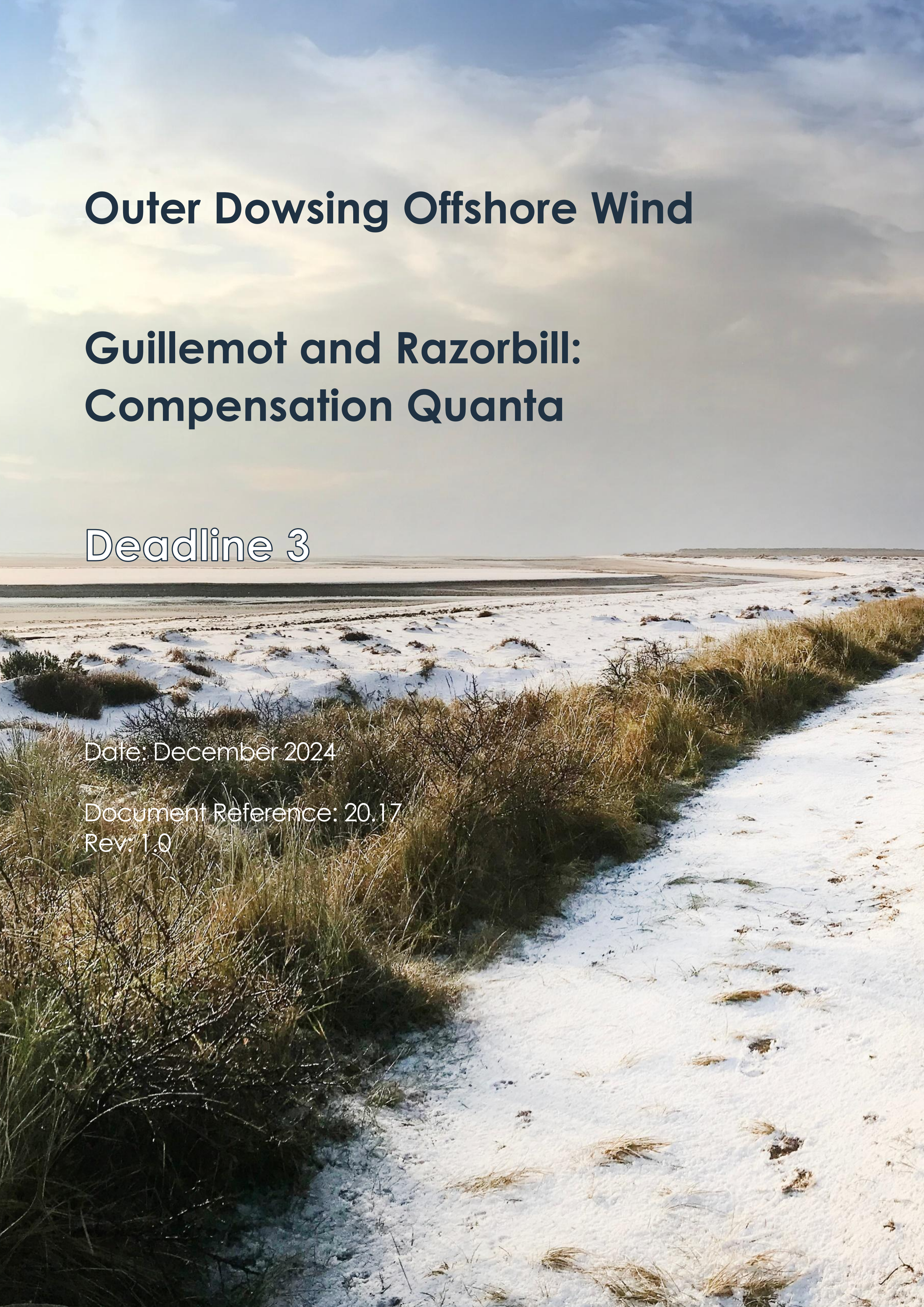

Outer Dowsing Offshore Wind

Guillemot and Razorbill: Compensation Quanta

Deadline 3

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Executive Summary

This document has been developed by Outer Dowsing Offshore Wind (the Applicant) to set out the specific quantum of deliverable compensation as currently proposed within the Application on a without-prejudice basis for Guillemot *Uria aalge* and Razorbill *Alca torda*, in the context of the potential requirements for compensation using the methodologies favoured by the Applicant and Natural England.

The document sets out the preferred method for calculating the potential impact of Outer Dowsing Offshore Wind (the Project), it then presents the calculated compensation requirements for those impacts using both the Applicant's preferred approach and the approach understood to be preferred by Natural England. Finally, the document details the maximum deliverable compensation of the various measures proposed without-prejudice which the Project may be required to provide.

The document also provides a non-technical discussion of how precaution is continually built into the calculations (and ultimately results in layers of precaution applied to address the same uncertainties).

Under all scenarios proposed by the Applicant, the document shows that the proposed compensation is deliverable through the measures being developed by the Applicant. Likewise, even using Natural England's calculation of impact, compensation would still be deliverable through the measures proposed.

The Applicant demonstrates that, using Natural England's Approach to impact assessment and compensation calculation, the Applicant may be required to deliver compensation for guillemot at a scale in line with 17% of the English breeding population and to deliver compensation for razorbill at a scale in line with the global population.

The Applicant proposes that a compensation calculation method that returns requirements at this scale cannot be considered fit for purpose and does not align with the appropriate use of the precautionary principle.

The Applicant considers that its approach to impact assessment is suitably precautionary, with evidence presented.

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Acronyms & Definitions

Abbreviations / Acronyms

Abbreviation / Acronym	Description
AON	Apparently Occupied Nest
ANS	Artificial Nesting Structure
BDMPS	Biologically Defined Minimum Population Scales
DAS	Digital Aerial Survey
FFC	Flamborough and Filey Coast
Km	Kilometre
MMFR	Mean Maximum Foraging Range
Prs	Pairs
SD	Standard Deviation
SPA	Special Protection Area
SW	South West

Terminology

Term	Definition
The Applicant	GTR4 Limited (a joint venture between Corio Generation (and its affiliates), TotalEnergies and Gulf Energy Development), trading as Outer Dowsing Offshore Wind.
Array Area	The area offshore within which the generating station (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling will be positioned, including the ORBA.
Baseline	The status of the environment at the time of assessment without the development in place.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the sensitivity of the receptor, in accordance with defined significance criteria.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Outer Dowsing Offshore Wind (ODOW)	The Project
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.

