East Anglia TWO Offshore Windfarm

Offshore Ornithology Without Prejudice Compensation Measures

Applicant: East Anglia TWO Limited
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Applicable to East Anglia TWO

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Glossary of Acronyms

AOE	Alde-Ore Estuary
CRM	Collision Risk Model
FFC	Flamborough and Filey Coast
HRA	Habitats Regulations Assessment
OTE	Outer Thames Estuary
SPA	Special Protection Area

1 Introduction

1.1 Background

1. East Anglia TWO offshore windfarm (the Project) applied on 25th of October 2019 for an order granting development consent under the Planning Act 2008 (the Applications) to authorise the construction, operation and maintenance of the East Anglia TWO windfarm generating station in the Southern North Sea, with associated offshore and onshore infrastructure.

2. The Application was accepted by the Planning Inspectorate ("PINS") on behalf of the Secretary of State for Business, Energy and Industrial Strategy (the Secretary of State) on 22nd of November 2019 and is subject to examination by the appointed Examining Authority (ExA) between 6th October 2020 and 6th April 2021 (the Examination).

3. In the ExA's Rule 6 letter of the 16th July 2020 the ExA asked East Anglia TWO Limited (The Applicant) under Procedural Decision 18, Question 2 to consider whether:

4. "*there is a need for the project before us to……. engage with the derogation tests set out under stages 3 and 4 of the Habitats Directives and Regulations*"

5. It is the Applicant's position in the Information to Support Appropriate Assessment (ISAA) (APP-043) that there would be no Adverse Effect on Integrity (AEoI) of any site as a result of either project alone or in-combination effects. The Applicant has engaged with Interested Parties and has considered comments raised in their Relevant Representations but does not consider that any of the issues raised alter the position stated at the time of the application.

6. Furthermore, in response to submissions made by Natural England (NE) and the Royal Society for the Protection of Birds (RSPB) during the Project's Examinations, the Applicant has proposed to implement further mitigation measures from those set out in the DCO Application (e.g. increasing rotor draught height to reduce collision risks in order to give further confidence that there will not be any adverse effects of the Project on the following Special Protection Areas (SPAs) and the features for which they are designated:

    - Flamborough and Filey Coast (FFC) SPA
        - Kittiwake (collision risk)
        - Gannet (collision risk)
        - Guillemot (displacement risk)
        - Razorbill (displacement risk)

- Alde-Ore Estuary AOE) SPA
  - Lesser black-backed gull (collision risk)
- Outer Thames Estuary (OTE) SPA
  - Red-throated diver (redistribution risk)

7. The mitigations are detailed in full in the following documents which have been submitted to the Project's examination:

- East Anglia ONE North and East Anglia TWO Offshore Windfarms Offshore ornithology cumulative and in-combination collision risk update (REP1-047).

8. The increase in turbine draught height results in the collision risks for kittiwake and gannet being reduced by up to 15% and for lesser black-backed gull by up to 10% compared with those figures presented in the Project's DCO Applications (REP1-047).

9. As stated in the original submission (APP-043), and subsequently during the Examination (REP1-047, REP2-006, REP3-049, REP4-042), the Applicant considers there to be no risk of an Adverse Effect on Integrity (AEoI) for these sites as a result of the Project alone and in-combination with other plans and projects, based on assessment of the original design. Following the additional mitigation for collisions and displacement risks, the Applicant firmly maintains that there are no AEoI for these sites as a result of the projects alone and in-combination with other plans and projects.

10. Nonetheless, in light of the Secretary of State's observation in the decision letters for recent windfarm applications (e.g. Norfolk Vanguard and Hornsea Project Three) that future projects should be mindful to ensure that in-principle compensation options were presented for consideration during the Examination of DCO applications, this document outlines in-principle compensatory measures that could be developed should the Secretary of State conclude AEoI on any of the qualifying features listed above.

1.2 Purpose of this Document

1.2.1 Context

11. The Applicant does not believe that any compensatory measures will need to be progressed. Therefore, the provision of evidence regarding compensation measures is provided 'in-principle', and is made entirely without prejudice to the Applicant's position that there will be no AEoI on any SPA.

12. This document therefore provides a review of a range of potential measures that could be adopted to compensate for the potential effects on the seabirds identified in ***section 1.1***. Where similar proposals have been made for other windfarm applications, and relevant stakeholders (e.g. NE and the RSPB) have

provided comments, those proposals and comments have been considered in the current review.

1.2.2 Consultation

13. The Applicant presented outline proposals to NE and the RSPB at a workshop on the 28th July 2020, which was followed by a draft set of proposals provided on the 25th September 2020 for review and comment. Both stakeholders provided comments on the outline proposals (NE under their discretionary advice service on 30th October 2020 and the RSPB direct on the 23rd October 2020), and again on the HRA Compensatory Measures submitted in the examination (REP3-054) in their Deadline 5 responses REP5-016 (RSPB) and REP5-082 (NE). These comments have been taken into consideration in the subsequent development of in-principle compensation.

2 Guidance on compensation

14. Should the Competent Authority conclude that, following Appropriate Assessment, an AEoI on a Natura 2000 site(s) cannot be ruled out, that there are no alternative solutions and that there are Imperative Reasons of Over-riding Public Interest (IROPI), Article 6(4) of the Habitats and Birds Directives *"requires that all necessary compensatory measures are taken to ensure the overall coherence of the network of European sites as a whole is protected*."

15. DEFRA (2012) and EC (2012 and 2018) explain that for SPAs, the overall coherence of the Natura 2000 Network can be maintained by:

- compensation that fulfils the same purposes that motivated the site's designation;
- compensation that fulfils the same function along the same migration path; and,
- the compensation site(s) are accessible with certainty by the birds usually occurring on the site affected by the project.

16. The guidance provides an element of flexibility, recognising that compensation of a '*like for like'* habitat and/or in the same designated site may not be practicable.

17. Compensation should not be used to address issues that are causing designated habitats or species to be in an unfavourable condition. This is the responsibility of the UK Government.

18. Ideally, compensation should be functioning before the effect takes place, although it is recognised that this may not always be possible, as stated in the EC (2012) guidance: "*in principle, the result of implementing compensation has normally to be operational at the time when the damage is effective on the site*

concerned. Under certain circumstances where this cannot be fully fulfilled, overcompensation would be required for the interim losses."

19. In line with the guidance, compensation measures for each SPA feature are presented in the following sections.

3 Approach

20. The approach which has been taken by the Applicant to identify potential compensation measures and for considering their suitability is as follows:

- Review of compensation measures discussed in Furness et al. (2013);
- Review of recent windfarm applications for which compensation options have been presented (e.g. Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas), accepted as appropriate in the determination (to date Hornsea Project Three only) and stakeholder comments on these proposals;
- Consideration of emerging evidence on windfarm and seabird interactions and influences on seabird ecology more widely to determine whether novel options may be appropriate.
- Features of the options identified through this process were then considered in relation to various criteria (feasibility, spatial and temporal scale, how it would be monitored, etc.).

21. In undertaking these steps, the scale of predicted impacts was also used as a guide, since this is a material factor in deciding on the degree of justification for any given measure, and also its feasibility.

22. Each of the features identified in ***section 1.1*** is covered in a separate appendix to this document which describes the measures for that species.

3.1 Summary of Measures proposed

23. The following in-principle (without prejudice) compensation options are set out for those SPA seabird populations for which NE has been unable to rule out in-combination AEoI.

- FFC SPA kittiwake: provision of a structure suitable for kittiwake to nest on at a location considered to offer a high probability of high breeding success (***Appendix 5***);
- FFC SPA gannet: provision of a structure suitable for gannet to nest on at a location considered to offer a high probability of high breeding success (Appendix 6;
- FFC SPA guillemot: eradication of introduced rats on an island where rat predation is considered to limit colony size and productivity;

- FFC SPA razorbill: eradication of introduced rats on an island where rat predation is considered to limit colony size and productivity;
- AOE SPA lesser black-backed gull: erection of predator proof fencing to provide safe habitat for nesting; and,
- OTE SPA red-throated diver: management of vessels to reduce disturbance and displacement within the SPA during critical periods of the nonbreeding season.

3.2 Fisheries management

24. NE's responses to compensation proposals for the Hornsea Three, Norfolk Vanguard and Norfolk Boreas windfarms have all stated that (in relation to kittiwake compensation) management of the North Sea sandeel fishery on the Dogger Bank is their preferred option. Such a measure would benefit several seabird species (e.g. gannet, guillemot and razorbill) and therefore this measure is considered in this up-front section, rather than within each individual species section below.

25. The Applicant's position, which is aligned with those of the developers of the above named windfarms, is that while fisheries management has the potential to generate very large benefits to the seabird populations which are dependent on the fished stocks, it is not a measure which a windfarm developer, either acting alone or in concert with others, can offer since this is under government control. Therefore, while the Applicant would be fully supportive of the UK government in undertaking this measure as strategic compensation for the industry, this cannot be offered as compensation in the current context. Furthermore, as noted above,

    Compensation should not be used to address issues that are causing designated habitats or species to be in an unfavourable condition. This is the responsibility of the UK Government.

    Thus, this measure is considered to be beyond the scope of individual projects or industry and requires Government action.

26. A review of Prey Availability Compensation Mechanisms was undertaken by Howell Marine Consulting on behalf of Ørsted for the Hornsea Three project (Ørsted, 2020a), Annex 1 of this document provides an update and review of that report and its conclusions.

4 References

DEFRA 2012. Habitats and Wild Birds Directives: guidance on the application of article 6(4) Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69622/pb13840-habitats-iropi-guide-20121211.pdf.

EC 2012. Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC Clarification of the Concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission. https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/new_guidance_art6_4_en.pdf

EC 2018. Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. Brussels, 21.11.2018 C(2018) 7621 final.

Furness, R.W., MacArthur, D., Trinder, M. and MacArthur, K. 2013. Evidence review to support the identification of potential conservation measures for selected species of seabirds. Report to Defra.

Ørsted 2020a. Response to the Secretary of State's Minded to Approve Letter Appendix 3: Supporting Evidence for Kittiwake Prey Resource.

5 Appendix 1: Kittiwake

5.1 Overview

27. Flamborough and Filey Coast (FFC) SPA covers an area of 7,858ha and is located on the Yorkshire coast between Bridlington and Scarborough approximately 245km from the proposed East Anglia TWO windfarm at the closest point. The SPA is in two sections: the southern section extends north from South Landing around Flamborough Head to Speeton; the northern section covers the peninsula of Filey Brigg before extending north west to Cunstone Nab. The seaward boundary extends 2km throughout the two sections of the site into the marine environment, running parallel to the landward boundaries to include the adjacent coastal waters. The SPA includes the RSPB reserve at Bempton Cliffs, the Yorkshire Wildlife Trust Flamborough Cliffs Nature Reserve and the East Riding of Yorkshire Council Flamborough Head Local Nature Reserve.

28. The site description indicates that the Flamborough and Filey Coast SPA qualifies under Article 4.2 of the Birds Directive (2009/147/EC) by supporting over 1% of the biogeographical population of Kittiwake:

- Kittiwake 44,520 pairs (89,040 breeding adults, 4 year average 2008-2011)

5.2 Conservation Objectives

29. The Conservation Objectives for the site are 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 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 populations of each of the qualifying features; and
- The distribution of the qualifying features within the site.

30. NE has stated the target is to restore the size of the breeding population of kittiwakes to a level which is at or above 83,700 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

31. The Flamborough and Filey Coast SPA replaced the Flamborough Head and Bempton Cliffs SPA. The trend in the kittiwake population for this site has been subject to discussion and disagreement between seabird experts (e.g. John Coulson) and the Statutory Nature Conservation Bodies (SNCBs). At the time of citation, the Flamborough Head and Bempton Cliffs SPA was thought to support 83,370 breeding pairs of kittiwakes (2.6% of the breeding Eastern Atlantic population) (count as of 1987). However, there were 37,617 kittiwake pairs or 75,234 breeding adults recorded in 2008 (JNCC Seabird Colony Register). The citation (JNCC 2011a) notes that the SPA designations were reviewed in 2000, at which point kittiwakes were the only notified feature of the site. There is some uncertainty as to whether there were ever as many as 83,370 pairs of kittiwakes at this site; this number has been challenged repeatedly by the world's leading expert on kittiwake biology (Coulson 2011), most recently by noting that this colony should have been increasing in numbers based on monitoring data on its productivity. The apparent decline from 83,370 pairs in 1987 to 37,617 pairs in 2008 does not correspond with population trajectories elsewhere based on the influence of productivity on population change (Coulson 2017) and the simplest explanation is that a count of individuals was erroneously reported as pairs, thereby doubling the apparent population size at a stroke. Indeed, recent counts by the RSPB show a small increase in kittiwake breeding numbers in the years since 2008 (Aitken et al. 2017), as predicted by Coulson (2017).

