



Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Gateshead Kittiwake Tower Modification – Quantification
of Productivity Benefits Technical Note (Revision B) (Clean)

Revision B

Deadline 3

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Glossary of Acronyms

ANS	Artificial Nesting Structure
AON	Apparently Occupied Nests
CI	Confidence Interval
CIMP	Compensation Implementation and Monitoring Plan
DAS	Discretionary Advice Service
DEP	Dudgeon Offshore Wind Farm Extension Project
FFC	Flamborough and Filey Coast
JNCC	Join Nature Conservation Committee
NRG	Northumbria Ringing Group
SEL	Scira Extension Limited
SEP	Sheringham Offshore Wind Farm Extension Project
SPA	Special Protection Area
UK	United Kingdom

Glossary of Terms

<p>Dudgeon Offshore Wind Farm Extension Project (DEP)</p>	<p>The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.</p>
<p>Sheringham Shoal Offshore Wind Farm Extension Project (SEP)</p>	<p>The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.</p>
<p>The Applicant</p>	<p>Equinor New Energy Limited. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the DCO. References in this document to obligations on, or commitments by, ‘the Applicant’ are given on behalf of SEL and DEL as the undertakers of SEP and DEP.</p>

1 Revision B Updates at Deadline 3

1. This document has been updated to Revision B at Deadline 3 to address comments received from Natural England in REP2-061. These comments and the Applicant's responses have been incorporated into [Table 2](#).

2 Purpose of Document

2. This note has been prepared to address comments provided within Appendix C Offshore Ornithology Compensation of Natural England's Relevant Representation [RR-063] in relation to Equinor New Energy Limited's (the Applicant's) proposed compensatory measure to increase kittiwake breeding success through nest site improvements as part of the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP).
3. In response to these comments, the Applicant has provided further information on the quantification of the productivity benefits afforded by the measure and clarification of the difference between the Applicant's proposals and those of other developers to install new artificial nesting structures (ANS). The quantification of productivity benefits has been provided in the context of the Applicant's proposal to modify the existing kittiwake tower at Saltmeadows, Gateshead.
4. Excerpt from Point 25 of Appendix C of Natural England's Relevant Representation as follows:

“A method to quantify benefit has not been fully detailed. This should be submitted into the Examination. We also observe that the Applicant equates birds lost from FFC [Flamborough and Filey Coast] SPA [Special Protection Area] with birds entering the biogeographic population from which FFC SPA draws its recruits. Given all the other colonies that kittiwake produced by the ANS could colonise, Natural England does not consider this equivalence is likely to maintain the coherence of the national site network.”
5. Natural England also requested that the planning application by RWE Renewables Ltd (RWE) to construct an artificial nesting structure in an industrial yard adjacent to the Saltmeadows tower be considered and for it to be demonstrated that, in light of this proposal, there is sufficient capacity within the Tyne kittiwake population to accommodate both the Applicant's and RWE's proposals. This note demonstrates that there is existing and, at present, increasing demand for both the Applicant's and RWE's measures.
6. Further detail on the Applicant's proposals for kittiwake compensation is available in [Appendix 3 – Kittiwake Compensation Document](#) [APP-072].

3 Summary of the Applicant's Proposals

7. The Applicant's proposal is to modify the existing kittiwake tower by installing two new north facing faces and removing the south face which over the past 20 years has produced more than 50% fewer fledglings than each of the other two faces (data from Turner (2010) and annual reports of kittiwake numbers and breeding success

for 2001 to 2021). For example, in 2021, there were 14 chicks in 15 nests on the south face (0.93 chicks per AON), 63 chicks in 54 nests on the northeast face (1.17 chicks per AON) and 92 chicks in 55 nests on the northwest face (1.67 chicks per AON) (MacArthur Green 2021). Not only do few pairs choose to nest on the south face, but their breeding success tends to be lower than that of pairs on the other two faces, so total output of chicks is much lower.