1 Introduction

1. Outer Dowsing Offshore Wind (the Applicant) has developed this document to set out the specific quantum of deliverable compensation as currently proposed within the Application on a without-prejudice basis for Guillemot *Uria aalge* and Razorbill *Alca torda*, in the context of the potential requirements for compensation using the methodologies favoured by the Applicant and Natural England.
2. The document firstly sets out the preferred method for calculating the potential impact of Outer Dowsing Offshore Wind (the Project) and the subsequent required compensation for those impacts, including a non-technical discussion of how precaution is continually built into the calculations (and ultimately results in layers of precaution applied to address the same uncertainties). Where further details have been submitted into the Examination or are planned to be submitted at a future deadline, this is noted as relevant in the text.
3. The document then goes on to present the calculated compensation requirements using both the Applicant's preferred approach and the approach understood to be preferred by Natural England. Natural England's preferred approach includes apportioning 100% of birds to the Flamborough and Filey Coast (FFC) Special Protection Area (SPA), apportioning 100% as adults, the addition of a bespoke post-breeding bioseason, and an assessment based on displacement of 70% and mortality of 2%. The Applicant's approach includes apportioning 50% of birds to FFC SPA, apportioning 57% as adults (in line with Furness 2015), uses the bioseasons described in Furness 2015, and makes an assessment based upon 50% displacement and 1% mortality (as described in REP2-058 Consideration of bioseasons in the assessment of guillemot and REP2-059 Rates of displacement in guillemot and razorbill).
4. Finally, the document details the maximum deliverable compensation of the various measures proposed without prejudice which the Project may be required to provide. These compensation figures are contextualised, with the various potential scenarios of calculation under both the Applicant's and Natural England's approaches presented. This document should be read alongside the Table 1.45.8.1 of the Applicant's Response to Relevant Representations (PD1-071) which provided an earlier summary of the proposed compensation measures for guillemot and razorbill and agreed compensation levels they provided.

2 Impact Methodology Calculation

2.1 Overview

5. The calculation of the potential impact of the Project and the required compensation quanta can be broken down into four general parts:
    - Setting of the bioseason baseline population: determination of the maximum number of individuals of a species within the survey area for the Project (in the case of guillemot and razorbill, based on the digital aerial survey (DAS) data) in each bioseason;
    - Assessment: calculation of the number of individuals of a species which may be impacted by the Project (in this instance applying a ratio of displacement and mortality to the baseline population);
    - Apportioning: calculation of the number of individuals impacted that may be associated with a specific colony during each bioseason (considering factors including the proportion of adults in the population, connectivity to relevant colonies and whether all adults are breeding (i.e. use of sabbaticals)); and
    - Compensation requirement: calculation of the number of adult pairs of a species which are needed to produce sufficient juveniles that survive to full maturity and are able to breed (using the summed total of impacts to an SPA during all bioseasons; considers aspects including productivity rates of a species, survival rates of all age classes to adulthood, as well as including any ratios which may be applied to the required quanta).
6. These stages are followed when using all methodologies for calculating the compensation quanta for the Project (if the Secretary of State determine this is required), including those preferred by the Applicant as well as those preferred by Natural England. Rather than wholesale differences in the methodology, the main disagreements between the parties focus on differences in definitions of aspects of the calculations (for example, duration of bioseasons) or around proportions and/or numbers to be used within the calculations.
7. The following sub-sections discuss the precaution built into the overall calculation, highlighting a number of key elements and, where relevant, signposting to technical documents which the Applicant has already submitted, or to those which are being developed for submission into the examination. The purpose of the summaries presented within this document is to provide a non-technical explanation of the purpose and/or consequences of the key areas of precaution in the calculation, including a brief discussion of the Applicant's position on the scientific validity of these aspects of precaution. Firstly, however, a short discussion on the use of the Precautionary Principle and the guidance on its use is provided.

2.2 The Precautionary Principle

8. The Precautionary Principle is a well-recognised, and well used, principle in environmental assessments, to manage areas of scientific uncertainty. It allows the use of precaution in the absence of certainty over impacts to enable continued progress (in technology, or decision making), however, where precaution builds on precaution on precaution, this over-precaution can prevent development which would otherwise have a general ecological and societal positive benefit (in the case of renewable energy and the corresponding reduction in carbon dioxide), if not properly interrogated and managed.
9. The Applicant agrees with the use of the precautionary principle in general and, as set out below, has included such considerations within the development of its preferred methodology, however, the Applicant is concerned that, in cases where precaution is added at multiple stages of a calculation, the effect multiplies up far beyond what could be considered appropriate in terms of addressing uncertainty.
10. The Applicant therefore considers that, although precaution is required to address uncertainty, it is a tool to enable decision makers to make a reasonable assessment of the associated risk using the best scientific evidence available. The risk must be plausible and real, and the precautionary principle should not be applied speculatively, nor should it be applied without consideration of the weight of scientific evidence in the round where data are available from multiple studies, rather than focusing on simply one or two to the exclusion of others.
11. The compounding effect of the addition of many levels of precaution, some of which address the same issue, will result in an over-precautionary position. If the precautionary principle is applied excessively, there is a risk that the over-precautionary position presented could interfere with the assessment, and the resulting decision, by generating outputs which are unrealistic compared to the environmental risk in question. In turn, this would lead to a disproportionate compensation requirement, contrary to guidance, and goes beyond the requirements in the Habitats Regulations to "*secure that any <u>necessary</u> compensatory measures are taken to ensure that the overall coherence of* [the National Site Network] *is protected*"[1] (emphasis added).