5.3 Quantification of effect

5.3.1 Project alone

32. The revised kittiwake collision mortality apportioned to the FFC SPA following incorporation of collision mitigation through an increase in rotor draught height of 2m (REP1-047, REP3-073) is 1.7 adults at East Anglia TWO.

33. Natural England has agreed that the Project alone will not result in AEoI (REP3-117).

5.3.2 In-combination

34. The in-combination annual kittiwake collisions apportioned to the FFC SPA from all windfarms predicted to have connectivity were presented in REP4-042. There are two total figures, one which includes Hornsea Project Four and one without that project (since only preliminary values are available for that windfarm). The total with Hornsea Project 4 included is 515 and without is 359.

35. Note that neither of these figures includes the estimated collisions at Hornsea Project Three since that windfarm has been consented on the basis that it fully compensates for its predicted 73 collisions.

36. The current Project therefore contributes between 0.3% and 0.4% to the total predicted mortality.

37. The Applicant firmly maintains the position presented in the original Application and during the Examination, based on consideration of the outputs from population modelling (APP-043) as supplemented in this submission, that an in-combination AEoI for the Project with other plans and projects can be ruled out beyond reasonable scientific doubt for the kittiwake feature of the FFC SPA.

38. Furthermore, the Project's impacts are extremely small compared with those for most other windfarms, and would also be more than offset by the difference between the total collisions based on consented windfarm designs compared with as-built designs (i.e. 'headroom', Trinder 2017).

39. The contribution to the in-combination total from the Project must also be taken into consideration with respect to the requirement, scale and timescale for delivery of compensation measures.

40. Nonetheless, without prejudice to the Applicant's position, possible compensation options are discussed below.

5.4 Compensation measures

5.4.1 Potential measures

41. Furness et al. (2013) identified seven potential measures that were likely to improve the conservation status of kittiwakes:

- Closure of sandeel and sprat fisheries in UK waters;
- Provision of artificial structures for new kittiwake colonies;
- Mink eradication;
- Feral cat eradication;
- Rat eradication;
- Fencing out foxes from colonies; and
- Exclusion of great skuas.

42. Controlling predators (mink, cat, rat, fox and great skua) is not considered appropriate at FFC SPA, since there is no evidence that predation from any of these species exerts any significant pressure on the population. This has been discussed with stakeholders for other projects in the Southern North Sea and was accepted by RSPB and NE in the screening exercise undertaken by the Applicant (as summarised in REP3-054)

43. As noted in ***section 3.2***, fisheries management is not considered a feasible compensation option for the Applicant to pursue. This aspect has also been discussed in detail in the Hornsea Project Three compensation submission

(Ørsted 2020a) (and in Annex 1 document reference ExA.AS-8.1.D6.V1). Therefore, provision of additional nesting habitat in southern North Sea coastal locations where natural (or existing artificial) nesting opportunities are limited is considered the only realistic option.

44. The Applicant notes that there are a number of existing programmes for the creation of artificial structures for kittiwake nesting and others may be proposed in the future. Therefore, where other parties have an interest in the creation or extension of artificial nest structures for kittiwakes the Applicant will seek to engage with them to work collaboratively and strategically where appropriate. However, on the basis that any proposed compensation measures must be demonstrated to be viable for the Project, the following sections provide the detail of provision of additional nesting habitat without assuming any collaboration or integration with other parties' measures.

5.4.2 Measures taken forward

5.4.2.1 Provision of artificial nest sites

5.4.2.1.1 Overview

45. Nesting habitat for kittiwakes is considered to be a limiting factor on the southern North Sea population (Coulson 2011). Natural nest habitat is sea cliffs with ledges which are too narrow for other species to use and which offer protection from aerial predators, for example through the presence of overhangs. Such habitat is almost completely absent south of Flamborough Head along the east English coast. However, this species does nest on artificial structures and there are several examples of this along the Suffolk and Norfolk coasts. The attraction of these locations is the lower competition for food in the surrounding seas due to the much smaller populations present (compared with the more than 40,000 pairs at FFC SPA). This means that foraging trips are typically shorter and consequently reproductive success is generally higher. Through higher breeding success these colonies can act as source populations, with the surplus productivity (i.e. above that required to replace natural losses in the natal colony) being exported as young birds which can recruit to become breeding adults at other colonies, such as FFC SPA. Notably the latter, which typically has low productivity rates, is likely to require such imports to maintain itself.

46. Examples of kittiwake colonies on artificial coastal structures include:

- Lowestoft: harbour wall structure (bespoke) and jetties, town centre buildings including a church tower;
- Sizewell nuclear power station: outfall structures;
- Tyneside and Gateshead: existing structures (e.g. buildings and bridges) and bespoke structures ('kittiwake towers'); and

- Dunbar: castle and harbour walls.

47. Kittiwakes also attempt to breed on offshore oil and gas platforms, although in most cases these birds are discouraged due to health and safety concerns. Nonetheless, where the birds are tolerated (e.g. certain Norwegian platforms), larger colonies of up to 200 have formed (Christensen-Dalsgaard et al. 2019). Studies indicate that these colonies perform well due to reduced predation pressures and proximity to less contested foraging grounds.

48. Descriptions of these colonies at Lowestoft and Tyneside are provided below.

5.4.2.1.1.1 Lowestoft

49. Lowestoft is distant from any large colonies of kittiwakes or other seabird species with which kittiwakes may compete (Mitchell et al. 2004). Kittiwakes have been nesting at Lowestoft since the 1940s, and breeding numbers have increased, reaching 364 pairs in 2017 (the most recent count in the JNCC SMP database). Kittiwakes used to nest on structures of the Lowestoft pier pavilion, but when the pier pavilion was removed in 1989, they moved to a purpose built structure (a wall in the harbour with ledges).

50. Birds immediately began using the new ledges, which were constructed with the initial aim of providing nest sites for 120 pairs, the number that used the pavilion structure. Since then kittiwakes have also colonised several nearby buildings, including a church tower, which may be a consequence of the limited space on the harbour wall ledges which by 1995 held over 240 pairs.

51. Unfortunately, it appears that the nest wall has become accessible to predators (foxes and large gulls) and as a consequence has been abandoned (pers. comm. M.Swindells). However, with some simple modifications (barriers at the base to prevent fox access and overhanging ledges to prevent large gulls from flying onto the nest ledges) it would be expected that these problems could be resolved. These would be expected to enable successful breeding at this location to recommence. The Applicant notes NE's commentary in their Deadline 5 submission (REP5- 082) regarding Lowestoft Harbour and will investigate these points further.

52. Coulson (2017) estimated that to maintain a stable population, kittiwakes need to produce about 0.8 chicks per nest (i.e. to replace natural losses). The Lowestoft kittiwake colonies produced an average of 1.1 chicks per nest between 2010 and 2017 (JNCC SMP database, most recent data available), which is among the highest recorded at any colonies in the UK. This is clear evidence that these birds have good supplies of food for breeding. By comparison, RSPB data show breeding success of kittiwakes at FFC SPA during the same period was below 0.8 chicks per nest (at monitored plots) in six years out of eight at colonies at Flamborough and Bempton and below 0.5

chicks per nest in six years out of the six monitored at Filey (Aitken et al. 2017). This is despite the fact that both locations are within the same sandeel spatial unit and so presumed to be affected by the same sandeel population dynamics (Olin et al. 2020). This may be explained by the presence of other prey species in the diet of kittiwakes at Lowestoft (Ørsted 2020b).

53. From this it can be seen that the Lowestoft breeding colonies have historically produced excess young (i.e. more chicks than needed for colony maintenance), and that there are opportunities to enhance this through further nest site provision, thereby increasing the numbers of kittiwakes breeding at Lowestoft, and providing additional recruits for the FFC SPA population.

5.4.2.1.1.2River Tyne

54. Kittiwakes have bred on various structures (including purpose-built ones) and buildings (e.g. warehouses and bridges) along the River Tyne for several decades, with around 1,000 pairs recorded in total (Turner 2010, JNCC SMP database). Despite some efforts to deter birds in some places, between 2010-2019 the mean productivity of the River Tyne artificial colonies was 0.96 chicks per nest (i.e. above the 0.8 chicks per nest threshold needed to sustain the population) and therefore this colony is expected to be exporting young birds able to recruit to colonies elsewhere. To reduce the potential for conflicts with residents (e.g. due to noise and guano) two new bespoke structures (kittiwake towers) were built to provide artificial nest sites in locations that avoided the risk of conflicts and there is now generally strong popular support for the kittiwakes in the area (Turner 2010).

55. Breeding success varies considerably among the different buildings and structures, suggesting that careful selection of where to provide additional nest sites would influence the productivity that would be achieved. This point indicates that not all artificial structures are equally good for kittiwakes to use and that breeding success will vary according to the quality of the artificial structure provided.

5.4.2.1.2 Recruitment Scale

56. A colony of 100 pairs would produce approximately 100 immature birds per year (productivity in artificial colonies varies, but it is considered realistic to assume 1 chick fledged per pair; Coulson 2011), slightly less than half of which would be predicted to be available to recruit to the breeding population (c. 49% survival from fledging to age 4, Horswill and Robinson 2015). Some of those would be required to replace losses at the new colony, but this would still leave considerable over-compensation for the 2 adults required, and certainly much more than the ratio of 1:2 or 1:3 which NE has advised for such measures in relation to recent applications. Further details are discussed in the following sections.

5.4.2.1.2.1 Expected productivity of colonising birds

57. Kittiwake first time breeders tend to be less productive than experienced adults (Coulson 2011) so it is typical for breeding success achieved by new populations to increase over the first few years. However, there is clear evidence that kittiwakes nesting on artificial nest sites typically have higher breeding success than kittiwakes at natural colonies:

- Lowestoft has averaged 1.1 chicks per nest (2010-2017);
- River Tyne artificial sites has averaged 0.96 chicks per nest (2010-2019), and over 1 chick per nest at some of the structures within that group of sites; and,
- Dunbar (castle and harbour) has averaged 1.2 chicks per nest (1991-2007).

58. By comparison, breeding success at natural colonies has included extended periods when productivity has not exceeded 0.8 chicks per nest, such as at the Isle of May (1991-2007) and FFC SPA (2010-2019).

59. Since productivity above 0.8 chicks per nest is required to maintain a UK kittiwake population it is clear that the artificial nest-site colonies of kittiwakes are able to both sustain themselves and to provide emigrants to support other colonies. The reason is likely to be due to competition for resources (e.g. prey), which will be greater at large colonies (i.e. a density dependent effect), and probably manifests as longer, less successful foraging trips which translates into poorer chick survival.

5.4.2.1.2.2 Size of colony required

60. It is important to consider that the requirement is to compensate for an estimated loss of up to 2 adult kittiwakes per year due to the Project. That equates to the equivalent of 4 fledglings per year (because a fledgling has a 0.49 probability of becoming a breeding adult). To estimate the number of nests required to produce the surplus recruits for the SPA population, it has been assumed that the artificial site productivity rate would be at least 1.0 and that 0.8 of that would be required to maintain the population. The excess of 0.2 chicks per pair is therefore available for recruitment elsewhere. To produce 2 breeding adults at FFC SPA this therefore requires 4 chicks, which at the excess productivity of 0.2 would be obtained from 20 nests. If this is scaled up to allow for over-compensation at a ratio of 1:3 this equates to 60 nests. This remains comfortably below the proposed target of a colony of 100 pairs (which represents an over-compensation ratio of 1:5). Note this also assumes productivity of 1.0, which is at the lower end of the range recorded at artificial colonies (0.96, to 1.2). Higher productivity would deliver additional compensation.

5.4.2.1.2.3Expected emigration rates of hatched birds from a new colony

61. Most kittiwakes that reach breeding age recruit to a different colony than the one they were hatched in, with over 90% of females and 60% of males at a studied colony found to be immigrants (Coulson and Neve de Mevergnies 1992, Coulson 2011). Most individuals recruit into a colony that is within 500km of where they were hatched.

62. There is strong evidence that young kittiwakes try to establish themselves at colonies with high breeding success (Danchin et al. 1998, Boulinier et al. 2008, Coulson 2011). Small colonies generally tend to have higher breeding success so there is a greater attraction of immigrants to smaller, growing colonies.

63. It is likely that kittiwake recruits will find it much easier to establish themselves in colonies that have vacancies created by natural mortality of established breeding adults but have relatively low productivity. Where breeding success has been low there will be fewer local birds in the population to recruit (especially when the low recruitment to natal colonies is factored in), and the colony will be less attractive to potential recruits compared with a colony with higher breeding success. Larger colonies will have larger numbers of such vacancies arising. This will tend to even out the distribution of potential recruits among prospective colonies, and is a likely mechanism by which birds fledged from the compensation colony may recruit into the FFC SPA colony. Therefore, it can be predicted that most of the kittiwakes that fledge from a compensation colony with newly created nest sites will end up nesting at other colonies, mostly but not exclusively within 500km of the compensation colony. This distance range encompasses most of the English North Sea coast between Tyneside and Lowestoft, with FFC SPA in the middle.

