**Changes in prey availability & behaviour**			**Indirect impacts via effects on prey**			**In-combination effects**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern *Sterna hirundo*		X[a]												X[b]	
Ruff *Calidris pugnax*					X[c]									X[d]	
Little tern *Sternula albifrons*															
Dark-bellied brent goose *Branta bernicla*					X[e]									X[f]	

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 4, supporting conclusions for Pagham Harbour SPA

Matrix 4: Pagham Harbour SPA

Common tern

Xa	**Common tern - collision during breeding season – operation and maintenance.** The collision risk to common terns during the breeding bio-seasons, is assessed in **paragraph 7.5.16** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). At PEIR stage it was predicted that predicted that zero individuals during the breeding bio-season would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of 'commic' tern records from the final nine months of DAS, the PEIR CRM results represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is appropriate.
Xb	**Common tern - collision risk during breeding season- Proposed Development in-combination — operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will have no adverse effect on common tern and make no contribution to an in-combination effect resulting from collision risk to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is appropriate.

Ruff

Xc	**Ruff - collision risk on migration - Proposed Development alone – operation and maintenance**. The collision risk to all waterbird species is assessed in **paragraph 7.5.340** of the **Rampion 2 Habitats Regulations Assessment Report to Inform the Appropriate Assessment**. For ruff, the total collision estimate (for the entire UK migratory population) was estimated as 0.01 birds per year, which would be further reduced by apportionment to individual designated sites. This is not considered to be a detectable level of mortality to any site. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to ruff. A finding of no AEOI is appropriate.
Xd	**Ruff - collision risk on migration - Proposed Development in- combination – operation and maintenance**. For the assessment of ruff alone for this designated site and feature, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on ruff and make no detectable contribution to an in-combination effect resulting from collision risk to ruff at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is appropriate.

Dark-bellied brent goose

Xe	**Dark-bellied brent goose – Collision risk on migration - alone – operation and maintenance.** The collision risk to all waterbird species, including dark-bellied brent goose, is assessed in **paragraph 7.5.340** of the **Habitats Regulations Assessment Report to Inform the Appropriate Assessment**. It is predicted that under one (0.3) individuals would pass through the array area per migration. Given this very small number exposed to collision risk, the resultant collision estimate is expected to be indistinguishable from zero birds per annum. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to dark-bellied brent goose. A finding of no AEOI is appropriate.
Xf	**Dark-bellied brent goose -- Collision risk on migration In-combination — operation and maintenance**. For the assessment of dark-bellied brent goose alone for this designated site and feature, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on dark-bellied brent goose and make no detectable contribution to an in-combination effect resulting from collision risk to dark-bellied brent goose at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. On this evidence, it is concluded that there is no potential for an AEOI to result from this interaction.

© WSP UK Limited

End of Matrix 4

© WSP UK Limited

6. Matrix 5: Pagham Harbour (UK) Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**Pagham Harbour (UK) Ramsar**						
EU Code:	**UK11052**						
Distance to Proposed Development	**795.43km from array, 780.2km to offshore cable route and 766.3 to onshore cable route**						
Likely Effects of Proposed Development							
Effect		**Collision risk (migration)**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Ramsar criterion 6: Dark-bellied brent goose, *Branta bernicla*			X a			X b	

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 5, supporting conclusions for Pagham Harbour Ramsar

Matrix 5: Pagham Harbour Ramsar	
Dark-bellied Brent goose	
✕a	**Dark-bellied brent goose - collision risk on migration – Proposed Development alone - operation and maintenance**. The collision risk to all waterbird species, including dark-bellied brent goose, is assessed in **paragraph 7.5.340** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment**. It is predicted that under one (0.3) individuals would pass through the array area per migration. Given this very small number exposed to collision risk, the resultant collision estimate is expected to be indistinguishable from zero birds per annum. There is, therefore, no potential for an adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this site as a consequence of potential collision risk to dark-bellied brent goose. No AEOI is concluded.
✕b	**Dark-bellied brent goose / -- Collision risk on migration – In-combination – operation and maintenance.** For the assessment of dark-bellied brent goose alone for this designated site and feature, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on dark-bellied brent goose and make no detectable contribution to an in-combination effect resulting from collision risk to dark-bellied brent goose at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. No AEOI is concluded.

End of Matrix 5

© WSP UK Limited

7. Matrix 6: The Mens SAC. HRA Integrity Matrix for Rampion 2

Name of European site:	The Mens (UK) SAC
EU Code:	UK0012716
Distance to Proposed Development	11.2 km from onshore cable corridor
Likely Effects of Proposed Development	

Effect	Land take / land cover change			Fragmentation or severance of habitats			Increased light levels			In-combination		
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**
Barbastelle bat *Barbastella barbastellus*	×a		×b	×c		×b	×d		×b	×e		×b
Atlantic acidophilous beech forests with Ilex and sometimes Taxus in the shrub layer *Quercion robori-petraeae* or *Ilici-Fagenion*												

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 6, supporting conclusions for The Mens SAC

Matrix 6: The Mens SAC

Barbastelle bat

✕a	**Barbastelle bat - Land take / land cover change – Construction**. There is 35ha of area within the proposed DCO Order Limits that overlaps with the 12km buffer placed around The Mens SAC by the draft Sussex Bat Protocol (SDNPA & Natural England, 2018). This 35ha is dominated by habitats that are sub-optimal for barbastelle bat (e.g., open arable fields) and represents only a very small proportion of the habitat available to these wide-ranging bats. Further, around 50% or more of the area within the proposed DCO Order Limits would not be subject to any works, its size and layout currently reflecting the stage of Proposed Development design, and any losses would be temporary and reinstated rapidly (C-103 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)). It can therefore be concluded that there would be no AEOI on barbastelle bats of The Mens SAC.
✕b	Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate.

Barbastelle bat

✕c	**Barbastelle bat - fragmentation of habitats - construction –** The active construction works could fragment the landscape for barbastelle bats as they may avoid crossing excavations. Further, recently planted hedgerows and treelines that will be established following the installation of cables are likely to be less attractive to commuting barbastelle bats, than more mature versions of these habitats. However, the disruptions to these linking habitats will be localised, leaving other areas of similar habitats intact, and restricted to between 6 and 14m in length; a distance over which barbastelle bats are likely to regularly traverse across more open ground (a situation that is inevitable if individual bats want to move between The Mens SAC and the proposed DCO Order Limits when within 12km). Further, areas that connect habitats north and south of the Proposed Development will be maintained intact as they will be crossed using a trenchless technique (i.e., Sullington Hill). It can therefore be concluded that there would be no AEOI on barbastelle bats of The Mens SAC.
✕d	**Barbastelle bat - increased light levels (disturbance) - construction.** The presence of artificial light could displace barbastelle bats from areas within which they might commute or forage. However, lighting will only be used in specific local areas such as at Horizontal Directional Drilling (HDD) compounds (where 24-hour working may be necessary) and at construction compounds (for security purposes). Although there is allowance for temporary movable lighting to be used for normal construction activities, the need for this will be highly seasonally dependent (given the typical specified working hours of 07:00 to 18:00). Therefore, the amount of habitat that may be lit will be small, localised and temporary. Further the lighting design will be designed sensitively following best practice (C-105 (**Table 6.1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)). Given the small areas affected by increased light levels, their temporary nature and the design guidance that will be followed no AEOI on barbastelle bats of The Mens SAC is predicted.
✕e	**Barbastelle bat - in-combination -** No plans or projects have been identified that would result in in-combination effects on the barbastelle bats of The Mens SAC associated with the Proposed Development.

End of Matrix 6

© WSP UK Limited

8. Matrix 7: Portsmouth Harbour Special Protection Area. HRA Integrity Matrix for Rampion 2

Name of European site:	**Portsmouth Harbour (UK) SPA**						
EU Code:	**UK9011051**						
Distance to Proposed Development	**38.3km to array, 34.5km to both offshore and onshore cable route**						
Likely Effects of Proposed Development							
Effect		**Collision risk (migration)**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Red-breasted merganser *Mergus serrator*			X a			X b	
Black-tailed godwit *Limosa limosa*			X a			X b	
Dunlin C*alidris alpina*			X a			X b	
Dark-bellied brent goose *Branta bernicla*			X a			X b	

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 7, supporting conclusions for Portsmouth Harbour SPA

Matrix 7: Portsmouth Harbour SPA

Waterbird species	
✕a	**Collison risk on migration (NB) - alone – operation and maintenance**. The collision risk to all waterbird species is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that no or very few individuals of any species per annum would be subject to collision consequent mortality from this SPA screened in for Rampion 2. For the assessment of all waterbird features of this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, the loss of none or well under one individual of any species per annum represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for any waterbird species. There is, therefore, no adverse effect as a result of collision risk to these waterbird species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to any waterbird species. A finding of no AEOI is concluded.
✕b	Collision risk on migration (NB) – Proposed Development in-combination – operation and maintenance. For the assessment of all waterbird species alone for this designated site and it's features, it was concluded that there would be there would be no effect or no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on these waterbird species and make no detectable contribution to an in-combination effect resulting from collision risk to these waterbird species at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is concluded.

End of Matrix 7

© WSP UK Limited

9. Matrix 8: Portsmouth Harbour Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**Portsmouth Harbour (UK) Ramsar**						
EU Code:	**UK11055**						
Distance to Proposed Development	**38.2km to array, 34.4km to both offshore and onshore cable route**						
Likely Effects of Proposed Development							
Effect		**Collision risk**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Dark-bellied brent goose *Branta bernicla*			X a			X b	

© WSP UK Limited

Matrix 8: Portsmouth Harbour Ramsar

Dark-bellied brent goose	
✕a	**Dark-bellied brent goose - collision risk on migration – Proposed Development alone – operation and maintenance.** The collision risk to all waterbird species, including dark-bellied brent goose, is assessed in **paragraph 7.5.340** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that under one (0.3) individuals would pass through the array area per migration. Given this very small number exposed to collision risk, the resultant collision estimate is expected to be indistinguishable from zero birds per annum. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to dark-bellied brent goose. A determination of no AEOI is concluded.
✕b	Da**rk-bellied brent goose - risk on migration – Proposed Development in-combination – operation and maintenance**. For the assessment of dark-bellied brent goose alone for this designated site and feature, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on dark-bellied brent goose and make no detectable contribution to an in-combination effect resulting from collision risk to dark-bellied brent goose at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A determination of no AEOI is concluded.

End of Matrix 8

© WSP UK Limited

10. Matrix 9: River Itchen SAC. HRA Integrity Matrix for Rampion 2

Name of European site:	**River Itchen (UK) SAC**					
EU Code:	**UK0012599**					
49.2 km to mouth of the Southampton Water (the estuary connecting River Itchen to marine environment)						
Likely Effects of Proposed Development						
Effect	**Underwater noise**			**In-combination**		
Stage of Development	C	O	D	C	O	D
Atlantic salmon *Salmo sala*	Xa		Xb	Xc		Xc
Otter *Lutra lutra*						
White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*						
Brook lamprey *Lampetra planeri*						
Bullhead *Cottus gobio*						
Southern damselfly *Coenagrion mercuriale*						
Water courses of plain to montane levels with Ranunculion fluitantis & Callitricho-Batrachion vegetation						

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 9, supporting conclusions for River Itchen SAC

Matrix 9: River Itchen SAC (cont. from previous page)

Atlantic salmon

×a **Atlantic salmon – underwater noise (physical harm and disturbance) - construction.** Atlantic salmon would not be attracted waters within the proposed DCO Order Limits, present within it in significant numbers (as per the baseline reported in **Chapter 8: Fish and shellfish ecology** of the ES (Document Reference: 6.2.8), or resident within or around the array. As such, the likelihood of exposure to lethal or injurious sounds levels (i.e., with 210m of the array see **Table 7-1** in the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)) is expected to be low and limited to sporadic, low numbers of passing migrants (at most). As such, mortalities and/or recoverable injuries due to exposure to underwater noise are not expected to manifest at levels that could (with reference to the site's target objectives) undermine the viability of the SAC population. Recoverable injury or behavioural changes to Atlantic salmon resulting in barriers to migration due to exposure to underwater noise generated during construction are not expected as exposure to lethal or injurious sounds levels is expected to be low (and would only occur within 5.9 km of the proposed DCO Order Limits (the noise modelling assessment is reported in full in **Chapter 8** of the ES (Document Reference: 6.2.8)**).** Furthermore, due to the intermittent nature of any potential noise impacts, significant effects on migration, including barrier effects, effects on coastal migrations or movement to/from coastal habitats during key migration periods are also not expected. Commitments relating to soft start / ramp up methods will also be adopted. Therefore, considering the Proposed Development alone there is no potential for an AEOI

×b **Atlantic salmon – underwater noise (physical harm and disturbance) - decommissioning.** Underwater noise effects during decommissioning are expected to be much less than pile driving and therefore impacts would be less than as assessed during the construction phase. The noise resulting from WTG decommissioning employing abrasive cutting is unlikely to result in any injury, avoidance or significant disturbance. Some temporary minor disturbance might be experienced in the immediate vicinity. Therefore, considering the Proposed Development alone there is no potential for an AEOI.

×c **Atlantic salmon – underwater noise (physical harm and disturbance) - in-combination.** On current information, with respect to mortality, injury, behavioural changes and auditory masking arising from noise and vibration one project, the Planned Perpetuus Tidal Energy Centre (PTEC) – a tidal energy demonstration facility – has been considered within the in-combination assessment as the only project within a 100km search area with the potential for spatial and temporal overlap. For both PTEC and Rampion 2, injury or mortality of Atlantic salmon as a result of underwater noise during construction would only be expected within the immediate vicinity of piling operations for relatively short durations. Therefore, even in-combination impacts on Atlantic salmon are not expected to be significant and underwater noise levels are unlikely to greatly exceed background levels. It is expected that fish will resume to normal behaviour and distribution within a short time period and as such, significant effects (in Environmental Impact Assessment (EIA) terms) are also not expected to occur in terms of cumulative duration of exposure. There is, therefore, no potential for an AEOI to the conservation objectives of the Atlantic salmon feature of River Itchen SAC in relation to effects (mortality, injury or behavioural changes) from underwater noise in-combination.

End of Matrix 9

© WSP UK Limited

11. Matrix 10: Solent Maritime Special Area Conservation. HRA Integrity Matrix for Rampion 2

Name of European site:	**Solent Maritime (UK) SAC**																		
EU Code:	**UK0030059**																		
Distance to Proposed Development	**23.3km to array**																		
Likely Effects of Proposed Development																			
Effect	**Suspended sediment & deposition**			**Physical habitat loss and disturbance**			**Invasive Non-Native Species**			**Physical processes**			**Pollution**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Sandbanks which are slightly covered by sea water all the time	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Atlantic salt meadows *Glauco-Puccinellietalia maritimae*	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Coastal lagoons	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Mudflats and sandflats not covered by seawater at low tide	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Estuaries	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Salicornia and other annuals colonising mud and sand	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Spartina swards *Spartinion maritimae*	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Perennial vegetation of stony banks																		
Shifting dunes along the shoreline with *Ammophila arenaria* (“White dunes”)																		
Annual vegetation of drift lines																		
Desmoulin's whorl snail *Vertigo moulinsiana*																		

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 10, supporting conclusions for Solent Maritime SAC

Matrix 10: Solent Maritime SAC (cont. from previous page)

×a	**Benthic / coastal habitats - suspended sediment – Proposed Development alone – construction -** Foundation and cable installation and seabed preparation (including sandwave clearance) would cause a temporary, localised increase in suspended sediment in benthic / coastal habitats. Prior analysis of sediment plumes resulting from comparable activities in the vicinity of Rampion 2 have shown that effects are expected to be short term and localised. Nonetheless, commitments have been secured to minimise seabed disturbance and reduce sediment suspension. In view of these commitments there is no potential for an AEOI from the Proposed Development alone during construction.
×b	**Benthic / coastal habitats - suspended sediment – Proposed Development alone – operation and maintenance** - Given that a determination of no AEOI was made for suspended sediment effects (of a greater magnitude) on benthic/coastal features during construction, and the limited capacity and intermittent nature of sediment dispersal during operation and maintenance works, no potential for an AEOI has been determined for the operational phase of the Proposed Development alone.
×c	**Benthic / coastal habitats – all pathways – Proposed Development alone – decommissioning**. Effects on benthic/coastal habitats during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate for the Proposed Development alone during decommissioning.
×d	**Benthic / coastal habitats - I**NNS**– Proposed Development alone – construction** - During construction, invasive and non-native species could be accidentally imported to benthic/coastal habitats via vessels; through fouling on the hulls, or the release of organisms in ballast water, should any such vessels be used. Some protection against bio-invasion risk is provided by assumed compliance with international legislation, guidelines, and methodologies, whilst commitment measures to avoid the introduction or spread of INNS will also be adhered to. The commitments will ensure there is no potential for AEOI on benthic / coastal habitats as a result of invasive species during the construction of the Proposed Development alone.
×e	**Benthic / coastal habitats - I**NNS **– Proposed Development alone – operation and maintenance** - The introduction of hard substrates and man-made underwater structures could act as local vectors (new habitats) for INNS. By creating new opportunities for organisms to settle, new substrates could encourage invasive species to spread and out-compete native species adversely affecting benthic/coastal habitats. Commitment measures to mitigate against and control invasive species will be incorporated into a Project Environmental Monitoring Programme (PEMP). The commitments will ensure there is no potential for AEOI on benthic / coastal habitats as a result of invasive species during the operation of the Proposed Development alone.
×f	**Benthic / coastal habitats — physical processes – operation and maintenance** - Potential effects on benthic / coastal habitats could result from changes to physical processes. For example, array structures and/ or sub-surface cables could influence the rate of erosion and deposition of sediment and / or prompt changes in water movement (e.g., to wave action). The coastal processes assessment for Rampion 2's ES (**Chapter 6: Coastal processes** of the ES (Document Reference: 6.2.6)**)** has determined that the impacts on hydrodynamic and wave regimes from cumulative impacts would not result in any significant changes to sediment transport and consequently will not have any significant adverse impacts on benthic ecology. There is, therefore, no potential for an AEOI during the operation of the Proposed Development alone, or in-combination.
×g	**Benthic / coastal habitats - pollution – Proposed Development alone – Construction** - Potential contamination of benthic / coastal habitats resulting from the spillage of fluids, fuels or construction materials from vessels and or /machinery during construction may result in a degradation of water quality and / or uptake of contaminants resulting in deleterious effects. Due to the limited potential for effects and the application of pollution prevention Commitments, unplanned oil or chemical spillages from vessels would not result in an AEOI during the construction of the Proposed Development alone.

Cont. on next page

© WSP UK Limited

Matrix 10: Solent Maritime SAC (cont.)

Evidence Supporting Conclusions

Evidence for Integrity Matrix 3, supporting conclusions for Solent Maritime SAC

	Matrix 10: Solent Maritime SAC (cont. from previous page)
×h	**Benthic / coastal habitats - pollution – Proposed Development alone – operation and maintenance** - The potential for pollution impacts on benthic / coastal habitats associated with accidental pollution events during the operation is associated with 33,390 vessel return trips per year over the 30-year design lifetime. A number of embedded environmental measures would reduce the risk to negligible levels. There is therefore no potential for AEOI from the Proposed Development alone during its operation.
×i	**Benthic / coastal habitats - in-combination** - With reference to the conclusions of the alone assessments it is determined there is no realistic potential for in-combination effects from the Proposed Development together with other plans or projects for any of the three pathways considered. As all site features are located well beyond the secondary zone of influence for potential effects (15km) and given the requirement to adhere to best practice measures, the embedded environmental measures secured by the Applicant (for Rampion 2) (see **Section 6** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)**)** and that similar measures would be required for external developments, it is considered that there is no potential for suspended sediment, accidental spills or Marine Invasive or Non-Native Species to contribute to AEOI in combination.

End of Matrix 10

© WSP UK Limited

12. Matrix 3: South Wight Maritime SAC. HRA Integrity Matrix for Rampion 2

Name of European site:	**South Wight Maritime (UK) SAC**
EU Code:	**UK0030061**
Distance to Proposed Development	**23km to Array**
Likely Effects of Proposed Development	

Effect	**Suspended sediment and deposition**			**Physical habitat loss & disturbance**			**Invasive Non-Native Species**			**Physical processes**			**Pollution**			**In-combination**		
Stage of Proposed Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**
Reefs	Xa	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Submerged or partially submerged sea caves	Xj	Xb	Xc				Xd	Xe	Xc		Xf		Xg	Xh	Xc	Xi	Xi	Xi
Vegetated sea cliffs of the Atlantic and Baltic Coasts																		

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 4, supporting conclusions for South Wight Maritime SAC

Matrix 11: South Wight Maritime SAC

✕a	**Benthic / coastal habitats - suspended sediment – Proposed Development alone – Construction -** Foundation and cable installation and seabed preparation (including sandwave clearance) would cause a temporary, localised increase in suspended sediment. The 'submerged or partially submerged sea caves' feature comprises mostly of cave systems located at the south western end of the Isle of Wight. The closest of these caves is 60.1 km from the proposed DCO Order Limits. The two/three caves on the south coast at the eastern end of the Isle are approximately 30 km from the array and offshore cable corridor. Based on distance and the predicted extents of any plumes, connectivity between the Proposed Development and the reefs and sea caves, is extremely limited. Neither features are considered particularly sensitive to suspended sediment. Adverse effects are therefore not anticipated. Therefore, there is no potential for an AEOI from the Proposed Development alone during the construction phase.
✕b	**Benthic / coastal habitats - suspended sediment – Proposed Development alone – operation and maintenance -** The assessment of the potential effects from the dispersal of sediment during operation and maintenance mirrors that provided for the construction phase above. Adverse effects are not anticipated and therefore, there is no potential for an AEOI from the Proposed Development alone during the operational phase.
✕c	**Benthic / coastal habitats – all pathways - Proposed Development during decommissioning.** Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, there is no potential for an AEOI from the Proposed Development alone during the decommissioning phase.
✕d	**Benthic / coastal habitats - invasive non-native species – Proposed Development alone – construction** - During construction, invasive and non-native species could be accidentally imported to benthic/coastal habitats via vessels; through fouling on the hulls, or the release of organisms in ballast water, should any such vessels be used. Some protection against bio-invasion risk is provided by assumed compliance with international legislation, guidelines, and methodologies, whilst commitment measures to avoid the introduction or spread of INNS will also be adhered to. The commitments will ensure there is no potential for AEOI on benthic / coastal habitats as a result of invasive species during the construction of the Proposed Development alone.
✕e	**Benthic / coastal habitats - I**NNS **– Proposed Development alone – operation and maintenance** - The introduction of hard substrates and man-made underwater structures could act as local vectors (new habitats) for INNS. By creating new opportunities for organisms to settle, new substrates could encourage invasive species to spread and out-compete native species adversely effecting benthic/coastal habitats. Commitment measures to mitigate against and control invasive species will be incorporated into a Project Environmental Monitoring Programme (PEMP). The commitments will ensure there is no potential for AEOI on benthic / coastal habitats as a result of invasive species during the operation of the Proposed Development alone.
✕f	**Benthic / coastal habitats — physical processes – operation and maintenance** - Potential effects on benthic / coastal habitats could result from changes to physical processes. For example, array structures and/ or sub-surface cables could influence the rate of erosion and deposition of sediment and / or prompt changes in water movement (e.g., to wave action). The coastal processes assessment for Rampion 2's ES (**Chapter 6** of the ES (Document Reference: 6.2.6)**)** has determined that the impacts on hydrodynamic and wave regimes from cumulative impacts would not result in any significant changes to sediment transport and consequently will not have any significant adverse impacts on benthic ecology. There is, therefore, no potential for an AEOI during the operation of the Proposed Development alone, or in-combination.
✕g	**Benthic / coastal habitats - Pollution – Proposed Development alone – construction** - Potential contamination of benthic / coastal habitats resulting from the spillage of fluids, fuels or construction materials from vessels and or /machinery during construction may result in a degradation of water quality and / or uptake of contaminants resulting in deleterious effects. Due to the limited potential for effects and the application of pollution prevention Commitments, unplanned oil or chemical spillages from vessels would not result in an AEOI during the construction of the Proposed Development alone.

Cont. on next page

© WSP UK Limited

HRA Integrity Matrix 11 South Wight Maritime (cont.)

Evidence Supporting Conclusions (cont.)

Evidence for Integrity Matrix 11, supporting conclusions for South Wight Maritime SAC

	Matrix 11: South Wight Maritime SAC
×h	**Benthic / coastal habitats - Pollution – Proposed Development alone – operation and maintenance** - The potential for pollution impacts on benthic / coastal habitats associated with accidental pollution events during the operation is associated with 33,390 vessel return trips per year over the 30-year design lifetime. A number of embedded environmental measures would reduce the risk to negligible levels. There is therefore no potential for AEOI from the Proposed Development alone during its operation.
×i	**Benthic / coastal habitats – in-combination –** With reference to the conclusions of the alone assessments it is determined there is no realistic potential for in-combination effects from the Proposed Development together with other plans or projects for any of the three pathways considered. As all site features are located well beyond the secondary zone of influence for potential effects (15km) and given the requirement to adhere to best practice measures, the Commitments secured by the Applicant (for Rampion 2) (see **Section 6** of the **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)**)** and that similar measures would be required for external developments, it is considered that there is no potential for suspended sediment, accidental spills or Marine Invasive or Non-Native Species to contribute to AEOI in combination.

End of Matrix 11

© WSP UK Limited

13. Matrix 4: Solent and Isle of Wight lagoons Special Area Conservation (SAC). HRA Integrity Matrix for Rampion 2

Name of European site:	**Solent and Isle of Wight lagoons SAC**																			
EU Code:	**UK0017073**																			
Distance to Proposed Development	**33.2km to Array**																			
Likely Effects of Proposed Development																				
Effect	**Suspended sediment /deposition**			**Physical habitat loss disturbance**			**Invasive Non-Native Species**			**Physical processes**			**Pollution**			**In-combination**				
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D		
Coastal lagoon (priority feature)	Xa	Xb	Xc				X	Xa	Xa		Xa		Xa	Xa	Xa	Xa	Xb	Xa		

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 5, supporting conclusions for Solent and Isle of Wight lagoons SAC

Matrix 12: Solent and Isle of Wight lagoons	
✗a	13.1.1 **Coastal habitats – all pathways – Proposed Development alone – construction.** Site information indicates (e.g., English Nature, 2005) that many of the coastal lagoons within the SAC are isolated or sluiced lagoons and many are separated from the sea by a sea-wall. This includes, Gilkicker Lagoon (a sluiced lagoon), the lagoons in Keyhaven (within the saltmarsh behind a sea-wall) and the lagoons at Bembridge Harbour (formed in a depression behind the sea-wall) (see Bamber and Robbins, 2010). Although sea water does enter some of the lagoons by percolation, or during spring tides, connectivity to the marine environment is considered to be extremely weak. Noting the distance, between Rampion 2 and these features the temporary, intermittent, transient, nature of effects and secured commitments (to minimise seabed disturbance and reduce sediment suspension) it I found there is no potential for an AEOI to results from the Proposed Development alone or combination on the lagoon feature during construction.
✗b	**Benthic / coastal habitats – all pathways – Proposed Development alone – operation and maintenance.** Given that a determination of no AEOI was made for suspended sediment effects (of a greater magnitude) on lagoon features during construction, and the limited capacity and intermittent nature of sediment dispersal during operation and maintenance works, no potential for an AEOI has been determined for the operation and maintenance phase of the Proposed Development alone, or in-combination.
✗c	**Coastal habitats – all pathways - Proposed Development during decommissioning.** Effects of suspended sediment on lagoon features during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate for the Proposed Development during decommissioning for effects alone and in-combination.

End of Matrix 12

© WSP UK Limited

14. Matrix 5: Dungeness, Romney Marsh & Rye Bay SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Dungeness, Romney Marsh and Rye Bay (UK) SPA**													
EU Site Code:	**UK9012091**													
Distance to Proposed Development	**46km from array, 67.3 to onshore cable route and 47.4 to offshore cable route**													
Likely Effects of Proposed Development														
Effect	**Collision risk (breeding)**			**Collision risk (migration)**			**Direct disturbance and displacement**			**In-combination**				
Stage of Proposed Development	**C**	**O**	**D**	**O**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**		
Common tern *Sterna hirundo*					X[a]						X[b]			
Sandwich tern *Thalasseus sandvicensis*		X[c]			X[d]		X[e]	X[f]	X[g]	X[h]	X[i]	X[j]		
Shoveler *Spatula clypeata*														
Marsh harrier *Circus aeruginosus*														

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 6, supporting conclusions for (Dungeness, Romney Marsh and Rye Bay SPA

Matrix 13: Dungeness, Romney Marsh and Rye Bay SPA

Common tern

✕a **Common tern - collision risk on migration - Proposed Development alone – operation and maintenance.** The collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **paragraph 7.5.368** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the Preliminary Environmental Information Report (PEIR) (Rampion Extension Development Ltd (RED), 2021) it was predicted that under one (0.61) individual (with a range of between 0.07 and 4.00 birds) "*commic*" tern (common and Arctic terns) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2, which is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common and Arctic terns and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. Given the reduction in the proposed array area and the absence of "*comic*" tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. This resulted in a determination of no AEOI.

✕b **Common tern – collision on migration - in-combination – operation and maintenance.** For the assessment of common tern alone for this designated site and feature, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on common tern and be the cause of no detectable change to any in-combination effect resulting from collision risk to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. This has resulted in a determination of no AEOI.

Sandwich tern

✕c **Sandwich tern - collision during breeding season – Proposed Development alone – operation and maintenance**. The collision risk to Sandwich terns during the breeding bio-season, is assessed in **paragraph 7.5.50** of the **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). At PEIR stage it was predicted that zero individuals during the breeding bio-season would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. This resulted in a determination of no AEOI.

✕d **Sandwich tern - collision risk on migration - Proposed Development alone – operation and maintenance**. The collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **paragraph 7.6.368** of the **Habitats Regulations Assessment Report to Inform the Appropriate Assessment**. Within the PEIR (RED, 2021) is was predicted that under one (0.84) individual (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2, which is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (PEIR, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. No AEOI is anticipated.

✕e **Sandwich tern – disturbance/displacement – Proposed Development alone – construction**. The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **paragraph 7.5.44** of the **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). In the offshore cable corridor, displacement from construction activities will be spatially and temporally restricted to the immediate vicinity of the construction vessel(s) and therefore likely to have no detectable displacement effect on Sandwich terns. In the array area, it is estimated that zero birds would be subject to mortality resulting from displacement during the construction phase. There is, therefore, no adverse effect as a result of displacement to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement to Sandwich tern. This resulted in a determination of no AEOI.

Cont. on next page (Page 1 of 3)

© WSP UK Limited

Matrix 13: Dungeness, Romney Marsh and Rye Bay SPA (cont.)

Evidence Supporting Conclusions

Evidence for Integrity Matrix 13, supporting conclusions for Dungeness, Romney Marsh and Rye Bay SPA

	Matrix 13: Dungeness, Romney Marsh and Rye Bay SPA
×f	**Sandwich tern - disturbance/displacement - Proposed Development alone – operation and maintenance.** The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **paragraph 7.5.57** of the **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero birds per annum would be subject to displacement consequent mortality from all SPA populations screened in for Rampion 2. There is, therefore, no adverse effect as a result of displacement to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement to Sandwich tern. Therefore, no AEOI is concluded.
×g	**Sandwich tern - Disturbance/displacement - Proposed Development alone – decommissioning**. Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate.
×h	**Sandwich tern - disturbance and displacement (breeding) – in-combination – construction.** For the assessment of Sandwich tern alone for this designated site and feature, it was concluded that as there would be zero mortalities and therefore, no adverse effect as a result of displacement to this species from Rampion 2. Therefore, it can be concluded that Rampion 2 will have no adverse effect on Sandwich tern it will not contribute to any in-combination effect resulting from displacement of Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is concluded.
×i	**Sandwich tern - disturbance and displacement – in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site and feature, it was concluded that as there would be zero mortalities and therefore, no adverse effect as a result of displacement to this species from Rampion 2. Therefore, it can be concluded that Rampion 2 will have no adverse effect on Sandwich tern it will not contribute to any in-combination effect resulting from displacement of Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is concluded.
×j	**Sandwich tern - disturbance and displacement (breeding) – in-combination** – decommissioning. Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate.

Cont. on next page (Page 2 of 3)

© WSP UK Limited

Matrix 13: Dungeness, Romney Marsh and Rye Bay SPA (cont.)

Name of European site:	**Dungeness, Romney Marsh and Rye Bay SPA**
EU Code:	**UK9012091**
Distance to Proposed Development	**46km from array, 67.3 to onshore cable route and 47.4 to offshore cable route**
Likely Effects of Proposed Development	

Effect	**Collision risk**	**Direct disturbance displacement**	**In-combination**
Hen harrier *Cygnus columbianus*			
Avocet			
Golden plover P*luvialis apricaria*			
Ruff *Calidris pugnax*			
Mediterranean gull *Ichthyaetus melanocephalus*			
Bittern *Cygnus columbianus*			
Bewick's swan *Cygnus columbianus*			
Little tern *Sternula albifrons*			
Waterbird assemblage - Non-breeding: Including Bewick's swan *Cygnus columbianus*, Bittern *Botaurus stellaris*, Hen harrier *Circus cyaneus*, golden plover *Pluvialis apricaria*, Ruff *Calidris pugnax*, aquatic warbler *Acrocephalus paludicola*, Shoveler *Spatula clypeata*, European white-fronted goose *Anser albifrons*, Wigeon *Mareca penelope*, Gadwall *Mareca strepera*, pochard Aythya ferina, little grebe *Tachybaptus ruficollis*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, coot *Fulica atra,* Sanderling, *Calidris alba*, whimbrel *Numenius phaeopus* and common sandpiper *Actitis hypoleucos*			

End of Matrix 13 (Page 3 of 3)

© WSP UK Limited

15. Matrix 6: Solent and Dorset Coast SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Solent and Dorset Coast (UK) SPA**					
EU Code:	**UK9020330**					
Distance to Proposed Development	**11.6 km from array, 0.96km to offshore cable route and 2.5 km to onshore cable route**					
Likely Effects of Proposed Development						
Effect	Direct disturbance and displacement			In-combination		
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**
Common tern *Sterna hirundo*	×**a**			×**b**		
Sandwich tern *Thalasseus sandvicensis*	×**c**	×**d**	×**e**	×**f**	×**g**	×**h**
Little tern *Sternula albifrons*	×**i**			×**j**		

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 7, supporting conclusions for Solent and Dorset Coast proposed (p) SPA

Matrix 14: Solent and Dorset Coast pSPA

Common tern	
×a	**Common tern - disturbance/displacement - alone - construction**. The potential impact from disturbance and displacement to common terns during the breeding season is assessed in **paragraph 7.5.62** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9) . In the offshore cable corridor, displacement from construction activities will be spatially and temporally restricted to the immediate vicinity of the construction vessel(s) and therefore likely to have no detectable displacement effect on common terns. In the array area, it is estimated that zero birds would be subject to mortality resulting from displacement during the construction phase. There is, therefore, no adverse effect as a result of displacement to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement to common tern. This resulted in a determination of no AEOI
Common tern	
×b	**Common tern – in-combination – construction**. The potential impact from disturbance and displacement to common terns during the breeding season is assessed in **paragraph 7.5.62** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero birds would be subject to mortality resulting from displacement from the array area during the construction phase, and there is estimated to be no detectable impact from displacement in the offshore cable corridor. Therefore, it can be concluded that Rampion 2 will have no adverse effect on common tern and make no detectable contribution to an in-combination effect resulting from displacement risk to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. This has resulted in a determination of no AEOI.
Sandwich tern	
×c	**Sandwich tern - Disturbance/displacement - construction**. The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). In the offshore cable corridor, displacement from construction activities will be spatially and temporally restricted to the immediate vicinity of the construction vessel(s) and therefore likely to have a negligible displacement impact on Sandwich terns. In the array area, it is estimated that zero birds would be subject to mortality resulting from displacement during the construction phase. Overall, this represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for Sandwich tern. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to Sandwich terns. This has resulted in a determination of no AEOI.
×d	**Sandwich tern - Disturbance/displacement – operation and maintenance.** The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero birds per annum would be subject to displacement consequent mortality from all SPA populations screened in for Rampion 2. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to Sandwich tern. This has resulted in a determination of no AEOI.
×e	**Sandwich tern – Decommissioning** - Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of no AEOI is appropriate.
×f	**Sandwich tern – In-combination – construction.** The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). In the offshore cable corridor, displacement from construction activities will be spatially and temporally restricted to the immediate vicinity of the construction vessel(s) and therefore likely to have a negligible displacement impact on Sandwich terns. In the array area, it is estimated that zero birds would be subject to mortality resulting from displacement during the construction phase. Therefore, it can be concluded that Rampion 2 will have no adverse effect on Sandwich tern and make no detectable contribution to an in-combination effect resulting from displacement risk to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. This has resulted in a determination of no AEOI.

Cont. on next page (Page 1 of 3)

© WSP UK Limited

Matrix 14: Solent and Dorset SPA (cont.)

Evidence Supporting Conclusions (cont.)