2.3 Discussion of Precaution in the Calculations

2.3.1 Introduction

12. Within each of the stages listed above, precaution is built into the assessment, where uncertainty is present regarding the most ecologically appropriate value to use. Due to the nature of the calculation, where precaution is added at the start, this is then multiplied throughout the latter stages, building precaution, on top of precaution.

[1] Regulation 36, Conservation of Offshore Marine Habitats and Species Regulations 2017

13. Figure 1 shows a flow diagram of the calculation stages and highlights all of the aspects of the calculation where precaution has been added in the assessment of auk impacts using Natural England's preferred method.

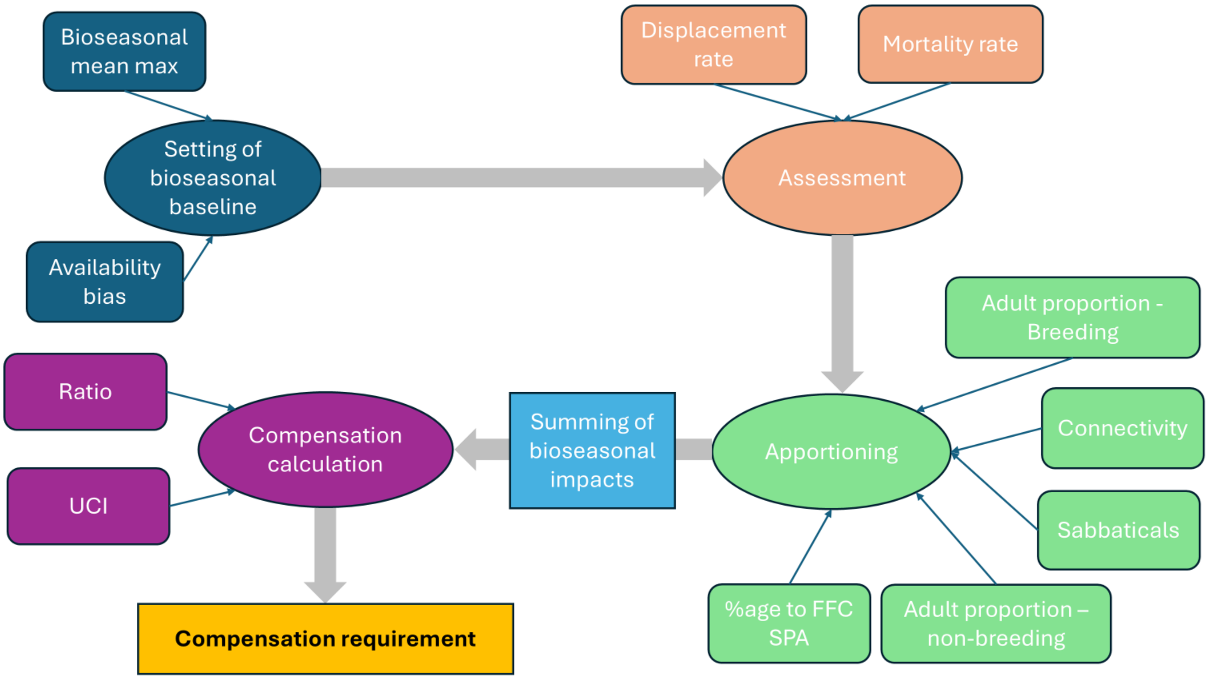

Figure 1. The four stages of calculating impact and resultant compensation requirements, with precautionary inputs, using Natural England's preferred approach for guillemot.

14. The following sections summarise how a number of aspects of the methodologies proposed by both the Applicant and Natural England have built precaution into the final outputs.

2.3.2 Overview of Approaches

15. There are a number of key aspects within the overall calculation where Natural England and the Applicant disagree on the correct parameter to use. Table 1 below sets out the position of the Applicant and Natural England on some of these key areas. The Applicant has then provided further details as to how the Applicant has incorporated a reasonable degree of precaution within its parameters, as informed by current scientific evidence, in line with the precautionary principle.

Table 1. Comparison of approaches to assessment and apportioning

Parameter	Applicant Approach	Natural England Approach
Bioseasons	For guillemot, the Applicant considers that the inclusion of the months of March and April in the breeding season is precautionary but assessments to date have aligned with the Natural England position. The Applicant does not consider that the addition of a discreet	For guillemot, Natural England advise that the breeding season runs from March to July, and that August and September should be considered a discreet post-breeding bioseason.

	post-breeding bioseason, with 100% of birds apportioned to FFC SPA during these months is appropriate.	
Displacement rate	The Applicant considers that there is robust evidence (REP2-059) that suggests that a displacement rate of 50% is appropriately precautionary.	Natural England advise that a displacement rate of 70% is appropriate for guillemot.
Mortality rate	The Applicant considers that there is evidence (APEM 2022) that suggests that a mortality rate of 1% is appropriately precautionary.	Natural England advise that a mortality rate of 2% is appropriate for guillemot.
Adult apportioning	The Applicant considers the use of stable age proportions as presented in Furness 2015 as the best available evidence, unless site specific age structures can be derived from the DAS. The Applicant has presented both approaches (AS1-095)	Where site specific age structures cannot be derived from DAS, Natural England advise to assume that all birds are adults.
Use of sabbaticals	The Applicant considers that, although published sabbatical rates may not capture the level of sabbaticals taken in any given year due to variation in the numbers of sabbaticals taken, some sabbaticals are taken every year. As such, published rates should be treated as the best available evidence and used in assessment. However, following Natural England's approach position, assessments have not applied a sabbatical rate.	Natural England do not consider the application of sabbatical rates appropriate due to known variation in the numbers of sabbaticals being taken every year in certain species.
Apportioning to FFC SPA in breeding season	The Applicant has apportioned 50% of impacts (based on April peaks) to FFC SPA, as further explained in paragraphs 33 and 34.	Natural England advise that 100% of birds are apportioned to FFC SPA in the breeding season

16. All the parameters set out above relate the determination of the "impact" to a specific SPA. The next (and final) step is the "compensation calculation", i.e. the determination of the required quantum of compensation to replace those impacted by the Project.
17. The Applicant's preferred calculation is that referred to as the "Hornsea Four" approach. Natural England's preferred calculation is that referred to as the "Hornsea Three" approach (sometimes the Hornsea Three approach is referred to as having two parts, however, for the purposes of this note, all references to the Hornsea Three approach includes both parts of that approach). The nomenclature for these two approaches originates from the corresponding names of the offshore wind projects where these were first proposed.
18. Both the Hornsea Three and Hornsea Four approaches were primarily designed to calculate the compensation quanta for impacts to kittiwake (*Rissa tridactyla*) and as such, caution should be applied when applied these directly to other species, with very different behaviours. The Applicant notes that whilst both approaches have been used by the Secretary of State to determine the compensation requirements for kittiwake, only the Hornsea Four approach has precedent in relation to guillemot.