5.4.2.1.2.4Evidence for availability of potential recruits

64. Kittiwake populations include large numbers of immature birds; using age based demographic rates (Horswill and Robinson 2015) it can readily be demonstrated that about 47% of the population comprises immature kittiwakes and 53% breeding adults (Furness 2015). Therefore, there is an ample supply of immature birds looking for nest sites. Many of these immature birds can be observed on the fringes of kittiwake colonies in summer.

65. During their time attending the colony the immature birds may often attempt to settle on an existing nest, but are chased away by breeding adults. Some manage to establish a site between existing nests, or where a nest has been abandoned, and then may return the next year to breed at that site (Coulson 2011). Immature kittiwakes may also try to recruit into one colony but fail to do so and subsequently move elsewhere to try to recruit where there is less competition for sites. As a consequence, there is a wide range of age at first

breeding in the kittiwake (Wooller and Coulson 1977, Porter 1990, Coulson 2011) as found in other long-lived birds.

66. A very few kittiwakes start to breed for the first time when two years old, whereas some do not breed for the first time until ten years old, with an average age of first breeding of four (Coulson 2011). Kittiwakes seeking to establish a nest site within a colony normally spend at least one year visiting the colony as an immature bird before establishing a nest site, and often take several years to succeed in obtaining a site. At North Shields, where kittiwakes were individually ringed so their recruitment behaviour could be observed, almost all marked birds that bred had been seen at the colony attempting to establish a site in the previous summer, and over 10% of female kittiwakes that started to breed at the colony had been seen there attempting to obtain sites at least three years before they managed to do so (Coulson 2011).

67. Danchin et al. (1998) and Boulinier et al. (2008) showed that immature kittiwakes, or adult kittiwakes that have failed in their breeding attempt, prefer to move to try to establish a breeding site within a colony where breeding success is high. This means that there is more competition for nest sites at more successful colonies. Tracking of kittiwakes seeking nesting opportunities (not only immatures but also failed breeders from unsuccessful colonies) has shown that birds may visit many colonies over a short period in summer in order to evaluate prospects for breeding, and seek to find a nest site where prospects are best (Ponchon et al. 2017).

68. Consistent with this evidence for kittiwakes competing to obtain better sites in more successful colonies, McKnight et al. (2019) found evidence for density-dependence in survival of immature kittiwakes and subsequent recruitment into the breeding population, implying strong competition for nest sites. Coulson (2011) found that the age of first breeding of kittiwakes at his study colony in North Shields changed significantly over decades, decreasing in breeding males from a mean of 4.59 in 1961-70 to 3.69 in 1981-90. Coulson (2011) attributed this change to reduced density-dependent competition for nest sites in the colony during the 1980s as a consequence of increased adult overwinter mortality at that time. This further supports the view that there is normally strong competition for high quality nest sites among kittiwakes, and that the birds are physiologically capable of breeding at a much younger age than they actually do, because competition limits access to suitable nesting opportunities (Coulson 2011).

69. It can therefore be concluded from the evidence that there is a large pool of nonbreeding kittiwakes physiologically capable of breeding but constrained by competition. This clearly demonstrates the principle of ecological additionality

and therefore, the provision of artificial nesting sites will address the impact of the development.

70. Furthermore, since it is clear that the amount of compensation required for the project would not be difficult to achieve, establishing a new artificial colony would permit kittiwakes to breed at a younger age because of less competition for sites, and would almost certainly allow high breeding success because of the lower levels of local competition for food.

71. Both of these demographic consequences would increase the rate of growth of the kittiwake population (overall) so would represent suitable compensation for losses attributable to the Project.

5.4.2.1.3 Temporal scale

5.4.2.1.3.1 Timescale to achieve compensation

72. The speed at which a new site would be colonised will depend on a range of factors, such as the status of the local population (increasing or declining), and availability of other structures. For example, the colony on the harbour wall in Lowestoft had reached a size of 259 pairs within six years of the pier (on which they had previously nested) being demolished (Brown and Grice 2005).

73. Efforts to accelerate recruits could include use of kittiwake models and using playback of sounds from established colonies. While these methods have been effective for other species (e.g. tern colonies have been shifted to areas at lower risk of flooding using decoy birds), it must be acknowledged that there is a degree of uncertainty about the effectiveness of such measures for the current purposes.

74. Nonetheless, kittiwakes were successfully attracted to the Gateshead tower within 6 months of construction by placing clay kittiwake decoys and disused old kittiwake nests on the ledges, with 18 pairs present in its first year of availability (note this is close to the estimated 20 nests that could deliver compensation for the Project). Furthermore, despite evidence that this is not the ideal design for an artificial colony, being rather exposed to sunshine, wind and rain, there were 131 pairs nesting there in the third breeding season (2000). In winter 2000/01 the structure was then relocated 1 km downstream from its original site to make way for commercial development of the area. However, many of the kittiwakes followed the tower; 112 pairs nested there in 2001 (slightly fewer than in the year before the structure was moved) and there were 143 pairs in 2007 (Turner 2010).

75. Hornsea Project Three compensation proposals for kittiwake have incorporated a requirement for the structure to be available for initial colonisation at least four years prior to the commencement of windfarm operation (i.e. as the point at

which the impact could begin). Four years would allow fledged chicks from the first cohort to reach breeding age and therefore be available to recruit into the FFC SPA population (thereby offsetting the windfarm impacts). It has been suggested that for each year of delay (i.e. less than four) the windfarm will accrue a mortality debt which will need to be paid off over the course of the compensation's operation.

76. In the case of the Project and the very small number of predicted collisions (2 / 1) the Applicant considers that while this risk of incurring a mortality debt exists, the size of debt for a delay of 1 to 2 years remains extremely small and would readily be recouped within a year or two of the nest site becoming operational. Therefore, since the requirement for the colony to be constructed and colonised four years before windfarm operation is a lower concern for the current project, it follows that there is also less requirement for the current in-principle compensation plan to contain detailed designs and site locations (although likely candidate locations would be Lowestoft or the River Tyne). Instead, these aspects can be addressed once a decision on the need to compensate for the Project has been made by the SoS.

5.4.2.1.4 Monitoring

77. Monitoring would be expected to be straightforward, subject to the availability of locations to observe the structure. The primary objectives would be counts of the number of pairs and of their success. It would also be appropriate to undertake similar monitoring of existing colonies in the vicinity (several kms) to understand the role of the new structure within the local metapopulation. Adult kittiwakes are not considered likely to move from a colony once they have established a nest site, so most growth and decline is by way of new breeding birds and natural losses respectively, but such monitoring, potentially combined with a colour ringing campaign (assuming birds could be readily caught) would permit this assumption to be tested. To facilitate this at the focal colony it would be advantageous to build in access. To minimise disturbance this could be via built-in doors accessed from behind. Such features would be dependent on the structure design and location, and should therefore be included as considerations at an early stage.

78. It would also be prudent to consider how the structure could be modified or enhanced should the rate of colonisation or success (i.e. productivity) be lower than anticipated. The more flexible (or modular) the structure, the simpler it is likely to be to make adjustments.

79. Allowance for adaptive management will be planned for (although by its nature, this cannot be defined in detail in advance). The need for such measures will be based on monitoring evidence, for example if predation is found to be limiting productivity, or additional nest space is required to achieve target colony size.

5.4.2.1.5 Delivery

80. Adding nest sites for kittiwakes at existing onshore artificial colonies (e.g. Lowestoft and/or River Tyne) would be an effective means to compensate for the project's impacts in both the short and long term. This would have the advantage of not requiring land purchase, instead being achieved in partnership with existing bodies (e.g. with the harbour authorities at Lowestoft and local authorities and land/property owners at Gateshead/Newcastle). If new structures were proposed, then these would be consented either through permitted development rights available to port authorities and/or statutory undertakers (if applicable) or by way of a separate planning application. This would be subject to the usual planning regulations (e.g. assessment of environmental impacts, etc.) However, it is not anticipated that structures at port locations would give rise to likely significant effects and the permitted development regime is likely to be appropriate for this type of structure.

81. As set out in the New Anglia Local Economic Partnership's Local Industrial Strategy (New Anglia 2020[1]), the Applicant is an important contributor to the delivery of the East of England offshore wind O&M cluster, and is therefore working closely with a number of companies in the local and regional supply chain, including the Port of Lowestoft. As part of this relationship, the Applicant would hope to be able to secure rights to an appropriate structure/facility on which additional nesting sites could be located in the event that compensation measures are deemed necessary by the SoS.

82. Because kittiwake have readily taken to nesting on a wide variety of artificial structures, both bespoke and opportunistic, there is scope to review the characteristics of alternatives to determine what the key features are for high breeding success. Likely candidate features are aspect (i.e. exposure to sun, rain and wind), protection from predators both aerial and terrestrial and distance to the sea. It is proposed that a study is undertaken of existing structures which will identify the important aspects to be incorporated into the proposed design. This will be carried out if the SoS decides that kittiwake compensation is required.

5.4.2.1.6 Feasibility

83. As detailed above, identifying suitable candidate locations, obtaining the necessary rights (land, access, etc.) and installing a suitable colony structure are all considered to be feasible undertakings that the Applicant could achieve within the relatively short time-frame that would be required. Furthermore, the success of these measures as compensation could be readily determined through monitoring, and if enhancement should be considered necessary (e.g. additional nest capacity, improved protection from rain or predators) this too

[1] https://newanglia.co.uk/economic-strategy-for-norfolk-and-suffolk/

could be readily achieved. However, further work will be undertaken to explore how this could be delivered alongside similar proposals from other developments, where appropriate.

5.4.3 Summary and Roadmap for Delivery of Compensation (if required)

84. If kittiwake compensation is deemed to be required following the Appropriate Assessment, the Applicant proposes that provision of artificial nest sites would be the most appropriate measure to deliver compensation prior to the operation of the Project.

85. The measures which would be undertaken by the Applicant to secure artificial nest sites are as follows:

- Following a decision from the SoS that compensation is required, a steering group would be appointed to the task (e.g. comprising all relevant stakeholders) to oversee the development, implementation, monitoring and reporting of the compensation measures.
- It is proposed to secure the construction of onshore artificial nest sites, so that they are constructed and available for use prior to first operation of any wind turbine generator forming part of the authorised development
- The nest sites would be located on a structure similar in size and form to those already used by kittiwakes (e.g. in Lowestoft and Tyneside). Detailed design would begin following a decision from the SoS that this is required. Consultation will be required with the steering group to agree the design parameters once the Applicant has developed initial proposals. If it is necessary to obtain planning consent for this structure the application would be submitted to the appropriate authority.
- The success of the compensation measures would be monitored through observation of numbers and breeding success. Results would be discussed with the steering group. If a need to modify the approach is identified this will also be discussed and steps taken accordingly.
- The structure would remain in place, and maintained as fit for purpose until the windfarm has been decommissioned or a determination is made by the SoS on duration, following consultation with the relevant statutory nature conservation body, that compensation is no longer required.

86. As previously highlighted, there are a number of existing programmes for the creation of artificial structures for kittiwake nesting and others may be proposed in the near future. Therefore, where other parties have an interest in the creation or extension of artificial nest structures for kittiwakes the Applicant will seek to engage with them to work collaboratively and strategically where appropriate. Given the scale of potential compensation from the Project, the Applicant considers that should compensation be required it would be more proportionate to deliver that through additions or contributions to a larger

measure. Notwithstanding this, the bullets listed under paragraph 85 provide the means to secure adequate Project alone measures.

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6 Appendix 2: Gannet

6.1 Overview

87. Flamborough and Filey Coast (FFC) SPA covers an area of 7,858ha and is located on the Yorkshire coast between Bridlington and Scarborough approximately 245km from the East Anglia TWO windfarm at the closest point. The SPA is in two sections: the southern section extends north from South Landing around Flamborough Head to Speeton; the northern section covers the peninsula of Filey Brigg before extending north west to Cunstone Nab. The seaward boundary extends 2km throughout the two sections of the site into the marine environment, running parallel to the landward boundaries to include the adjacent coastal waters. The SPA includes the RSPB reserve at Bempton Cliffs, the Yorkshire Wildlife Trust Flamborough Cliffs Nature Reserve and the East Riding of Yorkshire Council Flamborough Head Local Nature Reserve.