Evidence for Integrity Matrix 14, supporting conclusions for Solent and Dorset Coast pSPA

	Matrix 14: Solent and Dorset Coast pSPA
×g	**Sandwich tern – In-combination – operation and maintenance.** The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero birds per annum would be subject to displacement consequent mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will cause no contribution to any in-combination effect at this designated site and so will not be the cause of any potential adverse effect on the integrity of this species or designated site. This has resulted in a determination of no AEOI.
×h	**Sandwich tern – In-combination – decommissioning.** Effects during decommissioning are expected to be the same as or less than effects during construction, which were assessed as being negligible in the offshore cable corridor and zero in the array area. Therefore, it can be concluded that Rampion 2 will have no adverse effect on Sandwich tern and will not cause any detectable change to a in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. This has resulted in a determination of no AEOI.
Little tern	
×i	**Little tern - Disturbance/displacement - construction**. The potential impact from disturbance and displacement to little terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). In the offshore cable corridor, displacement from construction activities will be spatially and temporally restricted to the immediate vicinity of the construction vessel(s) and therefore likely to have zero impact and no detectable effect on little terns. The offshore cable corridor is also beyond the maximum foraging range (Woodward *et al.,* 2019) from any colonies within the SPA. In the array area, it is estimated that zero birds would be subject to mortality resulting from displacement during the construction phase. Overall, this represents zero impact and no adverse effect for little tern. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to little terns. A finding of no AEOI is determined.
×j	**Little tern– In-combination – construction**. The potential impact from disturbance and displacement to little terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). In the offshore cable corridor, displacement from construction activities will be spatially and temporally restricted to the immediate vicinity of the construction vessel(s) and therefore likely to have zero impact and no detectable effect on little terns. The offshore cable corridor is also beyond the maximum foraging range (Woodward *et al.,* 2019) from any colonies within the SPA. In the array area, it is estimated that zero birds would be subject to mortality resulting from displacement during the construction phase. Overall, this represents zero impact and no adverse effect for little tern. Therefore, it can be concluded that Rampion 2 will cause no detectable contribution to any in-combination effect and so not be the cause of any potential adverse effect on the integrity of this species or designated site. This has resulted in a determination of no AEOI.

End of Matrix 14 (Page 3 of 3)

© WSP UK Limited

16. Matrix 7: Chichester and Langstone Harbours Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**Chichester and Langstone Harbours (UK) Ramsar**
EU Code:	**UK11013**
Distance to Proposed Development	**23.1km from array**
Likely Effects of Proposed Development	

	Collision risk (migration)			In-combination		
Stage of Development	C	O	D	C	O	D
Ringed plover *Charadrius hiaticula*		Xa			Xb	
Black-tailed godwit *Limosa limosa*		Xa			Xb	
Redshank *Tringa totanus*		Xa			Xb	
Dark-bellied brent goose *Branta bernicla bernicla*		Xa			Xb	
Shelduck *Tadorna tadorna*		Xa			Xb	
Grey plover *Pluvialis squatarola*		Xa			Xb	
Dunlin *Calidris alpina alpina*		Xa			Xb	
Waterbird assemblage - Wintering (species not listed in Ramsar criteria).		Xa			Xb	

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 8, supporting conclusions for (Chichester and Langstone Harbours Ramsar

Matrix 15: Chichester and Langstone Harbours Ramsar

Waterbird species.

×a	**Collison risk on migration (NB) - alone – operation and maintenance**. The collision risk to all waterbird species is assessed in **paragraph 7.5.338 'Migratory Waterbirds – English South Coast SPAs'** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9): Report to Inform Appropriate Assessment. It is predicted that no or very few individuals of any species per annum would be subject to collision consequent mortality, across all SPAs screened in for Rampion 2. Therefore, the loss of none or very few individuals of any species per annum represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for any waterbird species. There is, therefore, no adverse effect as a result of collision risk to these waterbird species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to any waterbird species. A finding of no AEOI is determined.
×b	**Collision risk on migration (NB) – Proposed Development in-combination – operation and maintenance.** It is predicted that Rampion 2 will lead to the loss of none, or very few individuals of any species per annum across all SPAs screened in for Rampion 2, which represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for any waterbird species. Therefore, it can be concluded that Rampion 2 will have no adverse effect on these waterbird species and so will cause no detectable change to any in-combination effect. Therefore, Rampion 2 will not cause any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is determined.

End of Matrix 15

© WSP UK Limited

17. Matrix 8: Chichester and Langstone Harbours SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Chichester and Langstone Harbours (UK) SPA**
EU Code:	**UK9011011**
Distance to Proposed Development	**23.1km from Array to proposed DCO Order Limits**
Likely Effects of Proposed Development	

	Collision risk (breeding)			**Collision risk (migration)**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Common tern *Sterna hirundo*		X[a]												X[b]	
Sandwich tern *Thalasseus sandvicensis*		X[c]						X[d]			X[e]			X[f]	
Common Shelduck *Tadorna tadorna*					X[g]									X[h]	
Wigeon *Mareca penelope*					X[g]									X[h]	
Teal *Anas crecca*					X[g]									X[h]	
Northern pintail *Anas acuta*					X[g]									X[h]	
Shoveler *Spatula clypeata*					X[g]									X[h]	

Cont . on next page (Part 1 of 5)

© WSP UK Limited

Matrix 16: Chichester and Langstone Harbours SPA (cont.)

Name of European site:	**Chichester and Langstone Harbours (UK) SPA**															
EU Code:	**UK9011011**															
Distance to Proposed Development	**23.1km from Array to proposed DCO Order Limits**															
Likely Effects of Proposed Development																
	Collision risk (breeding)			**Collision risk (migration)**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Red-breasted merganser *Mergus serrator*															
Ringed plover *Charadrius hiaticula*															
Grey plover *Pluvialis squatarola*															
Sanderling *Calidris alba*															
Bar-tailed godwit *Limosa lapponica*															
Eurasian curlew *Numenius arquata*															
Redshank *Tringa totanus*															
Ruddy turnstone *Arenaria interpres*															

Cont . on next page (Part 2 of 5)

© WSP UK Limited

Matrix 16: Chichester and Langstone Harbours SPA (cont.)

Name of European site:	**Chichester and Langstone Harbours (UK) SPA**														
EU Code:	**UK9011011**														
Distance to Proposed Development	**23.3km from array, 15.9 to offshore cable route and 16.2km to onshore cable route**														
Likely Effects of Proposed Development															
	Collision risk (breeding)			**Collision risk (migration)**			**Barrier effect**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Little tern *Sternula albifrons*															
Dunlin *Calidris alpina alpina*															
Dark-bellied brent goose *Branta bernicla bernicla*															
Waterbird assemblage- Wintering: Including Bar-tailed godwit *Limosa lapponica*, Eurasian curlew *Numenius arquata* , dark-bellied Brent geese, Dunlin *Calidris alpina alpina*, grey plover, Northern pintail *Anas acuta*, red-breasted merganser, Redshank Tringa totanus, Ringed plover *Charadrius hiaticula*, Sanderling *Calidris alba*, Shelduck *Tadorna tadorna*, *Shoveler Spatula clypeata*, teal, Ruddy turnstone Arenaria interpres and Wigeon *Mareca penelope*.															

Cont . on next page (Part 3 of 5)

© WSP UK Limited

Matrix 16: Chichester and Langstone Harbours SPA (cont.)

Evidence Supporting Conclusions (cont.)

Evidence for Integrity Matrix 9, supporting conclusions for Integrity Matrix 15 (Chichester & Langstone Harbours SPA)

Matrix 15: Chichester & Langstone Harbours SPA	
Common tern	
×a	**Common tern - collision during breeding season – operation and maintenance**. The collision risk to common terns during the breeding bio-seasons, is assessed in **paragraph 7.5.16** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that predicted that zero individuals during the breeding bio-season would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of "*commic*" tern records from the final nine months of DAS, the PEIR CRM (RED, 2021) results represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is appropriate.
×b	**Common tern - In-combination -operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will have no adverse effect on common tern and make no contribution to an in-combination effect resulting from collision risk to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is appropriate.
Sandwich tern	
×c	**Sandwich tern - Collision risk - alone – operation and maintenance**. Collision risk to Sandwich terns during the breeding bio-seasons, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero individuals in the breeding bio-season would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is determined.
×d	**Sandwich tern - Barrier – alone – operation and maintenance.** The potential impact from a barrier effect to Sandwich terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Modelling by Joint Nature Conservation Committee (JNCC) (Wilson et al., 2014) suggests Sandwich terns from the colonies at Chichester and Langstone Harbours mostly forage near the coast or within the Solent. Aerial digital surveys found zero Sandwich terns in the proposed array area during the breeding bio-season, and Sandwich terns observed within the 4km buffer were in between the array area and the breeding colonies. The evidence is therefore that Sandwich terns from the colonies at Chichester and Langstone Harbours do not routinely forage in the waters beyond Rampion 2 and do not routinely commute through the proposed array area. Therefore, no barrier effect is predicted. A finding of no AEOI is determined.
×e	**Sandwich tern - Disturbance displacement – alone – operation and maintenance.** The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero birds per annum would be subject to displacement consequent mortality from all SPA populations screened in for Rampion 2. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to Sandwich tern. A finding of no AEOI is determined.
×f	**Sandwich tern - In-combination - operation and maintenance**. For the assessment of Sandwich tern alone for this designated site and feature, it was concluded that there would be zero risk from collision, zero risk from displacement, and zero or negligible risk as a result of a barrier effect. Therefore, it can be concluded that Rampion 2 will have no adverse effect on Sandwich tern and make no contribution to any in-combination effect on Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is appropriate. A finding of no AEOI is determined.

© WSP UK Limited

Matrix 16: Chichester and Langstone Harbours SPA (cont.)

Evidence Supporting Conclusions (cont.)

Wintering species	
✕g	**Collison risk on migration (NB) - alone – operation and maintenance.** The collision risk to all waterbird species is assessed in **Section 7.6 (paragraph 7.6.220)** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that no or very few individuals of any species per annum would be subject to collision consequent mortality from this SPA screened in for Rampion 2. Therefore, the loss of none or well under one individual of any species per annum represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for any waterbird species. There is, therefore, no adverse effect as a result of collision risk to these waterbird species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to any waterbird species. A finding of no AEOI is therefore concluded.
✕h	**Collision risk on migration (NB) – Proposed Development in-combination – operation and maintenance.** For the assessment of all waterbird species alone for this designated site and its features, it was concluded that there would be there would be no effect or no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will have no adverse effect on these waterbird species and make no detectable contribution to an in-combination effect resulting from collision risk to these waterbird species at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 16 (Page 5 of 5)

© WSP UK Limited

18. Matrix 9: Solent and Southampton Water SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Solent and Southampton Water (UK)SPA**															
EU Code:	**UK9011061**															
Distance to Proposed Development	**30.9km from array, 36.8km to onshore cable route and 32.4 to offshore**															
Likely Effects of Proposed Development																
Effect	**Collision risk (migration)**			**Collision risk (breeding)**			**Barrier**			**Direct disturbance displacement**			**In-combination**			
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	
Sandwich tern *Thalasseus sandvicensis*					Xa			Xb			Xc			Xd		
Ringed plover *Charadrius hiaticula*		Xe												Xf		
Teal *Anas crecca*		Xe												Xf		
Black-tailed *godwit Limosa limosa*		Xe												Xf		
Dark-bellied brent goose *Branta bernicla bernicla*		Xe												Xf		
Waterbird assemblage – Wintering: Including black-tailed godwit *Limosa limosa*, dark-bellied Brent goose *Branta bernicla*, Ringed plover *Charadrius hiaticula*, and teal *Anas crecca.*		Xe												Xf		

Evidence Supporting Conclusions (on next page)

Cont . on next page (Part 1 of 3)

© WSP UK Limited

Matrix 17: Solent and Southampton Water SPA (cont.)

Evidence Supporting Conclusions

Evidence for Integrity Matrix 10, supporting conclusions for Solent and Southampton Water SPA

Matrix 17: Solent and Southampton Water SPA

Sandwich tern

×a	**Sandwich tern - collision during breeding season – Proposed Development alone – operation and maintenance**. The collision risk to Sandwich terns during the breeding bio-season, is assessed in **paragraph 7.5.50** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that zero individuals during the breeding bio-season would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. This resulted in a determination of no AEOI.
×b	**Sandwich tern - barrier – alone – operation and maintenance.** The potential impact from a barrier effect to Sandwich terns during the breeding season is assessed in **Section 7.5** (**paragraph 7.6.144**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Modelling by JNCC (Wilson et al., 2014) suggests Sandwich terns from the colonies at Chichester and Langstone Harbours mostly forage near the coast or within the Solent. Aerial digital surveys found zero Sandwich terns in the proposed array area during the breeding bio-season, and Sandwich terns observed within the 4km buffer were in between the array area and the breeding colonies. The evidence is therefore that Sandwich terns from the colonies at Chichester and Langstone Harbours do not routinely forage in the waters beyond Rampion 2 and do not routinely commute through the proposed array area. Therefore, no adverse effect to Sandwich terns from a barrier effect is predicted. A finding of no AEOI is therefore concluded.
×c	**Sandwich tern - disturbance displacement – alone – operation and maintenance**. The potential impact from disturbance and displacement to Sandwich terns during the breeding season is assessed in **Section 7.5** (**paragraph 7.6.138**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero birds per annum would be subject to displacement consequent mortality from all SPA populations screened in for Rampion 2. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.
×d	**Sandwich tern - in-combination - operation and maintenance**. For the assessment of Sandwich tern alone for this designated site and feature, it was concluded that there would be zero risk from collision, zero risk from displacement, and zero or negligible risk as a result of a barrier effect. Therefore, it can be concluded that Rampion 2 will have no adverse effect on Sandwich tern and make no contribution to any in-combination effect on Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is appropriate.

Wintering species

×e	Collison risk on migration (NB) - alone – operation and maintenance. The collision risk to all waterbird species is assessed in **paragraph 7.5.338** (‘**Migratory Waterbirds – English South Coast SPAs**) and onwards of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that no or very few individuals of any species per annum would be subject to collision consequent mortality across all SPAs screened in for Rampion 2. Therefore, the loss of none or very few individuals of any species per annum represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for any waterbird species. There is, therefore, no adverse effect as a result of collision risk to these waterbird species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to any waterbird species. A finding of no AEOI is therefore concluded.
×f	**Collision risk on migration (NB) – In-combination – operation and maintenance**. For the assessment of all waterbird species alone for this designated site and its features, it was concluded that there would be there would be no effect or no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on these waterbird species and make no detectable contribution to an in-combination effect resulting from collision risk to these waterbird species at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

Cont . on next page (Part 2 of 3)

© WSP UK Limited

Matrix 17: Solent and Southampton Water SPA (cont.)

	Solent and Southampton Water (UK)SPA														
EU Code:	**UK9011061**														
Distance to Proposed Development	**30.9km from array, 36.8km to onshore cable route and 32.32 to offshore**														
Likely Effects of Proposed Development															
Effect	**Collision risk (migration)**			**Collision risk (breeding)**			**Barrier**			**Direct disturbance displacement**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Mediterranean gull *Ichthyaetus melanocephalus*															
Roseate tern *Sterna dougalli*															
Common tern *Sterna hirundo*															
Little tern *Sternula albifrons*															

End of Matrix 17 (Part 3 of 3)

© WSP UK Limited

19. Matrix 10 Solent and Southampton Water Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**Solent and Southampton Water (UK) Ramsar**						
EU Code:	**UK11063**						
Distance to Proposed Development	**30.8km from array, 36.7km to onshore cable route and 32.2km to offshore cable route**						
Likely Effects of Proposed Development							
Effect		**Collision risk (migration)**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Ringed plover *Charadrius hiaticula*			X a			X b	
Dark-bellied brent goose *Branta bernicla bernicla*			X a			X b	
Teal *Anas crecca*			X a			X b	
Black-tailed godwit *Limosa limosa*			X a			X b	
Waterbird assemblage - Wintering (species not listed in Ramsar criteria).			X a			X b	

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 11, supporting conclusions for (Solent and Southampton Water Ramsar

Matrix 18: Solent and Southampton Water Ramsar	
Waterbird species	
✕a	**Collison risk on migration (NB) - alone – operation and maintenance**. The collision risk to all waterbird species is assessed in **Section 7.5** (**paragraph 7.5.338**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that no or very few individuals of any species per annum would be subject to collision consequent mortality across all SPAs screened in for Rampion 2. Therefore, the loss of none or very few individuals of any species per annum represents a level of effect that would not be a detectable change to the overall annual natural baseline mortality rate for any waterbird species. There is, therefore, no adverse effect as a result of collision risk to these waterbird species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to any waterbird species. A finding of no AEOI is therefore concluded.
✕b	**Collision risk on migration (NB) – in-combination – operation and maintenance.** For the assessment of all waterbird species alone for this designated site and its features, it was concluded that there would be there would be no effect or no detectable change to baseline mortality as a result of Rampion 2, therefore no detectable change to any in-combination effect could occur also. Therefore, it can be concluded that Rampion 2 will have no adverse effect on these waterbird species and make no detectable contribution to an in-combination effect resulting from collision risk to these waterbird species at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 18

© WSP UK Limited

20. Matrix 11: Medway Estuary and Marshes SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Medway Estuary and Marshes (UK) SPA**							
EU Code:	**UK9012031**							
Distance to Proposed Development	**97.5km from array, 72.1km to onshore cable route and 102.2km to offshore cable route**							
Likely Effects of Proposed Development								
Effect				Collision risk (migration)			In-combination	
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**		
Common tern *Sterna hirundo*		X a			X b			
Shelduck *Tadorna tadorna*								
Northern pintail *Anas acuta*								
Avocet Recurvirostra avosetta								
Ringed plover *Charadrius hiaticula*								
Grey plover *Pluvialis squatarola*								

© WSP UK Limited

Matrix 19: Medway Estuary and Marsh

Common tern

✕a	**Common tern - collision risk on migration - Proposed Development alone – operation and maintenance**. The collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph "Migratory Terns – English South Coast SPAs and Ramsars**") of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is therefore concluded.
✕b	**Common tern – in-combination – operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

© WSP UK Limited

Matrix 19: Medway Estuary and Marsh (cont.)

Name of European site:	**Medway Estuary and Marshes (UK) SPA**						
EU Code:	**UK9012031**						
Distance to Proposed Development	**97.5km to Array**						
Likely Effects of Proposed Development							
Effect		**Collision risk (migration)**			**In-combination**		
Stage of Development		C	O	D	C	O	D
Red knot *Calidris canutus*							
Redshank *Tringa totanus*							
Little tern *Sternula albifrons*							
Dunlin Calidris *alpina alpina*							
Dark-bellied brent goose *Branta bernicla bernicla*							
Breeding bird assemblage: Including Oystercatcher *Haematopus ostralegus*, lapwing, Ringed plover *Charadrius hiaticula*, Redshank *Tringa 62etanus,* Shelduck *Tadorna tadorna*, mallard, teal, Shoveler *Spatula clypeata*, pochard, Common tern Sterna hirundo, Avocet *Recurvirostra avosetta,* mute swan, tufted duck and Gadwall *Mareca strepera*.							
Waterbird assemblage: Non-breeding: Including dark-bellied brent goose, Shelduck Tadorna tadorna, Wigeon Mareca 62etanus62, teal, Northern pintail Anas acuta, Ringed plover Charadrius hiaticula, grey plover, Red knot Calidris canutus, great crested grebe, Shoveler Spatula clypeata, Dunlin Calidris alpina alpina, black-tailed godwit Limosa limosa, Oystercatcher Haematopus ostralegus, Eurasian curlew Numenius arquata , Redshank Tringa 62etanus, greenshank and Ruddy turnstone Arenaria interpres.							

End of Matrix 19

© WSP UK Limited

21. Matrix 20: Littoral seino-marin Special Protection Area. HRA Integrity Matrix for Rampion 2

Name of European site:	**Littoral seino-marin (FR) SPA**					
EU Code:	**FR2310045**					
Distance to Proposed Development	**77.4km to Array**					
Likely Effects of Proposed Development						
Effect	Collision risk (breeding)			**In-combination**		
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**
Kittiwake *Rissa tridactyla*		Xa			Xc	
Lesser black-backed gull *Larus fuscus*		Xb			Xd	
Great black-backed gull *Larus marinus*						
Fulmar *Fulmarus glacialiscode*						

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 13, supporting conclusions for Littoral seino-marin SPA

Matrix 20: Littoral seino-marin (FR) SPA

Kittiwake

✗a	**Kittiwake – collision risk during breeding bio-season – operation and maintenance.** Collision risk to kittiwake is assessed in **Section 7.5** (**paragraph 7.5.129**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment**. It is predicted that approximately one (1.35) individual per annum would be subject to collision risk, of which 0.37 individuals per annum may be breeding adults associated with Littoral seino-marin SPA. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to kittiwake. A finding of no AEOI is therefore concluded.
✗b	**Kittiwake – in-combination – operation and maintenance.** For the assessment of kittiwake alone for this designated site, it was estimated that Rampion 2 will cause the mortality of 0.37 breeding adults, which will not be a detectable change to the natural baseline mortality for this species. Therefore, it can be concluded that Rampion 2 will cause no adverse effect to kittiwake and will make no detectable contribution to any in-combination effect to kittiwake at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

Lesser black-backed gull

✗c	**Lesser black-backed gull – collision risk during breeding bio-season – operation and maintenance**. Collision risk to lesser black-backed gulls is assessed in **Section 7.5** (**paragraph 7.5.135**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that under one (0.69) individual per annum would be subject to collision risk, of which 0.12 individuals per annum may be breeding adults associated with Littoral seino-marin SPA. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to lesser black-backed gull. A conclusion of no AEOI in concluded.
✗d	**Lesser black-backed gull - in-combination – operation and maintenance**. For the assessment of lesser black-backed gull alone for this designated site, it was estimated that Rampion 2 will cause the mortality of 0.12 breeding adults, which will not be a detectable change to the natural baseline mortality for this species. Therefore, it can be concluded that Rampion 2 will cause no adverse effect to lesser black-backed gull and will make no detectable contribution to any in-combination effect to lesser black-backed gull at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 20

© WSP UK Limited

22. Matrix 12: Foulness (Mid-Essex Coast Phase 5) SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Foulness (Mid-Essex Coast Phase 5) (UK) SPA**						
EU Code:	**UK9009246**						
Distance to Proposed Development	**116.2km to Array**						
Likely Effects of Proposed Development							
Effect		Collision risk (migration)			In-combination		
Stage of Development		C	O	D	C	O	D
Common tern *Sterna hirundo*			Xa			Xb	
Sandwich tern *Thalasseus sandvicensis*			Xc			Xd	
Avocet *Recurvirostra avosetta*							
Fulmar *Fulmarus glacialiscode*							

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 14, supporting conclusions for Foulness (Mid-Essex Coast Phase) SPA

Matrix 21: Foulness (Mid-Essex Coast Phase 5) SPA

Common tern	
×a	**Common tern - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in in **Section 7.5** (**paragraph 7.5.368**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is therefore concluded.
×b	**Common tern – in-combination – operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.
Sandwich tern	
×c	**Sandwich tern – collision risk on migration – Proposed Development alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **Section 7.5** (**paragraph 7.5.368**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.84) individual per annum (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.
×d	**Sandwich tern - in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 21

© WSP UK Limited

23. Matrix 13: Falaise du Bessin Occidental SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Falaise du Bessin Occidental (FR) SPA**					
EU Code:	**FR2510099**					
Distance to Proposed Development	**132.8km to Array**					
Likely Effects of Proposed Development						
Effect		**Collision risk (breeding)**			**In-combination**	
Stage of Development	C	O	D	C	O	D
Kittiwake *Rissa tridactyla*		Xa			Xb	
Fulmar *Fulmarus glacialis*						
Guillemot *Uria aalge*						
Lesser black-backed gull *Larus fuscus*						
Razorbill *Alca torda*						
Herring gull *Larus argentatus*						

© WSP UK Limited

Matrix 22: Falaise du Bessin Occidental SPA

Kittiwake

Xa **Kittiwake - Collision risk during breeding bio-season – operation and maintenance**. Collision risk to kittiwakes is assessed in **Section 7.5** (**paragraph 7.5.156**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that approximately one (1.35) individual would be subject to collision risk per annum in total as a result of Rampion 2, of which 0.35 individuals may be breeding adults associated with Falaise du Bessin Occidental SPA. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to kittiwake. A finding of no AEOI is therefore concluded.

Xb **Kittiwake - in-combination – operation and maintenance**. For the assessment of kittiwake alone for this designated site and feature, it was estimated that Rampion 2 will cause the mortality of 0.35 individuals, which will not be a detectable change to the natural baseline mortality for this species. Therefore, it can be concluded that Rampion 2 will cause no adverse effect to kittiwake and will make no detectable contribution to any in-combination effect to kittiwake at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

Cont. on next page

© WSP UK Limited

Matrix: 22 Falaise du Bessin Occidental SPA (cont.)

Name of European site:	**Falaise du Bessin Occidental (FR) Special Protection Area**					
EU Code:	**FR2510099**					
Distance to Proposed Development	**132.8km to Array**					
Likely Effects of Proposed Development						
Effect	**Collision risk (breeding)**			**In-combination**		
Stage of Development	C	O	D	C	O	D
Short-eared owl *Asio flammeus*						
Peregrine falcon *Falco peregrinus*						
Red-throated diver *Gavia stellata*						
Red-breasted merganser *Mergus serrator*						
Shag *Phalacrocorax aristotelis*						
Short-eared owl *Asio flammeus*						
Cormorant *Phalacrocorax carbo*						
Dartford Warbler *Curruca undata*						

End of Matrix 22

© WSP UK Limited

24. Matrix 14: Alderney West Coast and Burhou Islands Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**Alderney West Coast and Burhou Islands Ramsar**																
EU Code:	**UK22002**																
Distance to Proposed Development	**148.1km from Array**																
Likely Effects of Proposed Development																	
Effect	Collision risk **(breeding)**			Collision risk (migration)			**Direct disturbance displacement (breeding)**			**Direct disturbance displacement** (migration)			**In-combination**				
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D		
Northern gannet *Morus bassanus*		Xa			Xb			Xc			Xd			Xe			

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 16, supporting conclusions for Alderney West Coast and Burhou Islands Ramsar

Matrix 23: Alderney West Coast and Burhou Islands Ramsar

Northern gannet

✕a	**Northern gannet - collision risk during breeding season alone – operation and maintenance**. Collision risk to gannet is assessed in **Section 7.5** (**paragraph 7.5.224** onwards) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately three individuals per annum would be subject to collision risk in the breeding season, of which 1.1 individuals may be breeding adults associated with Alderney West Coast and Burhou Islands Ramsar. The population of the Ramsar site is 17,080 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,383 breeding adults. The addition of 1.1 adults therefore increases the mortality relative to the baseline mortality by 0.08%. This is a level of effect that would not be considered to be significant and not of a material contribution to the overall annual natural mortality rate for this species. A finding of no AEOI is therefore concluded.
✕b	**Northern gannet - collision risk during non-breeding season alone – operation and maintenance.** Collision risk to gannets is assessed in **Section 7.5** (**paragraph 7.5.224** onwards) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately two individuals would be subject to collision risk in the non-breeding seasons, of which less than one individual (0.05 birds) may be breeding adults associated with Alderney West Coast and Burhou Islands Ramsar. The population of the Ramsar site is 17,080 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,383 breeding adults. The addition of 0.05 adults therefore increases the mortality relative to the baseline mortality by 0.003%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to gannet during the non-breeding season and no adverse effect on the integrity of this designated site as a consequence of potential collision risk in the non-breeding season. A finding of no AEOI is concluded.
✕c	**Northern gannet - direct disturbance displacement during breeding season alone – operation and maintenance**. Displacement risk to gannet is assessed in **Section 7.5** (**paragraph 7.5.244** onwards**)** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of less than one individual per annum would be subject to mortality as a result of displacement in the breeding season, of which 0.22 – 0.30 individuals may be breeding adults associated with Alderney West Coast and Burhou Islands Ramsar. The population of the Ramsar site is 17,080 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,383 breeding adults. The addition of 0.22 – 0.30 adults therefore increases the mortality relative to the baseline mortality by 0.016 – 0.021%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to gannet. A finding of no AEOI is concluded.
✕d	**Northern gannet - direct disturbance displacement during non-breeding season alone – operation and maintenance**. Displacement risk to gannets is assessed in **Section 7.5** (**paragraph 7.5.244** onwards**)** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of less than two individuals per annum would be subject to mortality as a result of displacement in the migratory seasons, of which 0.04 – 0.05 individuals may be breeding adults associated with Alderney West Coast and Burhou Islands Ramsar. The population of the Ramsar site is 17,080 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,383 breeding adults. The addition of 0.04 – 0.05 adults therefore increases the mortality relative to the baseline by 0.003 – 0.004%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to gannet. A finding of no AEOI is concluded.

© WSP UK Limited

Evidence Supporting Conclusions (cont.)

Evidence for Integrity Matrix 17, supporting conclusions for Alderney West Coast and Burhou Islands Ramsar

	Matrix 23: Alderney West Coast and Burhou Islands Ramsar
Xe	**Northern gannet - in-combination – collision risk plus direct disturbance displacement during non-breeding season alone and in-combination – operation and maintenance**. The total annual mortality as a result of collision risk and displacement risk in the breeding season and non-breeding season of adult birds associated with Alderney West Coast and Burhou Islands Ramsar is 1.46 breeding adults. The population of the Ramsar site is 17,080 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,383 breeding adults. The addition of 1.46 breeding adults therefore increases the mortality relative to the baseline mortality by 0.106%. This is a level of effect that would not be considered to be significant and not a material contribution to the overall annual natural mortality rate for this species from Rampion 2 alone. A finding of no AEOI is concluded. When considered in-combination with other Offshore Wind Farms, the total annual mortality as a result of collision risk and displacement risk in the breeding season and non-breeding season of adult birds associated with Alderney West Coast and Burhou Islands Ramsar is approximately 19.09 adults. The population of the Ramsar site is 17,080 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,383 breeding adults. The addition of 19.09 adults therefore increases the mortality relative to the baseline by 1.38%. Therefore, additional Population Viability Analysis (PVA) was carried out to further characterise the potential impact. The results of the PVA indicated no significant impact on the gannet population over the lifetime of Rampion 2 (see **Section 8.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9)). Therefore, a finding of no AEOI is concluded.

End of Matrix 23

© WSP UK Limited

25. Matrix 15: Alde-Ore Estuary Special Protection Area. HRA Integrity Matrix for Rampion 2

Name of European site:	**Alde-Ore Estuary (UK) Special Protection Area**						
EU Code:	**UK9009112**						
Distance to Proposed Development	**188.1km to Array**						
Likely Effects of Proposed Development							
Effect		Collision risk (migration)			In-combination		
Stage of Development		O	O	D	C	O	D
Lesser black-backed gull *Larus fuscus*			Xa			Xb	
Sandwich tern *Thalasseus sandvicensis*			Xc			Xd	
Ruff *Calidris pugnax*							
Redshank *Tringa totanus*							
Avocet *Recurvirostra avosetta*							
Marsh harrier *Circus aeruginosus*							
Little tern *Sternula albifrons*							

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 18, supporting conclusions for Alde-Ore Estuary SPA

Lesser black-backed gull	
Xa	**Lesser black-backed gull - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all gull species during the migratory bio-seasons, including lesser black-backed gull, is assessed in **Section 7.5** (**paragraph 7.5.351** onwards) in the **Migratory Gulls – English South Coast SPAs and Ramsars section** of the Rampion 2 **HRA** It is predicted that zero adult bird apportioned to Alde-Ore Estuary SPA in the non-breeding bio-seasons would be subject to collision consequent mortality per annum. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to lesser black-backed gull. A finding of no AEOI is concluded.
Xb	**Lesser black-backed gull - collision risk - in-combination - operation and maintenance**. For the assessment of lesser black-backed gull alone for this designated site and feature, it was estimated that Rampion 2 will cause the mortality of zero individuals. Therefore, it can be concluded that Rampion 2 will cause no adverse effect to lesser black-backed gull and will make no detectable contribution to any in-combination effect to lesser black-backed gull at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.
Sandwich tern	
Xc	**Sandwich tern - collision risk on migration - alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **Section 7.6 (paragraph 7.5.368** onwards) in **the Migratory Terns – English South Coast SPAs and Ramsars section** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.84) individual per annum (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.
Xd	**Sandwich tern - in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 24

© WSP UK Limited

26. Matrix 16: Alde-Ore Estuary (UK) Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**Alde-Ore Estuary (UK) Ramsar**						
EU Code:	**UK11002**						
Distance to Proposed Development	**188.1km to Array**						
Likely Effects of Proposed Development							
Effect		Collision risk (migration)			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Lesser black-backed gull *Larus fuscus*			X[a]			X[b]	
Avocet Recurvirostra avosetta							
Redshank *Tringa totanus*							
Waterbird assemblage- Wintering (species not listed in Ramsar criteria)							
Wetland bird assemblage- Breeding (species not listed in Ramsar criteria)							

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 19, supporting conclusions for Alde-Ore Estuary (UK) Ramsar

Matrix 24: Alde-Ore Estuary (UK) Ramsar	
Lesser black-backed gull	
✕a	**Lesser black-backed gull - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all gull species during the migratory bio-seasons, including lesser black-backed gull, is assessed in **Section 7.5** (**paragraph 7.5.351** onwards) in the **Migratory Gulls – English South Coast SPAs and Ramsars section** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero adult bird apportioned to Alde-Ore Estuary Ramsar in the non-breeding bio-seasons would be subject to collision consequent mortality per annum. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to lesser black-backed gull. A finding of no AEOI is concluded.
✕b	**Lesser black-backed gull - collision risk - in-combination - operation and maintenance**. For the assessment of lesser black-backed gull alone for this designated site and feature, it was estimated that Rampion 2 will cause the mortality of zero individuals. Therefore, it can be concluded that Rampion 2 will cause no adverse effect to lesser black-backed gull and will make no detectable contribution to any in-combination effect to lesser black-backed gull at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 25

© WSP UK Limited

27. Matrix 17: The Wash SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**The Wash (UK) SPA**						
EU Code:	**UK9008021**						
Distance to Proposed Development	**229.9.km from Offshore cable corridor**						
Likely Effects of Proposed Development							
Effect		**Collision risk (migration)**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Common tern *Sterna hirundo*			Xa			Xb	
Pink-footed goose *Anser brachyrhynchus*							
Shelduck *Tadorna tadorna*							
Wigeon *Mareca penelope*							
Gadwall *Mareca strepera*							
Northern pintail *Anas acuta*							
Common scoter *Melanitta nigra*							

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 20, supporting conclusions for The Wash SPA

Matrix 26: The Wash (UK) SPA

Common tern	
✕a	**Common tern - collision risk on migration - alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph 7.5.368** onwards) in the **Migratory Terns – English South Coast SPAs and Ramsars** section of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is therefore concluded.
✕b	**Common tern - in-combination – collision –– operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

Cont. on next page

© WSP UK Limited

Matrix 26: The Wash SPA (cont.)

Name of European site:	The Wash (UK) SPA					
EU Code:	**UK9008021**					
Distance to Proposed Development	**229.9km from Offshore cable route**					
Likely Effects of Proposed Development						
Effect	**Collision risk (migration)**			**In-combination**		
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**
Grey plover *Pluvialis squatarola*;						
Red knot *Calidris canutus*						
Sanderling *Calidris alba*						
Bar-tailed godwit *Limosa lapponica*						
Eurasian curlew *Numenius arquata*						
Redshank *Tringa totanus*						
Ruddy turnstone *Arenaria interpres*						
Common Goldeneye *Bucephala clangula*						
Oystercatcher *Haematopus ostralegus*						

Cont. on next page

© WSP UK Limited

Matrix 26: The Wash SPA (cont.)

Name of European site:	**The Wash (UK) SPA**						
EU Code:	**UK9008021**						
Distance to Proposed Development	**229.9km from Offshore cable corridor**						
Likely Effects of Proposed Development							
Effect				**Collision risk (migration)**			**In-combination**
Bewick's swan *Cygnus columbianus bewicki*							
Little tern *Sternula albifrons*							
Black-tailed godwit *Limosa limosa*							
Dunlin Calidris *alpina alpina*							
Dark-bellied brent goose *Branta bernicla bernicla*							
Waterbird assemblage- Non-breeding: Including *Avocet Recurvirostra avosetta*, golden plover, lapwing, Ringed plover *Charadrius hiaticula*, black-tailed godwit *Limosa limosa*, Bar-tailed godwit *Limosa lapponica*, Oystercatcher *Haematopus ostralegus*, grey plover, Dunlin *Calidris alpina alpina*, Red knot *Calidris canutus*, Sanderling *Calidris alba*, Eurasian curlew *Numenius arquata* , whimbrel, Redshank Tringa totanus, Ruddy turnstone Arenaria interpres, little grebe, cormorant, whooper swan, white-fronted goose, pink-footed goose, dark-bellied brent goose, Shelduck *Tadorna tadorna*, Northern pintail *Anas acuta*, Wigeon *Mareca penelope*, teal, mallard, eider, *Common scoter Melanitta nigra*, black-headed gull, lesser black-headed gull, herring gull and great black-backed gull.							