2.3.3 Assessment

19. Within the "Assessment" phase, the number of overall mortalities is calculated based on population defined in the first stage. This uses a two-stage process, specifically, a consideration of the proportion of the population which could be displaced by the presence of the Project, and then applies a mortality rate to the displaced population. The mortality associated with displacement is predicated on an assumption that the individuals are displaced to a less suitable foraging location which results in a lower survival or increases competition when displaced birds mix with other birds. It is notable that studies of other species vulnerable to displacement have demonstrated that, despite high displacement, there was no mortality associated with that displacement (Topping et al., 2011).
20. The Applicant's approach uses 50% displacement and 1% mortality, whereas the Natural England preferred approach is 70% displacement and 2% mortality (refer to REP2-059 for further details on these approaches). The relationship between displacement and mortality is often shown as a ratio (i.e. 50:1 for the Applicant's approach) and this is used in this document. The Applicant considers that even the Applicant's approach of 50:1 is highly precautionary in terms of displacement proportions; this is based on recent data of displacement from the Beatrice Offshore Wind Farm in Scotland which has shown zero displacement as a result of the construction of that Project (Trinder et al., 2024). The Applicant further understands that a study from another U.K. basedproject is due to be published and also supports no displacement effect.
21. The 50:1 ratio proposed by the Applicant is based on the weight of current scientific evidence (prior to the publication of the Beatrice data), with particular consideration given to the season timing of the studies available. The Applicant notes that, whilst one study supports the Natural England proportion of 70% displacement, this study was undertaken during the non-breeding season when individuals are less energetically constrained and so have more capacity to forage elsewhere without any energetic costs (Dunn et al., 2020a). The remainder of the available studies from the breeding season suggest a smaller displacement effect, with some studies showing a displacement effect of 0% which is smaller than that proposed by the Applicant. As described above, more recent studies (i.e. Trinder et al., 2024) have shown a zero displacement effect (also see Gill et al., 2008); it is key to consider that the relevant guillemot colonies in these studies are breeding colonies and are therefore more similar to expected behaviours of breeding guillemot rather than non-breeding birds.
22. Overall, and as set out in more detail within REP2-059, the Applicant is confident that the 50:1 ratio is sufficiently precautionary and that to assume a higher ratio, particularly during the breeding season, is unreasonable and does not consider the available scientific evidence.

2.3.4 Apportioning

23. The "Apportioning" phase is where a proportion of the impact (in the case of auks, mortalities associated with displacement) is allocated to a specific SPA colony. As such, a necessary first step of this phase is to consider whether the Project area is ecologically connected to any SPA colonies.

24. Inherently, and due to a lack of offshore data, this apportioning, in most cases, solely considers onshore colonies. The Applicant has proven the presence of offshore breeding activity by both guillemot and razorbill in close proximity to the Project (Annex D of AS1-064, Niras 2021)), however, as data are only gradually becoming available on this, it has not been considered within the calculation. Therefore, a greater contribution of impacts will be allocated to onshore colonies than would occur in practice.
25. Notwithstanding the exclusion of offshore colonies, the current preferred Natural England approach for apportioning in the breeding season (i.e. apportioning 100% to the FFC SPA and assuming all birds are adults) is considered to be overly precautionary by the Applicant in that it considers an unreasonable degree of precaution.
26. There are two primary aspects where precaution (or over-precaution) can be introduced into the apportioning part of the calculation:
    - The proportion of adults assumed within the bioseason baseline populations, and if all these adults are breeding; and
    - The connectivity of the Project site to specific colonies, during different bioseasons.

2.3.4.1 Bioseasons

27. It is important to consider how the use of bioseasons affects the calculations at this point. For guillemot, Furness (2015) defines the breeding bioseason for guillemot to be March – July (inclusive), with the non-breeding season being August – February (inclusive). In practice, this definition of the breeding season captures a long period of colony attendance prior to the commencement of breeding, which generally commences in May (first eggs tend to be in late April but the bulk of egg laying occurs in May). Furthermore, colony attendance data (Dunn et al., 2020a) shows that guillemot start to periodically return to breeding colonies from November, in what is understood to be a territorial-type behaviour to ensure retention of preferential breeding sites. This intermittent colony attendance behaviour continues right up until egg laying commences. This gradual return to breeding colonies leads to a general northward movement of guillemot throughout the latter part of the non-breeding season and the start of the breeding season.
28. For the purposes of the overall calculation, impacts (including apportioned impacts) are calculated on a bioseason basis, with different parameters used within the "apportioning" phase based on the bioseason (to reflect different behaviours and the likelihood of the individuals in the Project area being associated with different SPAs). The calculation of the bioseason impacts, however, are based on the "mean-peak" density during each bioseason; this takes the peak density recorded in each bioseason in each year of the survey and the averages these values. This then provides a fixed density which is applied to that bioseason. The use of mean peak densities adds further precaution (refer to REP2-058 Consideration of bioseasons in the assessment of guillemot).