8. The Applicant's proposal differs from that of other developers by aiming to replace unsatisfactory nest sites with high quality nest sites, allowing higher breeding success to be achieved by birds that were nesting on unsatisfactory sites where they were failing to produce chicks. The Applicant's approach does not require an increase in breeding *numbers* to generate compensation, but requires an increase in breeding *success*. In contrast to other proposals, the Applicant's approach would therefore be able to generate compensation even if breeding numbers did not increase, because relocation of failing pairs onto high quality nest sites will generate increased production of young birds. The Applicant's approach is therefore not dependent on a continuing excess pool of site-seeking immatures but would be successful through relocation of failed birds from suboptimal sites even in the absence of any pool of immatures. Nevertheless, this note demonstrates that, even if the Applicant's proposal was dependent on a continuing excess pool of site-seeking immatures, then there would be sufficient numbers within the Tyne region to accommodate both the Applicant's and RWE's proposals.
9. The success of the Applicant's proposal depends not only on providing high quality nest sites for the 15 or so pairs of kittiwakes breeding on the south face but also providing high quality nest sites for kittiwakes nesting on other nearby structures where the conditions are resulting in their breeding failure. The high quality nest sites developed as part of the Applicant's proposal would provide an alternative nest site for kittiwakes nesting on those nearby structures. In 2021 there were over 100 kittiwake nests on buildings and bridges at the Tyne within 2 km of the Saltmeadows tower that failed to produce any chicks. The breeding success in 2021 was particularly good with a higher number of nests having failed in many other years (Dan Turner, 2021, pers. comm., and annual monitoring reports).
10. Every year a substantial number of kittiwakes fail to produce any young on the Tyne and therefore may seek an alternative nest site the following year. This is unsurprising at an urban colony where kittiwake is not always welcome. Whilst some of those unsuccessful kittiwakes may relocate to another colony entirely, it is likely, based on the evidence in Coulson (2011), that many will seek new sites on the Tyne within about 2 km of where they had previously attempted unsuccessfully to breed.
11. When the Saltmeadows tower was moved more than 1 km from beside the Baltic Arts Centre to its current location, many pairs immediately relocated onto the tower in its new location. When the North Shields warehouse colony studied by John Coulson was demolished, colour ringed adults from that site relocated onto a variety of alternative nest sites mostly within 2 km of the site but in some cases further away (Coulson 2011). So it seems likely that pairs that fail will generally relocate to sites within 2 km but on occasions will move greater distances.

12. **Table 1** summarises the key differences between the Applicant’s proposal and the proposals put forward by other offshore wind farm developers to construct new ANS and recruit kittiwakes from the wider population to breed on them.

Table 1: Summary of key differences between ANS and the Applicant’s proposal

Aspect	ANS proposed by other developers	The Applicant’s proposal
Number of nest sites	Provide new additional nest sites which are hoped to be adopted by kittiwakes. Relies on recruitment from a pool of site-seeking immatures.	Aims only to replace existing unsatisfactory nest sites with high quality nest sites. Does not rely on recruitment from a pool of site-seeking immatures.
Number of breeding kittiwakes	Aim to provide compensation by increasing breeding numbers at urban/artificial structure colonies where mean breeding success is higher than at natural colonies such as FFC SPA.	Increase in breeding numbers not required. In 2021, there were over 100 pairs on sites within 2 km of the Saltmeadows tower that failed to rear any chicks so were most likely attempting to breed on suboptimal sites. These were especially evident in the Newcastle Quayside area, which also has a high incidence of deployment of kittiwake deterrents (MacArthur Green 2021).
Breeding success	Increase in breeding success compared to local average not required to provide compensation.	Aims to provide compensation by increasing breeding success and therefore productivity relative to other local sites. Breeding success of pairs that relocate should increase from zero to around the average for the Tyne as a whole, so from zero to around 0.8 to 1.3 chicks per nest, depending on whether it is a relatively poor or relatively successful year for Tyne kittiwakes.
Removing failing nest sites	None.	To remove failing nest sites and replace them with high quality nest sites nearby.

4 Consultation on this Document

13. The Applicant shared a draft of this note with Natural England on 15 December 2022. Natural England provided comments as part of their Discretionary Advice Service (DAS) on 30 January 2023. These comments and the Applicant’s response are provided in **Table 2**. Natural England provided further comments at Deadline 2 [REP2-061] which have also been incorporated into **Table 2**.