End of Matrix 26

© WSP UK Limited

28. Matrix 18: Breydon Water SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Breydon Water (UK) SPA**						
EU Code:	**UK9009181**						
Distance to Proposed Development	**245km to Array**						
Likely Effects of Proposed Development							
Effect				**Collision risk (migration)**			**In-combination**
Stage of Development	C	O	D	C	O	D	
Common tern *Sterna hirundo*		X a			X b		
Avocet *Recurvirostra avosetta*							
Golden plover Pluvialis apricaria							
Lapwing Vanellus vanellus							
Ruff *Calidris pugnax*							
Bewick's swan Cygnus *columbianus bewickii*							
Waterbird assemblage: Non-breeding Including cormorant *Phalacrocorax carbo*, European white-fronted goose *Anser albifrons*, Wigeon *Mareca penelope*, Shoveler *Spatula clypeata*, black-tailed godwit *Limosa limosa*, Redshank *Tringa totanus* and snipe Gallinago gallinago.							

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 21, supporting conclusions for Breydon Water SPA

Matrix 27: Breydon Water (UK) SPA

Common tern

✕a	**Common tern - collision risk on migration - alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph 7.5.368** onwards) in the **Migratory Terns – English South Coast SPAs and Ramsars** section of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment**. Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is therefore concluded.
✕b	**Common tern - in-combination – collision — operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 27

© WSP UK Limited

29. Matrix 19: Greater Wash Special Protection Area (SPA). HRA Integrity Matrix for Rampion 2

Name of European site:	**Greater Wash (UK) SPA**						
EU Code:	**UK9020329**						
Distance to Proposed Development	**253.7 km from Array**						
Likely Effects of Proposed Development							
Effect		Collision risk (migration)			In-combination		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Common tern *Sterna hirundo*			×a			×b	
Sandwich tern *Thalasseus sandvicensis*			×c			×d	
Little gull *Hydrocoloeus minutus*							
Red-throated diver *Gavia stellata*							
Common scoter *Melanitta nigra*							
Little tern *Sternula albifrons*							
Common tern *Sterna hirundo*							

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 22, supporting conclusions for Greater Wash SPA

Matrix 28: Greater Wash (UK) SPA

Common tern

×a **Common tern - collision risk on migration - alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph 7.5.368** onwards) in the **Migratory Terns – English South Coast SPAs and Ramsars** section of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is therefore concluded.

×b **Common tern - in-combination – collision — operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

Sandwich tern

×c **Sandwich tern - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **Section 7.5** (**paragraph 7.5.368**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.84) individual per annum (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.

×d **Sandwich tern - in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 28

© WSP UK Limited

30. Matrix 20 North Norfolk Coast Special Protection Area. HRA Integrity Matrix for Rampion 2

Name of European site:	**North Norfolk Coast (UK) SPA**						
EU Code:	**UK9009031**						
Distance to Proposed Development	**260.7 km from Array**						
Likely Effects of Proposed Development							
Effect				Collision risk (migration)			**In-combination**
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Common tern *Sterna hirundo*			×a			×b	
Sandwich tern *Thalasseus sandvicensis*			×c			×d	
Eurasian Wigeon *Mareca penelope*							
Marsh harrier *Circus aeruginosus*							
Avocet *Recurvirostra avosetta*							
Knot *Calidris canutus*							
Bittern Botaurus stellaris							
Pink-footed goose *85nswer brachyrhynchus*							
Little tern *Sternula albifrons*							
Dark-bellied brent goose *Branta bernicla bernicla*							
Montagu's harrier *Circus pygargus*							
Waterbird assemblage – Non-breeding: Including pink-footed goose *85nswer brachyrhynchus*, dark-bellied brent goose *Brant bernicla bernicla,* wigeon *Mareca 85nswer85e*, knot *Calidris canutus*, white-fronted goose *85nswer albifrons*, shelduck *Tadorna tadorna*, pintail *Anas acuta*, oystercatcher *Haematopus ostralegus*, Ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola* and redshank *Tringa tetanus*.							

Cont. on next page

© WSP UK Limited

Matrix 29: North Norfolk Coast SPA (cont.)

Evidence Supporting Conclusions

Evidence for Integrity Matrix 29, supporting conclusions for Greater Wash SPA

Matrix 29: North Norfolk Coast SPA	
Common tern	
✕a	**Common tern – collision risk on migration – alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph 7.5.368** onwards) in the **Migratory Terns – English South Coast SPAs and Ramsars** section of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is therefore concluded.
✕b	**Common tern - in-combination – collision — operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.
Sandwich tern	
✕c	**Sandwich tern - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **Section 7.5** (**paragraph 7.5.368**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR stage it was predicted that under one (0.84) individual per annum (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.
✕d	**Sandwich tern - in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 29

© WSP UK Limited

31. Matrix 30 North Norfolk Coast Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**North Norfolk Coast (UK) Ramsar**
EU Code:	**UK11048**
Distance to Proposed Development	**260.7 km from Array**
Likely Effects of Proposed Development	

Effect	**Collision risk (migration)**			**In-combination**		
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**
Common tern *Sterna hirundo*		×a			×b	
Sandwich tern *Thalasseus sandvicensis*		×c			×d	
Eurasian Wigeon *Mareca penelope*						
Pintail *Anas acuta*						
Red knot *Calidris canutus*						
Pink-footed goose *Anser brachyrhynchus*						
Little tern *Sternula albifrons*						
Dark-bellied brent goose *Branta bernicla*						
Waterbird assemblage - Wintering (species not listed in Ramsar criteria)						

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 23, supporting conclusions for North Norfolk Coast Ramsar

Matrix 30: North Norfolk Coast Ramsar

Common tern

✕a	**Common tern - collision risk on migration - alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph 7.5.368** onwards) in the **Migratory Terns – English South Coast SPAs and Ramsars** section of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** (RED, 2021). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of no AEOI is therefore concluded.
✕b	**Common tern - in-combination – collision –– operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

Sandwich tern

✕c	**Sandwich tern - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **Section 7.5** (**paragraph 7.5.368**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.84) individual per annum (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.
✕d	**Sandwich tern - in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.

End of Matrix 30

© WSP UK Limited

32. Matrix 21: Côte de Granit Rose-Sept Iles SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Côte de Granit Rose-Sept Iles (FR) SPA**
EU Code:	**FR5310011**
Distance to Proposed Development	**259.3km to array**
Likely Effects of Proposed Development	

Effect	**Collision risk (breeding)**			**Collision risk Non-breeding**			**Direct disturbance displacement (breeding)**			**Direct disturbance displacement (Non-breeding)**			**In-combination**		
Stage of Development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Northern gannet *Morus bassanus*		X[a]			X[b]			X[c]			X[d]			X[e]	
Manx shearwater *Puffinus puffinus*															
Fulmar *Fulmarus glacialis*															
European storm petrel *Hydrobates pelagicus*															

© WSP UK Limited

Matrix 31: Côte de Granit Rose-Sept Iles SPA

Northern gannet

✗a **Northern gannet - collision risk during breeding season alone – operation and maintenance.** Collision risk to gannets is assessed in **paragraph 7.5.208** onwards of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately three individuals per annum would be subject to collision risk in the breeding season, of which 0.69 may be breeding adults associated with Côte de Granit Rose-Sept Iles SPA. The population of the SPA is 39,052 breeding adults and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 3,163 breeding adults. The addition of 0.69 adults therefore increases the mortality relative to the baseline mortality by 0.02%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to gannet. A finding of no AEOI is concluded.

✗b **Northern gannet - collision risk during non-breeding season - alone – operation and maintenance.** Collision risk to gannets is assessed in **paragraph 7.5.208** onwards of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately two individuals per annum would be subject to collision risk in the non-breeding seasons, of which 0.11 individuals may be breeding adults associated with Côte de Granit Rose-Sept Iles SPA. The population of the SPA is 39,052 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 3,163 breeding adults. The addition of 0.11 adults therefore increases the mortality relative to the baseline by 0.003%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to gannet. A finding of no AEOI is concluded.

✗c **Northern gannet - direct disturbance displacement during breeding season - Proposed Development alone – operation and maintenance**. The displacement risk to gannets is assessed in **paragraph 7.5.219** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of less than one individual per annum would be subject to mortality as a result of displacement in the breeding season, of which 0.14 – 0.19 individuals may be breeding adults associated with Côte de Granit Rose-Sept Iles SPA. The population of the SPA is 39,052 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 3,163 breeding adults. The addition of 0.14 – 0.19 adults therefore increases the mortality relative to the baseline by 0.005 – 0.006%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to gannet. A finding of no AEOI is concluded.

✗d **Northern gannet - direct disturbance displacement during non-breeding season - alone – operation and maintenance** The displacement risk to gannets is assessed in **paragraph 7.5.219** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately one individual per annum would be subject to mortality as a result of displacement in the non-breeding seasons, of which 0.09 – 0.012 individuals may be breeding adults associated with Côte de Granit Rose-Sept Iles SPA. The population of the SPA is 39,052 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 3,163 breeding adults. The addition of 0.09 – 0.012 mortalities therefore increases the mortality relative to the baseline by 0.003 – 0.004%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to gannet. A finding of no AEOI is concluded.

✗e **Northern gannet - in-combination – operation and maintenance.** For the assessment of gannet alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of either displacement or collision risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to gannet at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is concluded.

Cont. on next page

© WSP UK Limited

Matrix: 31 - Côte de Granit Rose-Sept Iles SPA (cont.)

Name of European site:	**Côte de Granit Rose-Sept Iles (FR) SPA**									
EU Code:	**FR5310011**									
Distance to Proposed Development	**259.3 km to Array**									
Likely Effects of Proposed Development										
Effect	**Collision risk (breeding)**			**Direct disturbance displacement (breeding)**			**In-combination**			
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**
Razorbill *Alca torda*									
Brent goose *Branta bernicla*									
Purple sandpiper *Calidris maritima*									
Ringed plover *Charadrius hiaticula*									
Puffin *Fratercula arctica*									
Oystercatcher H*aematopus ostralegus* ·									
Herring gull *Larus Argentatus*									
Common gull *Larus canus*									
Lesser black-backed gull *Larus Fuscus*									
Great black-backed gull *Larus marinus*									
Mediterranean gull Ichthyaetus melanocephalus									

Cont. on next page

© WSP UK Limited

Matrix: 31 Côte de Granit Rose-Sept Iles SPA (cont.)

Name of European site:	**Côte de Granit Rose-Sept Iles (FR) SPA**								
EU Code:	**FR5310011**								
Distance to Proposed Development	**259.3km to Array**								
Likely Effects of Proposed Development									
Effect	**Collision risk (breeding)**			**Direct disturbance displacement (breeding)**			**In-combination**		
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**
Red-breasted merganser *Mergus serrator*									
Common shag *Phalacrocorax aristotelis*									
Slavonian grebe Podiceps auritus ·									
Great-crested grebe *Podiceps cristatus*									
Balearic shearwater *Puffinus mauretanicus*									
Kittiwake *Rissa tridactyla*									
Little tern *Sternula albifrons*									
Roseate tern *Sterna dougallii*									
Common tern *Sterna hirundo*									
Sandwich tern *Thalasseus sandvicensis*									
Shelduck *Tadorna tadorna*									
Guillemot *Uria aalge*									

End of Matrix 31

© WSP UK Limited

33. Matrix 22: Grassholm Special Protection Area (SPA). HRA Integrity Matrix for Rampion 2

Name of European site:	**Grassholm (UK) SPA**									
EU Code:	**UK9014041**									
Distance to Proposed Development	**357.7km from array**									
Likely Effects of Proposed Development										
Effect		Collision risk (Non-breeding)			**Direct disturbance displacement (non-breeding)**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**
Northern gannet *Morus bassanus*			×a			×b			×c	

© WSP UK Limited

Matrix 32: Grassholm (UK) SPA

Northern Gannet	
×a	**Northern gannet - collision risk during non-breeding season alone – operation and maintenance**. Collision risk to gannets is assessed in **paragraph 7.6.339** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately one individual per annum would be subject to collision risk in the non-breeding seasons, of which zero individuals may be breeding adults associated with Grassholm SPA. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to gannet. A finding of no AEOI is concluded.
×b	**Northern gannet - direct disturbance displacement during non-breeding season - alone – operation and maintenance**. The displacement risk to gannets is assessed in **paragraph 7.6.345** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately two individuals per annum would be subject to mortality as a result of displacement in the non-breeding season, of which zero individuals may be breeding adults associated with Grassholm SPA. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to gannet. A finding of no AEOI is concluded.
×c	**Northern gannet - In-combination – operation and maintenance**. For the assessment of gannet alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of either displacement or collision risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to gannet at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is concluded.

End of Matrix 32

© WSP UK Limited

34. Matrix 23: Flamborough and Filey Coast SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Flamborough and Filey Coast (UK) SPA**												
EU Code:	**UK9006101**												
Distance to Proposed Development	**378.4 km from Array**												
Likely Effects of Proposed Development													
Effect	**Collision risk (migration)**			**Direct disturbance displacement (non-breeding season)**			**Direct disturbance displacement (breeding season)**			**In-combination**			
Stage of Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	
Gannet *Morus bassanus* (Feature and component of seabird assemblage)		✕a			✕b						✕c		
Guillemot (designated Feature and component of seabird assemblage)				✕d	✕e	✕f				✕g	✕h	✕i	
Razorbill (designated Feature and component of seabird assemblage)				✕j	✕k	✕l				✕m	✕n	✕o	
Kittiwake (designated Feature and component of seabird assemblage)		✕p									✕q		
Herring gull (component of seabird assemblage only)		✕r									✕s		
Fulmar (Component of seabird assemblage only)													
Shag (component of seabird assemblage only)													
Cormorant (component of seabird assemblage only)													
Puffin (component of seabird assemblage only)													
Breeding seabird assemblage feature		✕t									✕u		

Cont. on next page

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 26, supporting conclusions for Flamborough and Filey Coast SPA

Matrix 33: Flamborough and Filey Coast SPA

Northern gannet	
×a	**Northern gannet - collision risk during non-breeding season - alone – operation and maintenance.** Collision risk to gannet is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately two individuals would be subject to collision risk in the non-breeding seasons, of which 0.04 individuals may be breeding adults associated with Flamborough and Filey Coast SPA. The population of the SPA is 16,938 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,372. The addition of 0.04 individuals therefore increases the mortality relative to the baseline by 0.003%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to gannet. Therefore, a finding of **no AEOI** tis appropriate.
×b	**Northern gannet - Direct disturbance displacement during non-breeding season - alone – operation and maintenance**. The displacement risk to gannets is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately two individual would be subject to mortality as a result of displacement in the non-breeding seasons, of which 0.03 – 0.04 individuals may be breeding adults associated with Flamborough and Filey Coast SPA. The population of the SPA is 16,938 breeding adults, and the baseline mortality rate is 0.081 per annum. The baseline mortality for this site is therefore 1,372. The addition of 0.03 – 0.04 individuals therefore increases the mortality relative to the baseline by 0.002 – 0.003%. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to gannet. Therefore, a finding of **no AEOI** is appropriate.
×c	**Northern gannet - In-combination – operation and maintenance.** For the assessment of gannet alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of either displacement or collision risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to gannet at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.
Guillemot	
×d	**Guillemot - Direct disturbance displacement during non-breeding season – alone – Construction**. The risk from disturbance and displacement during construction is recognised as being lower than that during operation, due to the spatially and temporally restricted nature of the works. As no adverse effect to the species is expected during the operation phase, it follows that no adverse effect to the species and therefore **no AEOI** to this feature of the designated site is expected during the construction phase. Therefore, a finding of **no AEOI** is appropriate.
×e	**Guillemot - Direct disturbance displacement during non-breeding season – alone – operation and maintenance**. The displacement risk to auks (including guillemots) is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately 29 individuals would be subject to mortality as a result of displacement in the non-breeding seasons, of which 1.26 individuals may be breeding adults associated with Flamborough and Filey Coast SPA. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to guillemot. Therefore, a finding of **no AEOI** is appropriate.
×f	**Guillemot - Direct disturbance displacement during non-breeding season – alone – decommissioning**. Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of **no AEOI** is appropriate.

Cont on next page

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 27, supporting conclusions for Flamborough and Filey Coast SPA

Matrix 33: Flamborough and Filey Coast SPA	
×g	**Guillemot - Direct disturbance displacement during non-breeding season – in-combination – construction** For the assessment of guillemot alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of displacement risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will cause no detectable adverse effect on this species and make no contribution to an in-combination effect to guillemot at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.
×h	**Guillemot - Direct disturbance displacement during non-breeding season – in-combination – operation and maintenance**. For the assessment of guillemot alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of displacement risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will cause no detectable adverse effect on this species and make no contribution to an in-combination effect to guillemot at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.
×i	**Guillemot - Direct disturbance displacement during non-breeding season – in-combination – decommissioning**. For the assessment of guillemot alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of displacement risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will cause no detectable adverse effect on this species and make no contribution to an in-combination effect to guillemot at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.
Razorbill	
×j	**Razorbill - Direct disturbance displacement during non-breeding season - alone – construction**. The risk from disturbance and displacement during construction is recognised as being lower than that during operation, due to the spatially and temporally restricted nature of the works. As no AEOI is expected during the operation phase, it follows that no AEOI is expected during the construction phase.
×k	**Razorbill - Direct disturbance displacement during non-breeding season - alone – operation and maintenance.** The displacement risk to auks (including razorbills) is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately 38 individuals would be subject to mortality as a result of displacement in the non-breeding seasons, of which 1.23 individuals may be breeding adults associated with Flamborough and Filey Coast SPA. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to razorbill.
×l	**Razorbill - Direct disturbance displacement during non-breeding season – alone – decommissioning**. Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of **no AEOI** is appropriate.
×m	**Razorbill - Direct disturbance displacement during non-breeding season – in-combination – construction**. For the assessment of razorbill alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of displacement risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will cause no detectable adverse effect on this species and make no contribution to an in-combination effect to razorbill at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.
×n	**Razorbill - Direct disturbance displacement during non-breeding season – in-combination – operation and maintenance.** For the assessment of razorbill alone for this designated site and feature, it was concluded that there would be no adverse effect to this species as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will cause no detectable adverse effect on this species and make no contribution to an in-combination effect to razorbill at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.
×o	**Razorbill - Direct disturbance displacement during non-breeding season – in-combination – decommissioning**. For the assessment of razorbill alone for this designated site, it was concluded that the magnitude of change would be so low as to cause be no detectable increase to the overall annual baseline natural mortality to this species as a result of displacement risk from Rampion 2. Therefore, it can be concluded that Rampion 2 will cause no detectable adverse effect on this species and make no contribution to an in-combination effect to razorbill at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.

Cont on next page

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 28, supporting conclusions for Flamborough and Filey Coast SPA

Matrix 33: Flamborough and Filey Coast SPA	
Kittiwake	
×p	**Kittiwake–collision risk during non-breeding season - alone - operation and maintenance**. The collision risk to all gull species during the migratory bio-seasons, including kittiwake, is assessed in **Section 7.5** of the Rampion 2 HRA: Report to Inform Appropriate Assessment. It is predicted that under one (0.72) adult bird apportioned to Flamborough and Filey Coast SPA in the non-breeding bio-seasons would be subject to collision consequent mortality, which is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to kittiwake.
×q	**Kittiwake collision risk during non-breeding season - in-combination – operation and maintenance**. For the assessment of kittiwake alone for this designated site and feature, it was estimated that Rampion 2 will cause the mortality of 0.72 individuals, which will not be a detectable change to the natural baseline mortality for this species. Therefore, it can be concluded that Rampion 2 will cause no adverse effect to kittiwake and will make no detectable contribution to any in-combination effect to kittiwake at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of no AEOI is therefore concluded.
Herring gull	
×r	**Herring gull –collision risk during non-breeding season - – alone – operation and maintenance**. The collision risk to all gull species during the migratory bio-seasons, including herring gull, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that under one (0.02) adult bird apportioned to Flamborough and Filey Coast SPA in the non-breeding bio-seasons would be subject to collision consequent mortality, which is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to herring gull.
×s	**Herring gull collision risk during non-breeding season - – In-combination – operation and maintenance**. For the assessment of herring gull alone for this designated site and feature, it was estimated that Rampion 2 will cause the mortality of 0.02 individuals, which will not be a detectable change to the natural baseline mortality for this species. Therefore, it can be concluded that Rampion 2 will cause no adverse effect to herring gull and will make no detectable contribution to any in-combination effect to kittiwake at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.
Seabird Assemblage	
×t	**Seabird assemblage – alone – operation and maintenance**. The seabird assemblage comprises Northern gannet, fulmar, kittiwake, guillemot, razorbill, puffin, herring gull, shag and cormorant. Five of these species have been assessed as individual named features (gannet, kittiwake, guillemot, and razorbill) or named species within the assemblage (herring gull) as discussed above and it was found that Rampion 2 would lead to no detectable increase to baseline natural mortality. The components not individually assessed were screened out through the screening process due to very low connectivity or very low vulnerability to impacts. The impacts on components screened out for individual assessment are accordingly expected to be significantly lower than for those components screened in and therefore no detectable increase to natural baseline mortality is expected for any component. Therefore, on the basis that there are not considered to be any risks of adverse effects to the individual components of the seabird assemblage feature it can be concluded that there will be **no AEOI** on the seabird assemblage feature itself.
×u	**Seabird Assemblage – in-combination – operation and maintenance**. For the assessment of the seabird assemblage alone for this designated site, it was concluded that there would be no detectable increase in baseline mortality for any species and so no adverse effect as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to any in-combination effect to the seabird assemblage at this designated site and so not be the cause of any potential adverse effect on the integrity of this feature or designated site. A finding of **no** AEOI is therefore concluded.

End of Matrix 33

© WSP UK Limited

35. Matrix 24: Northumbria Coast Special Protection Area. HRA Integrity Matrix for Rampion 2

Name of European site:	**Northumbria Coast (UK) SPA**						
EU Code:	**UK9006131**						
Distance to Proposed Development	**453.8km from Array**						
Likely Effects of Proposed Development							
Effect		**Collision risk (migration)**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Artic tern *Sterna paradisaea*			**xa**			×**b**	

© WSP UK Limited

Evidence Supporting Conclusions (cont.)

Evidence for Integrity Matrix 29 for Northumbria Coast SPA

Matrix 34: Northumbria Coast (UK) SPA

Artic tern

×a	**Artic tern - Collision risk during non-breeding season – alone – operation and maintenance**. The collision risk to all tern species during the migratory bio-seasons, including Arctic tern, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of Arctic tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the four designated sites screened in for Arctic tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Arctic tern. A finding of **no AEOI** is therefore concluded.
×b	**Artic tern - Collision risk during non-breeding season – in-combination– operation and maintenance** For the assessment of Arctic tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Arctic tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.

End of Matrix 34

© WSP UK Limited

36. Matrix 25: Northumbria Coast Ramsar. HRA Integrity Matrix for Rampion 2

Name of European site:	**Northumbria Coast (UK) Ramsar**						
EU Code:	**UK11049**						
Distance to Proposed Development	**439.7km from Offshore cable corridor**						
Likely Effects of Proposed Development							
Effect		**Collision risk (migration)**			**In-combination**		
Stage of Development		**C**	**O**	**D**	**C**	**O**	**D**
Artic tern *Sterna paradisaea*			×a			×b	
Turnstone							
Purple sandpiper							
Little tern							

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 30, for Northumbria Coast Ramsar

Matrix 35: Northumbria Coast Ramsar

Artic tern

✕a	**Artic tern - Collision risk during non-breeding season – alone – operation and maintenance**. The collision risk to all tern species during the migratory bio-seasons, including Arctic tern, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed array area and the absence of Arctic tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the four designated sites screened in for Arctic tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Arctic tern. A finding of **no AEOI** is therefore concluded.
✕b	**Artic tern - Collision risk during non-breeding season – in-combination– operation and maintenance** For the assessment of Arctic tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Arctic tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.

End of Matrix 35

© WSP UK Limited

37. Matrix 26: Coquet Island SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Coquet Island (UK) SPA**					
EU Code:	**UK9006031**					
Distance to Proposed Development	**522.9 km from Array**					
Likely Effects of Proposed Development						
Effect	**Collision risk (migration)**			**In-combination**		
Stage of Development	C	O	D	C	O	D
Sandwich tern *Thalasseus sandvicensis* (designated feature and component of seabird assemblage)		×a			×b	
Artic tern *Sterna paradisaea* (designated feature and component of seabird assemblage)		×c			×d	
Common tern *Sterna hirundo* (designated feature and component of seabird assemblage)		×e			×f	
Herring gull *Larus argentatus* (component of seabird assemblage only)		×g			×h	
Lesser black-backed gull Larus fuscus (component of seabird assemblage only)		×i			×j	
Kittiwake *Rissa tridactyla (component of seabird assemblage only)*		×k			×l	
Roseate tern *Sterna dougallii (designated feature and component of seabird assemblage)*						
Puffin *Fratercula arctica* (component of seabird assemblage only)						
Black-headed gull *Chroicocephalus ridibundus* (component of seabird assemblage only)						
Fulmar *Fulmarus glacialiscode (*component of seabird assemblage only)						
Internationally important seabird assemblage of over 20,000 individuals Including the 4 qualifying species listed above plus: Atlantic puffin *Fratercula arctica* and black-headed gull *Chroicocephalus ridibundus* as main components.		×m			×n	

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 31, supporting conclusions for Coquet Island SPA

Matrix 36: Coquet Island SPA	
Xa	**Sandwich tern - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **Section 7.5** (**paragraph 7.5.368**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.84) individual per annum (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.–
Xb	**Sandwich tern – in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.–
Xc	**Artic tern – Collision risk during non-breeding season – alone – operation and maintenance**. The collision risk to all tern species during the migratory bio-seasons, including Arctic tern, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of Arctic tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the four designated sites screened in for Arctic tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Arctic tern. A finding of **no AEOI** is therefore concluded.
Xd	**Artic tern - Collision risk during non-breeding season – in-combination– operation and maintenance** For the assessment of Arctic tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Arctic tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.
Xe	**Common tern - collision risk on migration - alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph 7.5.368** onwards) in the **Migratory Terns – English South Coast SPAs and Ramsars** section of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of **no AEOI** is therefore concluded.–
Xf	**Common tern – in-combination – collision –– operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.–

Cont. on next page

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 36, supporting conclusions for Coquet Island SPA

Matrix 35: Coquet Island SPA	
×g	**Herring gull – collision risk during non-breeding season – alone – operation and maintenance.** The collision risk to all gull species during the migratory bio-seasons, including herring gull, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that zero adult birds subject to collision consequent mortality would be apportioned to Coquet Island SPA in the non-breeding bio-seasons. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to herring gull.
×h	**Herring gull - collision risk during non-breeding season – in-combination– operation and maintenance.** For the assessment of herring gull alone for this designated site and feature, it was concluded that there would be no adverse effect to this species as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to herring gull at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site.
×i	**Lesser black-backed gull- - Collision risk during non-breeding season – alone – operation and maintenance.** The collision risk to all gull species during the migratory bio-seasons, including lesser black-backed gull, is assessed in **Section 7.5** of the Rampion 2 HRA: Report to Inform Appropriate Assessment. It is predicted that zero adult birds subject to collision consequent mortality would be apportioned to Coquet Island SPA in the non-breeding bio-seasons. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to lesser black-backed gull.
×j	**Lesser black-backed gull- - Collision risk during non-breeding season – in-combination– operation and maintenance.** For the assessment of lesser black-backed gull alone for this designated site and feature, it was concluded that there would be no adverse effect to this species as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to lesser black-backed gull at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site.
×k	**Kittiwake - collision risk during non-breeding season – alone – operation and maintenance.** The collision risk to all gull species during the migratory bio-seasons, including kittiwake, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that under one (0.01) adult bird apportioned to Coquet Island SPA in the non-breeding bio-seasons would be subject to collision consequent mortality, which is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to kittiwake.
×l	**Kittiwake - collision risk during non-breeding season – in-combination– operation and maintenance.** For the assessment of kittiwake alone for this designated site and feature, it was concluded that there would be no adverse effect to this species as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to kittiwake at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site.
×m	**Seabird Assemblage – alone – operation and maintenance.** The main features of the seabird assemblage are Sandwich tern, Arctic tern, common tern, roseate tern, Atlantic puffin and black-headed gull. Of these, Sandwich tern, Arctic tern and common tern have been individually assessed above and it was found that Rampion 2 would lead to no detectable increase to baseline natural mortality. The components not individually assessed were screened out through the screening process due to very low connectivity or very low vulnerability to impacts. The impacts on components screened out for individual assessment are accordingly expected to be significantly lower than for those components screened in and therefore no detectable increase to natural baseline mortality is expected for any component. Therefore, on the basis that there are not considered to be any risks of adverse effects to the individual components of the seabird assemblage feature it can be concluded that there will be **no AEOI** on the seabird assemblage feature itself.
×n	**Seabird Assemblage – in-combination– operation and maintenance.** For the assessment of the seabird assemblage alone for this designated site, it was concluded that there would be no adverse effect to this feature as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to the seabird assemblage at this designated site and so not be the cause of any potential adverse effect on the integrity of this feautre or designated site.

End of Matrix 36

© WSP UK Limited

38. Matrix 27: Farne Islands SPA. HRA Integrity Matrix for Rampion 2

Name of European site:	**Farne Islands (UK) SPA**
EU Code:	**UK9006021**
Distance to Proposed Development	**555.0 km from Array**
Likely Effects of Proposed Development	

Effect	Collision risk (Migration)			Direct disturbance displacement (Migration)			In-combination		
Stage of Development	C	O	D	C	O	D	C	O	D
Sandwich tern *Thalasseus sandvicensis* (designated feature and component of seabird assemblage)		Xa						Xb	
Black-legged kittiwake *Rissa tridactyla (component of seabird assemblage only)*		Xc						Xd	
Guillemot *Uria aalge* (designated feature and component of seabird assemblage)				Xe	Xf	Xg	Xh	Xi	Xj
Common tern *Sterna hirundo* (designated feature and component of seabird assemblage)		Xk						Xl	
Artic tern *Sterna paradisaea* (designated feature and component of seabird assemblage)		Xm						Xn	
Common shag *Phalacrocorax aristotelis* (component of seabird assemblage only)									
Cormorant *Phalacrocorax carbo* (component of seabird assemblage only)									
Puffin *Fratercula arctica* (component of seabird assemblage only)									
Roseate tern *Sterna dougallii (designated feature and component of seabird assemblage)*									
Internationally important seabird assemblage of over 20,000 individuals Common tern *Sterna hirundo*, Arctic tern *Sterna paradisaea*, Roseate tern *Sterna dougallii*,, Sandwich tern *Sterna sandvicensis*, Common guillemot U*ria aalge,*. Also, Atlantic puffin *Fratercula arctica*, great cormorant Phalacrocorax carbo, European shag *Phalacrocorax aristotelis* and Black-legged kittiwake *Rissa tridactyla* as main components of the assemblage (Natural England, 2015)							Xo	Xp	Xq

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 37, supporting conclusions for **Farne Islands SPA**

Matrix 37: Farne Islands	
×a	**Sandwich tern - collision risk on migration - Proposed Development alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including Sandwich tern, is assessed in **Section 7.5** (**paragraph 7.5.368**) of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 20210 it was predicted that under one (0.84) individual per annum (with a range of between 0.14 and 4.94 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of Sandwich tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the seven designated sites screened in for Sandwich tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Sandwich tern. A finding of no AEOI is therefore concluded.
×b	**Sandwich tern – in-combination – operation and maintenance**. For the assessment of Sandwich tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Sandwich tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.
×c	**Kittiwake – collision risk during non-breeding season – alone – operation and maintenance.** The collision risk to all gull species during the migratory bio-seasons, including kittiwake, is assessed in **Section 7.6** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that under one (0.18) adult bird apportioned to Farne Islands SPA in the non-breeding bio-seasons would be subject to collision consequent mortality, which is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to kittiwake.
×d	**Kittiwake – collision risk during non-breeding season – in-combination – operation and maintenance.** For the assessment of kittiwake alone for this designated site and feature, it was estimated that Rampion 2 would lead to the mortality of under one (0.05) adult birds attributable to this SPA. This represents a magnitude of change which would cause no detectable increase to the natural baseline mortality and therefore Rampion 2 will cause no detectable adverse effect on this species at this site. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to kittiwake at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site.
×e	**Guillemot – direct disturbance displacement during non-breeding season – alone – Construction.** The risk from disturbance and displacement during construction is recognised as being lower than that during operation, due to the spatially and temporally restricted nature of the works. As no AEOI is expected during the operation phase, it follows that **no AEOI** is expected during the construction phase.
×f	**Guillemot –direct disturbance displacement during non-breeding season – In-combination – operation and maintenance.** The displacement risk to auks (including guillemots) is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). It is predicted that a total of approximately 1.07 breeding adults associated with the Farne Islands SPA would be subject to mortality as a result of displacement in the non-breeding seasons. This is a level of effect that would not be considered to be significant and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of displacement risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential displacement risk to guillemot.
×g	**Guillemot – direct disturbance displacement during non-breeding season – alone – decommissioning.** Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, a finding of **no AEOI** is appropriate.

Cont. on next page

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 37, supporting conclusions for **Farne Islands SPA**

Matrix 37: Farne Islands	
×h	**Guillemot – direct disturbance displacement during non-breeding season – in-combination – construction** The risk from disturbance and displacement during construction is recognised as being lower than that during operation, due to the spatially and temporally restricted nature of the works. It is predicted that Rampion 2 will lead to no detectable adverse effect and cause no contribution to any in-combination effect in the operational phase. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to guillemot at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site in the construction phase. Therefore, a finding of **no AEOI** is appropriate.
×i	**Guillemot – direct disturbance displacement during non-breeding season – in-combination – operation and maintenance.** For the assessment of guillemot alone for this designated site and feature, it was estimated that Rampion 2 would lead to the mortality of 1.07 adult birds attributable to this SPA. This represents a magnitude of change which would cause no detectable increase to the natural baseline mortality and therefore Rampion 2 will cause no detectable adverse effect on this species at this site. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to guillemot at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. Therefore, a finding of **no AEOI** is appropriate.
×j	**Guillemot – direct disturbance displacement during non-breeding season – in-combination – decommissioning.** The risk from disturbance and displacement during decommissioning is recognised as being the same as or lower than that during construction. It is predicted that Rampion 2 will lead to no detectable adverse effect and cause no contribution to any in-combination effect in the construction phase. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to guillemot at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site in the decommissioning phase. Therefore, a finding of **no AEOI** is appropriate.
×k	**Common tern - collision risk on migration - alone – operation and maintenance.** Collision risk to all tern species during the migratory bio-seasons, including common tern, is assessed in **Section 7.5** (**paragraph 7.5.368** onwards) in the **Migratory Terns – English South Coast SPAs and Ramsars** section of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual per annum (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of common tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the 12 designated sites screened in for common tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is, therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to common tern. A finding of **no AEOI** is therefore concluded.
×l	**Common tern - in-combination – collision –– operation and maintenance**. For the assessment of common tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to common tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.