2.3.4.2 Adult Proportions

29. Within Natural England's current preferred approach, they advise that 100% of individuals impacted by the Project during the breeding season should be assumed to be breeding adults. The Applicant considers that this is an unreasonable assumption, with no supporting scientific evidence.
30. The Applicant has used a proportion based on the available literature for offshore aggregations of auk species. The literature suggests a typical proportion of adults in offshore aggregations of auk species (collective term for guillemot and razorbill amongst other species) of 57% (reviewed in Furness (2015)). The Applicant notes that Natural England's assumption of 100% adults in a population, against the evidence set out in Furness (2015), is inconsistent with their advice to follow the recommendations of that paper for other parameters, including for setting reference populations (which the paper flags as highly uncertain in many cases). The Applicant considers that not following the recommendations of the same source for adult proportions appears to be unreasonable in the absence of any site specific data which would provide evidence for such a deviation. As such, the Applicant maintains that the use of an adult proportion of 57% is appropriate and considers a reasonable degree of precaution.

2.3.4.3 Connectivity

31. To determine the connectivity of the Project to relevant SPAs, the relevant SPA colonies which have a "mean-maximum" foraging range (MMFR) plus 1 standard deviation (+1SD) which overlaps with the Project array area are identified. The MMFR is the average of the maximum distance from the colony at which birds have been tracked foraging over multiple studies, which when combined with the standard deviation leads to highly precautionary ranges which birds may fly from a colony to forage. For example, for guillemot the MMFR is 73.2km and 1 standard deviation is an additional 80.5km, and thus the MMFR +1SD for guillemot is 153.7km, even though tracking data suggests that the vast majority of birds forage close (i.e. within a few kilometres) to the colony during the breeding season (Cleasby *et al*., 2020).
32. Continuing with the example of guillemot, the Project is outside the MMFR from the FFC SPA (~95km distant), but within the MMFR+1SD. Considering the datapoints within the studies from which the MMFR is calculated (ABPmer 2020)), the Project array area is far outside the normal foraging range for a breeding guillemot at FFC SPA. The Applicant acknowledges that the evidence suggests a degree of connectivity between the Project array area and the FFC SPA; however, as apparent from the fact that this connectivity is predicated on the use of extremes, the Applicant considers that the Natural England approach of 100% apportioning as unreasonably precautionary, even without consideration of whether the individuals recorded during that bioseason should be considered "breeding" birds or whether they may be undertaking some form of migratory behaviour to colonies further north.

33. Within the DAS data for the Project, a spike in the abundance of guillemot recorded in and around the proposed array area is seen in early April (in two out of the four surveys undertaken within this month over the 30 month survey period, which covered April within three separate years; Table 2), with the average April value more than twice that recorded within any of the remaining months of the breeding season. When combined with the colony attendance data at some of these northern colonies (e.g. Isle of May, (Dunn et al., 2020b) and Shetland colonies SOTEAG (2023)) which shows that guillemot are not undertaking what would be considered breeding behaviours until May (or at the very earliest, late April), it is the Applicant's position that the spike of guillemot in the April data is indicative of pre-breeding migration activity and that this is not representative of the population of guillemot which could be considered breeding adults associated with the FFC SPA in the proximity of the array area. This is especially the case given that the highest April peaks are from surveys carried out within the first week of that month, a time at which birds are even less likely to be in attendance at a colony and are more likely to be a substantial distance from their breeding colony (Dunn et al., 2020a).
34. Notwithstanding the above points, the Applicant also notes that the calculation of an impact during a particular bioseason only utilises the "mean peak" value recorded throughout the surveys. As such, the maximum monthly value from each bioseason within each year/survey is averaged to provide the value to be used for the assumed abundance across that bioseason. The result is that the spike in the April data for the Project is even further emphasised as it is not averaged out by the remaining data within the bioseason. The discrepancy between the breeding season monthly totals is presented in Table 2. This shows how large the April peaks are in comparison with the rest of the breeding season. In particular, the average April count is larger than the average counts from the rest of the breeding season added together. Whilst there appears to be an overall lower count of guillemot in all months in 2023, the proportions of the counts match the pattern seen in previous years.

Table 2. "Breeding season" counts by month

Year	Month	Day of month	Population estimate	Monthly average
2021	March	03	5,830	4851.5
2022	March	11	5,960	
2022	March	22	6,541	
2023	March	23	2,474	
2021	April	04	15,700	11364.3
2022	April	02	19,813	
2022	April	15	9,906	
2023	April	05	3533	
2021	May	12	3892	4320.5
2022	May	02	11,756	
2022	May	17	3,549	
2023	May	03	1417	
2021	June	09	964	1368.2
2022	June	09	1,916	
2022	June	21	2,898	

Year	Month	Day of month	Population estimate	Monthly average
2023	June	17	734	
2021	July	24	6001	3589.1
2022	July	04	1,714	
2022	July	16	6004	
2023	July	05	894	

35. Whilst the Applicant considers that there is evidence to suggest that April should be entirely excluded from the "breeding" bioseasons as set out above, the Applicant has followed the guidance from Furness (2015) on a precautionary basis and April is retained within the overall breeding bioseason. Consequently, the April counts are the peak in all three survey years, and as such the "mean-peak" value for the breeding bioseason is informed by this spike in the data. The mean-peak based on the April data (11,364.3) is more than twice that which would be calculated based on a mean-peak were the breeding season only considered to be May – July (when the individuals would be nesting/feeding young) (5,318.8).
36. However, the Applicant considers that the combination of site-specific DAS data and colony attendance data demonstrates that not all individuals recorded in the Project survey area during April can possibly be associated with the FFC SPA and due consideration must be given to this during the determination of a final apportioning percentage.

2.3.4.4 Apportioning Value

37. In order to determine an overall reasonable proportion of individuals impacted by the Project which may be associated with the FFC SPA, the Applicant has considered:
    - Distance of the site to the FFC SPA (i.e. outside the MMFR but within the MMFR +1SD);
    - The likely behaviour of guillemot in April (the monthly counts determining the bioseasonal density); and
    - Known colony attendance for guillemot.
38. In consideration of the three above factors, the Applicant considers that an overall apportioning proportion of 50% of the final impact to FFC SPA is reasonably precautionary. The Applicant considers that, in reality, many fewer birds within the array area will be associated with the FFC SPA due to the distance to the site (when compared to studies showing a typical foraging range of only a few kilometres, Cleasby et al., 2020), the likelihood of any birds recorded in April being associated with more northerly guillemot colonies (when considered against colony attendance data and counts of migrating birds off the coast of north-east England in May (PD1-092 Apportioning Appendix) and the absence of any consideration of offshore guillemot colonies (offshore breeding by guillemots has now been proven).