88. The site description indicates that the Flamborough and Filey Coast SPA qualifies under Article 4.2 of the Birds Directive (2009/147/EC) by supporting over 1% of the biogeographical population of gannet:

- Gannet 8,469 pairs (16,938 breeding adults, 2008-2012);

6.2 Conservation objectives

89. The Conservation Objectives for the site are 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 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 populations of each of the qualifying features; and
- The distribution of the qualifying features within the site.

90. The Flamborough and Filey Coast SPA supports the only mainland breeding colony of gannet in the UK. Bempton Cliffs, which forms part of the SPA, was first colonised in the 1960s, and there has been a steady rate of increase since that time (Joint Nature Conservation Committee (JNCC), 2013). This increase in breeding numbers has become rapid since 2000, with 3,940 Apparently Occupied Nests (AONs) counted in 2004, rising to 7,859 AONs in 2009, and 11,061 AONs in 2012 (Joint Nature Conservation Committee (JNCC), 2013). This contrasts with the situation across Britain and Ireland as a whole, where the rate of population growth has dropped in recent years, consistent with the

expectation that the rate of increase would plateau (Langston et al., 2013), (WWT Consulting et al., 2012).

91. The potential for further growth of the Bempton Cliffs colony is considerable in view of the large number of non-breeding immature birds associated with the colony; 1,470 in 2009, and 798 in 2012 (Langston et al., 2013). The average (mean) number of nesting pairs from counts taken between 2008 and 2012 was 8,469 (Joint Nature Conservation Committee (JNCC), 2013), representing 2.6% of the North Atlantic biogeographic population (African-Eurasian Waterbird Agreement (AEWA), 2012).

6.3 Quantification of effect

6.3.1 Project alone

92. The revised gannet collision mortality apportioned to the FFC SPA following incorporation of collision mitigation through an increase in rotor draught height of 2m (REP1-047, REP3-073) is 12.2 at East Anglia TWO.

93. Natural England has agreed that the Project alone will not result in AEoI (REP3-117).

6.3.2 In-combination

94. The in-combination annual gannet collisions apportioned to the FFC SPA from all windfarms predicted to have connectivity were presented in REP4-042. There are two total figures, one which includes Hornsea Project Four and one without that project (since only preliminary values are available for that windfarm). The total with Hornsea Project 4 is 356 and without is 312.

95. Note that these figures include an estimated 27 collisions at Hornsea Project Three, as presented for that windfarm prior to the incorporation of additional collision mitigation. While revised kittiwake collision estimates were presented after the incorporation of the additional mitigation, no revised collision estimates for other species have been presented to date. On the basis that the kittiwake collisions were reduced by around 60% (from 181 to 73) it is estimated that the gannet contribution may also be reduced by a similar margin (e.g. from 27 to around 11). However, until such time as Hornsea Project Three provide revised collisions for gannet this reduction cannot be confirmed.

96. The current Project therefore contributes between 3.4% and 4.0% (East Anglia TWO) to the total predicted mortality.

97. The Project's impacts are small compared with those for most other windfarms, and would also be more than offset by the difference between the total collisions based on consented windfarm designs compared with as-built designs (i.e. 'headroom', Trinder 2017).

98. On this basis, the Applicant firmly maintains the position presented in the original Application and during the Examination, as supplemented in this submission, that an in-combination AEoI for the Project with other plans and projects can be ruled out beyond reasonable scientific doubt for the gannet feature of the FFC SPA.

99. The contribution to the in-combination total from the Project must also be taken into consideration with respect to the scale and timescale for delivery of compensation measures.

100. It is also of note that all ten of the gannet populations at UK SPAs are in favourable conservation status, and all continue to increase, at an overall average of 2% per year. The UK SPA suite for breeding gannets was estimated to hold over 95% of the gannets breeding in the UK in 2000 (Stroud et al. 2016), and based on the most recent data for each site in the JNCC Seabird Monitoring Programme database, now holds about 90,000 more pairs than were present at designation of these sites (i.e. additional mortality of 180,000 adults would be required before favourable conservation status across the UK SPA suite would be at risk). Because gannet numbers are far above the population size at SPA designation in every one of the ten SPAs where breeding gannets are a feature, there should be no need to carry out measures to compensate for small levels of adult mortality, since those will not alter the favourable conservation status of the SPA suite for breeding gannets. Therefore, the overall coherence of the network of European sites for breeding gannets is not at risk.

101. Nonetheless, without prejudice to the Applicant's position, possible compensation options are discussed below.

6.4 Compensation measures

6.4.1 Potential measures

102. Furness et al. (2013) proposed measures which could improve the conservation status of UK seabird populations. These options were presented in relation to the UK SPA suite as a whole, but not all of them would be appropriate or effective for all locations. Those identified for gannet were:

- End harvest of chicks;
- Encourage establishment of new colonies (natural or artificial); and
- Reduce bycatch in fisheries.

103. There is only one UK colony where gannet chicks are harvested, Sula Sgeir, north of the Isle of Lewis. An annual harvest of 2,000 chicks is taken under license from this colony. This harvest is treated as culturally important and efforts to reduce or end this would be expected to be strongly opposed by both

members of the community involved and the Scottish Government. Thus, while stopping the current harvest would offset the predicted losses due to windfarm collisions across the SPA suite for this species, it is not considered feasible.

104. Gannet has been identified a species potentially at high risk of fishery bycatch, both in UK waters and elsewhere within the species migration and wintering areas (e.g. Portuguese coastal waters and off West Africa). However, it is extremely difficult to obtain reliable estimates for the mortality this results in, and attempting to change methods to reduce this across these regions would represent a severe challenge. In addition, monitoring to determine update of these measures and their success would be extremely difficult to achieve. Thus, while reducing fishery bycatch through use of modified fishing gear or deployment methods could offset predicted windfarm mortality, it is not considered a feasible option. Some studies have indicated that in regions where fisheries discards are banned gannets tend to have lower association with fishing vessels (Clark et al. 2020). Therefore, banning discards from fisheries where this practice exists could reduce bycatch. However, this is also considered to be very unlikely to be feasible in the fisheries where this practice continues.

105. As noted in ***section 3.2***, fisheries management is not considered a feasible compensation option for the Applicant to pursue (see Annex 1 also submitted at Deadline 6 (document reference ExA.AS-8.1.D6.V1).

106. Therefore, the only remaining option from those identified above is encouragement of new colonies. This is considered in more detail below.

6.4.2 Measures taken forward

6.4.2.1 Provision of artificial nest sites and/or establishment of new colonies

6.4.2.1.1 Overview

107. Furness et al. (2013) state: *It might be possible to encourage gannets to form new colonies at locations where the species does not currently breed that are some distance from existing colonies. Birds would be likely to be able to exploit local fish resources more efficiently where they did not have to travel long distances from their colony to feeding areas, and where nesting numbers were smaller so reduced competition. Behavioural attraction methods developed in Maine have since been used globally to restore at least 49 species of seabirds on 89 islands in 14 countries (Jones et al. 2011). Jones and Kress (2011) suggest that a typical restoration project for a seabird in a developed country may cost around £500,000 per annum over a project lasting at least 5, possibly 10 years on average. They point out that the successful project restoring Atlantic puffins to Eastern Egg Rock in Maine took 35 years of sustained effort to establish a population of 100 pairs of puffins. An attempt to start a new Australasian gannet colony at Young Nick's Head, in New Zealand by social*

attraction was successful, but attempts using the same method with Australasian gannets at Mana Island, New Zealand, and with northern gannets in Nova Scotia and in Quebec failed (Jones and Kress 2011). So it is uncertain whether northern gannets could be encouraged to colonise new sites, and the cost of attempting to stimulate colonisation would be quite high.

108. In the North Sea, south of FFC SPA the only gannet colony is on the German Helgoland Island. Therefore, there is potential that given an appropriate location a colony could be established further south on the English North Sea coast (e.g. Norfolk or Suffolk). A colony in these locations would be around 200km from FFC SPA and therefore competition for prey resources would not be expected to be high. Birds breeding at a new site in this area could be at risk of collisions at existing offshore windfarms, although the high degree of windfarm avoidance exhibited by gannet (e.g. APEM 2014) would suggest this risk is likely to be small.

6.4.2.1.2 Delivery

109. Given the small magnitude of project alone impact that would need to be compensated (12 adults per year), a colony of approximately 175 pairs would produce 140 fledglings, of which around 25% (estimated as the product of the individual age class survival rates, Horswill and Robinson 2015) would be expected to reach breeding age (at five years). Thus, 35 adult recruits would ensure 25 to replace predicted losses at the current projects and a further 10 to replace natural losses in the colony itself (using the adult survival rate of 92%).

110. It is likely that it would be necessary to actively encourage prospecting gannets to the new site. This would take the form of playback of colony sounds and using decoy birds and nests.

6.4.2.1.3 Spatial scale

111. Nelson (1966) reported that gannets nested on the Bass Rock at a density of 2.3m^2. While the population was much smaller at that time (c. 7,000 pairs), than it is now (over 75,000 pairs in 2014, Murray et al. 2015), this density figure is considered a reasonable guide for current purposes. On this basis, a platform 10m to a side (gannets nest on flat surfaces at many colonies) could accommodate 175 pairs. A larger colony platform would be sensible to minimise the risk of experiencing chance breeding or recruitment failures in some years, and/or cope with such events without being abandoned, however at this nesting density, increasing the size of platform would not represent a problem.

6.4.2.1.4 Temporal scale

112. Efforts to accelerate establishment of a new colony could include use of gannet models and playback of sounds from established colonies. While these methods have been effective for other species (e.g. tern colonies have been

shifted to areas at lower risk of flooding using decoy birds), and success has been reported for Australasian gannet (e.g. one reported 28 fledged young in 2012, four years after the first attempts to attract birds began; Sawyer and Fogle 2013), it must be acknowledged that there is a degree of uncertainty about the effectiveness of such measures for northern gannet.

113. If the recent compensation proposals for artificial kittiwake colony establishment are used as a guide, then allowance may be required for a five year time lag between availability and initial colonisation of the proposed artificial colony sites and the commencement of windfarm operation (i.e. as the point at which the impact could begin). The five years is to allow fledged chicks from the first year of the colony to reach breeding age and therefore be available to recruit into the FFC SPA population (thereby offsetting the windfarm impacts). It has been suggested that if the colony is not producing chicks to this timetable then the windfarm will incur a mortality debt for each year of delay, which will need to be paid off over the course of the compensation's operation.

114. In the case of the Project and the small number of predicted collisions (12) the Applicant considers that while the same risk of incurring a mortality debt exists, the size of that debt for a delay of 1 to 2 years remains small and could be repaid across subsequent years. Therefore, since the requirement for the colony to be constructed and colonised five years before windfarm operation is of a lower concern for the current project, it follows that the requirement for the current in-principle compensation plan to provide detailed designs and site locations is also of a reduced concern, and these aspects can be addressed once a decision on the need to compensate for the Project has been made by the SoS. Areas of search would be expected to include the Suffolk and Norfolk coasts, which are far enough from existing colonies (the nearest are FFC SPA at over 150km and Helgoland, Germany at over 400km) that the risk of competitive exclusion from foraging areas would be minimal (as has been found in existing colonies, (Wakefield et al. 2013)).

6.4.2.1.5 Monitoring

115. Monitoring would be expected to be straightforward, subject to the availability of locations to observe the structure. The primary objectives would be counts of the number of pairs and of their success. Adult gannets are not considered likely to move from a colony once established, so most growth and decline is by way of new breeding birds and natural losses respectively, but such monitoring, potentially combined with a colour ringing campaign (assuming birds could be readily caught) would permit this assumption to be tested. To facilitate this at the focal colony it would be advantageous to incorporate means of access. Gannets have been found to be fairly tolerant of disturbance at their colonies (e.g. for the purposes of fitting leg rings and tags), so it would be ideal

if the new colony provided comparatively easy and safe access (as compared with the very great challenges of such work at FFC SPA) to permit research and monitoring opportunities. Such features would be dependent on the structure design and location, and should therefore be included as considerations at an early stage.

116. It would also be prudent to consider how the structure could be modified or enhanced should the rate of colonisation or success (i.e. productivity) be lower than anticipated. The more flexible (or modular) the structure, the simpler it is likely to be to make adjustments.

6.4.2.1.6 Feasibility

117. As detailed above, identifying suitable candidate locations, obtaining the necessary rights (land, access, etc.) and installing a suitable colony structure are all considered to be feasible undertakings that the Applicant could achieve, although as this would be a comparatively novel undertaking for this species there are questions about the time frame for achieving success. However, once established the success of this measure as compensation could be readily determined through monitoring, and if enhancement should be considered necessary this too would be expected to be readily achievable.

6.4.3 Summary and Roadmap for Delivery of Compensation (if required)

118. The Applicant reiterates that because gannet numbers are far above the population size at SPA designation in every one of the ten SPAs where breeding gannets are a feature, there should be no need to carry out measures to compensate for small levels of adult mortality. Therefore, the overall coherence of the network of European sites for breeding gannets is not at risk. The Applicant therefore does not consider that there is any requirement for any compensation.