Cont. on next page

© WSP UK Limited

Evidence Supporting Conclusions

Evidence for Integrity Matrix 32, supporting conclusions for **Farne Islands SPA**

Matrix 37: Farne Islands	
×m	**Artic tern - Collision risk during non-breeding season – alone – operation and maintenance**. The collision risk to all tern species during the migratory bio-seasons, including Arctic tern, is assessed in **Section 7.5** of the Rampion 2 **Habitats Regulations Assessment Report to Inform the Appropriate Assessment** of the ES (Document Reference: 5.9). Within the PEIR (RED, 2021) it was predicted that under one (0.61) individual (with a range of between 0.07 and 4.00 birds) in the migratory bio-seasons would be subject to collision consequent mortality from all SPA populations screened in for Rampion 2. Given the reduction in the proposed Offshore Array Area and the absence of Arctic tern records from the final nine months of DAS, the PEIR CRM results (RED, 2021) represent the upper bound of the likely collision rate for the Proposed Development, and modelling was not repeated. This is a level of effect that would not be considered to be significant when split between the four designated sites screened in for Arctic tern and deemed to be a level of change that would not be detectable to the overall annual baseline natural mortality rate for this species. There is therefore, no adverse effect as a result of collision risk to this species and no adverse effect on the integrity of this designated site as a consequence of potential collision risk to Arctic tern. A finding of **no AEOI** is therefore concluded.
×n	**Artic tern - Collision risk during non-breeding season – in-combination– operation and maintenance** For the assessment of Arctic tern alone for this designated site, it was concluded that there would be no detectable change to baseline mortality as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no detectable contribution to an in-combination effect to Arctic tern at this designated site and so not be the cause of any potential adverse effect on the integrity of this species or designated site. A finding of **no AEOI** is therefore concluded.
	Seabird Assemblage – alone. The main features of the seabird assemblage are common tern, Arctic tern, roseate tern, Sandwich tern, guillemot, puffin, cormorant, shag and kittiwake. Of these, kittiwake, guillemot, Sandwich tern, Arctic tern and common tern have been individually assessed above and it was found that Rampion 2 would lead to no detectable increase to baseline natural mortality. The components not individually assessed were screened out through the screening process due to very low connectivity or very low vulnerability to impacts. The impacts on components screened out for individual assessment are accordingly expected to be significantly lower than for those components screened in and therefore no detectable increase to natural baseline mortality is expected for any component. Therefore, on the basis that there are not considered to be any risks of adverse effects to the individual components of the seabird assemblage feature it can be concluded that there will be **no AEOI** on the seabird assemblage feature itself.
×o	**Seabird Assemblage – in-combination – Construction.** The risk from disturbance and displacement during construction is recognised as being lower than that during operation, due to the spatially and temporally restricted nature of the works. There is no risk from collision during the construction phase. For the assessment of the seabird assemblage alone for this designated site, it was concluded that there would be no detectable increase to baseline natural mortality to any species and therefore no adverse effect to this feature as a result of Rampion 2 during the Operational phase as a result of either displacement or collision. Therefore, it can be concluded that Rampion 2 cause no adverse effect and will make no contribution to an in-combination effect to the seabird assemblage at this designated site during the construction phase and so not be the cause of any potential adverse effect on the integrity of this feature or designated site. A finding of **no AEOI** is therefore concluded.
×p	**Seabird Assemblage – in-combination – operation and maintenance.** For the assessment of the seabird assemblage alone for this designated site, it was concluded that Rampion 2 will not lead to any detectable increase in baseline mortality to any species as a result of displacement or collision, and therefore Rampion 2 will cause no adverse effect to this feature as a result of Rampion 2. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to the seabird assemblage at this designated site and so not be the cause of any potential adverse effect on the integrity of this feature or designated site.
×q	**Seabird Assemblage – in-combination – Decommissioning.** Effects during decommissioning are expected to be the same as, or less than effects during construction. Therefore, it can be concluded that Rampion 2 will make no contribution to an in-combination effect to the seabird assemblage at this designated site during the decommissioning phase and so not be the cause of any potential adverse effect on the integrity of this feature or designated site.

End of Matrix 37

END OF INTEGRITY MATRICES

© WSP UK Limited

39. References

Planning Inspectorate, (2022). Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-ten/ [Accessed 05 June 2023].

Rampion Extension Development Limited (RED), (2021). *Preliminary Environmental Information Report 2021.* [Online] Available at: https://rampion2.com/consultation-2022/documents/#documents2021 [Accessed 06 June 2023].

South Downs National Park Authority and Natural England (Undated). *Draft Sussex Bat Special Area of Conservation. Planning and Landscape Scale Enhancement Protocol.* [Online] Available at: https://www.southdowns.gov.uk/wp-content/uploads/2018/04/TLL-15-Draft-Sussex-Bat-SAC-Protocol.pdf [Accessed 06 June 2023].

© WSP UK Limited

Page intentionally blank

Rampion 2
WIND FARM



© WSP UK Limited

Appendix I
Glossary for Habitats Regulations Assessment

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment Appendix I

HRA glossary



© WSP UK Limited

Glossary to the Draft RIAA

Term	Description
Above Ordnance Datum	Ordnance Datum is the vertical datum used by the Ordnance Survey as the basis for deriving the height of ground level on maps. Topography may be described using the level in comparison to 'above' ordnance datum.
Advice on Operations	A potential component of the conservation advice package produced for a European site by advising authorities. The Advice on Operations provides information on activities capable of affecting site integrity, and achievement of the site's conservation objectives and feature-specific pressure thresholds for those activities.
Adverse Effect on Integrity (AEoI)	If likely significant effects cannot be ruled out, an Appropriate Assessment needs to determine whether there will be an 'adverse effect on integrity' on any sites, with reference to their conservation objectives.
Agreement for Lease	The Proposed Development is located within an extension area afforded an Agreement for Lease by The Crown Estate which also extends across part of residual Round 3 Zone 6 offshore wind farm zone.
Annex I habitat	Annexes to the Habitats Directive list those habitats to which the Directives apply and to which the European Commission can propose amendments. Annex I outlines the habitats protected ('Annex I habitats'). Following the United Kingdom's departure from the European Union, the UK 'network objectives' still refer to "habitats listed on Annex II". However, the UK may amend the schedules to the Habitats Regulations (2017) (as amended) and the habitats protected under them in the UK (Defra, 2021)
Annex II species	Annexes to the Habitats Directive list those species to which the Directives apply and to which the European Commission can propose amendments. Annex II outlines the species protected ('Annex II species'). Following the United Kingdom's departure from the European Union, the UK 'network objectives' still refer to "species listed on Annex II". However, the UK may amend the schedules to the Habitats Regulations (2017) (as amended) and the species protected under them in the UK (Defra, 2021)
Appropriate Assessment	The assessment of the implications for each qualifying feature of each potentially affected European site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation

© WSP UK Limited

Term	Description
	objectives. The Appropriate Assessment should be undertaken by the competent authority.
Barrier effect	Barrier effect is experienced by bird species which intend forage beyond or migrate past the array but due to avoidance behaviour, have to navigate around the array. Barrier effect is often not discernible from displacement behaviour.
Baseline	Refers to existing conditions as represented by latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of development.
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the Proposed Development together with any known or foreseeable future changes that will take place before completion of the Proposed Development.
Benthic ecology	Benthic ecology encompasses the study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment
Beyond all reasonable scientific doubt.	For HRA, case law establishes that the Appropriate Assessment of effects on the integrity of a European site must produce certainty "beyond all reasonable [scientific] doubt"
Biologically Defined Minimum Population (BDMPS)	The total number of birds in each spatially distinct biologically defined minimum population scales (BDMPS) population during that defined season
Birds Directive	'Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds' is binding for all Member States of the European Union for the protection of wild birds. The United Kingdom's is no longer an European Union Member State. However, the Habitats Regulations (2017) (as amended) continue to provide the legislative backdrop for Habitats Regulations Assessment and the National Site Network shall include the Special Protection Areas classified pursuant to the Birds Directive (Defra,21).
Cetacean	A whale, dolphin, or porpoise of the order Cetacea. Bottlenose dolphins and harbour porpoises are the only cetaceans listed in Annex II of the Habitats Directive.
Coastal processes	The processes that interact to control the physical characteristics of a natural environment, for example: winds; waves; currents; water levels; sediment transport; turbidity; coastline and seabed morphology.

© WSP UK Limited

Term	Description
Code of Construction Practice	The code sets out the standards and procedures to which developers and contractors must adhere to when undertaking construction of major projects. This will assist with managing the environmental impacts and will identify the main responsibilities and requirements of developers and contractors in constructing their projects.
Competent authority	Any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office. For Rampion 2's Development Consent Order, the Secretary of State for Department for Business Energy and Industrial Strategy is the relevant competent authority
Conservation Advice	Detailed advice for public authorities and stakeholders is provided by the Statutory Nature Conservation Bodies on in the form of 'conservation advice.' This advice provides the framework for Habitats Regulation Assessment. It should the conservation objectives for each European site and an understanding of the designated features and the factors contributing to site integrity.
Connectivity	Connectivity (and the potential for likely significant effects) is established where the distributions of ecological features (habitats, species and ecosystems, including functional processes) spatially overlap with the potential ecological effects of the Proposed Development (the zone of influence) which could affect them.
Condition Assessment	Under the Habitats Directive the United Kingdom was obliged to report (every 6 years) on the conservation status (feature condition) of the habitats and species within protected sites. Since leaving the European Union, this report is made to the Secretary of State.
Conservation objectives	The achievement of Favourable Conservation Status for all species and habitat protected under the Habitats Directive is translated into site-level Conservation Objectives. These define the condition to be achieved by species and habitat types for which a European site has been designated and the (targets) parameters that define them. 'High level' Conservation Objectives set the high-level objectives and priorities for the European-wide network of designations.
Cumulative Effects Assessment	The requirement for cumulative effects assessment is required under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and refers to effects that may result from the incremental changes caused by other past, present and reasonably foreseeable human activities, and natural processes, together with the Proposed Development.

Term	Description
	The 'in-combination assessment' in the Habitats Regulations Assessment will draw from the Cumulative Effects Assessment as far as is appropriate under the respective Regulations.
Cumulative Effects	Additional changes caused by a Proposed Development in conjunction with other similar developments or as a combined effect of a set of developments, taken together' (SNH, 2012)
Development Consent Order	This is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects, under the Planning Act 2008.
DCO Application	An application for consent to undertake a Nationally Significant Infrastructure Project made to the Planning Inspectorate who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the Proposed Development.
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Department for Business, Energy & Industrial Strategy	The Government department responsible for business; industrial strategy; science; research and innovation; energy and clean growth; and climate change.
Department for Environment, Food and Rural Affairs	The lead UK Government Department for environmental policy.
Disturbance	Disturbance can occur when a bird's normal pattern of activity is affected by an anthropogenic activities in the construction, operation, and decommissioning phases (JNCC 2017).
Displacement	In relation to offshore wind farm development, Furness et al. (2013) define displacement as 'a reduced number of birds occurring within or immediately adjacent to an offshore wind farm' which can result in habitat loss (e.g., loss of foraging or rafting areas).
Draft Report to Inform an Appropriate Assessment (draft RIAA)	Under the Habitats Regulations, it is the responsibility of the relevant competent authority to undertake the Appropriate Assessment. It is for the Applicant to provide such information as may reasonably be required to undertake the assessment. This information is provided by the Applicant to the competent authority in a 'Report to Inform' the Appropriate Assessment. The report is in 'draft,' during the pre-application stage.

Term	Description
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
European Commission	The executive branch of the European Union, responsible for proposing legislation, implementing decisions, upholding the EU treaties and oversees the day-to-day business (europa.eu/institutions/inst/comm/ _en.htm)
Court of Justice of the European Union	The highest court of the European Union in matters of Union law. Since 31 December 2020 ("completion day"), the UK has not been bound by EU law. In accordance with the European Union (Withdrawal) Act, the environmental principles established by the decisions of the CJEU made prior to completion day will continue to bind the lower national courts. The Supreme Court could decide not to follow the rulings of the CJEU (so far as it only rarely decides to depart from prior CJEU decisions).
EIA Regulations, 2017	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The EIA regulations require that the effects of a project, where these are likely to have a significant effect on the environment, are taken into account in the decision-making process for the project.
Electromagnetic field (EMF)	An electromagnetic field is an electric and magnetic force field that surrounds a moving electric charge.
Embedded environmental measures	Equate to 'mitigation' or protective measures that form part of a project and are intended to avoid or reduce adverse effects as established under Grace v An Bord Pleanala (C-164/17).
Environmental Impact Assessment	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline'). The information in the Environmental Impact Assessment informs the Applicant's Habitat Regulations Assessment in accordance with European Commission guidance (2016) on streamlining these separate and distinct assessments.
Environmental Statement	The written output presenting the full findings of the Environmental Impact Assessment.
Expert Technical Group	Throughout the pre-application period, the Applicant has arranged Expert Technical Group meetings to discuss topic specific issues with relevant stakeholders

© WSP UK Limited

Term	Description
EU Exit	The United Kingdom's departure from the European Union on 31 December 2020 ('completion day') after which, the United Kingdom's is no longer an European Union Member State.
EU Exit Regulations	The 'Conservation of Habitats and species Amendment (EU Exit) Regulations 2019' came into force on 'completion day' (31 December 2020). The amendments therein secure existing protections for habitats and species under the Habitats Directive and the Habitats Regulations (2017) (as amended) other than for some 'operability changes, continue to function following the United Kingdom's departure from the European Union.
European site	European sites are those previously designated (via national legislation as appropriate) under the Habitats Directive and Birds Directive and future sites designated under the Habitats Regulations (2017) (as amended~~).~~ European sites European sites in England are considered to be SPAs, SACs, candidate SACs and Sites of Community Importance (SCI). Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites (designated under international convention) and proposed Ramsar sites. References to "European sites" are retained following the United Kingdom's departure from the European Union (as Defra see no operability reason for this to change) and the sites covered by the term (as above) have not changed.
European Union	The union of 27 European member states.
Evidence Base	The sources of information used to make an assessment. For the Habitats Regulations Assessment, the Applicant must provide to the competent authority, information that is *sufficient* to inform the Appropriate Assessment and represents the best scientific knowledge in the field (paragraph 54 of Waddenzee).
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach and the information required to support the EIA and HRA for certain aspects.
External plans or projects'	Projects other than the Proposed Development and projects proposed by other development plans that may affect a European site concurrently or consecutively with the Proposed Development and referred to as being assessed in the In-combination Assessment.
Favourable Condition Status	The achievement of Favourable Condition Status is the explicit aim of the EU Habitats Directive for the habitats and species protected under it. Broadly, it concerns the long-term distribution and abundance of populations of species in their

Term	Description
	natural range, and for the long-term natural distribution, structure and functions of habitats and long-term survival of its typical species.
Fragmentation	The process by which larger expanses of natural habitat are divided into smaller, more isolated pieces resulting in a reduction in the available habitat. Typically, the result of direct habitat loss, or anthropogenic barriers that divide the habitat, or movement between areas.
Functionally Linked habitat	Areas of land or sea occupied or utilised by the qualifying interests (species) of a European site that lie beyond the boundary of the site. Such areas support activities such as feeding, roosting and migration.
Habitats Directive	Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora. The UK is no longer bound by European legislation. However, the Habitats Regulations (2017) (as amended) continue to provide the legislative backdrop for Habitats Regulations Assessment and the National Site Network shall include the Special Protection Areas classified pursuant to the Birds Directive (Defra, 2021).
Habitats Regulation Assessment (HRA)	The assessment of the potential implications of implementing a plan or project on European sites. With reference to the conservation objectives of the sites, the process helps to determine likely significant effects and (where appropriate) assesses adverse effects on site integrity. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest.
Habitats Regulations 2017 (as amended)	An umbrella term that refers to the legislative strands that originally transposed the Habitats Directive into UK law (i.e., The Conservation of Habitats and Species Regulations 2017, the Scottish and Northern Ireland Regulations and the Offshore Marine Habitats and Species Regulations 2017) and the amendments to the 2017 Habitats Regulations by the 'Conservation of Habitats and species Amendment (EU Exit) Regulations 2019.
HRA Screening	The initial stage of the Habitats Regulations Assessment process to identify the likely significant effects arising from the Proposed Development.
HRA Stage One	Habitats Regulations Assessment is generally accepted to be a four-stage sequential process (see Planning Inspectorate Advice Note Ten). The first stage is the 'Screening' , a process

Term	Description
	that identifies the likely impacts of a plan or project upon a European site, whether these impacts are significant and therefore, where further consideration, (an 'Appropriate Assessment') is required. The Screening process represents the first stage of the Habitats Regulations Assessment process (Stage One (AA)).
Stage Two (AA)	Habitats Regulations Assessment is generally accepted to be a four-stage sequential process (see Planning Inspectorate Advice Note Ten). Appropriate Assessment (AA) is required when a plan or project is likely to have a significant effect on a European site and represents the second stage of the Habitats Regulations Assessment process (Stage Two (AA)).
Horizontal Directional Drill (HDD)	An engineering technique avoiding open trenches.
Hydrodynamic regime	The characteristic patterns and statistics of variation in water levels and currents for a given location or area. Potentially includes tidal, surge and other residual flow processes; (does not include waves).
Impact	The changes resulting from an action.
Impact pathway	A change descriptively assessed by one aspect, used by another aspect to inform a related assessment.
In-combination effects	Effects that may arise from the Proposed Development in combination with external plans and projects proposed/consented but not yet built and operational (i.e., those developments that are separate from the baseline).
In-combination assessment	The assessment required under the Habitats Regulations and presented in the Habitats Regulations Assessment reports, of the combined effect of the Proposed Development in combination with the effects from a external plans and projects, on the same feature.
Indirect effects	Effects that result indirectly from the Proposed Development as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects.
Informal consultation	Informal consultation refers to the voluntary consultation that RED undertake in addition to the formal consultation requirements.

© WSP UK Limited

Term	Description
Integrity	The coherence of a site's ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it [is or] was classified
Integrity matrices	The Planning Inspectorate's Advice Note Ten (Habitats Regulations Assessment for Nationally significant Infrastructure Projects) provides (as Appendix 2) a template for 'integrity matrices' which should be prepared by the Applicant to inform the decision-making process.
Integrity test	The test applied at Stage Two of a Habitats Regulations Assessment. The purpose of the Appropriate Assessment is to determine whether an adverse effect on site integrity (AEOI) can be ruled out (the integrity test).
Intertidal	The area of the shoreline which is covered at high tide and uncovered at low tide.
Joint Nature Conservation Committee	JNCC is the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation.
Land cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it. Related to but not the same as land use.
Landfall	The point at which all the export cables will be landed and is the transitional area between the offshore export cabling and the onshore export cabling.
Likely Significant Effects	Under the Habitat Regulations an effect is likely if, on the basis of objective information, it cannot be excluded that the effect that could undermine a European site's conservation objectives.
'Likely Significance Effects Test'	The test applied at Stage One of a Habitats Regulations Assessment to determine if there is a real (not hypothetical) risk (meaning 'possibility') of a significant effect on a European site that cannot be excluded on the basis of objective information and might undermine the site's conservation objectives.
Likely Significant Effects In-combination	In-combination (inter-relationship) effects are included (and described as Likely Significant Effects In-Combination) where the interaction between effects of the Proposed Development combine with effects from external plans and projects to affect a receptor such that a Likely Significant Effect (not identified as

Term	Description
	likely to result from the Proposed Development acting alone) could result.
In-combination effects	The in-combination effects of different effects on the same receptor.
Management Unit (MU)	The Inter-Agency Marine Mammal Working Group (IAMMWG) management units (MU) (JNCC, 2015) provide an indication of the spatial scales at which impacts of plans and projects alone and in-combination, need to be assessed for the key cetacean species in UK waters.
Marine Mammal Mitigation Protocol	To include measures to minimise the risk of injury (PTS) in marine mammals.
Marine Management Organisation	MMO is an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs. MMO license, regulate and plan marine activities in the seas around England.
Maximum Design Scenario	The parameters (or combination of parameters) that represent the greatest effect for an individual impact for a receptor, resulting in the Rochdale Envelope assessed for the Proposed Development
Maximum Temporal Design Scenario	The maximum temporal design scenario represents the longest duration of effects
Mean-High Water Springs (MHWS)	The average height of mean high waters during spring tides in a year.
Mean-maximum +1 standard deviation (SD)	The foraging ranges published in Woodward et al. 2019 (used to establish potential connectivity to Special Protection Areas) provide the following foraging range metrics: mean-mean maximum, mean-maximum +1 standard deviation (which accounts for the variation around the mean) and maximum.
National Site Network	Prior to 31 December 2020, sites designated under the Nature Directives in the UK contributed to Natura 2000 network. Since the UK's departure from the European Union, such sites the 'National Site Network.' This network comprises former Natura 2000 sites (onshore, marine and offshore) located in the UK that already existed on 31 December 2020 (or were proposed to the European Commission before that date) but not Ramsar sites (Defra, 2021). An appropriate authority is only responsible for managing and adapting the National Site Network to secure the favourable condition status of a feature of importance of the UK.

© WSP UK Limited

Term	Description
Network Objectives	Management objectives are established for the national site network (the 'Network Objectives'). Appropriate authorities are required to manage, and where necessary, adapt the national site network and co-operate with each other to meet the management of objectives of the National Site Network.
National Policy Planning Framework	The National Policy Planning Framework sets out the Governments planning policies for England and how these are expected to be applied. It provides a framework within which local plans can be developed which reflect the community's needs.
Nationally Significant Infrastructure Project	Nationally Significant Infrastructure Projects are major infrastructure developments in England and Wales which are consented by DCO. These include proposals for renewable energy projects with an installed capacity greater than 100MW.
Natura 2000 Network	The network of nature protection areas in the territory of the European Union for selected species and habitats listed in the Habitats and Birds Directives
Natural England	The government advisor for the natural environment in England and the statutory nature conservation body for Habitats Regulations Assessment. Natural England helps to agree the process (such as the selection of sites and the scope of the appraisal) and work with the competent authority on agreeing the outcomes and mitigation proposals
Nature Directives	The Birds (Directive 2009/147/EC) and the Habitats Directive (Directive 92/43/EEC) that together provide the framework for the European Unition's nature conservation policy.
Onshore of offshore cable corridor	To be used when referring to the cable corridor. To be defined in width for each stage (Scoping, PEIR and ES).
Offshore	The sea further than two miles from the coast.
Offshore part of the Proposed DCO Order Limits	An area that encompasses all planned offshore infrastructure.
Offshore Wind Farm	An offshore wind farm is a group of wind turbines in the same location (offshore) in the sea which are used to produce electricity.
Onshore part of the Proposed DCO Order Limits	An area that encompasses all planned onshore infrastructure.

© WSP UK Limited

Term	Description
Permanent Threshold Shift	A permanent reduction in an animals sensitivity to sound.
Planning Act 2008	The legislative framework for the process of approving major new infrastructure projects.
Planning Inspectorate	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales.
PINS advice notes	A series of advice notes published by the Planning Inspectorate that provide guidance on matters relating to Nationally Significant Infrastructure Projects under the Planning Act 2008 regime, including in relation to Habitats Regulations Assessment and assessment matrices (Advice Note Ten), cumulative effects assessment (Advice note 17) and use of the 'Rochdale Envelope' (Advice note 9)
Precautionary Principle	Established under Waddenzee (C-127/02) it is a fundamental premise of Habitats Regulations Assessment that where there is doubt as to the absence of significant effects, an appropriate assessment must be carried out.
Preliminary Environmental Information Report	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
Proposed Development	The development that is subject to the application for development consent, as described in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).
Qualifying features	Also referred to as 'interest features', or 'designated features', qualifying features are those habitats or species that are the reason for selection and designation of a European site.
Rampion 1	The existing Rampion Offshore Wind Farm located in the English Channel in off the south coast of England.
Rampion 2	The onshore and offshore infrastructure associated with the offshore wind farm comprising of installed capacity of up to

© WSP UK Limited

Term	Description
	1200 MW, located in the English Channel in off the south coast of England (the Proposed Development).
Ramsar site	Areas designated by the UK Government under the International Ramsar Convention (the Convention on Wetlands of International Importance) 1971.
Receptor	Qualifying interest features of European sites, or habitats or processes that support qualifying features, that may be at risk from adverse effects which could potentially arise as a result of the Proposed Development.
Rochdale Approach	The Rochdale Approach is a parameter-based approach to environmental assessment which aims to take account of the need for flexibility in the evolution of detailed design.
Seal Management Units	The appropriate assessment/ management units for seals are the Seal Management Units (SMU) provided by the Special Committee on Seals (SCOS) (SCOS, 2019), based on the latest scientific information provided to SCOS by the Sea Mammal Research Unit. These sub-divisions (units) are based on a balance of current biological knowledge; major haul-out locations, environmental conditions, and historical data and distinct from the Management Units provided for cetaceans (IAMMWG, 2021)
Secretary of State	The body that makes the decision to grant development consent.
Sediment deposition	Settlement of sediment in suspension back to the seabed, causing a localised accumulation.
Sediment transport	The movement of sediment by natural processes, as individual grains or as a collective volume.
Scour	A localised sediment erosion feature caused by local enhancement of flow speed and turbulence due to interaction with an obstacle.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value associated to that receptor.
Scoping Opinion	A Scoping Opinion is adopted by the Secretary of State for a Proposed Development.
Screening	The first stage of a Habitats Regulations Assessment which involves an initial analysis to determine whether a plan or

Term	Description
	project is likely to have a significant effect on any European sites
Screening matrices	The Planning Inspectorate's Advice Note Ten (Habitats Regulations Assessment for Nationally significant Infrastructure Projects) provides (as Appendix 1) a template for 'Screening matrices' which should be completed by the Applicant to inform the decision-making process.
Significance	A measure of the importance of the environmental effect for a receptor. For the purposes of Habitats Regulations Assessment an effect that could undermine a site's conservation objectives. .
Site integrity	"*The coherence of its ecological structure and function across its whole area, or the habitats and/or populations of species for which the site has been (or will be) designated* (Defra, 2012)". Any part of the site, even parts which are not designated features, are relevant to the consideration of site integrity. European Commission associated a high degree of site integrity with the capacity for self-repair and self-renewal under dynamic conditions, where a minimum of external management support is required'(EC, 2000; para 4.6.3)
Spatial Scope	Spatial scope is the area over which changes to the environment are predicted to occur as a consequence of the Proposed Development.
Special Area of Conservation (SAC)	A conservation site for the protection of habitats and certain species historically designated under the Habitats Directive and Habitats Regulations (2017). Following the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 and under the Habitats Regulations (2017) (as amended) there is an amended process for the designation of SACs in the UK and scope to alter the schedule of habitats and species (the annexes of the Nature Directives) to which the Habitats Regulations apply.
Special Protection Area (SPA)	Sites designated under EU Directive (79/409/EEC) to protect habitats of migratory birds and certain threatened birds under the Birds Directive
Stakeholder	Person or organisation with a specific interest (commercial, professional or personal) in a particular issue.
Statutory consultee	Consultees for which there is a legal requirement to consult. Where an appropriate assessment is required, the competent authority must consult Natural England.

© WSP UK Limited

Term	Description
Statutory Nature Conservation Bodies (SNCB)	The organisations charged respective governments to advise on nature conservation matters for jurisdictions within the spatial scope of the Habitats regulations Assessment. For example, Natural England (in England) and Scottish Natural Heritage (in Scotland)
Subtidal	The region of shallow waters which are below the level of low tide.
Supplementary Advice	A potential component of a conservation advice package produced by advising authorities. The Supplementary Advice provides more detail on the ecological attributes (target attributes) on which the qualifying habitats and species depend and contribute to a site's overall integrity.
Suspended sediment concentration	The mass concentration (mass/ volume) of sediment in suspension.
Sweetman ruling	The European court ruling that established that projects or plans that are likely to have a significant effect on a European site should be subject to an Appropriate Assessment, *regardless* of any proposed mitigation measures intended to avoid or reduce those effects.
Temporal Scope	The temporal scope covers the time period over which changes to the environment and the resultant effects are predicted to occur and are typically defined as either being temporary or permanent.
Temporary or permanent effects	Effects may be considered as temporary or permanent. In the case of wind energy development, the application is for a 30 year period after which the assessment assumes that decommissioning will occur and that the site will be restored. For these reasons the development is referred to as long term and reversible.
Temporary Threshold Shift	A temporary reduction in an animals sensitivity to sound.
The Applicant	Rampion Extension Development Limited (RED)
Transboundary effects	Assessment of changes to the environment caused by the combined effect of past, present and future human activities and natural processes on other European Economic Area Member States.
Planning Act 2008	The legislative framework for the process of approving major new infrastructure projects.

© WSP UK Limited

Term	Description
Unexploded Ordnance	Unexploded ordnance are explosive weapons (bombs, shells, grenades, land mines, naval mines, etc.) that did not explode when they were employed and still pose a risk of detonation, potentially many decades after they were used or discarded.
Wave regime	The characteristic patterns and statistics of variation in waves for a given location or area.
Zone of Influence	The area surrounding the Proposed Development which could result in likely significant effects.

Rampion 2
WIND FARM



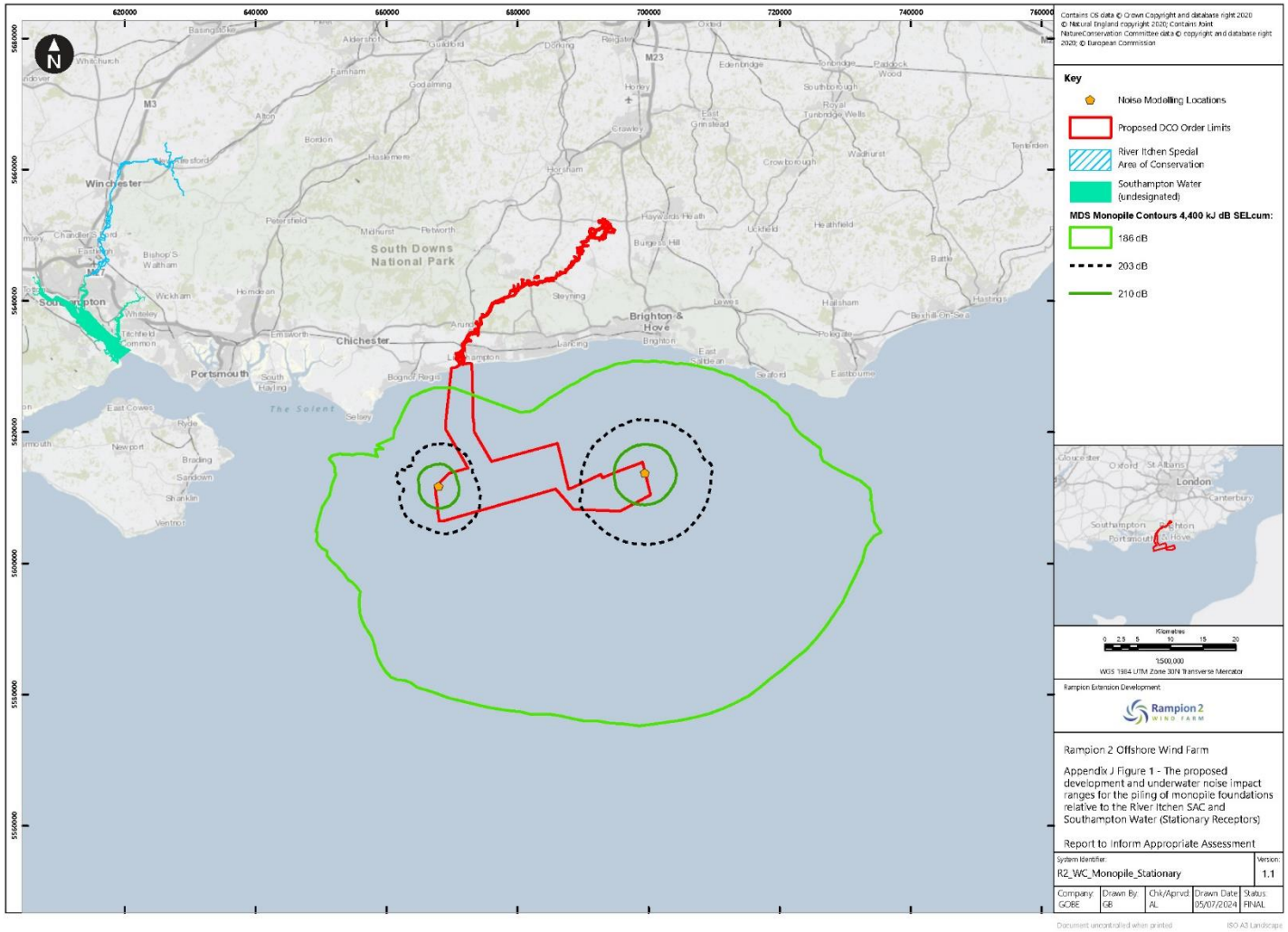
© WSP UK Limited

Appendix J
Stationary receptor noise modelling outputs

In response to Natural England's response to ref E81 **Appendix M4 Natural England's Risk and Issues Log [REP4-096]** submitted into Examination at Deadline 4, the Applicant has submitted the following figures showing Atlantic salmon as a stationary receptor on a without prejudice basis. The Applicant however maintains their position that (as detailed in the Applicants response to ref E81 of **Appendix M4 Natural England's Risk and Issues Log** (submitted at Deadline 5) a fleeing receptor model is appropriate to inform the assessment of underwater noise impacts on Atlantic salmon as the receptor is not spatially restricted by, for example, demersal breeding behaviours. The Applicant however, notes that even when a stationary receptor model is used, there will be no LSE on Atlantic salmon as a feature of the River Itchen SAC.

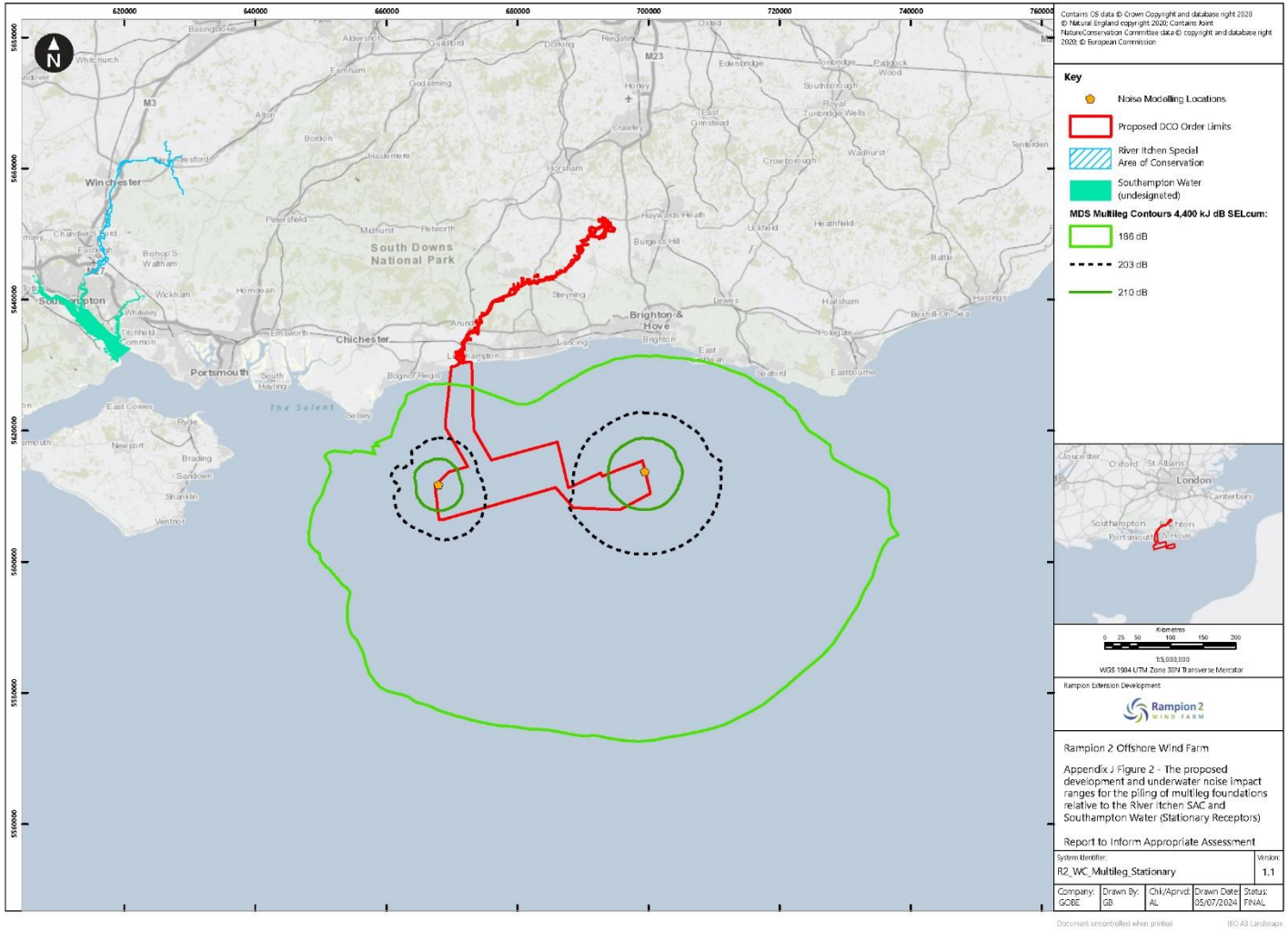
© WSP UK Limited

Appendix J Figure 1 - The Proposed Development and underwater noise impact ranges for the piling of monopile foundations relative to the River Itchen SAC and Southampton Water (stationary receptor)



© WSP UK Limited

Appendix J Figure 2 - The Proposed Development and underwater noise impact ranges for the piling of monopile foundations relative to the River Itchen SAC and Southampton Water (stationary receptor)



Appendix K
In-combination assessment update for guillemot and razorbill

Rampion 2 WIND FARM

Report to Inform Appropriate Assessment: Appendix K

In-combination assessment update for guillemot and razorbill (tracked)



Document revisions

Revision	Date	Status/reason for issue	Author	Checked by	Approved by
A	01/08/2024	Submitted during Examination, converted to Environmental Statement Appendix at Deadline 6	APEM	RED	RED

© WSP UK Limited

Contents

1. Introduction 6

1.1 Overview 6

1.2 Purpose of this Document 6

2. Methodology 7

2.1 Cumulative and In-combination Assessments 7

2.2 Displacement Rates 9

3. In-combination Impacts 10

3.1 Flamborough and Filey Coast SPA – Guillemot 10

3.2 Flamborough and Filey Coast SPA – Razorbill 31

3.3 Farne Islands SPA – Guillemot 50

4. Population Viability Analysis 59

Modelling approach 59
PVA demographic parameters 60
Validation results 63
Guillemot – Flamborough and Filey Coast SPA 67
Razorbill – Flamborough and Filey Coast SPA 74
Guillemot – Farne Islands SPA 78

5. References 82

Tables

Table 2.1 Description of Tiers of other developments 7

Table 2.2 Mean max plus one SD foraging ranges for auk species derived from Woodward *et al.,* (2019) 8

Table 2.3 Non-breeding season apportionment values for auk species derived from Furness (2015) for the North Sea and English. 9

Table 3.1 In-combination abundance totals for guillemot attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 153.7 km) 11

© WSP UK Limited

Table 3.2 In-combination abundance totals for guillemot attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 95.2 km) 15
Table 3.3 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 153.7 km mean max plus one SD foraging range (Applicant's preferred approach) 19
Table 3.4 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 95.2 km mean max plus one SD foraging range (Applicant's preferred approach) 22
Table 3.5 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 153.7 km mean max plus one SD foraging range (Natural England's preferred approach) 25
Table 3.6 FFC SPA guillemot in-combination operation and maintenance phase displacement using the 95.2 km mean max plus one SD foraging range (Natural England's preferred approach) 28
Table 3.7 In-combination abundance totals for razorbill attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 164.6 km) 32
Table 3.8 In-combination abundance totals for razorbill attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 122.2 km) 36
Table 3.9 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the 164.6 km mean max plus one SD foraging range (Applicant's approach) 40
Table 3.10 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the 122.2 km mean max plus one SD foraging range (Applicant's approach) 42
Table 3.11 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the mean max plus one SD foraging range of 164.6 km (Natural England's preferred approach) 44
Table 3.12 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the mean max plus one SD foraging range of 122.2 km (Natural England's preferred approach) 47
Table 3.13 In-combination abundance totals for guillemot attributed to the Farne Islands SPA 51
Table 3.14 Farne Islands SPA guillemot in-combination operation and maintenance phase displacement estimates (Applicant's approach) 55
Table 3.15 Farne Islands SPA guillemot in-combination operation and maintenance phase displacement estimates (Natural England's preferred approach) 57
Table 4.1 SPA population demographic parameters for guillemot and razorbill 62
Table 4.2 Flamborough and Filey Coast SPA historic colony counts for guillemot and razorbill 63
Table 4.3 Farne Islands SPA historic colony counts for guillemot and razorbill 64
Table 4.4 PVA results using Seabird PVA Tool for impacts apportioned to the Flamborough and Filey Coast SPA guillemot population showing displacement in-combination outputs for various scenarios 67
Table 4.5 Average annual colony growth rate for guillemot colony for Flamborough and Filey Coast SPA between 2000 and 2022 73

© WSP UK Limited

Table 4.6 PVA results using Seabird PVA Tool for impacts apportioned to the Flamborough and Filey Coast SPA guillemot population showing displacement in-combination outputs for various scenarios 74
Table 4.7 Average annual colony growth rate for razorbill colony for Flamborough and Filey Coast SPA between 2000 and 2022 77
Table 4.8 PVA results using Seabird PVA Tool for impacts apportioned to the Farne Islands SPA guillemot population showing displacement in-combination outputs for various scenarios 78
Table 4.9 Average annual colony growth rate for guillemot colony for Farne Islands SPA between 1990 and 2023 80

Figures

Figure 4.1 FFC SPA guillemot baseline PVA model validation 64
Figure 4.2 FFC SPA razorbill baseline PVA model validation 65
Figure 4.3 Farne Islands SPA guillemot baseline PVA model validation 66

© WSP UK Limited

1. Introduction

1.1 Overview

1.1.1 Rampion Extension Development Limited (hereafter referred to as 'RED') (the 'Applicant') is developing 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.