2.4 Application of the Precautionary Principle

39. As outlined in Section 2.2, the Applicant agrees with the precautionary principle and agrees that it is a useful tool in managing uncertainty. The examples for the displacement mortality ratio and the apportioning proportion set out above provide a description of how the Applicant has used the precautionary principle within the determination of the proportions and numbers to be used within the calculation of the impact from the Project and the compensation which it may be required to deliver, if the Secretary of State concludes it is necessary.
40. Whilst the Applicant appreciates that the application of precaution is based upon expert judgement and there is potential for experts to disagree, it considers that the overall extent of the precaution which Natural England propose within their preferred approach is unreasonable and does not follow the intention of the precautionary principle, in that it effectively applies precaution speculatively in a number of places and disregards the best available scientific evidence in some instances, as set out above.
41. Within the final component of the compensation quantum calculation is the consideration of whether a ratio should be applied to the required compensation. A purpose of this ratio is to manage uncertainty within the previous stages of the assessment, as such, were any degree of uncertainty over parameters used with the assessment remaining, this can be managed in a proportionate manner through the application of a ratio.
42. As it currently stands, the Natural England preferred approach uses both overly precautionary values within the assessment and then applies a “standard” 3:1 ratio in relation to required compensation. This 3:1 ratio is not based upon any qualitative or quantitative assessment of uncertainty. This is demonstrably far beyond the purpose of the precautionary principle in that it multiplies precaution on precaution which in many cases has been applied where there is not a plausible risk of the uncertainty in values leading to any adverse environmental effect.

3 Potential Required Compensation Quanta

3.1 Overview

43. As discussed in Section 2, there are a variety of factors that can affect the calculated quantum of compensation that the Project may be required to deliver (if determined as necessary by the Secretary of State). One of the aspects is the specific methods within the "Compensation requirement" stage of the overall calculation. The parameters considered within that stage can vary depending on the species being considered as well as the proposed compensation measures, however, there are two methods referred to within the Application: the "Hornsea Four" method; and the "Hornsea Three" method. Both methods were accepted by the Secretary of State as being appropriate for the compensation calculation at their respective projects, with the Hornsea Four method being more recently approved by the Secretary of State.
44. The Hornsea Four method uses published survival rates to calculate the number of fledged young required to deliver a given number of mature adult birds. Once the number of fledglings required is known, a productivity rate is applied, to give the number of breeding pairs required to give the requisite number of young. This is the most recent precedent for auk compensation and the Applicant's preferred method for compensation calculation for kittiwake and auks.
45. There is no precedent for use of Hornsea Three to define auk compensation requirements. To date, this method has only been used to define requirements for kittiwake. The most recent suitable precedent for defining auk requirements is Hornsea Four.
46. Hornsea Three considers philopatry (i.e. the proportion of birds that will breed away from the natal colony), and the impact the measure has on the colony being compensated. Where a measure such as an Artificial Nesting Structure (ANS) requires breeding birds to colonise it, Hornsea Three assumes that all of the birds that colonise the measure, over the lifetime of the measure, will come from the colony being compensated (in this case, the FFC SPA). In this scenario, where space becomes available at a measure through natural wastage (either mortalities or adult dispersal), that space will be filled with birds that have already bred at the FFC SPA.
47. For measures located within the Channel Islands and South-Western England, the likelihood that birds filling spaces created through natural wastage at these measures have come from the FFC SPA is very small. As such, the Hornsea Three method is not appropriate.
48. Although potential connectivity is more likely between an ANS in the southern North Sea and the FFC SPA, for auk compensation the use of Hornsea Three should still be considered inappropriate for reasons presented in the following paragraphs.
49. Surveys of offshore installations have discovered both guillemot and razorbill breeding in the vicinity of the ANS area. Breeding has been proven on offshore installations and although exact breeding numbers are not known, substantial numbers of guillemot in particular are exhibiting behaviour in line with breeding. As such, this population would be very likely to contribute birds to the ANS colony on the event of space becoming available.

50. In addition, a proportion of the population of guillemot are young birds that are yet to recruit to any colony. Furness (2015) calculated that 43% of the guillemot population was yet to achieve maturity. In every year, a proportion of this population will breed for the first time, and it is likely that some birds that would recruit to an ANS would come from this pool.

51. As such, contributions from birds breeding locally on offshore structures and those maturing to breed for the first time contribute some, if not the majority of recruits filling space at the ANS. In this case, the use of the Hornsea Three calculation is not necessary.

52. Hornsea Four successfully justified the use of their approach for compensation calculation through demonstration that the Habitats Regulations requires that the overall coherence of the National Site Network, rather than a specific site, is upheld. Likewise, the Habitats Directive refers to 'overall coherence of Natura 2000' rather than specific sites. The Habitats Regulations do not require compensation to be carried out in the same country as the impacted site. All that is required is the demonstration of connectivity.

53. Connectivity was evidenced through the dispersal range of birds breeding away from their natal colony being larger than the distance between the measure and the site. Further evidence came from data from recoveries of birds ringed at FFC SPA being recovered in the English Channel and specifically, from the Channel Islands, while birds from the Farne Islands SPA were tracked to the English Channel in the non-breeding season, suggesting that it is reasonable to assume that birds breeding further south may take these routes (Orsted, 2022). Known rates of philopatry (i.e. the proportion of birds that return to breed at the natal colony) demonstrate that a considerable proportion of birds will disperse to new colonies, thus enhancing the National Site Network.

54. There is also precedent with the Hornsea Three case for kittiwake in relation to connectivity. Hornsea Three's kittiwake measures will produce birds that will recruit into the 'southern North Sea' population. This population will then provide the future recruits for the FFC SPA population. The same can be said of Auks and the Applicant's suite of measures. These measures will all produce birds into the 'North Sea and English Channel' Biologically Defined Minimum Population Scales (BDMPS) as defined by Furness 2015. This same principle can be applied to the Applicant's measures in the English Channel and south-west England, and therefore the measures can be seen as feeding the North Sea and English Channel BDMPS, which in turn will feed the FFC SPA.