Table 2: Applicant’s Comments on Natural England’s DAS response and Natural England’s comments provided in REP2-061

ID	Natural England Comment	Applicant Comment
DAS Comments Received 30 January 2023		
<i>Summary of Natural England’s Response</i>		
A.	<p>1. Background</p> <p>Natural England’s advice to offshore windfarm developers has been that due to the number of projects already required to provide artificial nest structures (ANS) along the East Anglian and Northeast coastlines as compensation, further ANS should be located offshore rather than onshore. Offshore there is more likely to be a shortage of suitable nest spaces and the opportunity to access offshore foraging grounds that coastal kittiwakes are less able to access. In particular, we have advised this to the Hornsea 4 Examination and to the Crown Estate as part of our engagement with the Round 4 Habitats Regulations Assessment (HRA).</p>	Noted.
B.	<p>2. Main Advice</p> <p>We note that SEP and DEP emphasise that this proposal differs from others in that it is based on increasing productivity, by replacing sub-optimal (lower productivity) sites with new, high quality nest sites. It is not clear from the report (or our understanding of the Newcastle Gateshead colony) that these differences are genuinely the case. Natural England have provided comments on the draft report in Annex A that may aid in clarifying this.</p> <p>However, it may be that dwelling on the distinction between establishing new high quality nest sites for existing pairs (relocating from sub optimal sites) or providing quality sites for new pairs is somewhat unnecessary. This is for the following reasons:</p>	<p>The Applicant acknowledges that there are similarities between the Applicant’s and other developers’ proposals.</p> <p>The Applicant agrees that the measure proposed has potential to be successful and indeed is confident that the measures can provide the required levels of compensation which for kittiwake is relatively low compared to other consented offshore wind farm projects.</p> <p>The Applicant does not suggest that kittiwake nest site space is currently a limitation. As suggested by Natural England that is probably not the case. However, it seems highly likely, based on monitoring evidence, that many of the sites now being occupied by kittiwakes as the population increases are suboptimal sites where breeding success is unlikely to be as good as it can be on high quality nest sites. Therefore, the provision of high quality nest sites can be anticipated to attract kittiwakes and to achieve an increase in breeding success by birds that might otherwise only be able to try to make use of poor quality sites.</p> <p>Data showing the numbers of failed nests at artificial sites within 2km of the Saltmeadows tower has been added at Table 3.</p>

ID	Natural England Comment	Applicant Comment
	<ul style="list-style-type: none"> • The predicted contribution of SEP and DEP to the in-combination adverse effect on the Flamborough and Filey Coast SPA kittiwake feature are comparatively small – a predicted central value of 6.4 adult collisions per annum. This is relatively low compared to the equivalent central values of some other recent projects (e.g., Hornsea Three, 65-73; Norfolk Vanguard, 21; Hornsea Four, 71). This indicates that the compensation will only need to produce a modest number of additional recruits into the national site network, in turn indicating that an onshore ANS, whilst somewhat compromised by the likely availability of other nest spaces in the Newcastle Gateshead area, still has the potential to be successful. • None of the consented offshore wind projects requiring compensation are developing ANS proposals on the Tyne, whereas Lowestoft, the Suffolk coast and Hartlepool are scheduled to see substantial provision in the future. • The submission, whilst not demonstrating that nest space availability is currently a limitation at the Tyne colony, does make a reasonable case that every year a substantial number of kittiwakes fail to produce any young on the Tyne and therefore may seek an alternative nest site the following year. This is unsurprising at an urban colony where kittiwake is not always welcome. Whilst some of those unsuccessful kittiwakes may relocate to another colony entirely, it is plausible that others will seek new sites on the Tyne. 	
C.	<p>We recommend that greater emphasis is placed on these matters in any submitted document. Regarding the last bullet point, we have previously raised that planning permission has recently been granted for an experimental 'kittiwakery' directly adjacent to the Gateshead Saltmeadows tower, which is of a similar scale to the SEP and DEP intervention. In light of the evidence presented regarding the likely number of failing breeders on the Tyne every year, we consider that the presence of the 'kittiwakery' in advance of the SEP and DEP intervention is, on balance, unlikely to preclude the SEP and DEP intervention from providing compensatory benefits. There remains an element of risk around this occurring however, and therefore advise SEP and DEP to carefully consider the need to progress their proposals as soon as possible, to minimise the potential</p>	<p>The Applicant welcomes Natural England's agreement that the presence of the 'kittiwakery' does not pose a barrier to its own compensation proposal and acknowledges Natural England's recommendation regarding delivery timescales. The Applicant can confirm that discussions with Gateshead Council (who is both the landowner and local planning authority responsible for determining any planning application associated with modifying the existing kittiwake tower) to secure the necessary permissions and consents are progressing positively. Further information, including updates on progress since Deadline 1 is presented in the Habitats Regulations Assessment Derogation and Compensatory Measures Update</p>