1.1.2 Rampion 2 will be located between 13km and 26km from the Sussex Coast in the English Channel and the offshore array area will occupy an area of approximately 160km^2. A detailed description of the Proposed Development is set out in **Chapter 4: The Proposed Development, Volume 2** of the Environmental Statement (ES) **[APP-045]** (updated at Deadline 6), submitted with the Development Consent Order (DCO) Application.

1.2 Purpose of this Document

~~1.1.1~~1.2.1 As presented within Natural England's Relevant Representations **[RR-265]** the following additional assessment requests were made in relation to in-combination assessments:

- "*The Applicant should carry out a full in-combination assessment of impacts for guillemot and razorbill at FFC SPA, to allow NE to advice further regarding the risks of adverse effects in-combination*"; and
- "*The Applicant should carry out a full in-combination assessment of impacts of guillemot at the Farne Islands SPA, to allow NE to advise further regarding the risks of adverse effects in-combination*".

~~1.1.2~~1.2.2 As reference, the Applicant's assessment of these qualifying features alone is presented in Table 7-10 of the **Report to Inform Appropriate Assessment [REP5-025]** (updated at Deadline 6). For all three auk features, assessments concluded no Adverse Effect on Integrity (AEoI) with respect to the level of predicted impact from the Proposed Development alone. Due to the level of impact predicted for the Proposed Development alone apportioned to the three auk features being approximately a single breeding adult per annum, the Applicant concluded that such a level of effect would not materially contribute to any in-combination effect, hence why no in-combination assessments for these features were presented within the **Report to Inform Appropriate Assessment [REP5-025]** (updated at Deadline 6).

~~1.1.3~~1.2.3 Following review of the Natural England's Relevant Representations **[RR-265]**, the Applicant has undertaken a full in-combination assessment for guillemot at both the Flamborough and Filey Coast Special Protected Area (FFC SPA) and the Farne Islands Special Protection Area (SPA) as well as an in-combination assessment for razorbill at FFC SPA, the results of which are presented within this report. This is inclusive of Population Viability Analysis (PVA) where any level of predicted impact exceeded a 1% increase in baseline mortality.

© WSP UK Limited

2. Methodology

2.1 Cumulative and In-combination Assessments

2.1.1 The criteria for identification of projects for inclusion within the in-combination assessments is described within the **Report to Inform Appropriate Assessment [REP5-025]** (updated at Deadline 6). The Applicant has used the latest predicted impacts for projects included within the in-combination assessments presented, as informed from the latest documents submitted to the Planning Inspectorate. Developments within the same region are currently at varying stages of the planning process, with the final proposed project designs for some at the assessment and reporting stage, while others may not actually be taken forward or completed to their full maximum capacities. To incorporate this uncertainty, developments have been categorised into different tiers dependent on project status as described in **Table 2.1**.

Table 2-1 Description of Tiers of other developments

Tier	Sub-tier	Description
Tier 1	Tier 1a	Project in operation
	Tier 1b	Project under construction
	Tier 1c	Permitted applications, whether under the Planning Act 2008 or other regimes, but not yet implemented
	Tier 1d	Submitted applications, whether under the Planning Act 2008 or other regimes, but not yet determined
Tier 2	N/A	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted
Tier 3	Tier 3a	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted
	Tier 3b	Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited
	Tier 3c	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward

2.1.2 For both guillemot and razorbill, a regional in-combination assessment has been assessed based on projects within mean max plus one Standard Deviation (SD) foraging distance (Woodward *et al.*, 2019) from the colony for the breeding season (**Table 2.2**). Within Woodward *et al.,* (2019), there are two foraging ranges provided for guillemot and razorbill, the first is inclusive of data from the Fair Isle colony and the other excludes these data. When considering the difference in foraging range between Northern Isle colonies and those located within the Southern North Sea, the Applicant considers the foraging range value that excludes Fair Isle data to be most appropriate for the FFC SPA, as recommended by the author (Woodward *et al.*, 2019). The use of this value has also been acknowledged by Natural England at the end of the Hornsea Four examination whereby they requested the exclusion of Hornsea Three from the guillemot and razorbill FFC SPA in-combination assessments due to the project being situated outside of the mean max plus one SD foraging range to the FFC SPA (Natural England, 2022). If the foraging range value inclusive of Fair Isle is used, Hornsea Three would still be considered to have partial connectivity during the breeding season.

Table 2-2 Mean max plus one SD foraging ranges for auk species derived from Woodward *et al.,* (2019)

Species	Value origin	Mean max plus one SD foraging range (km)
Guillemot	Including Fair Isle data	73.2±80.5
	Excluding Fair Isle data	55.5±39.7
Razorbill	Including Fair Isle data	88.7±75.9
	Excluding Fair Isle data	73.8±48.4

2.1.3 For non-breeding seasons, if values were not provided in project RIAAs the project alone values from the ES chapters were multiplied by the relevant non-breeding season apportionment values derived from the colony proportional splits presented within Appendix A of Furness (2015) as recommended within Natural England's best practice guidance (Parker *et al.,* 2022). For clarity these are provided in **Table 2.3**.

© WSP UK Limited

Table 2-3 Non-breeding season apportionment values for auk species derived from Furness (2015) for the North Sea and English.

Species	SPA	Apportionment values for non-breeding seasons (%)			
		Non-breeding	Post-breeding migration	Migration-free winter	Return migration
Guillemot	FFC SPA	4.41%	N/A	N/A	N/A
	Farne Islands SPA	3.73%	N/A	N/A	N/A
Razorbill	FFC SPA	N/A	3.38%	2.74%	3.38%

2.2 Displacement Rates

2.2.1 The SNCBs (2022) updated interim guidance recommends the following in relation to defining appropriate levels of displacement and mortality:

"developers are encouraged to seek and present emerging sources of empirical evidence to provide support for their displacement assessment".

2.2.2 Following this recommendation, the Applicant has referred to the APEM (2022) literature review on auk displacement and mortality rates, which is considered the most comprehensive study of seabird displacement to date. The auk displacement and mortality review critically appraised studies from a total of 21 offshore wind farms (OWFs) which included up to six years of post-consent monitoring for some OWFs. The recommended rates from this literature review concluded the most appropriate displacement rates to be up to 50% and a mortality rate of up to 1% being suitably precautionary, regardless of the bio-season. Corroboration of these rates can also be found in the Beatrice OWF Year 2 Post-construction Monitoring Report (MacArthur Green, 2023) whereby a displacement rate or 70% for both guillemot and razorbill is deemed as an over-estimate.

2.2.3 Assessments using Natural England's preferred range of 30-70% displacement and 1-10% mortality rate for auk species are also presented. Within this range, assessments for 70% displacement with either 2% or 5% mortality have also been considered. The value of 70% displacement and 2% mortality have previously been agreed upon by the Secretary of State as appropriate for other southern North Sea OWF projects including Hornsea Four and East Anglia one North (Secretary of State 2022 & 2023). In addition, Natural England have previously considered the rate of 70% displacement and 5% mortality as the upper worst case for concluding impacts for Hornsea Four (Natural England, 2022).

© WSP UK Limited

3. In-combination Impacts

3.1 Flamborough and Filey Coast SPA – Guillemot

3.1.1 The in-combination tables below (**Table 3-1** and **Table 3-2**) provide values from all consented and planned projects apportioned to the FFC SPA. Totals are provided for the following scenarios:

- Rampion 2 plus all consented projects
- Rampion 2 plus all consented projects (excluding Dudgeon and Sheringham Shoal Extension Projects), ~~Dudgeon and Sheringham Shoal Extension Projects and all consented projects~~
- All projects
- Rampion 2 plus all consented projects (excluding Hornsea Four)
- ~~Rampion 2 plus Dudgeon and Sheringham Shoal Extension Projects and all consented projects (excluding Hornsea Four)~~
- All projects (excluding Hornsea Four)

3.1.2 The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to ~~the similarity in timeline to the Proposed Development~~consent for those projects being issued during Rampion 2'~~;~~s Examination period. Splitting out these projects in the manner presented accounts for any consent conclusions, such as removal of impact predictions from in-combination assessment in line with previous advice for consideration of projects where compensation is required.~~.~~ Therefore, ~~S~~scenarios including and excluding these two projects have been provided.

3.1.3 Following the latest conclusions from the Secretary of State in relation to the guillemot feature of the FFC SPA requiring compensation for predicted impacts from Hornsea Four, this project has been removed from the in-combination assessment of ~~the~~ guillemot in line with previous advice for consideration of projects whereby ~~the commitment to~~ compensation is required. Hence, scenarios including and excluding Hornsea Four impacts have been presented.

3.1.4 Due to the different values for mean max plus one SD foraging ranges for guillemot (Woodward *et al.*, 2019) two in-combination tables are provided as the use of the different foraging ranges will include or exclude different projects within the breeding season. The Applicant considers that as recommended by the author, the mean max plus one SD excluding Fair Isle data (95.2 km) is most appropriate for identifying theoretical breeding season connectivity (Woodward *et al*., 2019).

3.1.5 Displacement matrices for all displacement rate and mortality rate scenarios are provided for the annual totals in **Appendix A**.

© WSP UK Limited

Table 3-1 In-combination abundance totals for guillemot attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 153.7 km)

Project	Breeding	Non-breeding	Annual	Tier
Beatrice	0	121	121	1a
Blyth Demonstration Site	0	58	58	1a
Dudgeon	0	24	24	1a
EOWDC	0	10	10	1a
Galloper	0	26	26	1a
Greater Gabbard	0	24	24	1a
Gunfleet Sands	0	16	16	1a
Humber Gateway	99	6	105	1a
Hywind 2 Demonstration	0	94	94	1a
Kentish Flats Extension	0	0	0	1a
Kentish Flats	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	36	36	1a
London Array	0	17	17	1a
Methil	0	0	0	1a
Race Bank	0	31	31	1a

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Rampion	0	684	684	1a
Scroby Sands	-	-	0	1a
Sheringham Shoal	0	32	32	1a
Teesside	267	40	307	1a
Thanet	0	6	6	1a
Westermost Rough	347	21	368	1a
East Anglia One	0	28	28	1a
Hornsea Project One	4,554	356	4,910	1a
Hornsea Project Two	3,581	579	4,160	1a
Moray East	0	24	24	1b
Triton Knoll	425	33	458	1b
Kincardine	0	0	0	1b
Dogger Bank A	1,893	270	2,163	1c
Dogger Bank B	3,318	467	3,785	1c
Dogger Bank C	0	100	100	1c
East Anglia Three	0	126	126	1c
Inch Cape	0	140	140	1c

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Moray West	0	1,680	1,680	1c
Neart na Gaoithe	0	166	166	1c
Seagreen Alpha	0	206	206	1c
Seagreen Bravo	0	181	181	1c
Sofia	0	163	163	1c
Hornsea Three	0	782	782	1c
Norfolk Boreas	0	606	606	1c
Norfolk Vanguard	0	210	210	1c
East Anglia ONE North	0	83	83	1c
East Anglia TWO	0	74	74	1c
Hornsea Four (Natural England's Bespoke Approach)	9,382	22,927	32,309	1c
Pentland	-	29	29	1c
Forth Wind	-	18	18	1c
Dudgeon Extension Project (DEP)	0	655	655	1c
Sheringham Shoal Extension Project (SEP)	0	48	48	1c
Rampion 2	0	252	252	1d

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Total (Rampion 2 plus all consented projects ~~only~~except SEP & DEP)	**23,866**	**30,745**	**54,611**	
Total (Rampion 2 plus all consented projects only)	**23,866**	**31,447**	**55,313**	
Total (Rampion 2 plus all consented projects except Hornsea Four)	**14,484**	**8,520**	**22,004**	
Green Volt	0	710	710	1d
West of Orkney	-	189	189	1d
~~Dudgeon Extension Project (DEP)~~	~~0~~	~~655~~	~~655~~	~~1c~~
~~Sheringham Shoal Extension Project (SEP)~~	~~0~~	~~48~~	~~48~~	~~1c~~
Berwick Bank	-	1,948	1,948	1d
Dogger Bank South	0	0	0	2
Outer dowsing (PEIR)	12,284	982	13,266	2
Five Estuaries (PEIR)	0	163	163	2
North Falls (PEIR)	0	198	198	2
Total (All Projects)	**36,150**	**35,637**	**71,787**	
Total (All Projects except Hornsea Four)	**26,768**	**12,710**	**39,478**	

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
~~Total (Consented+ Rampion 2 + DEP&SEP)~~	~~23,866~~	~~31,447~~	~~55,313~~	
~~Total (Consented (Except Hornsea Four)+ Rampion 2 + DEP&SEP)~~	~~14,484~~	~~8,520~~	~~23,004~~	

Table 3-2 In-combination abundance totals for guillemot attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 95.2 km)

Project	Breeding	Non-breeding	Annual	Tier
Beatrice	0	121	121	1a
Blyth Demonstration Site	0	58	58	1a
Dudgeon	0	24	24	1a
EOWDC	0	10	10	1a
Galloper	0	26	26	1a
Greater Gabbard	0	24	24	1a
Gunfleet Sands	0	16	16	1a
Humber Gateway	99	6	105	1a
Hywind 2 Demonstration	0	94	94	1a
Kentish Flats Extension	0	0	0	1a

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Kentish Flats	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	36	36	1a
London Array	0	17	17	1a
Methil	0	0	0	1a
Race Bank	0	31	31	1a
Rampion	0	684	684	1a
Scroby Sands	-	-	0	1a
Sheringham Shoal	0	32	32	1a
Teesside	267	40	307	1a
Thanet	0	6	6	1a
Westermost Rough	347	21	368	1a
East Anglia One	0	28	28	1a
Hornsea Project One	0	356	356	1a
Hornsea Project Two	0	579	579	1a
Moray East	0	24	24	1b
Triton Knoll	425	33	458	1b
Kincardine	0	0	0	1b

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Dogger Bank A	0	270	270	1c
Dogger Bank B	0	467	467	1c
Dogger Bank C	0	100	100	1c
East Anglia Three	0	126	126	1c
Inch Cape	0	140	140	1c
Moray West	0	1,680	1,680	1c
Neart na Gaoithe	0	166	166	1c
Seagreen Alpha	0	206	206	1c
Seagreen Bravo	0	181	181	1c
Sofia	0	163	163	1c
Hornsea Three	0	782	782	1c
Norfolk Boreas	0	606	606	1c
Norfolk Vanguard	0	210	210	1c
East Anglia ONE North	0	83	83	1c
East Anglia TWO	0	74	74	1c
Hornsea Four (Natural England's Bespoke Approach)	9,382	22,927	32,309	1c

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Pentland	-	29	29	1c
Forth Wind	-	18	18	1c
Dudgeon Extension Project (DEP)	0	655	655	1c
Sheringham Shoal Extension Project (SEP)	0	48	48	1c
Rampion 2	0	252	252	1d
Total (Rampion 2 plus all consented projects ~~only~~except DEP & SEP)	**10,520**	**30,745**	**41,265**	
Total (Rampion 2 plus all consented projects except Hornsea Four)	**1,138**	**8,5207,818**	**9,6588,956**	
Total (Rampion 2 plus all consented)	**10,520**	**31,447**	**41,967**	
Green Volt	0	710	710	1d
West of Orkney	-	189	189	1d
~~Dudgeon Extension Project (DEP)~~	~~0~~	~~655~~	~~655~~	~~1c~~
~~Sheringham Shoal Extension Project (SEP)~~	~~0~~	~~48~~	~~48~~	~~1c~~
Berwick Bank	-	1,948	1,948	1d
Dogger Bank South	0	0	0	2
Outer dowsing (PEIR)	12,284	982	13,266	2

© WSP UK Limited

Project	Breeding	Non-breeding	Annual	Tier
Five Estuaries (PEIR)	0	163	163	2
North Falls (PEIR)	0	198	198	2
Total (All Projects)	**22,804**	**35,637**	**58,441**	
Total (All Projects except Hornsea Four)	**13,422**	**12,710**	**26,132**	
~~**Total (Consented+ Rampion 2 + DEP&SEP)**~~	~~**10,520**~~	~~**31,447**~~	~~**41,967**~~	
~~**Total (Consented (Except Hornsea Four)+ Rampion 2 + DEP&SEP)**~~	~~**1,138**~~	~~**8,520**~~	~~**9,568**~~	

© WSP UK Limited

Table 3-3 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 153.7 km mean max plus one SD foraging range (Applicant's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	23,866	83,214	5,076	119.3	2.35%
	Rampion 2 plus all consented projects only	23,866			119.3	2.35%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	14,484			72.4	1.43%
	All projects	36,150			180.8	3.56%
	All projects (excluding Hornsea Four)	26,768			133.8	2.64%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	23,866	141,815	8,651	119.3	1.38%
	Rampion 2 plus all consented projects only	23,866			119.3	1.38%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	14,484			72.4	0.84%
	All projects	36,150			180.8	2.09%
	All projects (excluding Hornsea Four)	26,768			133.8	1.55%
Non-breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	83,214	5,076	153.7	3.03%
	Rampion 2 plus all consented projects only	31,447			157.2	3.10%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			42.6	0.84%
	All projects	35,637			178.2	3.51%
	All projects (excluding Hornsea Four)	12,710			63.6	1.25%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	141,815	8,651	153.7	1.78%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
	Rampion 2 plus all consented projects only	31,447			157.2	1.82%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			42.6	0.49%
	All projects	35,637			178.2	2.06%
	All projects (excluding Hornsea Four)	12,710			63.6	0.73%
Annual	Rampion 2 plus all consented projects (excluding DEP & SEP)	54,611	83,214	5,076	273.1	5.38%
	Rampion 2 plus all consented projects only	55,313			276.6	5.45%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			115.0	2.27%
	All projects	71,787			358.9	7.07%
	All projects (excluding Hornsea Four)	39,478			197.4	3.89%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	54,611	141,815	8,651	273.1	3.16%
	Rampion 2 plus all consented projects only	55,313			276.6	3.20%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			115.0	1.33%
	All projects	71,787			358.9	4.15%
	All projects (excluding Hornsea Four)	39,478			197.4	2.28%

© WSP UK Limited

Table 3-4 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 95.2 km mean max plus one SD foraging range (Applicant's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	10,520	83,214	5,076	52.6	1.04%
	Rampion 2 plus all consented projects only	10,520			52.6	1.04%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	1,138			5.7	0.11%
	All projects	22,804			114.0	2.25%
	All projects (excluding Hornsea Four)	13,422			67.1	1.32%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	10,520	141,815	8,651	52.6	0.61%
	Rampion 2 plus all consented projects only	10,520			52.6	0.61%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	1,138			5.7	0.07%
	All projects	22,804			114.0	1.32%
	All projects (excluding Hornsea Four)	13,422			67.1	0.78%
Non-breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	83,214	5,076	153.7	3.03%
	Rampion 2 plus all consented projects only	31,447			157.2	3.10%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			42.6	0.84%
	All projects	35,637			178.2	3.51%
	All projects (excluding Hornsea Four)	12,710			63.6	1.25%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	141,815	8,651	153.7	1.78%
	Rampion 2 plus all consented projects only	31,447			157.2	1.82%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			42.6	0.49%
	All projects	35,637			178.2	2.06%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
	All projects (excluding Hornsea Four)	12,710			63.6	0.73%
Annual	Rampion 2 plus all consented projects (excluding DEP & SEP)	41,265	83,214	5,076	206.3	4.06%
	Rampion 2 plus all consented projects only	41,967			209.8	4.13%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			48.3	0.95%
	All projects	58,441			292.2	5.76%
	All projects (excluding Hornsea Four)	26,132			130.7	2.57%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	41,265	141,815	8,651	206.3	2.39%
	Rampion 2 plus all consented projects only	41,967			209.8	2.43%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			48.3	0.56%
	All projects	58,441			292.2	3.38%
	All projects (excluding Hornsea Four)	26,132			130.7	1.51%

© WSP UK Limited

Table 3-5 FFC SPA guillemot in-combination operation and maintenance phase displacement estimates using the 153.7 km mean max plus one SD foraging range (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
Breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	23,866	83,214	5,076	71.6 – 1,670.6	334.4	835.3	1.41 – 32.9%	6.58%	16.5%
	Rampion 2 plus all consented projects only	23,866			71.6 – 1,670.6	334.4	835.3	1.41 – 32.9%	6.58%	16.5%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	14,484			43.5 – 1,013.9	202.8	506.9	0.86 – 20.0%	4.00%	10.00%
	All projects	36,150			108.5 – 2,530.5	506.1	1,265.3	2.14 – 49.9%	10.00%	24.93%
	All projects (excluding Hornsea Four)	26,768			80.3 – 1,873.8	374.8	936.9	1.58 – 36.91%	7.38%	18.46%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	23,866	141,815	8,651	71.6 – 1,670.6	334.4	835.3	0.83 – 19.31%	3.86%	9.66%
	Rampion 2 plus all consented projects only	23,866			71.6 – 1,670.6	334.4	835.3	0.83 – 19.31%	3.86%	9.66%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	14,484			43.5 – 1,013.9	202.8	506.9	0.50 – 11.72%	2.34%	5.86%
	All projects	36,150			108.5 – 2,530.5	506.1	1,265.3	1.25 – 29.25%	5.85%	14.63%
	All projects (excluding Hornsea Four)	26,768			80.3 – 1,873.8	374.8	936.9	0.93 – 21.66%	4.33%	10.83%
Non-breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	83,214	5,076	92.2 – 2,152.1	430.4	1,076.1	1.82 – 42.4%	8.48%	21.20%
	Rampion 2 plus all consented projects only	31,447			94.3 – 2,201.3	440.3	1,100.7	1.86 – 43.37%	8.67%	21.68%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			25.6 – 596.4	119.3	298.2	0.50 – 11.75%	2.35%	5.87%
	All projects	35,637			106.9 – 2,494.6	498.9	1,247.3	2.11 – 49.14%	9.83%	24.57%
	All projects (excluding Hornsea Four)	12,710			38.1 – 889.7	177.9	444.8	0.75 – 17.53%	3.51%	8.76%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	141,815	8,651	92.2 – 2,152.1	430.4	1,076.1	1.07 – 24.88%	4.98%	12.44%
	Rampion 2 plus all consented projects only	31,447			94.3 – 2,201.3	440.3	1,100.7	1.09 – 25.45%	5.09%	12.72%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			25.6 – 596.4	119.3	298.2	0.80 – 18.61%	3.72%	9.31%
	All projects	35,637			106.9 – 2,494.6	498.9	1,247.3	1.24 – 28.84%	5.77%	14.42%
	All projects (excluding Hornsea Four)	12,710			38.1 – 889.7	177.9	444.8	0.44 – 10.28%	2.06%	5.14%
Annual	Rampion 2 plus all consented projects (excluding DEP & SEP)	54,611	83,214	5,076	163.8 – 3,822.7	764.6	1,911.4	3.23 – 75.31%	15.06%	37.65%
	Rampion 2 plus all consented projects only	55,313			165.9 – 3,871.9	774.4	1,936.0	3.27 – 76.28%	15.26%	38.14%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			69.0 – 1,610.3	322.1	805.2	1.36 – 31.72%	6.34%	15.86%
	All projects	71,787			215.4 – 5,025.1	1,005.0	2,512.5	4.24 – 99.00%	19.80%	49.50%
	All projects (excluding Hornsea Four)	39,478			118.4 – 2,763.4	552.7	1,381.7	2.33 – 54.55%	10.89%	27.22%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	54,611	141,815	8,651	163.8 – 3,822.7	764.6	1,911.4	1.89 – 44.19%	4.98%	12.44%
	Rampion 2 plus all consented projects only	55,313			165.9 – 3,871.9	774.4	1,936.0	1.92 – 44.76%	8.95%	22.38%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	23,004			69.0 – 1,610.3	322.1	805.2	0.80 – 18.61%	3.72%	9.31%
	All projects	71,787			215.4 – 5,025.1	1,005.0	2,512.5	2.49 – 58.09%	11.62%	29.04%
	All projects (excluding Hornsea Four)	39,478			118.4 – 2,763.4	552.7	1,381.7	1.37 – 31.94%	6.39%	15.97%

© WSP UK Limited

Table 3-6 FFC SPA guillemot in-combination operation and maintenance phase displacement using the 95.2 km mean max plus one SD foraging range (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
Breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	10,520	83,214	5,076	31.6 – 736.4	147.3	368.2	0.62 – 14.51%	2.90%	7.25%
	Rampion 2 plus all consented projects only	10,520			31.6 – 736.4	147.3	368.2	0.62 – 14.51%	2.90%	7.25%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	1,138			3.4 – 79.7	15.9	39.8	0.07 – 1.57%	0.31%	0.78%
	All projects	22,804			68.4 – 1,596.3	319.3	798.1	1.35 – 31.45%	6.29%	15.72%
	All projects (excluding Hornsea Four)	13,422			78.4 – 1,829.2	365.8	914.6	1.54 – 36.04%	7.21%	18.02%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	10,520	141,815	8,651	31.6 – 736.4	147.3	368.2	0.36 – 8.51%	1.70%	4.26%
	Rampion 2 plus all consented projects only	10,520			31.6 – 736.4	147.3	368.2	0.36 – 8.51%	1.70%	4.26%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	1,138			3.4 – 79.7	15.9	39.8	0.04 – 0.92%	0.18%	0.46%
	All projects	22,804			68.4 – 1,596.3	319.3	798.1	0.79 – 18.45%	3.69%	9.23%
	All projects (excluding Hornsea Four)	13,422			78.4 – 1,829.2	365.8	914.6	0.47 – 10.86%	2.17%	5.43%
Non-breeding	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	83,214	5,076	92.2 – 2,152.1	430.4	1,076.1	1.82 – 42.40%	8.48%	21.20%
	Rampion 2 plus all consented projects only	31,447			94.3 – 2,201.3	440.3	1,100.7	1.86 – 43.37%	8.67%	21.68%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			25.6 – 596.4	119.3	298.2	0.50 – 11.75%	2.35%	5.87%
	All projects	35,637			106.9 – 2,494.6	498.9	1,247.3	2.11 – 49.14%	9.83%	24.57%
	All projects (excluding Hornsea Four)	12,710			38.1 – 889.7	177.9	444.8	0.75 – 17.53%	3.51%	8.76%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 – 70% Disp 1 – 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
	Rampion 2 plus all consented projects (excluding DEP & SEP)	30,745	141,815	8,651	92.2 – 2,152.1	430.4	1,076.1	1.07 – 24.88%	4.98%	12.44%
	Rampion 2 plus all consented projects only	31,447			94.3 – 2,201.3	440.3	1,100.7	1.09 – 25.45%	5.09%	12.72%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	8,520			25.6 – 596.4	119.3	298.2	0.30 – 6.89%	1.38%	3.45%
	All projects	35,637			106.9 – 2,494.6	498.9	1,247.3	1.24 – 28.84%	5.77%	14.42%
	All projects (excluding Hornsea Four)	12,710			38.1 – 889.7	177.9	444.8	0.44 – 10.28%	2.06%	5.14%
Annual	Rampion 2 plus all consented projects (excluding DEP & SEP)	41,265	83,214	5,076	123.8 – 2,888.5	577.7	1,444.3	2.44 – 56.90%	11.38%	28.45%
	Rampion 2 plus all consented projects only	41,967			125.9 – 2,937.7	587.5	1,468.9	2.48 – 57.87%	11.57%	28.94%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			29.0 – 676.1	135.2	338.0	0.57 – 13.32%	2.66%	6.66%
	All projects	58,441			175.3 – 4,090.8	818.2	2,045.4	3.45 – 80.59%	16.12%	40.30%
	All projects (excluding Hornsea Four)	26,132			78.4 – 1,829.2	365.8	914.6	01.54 – 36.04%	7.21%	18.02%
	Rampion 2 plus all consented projects (excluding DEP & SEP)	41,265	141,815	8,651	123.8 – 2,888.5	577.7	1,444.3	1.43 – 33.39%	6.68%	16.70%
	Rampion 2 plus all consented projects only	41,967			125.9 – 2,937.7	587.5	1,468.9	1.46 – 33.96%	6.79%	16.98%
	Rampion 2 plus all consented projects (excluding Hornsea Four)	9,658			29.0 – 676.1	135.2	338.0	0.33 – 7.82%	1.56%	3.91%
	All projects	58,441			175.3 – 4,090.8	818.2	2,045.4	2.03 – 47.29%	9.46$	23.64%
	All projects (excluding Hornsea Four)	26,132			78.4 – 1,829.2	365.8	914.6	0.91 – 21.15%	4.23%	10.57%

© WSP UK Limited

3.2 Flamborough and Filey Coast SPA – Razorbill

3.2.1 The in-combination tables below (**Table 3.7** and **Table 3.8**) provide values from all consented and planned projects apportioned to the Flamborough and Filey Coast SPA. Totals are provided for the following scenarios:

- Rampion 2 plus all consented projects;
- Rampion 2 plus all consented projects (excluding Dudgeon and Sheringham Shoal Extension Projects) ~~and all consented projects~~; and
- All projects.

3.2.2 ~~The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to the similarity in timeline to the Proposed Development~~The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to consent for those projects being discussed during Rampion 2's Examination period. Splitting out in the manner presented accounts for any consent conclusions, such as removal of impact predictions from in-combination assessment in line with previous advice for consideration of projects where compensation is required. ~~.~~ Therefore, ~~S~~scenarios including and excluding these projects have been provided.

3.2.3 Due to the different values for mean max plus one SD foraging range for razorbill (Woodward *et al.*, 2019) two in-combination tables are provided as the use of the different foraging ranges will include or exclude different projects within the breeding season.

3.2.4 Displacement matrices for all displacement rate and mortality rate scenarios are provided for the annual totals in **Appendix A**.