119. If gannet compensation is deemed to be required following the Appropriate Assessment, the Applicant proposes that provision of artificial nest sites would be the most appropriate measure to deliver compensation prior to the operation of the Project.

120. The measures which would be undertaken by the Applicant to secure artificial nest sites are as follows:

- Following a decision from the SoS that compensation is required, a steering group would be appointed to the task (e.g. comprising all relevant stakeholders) to oversee the development, implementation, monitoring and reporting of the compensation measures.
- It is proposed to secure the construction of onshore artificial nest sites, so that they are constructed and available for use prior to first operation of any wind turbine generator forming part of the authorised development.

- Detailed design would begin following a decision from the SoS that this is required. Consultation will be required with the steering group to agree the design parameters once the Applicant has developed initial proposals. If it is necessary to obtain planning consent for this structure the application would be submitted to the appropriate authority.
- The success of the compensation measures would be monitored through observation of numbers and breeding success. Results would be discussed with the steering group. If a need to modify the approach is identified this will also be discussed and steps taken accordingly.
- The structure would remain in place, and maintained as fit for purpose until the windfarm has been decommissioned or a determination is made by the SoS on duration, following consultation with the relevant statutory nature conservation body, that compensation is no longer required.

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7 Appendix 3: Guillemot

7.1 Preamble

121. On the basis of the in-combination totals ((see ***Section 4.6.4.2, Information to Support AA Report*** (APP-043)) the combined displacement mortality of guillemot was estimated to be in the range 77 to 1,796 individuals. These would increase the baseline mortality rate of the population by 1.5% to 35%, while assessed using the Applicant's preferred evidence-based displacement and mortality rates, the increase would be 2.5%. On the basis of the most precautionary rates preferred by Natural England, there is potential for an adverse effect on the guillemot population due to in-combination displacement effects. However, the contribution to this from East Anglia TWO is very small, estimated to comprise 0.2% (74 of 1,796). If Hornsea Four is included the contribution of the Project remains approximately 0.2%.

122. On the basis of the population model outputs (see ***Section 4.6.4.2.2, Information to Support AA Report*** (APP-043)) the number of predicted in-combination guillemot displacement mortalities attributed to the Flamborough and Filey Coast SPA is not at a level which would trigger a risk of population decline, but would only result in a small reduction in the growth rate currently seen at this colony, and so would not have an adverse effect on integrity of the SPA.

123. Therefore, the Applicant does not consider there is a likelihood that the Secretary of State would determine AEOI for in-combination effects. In addition, in the event the Secretary of State did determine AEOI for in-combination effects, the Project's contribution would be *de minimis* (0.2% of the precautionary in-combination total). Therefore, the Applicant considers there to be no grounds on which compensation measures would be required for the Project.

124. However, in the absence of any clear guidance for establishing a threshold at which 'without prejudice' compensation measures should be developed and noting that NE's position on guillemot is that AEoI *'cannot be ruled out'* in combination with Hornsea Project Three and Project Four, the following measures are presented. The Applicant requests that NE provides a clear view on whether they consider compensation measures should be proposed for this species.

7.2 Overview

125. Flamborough and Filey Coast (FFC) SPA covers an area of 7,858ha and is located on the Yorkshire coast between Bridlington and Scarborough approximately 245km from the East Anglia TWO windfarm at the closest point.

The SPA is in two sections: the southern section extends north from South Landing around Flamborough Head to Speeton; the northern section covers the peninsula of Filey Brigg before extending north west to Cunstone Nab. The seaward boundary extends 2km throughout the two sections of the site into the marine environment, running parallel to the landward boundaries to include the adjacent coastal waters. The SPA includes the RSPB reserve at Bempton Cliffs, the Yorkshire Wildlife Trust Flamborough Cliffs Nature Reserve and the East Riding of Yorkshire Council Flamborough Head Local Nature Reserve.

126. The site description indicates that the Flamborough and Filey Coast SPA qualifies under Article 4.2 of the Birds Directive (2009/147/EC) by supporting over 1% of the biogeographical population of guillemot:

- Guillemot 41,607 pairs (83,214 breeding adults, 2008-2011); and

7.3 Conservation objectives

127. The Conservation Objectives for the site are 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 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 populations of each of the qualifying features; and
- The distribution of the qualifying features within the site.

128. The Flamborough and Filey Coast SPA colony of breeding common guillemot is the largest colony in England and the southernmost colony on the east coast that comprises over 10,000 individuals. Guillemot are absent from the low coastlines of south-east England, with no colonies between the Bempton-Flamborough coast and the Isle of Wight on the south coast (Joint Nature Conservation Committee (JNCC), 2001). Between 2008 and 2011 the site supported around 41,607 pairs during the breeding season (Natural England, 2014), equating to 83,214 breeding adults and representing 15.6% of biogeographic population of the southern albionis subspecies (African-Eurasian Waterbird Agreement (AEWA), 2012).

129. Counts undertaken as part of the 2008 Seabird Colony Census recorded a minimum of 59,817 individuals, an increase of 370% at this colony over 40 years and an increase of 20% since the year 2000 (Gilroy et al., 2009).

Compared to declines in many Scottish colonies, this data demonstrates how important and productive the Flamborough and Filey Coast SPA is[2].

7.4 Quantification of effect

7.4.1 Project alone

130. The estimated guillemot annual displacement mortality apportioned to the FFC SPA is 74 at East Anglia TWO. It should be noted that these figures were estimated using Natural England's precautionary rates of displacement (80%) and mortality (10%). In a review of evidence on likely displacement effects for this species (Vattenfall 2019), it was concluded that realistic (but still precautionary) rates of 50% and 1% respectively were appropriate. Use of the latter rates reduces the predicted impact by a factor of 16 (the difference between a mortality of 8% of birds (80% x 10%) and 0.5% of birds (50% x 1%)).

131. The above considerations on precaution notwithstanding, Natural England has agreed that the Project alone will not result in AEoI (REP3-117).

7.4.2 In-combination

132. The in-combination guillemot annual displacement mortality apportioned to the FFC SPA from all windfarms predicted to have connectivity was presented in REP2-006. There are two total figures, one which includes Hornsea Projects Three and Four and one without these projects (since only preliminary values are available for Hornsea Project Four and NE dispute the figures presented for Hornsea Project Three). The total with Hornsea Projects Three and Four is 43,342 and without is 24,193. It is also worth noting that the Hornsea windfarms together (projects 1 to 4) account for over 65% of the in-combination FFC SPA total and Project 4 accounts for 42% of the total alone.

133. The current Project therefore contributes between 0.2% and 0.3% (East Anglia TWO) to the total predicted mortality.

134. The Project's impacts are extremely small compared with those for most other windfarms.

135. On the basis of these figures, the Applicant firmly maintains the position presented in the original Application and during the Examination, as supplemented in this submission, that an in-combination AEoI for the Project with other plans and projects can be ruled out beyond reasonable scientific doubt for the guillemot feature of the FFC SPA.

[2] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9006101&SiteName=flamb&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&HasCA=1&NumMarineSeasonality=4&SiteNameDisplay=Flamborough%20and%20Filey%20Coast%20SPA

136. The contribution to the in-combination total from the Project must also be taken into consideration with respect to the scale and timescale for delivery of compensation measures.

137. Nonetheless, without prejudice to the Applicant's position, possible compensation options are discussed below.

7.4.3 Compensation measures

7.4.3.1 Potential measures

138. Furness et al. (2013) identified four potential measures that were likely to improve the conservation status of common guillemots:

- Closure of sandeel and sprat fisheries in all UK waters;
- Closure of sandeel and sprat fisheries in guillemot wintering areas;
- Rat eradication; and
- Prevent oil spills.

139. As noted in ***section 3.2***, fisheries management is not considered a feasible compensation option for the Applicant to pursue (see Annex 1 (document reference ExA.AS-8.1.D6.V1).

140. Furness et al. (2013) considered that there was strong evidence that preventing oil spills would benefit this species, but also acknowledged that considerable efforts are already made to avoid oil spills so it was not obvious what further steps could be taken.

141. Therefore, the remaining option is rat eradication and this is considered in more detail below.

7.4.3.2 Measures taken forward

7.4.3.2.1 Rat eradication from breeding colonies

7.4.3.2.1.1 Overview

142. Rats are not expected to be a significant predator of guillemot eggs and chicks at FFC SPA, since most birds nest on cliff ledges which will be largely inaccessible to rats. However, there is potential for rat eradication to be undertaken at other SPA colonies, thereby benefiting the suite of sites designated for their conservation, or at non-SPA colonies, thereby benefiting the meta-population of common guillemot in the UK and indirectly benefiting the SPA sites because birds that recruit into SPA colonies include individuals reared at non-SPA colonies as well as at other SPA colonies.

143. Eradication of rats from Lundy resulted in guillemot breeding numbers increasing from 2,348 to 6,198 individuals. This manifested both as an increase in success in existing parts of the island and an increase in breeding distribution of this species on the island into areas that would have been accessible to rats.

Combined, the productivity increases are therefore attributed to the removal of the pressure of predation by rats (Booker et al. 2019). Clearly the Lundy case study provides strong evidence that eradication of rats can benefit guillemots in some colonies, but this may depend on the amount of ground nesting habitat and whether or not guillemot numbers can increase into such habitat or are constrained by other factors such as food availability.

7.4.3.2.2 Delivery

144. Rat eradication from offshore islands to benefit breeding birds has been undertaken on numerous islands worldwide. The methods used and the success achieved vary depending on the island characteristics. Therefore, it would first be necessary to identify a suitable island for an eradication campaign before the delivery mechanism could be determined.

7.4.3.2.3 Spatial scale

145. The most important considerations are to ensure complete eradication and minimising the risk of recolonisation. Thus, it is important to distribute bait throughout the site in question (to ensure no survivors) and to take steps to prevent accidental reintroduction (e.g. use of sealed containers for transporting supplies to the island).

146. Selection of a suitable location for an eradication programme would need to consider factors such as whether rats are thought to be limiting the guillemot population, accessibility, delivery method, likelihood of reintroduction and whether the island has human inhabitants (and how this would affect the programme). Selection of the colony would be based on criteria, developed by Ratcliffe et al, (2009) and Stanbury et al. (2017), to rank locations in terms of the cost-effectiveness and consideration of the risk of re-invasion by rats.

7.4.3.2.4 Temporal scale

147. Eradication programmes are typically conducted in a relatively short space of time (weeks/months) as this improves success rates. Once completed, apart from ongoing measures to prevent reintroduction, no additional costs would be required. Species often show recoveries in numbers and breeding success within a short period of time (e.g. within 1 to 2 years), although this would be very dependent on the specific situation.

7.4.3.2.5 Monitoring

148. Monitoring for both rats and the response in the target populations would be essential. Regular checked traps is the simplest means to check for the presence of rats, while annual counts of the guillemot population and productivity rates would reveal how successful the measure had been. A relatively modest increase in productivity would be required to offset the predicted mortality at the projects.

7.4.3.2.6 Feasibility

149. Rat eradications are an established method for improving the conservation status of breeding seabird populations. However, since this is not an option for FFC SPA itself it would need to be conducted at another location.

7.4.4 Summary and Roadmap for Delivery of Compensation (if required)

150. If guillemot compensation is deemed to be required following the Appropriate Assessment, the Applicant proposes that rat eradication at relevant colonies would be the most appropriate measure to deliver compensation prior to the operation of the Project.

151. The measures which would be undertaken by the Applicant to secure rat eradication are as follows:

- Following a decision from the SoS that compensation is required, a steering group would be appointed to the task (e.g. comprising all relevant stakeholders) to oversee the development, implementation, monitoring and reporting of the compensation measures
- The Applicant will undertake a screening exercise to locate a suitable Guillemot colony (or colonies) for an eradication programme. This exercise would be based on criteria referenced above and guided by the steering group.
- Once suitable location(s) have been identified, the Applicant will liaise with the relevant landowners and appropriate authorities to determine the permitting requirements and any land access needs.
- The compensation site(s) will be approved by the SoS after consultation with the steering group and eradication undertaken with all necessary permits/authorisations in place.
- The success of the eradication measures would be monitored through observation of numbers of Guillemot at the compensation site(s). Results would be discussed with the steering group. If a need to modify the approach is identified this will also be discussed and steps taken accordingly.
- On-going monitoring at the compensation site(s) will be undertaken periodically to ensure that the compensation site(s) remains rat-free.
- Monitoring and, if necessary, repeat eradications would continue, until the windfarm has been decommissioned or a determination is made by the SoS on duration, following consultation with the relevant statutory nature conservation body, that compensation is no longer required.