55. The Applicant maintains that the most appropriate method is the Hornsea Four approach, with the additional parameters included within the Hornsea Three method (which was specifically designed to define kittiwake compensation requirements) being considered to be speculative and with limited evidence as to the validity of these within any determination of a compensation requirement especially for guillemot and razorbill. However, the Applicant understands that Natural England's preferred approach is the Hornsea Three method.

56. This section therefore presents the potential compensation quanta which may be required for guillemot and razorbill for the Project, based on the following scenarios:

- The Applicant's approach as set out within the assessment, using the Hornsea Four method;

- The Applicant's approach, excluding April data from the breeding season (for guillemot only), using the Hornsea Four method;
- Natural England's approach, using the Hornsea Four method; and
- Natural England's approach, using the Hornsea Three method.

57. The values for each of the scenarios is set out below, alongside a series of potential ratios which may be applied by the Secretary of State.

3.2 Presentation of Potential Quanta

3.2.1 Applicant's Approach

58. Two scenarios based on the Applicant's approach for guillemot have been set out in Table 3, one based on the Applicant's proposed approach for the overall Application (inclusion of April in the breeding season on a 50% basis), and one presenting the Applicant's approach with the exclusion of April from the breeding season to demonstrate the reduction in the quanta this could have led to, and the precaution within the Applicant's presented approach. Compensation requirements using the Applicant's approach for razorbill are provided in Table 4.

Table 3. Compensation requirements using the Applicant's approach, including and excluding April data from the breeding season for guillemot

Scenario	Impact (individuals)	Compensation requirement 1:1 ratio (pairs)	With Ratio 2:1	3:1
Applicant's approach (including April), with Hornsea Four	18.2	77.3	154.9	239.7
Applicant's approach (excluding April), with Hornsea Four	11.1	47.2	94.3	141.5

Table 4. Compensation requirements using the Applicant's approach for razorbill

Scenario	Impact (individuals)	Compensation requirement 1:1 ratio (pairs)	With Ratio 2:1	3:1
Applicant's approach, with Hornsea Four	10.5	92.0	183.9	275.9

3.2.2 Natural England's Approach

59. Two scenarios for Natural England's approach have been set out for guillemot (Table 5) and razorbill (Table 6), one using the Hornsea Four method for compensation requirements and one using the Hornsea Three method.

Table 5. Compensation requirements using Natural England's approach for guillemot

Scenario	Impact (individuals)	Compensation requirement 1:1 ratio (pairs)	With Ratio 2:1	3:1
Natural England's approach, with Hornsea Four	375.2	1,517.8	3,188.6	4,783.0
Natural England's approach, with Hornsea Three	375.2	5,224.4	10,975.6	16,462.9

Table 6. Compensation requirements using Natural England's approach for razorbill

Scenario	Impact (individuals)	Compensation requirement 1:1 ratio (pairs)	With Ratio 2:1	3:1
Natural England's approach, with Hornsea Four	71.9	629.8	1,259.6	1,889.4
Natural England's approach, with Hornsea Three	71.9	230,872.7	461,734.1	692,578.4

3.2.3 Discussion

60. Table 3 to Table 6 show the potential range of compensation requirements calculated using both the Applicant and Natural England's preferred approaches to assessment and apportioning, and the Applicant and Natural England's preferred approaches to compensation calculation and variations of those. Natural England have stated that Hornsea Three is their preferred calculation method, and it is assumed that Natural England will prefer a 3:1 ratio based on previous requests.

61. The Applicant considers that provision of compensation of 239.7 pairs of guillemot (i.e. 479.4 individuals) to address an impact of 18.2 birds is appropriate and suitably precautionary and provision of 275.9 pairs of razorbill (i.e. 557.8 individuals) to address an impact of 10.5 birds is appropriate and suitably precautionary. The scenario for guillemot is the Applicant's position as set out within the Application, which utilises the April data to inform the breeding season assessment and apportions 50% of impacts to FFC SPA.

62. The Applicant considers that both the impacts and compensation requirements calculated using Natural England's preferred methods are not appropriate. In order to address an overly precautionary impact of 375.2 guillemots (i.e. using Natural England's approach to impact assessment and apportioning), Natural England's preferred method of compensation calculation (Hornsea Three) results in a requirement of 16,463 pairs on a 3:1 ratio. This requirement is 23% of the Flamborough and Filey Coast SPA population in 2022 (SMP, 2024), and approximately 17% of the entire English breeding population (Burnell et al., 2023). This is demonstrably disproportionate for an impact that is, using the Applicant's approach, 18.2 individuals or, using Natural England's approach, 375.2 individuals.
63. For razorbill, to address a highly precautionary impact of 71.9 birds (i.e. using Natural England's approach to impact assessment and apportioning), Natural England's preferred method of calculating compensation results in a requirement of 692,578 pairs. This number is very likely to be higher than the global population of razorbill, defined as being between 838,000 and 1,660,000 individuals in Burnell et al., 2023.
64. The Applicant proposes that a compensation calculation method that returns a requirement that may be larger than the global population of razorbill, to address an impact of 71.9 birds cannot be considered fit for purpose and does not align with appropriate use of the precautionary principle.
65. In respect of both guillemot and razorbill, calculation of the compensation requirement using the Hornsea Three approach results in significantly disproportionate compensation requirements, going far beyond the requirements in the Habitats Regulations to "*secure that any <u>necessary</u> compensatory measures are taken to ensure that the overall coherence of* [the National Site Network] *is protected*".