© WSP UK Limited

Table 3-7 In-combination abundance totals for razorbill attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 164.6 km)

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Beatrice	0	28	15	28	72	1a
Blyth Demonstration Site	0	3	2	3	8	1a
Dudgeon	0	12	20	12	44	1a
EOWDC	0	2	0	1	3	1a
Galloper	0	2	3	13	18	1a
Greater Gabbard	0	0	11	3	13	1a
Gunfleet Sands	0	0	1	0	1	1a
Humber Gateway	0	1	0	1	2	1a
Hywind 2 Demonstration	0	24	0		25	1a
Kentish Flats	-	-	-	-	0	1a
Kentish Flats Extension	-	-	-	-	0	1a
Lincs, Lynn & Inner Dowsing	0	1	1	1	3	1a
London Array	0	1	0	1	2	1a
Methil	0	0	0	0	0	1a

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Race Bank	0	1	1	1	4	1a
Rampion	0	2	34	113	149	1a
Scroby Sands	-	-	-	-	0	1a
Sheringham Shoal	0	46	6	1	52	1a
Teesside	0	2	0	1	3	1a
Thanet	0	0	0	1	1	1a
Westermost Rough	91	4	4	3	102	1a
East Anglia One	0	1	4	11	17	1a
Hornsea Project One	535	164	41	61	800	1a
Hornsea Project Two	1,210	144	19	57	1,430	1a
Moray East	0	38	1	6	44	1b
Triton Knoll	0	9	23	4	36	1b
Kincardine	0	0	0	0	0	1b
Dogger Bank A	375	54	47	141	616~~241~~	1c
Dogger Bank B	461	71	58	174	764~~303~~	1c

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Dogger Bank C	250	11	26	65	352~~102~~	1c
East Anglia Three	0	38	41	52	130	1c
Inch Cape	0	98	18	-	115	1c
Moray West	0	121	5	122	247	1c
Neart na Gaoithe	0	187	14	-	200	1c
Seagreen Alpha	0	0	30	-	30	1c
Seagreen Bravo	0	0	34	-	34	1c
Sofia	346	20	39	100	505~~159~~	1c
Hornsea Three	0	69	99	72	240	1c
Norfolk Boreas	0	9	29	12	49	1c
Norfolk Vanguard	0	30	23	31	84	1c
East Anglia ONE North	0	3	2	7	11	1c
East Anglia TWO	0	2	4	8	13	1c
Pentland	0	1	1	1	3	1c
Hornsea Four (Natural England's Bespoke Approach)	386	2,845	13	15	3,259	1c

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Forth Wind	-	3	2	3	7	1c
Dudgeon Extension Project (DEP)	0	31	23	11	65	1c
Sheringham Shoal Extension Project (SEP)	0	11	19	5	35	1c
Rampion 2	0	1	331	21372	24774	1d
Total (Rampion 2 plus all consented projects except DEP & SEP)	**3,653**	**4,044**	**699**	**1,338**	**9,735**	
Total (Rampion 2 plus all consented projects only)	**3,653**	**4,086**	**741**	**1,354**	**9,835**	
Green Volt	0	-	-2	-	2	1d
West of Orkney	0	-	5	-	5	1d
~~Dudgeon Extension Project (DEP)~~	~~0~~	~~31~~	~~23~~	~~11~~	~~65~~	~~1d~~
~~Sheringham Shoal Extension Project (SEP)~~	~~0~~	~~11~~	~~19~~	~~5~~	~~35~~	~~1d~~
Berwick Bank	0	301	38	254	593	1d
Dogger Bank South	-	-	-	-	-	2
Outer dowsing (PEIR)	2,737	80	23	178	3,017	2

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Five Estuaries (PEIR)	0	10	10	26	46	2
North Falls (PEIR)	0	9	726	1,304	2,039	2
Total (All Projects)	**6,390**	**4,485**	**1,545**	**3,117**	**15,537**	

Table 3-8 In-combination abundance totals for razorbill attributed to the Flamborough and Filey Coast SPA. (Using mean max plus one SD foraging range of 122.2 km)

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Beatrice	0	28	15	28	72	1a
Blyth Demonstration Site	0	3	2	3	8	1a
Dudgeon	0	12	20	12	44	1a
EOWDC	0	2	0	1	3	1a
Galloper	0	2	3	13	18	1a
Greater Gabbard	0	0	11	3	13	1a
Gunfleet Sands	0	0	1	0	1	1a
Humber Gateway	0	1	0	1	2	1a

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Hywind 2 Demonstration	0	24	0		25	1a
Kentish Flats	-	-	-	-	0	1a
Kentish Flats Extension	-	-	-	-	0	1a
Lincs, Lynn & Inner Dowsing	0	1	1	1	3	1a
London Array	0	1	0	1	2	1a
Methil	0	0	0	0	0	1a
Race Bank	0	1	1	1	4	1a
Rampion	0	2	34	113	149	1a
Scroby Sands	-	-	-	-	0	1a
Sheringham Shoal	0	46	6	1	52	1a
Teesside	0	2	0	1	3	1a
Thanet	0	0	0	1	1	1a
Westermost Rough	91	4	4	3	102	1a
East Anglia One	0	1	4	11	17	1b
Hornsea Project One	535	164	41	61	800	1b

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Hornsea Project Two	1,210	144	19	57	1,430	1b
Moray East	0	38	1	6	44	1b
Triton Knoll	0	9	23	4	36	1b
Kincardine	0	0	0	0	0	1b
Dogger Bank A	0	54	47	141	241	1c
Dogger Bank B	0	71	58	174	303	1c
Dogger Bank C	0	11	26	65	102	1c
East Anglia Three	0	38	41	52	130	1c
Inch Cape	0	98	18	-	115	1c
Moray West	0	121	5	122	247	1c
Neart na Gaoithe	0	187	14	-	200	1c
Seagreen Alpha	0	0	30	-	30	1c
Seagreen Bravo	0	0	34	-	34	1c
Sofia	0~~346~~	20	39	100	159	1c
Hornsea Three	0	69	99	72	240	1c

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
Norfolk Boreas	0	9	29	12	49	1c
Norfolk Vanguard	0	30	23	31	84	1c
East Anglia ONE North	0	3	2	7	11	1c
East Anglia TWO	0	2	4	8	13	1c
Pentland	0	1	1	1	3	1c
Hornsea Four (Natural England's Bespoke Approach)	386	2,845	13	15	3,259	1c
Forth Wind	-	3	2	3	7	1c
Dudgeon Extension Project (DEP)	0	31	23	11	65	1c
Sheringham Shoal Extension Project (SEP)	0	11	19	5	35	1c
Rampion 2	0	1	331	21372	24774	1d
Total (Rampion 2 plus all consented projects only)	**2,221**	**4,086**	**741**	**1,354**	**8,403**	
Total (Rampion 2 plus all consented projects except DEP & SEP)	**2,221**	**4,044**	**699**	**1,338**	**8,303**	
Green Volt	0	-	2	-	2	1d

© WSP UK Limited

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual	Tier
West of Orkney	0	-	5	-	5	1d
~~Dudgeon Extension Project (DEP)~~	~~0~~	~~31~~	~~23~~	~~11~~	~~65~~	~~1d~~
~~Sheringham Shoal Extension Project (SEP)~~	~~0~~	~~11~~	~~19~~	~~5~~	~~35~~	~~1d~~
Berwick Bank	0	301	38	254	593	1d
Dogger Bank South	-	-	-	-	-	2
Outer dowsing (PEIR)	2,737	80	23	178	3,017	2
Five Estuaries (PEIR)	0	10	10	26	46	2
North Falls (PEIR)	0	9	726	1,304	2,039	2
Total (All Projects)	**4,958**	**4,485**	**1,545**	**3,117**	**14,105**	

© WSP UK Limited

Table 3-9 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the 164.6 km mean max plus one SD foraging range (Applicant's approach)

Bio-season	Projects included within seasonal totals	Seasonal abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Migration-free Breeding	Rampion 2 plus all consented projects (except SEP & DEP)	3,653	21,140	2,220	18.3	0.82%
	Rampion 2 plus all consented projects only	3,653			18.3	0.82%
	All projects	6,390			32.0	1.44%
	Rampion 2 plus all consented projects (except SEP & DEP)	3,653	59,055	6,201	18.3	0.29%
	Rampion 2 plus all consented projects only	3,653			18.3	0.29%
	All projects	6,390			32.0	0.52%
Post-breeding migration	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	21,140	2,220	20.2	0.91%
	Rampion 2 plus all consented projects only	4,086			20.4	0.92%
	All projects	4,485			22.4	1.01%
	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	59,055	6,201	20.2	0.33%
	Rampion 2 plus all consented projects only	4,086			20.4	0.33%
	All projects	4,485			22.4	0.36%
Migration-free winter	Rampion 2 plus all consented projects (except SEP & DEP)	699	21,140	2,220	3.5	0.16%
	Rampion 2 plus all consented projects only	741			3.7	0.17%
	All projects	1,545			7.7	0.35%
	Rampion 2 plus all consented projects (except SEP & DEP)	699	59,055	6,201	3.5	0.06%
	Rampion 2 plus all consented projects only	741			3.7	0.06%
	All projects	1,545			7.7	0.12%
Return migration	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	21,140	2,220	6.7	0.30%
	Rampion 2 plus all consented projects only	1,354			6.8	0.31%
	All projects	3,117			15.6	0.70%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal abundance (array area & 2km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	59,055	6,201	6.7	0.11%
	Rampion 2 plus all consented projects only	1,354			6.8	0.11%
	All projects	3,117			15.6	0.25%
Annual	Rampion 2 plus all consented projects (except SEP & DEP)	9,735	21,140	2,220	48.7	2.19%
	Rampion 2 plus all consented projects only	9,835			49.2	2.22%
	All projects	15,537			77.7	3.50%
	Rampion 2 plus all consented projects (except SEP & DEP)	9,735	59,055	6,201	48.7	0.78%
	Rampion 2 plus all consented projects only	9,835			49.2	0.79%
	All projects	15,537			77.7	1.25%

© WSP UK Limited

Table 3-10 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the 122.2 km mean max plus one SD foraging range (Applicant's approach)

Bio-season	Projects included within seasonal totals	Seasonal abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Migration-free Breeding	Rampion 2 plus all consented projects (except SEP & DEP)	2,221	21,140	2,220	11.1	0.50%
	Rampion 2 plus all consented projects only	2,221			11.1	0.50%
	All projects	4,958			24.8	1.12%
	Rampion 2 plus all consented projects (except SEP & DEP)	2,221	59,055	6,201	11.1	0.18%
	Rampion 2 plus all consented projects only	2,221			11.1	0.18%
	All projects	4,958			24.8	0.40%
Post-breeding migration	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	21,140	2,220	20.2	0.91%
	Rampion 2 plus all consented projects only	4,086			20.4	0.92%
	All projects	4,485			22.4	1.01%
	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	59,055	6,201	20.2	0.33%
	Rampion 2 plus all consented projects only	4,086			20.4	0.33%
	All projects	4,485			22.4	0.36%
Migration-free winter	Rampion 2 plus all consented projects (except SEP & DEP)	699	21,140	2,220	3.5	0.16%
	Rampion 2 plus all consented projects only	741			3.7	0.17%
	All projects	1,545			7.7	0.35%
	Rampion 2 plus all consented projects (except SEP & DEP)	699	59,055	6,201	3.5	0.06%
	Rampion 2 plus all consented projects only	741			3.7	0.06%
	All projects	1,545			7.7	0.12%
Return migration	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	21,140	2,220	6.7	0.30%
	Rampion 2 plus all consented projects only	1,354			6.8	0.31%
	All projects	3,117			15.6	0.70%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	59,055	6,201	6.7	0.11%
	Rampion 2 plus all consented projects only	1,354			6.8	0.11%
	All projects	3,117			15.6	0.25%
Annual	Rampion 2 plus all consented projects (except SEP & DEP)	8,303	21,140	2,220	41.5	1.87%
	Rampion 2 plus all consented projects only	8,403			42.0	1.89%
	All projects	14,105			70.5	0.50%
	Rampion 2 plus all consented projects (except SEP & DEP)	8,303	59,055	6,201	41.5	0.67%
	Rampion 2 plus all consented projects only	8,403			42.0	0.68%
	All projects	14,105			70.5	0.18%

© WSP UK Limited

Table 3-11 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the mean max plus one SD foraging range of 164.6 km (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1% Mort - 10	70% Disp 2% Mort	70% Disp 5% Mort
Migration-free Breeding	Rampion 2 plus all consented projects (except SEP & DEP)	3,653	21,140	2,220	11.0 – 255.7	51.2	127.9	0.49 – 11.52%	2.30%	5.76%
	Rampion 2 plus all consented projects only	3,653			11.0 – 255.7	51.2	127.9	0.49 – 11.52%	2.30%	5.76%
	All projects	6,390			19.2 – 447.3	89.5	223.7	0.86 – 20.15%	4.03%	10.08%
	Rampion 2 plus all consented projects (except SEP & DEP)	3,653	59,055	6,201	11.0 – 255.7	51.2	127.9	0.18 – 4.12%	0.82%	2.06%
	Rampion 2 plus all consented projects only	3,653			11.0 – 255.7	51.2	127.9	0.18 – 4.12%	0.82%	2.06%
	All projects	6,390			19.2 – 447.3	89.5	223.7	0.31 – 7.21%	1.44%	3.61%
Post-breeding migration	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	21,140	2,220	12.1 – 283.1	56.6	141.5	0.55 – 12.75%	2.55%	6.38%
	Rampion 2 plus all consented projects only	4,086			12.3 – 286.0	57.2	143.0	0.55 – 12.88%	2.58%	6.44%
	All projects	4,485			13.5 – 313.9	62.8	157.0	0.61 – 14.14%	2.83%	7.07%
	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	59,055	6,201	12.1 – 283.1	56.6	141.5	0.20 – 4.56%	0.91%	2.28%
	Rampion 2 plus all consented projects only	4,086			12.3 – 286.0	57.2	143.0	0.20 – 4.61%	0.92%	2.31%
	All projects	4,485			13.5 – 313.9	62.8	157.0	0.22 – 5.06%	1.01%	2.53%
Migration-free winter	Rampion 2 plus all consented projects (except SEP & DEP)	699	21,140	2,220	2.1 – 49.0	9.8	24.5	0.09 – 2.21%	0.44%	1.10%
	Rampion 2 plus all consented projects only	741			2.2 – 51.9	10.4	25.9	0.10 – 2.34%	0.47%	1.17%
	All projects	1,545			4.6 – 108.2	21.6	54.1	0.21 – 4.87%	0.97%	2.44%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1% Mort - 10	70% Disp 2% Mort	70% Disp 5% Mort
	Rampion 2 plus all consented projects (except SEP & DEP)	699	59,055	6,201	2.1 – 49.0	9.8	24.5	0.03 – 0.79%	0.16%	0.39%
	Rampion 2 plus all consented projects only	741			2.2 – 51.9	10.4	25.9	0.04 – 0.84%	0.17%	0.42%
	All projects	1,545			4.6 – 108.2	21.6	54.1	0.07 – 1.74%	0.35%	0.87%
Return migration	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	21,140	2,220	4.0 – 93.7	18.7	46.8	0.18 – 4.22%	0.84%	2.11%
	Rampion 2 plus all consented projects only	1,354			4.1 – 94.8	19.0	47.4	0.18 – 4.27%	0.85%	2.14%
	All projects	3,117			9.4 – 218.2	43.6	109.1	0.42 – 9.83%	1.97%	4.91%
	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	59,055	6,201	4.0 – 93.7	18.7	46.8	0.06 – 1.51%	0.30%	0.76%
	Rampion 2 plus all consented projects only	1,354			4.1 – 94.8	19.0	47.4	0.07 – 1.53%	0.31%	0.76%
	All projects	3,117			9.4 – 218.2	43.6	109.1	0.15 – 3.52%	0.70%	1.76%
Annual	Rampion 2 plus all consented projects (except SEP & DEP)	9,735	21,140	2,220	29.2 – 681.4	136.3	340.7	1.32 – 30.70%	6.14%	15.35%
	Rampion 2 plus all consented projects only	9,835			29.5 – 688.4	137.7	344.2	1.33 – 31.01%	6.20%	15.51%
	All projects	15,537			46.6 – 1,087.6	217.5	543.8	2.10 – 49.00%	9.80%	24.50%
	Rampion 2 plus all consented projects (except SEP & DEP)	9,735	59,055	6,201	29.2 – 681.4	136.3	340.7	0.47 – 10.99%	2.20%	5.49%
	Rampion 2 plus all consented projects only	9,835			29.5 – 688.4	137.7	344.2	0.48 – 11.10%	2.22%	5.55%
	All projects	15,537			46.6 – 1,087.6	217.5	543.8	0.75 – 17.54%	3.51%	8.77%

© WSP UK Limited

Table 3-12 FFC SPA razorbill in-combination operation and maintenance phase displacement estimates using the mean max plus one SD foraging range of 122.2 km (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1% Mort - 10	70% Disp 2% Mort	70% Disp 5% Mort
Migration-free Breeding	Rampion 2 plus all consented projects (except SEP & DEP)	2,221	21,140	2,220	6.7 – 155.5	31.1	77.7	0.30 – 7.01%	1.40%	3.50%
	Rampion 2 plus all consented projects only	2,221			6.7 – 155.5	31.1	77.7	0.30 – 7.01%	1.40%	3.50%
	All projects	4,958			14.9 – 347.1	69,4	173.5	0.67 – 15.64%	3.13%	7.82%
	Rampion 2 plus all consented projects (except SEP & DEP)	2,221	59,055	6,201	6.7 – 155.5	31.1	77.7	0.11 – 2.51%	0.50%	1.25%
	Rampion 2 plus all consented projects only	2,221			6.7 – 155.5	31.1	77.7	0.11 – 2.51%	0.50%	1.25%
	All projects	4,958			14.9 – 347.1	69,4	173.5	0.24 – 5.60%	1.12%	2.80%
Post-breeding migration	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	21,140	2,220	12.1 – 283.1	56.6	141.5	0.55 – 12.75%	2.55%	6.38%
	Rampion 2 plus all consented projects only	4,086			12.3 – 286.0	57.2	142.2	0.55 – 12.88%	2.58%	6.44%
	All projects	4,485			13.5 – 314.0	62.8	157.0	0.61 – 14.14%	2.83%	7.07%
	Rampion 2 plus all consented projects (except SEP & DEP)	4,044	59,055	6,201	12.1 – 283.1	56.6	141.5	0.20 – 4.56%	0.91%	2.28%
	Rampion 2 plus all consented projects only	4,086			12.3 – 286.0	57.2	142.2	0.20 – 4.61%	0.92%	2.31%
	All projects	4,485			13.5 – 314.0	62.8	157.0	0.22 – 5.06%	1.01%	2.53%
Migration-free winter	Rampion 2 plus all consented projects (except SEP & DEP)	699	21,140	2,220	2.1 – 49.0	9.8	24.5	0.09 – 2.21%	0.44%	1.10%
	Rampion 2 plus all consented projects only	741			2.2 – 51.9	10.4	25.9	0.10 – 2.34%	0.47%	1.17%
	All projects	1,545			4.6 – 108.2	21.6	54.1	0.21 – 4.87%	0.97%	2.44%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2 km buffer)	FFC SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of razorbills subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1% Mort - 10	70% Disp 2% Mort	70% Disp 5% Mort
	Rampion 2 plus all consented projects (except SEP & DEP)	699	59,055	6,201	2.1 – 49.0	9.8	24.5	0.03 – 0.79%	0.16%	0.39%
	Rampion 2 plus all consented projects only	741			2.2 – 51.9	10.4	25.9	0.04 – 0.84%	0.17%	0.42%
	All projects	1,545			4.6 – 108.2	21.6	54.1	0.07 – 1.74%	0.35%	0.87%
Return migration	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	21,140	2,220	4.0 – 93.7	18.7	46.8	0.18 – 4.22%	0.84%	2.11%
	Rampion 2 plus all consented projects only	1,354			4.1 – 94.8	19.0	47.4	0.18 – 4.27%	0.85%	2.14%
	All projects	3,117			9.4 – 987.3	197.5	493.7	1.91 – 44.48%	8.90%	22.24%
	Rampion 2 plus all consented projects (except SEP & DEP)	1,338	59,055	6,201	4.0 – 93.7	18.7	46.8	0.06 – 1.51%	0.30%	0.76%
	Rampion 2 plus all consented projects only	1,354			4.1 – 94.8	19.0	47.4	0.07 – 1.53%	0.31%	0.76%
	All projects	3,117			9.4 – 987.3	197.5	493.7	0.68 – 15.92%	3.18%	7.69%
Annual	Rampion 2 plus all consented projects (except SEP & DEP)	8,303	21,140	2,220	24.9 – 581.2	116.2	290.6	1.12 – 26.18%	5.24%	13.09%
	Rampion 2 plus all consented projects only	8,403			25.2 – 588.2	117.6	294.1	1.14 – 26.50%	5.30%	13.25%
	All projects	14,105			42.3 – 987.3	197.5	493.7	1.91 – 44.48%	8.90%	22.24%
	Rampion 2 plus all consented projects (except SEP & DEP)	8,303	59,055	6,201	24.9 – 581.2	116.2	290.6	0.40 – 9.37%	1.87%	4.69%
	Rampion 2 plus all consented projects only	8,403			25.2 – 588.2	117.6	294.1	0.41 – 9.49%	1.90%	4.74%
	All projects	14,105			42.3 – 987.3	197.5	493.7	0.68 – 15.92%	3.18%	7.96%

© WSP UK Limited

3.3 Farne Islands SPA – Guillemot

3.3.1 The in-combination table below (**Table 3.13**) provides values from all consented and planned projects apportioned to the Farne Islands SPA. Totals are provided for the following scenarios:

- Rampion 2 plus all consented projects;
- Rampion 2 plus all consented projects (excluding Dudgeon and Sheringham Shoal Extension Projects) ~~and all consented projects~~; and
- All projects.

3.3.2 ~~The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to the similarity in timeline to the Proposed Development~~The consideration of Dudgeon and Sheringham Shoal Extension Projects is due to consent for those projects being decided within Rampion 2's Examination period. Spitting out in the manner presented accounts for any consent conclusions, such as removal of impact predictions from in-combination assessment in line with previous advice for consideration of projects where compensation is required. Therefore, ~~S~~scenarios including and excluding these projects have been provided.

3.3.3 Regardless of which of the two foraging ranges (95.2 km or 153.7 km) for guillemot is used (Woodward *et al.*, 2019) to identify theoretical breeding season connectivity, the overall in-combination abundance total apportioned the Farne Islands SPA remains the same.

3.3.4 It should be noted that despite a number of Scottish OWF projects (Inch Cape, Nearte na Gaoithe and Seagreen) being within foraging range, and so having theoretical connectivity during the breeding season, predicted impacts during the breeding season were instead entirely apportioned to Scottish SPAs closer to the projects. Therefore, no abundance for such projects were attributed to the Farne Islands SPA during the breeding season.

3.3.5 Additionally, no quantitative Farne Islands SPA assessment information was available for Teeside OWF to be able to apportion abundance from the project during the breeding season.

3.3.6 Displacement matrices for all displacement rate and mortality rate scenarios are provided for the annual totals in **Appendix A**.

© WSP UK Limited

Table 3-13 In-combination abundance totals for guillemot attributed to the Farne Islands SPA

Project	Breeding season	Non-breeding season	Annual	Tier
Beatrice	0	103	103	1a
Blyth Demonstration Site	-	49	49	1a
Dudgeon	0	20	20	1a
EOWDC	0	8	8	1a
Galloper	0	22	22	1a
Greater Gabbard	0	20	20	1a
Gunfleet Sands	0	14	14	1a
Humber Gateway	0	5	5	1a
Hywind 2 Demonstration	0	80	80	1a
Kentish Flats Extension	0	0	0	1a
Kentish Flats	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	30	30	1a
London Array	0	14	14	1a
Methil	0	0	0	1a
Race Bank	0	26	26	1a

© WSP UK Limited

Project	Breeding season	Non-breeding season	Annual	Tier
Rampion	0	579	579	1a
Scroby Sands	0	-	0	1a
Sheringham Shoal	0	27	27	1a
Teesside	0	34	34	1a
Thanet	0	5	5	1a
Westermost Rough	0	18	18	1a
East Anglia One	0	24	24	1b
Hornsea Project One	0	302	302	1b
Hornsea Project Two	0	491	491	1b
Moray East	0	20	20	1b
Triton Knoll	0	28	28	1b
Kincardine	0	0	0	1b
Dogger Bank A	0	229	229	1c
Dogger Bank B	0	396	396	1c
Dogger Bank C	0	85	85	1c
East Anglia Three	0	107	107	1c

© WSP UK Limited

Project	Breeding season	Non-breeding season	Annual	Tier
Inch Cape	0	119	119	1c
Moray West	0	1,424	1,424	1c
Neart na Gaoithe	0	140	140	1c
Seagreen Alpha	0	175	175	1c
Seagreen Bravo	0	153	153	1c
Sofia	0	138	138	1c
Hornsea Three	0	663	663	1c
Norfolk Boreas	0	514	514	1c
Norfolk Vanguard	0	178	178	1c
East Anglia ONE North	0	70	70	1c
East Anglia TWO	0	62	62	1c
Pentland	0	24	24	1c
Forth Wind	0	15	15	1c
Hornsea Four (Natural England's Standard Approach)	0	1,379	1,379	1c
Dudgeon Extension Project (DEP)	-	555	555	1c

© WSP UK Limited

Project	Breeding season	Non-breeding season	Annual	Tier
Sheringham Shoal Extension Project (SEP)	-	41	41	1c
Rampion 2	0	214	214	1d
Total (Rampion 2 plus all consented projects except DEP & SEP)	**0**	**8,005**	**8,005**	
Total (Rampion 2 plus all consented projects only)	**0**	**8,601**	**8,601**	
Green Volt	0	601	601	1d
West of Orkney	0	160	160	1d
~~Dudgeon Extension Project (DEP)~~	~~-~~	~~555~~	~~555~~	~~1d~~
~~Sheringham Shoal Extension Project (SEP)~~	~~-~~	~~41~~	~~41~~	~~1d~~
Berwick Bank	2,949	1,648	4,597	1d
Dogger Bank South	0	-	-	2
Outer dowsing	0	830	830	2
Five Estuaries (PEIR)	-	138	138	2
North Falls (PEIR)	-	168	168	2
Total (All Projects)	**2,949**	**12,145**	**15,094**	

© WSP UK Limited

Table 3-14 Farne Islands SPA guillemot in-combination operation and maintenance phase displacement estimates (Applicant's approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	Farne Islands SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)	Increase in baseline mortality (%)
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	50% Disp 1% Mort	50% Disp 1% Mort
Breeding	Rampion 2 plus all consented projects (except DEP & SEP)	0	65,751	4,011	0	0.00%
	Rampion 2 plus all consented projects only	0			0	0.00%
	All projects	2,949			14.7	0.37%
	Rampion 2 plus all consented projects (except DEP & SEP)	0	62,085	3,787	0	0.00%
	Rampion 2 plus all consented projects only	0			0	0.00%
	All projects	2,949			14.7	0.39%
Non-breeding	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	65,751	4,011	40.0	1.00%
	Rampion 2 plus all consented projects only	8,601			43.0	1.07%
	All projects	12,145			60.7	1.51%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	62,085	3,787	40.0	1.06%
	Rampion 2 plus all consented projects only	8,601			43.0	1.14%
	All projects	12,145			60.7	1.60%
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	65,751	4,011	40.0	1.00%
	Rampion 2 plus all consented projects only	8,601			43.0	1.07%
	All projects	15,094			75.5	1.88%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	62,085	3,787	40.0	1.06%
	Rampion 2 plus all consented projects only	8,601			43.0	1.14%
	All projects	15,094			75.5	1.99%

© WSP UK Limited

Table 3-15 Farne Islands SPA guillemot in-combination operation and maintenance phase displacement estimates (Natural England's preferred approach)

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	Farne Islands SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
Breeding	Rampion 2 plus all consented projects (except DEP & SEP)	0	65,751	4,011	0.0	0.0	0.0	0.00 – 0.00%	0.00%	0.00%
	Rampion 2 plus all consented projects only	0			0.0	0.0	0.0	0.00 – 0.00%	0.00%	0.00%
	All projects	2,949			8.8 – 206.5	41.3	103.2	0.22 – 5.15%	1.03%	2.57%
	Rampion 2 plus all consented projects (except DEP & SEP)	0	62,085	3,787	0.0	0.0	0.0	0.00 – 0.00%	0.00%	0.00%
	Rampion 2 plus all consented projects only	0			0.0	0.0	0.0	0.00 – 0.00%	0.00%	0.00%
	All projects	2,949			8.8 – 206.5	41.3	103.2	0.23 – 5.45%	1.09%	2.73%
Non-breeding	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	65,751	4,011	24.0 – 560.4	112.1	280.2	0.60 – 13.97%	2.79%	6.99%
	Rampion 2 plus all consented projects only	8,601			25.8 – 602.1	120.4	301.0	0.64 – 15.01%	3.00%	7.51%
	All projects	12,145			36.4 – 850.1	170.0	425.1	0.91 – 21.20%	4.24%	10.60%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	62,085	3,787	24.0 – 560.4	112.1	280.2	0.63 – 14.80%	2.96%	7.40%
	Rampion 2 plus all consented projects only	8,601			25.8 – 602.1	120.4	301.0	0.68 – 15.90%	3.18%	7.95%
	All projects	12,145			36.4 – 850.1	170.0	425.1	0.96 – 22.45%	4.49%	11.22%
Annual	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	65,751	4,011	24.0 – 560.4	112.1	280.2	0.60 – 13.97%	2.79%	6.99%
	Rampion 2 plus all consented projects only	8,601			25.8 – 602.1	120.4	301.0	0.64 – 15.01%	3.00%	7.51%
	All projects	15,094			43.3 – 1,056.6	211.3	528.3	1.13 – 26.34%	5.27%	13.17%
	Rampion 2 plus all consented projects (except DEP & SEP)	8,005	62,085	3,787	24.0 – 560.4	112.1	280.2	0.63 – 14.80%	2.96%	7.40%

© WSP UK Limited

Bio-season	Projects included within seasonal totals	Seasonal breeding adult abundance (array area & 2km buffer)	Farne Islands SPA citation and latest colony (2022) population and baseline mortality rate		Estimated number of guillemots subject to mortality (breeding adults per annum)			Increase in baseline mortality (%)		
			Population (breeding adults)	Baseline mortality (breeding adults per annum)	30 – 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort	30 - 70% Disp 1 - 10% Mort	70% Disp 2% Mort	70% Disp 5% Mort
	Rampion 2 plus all consented projects only	8,601			25.8 – 602.1	120.4	301.0	0.68 – 15.90%	3.18%	7.95%
	All projects	15,094			43.3 – 1,056.6	211.3	528.3	1.20 – 27.90%	5.58%	13.95%

© WSP UK Limited

4. Population Viability Analysis

4.1.1 PVA was conducted where in-combination impacts presented in **Section 3** exceeded a 1% increase in baseline mortality at the SPA population scale. An overview of the PVA methodology is described below.

Modelling approach

4.1.2 The Seabird PVA Tool (Searle *et al*., 2019) uses a Leslie matrix to construct a PVA model (Caswell, 2000) based on the parameters provided by the user. Users can specify whether they wish the model to include demographic stochasticity, environmental stochasticity, and either use density dependent or independent methods, or whether they want the model to run as entirely deterministic model. Additionally, the model offers the user pre-set demographic rates which are based on generic parameters such as Horswill & Robinson (2015) or site-specific growth rates from previous studies. The selection of appropriate parameters is critical to producing justifiable PVA outputs, with the selection of demographic parameters details in **Table 4.1**.

4.1.3 A deterministic model translates the demographic parameters provided into actual numbers and provides a simplistic model, which can be used to generate average trends. Due to the lack of stochasticity, a deterministic model will produce the same result every time the simulation is run. In situations where little is known about how the population size has varied, or how the scale of impact may vary, running a deterministic model might provide a more candid assessment of the population and how it may be impacted.

4.1.4 A stochastic model produces probabilistic outputs to account for the impact of environmental and demographic stochasticity. Environmental stochasticity describes the effects random variation in factors such as weather or viral outbreaks can have on a population and is modelled by the incorporation of randomly generated values, based on a set standard deviation, for the probability of survival from one-time step to the next. Demographic stochasticity refers to the effect of random variation in population structure on demographic rates and is modelled by generating random numbers of surviving individuals for any given survival probability. Demographic stochasticity can usually be ignored for populations greater than 100 individuals, however including demographic stochasticity will not cause any penalty when simulating larger populations (WWT Consulting, 2012).

4.1.5 Natural populations continually operate under density dependency, including nature mechanisms such as food resources which limit the growth rate and total size a population could obtain (theoretical carrying capacity). Demographic processes such as growth, survival, productivity and recruitment are density-dependent, as their rates change in relation to the number of individuals in a population. Density dependence can be described as being either compensatory or depensatory (Begon *et al.,* 2005). Compensation is characterised by demographic changes that cause a stabilising effect on a populations long-term average. Depensation acts to further decrease the rate of population growth in

declining populations and can delay the rate of recovery. This is typically exhibited in populations that have been significantly depleted in size and is caused by a reduction in the benefits associated with conspecific presence.

4.1.6 Density dependence is self-evident in the natural environment, as without density dependence, populations would grow exponentially. For seabird populations, the mechanisms as to how this operates are largely uncertain, or where known is highly variable. Therefore, the more typical approach of using density independent models for seabird assessments, despite the lack of biologically realistic density dependence. Density independent models lack any means by which a population can recover once it has been reduced beyond a certain point or alternatively populations can grow exponentially, they are therefore appropriate for impact assessment purposes on the grounds of precaution (i.e., another source of precaution in the assessment process) as they are more likely to overestimate true impacts (Ridge *et al.,* 2019).

PVA demographic parameters

4.1.7 The Seabird PVA Tool (Searle *et al.,* 2019) has a Shiny App that offers the user the choice of using pre-set demographic parameters or the ability to enter custom values. The pre-set demographic values are available for a total of 15 different species. The values are derived from previously reported national or colony specific demographic parameters sourced from the Joint Nature Conservation Committee (JNCC) Seabird Monitoring Programme (SMP, 2020). This data is further divided into eight regional classifications (Mobbs *et al.,* 2020) for breeding success data or Horswill & Robinson (2015) for survival rate.

4.1.8 Following a review of the pre-formulated productivity rates within the Seabird PVA Tool (Searle *et al*., 2019) for the eight regional classifications, none of the pre-formulated values for productivity were representative of known population trends for those assessed within this report. This was due to the age of these data (productivity data spanning over 50 years in some instances) feeding into the productivity rates. Therefore, where possible, SPA-specific productivity values were calculated using breeding success from the SMP database (Seabird Monitoring Programme, 2023) and the associated colony count data. Average productivity rates (and associated standard deviations) were calculated using the datasets provided in the SMP database for the guillemot and razorbill feature for FFC SPA and the guillemot feature at Farne Islands SPA. **Table 4.1** summarises the species-specific values selected for the two species that are the focus of this report.

4.1.9 The overall productivity was calculated as the mean of each year's colony counts for all the years SPA colony count data available. Where specific years had multiple counts, these were subject to a weighted mean approach to avoid bias towards productivity for a certain year.

4.1.10 For the seabird colonies assessed there are currently no colony-specific survival rates available. In the absence of colony-specific survival rates all modelling relied on the pre-formulated national values presented within the Seabird PVA Tool (Searle *et al.,* 2019). These pre-formulated values were derived from Horswill and Robinson (2015) and are deemed to be the most appropriate values in the absence of colony-specifics. The age at first breeding and maximum brood size

© WSP UK Limited

per pair parameters were also selected from the pre-formulated values within the Seabird PVA Tool (Searle *et al.,* 2019).

© WSP UK Limited

Table 4-1 SPA population demographic parameters for guillemot and razorbill

Species	SPA	Population count	SPA population size (adults)	Productivity rate +SD	Mean adult survival rate + SD	Mean immature age class 0-1 survival rate +SD	Mean immature age class 1-2 survival rate +SD	Mean immature age class 2-3 survival rate +SD	Mean immature age class 3-4 survival rate +SD	Mean immature age class 5-6 survival rate +SD
Guillemot	FFC SPA	Citation	83,214	0.715 ± 0.075	0.939 ± 0.015	0.560 ± 0.001	0.792 ± 0.001	0.917 ± 0.001	0.917 ± 0.001)	0.939 ± 0.015
		Latest count	141,814							
	Farne Islands SPA	Citation	65,751	0.823 ± 0.164						
		Latest count	62,085							
Razorbill	FFC SPA	Citation	21,140	0.653 ± 0.099	0.895 ± 0.067	0.630 ± 0.209	0.630 ± 0.209	0.895 ± (0.067)	0.895 ± (0.067)	0.895 ± (0.067)
		Latest count	59,055							

4.1.11 The outputs of the Seabird PVA Tool are set out in **Table 4.4**, **Table 4.6** and **Table 4.8** below. The metrics used to summarise the PVA results are based on the counterfactual of population growth calculated as the median of the ratio of the annual growth rate of the impacted to un-impacted population, expressed as a proportion.

4.1.12 Three different approaches were taken for the PVA as follows:

- Applicant's upper level of predicted impact using 50% Displacement and 1% Mortality;
- Secretary of States upper level of predicted impact using 70% Displacement and 2% Mortality;
- Natural England's upper level of predicted impact using 70% Displacement and 5% Mortality.

Validation results

4.1.13 Prior to running PVA validation modelling was undertaken to provide context as to whether the demographic rates used for modelling are representative of the trends naturally exhibited in the population or colony being analysed to ensure the PVA is as robust as possible (in the absence of density dependence). In order to validate the model, historic population / colony size data is required to compare the models baseline population against.

4.1.14 For PVA modelling at the HRA level, when assessing impacts against the relevant qualifying species' colony from designated sites such as the FFC SPA, the colony has been consistently monitored since 1969 which allows for validation to be undertaken. A summary of the historic colony counts for the qualifying features of the FFC SPA are presented in **Table 4.2** and count for Farne Islands SPA in **Table 4.3**. The starting, or initial, population was set to the 2000 colony count for each feature for the FFC SPA and 2004 for the Farne Islands SPA in order to allow for comparison with recent exhibited colony trends.

4.1.15 Summaries of the model logs presenting the input demographic rates for the validation analysis is provided in **Appendix B**. With the exception of productivity rate, the demographic values are the models preformulated values which are based on the literature review conducted by Horswill & Robinson (2015).

Table 4-2 Flamborough and Filey Coast SPA historic colony counts for guillemot and razorbill

Species	Year			
	2000	2008	2017	2022
Guillemot	63,268	80,155	113,427	141,815
Razorbill	11,340	20,041	37,473	59,055

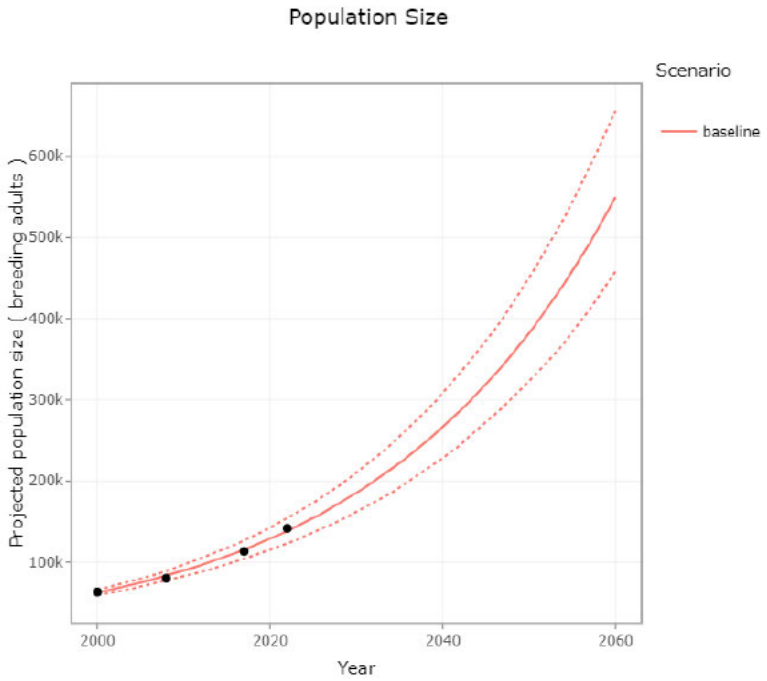
Table 4-3 Farne Islands SPA historic colony counts for guillemot and razorbill

Species	Year				
	2004	**2005**	**2006**	**2007**	**2008**
Guillemot	58,550	62,866	64,234	65,191	58,779
	2009	**2010**	**2011**	**2012**	**2013**
	64,489	62,116	64,289	65,762	67,064
	2014	**2015**	**2016**	**2017**	**2018**
	69,523	71,638	65,710	64,634	66,962
	2019	**2020**	**2021**	**2022**	**2023**
	85,816	84,973	84,334	79,285	62,085

Guillemot Validation for FFC SPA

4.1.16 As presented in **Figure 4.1**, the baseline population trend produced from the model matches closely with the actual exhibited colony growth trend. Therefore, the demographic rates used for guillemot (productivity rate of 0.715 and survival rate of 0.939) can be considered appropriate for analysis.