7.5 References

African-Eurasian Waterbird Agreement (AEWA). 2012. Report on the Conservation Status of Migratory Waterbirds in the Agreement Area. Fifth Edition: African-Eurasian Waterbird Agreement (AEWA).

Booker, H., Price, D., Slader, P., Frayling, T., Williams, T. and Bolton, M. 2019. Seabird recovery on Lundy population change in Manx shearwaters and other seabirds in response to the eradication of rats. British Birds 112: 217-230.

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8 Appendix 4: Razorbill

8.1 Preamble

152. On the basis of the in-combination totals ((see ***section 4.6.3.2, Information to Support AA Report*** (APP-043)) the combined displacement mortality of razorbill apportioned to the FFC SPA was estimated to be in the range 18 to 421 individuals. These would increase the baseline mortality rate of the population (all ages) by 0.8% to 19%, while assessed using the Applicant's preferred evidence-based displacement and mortality rates, the increase would be 1.3%. Applying the most precautionary rates preferred by Natural England, there is potential for an adverse effect on the razorbill population due to in-combination displacement effects. However, the contribution to this from the Project is very small, estimated to comprise 0.2% (0.9 individuals from a total of 421). If Hornsea Four is included the contribution of the Project remains approximately 0.2%.

153. On the basis of the population model outputs (see ***section 4.6.3.2.2, Information to Support AA Report*** (APP-043)) the number of predicted in-combination razorbill displacement mortalities attributed to the FFC SPA is not at a level which would trigger a risk of population decline, but would only result in a small reduction in the growth rate currently seen at this colony, and so would not have an adverse effect on integrity of the SPA.

154. Therefore, the Applicant does not consider there is a likelihood that the SoS would determine AEOI for in-combination effects and even if this were the case, the Project's contribution would be *de minimis* (0.2% of the precautionary in-combination total). Therefore, the Applicant considers there to be no grounds on which compensation measures would be required for the Project.

155. However, in the absence of any clear guidance for establishing a threshold at which 'without prejudice' compensation measures should be developed and noting that NE's position on guillemot is that AEoI *'cannot be ruled out'* in combination with Hornsea Project Three and Project Four, the following measures are presented. The Applicant requests that NE provide a clear view on whether they consider compensation measures should be proposed for this species.

8.2 Overview

156. Flamborough and Filey Coast (FFC) SPA covers an area of 7,858ha and is located on the Yorkshire coast between Bridlington and Scarborough approximately 245km from the East Anglia TWO windfarm at the closest point. The SPA is in two sections: the southern section extends north from South Landing around Flamborough Head to Speeton; the northern section covers

the peninsula of Filey Brigg before extending north west to Cunstone Nab. The seaward boundary extends 2km throughout the two sections of the site into the marine environment, running parallel to the landward boundaries to include the adjacent coastal waters. The SPA includes the RSPB reserve at Bempton Cliffs, the Yorkshire Wildlife Trust Flamborough Cliffs Nature Reserve and the East Riding of Yorkshire Council Flamborough Head Local Nature Reserve.

157. The site description indicates that the Flamborough and Filey Coast SPA qualifies under Article 4.2 of the Birds Directive (2009/147/EC) by supporting over 1% of the biogeographical population of razorbill:

- Razorbill 10,570 pairs (21,140 breeding adults, 2008-2011).

8.3 Conservation objectives

158. The Conservation Objectives for the site are 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 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 populations of each of the qualifying features; and
- The distribution of the qualifying features within the site.

159. The Flamborough and Filey Coast SPA is the only site in England to support a colony of over 5,000 individuals, the only other colonies of this size being located in Scotland, and is the southernmost colony of any size on the east coast. The SPA support around 10,500 breeding pairs. This constitutes 2.3% of the biogeographic population of the subspecies *Alca torda islandica* (African-Eurasian Waterbird Agreement (AEWA), 2012).

8.4 Quantification of effect

8.4.1 Project alone

160. The estimated razorbill annual displacement mortality apportioned to the FFC SPA is 13 at East Anglia TWO. It should be noted that this figure was estimated using Natural England's precautionary rates of displacement (80%) and mortality (10%). In a review of evidence on likely displacement effects for this species (Vattenfall 2019), it was concluded that realistic (but still precautionary) rates of 50% and 1% respectively were appropriate. Use of the latter rates

reduces the predicted impact by a factor of 16 (the difference between a mortality of 8% of birds, (80% x 10%) and 0.5% of birds, (50% x 1%)).

161. The above considerations on precaution notwithstanding, Natural England has agreed that the Project alone will not result in AEoI (REP3-117).

8.4.2 In-combination

162. The in-combination razorbill annual displacement mortality apportioned to the FFC SPA from all windfarms predicted to have connectivity were presented in REP2-006. There are two total figures, one which includes Hornsea Projects Three and Four and one without these projects (since only preliminary values are available for Hornsea Project Four and NE dispute the figures presented for Hornsea Project Three). The total with Hornsea Projects Three and Four is 7,091 and without is 5,980. It is also worth noting that the Hornsea windfarms together (projects 1 to 4) account for over 47% of the in-combination FFC SPA total and Project 4 accounts for 12% of the total alone.

163. The current Project therefore individually contributes 0.2% to the total predicted mortality (either with or without the inclusion of Hornsea Projects Three and Four).

164. The Project's impacts are extremely small compared with those for most other windfarms.

165. On the basis of these figures, the Applicant firmly maintains the position presented in the original Application and during the Examination, as supplemented in this submission, that an in-combination AEoI for the Project with other plans and projects can be ruled out beyond reasonable scientific doubt for the razorbill feature of the FFC SPA.

166. The contribution to the in-combination total from the Project must also be taken into consideration with respect to the scale and timescale for delivery of compensation measures.

167. Nonetheless, without prejudice to the Applicant's position, possible compensation options are discussed below.

8.5 Compensation measures

8.5.1 Potential measures

168. Furness et al. (2013) identified four potential measures that were likely to improve the conservation status of razorbills:

- Closure of sandeel and sprat fisheries in all UK waters;
- Closure of sandeel and sprat fisheries in razorbill wintering areas;
- Rat eradication; and

- Prevent oil spills.

169. As noted in ***section 3.2***, fisheries management is not considered a feasible compensation option for the Applicant to pursue (see Annex 1 (document reference ExA.AS-8.1.D6.V1).

170. Furness et al. (2013) considered that there was strong evidence that preventing oil spills would benefit this species, but also acknowledged that considerable efforts are already made to avoid oil spills so it was not obvious what further steps could be taken.

171. Therefore, the remaining option is rat eradication and this is considered in more detail below.

8.5.2 Measures taken forward

8.5.2.1 Rat eradication from breeding colonies

8.5.2.1.1 Overview

172. Rats are not expected to be a significant predator of razorbill eggs and chicks at FFC SPA, since most birds nest on cliff ledges which will be largely inaccessible to rats. However, there is potential for rat eradication to be undertaken at other SPA colonies, thereby benefiting the suite of sites designated for their conservation, or at non-SPA colonies, thereby benefiting the meta-population of razorbill in the UK and indirectly benefiting the SPA sites because birds that recruit into SPA colonies include individuals reared at non-SPA colonies as well as at other SPA colonies.

173. Eradication of rats from Lundy resulted in razorbill breeding numbers increasing from 950 to 1,735 individuals and showing an increase in breeding distribution of this species on the island into areas that would have been accessible to rats, so the increase is attributed to the removal of the pressure of predation by rats (Booker et al. 2019).

8.5.2.1.2 Delivery

174. Rat eradication from offshore islands to benefit breeding birds has been undertaken on numerous islands worldwide. The methods used and the success achieved vary depending on the island characteristics. Therefore, it would first be necessary to identify a suitable island for an eradication campaign before the delivery mechanism could be determined.

8.5.2.1.3 Spatial scale

175. The most important considerations are to ensure complete eradication and minimising the risk of recolonisation. Thus, it is important to distribute bait throughout the site in question (to ensure no survivors) and to take steps to prevent accidental reintroduction (e.g. use of sealed containers for transporting supplies to the island). Costs have been estimated as between £150/ha to over £400/ha.

176. Selection of a suitable location for an eradication programme would need to consider factors such as whether rats are thought to be limiting the razorbill population, accessibility, delivery method, likelihood of reintroduction and whether the island has human inhabitants (and how this would affect the programme). Selection of the colony would be based on criteria, developed by Ratcliffe et al, (2009) and Stanbury et al. (2017), to rank locations in terms of the cost-effectiveness and consideration of the risk of re-invasion by rats.

8.5.2.1.4 Temporal scale

177. Eradication programmes are typically conducted in a relatively short space of time (weeks/months) as this improves success rates. Once completed, apart from ongoing measures to prevent reintroduction, no additional costs would be required. Species often show recoveries in numbers and breeding success within a short period of time (e.g. within 1 to 2 years), although this would be very dependent on the specific situation.

8.5.2.1.5 Monitoring

178. Monitoring for both rats and the response in the target populations would be essential. Regular checked traps is the simplest means to check for the presence of rats, while annual counts of the razorbill population and productivity rates would reveal how successful the measure had been. An extremely modest increase in productivity is all that would be required to offset the predicted mortality at the projects.

8.5.2.1.6 Feasibility

179. Rat eradications are an established method for improving the conservation status of breeding seabird populations. However, since this is not an option for FFC SPA itself it would need to be conducted at another location.

8.5.3 Summary and Roadmap for Delivery of Compensation (if required)

180. If razorbill compensation is deemed to be required following the Appropriate Assessment, the Applicant proposes that rat eradication at relevant colonies would be the most appropriate measure to deliver compensation prior to the operation of the Project.

181. The measures which would be undertaken by the Applicant to secure rat eradication are as follows:

- Following a decision from the SoS that compensation is required, a steering group would be appointed to the task (e.g. comprising all relevant stakeholders) to oversee the development, implementation, monitoring and reporting of the compensation measures
- The Applicant will undertake a screening exercise to locate a suitable razorbill colony (or colonies) for an eradication programme. This exercise

would be based on criteria referenced above and guided by the steering group.

- Once suitable location(s) have been identified, the Applicant will liaise with the relevant landowners and appropriate authorities to determine the permitting requirements and any land access needs.
- The compensation site(s) will be approved by the SoS after consultation with the steering group and eradication undertaken with all necessary permits/authorisations in place.
- The success of the eradication measures would be monitored through observation of numbers of razorbill at the compensation site(s). Results would be discussed with the steering group. If a need to modify the approach is identified this will also be discussed and steps taken accordingly.
- On-going monitoring at the compensation site(s) will be undertaken periodically to ensure that the compensation site(s) remains rat-free.
- Monitoring and, if necessary, repeat eradications would continue, until the windfarm has been decommissioned or a determination is made by the SoS on duration, following consultation with the relevant statutory nature conservation body, that compensation is no longer required.

8.6 References

African-Eurasian Waterbird Agreement (AEWA). 2012. Report on the Conservation Status of Migratory Waterbirds in the Agreement Area. Fifth Edition: African-Eurasian Waterbird Agreement (AEWA).

Booker, H., Price, D., Slader, P., Frayling, T., Williams, T. and Bolton, M. 2019. Seabird recovery on Lundy population change in Manx shearwaters and other seabirds in response to the eradication of rats. British Birds 112: 217-230.

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9 Appendix 5: Lesser Black backed gull

9.1 Overview

182. The Alde-Ore Estuary SPA covers 2,417ha and is located on and around the Suffolk coast, 34km from the proposed East Anglia TWO windfarm at its closest point. The SPA comprises an estuarine complex of the rivers Alde, Butley and Ore. The Alde-Ore Estuary was also listed as a Ramsar site in October 1996 for its internationally important wetland assemblage. The SPA citation was published in January 1996 and the site was classified by the UK Government as an SPA under the provisions of the Birds Directive in August 1998. The site is coincident with the Alde-Ore Estuary Site of Special Scientific Interest (SSSI), which was notified in 1952, with the SSSI boundary being identical to that of the SPA and Ramsar sites. The SPA/Ramsar site also forms part of the Alde-Ore and Butley European Marine Site.

183. There are several important habitats within the Alde-Ore Estuary site, including intertidal mudflats, saltmarsh, vegetated shingle (including the second-largest and best-preserved area in Britain at Orfordness), saline lagoons and semi-intensified grazing marsh. The diversity of wetland habitat types present is of particular significance to the birds occurring on the site, as these provide a range of opportunities for feeding, roosting and nesting within the site complex. At different times of the year, the site supports notable assemblages of wetland birds including seabirds, wildfowl and waders. As well as being an important wintering area for waterbirds, the Alde-Ore Estuary provides important breeding habitat for several species of seabird, wader and birds of prey. During the breeding season, gulls and terns feed substantially outside the SPA (JNCC 2011). The Suffolk Wildlife Trust, the National Trust and the RSPB have nature reserves within the SPA.