ID	Natural England Comment	Applicant Comment
	for mortality debt to build up as a result of the competing 'offer' of the RWE proposal.	(Revision B) [document reference 13.7] submitted at Deadline 3, including a letter of support from Gateshead Council provided in Appendix B.
D.	<p>3. Conclusions</p> <p>It remains Natural England's general position that ANS should be located offshore. However, having reviewed the Applicant's proposed submission, Natural England considers it might be possible to conclude that this particular onshore measure (i.e., augmenting the existing Gateshead Saltmeadows tower on the Tyne with two new nest faces) has the potential to provide appropriate compensation for SEP and DEP. This is subject to the following caveats;</p> <ul style="list-style-type: none"> • Greater emphasis on the bulleted points raised above is given in the submitted report; • The clarifications sought in our DAS advice are addressed in the submitted report; 	The Applicant welcomes Natural England's conclusion and has updated this note to incorporate the recommended points.
E.	<ul style="list-style-type: none"> • A more detailed design of the proposed measures is submitted into the Examination for review in due course. 	Noted. Please see the Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B) [document reference 13.7] submitted at Deadline 3 for further information regarding the onward delivery programme for this compensatory measure.
F.	We stress that Natural England's advice to projects or plans with more substantial impacts than SEP and DEP will continue to be that ANS should be located offshore to ensure that they have good prospects for delivering sufficient recruits into the national site network. We will continue to appraise the potential for onshore ANS to compensate for future offshore wind projects with smaller contributions on a case-by-case basis.	Noted.
<i>Annex A Detailed Comments</i>		
1	<p>Para number 6</p> <p><u>Excerpt:</u></p>	The Applicant notes this text was an error and should have read "more than 50% fewer". In 2021, there were 14 chicks in 15 nests on the south face (0.93 chicks per AON), 63 chicks in 54 nests on the northeast face (1.17 chicks per AON) and 92 chicks in 55 nests on the northwest face (1.67 chicks per AON) (MacArthur Green 2021). Not

ID	Natural England Comment	Applicant Comment
	<p>‘...removing the south face which over the past 20 years has produced 50% fewer fledglings than each of the other two faces’</p> <p><u>Comment</u></p> <p>As Natural England understands there are currently in the order of 13-15 apparently occupied nests (AON) on the south face compared to 52-54 AON and 53-55 AON on the other faces. So, the south face holds roughly 30% of the population of either of the north faces. This suggests that if there are 50% fewer fledglings being produced on the south face, it would need to have a higher productivity than the north faces.</p> <p><u>Requested Action</u></p> <p>Please clarify this by providing a table listing AON and productivity for each face separately for the years for which such data is available.</p>	<p>only do few pairs choose to nest on the south face, but their breeding success tends to be lower than that of pairs on the other two faces, so total output of chicks is much lower. Data for other years apart from 2021 belong to Dan Turner and Andy Rickeard, but they have confirmed that the kind of difference seen in 2021 occurs in other years. Paragraph 7 has been updated to include this information.</p>
2	<p>Para number 7</p> <p><u>Excerpt</u></p> <p>‘...by aiming to replace unsatisfactory nest sites with high quality nest sites, allowing higher breeding success to be achieved by birds that were nesting on unsatisfactory sites where they were failing to produce chicks’.</p> <p><u>Comment</u></p> <p>If the ‘unsatisfactory nest sites’ were the south face of the tower alone, this would appear to only result in replacing 13-15 AON, and not be sufficient. If this is the case, the success of the measure therefore requires failing breeders from locations other than the south face of the tower, and therefore the measure is closer to standard ANS provision than asserted.</p> <p><u>Requested Action</u></p> <p>Please could the report include a table presenting the number of ‘unsatisfactory/sub optimal nest sites’ (and productivity of these sites) in the wider area that are considered likely candidates for relocation to the new high-quality sites, and a clear indication of what level of increased productivity is likely to be achieved.</p>	<p>The success of the Applicant’s proposal depends not only on providing high quality nest sites for the 15 or so pairs of kittiwakes breeding on the south face but also providing high quality nest sites for kittiwakes nesting on other nearby structures where the conditions are resulting in their breeding failure. In 2021 there were over 100 kittiwake nests on buildings and bridges at the Tyne within 2 km of the Saltmeadows tower that failed to produce any chicks. The breeding success in 2021 was particularly good with a higher number of nests having failed in many other years (Dan Turner, pers. comm., and annual monitoring reports).</p> <p>When the Saltmeadows tower was moved more than 1 km from beside the Baltic Arts Centre to its current location many pairs immediately relocated onto the tower in its new location. When the North Shields warehouse colony studied by John Coulson was demolished, colour ringed adults from that site relocated onto a variety of alternative nest sites mostly within 2 km of the site but in some cases further away (Coulson 2011). So it seems likely that pairs that fail will generally relocate to sites within 2 km but on occasions will move greater distances.</p>