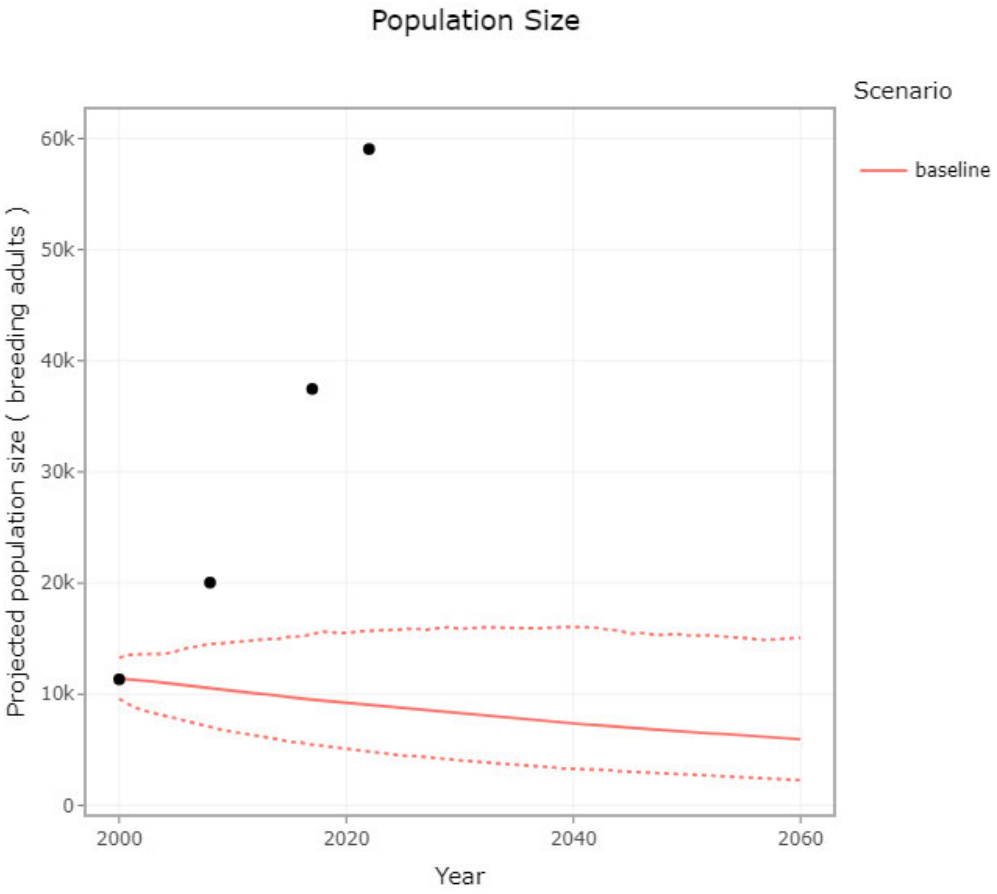
Figure 4.1 FFC SPA guillemot baseline PVA model validation



Razorbill Validation for FFC SPA

4.1.17 As presented in **Figure 4.2**, the baseline population trend produced from the PVA model when using the preformulated demographic rates, including productivity rate per pair of 0.653 results in a negative population decline. This is in complete contrast to observed counts where the colony trend shows a significant positive growth trend over a prolonged period of time at the FFC SPA colony (compound growth rate of +7.79% per annum between 2000 – 2022). This would suggest that there are other key variables that are not included within the current version of the PVA model that are having a significant effect on the population. Therefore, it is likely that the level of predicted impact from PVA modelling is overly precautionary.

Figure 4.2 FFC SPA razorbill baseline PVA model validation



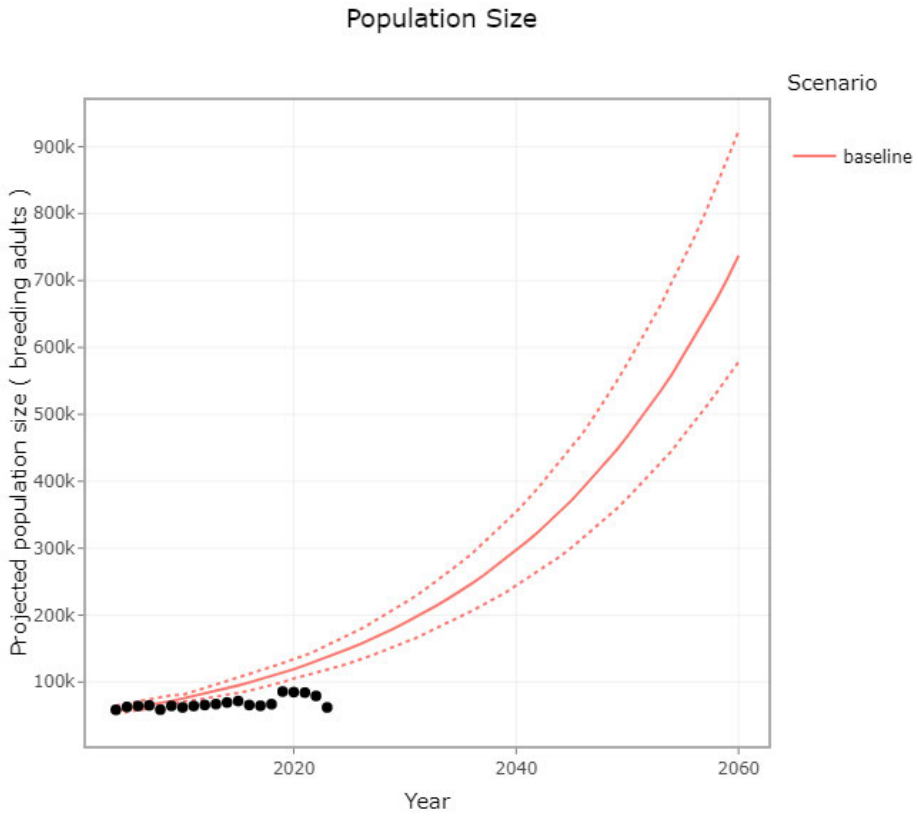
Guillemot Validation for Farne Islands SPA

4.1.18 As presented in **Figure 4.3**, the baseline population trend produced from the PVA model follows a positive exponential growth that differs from the colony data that stays relatively constant with no signs of exponential growth.

4.1.19 Potentially, the current data inputs within the density independent PVA model are not suitable for reflecting known population trends. It is possible that the local population dynamics lead to observed counts varying significantly from model

expectations, and therefore the current PVA methods cannot solely be relied upon for assessing likely population trends within the context of wind farm developments.

Figure 4.3 Farne Islands SPA guillemot baseline PVA model validation



© WSP UK Limited

Guillemot – Flamborough and Filey Coast SPA

Table 4-4 PVA results using Seabird PVA Tool for impacts apportioned to the Flamborough and Filey Coast SPA guillemot population showing displacement in-combination outputs for various scenarios

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
153.7	Applicant	Rampion 2 plus all consented projects (excluding DEP & SEP)	273	0.998 (<0.001)	0.936 (0.004)	0.2%	6.4%
		Rampion 2 plus all consented	277	0.998 (<0.001)	0.933 (0.004)	0.2%	6.7%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	115	0.999 (<0.001)	0.973 (0.004)	0.1%	2.7%
		All projects	359	0.997 (<0.001)	0.917 (0.004)	0.3%	8.3%
		All projects (excluding Hornsea Four)	197	0.998 (<0.001)	0.953 (0.004)	0.2%	4.7%
	Secretary of State	Rampion 2 plus all consented projects (excluding DEP & SEP)	765	0.994 (<0.001)	0.829 (0.003)	0.6%	17.1%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented	774	0.994 (<0.001)	0.826 (0.003)	0.6%	17.4%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	322	0.997 (<0.001)	0.923 (0.004)	0.3%	7.7%
		All projects	1,005	0.992 (<0.001)	0.781 (0.003)	0.8%	21.9%
		All projects (excluding Hornsea Four)	553	0.996 (<0.001)	0.873 (0.004)	0.4%	12.7%
	Natural England	Rampion 2 plus all consented projects (excluding DEP & SEP)	1,911	0.985 (<0.001)	0.624 (0.003)	1.5%	37.6%
		Rampion 2 plus all consented	1,936	0.985 (<0.001)	0.619 (0.003)	1.5%	38.1%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	805	0.994 (<0.001)	0.820 (0.003)	0.6%	18.0%
		All projects	2,513	0.980 (<0.001)	0.538 (0.002)	2.0%	46.2%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		All projects (excluding Hornsea Four)	1,382	0.989 (<0.001)	0.713 (0.003)	1.1%	28.7%
95.2 km	Applicant	Rampion 2 plus all consented projects (excluding DEP & SEP)	206	0.998 (<0.001)	0.949 (0.004)	0.2%	5.1%
		Rampion 2 plus all consented	210	0.998 (<0.001)	0.949 (0.004)	0.2%	5.1%
		Rampion 2 plus all consented projects (excluding Hornsea Four)	48	1.000 (<0.001)	0.990 (0.004)	0.0%	1.0%
		All projects	292	0.998 (<0.001)	0.930 (0.004)	0.2%	7.0%
		All projects (excluding Hornsea Four)	131	0.999 (<0.001)	0.969 (0.004)	0.1%	3.1%
	Secretary of State	Rampion 2 plus all consented projects (excluding DEP & SEP)	578	0.995 (<0.001)	0.867 (0.004)	0.5%	13.3%
		Rampion 2 plus all consented	598	0.995 (<0.001)	0.867 (0.003)	0.5%	13.3%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric (30 years)		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented projects (excluding Hornsea Four)	135	0.999 (<0.001)	0.966 (0.004)	0.1%	3.4%
		All projects	818	0.994 (<0.001)	0.817 (0.004)	0.6%	18.3%
		All projects (excluding Hornsea Four)	366	0.997 (<0.001)	0.913 (0.004)	0.3%	8.7%
		Rampion 2 plus all consented projects (excluding DEP & SEP)	1,444	0.989 (<0.001)	0.700 (0.003)	1.1%	30.0%
		Rampion 2 plus all consented	1,469	0.988 (<0.001)	0.695 (0.003)	1.2%	30.5%
	Natural England	Rampion 2 plus all consented projects (excluding Hornsea Four)	338	0.997 (<0.001)	0.920 (0.004)	0.3%	8.0%
		All projects	2,045	0.984 (<0.001)	0.604 (0.003)	1.6%	39.6%
		All projects (excluding Hornsea Four)	915	0.993 (<0.001)	0.800 (0.003)	0.7%	20.0%

4.1.20 Following analysis of the range of outputs from the in-combination PVAs for the guillemot feature of the Flamborough and Filey Coast SPA they are largely indicative of minimal reductions (**Table 4.4**). The maximum predicted impact is when Hornsea Four is included in the in-combination assessments (that incorporate the 153.7 km foraging range) following the 70% Displacement and 5% Mortality of Natural England's preferred approach. This PVA predicts a potential 46.2% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a decrease in growth rate of 2.0%. However, this uppermost prediction is viewed as highly precautionary, as evidence from operational OWFs indicate that displacement rates for auks are significantly lower than those advocated for use in Natural England's preferred approach (MacArthur Green, 2023 and APEM, 2022). Therefore, the Applicant considers the more realistic scenario following the Applicant's Approach, which predicts a maximum potential for all modelled scenarios of 8.3% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a reduction in growth rate of 0.3% to be most appropriate for concluding assessments.

4.1.21 Colony-specific population growth trends for guillemot show a high degree of variability, likely associated with prey resources (Wanless *et al.*, 2005) (**Table 4.5**). With the projected growth rate not expected to vary significantly from that of the baseline population in all modelling scenarios, the PVA model outputs fall within the high level of natural variation of population growth, indicating little to no true impact is likely.

Table 4-5 Average annual colony growth rate for guillemot colony for Flamborough and Filey Coast SPA between 2000 and 2022

Species	2000-2022	2008-2022	2017-2022
Guillemot	3.74%	4.16%	4.57%

4.1.22 When considering the displacement impacts from the Project in-combination with other plans and projects on the guillemot feature of the Flamborough to Filey Coast SPA, regardless of the impact scenario chosen the colony would still increase in size. This is due to the favourable condition of the colony as demonstrated by the consistent increasing growth rate from both historic and recent colony counts (**Table 4.5**). The favourable condition of the colony suggests strong resilience to any apparent change such as any potential displacement effect, and so the integrity of the guillemot feature of the FFC SPA will be maintained.

4.1.23 There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Flamborough to Filey Coast SPA in relation to displacement effects in the operation and maintenance phase from the project in-combination and, therefore, subject to natural change guillemot will be maintained as a feature in the long term.

© WSP UK Limited

Razorbill – Flamborough and Filey Coast SPA

Table 4-6 PVA results using Seabird PVA Tool for impacts apportioned to the Flamborough and Filey Coast SPA guillemot population showing displacement in-combination outputs for various scenarios

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
164.6	Applicant	Rampion 2 plus all consented projects (Except DEP & SEP)	49	0.999 (<0.001)	0.971 (0.012)	0.1%	2.9%
		Rampion 2 plus all consented only	49	0.999 (<0.001)	0.971 (0.012)	0.1%	2.9%
		All projects	78	0.998 (<0.001)	0.953 (0.012)	0.2%	4.7%
	Secretary of State	Rampion 2 plus all consented projects (Except DEP & SEP)	136	0.997 (<0.001)	0.919 (0.012)	0.3%	8.1%
		Rampion 2 plus all consented only	138	0.997 (<0.001)	0.919 (0.012)	0.3%	8.1%
		All projects	218	0.996 (<0.001)	0.873 (0.011)	0.4%	12.7%
	Natural England	Rampion 2 plus all consented projects (Except DEP & SEP)	341	0.993 (<0.001)	0.808 (0.011)	0.7%	19.2%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented only	344	0.993 (<0.001)	0.808 (0.011)	0.7%	19.2%
		All projects	544	0.989 (<0.001)	0.713 (0.010)	1.1%	28.7%
122.2	Applicant	Rampion 2 plus all consented projects (Except DEP & SEP)	42	0.999 (<0.001)	0.975 (0.012)	0.1%	2.5%
		Rampion 2 plus all consented only	42	0.999 (<0.001)	0.975 (0.012)	0.1%	2.5%
		All projects	71	0.999 (<0.001)	0.957 (0.012)	0.1%	4.3%
	Secretary of State	Rampion 2 plus all consented projects (Except DEP & SEP)	116	0.998 (<0.001)	0.930 (0.012)	0.2%	7.0%
		Rampion 2 plus all consented only	118	0.998 (<0.001)	0.930 (0.012)	0.2%	7.0%
		All projects	198	0.996 (<0.001)	0.886 (0.011)	0.4%	11.4%
	Natural England	Rampion 2 plus all consented projects (Except DEP & SEP)	291	0.994 (<0.001)	0.836 (0.011)	0.6%	16.4%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented only	294	0.994 (<0.001)	0.833 (0.011)	0.6%	16.7%
		All projects	494	0.990 (<0.001)	0.734 (0.010)	1.0%	26.6%

4.1.24 Following analysis of the range of outputs from the in-combination PVAs for the razorbill feature of the Flamborough and Filey Coast SPA they are largely indicative of minimal reductions (**Table 4.6**). The maximum predicted impact is reached when a foraging range of 164.6 km is used to assess in-combination projects and the 70% Displacement and 5% Mortality of Natural England's preferred approach is used. This PVA predicts a potential 28.7% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a decrease in growth rate of 1.1%. However, this uppermost prediction is viewed as highly precautionary, as evidence from operational OWFs indicate that displacement rates for auks are significantly lower than those advocated for use in Natural England's preferred approach (MacArthur Green, 2023 and APEM, 2022). Therefore, the Applicant considers the more realistic scenario following the Applicant's Approach, which predicts a maximum potential for all modelled scenarios of 4.7% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a reduction in growth rate of 0.2% to be most appropriate for concluding assessments.

4.1.25 Colony-specific population growth trends for razorbill show a high degree of variability (**Table 4.7**). With the projected growth rate not expected to vary significantly from that of the baseline population in all modelling scenarios, the PVA model outputs fall within the high level of natural variation of population growth, indicating little to no true impact is likely.

Table 4-7 Average annual colony growth rate for razorbill colony for Flamborough and Filey Coast SPA between 2000 and 2022

Species	2000-2022	2008-2022	2017-2022
Razorbill	7.79%	8.02%	9.52%

4.1.26 Regardless of the impact scenario chosen the colony would still increase in size. This is due to the favourable condition of the colony as demonstrated by the consistent increasing growth rate from both historic and recent colony counts (**Table 4.7**). The favourable condition of the colony suggests strong resilience to any apparent change such as any potential displacement effect, and so the integrity of the razorbill feature of the FFC SPA will be maintained.

4.1.27 There is, therefore, no potential for an Adverse Effect on Site Integrity (AEoSI) to the conservation objectives of the razorbill feature of Flamborough to Filey Coast SPA in relation to displacement effects in the operation and maintenance phase from the Project in-combination and, therefore, subject to natural change razorbill will be maintained as a feature in the long term.

© WSP UK Limited

Guillemot – Farne Islands SPA

Table 4-8 PVA results using Seabird PVA Tool for impacts apportioned to the Farne Islands SPA guillemot population showing displacement in-combination outputs for various scenarios

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
153.7	Applicant	Rampion 2 plus all consented projects (Except DEP & SEP)	40	0.999 (<0.001)	0.979 (0.005)	0.1%	2.1%
		Rampion 2 plus all consented only	43	0.999 (<0.001)	0.976 (0.005)	0.1%	2.4%
		All projects	76	0.999 (<0.001)	0.959 (0.005)	0.1%	4.1%
	Secretary of State	Rampion 2 plus all consented projects (Except DEP & SEP)	112	0.998 (<0.001)	0.939 (0.005)	0.2%	6.1%
		Rampion 2 plus all consented only	120	0.998 (<0.001)	0.936 (0.005)	0.2%	6.4%
		All projects	211	0.996 (<0.001)	0.888 (0.005)	0.4%	11.2%
	Natural England	Rampion 2 plus all consented projects (Except DEP & SEP)	280	0.995 (<0.001)	0.855 (0.005)	0.5%	14.5%

© WSP UK Limited

Foraging range (km)	Approach	Scenario	Additional mortality (breeding adult birds)	Density independent counterfactual metric		Reduction in growth rate	Reduction in population size
				Median growth rate (SD)	Median pop.size (SD)		
		Rampion 2 plus all consented only	301	0.995 (<0.001)	0.846 (0.005)	0.5%	15.4%
		All projects	528	0.990 (<0.001)	0.743 (0.004)	1.0%	25.7%

4.1.28 Following analysis of the range of outputs from the in-combination PVAs for the guillemot feature of the Farne Islands SPA they are largely indicative of minimal reductions (**Table 4.8**). The maximum predicted impact is reached when using a 70% Displacement and 5% Mortality of Natural England's preferred approach. This PVA predicts a potential 23.6% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a decrease in growth rate of 0.9% per annum. However, this uppermost prediction is viewed as highly precautionary, as recent evidence from operational OWFs indicate that displacement rates for auks are significantly lower than those advocated for use in Natural England's preferred approach (MacArthur Green, 2023 and APEM, 2022 & 2023). Therefore, the Applicant considers the more realistic scenario following the Applicant's Approach, which predicts a maximum potential for all modelled scenarios of 4.1% reduction in population size after 30 years in contrast to the unimpacted baseline scenario, with a reduction in growth rate of 0.1% to be most appropriate for concluding assessments.

4.1.29 Colony-specific population growth trends for guillemot show a high degree of variability, likely associated with prey resources (Wanless *et al.,* 2005) (**Table 4.9**). With the projected growth rate not expected to vary significantly from that of the baseline population in all modelling scenarios, the PVA model outputs fall within the high level of natural variation of population growth, indicating little to no true impact is likely.

Table 4-9 Average annual colony growth rate for guillemot colony for Farne Islands SPA between 1990 and 2023

Species	1990-2023	1997-2023	2004-2023	2011-2023	2018-2023
Guillemot	3.01%	1.08%	0.31%	-0.29%	-1.50%

4.1.30 When considering the displacement impacts from the Project in-combination with other plans and projects on the guillemot feature of the Farne Islands SPA, the variability in colony growth and the Project's minimal contribution, it is not expected that any scenario would significantly affect the predicted population trend. When considering the annual colony growth rates (**Table 4.9**) the guillemot feature at the Farne Islands SPA has shown reductions since the early 2000's. The reductions in colony growth are a 'natural' occurrence in many guillemot colonies, with mass mortality events occurring sporadically within non-breeding seasons. This has been described in 2013 – 2014 and 2018 – 2019 (Burnell *et al.*, 2023). In addition, recent surveys on the effects of the Highly Pathogenic Avian Influenza (HPAI) on seabird colonies around the UK have shown declines in guillemots at the Farne Islands SPA since the outbreak of the virus (Tremlett *et al.*, 2024), further aiding in the represented colony growth reduction.

4.1.31 A consideration needs to be had for the in-combination results that are being modelled within the PVA tool. When considering only consented projects and the Proposed Development, there are currently no in-combination values apportioned to the Farne Islands SPA within the breeding season. It is expected that if the

presence of OWFs were to effect guillemots then the greatest level of effect would be expected during the breeding season where birds foraging is restricted, and birds are under additional stressors from breeding. As connectivity is therefore limited to the non-breeding season, the Applicant therefore considers a displacement rate of 50% displacement and 1% mortality to be most appropriate, which at most predicts a reduction in growth rate of 0.1% per annum. Regardless of the current status of the population such a reduction in growth rate would almost certainly be indistinguishable from natural fluctuations in the population. Furthermore the Applicant's maintains the position that the project's contribution to any in-combination effect can be considered non material given the highly limited connectivity and minimal level of predicted impact.

4.1.32 There is, therefore, no potential for an AEoI to the conservation objectives of the guillemot feature of Farne Islands SPA in relation to displacement effects in the operation and maintenance phase from the Project in-combination and, therefore, subject to natural change guillemot will be maintained as a feature in the long term.

5. References

APEM (2022) *Hornsea Project Four: Auk Displacement and Mortality Evidence Review.* (Online) Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010098/EN010098-001044-Hornsea%20Project%20Four%20-%20G1.47%20Auk%20Displacement%20and%20Mortality%20Evidence%20Review.pdf [Accessed: 01 February 2024]

Begon, M., Townsend, C. R. and Harper John L. (2005) *Ecology: From Individuals to Ecosystems. 4th Edition.* Hoboken, New Jersey, USA: Wiley-Blackwell.

Burnell,D., Perkins, A.J., Newton. S.F., Bolton. M., Tierney. T.D. & Dunn, T.E. (2023) *Seabirds Count: A census of breeding seabirds in Britain and Ireland (2015-2021*). Lynx Nature Books, Barcelona.

Caswell, H. (2000). *Matrix Population Models.* Sinauer Associates Inc., Sunderland.

Furness, R.W. (2015) *Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS),* Natural England Commissioned Report Number 164.

Horswill, C. & Robinson, R.A. (2015). *Review of seabird demographic rates and density dependence, JNCC Report No: 552,* JNCC, Peterborough, ISSN 0963-8901

MacArthur Green (2023) *Beatrice Offshore Wind Farm: Year 2 post-construction ornithology monitoring report.* (Online) Available at: https://marine.gov.scot/sites/default/files/bowl_2021_post_construction_ornithology_monitoring_report_25_07_2023.pdf (Accessed: February 2024).

Mobbs, D., Searle, K., Daunt, F. & Butler, A. (2020). *A Population Viability Analysis Modelling Tool for Seabird Species: Guide for using the PVA tool (v2.0) user interface.* (Online) Available at: https://github.com/naturalengland/Seabird_PVA_Tool/blob/master/Documentation/PVA_Tool_UI_Guidance.pdf (Accessed: February 2024).

Natural England (2022) Natural England's End of Examination Position on Offshore Ornithology for: Hornsea Four.(Online) Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010098/EN010098-001969-Natural%20England%20-%20Comments%20on%20any%20submissions%20received%20at%20Deadline%206.pdf (Accessed: February 2024).

Parker, J., Fawcett, A., Banks, A., Rowson, T., Allen, S., Rowell, H., Harwood, A., Ludgate, C., Humphrey, O., Axelsson, M., Baker, A. & Copley, V. (2022). *Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase III: Expectations for data analysis and presentation at examination for offshore wind applications*. Natural England. Version 1.2. 140 pp.

Ridge, K., Jones, C., Jones, G. & Kean, G. (2019). *Norfolk Vanguard Offshore Wind Farm Examing Authority's Report of Findings and Conclusions and Recommendations to the Secretary of State for Business, Energy and Industrial Strategy.* (Online) Available at:

https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-002359-Norfolk%20Vanguard%20Examining%20Authority%E2%80%99s%20Report%20of%20Findings%20and%20Conclusions.pdf (Accessed: February 2024).

BTO (2023). *Seabird Monitoring Programme.* (Online) Available at: https://app.bto.org/seabirds/public/data.jsp (Accessed: February 2024).

Secretary of State (2022) *East Anglia One North Habitats Regulations Assessment. Regulation 63 of the Conservation of Habitats and Species Regulations 2017 and Regulations 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017*. (Online) Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010077/EN010077-009803-EA1N%20-%20Habitats%20Regulations%20Assessment.pdf (Accessed: February 2024).

Secretary of State (2023) *Hornsea Project Four Offshore Windfarm. Habitats Regulations Assessment for an Application Under the Planning Act 2008*. (Online) Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010098/EN010098-002331-DESNZ%20HRA%20-%20Hornsea%20Four_Final.pdf (Accessed: February 2024).

Searle, K., Mobbs, D., Daunt, F. and Butler, A. (2019). *A Population Viability Analysis Modelling Tool for Seabird Species*. Natural England Commissioned Reports, Number 274.

SMP (2020). *JNCC UK Seabird Monitoring Programme.* (Online) Available at: https://jncc.gov.uk/news/smp-database-launch (Accessed: February 2024).

Statutory Nature Conservation Bodies (2022). *Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm (OWF) developments.* (Online) Available at: https://data.jncc.gov.uk/data/9aecb87c-80c5-4cfb-9102-39f0228dcc9a/joint-sncb-interim-displacement-advice-note-2022.pdf (Accessed: February 2024).

Tremlett, C.J., Morley, N. & Wilson, L.J. (2024) *UK seabird colony counts in 2023 following the 2021-22 outbreak of highly pathogenic avian influenza.* Research report 76.

Wanless, S., Harris, M.P., Redmand, P. & Speakman, J.R. (2005) *Low energy values of fish as a probable cause of a major seabird breeding failure in the North Sea.* Mar. Ecol. Prog. Ser. Vol 294: 1-8.

Woodward, I., Thaxter, C.B., Owen.E. & Cook, A.S.C.P. (2019) *Desk-based revision of seabird foraging ranges used for HRA screening.* BTO Research Report No. 724.

WWT Consulting (2012). *SOSS-04 Gannet Population Viability Analysis: Developing guidelines on the use of Population Viability Analysis for investigating bird impacts due to offshore wind farms.* Report to The Crown Estate.

© WSP UK Limited

Appendix A
Displacement matrices

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2 plus all consented projects (Using 153.7km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	5	11	16	22	27	55	109	164	218	273	328	382	437	491	546
10	55	109	164	218	273	546	1,092	1,638	2,184	2,731	3,277	3,823	4,369	4,915	5,461
15	82	164	246	328	410	819	1,638	2,457	3,277	4,096	4,915	5,734	6,553	7,372	8,192
20	109	218	328	437	546	1,092	2,184	3,277	4,369	5,461	6,553	7,645	8,738	9,830	10,922
25	137	273	410	546	683	1,365	2,731	4,096	5,461	6,826	8,192	9,557	10,922	12,287	13,653
30	164	328	491	655	819	1,638	3,277	4,915	6,553	8,192	9,830	11,468	13,107	14,745	16,383
35	191	382	573	765	956	1,911	3,823	5,734	7,645	9,557	11,468	13,380	15,291	17,202	19,114
40	218	437	655	874	1,092	2,184	4,369	6,553	8,738	10,922	13,107	15,291	17,475	19,660	21,844
50	273	546	819	1,092	1,365	2,731	5,461	8,192	10,922	13,653	16,383	19,114	21,844	24,575	27,305
60	328	655	983	1,311	1,638	3,277	6,553	9,830	13,107	16,383	19,660	22,936	26,213	29,490	32,766
70	382	765	1,147	1,529	1,911	3,823	7,645	11,468	15,291	19,114	22,936	26,759	30,582	34,405	38,227
80	437	874	1,311	1,748	2,184	4,369	8,738	13,107	17,475	21,844	26,213	30,582	34,951	39,320	43,688
90	491	983	1,474	1,966	2,457	4,915	9,830	14,745	19,660	24,575	29,490	34,405	39,320	44,235	49,149
100	546	1,092	1,638	2,184	2,731	5,461	10,922	16,383	21,844	27,305	32,766	38,227	43,688	49,149	54,611
		<1% increase in baseline mortality				>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2 plus all consented projects (Using 95.2km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	6	12	18	23	29	58	117	175	234	292	351	409	468	526	584
10	58	117	175	234	292	584	1,169	1,753	2,338	2,922	3,506	4,091	4,675	5,260	5,844
15	88	175	263	351	438	877	1,753	2,630	3,506	4,383	5,260	6,136	7,013	7,889	8,766
20	117	234	351	468	584	1,169	2,338	3,506	4,675	5,844	7,013	8,182	9,350	10,519	11,688
25	146	292	438	584	731	1,461	2,922	4,383	5,844	7,305	8,766	10,227	11,688	13,149	14,610
30	175	351	526	701	877	1,753	3,506	5,260	7,013	8,766	10,519	12,273	14,026	15,779	17,532
35	205	409	614	818	1,023	2,045	4,091	6,136	8,182	10,227	12,273	14,318	16,363	18,409	20,454
40	234	468	701	935	1,169	2,338	4,675	7,013	9,350	11,688	14,026	16,363	18,701	21,039	23,376
50	351	701	1,052	1,403	1,753	3,506	7,013	10,519	14,026	17,532	21,039	24,545	28,051	31,558	35,064
60	351	701	1,052	1,403	1,753	3,506	7,013	10,519	14,026	17,532	21,039	24,545	28,051	31,558	35,064
70	409	818	1,227	1,636	2,045	4,091	8,182	12,273	16,363	20,454	24,545	28,636	32,727	36,818	40,908
80	468	935	1,403	1,870	2,338	4,675	9,350	14,026	18,701	23,376	28,051	32,727	37,402	42,077	46,752
90	526	1,052	1,578	2,104	2,630	5,260	10,519	15,779	21,039	26,298	31,558	36,818	42,077	47,337	52,597
100	584	1,169	1,753	2,338	2,922	5,844	11,688	17,532	23,376	29,220	35,064	40,908	46,752	52,597	58,441

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2 plus all consented projects excluding Hornsea Four (Using 153.7km foraging range)

	Mortality rates (%)														
Displacement (%)	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	2	4	7	9	11	22	45	67	89	112	134	156	178	201	223
10	22	45	67	89	112	223	446	669	892	1,115	1,338	1,561	1,784	2,007	2,230
15	33	67	100	134	167	335	669	1,004	1,338	1,673	2,007	2,342	2,676	3,011	3,345
20	45	89	134	178	223	446	892	1,338	1,784	2,230	2,676	3,122	3,568	4,014	4,460
25	56	112	167	223	279	558	1,115	1,673	2,230	2,788	3,345	3,903	4,460	5,018	5,575
30	67	134	201	268	335	669	1,338	2,007	2,676	3,345	4,014	4,683	5,352	6,021	6,690
35	78	156	234	312	390	781	1,561	2,342	3,122	3,903	4,683	5,464	6,244	7,025	7,806
40	89	178	268	357	446	892	1,784	2,676	3,568	4,460	5,352	6,244	7,136	8,029	8,921
50	112	223	335	446	558	1,115	2,230	3,345	4,460	5,575	6,690	7,806	8,921	10,036	11,151
60	134	268	401	535	669	1,338	2,676	4,014	5,352	6,690	8,029	9,367	10,705	12,043	13,381
70	156	312	468	624	781	1,561	3,122	4,683	6,244	7,806	9,367	10,928	12,489	14,050	15,611
80	178	357	535	714	892	1,784	3,568	5,352	7,136	8,921	10,705	12,489	14,273	16,057	17,841
90	201	401	602	803	1,004	2,007	4,014	6,021	8,029	10,036	12,043	14,050	16,057	18,064	20,071
100	223	446	669	892	1,115	2,230	4,460	6,690	8,921	11,151	13,381	15,611	17,841	20,071	22,302
		<1% increase in baseline mortality				>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2 plus all consented projects excluding Hornsea Four(Using 95.2km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	3	4	4	9	18	27	36	45	54	63	72	81	90
10	9	18	27	36	45	90	179	269	358	448	537	627	716	806	896
15	13	27	40	54	67	134	269	403	537	672	806	940	1,075	1,209	1,343
20	18	36	54	72	90	179	358	537	716	896	1,075	1,254	1,433	1,612	1,791
25	22	45	67	90	112	224	448	672	896	1,119	1,343	1,567	1,791	2,015	2,239
30	27	54	81	107	134	269	537	806	1,075	1,343	1,612	1,881	2,149	2,418	2,687
35	31	63	94	125	157	313	627	940	1,254	1,567	1,881	2,194	2,508	2,821	3,134
40	36	72	107	143	179	358	716	1,075	1,433	1,791	2,149	2,508	2,866	3,224	3,582
50	54	107	161	215	269	537	1,075	1,612	2,149	2,687	3,224	3,761	4,299	4,836	5,373
60	54	107	161	215	269	537	1,075	1,612	2,149	2,687	3,224	3,761	4,299	4,836	5,373
70	63	125	188	251	313	627	1,254	1,881	2,508	3,134	3,761	4,388	5,015	5,642	6,269
80	72	143	215	287	358	716	1,433	2,149	2,866	3,582	4,299	5,015	5,732	6,448	7,164
90	81	161	242	322	403	806	1,612	2,418	3,224	4,030	4,836	5,642	6,448	7,254	8,060
100	90	179	269	358	448	896	1,791	2,687	3,582	4,478	5,373	6,269	7,164	8,060	8,956
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2, Dudgeon and Sheringham Shoal Extension Projects plus all consented projects (using 153.7km foraging range)

	Mortality rates (%)														
Displacement (%)	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	6	11	17	22	28	55	111	166	221	277	332	387	443	498	553
10	55	111	166	221	277	553	1,106	1,659	2,213	2,766	3,319	3,872	4,425	4,978	5,531
15	83	166	249	332	415	830	1,659	2,489	3,319	4,148	4,978	5,808	6,638	7,467	8,297
20	111	221	332	443	553	1,106	2,213	3,319	4,425	5,531	6,638	7,744	8,850	9,956	11,063
25	138	277	415	553	691	1,383	2,766	4,148	5,531	6,914	8,297	9,680	11,063	12,445	13,828
30	166	332	498	664	830	1,659	3,319	4,978	6,638	8,297	9,956	11,616	13,275	14,935	16,594
35	194	387	581	774	968	1,936	3,872	5,808	7,744	9,680	11,616	13,552	15,488	17,424	19,360
40	221	443	664	885	1,106	2,213	4,425	6,638	8,850	11,063	13,275	15,488	17,700	19,913	22,125
50	277	553	830	1,106	1,383	2,766	5,531	8,297	11,063	13,828	16,594	19,360	22,125	24,891	27,657
60	332	664	996	1,328	1,659	3,319	6,638	9,956	13,275	16,594	19,913	23,232	26,550	29,869	33,188
70	387	774	1,162	1,549	1,936	3,872	7,744	11,616	15,488	19,360	23,232	27,103	30,975	34,847	38,719
80	443	885	1,328	1,770	2,213	4,425	8,850	13,275	17,700	22,125	26,550	30,975	35,400	39,826	44,251
90	498	996	1,493	1,991	2,489	4,978	9,956	14,935	19,913	24,891	29,869	34,847	39,826	44,804	49,782
100	553	1,106	1,659	2,213	2,766	5,531	11,063	16,594	22,125	27,657	33,188	38,719	44,251	49,782	55,313
		<1% increase in baseline mortality				>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2, Dudgeon and Sheringham Shoal Extension Projects plus all consented projects (using 95.2km foraging range)