184. The SPA site description (as published in 2001) indicates that the Alde-Ore Estuary qualifies as an SPA under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting populations of Annex I species of European importance: breeding populations of little tern, marsh harrier and Sandwich tern, and avocet (both breeding and wintering). The site also qualifies under Article 4.2 of the Birds Directive by supporting two Annex II species - a wintering population of redshanks, and a breeding population of lesser black-backed gulls, the designation of the lesser black-backed gulls being based on 14,074 breeding pairs (4 year mean peak, 1994-1997). At designation, the site regularly supported 59,118 individual seabirds during the breeding season, including: herring gull, black-headed gull, lesser black-backed gull, little tern and Sandwich tern.

185. Following the UK SPA review (Stroud et al. 2001) additional Article 4.2 qualifying features were identified as needing protection: a breeding seabird assemblage of international importance (at least 20,000 seabirds) and a wintering waterbird assemblage of international importance (at least 20,000 waterbirds).

186. This site does not support any priority habitats or species.

9.2 Conservation Objectives

187. The Conservation Objectives for the site are 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 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 populations of each of the qualifying features; and
- the distribution of the qualifying features within the site.

188. When the site was classified in 1996, breeding lesser black-backed gulls were present in internationally important numbers (Natural England 2014); the 4 year peak mean (1994-1997) was 14,070 breeding pairs (derived from the JNCC Seabird Monitoring Programme database; agreed by Natural England's Chief Scientist in 2012). However, after a peak of 23,400 pairs in 2000, numbers reduced significantly below the target; the 5 year peak mean (2011-2015) was 1,940 breeding pairs (JNCC 2014).

189. Natural England has stated the target is to restore the size of the breeding population to a level which is above 14,074 breeding pairs whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

9.3 Quantification of effect

9.3.1 Project alone

190. The revised lesser black-backed gull collision mortality apportioned to the Alde-Ore Estuary (AOE) SPA following incorporation of collision mitigation through an increase in rotor draught height of 2m (REP1-047, REP3-073) is 1.6 at East Anglia TWO.

191. Natural England has agreed that the Project alone will not result in AEoI (REP3-117).

9.3.2 In-combination

192. The in-combination annual lesser black-backed gull collisions apportioned to the AOE SPA from all windfarms predicted to have connectivity were presented in REP4-042. The total is 52.7.

193. The current Project therefore contributes 3% to the total predicted mortality.

194. The Project's impacts are of a size which would be more than offset by the difference between the total collisions based on consented windfarm designs compared with as-built designs (i.e. 'headroom', Trinder 2017).

195. The Applicant firmly maintains the position presented in the original Application and during the Examination, as supplemented in this submission, that an in-combination AEoI for the Project with other plans and projects can be ruled out beyond reasonable scientific doubt for the lesser black-backed gull feature of the AOE SPA.

196. The contribution to the in-combination total from the Project must also be taken into consideration with respect to the scale and timescale for delivery of compensation measures.

197. Nonetheless, without prejudice to the Applicant's position, possible compensation options are discussed below.

9.4 Compensation measures

9.4.1 Potential measures

198. Furness et al. (2013) identified five potential measures that were likely to improve the conservation status of lesser black-backed gulls:

- Mink eradication at lesser black-backed gull colonies;
- Fencing out foxes from colonies;
- End culling of lesser black-backed gulls;
- Closure of sandeel and sprat fisheries; and
- Eradicate rats at lesser black-backed gull colonies.

199. As noted in ***section 3.2***, fisheries management is not considered a feasible compensation option for the Applicant to pursue (see Annex 1 (document reference ExA.AS-8.1.D6.V1). Furthermore, there is little evidence that this would deliver improvements in breeding success for this species since it is not reliant on these forage fish species and has a diverse diet, including terrestrial sources.

200. Until 2019 this species could be legally culled under a General Licence and consequently there was no requirement to report numbers killed. This is no longer the case and culling licences require reporting which should enable a

better understanding of the extent to which this affects populations. While this may become an option for future consideration, at present it is too uncertain for inclusion.

201. Consequently, predator control, and in particular fox control for the AOE SPA, is taken forward for further consideration.

9.4.2 Measures taken forward

9.4.2.1 Fencing to exclude foxes

9.4.2.1.1 Overview

202. Lesser black-backed gulls at AOE SPA are thought to be subject to high levels of egg and chick predation by mammals (especially foxes). Prevention of this predation would greatly enhance productivity and could more than compensate for the loss of 1.6 adults at the Project.

203. Numbers of lesser black-backed gulls breeding at the Alde-Ore Estuary SPA have declined dramatically since 2000. A part of that decline could be related to reductions in the availability of fisheries discards (Sherley et al. 2020). However, the decline has been attributed primarily to impacts of predation by foxes in the colony. At Orford Ness, in 2000, 75% of nests (in a colony of 23,000 pairs), failed due to fox predation (Mavor et al. 2001). Breeding numbers at Orford Ness fell from 24,000 pairs in 2001 to 6,500 pairs in 2002 due to fox activity at the colony because fox control was not carried out there in 2002 (Mavor et al. 2003). Numbers of lesser black-backed gulls breeding at Orford Ness have now declined to a few tens of pairs, all of which have nested on the rooftops of buildings there, which further supports the hypothesis that this species is now unwilling to nest on the ground at Orford Ness because of the impact of mammal predators (notably foxes) on breeding success.

204. In the UK, some examples of using electric fences to exclude foxes from colonies have been partially successful, but electric fences are not fully effective in excluding predators and require frequent maintenance. A more expensive but much more effective alternative is the use of predator-proof fences, such as deployed in Hawaii at Ka'ena Point Natural Area Reserve (Young et al. 2012). These 2m tall fences were set up in November 2010 to February 2011 around 20 ha of coastal habitat within Ka'ena Point to prevent predators (including rats and mice) from entering the protected area. Predators (in their case dogs, cats, mongoose, rats and mice) were eradicated within the enclosed 20ha. This was the first predator proof fence constructed in the United States at the time of its completion (Young et al. 2012). Such completely predator-proof fencing would be particularly appropriate for colonies subject to predation by rats or American mink as well as by foxes. Similar predator-proof fences have been established at many sites around the world with very high

success in protecting birds from mammal predators (VanderWerf et al. 2014, Ruykys and Carter 2019).

205. By 2006, in total, around 109 km of predator-proof fencing had been erected in various areas of mainland New Zealand to exclude predators from sites with important populations of native animals and birds (Scofield et al. 2011, Innes et al. 2012, Scofield and Cullen 2012, https://predatorfreenz.org/sums-best-predator-control-options).

206. There are several examples of the use of predator-proof fences to protect seabirds from mammals (https://www.acap.aq/index.php/news/latest-news/1359). A predator-proof fence completed in 2007 stretches 10.6 km across the neck of the peninsula from coast to coast at Cape Kidnappers Peninsula, North Island, New Zealand. This fence protects a privately owned and financed seabird restoration project where grey-faced petrels and Cook's petrels are being re-introduced (Furness et al. 2013). Another good example of successful deployment of a predator-proof fence to protect a seabird colony is one erected in 2001 to protect 36-ha on Pitt Island (Chatham Islands, New Zealand) from feral cats and pigs. Between 2002 and 2005, 200 endangered Chatham petrel chicks from the only known breeding site on South East Island (Chatham Islands) were moved into the fenced reserve. In 2012, 17 pairs from these translocated birds returned to breed (Furness et al. 2013). In Europe, predator-proof fencing has been used very successfully to protect breeding seabirds from alien invasive mammal predators in Azores (Portugal), funded by EU LIFE+ (https://www.xcluder.com).

9.4.2.1.2 Delivery

207. Subject to further discussions with relevant stakeholders and landowners, fences could be installed at strategic locations to exclude foxes (and potentially other predators).

208. It seems very likely that provision of a nesting area from which mammal predators are excluded would be a highly effective conservation measure for this population. However, it would be important to collate the available evidence at the site in order to ensure that other options which could offer alternative effective solutions are not overlooked, and to confirm that the current poor breeding success is related primarily to mammalian predation rather than other possible contributory factors.

209. The results of the above review notwithstanding, it is apparent that part of Orford Ness would be suitable for lesser black-backed gulls to nest if an area was made fox-proof. Establishing a protected area for lesser black-backed gulls at Orford Ness would also reduce the conflict between recovering gull breeding numbers and protecting avocets and other ground nesting birds from gull predation at Havergate Island. It has been demonstrated not only that seabird

breeding success can be very much higher in areas within predator-proof fences, but also that seabird breeding numbers tend to recover rapidly when given such protection. This method would be much more effective than attempting to reduce fox numbers by lethal control, as the lower fox densities in areas subject to control will draw in replacement individuals from the surrounding wider countryside where fox numbers are higher. In addition, predator proof fences exclude rats and American mink as well as other mammal predators such as feral cats, so provide a very much more effective protection than any attempts simply to control fox numbers in the area.

9.4.2.1.3 Spatial scale

210. The spatial scale would be determined by the results of the review and a pilot study. However, as an illustration the following sections consider the scale of predator exclusion fencing that would be appropriate.

211. Predator-proof fencing is expensive, costing around £100 per m to construct, and around £1 per m per year to maintain, with a life-span in New Zealand of around 25 years, so a considerable rate of depreciation (Scofield et al. 2011). However, maintenance costs and life span will depend very much on the environment where the fencing is set up. In New Zealand, where much of the fencing is in forested habitat, trees falling onto the fence can cause expensive damage, as can cyclones (Scofield et al. 2011). In the predominantly open habitat of UK seabird colonies such fencing would be under less risk of damage, although corrosion from salt spray would be a consideration. There are several companies providing predator-proof fencing.

212. Enclosing an area of four hectares (i.e. a square with 200m long sides) would require a minimum of 800m at £100/m construction, so £80,000 with annual maintenance costs of approximately £800. It is probably not appropriate to enclose an area much smaller than this in order to minimise the risk that the birds do not use the enclosed space (and careful siting would be important). However, this scale of enclosure would provide for orders of magnitude more successful nesting pairs than necessary to compensate for the potential loss of 1.6 birds at the Project. For example, lesser black-backed gull nest density at the SPA probably averages less than 1 pair per square metre, therefore within an enclosure of 40,000m^2 (as proposed) the entire target restored population of 14,000 could readily be accommodated, even allowing for the fact that not all the habitat within the enclosure would be expected to be suitable.

213. Key to this process is recognition of the small number for which compensation may be appropriate (1.6 birds per year), in the context of the massive decline in breeding numbers of lesser black-backed gulls at Alde-Ore Estuary SPA from tens of thousands of pairs at site designation to a few hundred pairs at present. Recovery of that population requires much stronger management action than

has been taken up to now, and the Applicant is willing to contribute in a proportionate way to that important conservation action. For example, at Galloper Wind Farm 22 lesser black-backed gull collisions were predicted for birds from the SPA (on the basis of equivalent modelling methods to those used in the current assessment), which represents more than a third of the in-combination total of 54. A proportionate contribution from the Applicant might therefore be around 10% of the level of contribution made by Galloper, and the Applicant considers that the above outline (funding an evidence review, pilot study and illustrative fencing proposal) is in line with this level of contribution.

9.4.2.1.4 Temporal scale

214. If the above outline proposal is adopted then, in its entirety, it would represent a long term compensation measure, and it may not be achievable to complete all of the steps outlined above prior to wind farm operation. However, the Applicant would begin the process (consultation with stakeholders, collation of evidence, drafting plan for implementation) prior to operation. Until the results of the initial phases (review and pilot study) are available it would not be possible to guarantee completion of all remaining stages prior to operation. However, this is considered appropriate given the small magnitude of the contribution to the in-combination impact from the Project, which is less than 5%. Hence, an appropriate timescale for implementing the various measures, based on the small scale of impact from the project and the predicted large magnitude of success, would be agreed with the Secretary of State in consultation with NE as part of the approval of the agreed strategy. This approach is considered appropriate given the large degree of over-compensation that is anticipated from this proposal and is in line with the EC (2012) guidance.

215. As an alternative longer term option, a strategic fund could be set-up and administered by an appropriate body, such as the local planning authority, in consultation with NE and the land owners responsible for managing the Alde-Ore Estuary SPA. This could set out the level of contribution payable by a project (determined by reference to impact) and how those contributions would be used to compensate for impacts on the SPA population.

9.4.2.1.5 Monitoring

216. Monitoring would include regular checks of the fence integrity and of the breeding population within the enclosure. If initial take up of the nesting opportunities within enclosed areas is slow then playback of calls and use of decoys could be considered to attract individuals.

9.4.2.1.6 Feasibility

217. This option is considered to be entirely feasible. This has also been accepted as feasible in principle by stakeholders. However, further work will be

undertaken to explore how this could be delivered alongside similar proposals from other developments, where appropriate (e.g. Norfolk Boreas).