4 Compensation Deliverable by the Without-Prejudice Measures

4.1 Introduction

66. The Applicant has set out within the Without-Prejudice Guillemot Compensation Plan (APP-252) and the Without-Prejudice Razorbill Compensation Plan (APP-255) a series of measures which have been developed on a without-prejudice basis to provide sufficient compensation for the Project impacts were the Secretary of State to conclude that the potential for an adverse effect on the integrity of the FFC SPA could not be excluded as a result of the construction, operation and decommissioning of the Project.
67. These without-prejudice measures are continuing to be developed by the Applicant through analysis of data collected post-application, with further definition now available regarding the potential compensation quanta deliverable at each colony now under consideration. Full details will be provided within an updated version of the Without-Prejudice Additional Measures for Guillemot and Razorbill Evidence Base and Roadmap which will be submitted at Deadline 4. However, in advance of the submission of the revised evidence base and roadmap document (including full survey results), the Applicant's current understanding of how many pairs of guillemot and razorbill could be delivered from each colony is presented below.
68. Additionally, and for completeness, the Applicant has presented the number of pairs of each species which could be delivered by the Plemont Nature Reserve and on an ANS.
69. Compensation Quanta Deliverable by the Proposed Without-Prejudice Measures which can be delivered has been presented as a number of pairs. Where a measure delivers new pairs, this is a simple expression of how many pairs can be generated at a specific colony. However, creation of a predator free environment is likely to, and reduction in disturbance is designed to, enhance productivity. Therefore, the number of pairs presented takes this into account as well by taking the number of new birds generated through enhanced productivity (compared to those which would have been produced in the absence of any improvement) and expressing this as the equivalent number of pairs needed to generate this number of birds (using a standard productivity rate).
70. For Plémont, the potential output is presented based upon achieving a historic population level, under two productivity scenarios, one which uses the national productivity rate from Horswill and Robinson, and another based upon a higher productivity rate that would result from breeding in a predator free environment (i.e. productivity would be higher due to fewer losses of young to predators, and fewer losses of breeding adults to predators which would in turn lead to mortality of those adults' young).

71. For measures at sites in South-Western England, increases in both colony size and productivity have been considered on a site-by-site basis. This is due to some colonies already being at their peak, with gains only being available through increased productivity (i.e. those produced at the colony and then dispersing elsewhere as no space remains for them). For those sites where there is capacity for the colony to grow, the compensation potential considers productivity at an enhanced level for the whole colony, plus the number of additional nests. Compensation potential across the suite of the Project compensation measures is presented in Table 7 (guillemot) and Table 8 (razorbill).

Table 7. Guillemot outputs (i.e. additional young birds produced) from the suite of compensation measures.

Measure	Detail	Output (pairs)
Plemont	Historic peak (200 prs)	200
	Historic peak improved productivity	245
SW Sites	The Mouls	598
	Ore Stone	197
	North Cornwall 3 VP2	84
	North Cornwall 2	89
	North cliffs 3	135
	Gulland rock	945
	Cow and calf	1045
	Berry head	1147
ANS AONs		1,635

Table 8. Razorbill outputs (i.e. additional young birds produced) from the suite of compensation measures.

Measure	Detail	Compensation potential (pairs)
Plemont	Historic peak (200 prs)	200
	Historic peak improved productivity	253
SW Sites	The Mouls	45
	Ore Stone	16
	North Cornwall 3 VP2	56
	North Cornwall 2	0
	North cliffs 3	7
	Gulland rock	55
	Cow and calf	121
	Berry head	0
ANS AONs		400

72. The total compensation potential across the suite, using the figures for Plémont that utilise the higher productivity rate, are 6,150 pairs of guillemot and 909 pairs of razorbill. Without use of the higher rate of productivity, the compensation potential is 6,105 pairs of guillemot and 856 pairs of razorbill.

73. The requirements defined by the compensation calculations, and the potential compensation provided across the suite of measures are provided in Table 9 to Table 11.

Table 9. The requirement using the Hornsea Four method and the Applicant's approach to impact calculation. This assumes a 1:1 ratio.

Species	Requirement (pairs) (Hornsea Four)	Compensation potential across all measures (pairs)	Ratio of requirement to potential
Guillemot	77.3	6,150	1:79.6
Razorbill	92.0	909	1:9.9

Table 10. The requirement using the Hornsea Four method and the Natural England's approach to impact calculation. This assumes a 1:1 ratio.

Species	Requirement (pairs) (Hornsea Four)	Compensation potential across all measures (pairs)	Ratio of requirement to potential
Guillemot	1,517.8	6,150	1:4.1
Razorbill	629.8	909	1:1.4

Table 11. The requirement using the Hornsea Three method and Natural England's preferred approach to impact calculation. This assumes a 1:1 ratio.

Species	Requirement (Hornsea Three stage two)(pairs)	Compensation potential across all measures (pairs)	Ratio of requirement to potential
Guillemot	5,224	6,150	1:1.2
Razorbill	230,873	909	1:0.003

5 Conclusions

Under all scenarios proposed by the Applicant, the proposed compensation is deliverable through the measures being developed by the Applicant(Table 9). Likewise, even using Natural England's calculation of impact, compensation would still be deliverable through the measures proposed (see Table 10).

74. Based upon Natural England's Approach to impact assessment and compensation calculation (includes a 3:1 ratio), the Applicant may be required to deliver compensation for guillemot at a scale in line with 17% of the English breeding population. Based upon Natural England's Approach to impact assessment and compensation calculation (includes a 3:1 ratio), the Applicant may be required to deliver compensation for razorbill at a scale in line with the global population. The Applicant proposes that a compensation calculation method that returns requirements at this scale cannot be considered fit for purpose and does not align with appropriate use of the precautionary principle.
75. In respect of both guillemot and razorbill, calculation of the compensation requirement using the Hornsea Three approach results in significantly disproportionate compensation requirements, going far beyond the requirements in the Habitats Regulations to "*secure that any <u>necessary</u> compensatory measures are taken to ensure that the overall coherence of* [the National Site Network] *is protected*".
76. The Applicant considers that their approach to impact assessment is suitably precautionary, with evidence presented in REP2-057 Levels of precaution in the assessment and compensation calculations for offshore ornithology, REP2-058 Consideration of bioseasons in the assessment of guillemot and REP2-059 Rates of displacement in guillemot and razorbill. Compensation calculations are based upon the method used by Hornsea Four, which was agreed by the Secretary of State, and is the only method for which relevant precedent is available for auk species.

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