	Mortality rates (%)														
Displacement (%)	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	4	8	13	17	21	42	84	126	168	210	252	294	336	378	420
10	42	84	126	168	210	420	839	1,259	1,679	2,098	2,518	2,938	3,357	3,777	4,197
15	63	126	189	252	315	630	1,259	1,889	2,518	3,148	3,777	4,407	5,036	5,666	6,295
20	84	168	252	336	420	839	1,679	2,518	3,357	4,197	5,036	5,875	6,715	7,554	8,393
25	105	210	315	420	525	1,049	2,098	3,148	4,197	5,246	6,295	7,344	8,393	9,443	10,492
30	126	252	378	504	630	1,259	2,518	3,777	5,036	6,295	7,554	8,813	10,072	11,331	12,590
35	147	294	441	588	734	1,469	2,938	4,407	5,875	7,344	8,813	10,282	11,751	13,220	14,689
40	168	336	504	671	839	1,679	3,357	5,036	6,715	8,393	10,072	11,751	13,430	15,108	16,787
50	210	420	630	839	1,049	2,098	4,197	6,295	8,393	10,492	12,590	14,689	16,787	18,885	20,984
60	252	504	755	1,007	1,259	2,518	5,036	7,554	10,072	12,590	15,108	17,626	20,144	22,662	25,180
70	294	588	881	1,175	1,469	2,938	5,875	8,813	11,751	14,689	17,626	20,564	23,502	26,439	29,377
80	336	671	1,007	1,343	1,679	3,357	6,715	10,072	13,430	16,787	20,144	23,502	26,859	30,216	33,574
90	378	755	1,133	1,511	1,889	3,777	7,554	11,331	15,108	18,885	22,662	26,439	30,216	33,993	37,770
100	420	839	1,259	1,679	2,098	4,197	8,393	12,590	16,787	20,984	25,180	29,377	33,574	37,770	41,967
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2, Dudgeon and Sheringham Shoal Extension Projects plus all consented projects excluding Hornsea Four (using 153.7km foraging range)

	Mortality rates (%)														
Displacement (%)	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	2	5	7	9	12	23	46	69	92	115	138	161	184	207	230
10	23	46	69	92	115	230	460	690	920	1,150	1,380	1,610	1,840	2,070	2,300
15	35	69	104	138	173	345	690	1,035	1,380	1,725	2,070	2,415	2,761	3,106	3,451
20	46	92	138	184	230	460	920	1,380	1,840	2,300	2,761	3,221	3,681	4,141	4,601
25	58	115	173	230	288	575	1,150	1,725	2,300	2,876	3,451	4,026	4,601	5,176	5,751
30	69	138	207	276	345	690	1,380	2,070	2,761	3,451	4,141	4,831	5,521	6,211	6,901
35	81	161	242	322	403	805	1,610	2,415	3,221	4,026	4,831	5,636	6,441	7,246	8,051
40	92	184	276	368	460	920	1,840	2,761	3,681	4,601	5,521	6,441	7,361	8,282	9,202
50	115	230	345	460	575	1,150	2,300	3,451	4,601	5,751	6,901	8,051	9,202	10,352	11,502
60	138	276	414	552	690	1,380	2,761	4,141	5,521	6,901	8,282	9,662	11,042	12,422	13,803
70	161	322	483	644	805	1,610	3,221	4,831	6,441	8,051	9,662	11,272	12,882	14,493	16,103
80	184	368	552	736	920	1,840	3,681	5,521	7,361	9,202	11,042	12,882	14,723	16,563	18,403
90	207	414	621	828	1,035	2,070	4,141	6,211	8,282	10,352	12,422	14,493	16,563	18,633	20,704
100	230	460	690	920	1,150	2,300	4,601	6,901	9,202	11,502	13,803	16,103	18,403	20,704	23,004
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2, Dudgeon and Sheringham Shoal Extension Projects plus all consented projects excluding Hornsea Four (using 95.2km foraging range)

	Mortality rates (%)														
Displacement (%)	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	3	4	5	10	19	29	39	48	58	68	77	87	97
10	10	19	29	39	48	97	193	290	386	483	579	676	773	869	966
15	14	29	43	58	72	145	290	435	579	724	869	1,014	1,159	1,304	1,449
20	19	39	58	77	97	193	386	579	773	966	1,159	1,352	1,545	1,738	1,932
25	24	48	72	97	121	241	483	724	966	1,207	1,449	1,690	1,932	2,173	2,415
30	29	58	87	116	145	290	579	869	1,159	1,449	1,738	2,028	2,318	2,608	2,897
35	34	68	101	135	169	338	676	1,014	1,352	1,690	2,028	2,366	2,704	3,042	3,380
40	39	77	116	155	193	386	773	1,159	1,545	1,932	2,318	2,704	3,091	3,477	3,863
50	48	97	145	193	241	483	966	1,449	1,932	2,415	2,897	3,380	3,863	4,346	4,829
60	58	116	174	232	290	579	1,159	1,738	2,318	2,897	3,477	4,056	4,636	5,215	5,795
70	68	135	203	270	338	676	1,352	2,028	2,704	3,380	4,056	4,733	5,409	6,085	6,761
80	77	155	232	309	386	773	1,545	2,318	3,091	3,863	4,636	5,409	6,181	6,954	7,727
90	87	174	261	348	435	869	1,738	2,608	3,477	4,346	5,215	6,085	6,954	7,823	8,692
100	97	193	290	386	483	966	1,932	2,897	3,863	4,829	5,795	6,761	7,727	8,692	9,658
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for all projects (using 153.7km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	7	14	22	29	36	72	144	215	287	359	431	503	574	646	718
10	72	144	215	287	359	718	1,436	2,154	2,871	3,589	4,307	5,025	5,743	6,461	7,179
15	108	215	323	431	538	1,077	2,154	3,230	4,307	5,384	6,461	7,538	8,614	9,691	10,768
20	144	287	431	574	718	1,436	2,871	4,307	5,743	7,179	8,614	10,050	11,486	12,922	14,357
25	179	359	538	718	897	1,795	3,589	5,384	7,179	8,973	10,768	12,563	14,357	16,152	17,947
30	215	431	646	861	1,077	2,154	4,307	6,461	8,614	10,768	12,922	15,075	17,229	19,382	21,536
35	251	503	754	1,005	1,256	2,513	5,025	7,538	10,050	12,563	15,075	17,588	20,100	22,613	25,125
40	287	574	861	1,149	1,436	2,871	5,743	8,614	11,486	14,357	17,229	20,100	22,972	25,843	28,715
50	359	718	1,077	1,436	1,795	3,589	7,179	10,768	14,357	17,947	21,536	25,125	28,715	32,304	35,893
60	431	861	1,292	1,723	2,154	4,307	8,614	12,922	17,229	21,536	25,843	30,150	34,458	38,765	43,072
70	503	1,005	1,508	2,010	2,513	5,025	10,050	15,075	20,100	25,125	30,150	35,175	40,200	45,226	50,251
80	574	1,149	1,723	2,297	2,871	5,743	11,486	17,229	22,972	28,715	34,458	40,200	45,943	51,686	57,429
90	646	1,292	1,938	2,584	3,230	6,461	12,922	19,382	25,843	32,304	38,765	45,226	51,686	58,147	64,608
100	718	1,436	2,154	2,871	3,589	7,179	14,357	21,536	28,715	35,893	43,072	50,251	57,429	64,608	71,787
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for all projects (using 95.2km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	6	12	18	23	29	58	117	175	234	292	351	409	468	526	584
10	58	117	175	234	292	584	1,169	1,753	2,338	2,922	3,506	4,091	4,675	5,260	5,844
15	88	175	263	351	438	877	1,753	2,630	3,506	4,383	5,260	6,136	7,013	7,889	8,766
20	117	234	351	468	584	1,169	2,338	3,506	4,675	5,844	7,013	8,182	9,350	10,519	11,688
25	146	292	438	584	731	1,461	2,922	4,383	5,844	7,305	8,766	10,227	11,688	13,149	14,610
30	175	351	526	701	877	1,753	3,506	5,260	7,013	8,766	10,519	12,273	14,026	15,779	17,532
35	205	409	614	818	1,023	2,045	4,091	6,136	8,182	10,227	12,273	14,318	16,363	18,409	20,454
40	234	468	701	935	1,169	2,338	4,675	7,013	9,350	11,688	14,026	16,363	18,701	21,039	23,376
50	292	584	877	1,169	1,461	2,922	5,844	8,766	11,688	14,610	17,532	20,454	23,376	26,298	29,220
60	351	701	1,052	1,403	1,753	3,506	7,013	10,519	14,026	17,532	21,039	24,545	28,051	31,558	35,064
70	409	818	1,227	1,636	2,045	4,091	8,182	12,273	16,363	20,454	24,545	28,636	32,727	36,818	40,908
80	468	935	1,403	1,870	2,338	4,675	9,350	14,026	18,701	23,376	28,051	32,727	37,402	42,077	46,752
90	526	1,052	1,578	2,104	2,630	5,260	10,519	15,779	21,039	26,298	31,558	36,818	42,077	47,337	52,597
100	584	1,169	1,753	2,338	2,922	5,844	11,688	17,532	23,376	29,220	35,064	40,908	46,752	52,597	58,441
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for all projects excluding Hornsea Four (using 153.7km foraging range)

	Mortality rates (%)														
Displacement (%)	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	4	8	12	16	20	39	79	118	158	197	237	276	316	355	395
10	39	79	118	158	197	395	790	1,184	1,579	1,974	2,369	2,763	3,158	3,553	3,948
15	59	118	178	237	296	592	1,184	1,776	2,369	2,961	3,553	4,145	4,737	5,329	5,922
20	79	158	237	316	395	790	1,579	2,369	3,158	3,948	4,737	5,527	6,316	7,106	7,896
25	99	197	296	395	493	987	1,974	2,961	3,948	4,935	5,922	6,909	7,896	8,882	9,869
30	118	237	355	474	592	1,184	2,369	3,553	4,737	5,922	7,106	8,290	9,475	10,659	11,843
35	138	276	415	553	691	1,382	2,763	4,145	5,527	6,909	8,290	9,672	11,054	12,435	13,817
40	158	316	474	632	790	1,579	3,158	4,737	6,316	7,896	9,475	11,054	12,633	14,212	15,791
50	197	395	592	790	987	1,974	3,948	5,922	7,896	9,869	11,843	13,817	15,791	17,765	19,739
60	237	474	711	947	1,184	2,369	4,737	7,106	9,475	11,843	14,212	16,581	18,949	21,318	23,687
70	276	553	829	1,105	1,382	2,763	5,527	8,290	11,054	13,817	16,581	19,344	22,107	24,871	27,634
80	316	632	947	1,263	1,579	3,158	6,316	9,475	12,633	15,791	18,949	22,107	25,266	28,424	31,582
90	355	711	1,066	1,421	1,776	3,553	7,106	10,659	14,212	17,765	21,318	24,871	28,424	31,977	35,530
100	395	790	1,184	1,579	1,974	3,948	7,896	11,843	15,791	19,739	23,687	27,634	31,582	35,530	39,478
	<1% increase in baseline mortality						>1% increase in baseline mortality				>1% threshold for citation population				

© WSP UK Limited

FFC SPA guillemot in-combination operation and maintenance phase annual displacement matrix for all projects excluding Hornsea Four(using 95.2km foraging range)

	Mortality rates (%)														
Displacement (%)	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	3	5	8	10	13	26	52	78	105	131	157	183	209	235	261
10	26	52	78	105	131	261	523	784	1,045	1,307	1,568	1,829	2,091	2,352	2,613
15	39	78	118	157	196	392	784	1,176	1,568	1,960	2,352	2,744	3,136	3,528	3,920
20	52	105	157	209	261	523	1,045	1,568	2,091	2,613	3,136	3,658	4,181	4,704	5,226
25	65	131	196	261	327	653	1,307	1,960	2,613	3,266	3,920	4,573	5,226	5,880	6,533
30	78	157	235	314	392	784	1,568	2,352	3,136	3,920	4,704	5,488	6,272	7,056	7,839
35	91	183	274	366	457	915	1,829	2,744	3,658	4,573	5,488	6,402	7,317	8,231	9,146
40	105	209	314	418	523	1,045	2,091	3,136	4,181	5,226	6,272	7,317	8,362	9,407	10,453
50	131	261	392	523	653	1,307	2,613	3,920	5,226	6,533	7,839	9,146	10,453	11,759	13,066
60	157	314	470	627	784	1,568	3,136	4,704	6,272	7,839	9,407	10,975	12,543	14,111	15,679
70	183	366	549	732	915	1,829	3,658	5,488	7,317	9,146	10,975	12,804	14,634	16,463	18,292
80	209	418	627	836	1,045	2,091	4,181	6,272	8,362	10,453	12,543	14,634	16,724	18,815	20,905
90	235	470	706	941	1,176	2,352	4,704	7,056	9,407	11,759	14,111	16,463	18,815	21,167	23,518
100	261	523	784	1,045	1,307	2,613	5,226	7,839	10,453	13,066	15,679	18,292	20,905	23,518	26,132
		<1% increase in baseline mortality				>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA razorbill in-combination operation and maintenance phase annual displacement matrix for Rampion 2 plus all consented projects (Using 164.6km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	3	4	5	10	19	29	39	49	58	68	78	88	97
10	10	19	29	39	49	97	195	292	389	487	584	681	779	876	973
15	15	29	44	58	73	146	292	438	584	730	876	1,022	1,168	1,314	1,460
20	19	39	58	78	97	195	389	584	779	973	1,168	1,363	1,558	1,752	1,947
25	24	49	73	97	122	243	487	730	973	1,217	1,460	1,704	1,947	2,190	2,434
30	29	58	88	117	146	292	584	876	1,168	1,460	1,752	2,044	2,336	2,628	2,920
35	34	68	102	136	170	341	681	1,022	1,363	1,704	2,044	2,385	2,726	3,066	3,407
40	39	78	117	156	195	389	779	1,168	1,558	1,947	2,336	2,726	3,115	3,504	3,894
50	49	97	146	195	243	487	973	1,460	1,947	2,434	2,920	3,407	3,894	4,381	4,867
60	58	117	175	234	292	584	1,168	1,752	2,336	2,920	3,504	4,089	4,673	5,257	5,841
70	68	136	204	273	341	681	1,363	2,044	2,726	3,407	4,089	4,770	5,451	6,133	6,814
80	78	156	234	312	389	779	1,558	2,336	3,115	3,894	4,673	5,451	6,230	7,009	7,788
90	88	175	263	350	438	876	1,752	2,628	3,504	4,381	5,257	6,133	7,009	7,885	8,761
100	97	195	292	389	487	973	1,947	2,920	3,894	4,867	5,841	6,814	7,788	8,761	9,735

<1% increase in baseline mortality | >1% increase in baseline mortality | >1% threshold for citation population

© WSP UK Limited

FFC SPA razorbill in-combination operation and maintenance phase annual displacement matrix for Rampion 2 plus all consented projects (Using 122.2km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	2	3	4	8	17	25	33	42	50	58	66	75	83
10	8	17	25	33	42	83	166	249	332	415	498	581	664	747	830
15	12	25	37	50	62	125	249	374	498	623	747	872	996	1,121	1,245
20	17	33	50	66	83	166	332	498	664	830	996	1,162	1,328	1,494	1,661
25	21	42	62	83	104	208	415	623	830	1,038	1,245	1,453	1,661	1,868	2,076
30	25	50	75	100	125	249	498	747	996	1,245	1,494	1,744	1,993	2,242	2,491
35	29	58	87	116	145	291	581	872	1,162	1,453	1,744	2,034	2,325	2,615	2,906
40	33	66	100	133	166	332	664	996	1,328	1,661	1,993	2,325	2,657	2,989	3,321
50	42	83	125	166	208	415	830	1,245	1,661	2,076	2,491	2,906	3,321	3,736	4,151
60	50	100	149	199	249	498	996	1,494	1,993	2,491	2,989	3,487	3,985	4,483	4,982
70	58	116	174	232	291	581	1,162	1,744	2,325	2,906	3,487	4,068	4,650	5,231	5,812
80	66	133	199	266	332	664	1,328	1,993	2,657	3,321	3,985	4,650	5,314	5,978	6,642
90	75	149	224	299	374	747	1,494	2,242	2,989	3,736	4,483	5,231	5,978	6,725	7,472
100	83	166	249	332	415	830	1,661	2,491	3,321	4,151	4,982	5,812	6,642	7,472	8,303
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA razorbill in-combination operation and maintenance phase annual displacement matrix for Rampion 2, Dudgeon and Sheringham Shoal Extension Projects plus all consented projects (using 164.6km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	3	4	5	10	20	30	39	49	59	69	79	89	98
10	10	20	30	39	49	98	197	295	393	492	590	688	787	885	983
15	15	30	44	59	74	148	295	443	590	738	885	1,033	1,180	1,328	1,475
20	20	39	59	79	98	197	393	590	787	983	1,180	1,377	1,574	1,770	1,967
25	25	49	74	98	123	246	492	738	983	1,229	1,475	1,721	1,967	2,213	2,459
30	30	59	89	118	148	295	590	885	1,180	1,475	1,770	2,065	2,360	2,655	2,950
35	34	69	103	138	172	344	688	1,033	1,377	1,721	2,065	2,409	2,754	3,098	3,442
40	39	79	118	157	197	393	787	1,180	1,574	1,967	2,360	2,754	3,147	3,540	3,934
50	49	98	148	197	246	492	983	1,475	1,967	2,459	2,950	3,442	3,934	4,426	4,917
60	59	118	177	236	295	590	1,180	1,770	2,360	2,950	3,540	4,130	4,721	5,311	5,901
70	69	138	207	275	344	688	1,377	2,065	2,754	3,442	4,130	4,819	5,507	6,196	6,884
80	79	157	236	315	393	787	1,574	2,360	3,147	3,934	4,721	5,507	6,294	7,081	7,868
90	89	177	266	354	443	885	1,770	2,655	3,540	4,426	5,311	6,196	7,081	7,966	8,851
100	98	197	295	393	492	983	1,967	2,950	3,934	4,917	5,901	6,884	7,868	8,851	9,835
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA razorbill in-combination operation and maintenance phase annual displacement matrix for Rampion 2, Dudgeon and Sheringham Shoal Extension Projects plus all consented projects (using 122.2km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	3	3	4	8	17	25	34	42	50	59	67	76	84
10	8	17	25	34	42	84	168	252	336	420	504	588	672	756	840
15	13	25	38	50	63	126	252	378	504	630	756	882	1,008	1,134	1,260
20	17	34	50	67	84	168	336	504	672	840	1,008	1,176	1,344	1,512	1,681
25	21	42	63	84	105	210	420	630	840	1,050	1,260	1,470	1,681	1,891	2,101
30	25	50	76	101	126	252	504	756	1,008	1,260	1,512	1,765	2,017	2,269	2,521
35	29	59	88	118	147	294	588	882	1,176	1,470	1,765	2,059	2,353	2,647	2,941
40	34	67	101	134	168	336	672	1,008	1,344	1,681	2,017	2,353	2,689	3,025	3,361
50	42	84	126	168	210	420	840	1,260	1,681	2,101	2,521	2,941	3,361	3,781	4,201
60	50	101	151	202	252	504	1,008	1,512	2,017	2,521	3,025	3,529	4,033	4,537	5,042
70	59	118	176	235	294	588	1,176	1,765	2,353	2,941	3,529	4,117	4,705	5,294	5,882
80	67	134	202	269	336	672	1,344	2,017	2,689	3,361	4,033	4,705	5,378	6,050	6,722
90	76	151	227	302	378	756	1,512	2,269	3,025	3,781	4,537	5,294	6,050	6,806	7,562
100	84	168	252	336	420	840	1,681	2,521	3,361	4,201	5,042	5,882	6,722	7,562	8,403
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA razorbill in-combination operation and maintenance phase annual displacement matrix for all projects (using 164.6km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	2	3	5	6	8	16	31	47	62	78	93	109	124	140	155
10	16	31	47	62	78	155	311	466	621	777	932	1,088	1,243	1,398	1,554
15	23	47	70	93	117	233	466	699	932	1,165	1,398	1,631	1,864	2,097	2,331
20	31	62	93	124	155	311	621	932	1,243	1,554	1,864	2,175	2,486	2,797	3,107
25	39	78	117	155	194	388	777	1,165	1,554	1,942	2,331	2,719	3,107	3,496	3,884
30	47	93	140	186	233	466	932	1,398	1,864	2,331	2,797	3,263	3,729	4,195	4,661
35	54	109	163	218	272	544	1,088	1,631	2,175	2,719	3,263	3,806	4,350	4,894	5,438
40	62	124	186	249	311	621	1,243	1,864	2,486	3,107	3,729	4,350	4,972	5,593	6,215
50	78	155	233	311	388	777	1,554	2,331	3,107	3,884	4,661	5,438	6,215	6,992	7,768
60	93	186	280	373	466	932	1,864	2,797	3,729	4,661	5,593	6,525	7,458	8,390	9,322
70	109	218	326	435	544	1,088	2,175	3,263	4,350	5,438	6,525	7,613	8,701	9,788	10,876
80	124	249	373	497	621	1,243	2,486	3,729	4,972	6,215	7,458	8,701	9,943	11,186	12,429
90	140	280	419	559	699	1,398	2,797	4,195	5,593	6,992	8,390	9,788	11,186	12,585	13,983
100	155	311	466	621	777	1,554	3,107	4,661	6,215	7,768	9,322	10,876	12,429	13,983	15,537
	<1% increase in baseline mortality					>1% increase in baseline mortality					>1% threshold for citation population				

© WSP UK Limited

FFC SPA razorbill in-combination operation and maintenance phase annual displacement matrix for all projects (using 122.2km foraging range)

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	3	4	6	7	14	28	42	56	71	85	99	113	127	141
10	14	28	42	56	71	141	282	423	564	705	846	987	1,128	1,269	1,410
15	21	42	63	85	106	212	423	635	846	1,058	1,269	1,481	1,693	1,904	2,116
20	28	56	85	113	141	282	564	846	1,128	1,410	1,693	1,975	2,257	2,539	2,821
25	35	71	106	141	176	353	705	1,058	1,410	1,763	2,116	2,468	2,821	3,174	3,526
30	42	85	127	169	212	423	846	1,269	1,693	2,116	2,539	2,962	3,385	3,808	4,231
35	49	99	148	197	247	494	987	1,481	1,975	2,468	2,962	3,456	3,949	4,443	4,937
40	56	113	169	226	282	564	1,128	1,693	2,257	2,821	3,385	3,949	4,514	5,078	5,642
50	71	141	212	282	353	705	1,410	2,116	2,821	3,526	4,231	4,937	5,642	6,347	7,052
60	85	169	254	339	423	846	1,693	2,539	3,385	4,231	5,078	5,924	6,770	7,617	8,463
70	99	197	296	395	494	987	1,975	2,962	3,949	4,937	5,924	6,911	7,899	8,886	9,873
80	113	226	339	451	564	1,128	2,257	3,385	4,514	5,642	6,770	7,899	9,027	10,155	11,284
90	127	254	381	508	635	1,269	2,539	3,808	5,078	6,347	7,617	8,886	10,155	11,425	12,694
100	141	282	423	564	705	1,410	2,821	4,231	5,642	7,052	8,463	9,873	11,284	12,694	14,105
	<1% increase in baseline mortality						>1% increase in baseline mortality					>1% threshold for citation population			

© WSP UK Limited

Farne Islands SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2 plus all consented projects

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	2	3	4	8	16	24	32	40	48	56	64	72	80
10	8	16	24	32	40	80	160	240	320	400	480	560	640	720	801
15	12	24	36	48	60	120	240	360	480	600	720	841	961	1,081	1,201
20	16	32	48	64	80	160	320	480	640	801	961	1,121	1,281	1,441	1,601
25	20	40	60	80	100	200	400	600	801	1,001	1,201	1,401	1,601	1,801	2,001
30	24	48	72	96	120	240	480	720	961	1,201	1,441	1,681	1,921	2,161	2,402
35	28	56	84	112	140	280	560	841	1,121	1,401	1,681	1,961	2,241	2,522	2,802
40	32	64	96	128	160	320	640	961	1,281	1,601	1,921	2,241	2,562	2,882	3,202
50	40	80	120	160	200	400	801	1,201	1,601	2,001	2,402	2,802	3,202	3,602	4,003
60	48	96	144	192	240	480	961	1,441	1,921	2,402	2,882	3,362	3,842	4,323	4,803
70	56	112	168	224	280	560	1,121	1,681	2,241	2,802	3,362	3,923	4,483	5,043	5,604
80	64	128	192	256	320	640	1,281	1,921	2,562	3,202	3,842	4,483	5,123	5,764	6,404
90	72	144	216	288	360	720	1,441	2,161	2,882	3,602	4,323	5,043	5,764	6,484	7,205
100	80	160	240	320	400	801	1,601	2,402	3,202	4,003	4,803	5,604	6,404	7,205	8,005
	<1% increase in baseline mortality					>1% increase in baseline mortality				>1% threshold for citation population					

© WSP UK Limited

Farne Islands SPA guillemot in-combination operation and maintenance phase annual displacement matrix for Rampion 2, Dudgeon and Sheringham Shoal Extension Projects plus all consented projects

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	1	2	3	3	4	9	17	26	34	43	52	60	69	77	86
10	9	17	26	34	43	86	172	258	344	430	516	602	688	774	860
15	13	26	39	52	65	129	258	387	516	645	774	903	1,032	1,161	1,290
20	17	34	52	69	86	172	344	516	688	860	1,032	1,204	1,376	1,548	1,720
25	22	43	65	86	108	215	430	645	860	1,075	1,290	1,505	1,720	1,935	2,150
30	26	52	77	103	129	258	516	774	1,032	1,290	1,548	1,806	2,064	2,322	2,580
35	30	60	90	120	151	301	602	903	1,204	1,505	1,806	2,107	2,408	2,709	3,010
40	34	69	103	138	172	344	688	1,032	1,376	1,720	2,064	2,408	2,752	3,096	3,441
50	43	86	129	172	215	430	860	1,290	1,720	2,150	2,580	3,010	3,441	3,871	4,301
60	52	103	155	206	258	516	1,032	1,548	2,064	2,580	3,096	3,613	4,129	4,645	5,161
70	60	120	181	241	301	602	1,204	1,806	2,408	3,010	3,613	4,215	4,817	5,419	6,021
80	69	138	206	275	344	688	1,376	2,064	2,752	3,441	4,129	4,817	5,505	6,193	6,881
90	77	155	232	310	387	774	1,548	2,322	3,096	3,871	4,645	5,419	6,193	6,967	7,741
100	86	172	258	344	430	860	1,720	2,580	3,441	4,301	5,161	6,021	6,881	7,741	8,601

<1% increase in baseline mortality | >1% increase in baseline mortality | >1% threshold for citation population

© WSP UK Limited

Farne Islands SPA guillemot in-combination operation and maintenance phase annual displacement matrix for all projects

Displacement (%)	Mortality rates (%)														
	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
1	2	3	5	6	8	15	30	45	60	75	91	106	121	136	151
10	15	30	45	60	75	151	302	453	604	755	906	1,057	1,208	1,358	1,509
15	23	45	68	91	113	226	453	679	906	1,132	1,358	1,585	1,811	2,038	2,264
20	30	60	91	121	151	302	604	906	1,208	1,509	1,811	2,113	2,415	2,717	3,019
25	38	75	113	151	189	377	755	1,132	1,509	1,887	2,264	2,641	3,019	3,396	3,773
30	45	91	136	181	226	453	906	1,358	1,811	2,264	2,717	3,170	3,623	4,075	4,528
35	53	106	158	211	264	528	1,057	1,585	2,113	2,641	3,170	3,698	4,226	4,755	5,283
40	60	121	181	242	302	604	1,208	1,811	2,415	3,019	3,623	4,226	4,830	5,434	6,038
50	75	151	226	302	377	755	1,509	2,264	3,019	3,773	4,528	5,283	6,038	6,792	7,547
60	91	181	272	362	453	906	1,811	2,717	3,623	4,528	5,434	6,339	7,245	8,151	9,056
70	106	211	317	423	528	1,057	2,113	3,170	4,226	5,283	6,339	7,396	8,453	9,509	10,566
80	121	242	362	483	604	1,208	2,415	3,623	4,830	6,038	7,245	8,453	9,660	10,868	12,075
90	136	272	408	543	679	1,358	2,717	4,075	5,434	6,792	8,151	9,509	10,868	12,226	13,585
100	151	302	453	604	755	1,509	3,019	4,528	6,038	7,547	9,056	10,566	12,075	13,585	15,094
	<1% increase in baseline mortality					>1% increase in baseline mortality				>1% threshold for citation population					

Appendix B
PVA validation logs

Population Viability Analysis Parameter log – Guillemot FFC SPA

Set up

The log file was created on: 2024-02-16 12:12:15 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_FFC”.

PVA model run type: validation.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 63268 in 2000

Productivity rate per pair: mean: 0.715 , sd: 0.075

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 0.

Output:

First year to include in outputs: NA

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Validation data

63268 in 2000

80154 in 2008

113427 in 2017

141814 in 2022

Population Viability Analysis Parameter log – Razorbill FFC SPA

Set up

The log file was created on: 2024-02-20 12:12:34 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “FFC SPA_razorbill”.

PVA model run type: validation.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 11340 in 2000

Productivity rate per pair: mean: 0.653 , sd: 0.0995

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

Age class 0 to 1 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 1 to 2 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 2 to 3 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.067 , DD: NA

Impacts

Number of impact scenarios: 0.

Output:

First year to include in outputs: NA

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Validation data

11340 in 2000

20041 in 2008

37473 in 2017

59055 in 2022

Population Viability Analysis Parameter log – Guillemot Farne Islands SPA

Set up

The log file was created on: 2024-02-16 11:50:45 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_Farne Islands”.

PVA model run type: validation.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 58550 in 2004

Productivity rate per pair: mean: 0.823 , sd: 0.164

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 0.

Output:

First year to include in outputs: NA

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Validation data

58550 in 2004

62866 in 2005

64234 in 2006

65191 in 2007

58779 in 2008

64489 in 2009

62116 in 2010

64289 in 2011

65761 in 2012

67064 in 2013

69523 in 2014

71638 in 2015

65709 in 2016

64634 in 2017

66963 in 2018

85816 in 2019

84973 in 2020

84334 in 2021

79285 in 2022

62085 in 2023

Appendix C
PVA run logs

Population Viability Analysis Parameter log – Guillemot at FFC SPA (153.7km foraging range) using 50% displacement and 1% mortality rates

Set up

The log file was created on: 2024-02-21 08:41:26 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “RG1_GU_FFC SPA_153.7 foraging range”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 141815 in 2022

Productivity rate per pair: mean: 0.715 , sd: 0.075

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0019 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0025 , se: NA

Scenario D - Name: Consented plus R2 (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8e-04 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP(without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8e-04 , se: NA

Scenario F - Name: All projects (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0014 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for Guillemot at FFC SPA (153.7km foraging range) using 70% displacement and 2% mortality rates

Set up

The log file was created on: 2024-02-21 10:31:21 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_FFC SPA_153.7 foraging range-70 disp and 2 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 141815 in 2022

Productivity rate per pair: mean: 0.715 , sd: 0.075

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0054 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0055 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0071 , se: NA

Scenario D - Name: Consented plus R2 (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0022 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP(without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0023 , se: NA

Scenario F - Name: All projects (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0039 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for Guillemot at FFC SPA (153.7km foraging range) using 70% displacement and 5% mortality rates

Set up

The log file was created on: 2024-02-21 09:05:55 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_FFC SPA_153.7 foraging range-70 disp and 5 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 141815 in 2022

Productivity rate per pair: mean: 0.715 , sd: 0.075

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0135 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0137 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0177 , se: NA

Scenario D - Name: Consented plus R2 (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0055 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP(without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0057 , se: NA

Scenario F - Name: All projects (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0097 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for Guillemot at FFC SPA (95.2km foraging range) using 50% displacement and 1% mortality rates

Set up

The log file was created on: 2024-02-21 10:20:04 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_FFC SPA_95.2 foraging range-50 disp and 1 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 141815 in 2022

Productivity rate per pair: mean: 0.715 , sd: 0.075

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0015 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0015 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0021 , se: NA

Scenario D - Name: Consented plus R2 (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 3e-04 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP(without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 3e-04 , se: NA

Scenario F - Name: All projects (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9e-04 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for Guillemot at FFC SPA (95.2km foraging range) using 70% displacement and 2% mortality rates

Set up

The log file was created on: 2024-02-21 10:52:32 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_FFC SPA_95.2 foraging range-70 disp and 2 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 141815 in 2022

Productivity rate per pair: mean: 0.715 , sd: 0.075

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0041 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0041 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0058 , se: NA

Scenario D - Name: Consented plus R2 (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9e-04 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP(without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001 , se: NA

Scenario F - Name: All projects (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0026 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for Guillemot at FFC SPA (95.2km foraging range) using 70% displacement and 5% mortality rates

Set up

The log file was created on: 2024-02-21 11:04:13 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_FFC SPA_95.2 foraging range-70 disp and 5 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 141815 in 2022

Productivity rate per pair: mean: 0.715 , sd: 0.075

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0102 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0104 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0144 , se: NA

Scenario D - Name: Consented plus R2 (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0022 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP(without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0024 , se: NA

Scenario F - Name: All projects (without H4)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0064 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for razorbill at FFC SPA (using 164.6km foraging range) for all scenarios of displacement and mortality rates

Set up

The log file was created on: 2024-02-21 12:29:39 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “RA_FFC SPA_ 164.6 foraging”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 59055 in 2022

Productivity rate per pair: mean: 0.653 , sd: 0.0995

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

Age class 0 to 1 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 1 to 2 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 2 to 3 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.067 , DD: NA

Impacts

Number of impact scenarios: 9.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2 - 50 and 1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8e-04 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP - 50 and 1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8e-04 , se: NA

Scenario C - Name: All projects - 50 and 1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0013 , se: NA

Scenario D - Name: Consented plus R2 - 70 and 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0023 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP- 70 and 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0023 , se: NA

Scenario F - Name: All projects- 70 and 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0037 , se: NA

Scenario G - Name: Consented plus R2 - 70 and 5

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0058 , se: NA

Scenario H - Name: Consented plus R2 and DEP and SEP- 70 and 5

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0058 , se: NA

Scenario I - Name: All projects- 70 and 5

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0092 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for razorbill at FFC SPA (using 122.2km foraging range) for all scenarios of displacement and mortality rates

Set up

The log file was created on: 2024-02-21 13:58:01 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “RA_FFC SPA_122.2 foraging range”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 5.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 59055 in 2022

Productivity rate per pair: mean: 0.653 , sd: 0.0995

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

Age class 0 to 1 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 1 to 2 - mean: 0.63 , sd: 0.209 , DD: NA

Age class 2 to 3 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.067 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.067 , DD: NA

Impacts

Number of impact scenarios: 9.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: consented and R2 - 50 and 1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7e-04 , se: NA

Scenario B - Name: Consented plus R2 and DEP and SEP - 50 and 1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7e-04 , se: NA

Scenario C - Name: all projects - 50 and 1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0012 , se: NA

Scenario D - Name: consented and R2 - 70 and 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002 , se: NA

Scenario E - Name: Consented plus R2 and DEP and SEP - 70 and 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002 , se: NA

Scenario F - Name: all projects - 70 and 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0033 , se: NA

Scenario G - Name: consented and R2 - 70 and 5

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0049 , se: NA

Scenario H - Name: Consented plus R2 and DEP and SEP - 70 and 5

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005 , se: NA

Scenario I - Name: all projects - 70 and 5

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0084 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for guillemot at Farne Islands SPA for 50% displacement and 1% mortality rate

Set up

The log file was created on: 2024-02-21 11:21:33 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_Farne Island SPA_ 50 disp and 1 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 62085 in 2023

Productivity rate per pair: mean: 0.823 , sd: 0.164

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 3.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 6e-04 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7e-04 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0012 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for guillemot at Farne Islands SPA for 70% displacement and 2% mortality rate

Set up

The log file was created on: 2024-02-21 11:33:24 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_Farne Island SPA_ 70 disp and 2 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 62085 in 2023

Productivity rate per pair: mean: 0.823 , sd: 0.164

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 3.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0018 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0019 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0034 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA

Population Viability Analysis Parameter log for guillemot at Farne Islands SPA for 70% displacement and 5% mortality rate

Set up

The log file was created on: 2024-02-21 12:02:19 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

Package Version

popbio "popbio" "2.4.4"

shiny "shiny" "1.1.0"

shinyjs "shinyjs" "1.0"

shinydashboard "shinydashboard" "0.7.1"

shinyWidgets "shinyWidgets" "0.4.5"

DT "DT" "0.5"

plotly "plotly" "4.8.0"

rmarkdown "rmarkdown" "1.10"

dplyr "dplyr" "0.7.6"

tidyr "tidyr" "0.8.1"

Basic information

This run had reference name “GU_Farne Island SPA_ 70 disp and 5 mort”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1234.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.

Region type to use for breeding success data: Global.

Available colony-specific survival rate: National. Sector to use within breeding success region: Global.

Age at first breeding: 6.

Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.

Number of subpopulations: 1.

Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: breeding.adults

Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 62085 in 2023

Productivity rate per pair: mean: 0.823 , sd: 0.164

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.015 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.015 , DD: NA

Impacts

Number of impact scenarios: 3.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2030 to 2060

Impact on Demographic Rates

Scenario A - Name: Consented plus R2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0045 , se: NA

Scenario B - Name: Consented plus R2 & DEP and SEP

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0048 , se: NA

Scenario C - Name: All projects

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0085 , se: NA

Output:

First year to include in outputs: 2030

Final year to include in outputs: 2060

How should outputs be produced, in terms of ages?: breeding.adults

Target population size to use in calculating impact metrics: NA

Quasi-extinction threshold to use in calculating impact metrics: NA



Rampion 2
WIND FARM