9.4.3 Summary and Roadmap for Delivery of Compensation (if required)

218. If compensation is deemed to be required following the Appropriate Assessment, the Applicant proposes that predator control would be the most appropriate measure to deliver compensation prior to the operation of the Project.

219. The measures which would be undertaken by the Applicant to secure predator control are as follows:

- Following a decision from the Secretary of State that compensation is required, a steering group would be appointed to the task (e.g. comprising all relevant stakeholders) to oversee the development, implementation, monitoring and reporting of the compensation measures
- It is proposed to secure the compensation, so that it is constructed and operational prior to first operation of any wind turbine generator forming part of the authorised development.
- Detailed design would begin following a decision from the Secretary of State that this is required. Consultation will be undertaken with the Secretary of State to approve the design parameters once the Applicant has developed initial proposals. If it is necessary to obtain land rights this will be explored.
- The success of the measures would be monitored through observation of numbers of lesser black back gull and ensuring fence integrity. Results would be discussed with the steering group. If a need to modify the approach is identified this will also be discussed and steps taken accordingly.
- Management would continue, until the windfarm has been decommissioned or a determination is made by the SoS on duration, following consultation with the relevant statutory nature conservation body, that compensation is no longer required.

220. As previously highlighted, there is potential for other parties (i.e. Norfolk Boreas Ltd) to be developing similar compensation proposals for the Alde-Ore SPA. Therefore, the Applicant will seek to engage with Norfolk Boreas Ltd to work collaboratively and strategically where appropriate. Given the scale of potential compensation from the Project, the Applicant considers that should compensation be required it would be more proportionate to deliver that through collaboration on a strategic larger measure. Notwithstanding this, the bullets listed under paragraph 219 provide the means to secure adequate Project alone measures.

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10 Appendix 6: Red-throated diver

10.1 Overview

221. The Outer Thames Estuary SPA (OTE SPA) was designated in August 2010. It covers 379,268.14ha of marine habitat with part in English territorial waters (0-12 nautical miles) and part in UK offshore waters (12 to 200 nautical miles), with the Annex 1 species red-throated diver as the sole feature (Natural England and JNCC 2010). Extensions were proposed to the SPA in 2015 to include coastal and riverine areas used for foraging by breeding terns (the tern colonies are already designated at other locations).

222. An estimated 6,466 red-throated divers wintered in the SPA from 1989-2006/07 (Natural England and JNCC 2013). However, the population appears to have increased substantially since then, and NE's current advice is that the population is 18,079 (NE, 2019).

223. The Thames supports important commercial fisheries, estuarine and marine recreational angling. There is also a well-established cockle harvesting industry (Natural England and JNCC 2010).

10.2 Conservation Objectives

224. The Conservation Objectives for the site are 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 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 populations of each of the qualifying features; and
- the distribution of qualifying features within the site.

225. JNCC and Natural England (2013) advise that to fulfil the conservation objectives for the Annex I feature red-throated diver and its supporting habitat, the relevant and competent authorities for this area should manage human activities within their remit such that they do not result in deterioration or disturbance, or impede the restoration of this feature through loss of habitat by removal (e.g. capital dredging, harvesting, coastal and marine development), damage by physical disturbance or abrasion of habitat (e.g. extraction), non-physical disturbance through noise or visual disturbance (e.g. shipping, wind turbines), toxic contamination by introduction of synthetic and/or non-synthetic

compounds (e.g. polychlorinated biphenyls (PCBs), pollution from oil and gas industry, shipping), non-toxic contamination to prey species only by changes in e.g. turbidity (e.g. capital and maintenance dredging), biological disturbance by selective extraction of species (e.g. commercial fisheries) and non-selective extraction (e.g. entanglement with netting and wind turbine strike).

10.3 Quantification of effect

10.3.1 Project alone

226. The Applicant has undertaken a considerable amount of assessment on the potential effects of the Project on red-throated divers in the OTE SPA (REP5-025). The spatial modelling found that the average distance over which the existing windfarms in the SPA have displaced birds is 7-8km (a range as the modelling used 1km wide buffers). Since East Anglia TWO is a minimum of 8.3km from the SPA this indicates that no displacement within the SPA would occur due to the windfarm.

227. Therefore, the Applicant considers there will be no AEoI on the SPA due to the Project.

228. Natural England has accepted that there is very unlikely to be a detectable effect on the SPA population from the Project (REP4-087), however NE consider that redistribution of individuals within the SPA is contrary to the conservation objective to maintain the diver distribution and that this therefore constitutes an AEoI in its own right. Natural England state that the AEoI for the Project alone cannot be ruled out at this stage (REF) (REP4-087).

10.3.2 In-combination

229. The Applicant undertook an in-combination assessment (REP5-025), which considered the dates of windfarm construction, diver survey data and designation of the SPA. This presented an argument that since all of the windfarms within the SPA (Kentish Flats, Gunfleet Sands and London Array) were consented prior to the SPA's designation, and in the case of the first two were operational by this time, they should be treated as part of the baseline in the assessment since any effects of these windfarms would already have been included in the designated SPA. Furthermore, the SPA population estimate was updated following surveys conducted in 2018, when all of these windfarms had been operational for a minimum of five years. Consequently, there is a strong argument to be made that these operational windfarms should not be included in the in-combination assessment.

230. This position notwithstanding, it is also very apparent that if the operational wind farms are included, these sites contribute approximately 10 times as much impact as the projects (i.e. an effective area of displacement of 5% compared with 0.5% for East Anglia ONE North, and no displacement due to East Anglia

TWO). And yet, the diver population estimated in the SPA has either increased (the population estimate has changed from approximately 6,000 in 2005, to 14,000 in 2014 and 21,000 in 2018) or at the very least not declined (if this three times increase is solely attributable to improved survey methods as NE suggest). It is therefore reasonable to state that there is no effective impact on the diver population at present and the very small additional effect attributed to the projects will not materially change that situation.

231. Nonetheless, without prejudice to the Applicant's position, possible compensation options are discussed below.

10.4 Compensation measures

10.4.1 Potential measures

232. Furness et al. (2013) identified the following potential measures that were likely to improve the conservation status of red-throated divers:

- Provision of nesting rafts;
- Closure of sandeel and sprat fisheries close to wintering areas, breeding areas or generally in UK waters; and,
- Prevention of oil spills.

233. As noted in ***section 3.2***, fisheries management is not considered a feasible compensation option for the Applicant to pursue (see Annex 1 (document reference ExA.AS-8.1.D6.V1)).

234. Furness et al. (2013) considered that although this species is at risk of oiling in winter, there was limited evidence that preventing oil spills would yield a notable improvement in their conservation status. Furthermore, it was acknowledged that considerable efforts are already made to avoid oil spills so it was not obvious what further steps could be taken.

235. While nesting rafts have been demonstrated to improve breeding success, the population of red-throated divers which winter in the southern North Sea do not breed in the UK, but are distributed widely through remote areas of Fennoscandia and Russia. Therefore, this would be an extremely difficult measure to deliver and monitor. Furthermore, as noted above, the Applicant and NE are in agreement that it is very unlikely that there will be a population effect which needs to be compensated. Instead, the effect that NE would require to be compensated is the distribution of birds within the SPA, which can only be delivered through a reduction in displacement within the SPA.

236. Therefore, the proposed compensation for this effect given further consideration below is ship navigation management.

10.4.1.1 Measures taken forward

10.4.1.1.1 Navigation management

10.4.1.1.1.1 Overview

237. In order to offset redistribution of birds due to East Anglia ONE North, either current heavily used shipping lanes through the SPA could be targeted for modification or be restricted from accessing certain areas at the most sensitive periods of the year, in order to direct vessels away from suitable habitat that is currently avoided by red-throated divers.

238. Additionally, the Applicant can deliver management of the vessels it controls, namely vessel traffic that will be associated with construction, operation and maintenance. The Applicant and its parent company ScottishPower Renewables (SPR) are committed to navigation management for both the East Anglia ONE North and East Anglia TWO projects, and should compensatory measures be necessary, East Anglia THREE as well. This is discussed further below. Importantly, the Applicant and SPR can deliver this commitment within the SPA where Natural England consider the AEoI may occur. This would be the primary compensatory measure.

10.4.1.1.1.2 Delivery

239. The Applicant and SPR can undertake the necessary re-routing studies now for the vessels it controls for the primary compensatory measure. With regard to other sea users, and as a secondary compensatory measure, it may be necessary to identify suitable shipping areas (or areas from which pleasure craft could be restricted), relocation of which could open up suitable habitat for red-throated divers. Once these have been identified it would then be a case of determining if it is possible to agree revised routes with the relevant authorities and determine how to implement the proposed changes.

10.4.1.1.1.3 Spatial scale

240. The extent of change required would be in proportion to the magnitude of effect predicted to occur as a result of East Anglia ONE North. Thus, the first step would be to estimate and agree the area of the SPA affected, and then to determine where within the SPA the same area could be subject to navigational management measures. On the basis of the assessment in REP5-025, applying NE's approach, based simply on the overlap of the project buffer and the SPA (i.e. without accounting for the number of individuals affected) this equates to 2.8% of the SPA. If the population consequence is included, this figure is 0.5% of the SPA. Therefore, vessel management would need to reduce shipping disturbance within 0.5-2.8% of the SPA to compensate for the windfarm. The SPA has an area of 3,795km^2, therefore disturbance to divers would be required to be reduced within 19-106km^2. Since vessels are typically predicted to displace red-throated divers by up to 2km, this equates to shipping

corridors of 5-26.5km in length (assuming 2km displacement to either side). A similar calculation could be applied if areas are targeted for restricting recreational craft.

241. The Applicant is currently analysing routeing of those vessels over which it has control now and in future to determine the effect of re-routeing construction and operation and maintenance traffic to avoid (as far as is possible) the OTE SPA through the core winter months of 1 November to 29 February inclusive. It is recognised that any commitments for East Anglia TWO, East Anglia ONE North and, should compensatory measures be required, East Anglia THREE, would not address the current level of disturbance within the SPA, this would merely reduce the future increases. Management of existing or planned traffic associated with East Anglia THREE however would represent a genuine reduction in disturbance and be considered compensation.

10.4.1.1.1.4 Temporal scale

242. This compensation would need to be operating once the turbines were installed and to continue until decommissioning was complete, unless evidence is collected to confirm that the birds have habituated to the effect and that compensation is no longer required. It should also be noted that these measures are only likely to be required during the core winter months of November to February (inclusive).

10.4.1.1.1.5 Monitoring

243. The red-throated diver distribution within the SPA would need to be regularly monitored in order to determine the extent of diver redistribution due to both the windfarm and the shipping management. This would either confirm the efficacy of the compensation, determine that it was in fact unnecessary (e.g. if a redistribution due to the windfarm is not actually observed) or determine that additional measures would be required (e.g. further shipping management). The established method for monitoring the red-throated diver distribution is digital aerial surveys. Initially these would need to be undertaken annually, until such time as the effects were considered sufficiently well understood that no further monitoring was required. This could include more focussed surveys of the shipping management areas, to record diver distributions in relation to shipping movements and thereby establish the degree of displacement and how this has been reduced.

10.4.1.1.1.6 Feasibility

244. The Applicant considers redirecting existing (or planned) construction, operation and maintenance traffic shipping routes within the SPA to be entirely feasible, especially as there are different degrees to which this will be required (e.g. seasonally) and also that measures such as reducing vessel speed can also play a role in the success of this as compensation for disturbance.

245. The Applicant will provide further detail for the Examination upon completion of the shipping routeing analysis.

10.4.2 Summary and Roadmap for Delivery of Compensation (if required)

246. If compensation is deemed to be required following the Appropriate Assessment, the Applicant proposes that vessel traffic management would be the most appropriate measure to deliver compensation prior to the construction of the Project.

247. The measures which would be undertaken by the Applicant to secure vessel traffic management are as follows:

- The Applicant would confirm the vessel management measures to be adhered to by SPR projects (including locations and timing) and how vessel routeing would be controlled and monitored.
- Regular reporting would be undertaken to demonstrate compliance with the vessel routeing. In addition, the red throated diver displacement monitoring committed to outside of the compensation measures (REF IPMP) would be reported on. If feasible, this monitoring would be designed to incorporate consideration of the vessel management measures and their effects. Results would be discussed with the statutory nature conservation body.
- Management would continue, until the windfarm has been decommissioned or a determination is made by the SoS on duration, following consultation with the relevant statutory nature conservation body, that compensation is no longer required.

10.5 References

Furness, R.W., MacArthur, D., Trinder, M. and MacArthur, K. 2013. Evidence review to support the identification of potential conservation measures for selected species of seabirds. Report to Defra.

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