ID	Natural England Comment	Applicant Comment
		<p>In terms of increased productivity, that is likely to be from zero (pairs that fail and so relocate) to around the average for the existing north-facing sides of the Saltmeadows tower. That varies from year to year, but in 2021 was 1.17 chicks per AON on one face and 1.67 chicks per AON on the other.</p> <p>This information has been included in paragraphs 7 and 9 to 11 above.</p>
3	<p><u>Table 1 Requested Action</u></p> <p>As noted in comment 2, because of the low numbers of birds using the south face (albeit with a breeding success broadly equivalent to that of the wider Newcastle Gateshead colony) we are not persuaded that this measure is substantially different to provision of ANS in or adjacent to other urban locations (e.g., Lowestoft, Hartlepool). Our view is that the differences set out here relate more to how the evolving nature of how ANS benefits have been described by successive developers, to which this report’s focus on replacing sub-optimal nests with high quality ones makes a useful contribution. Nevertheless, Natural England considers this difference is over-emphasised in the report compared to other factors that are more trenchant to the potential success of the measure, such as the low number of predicted collisions from SEP and DEP, the current level of ANS provision in Newcastle Gateshead compared to other locations, and the likelihood that human/kittiwake conflicts in urban areas do result in failing breeders that seek better nest sites in the following years.</p>	Noted.
4	<p>Table 1</p> <p><u>Excerpt</u></p> <p>Number of nest sites</p> <p><u>Comment</u></p> <p>Please see comment [ID] 2 above</p>	See Applicant’s response to ID 2 of this table.
5	<p>Table 1</p> <p><u>Excerpt</u></p> <p>‘Relies on recruitment from a pool of site-seeking immatures.’</p>	Noted; however, in practice where a population is increasing rapidly, as at the Tyne, it seems likely that most non-breeders will be

ID	Natural England Comment	Applicant Comment
	<p><u>Comment</u> Non-breeders might not all be immatures, though we recognise that this is how the benefits of ANS provision have generally been portrayed.</p>	<p>immatures recruiting into the population, as the rate of non-breeding by established adults is normally low (Coulson 2011).</p>
6	<p>Table 1 <u>Excerpt</u> Number of breeding kittiwakes - 'Increase in breeding numbers not required.' <u>Comment</u> Please see comment on para 7 above <u>Requested Action</u> If the assertion that an 'increase in breeding numbers' is not required, it should be more clearly presented how many sub-optimal breeding pairs are in the area.</p>	<p>As noted in the Applicant's response to ID 2 of this table, there were over 100 pairs on sites within 2 km of the Saltmeadows tower that failed to rear any chicks so were most likely attempting to breed on suboptimal sites. These were especially evident in the Newcastle Quayside area, which also has a high incidence of deployment of kittiwake deterrents (MacArthur Green 2021). Table 1 has been updated.</p>
7	<p>Table 1 <u>Excerpt</u> 'Aims to provide compensation by increasing breeding success and therefore productivity relative to other local sites.' <u>Requested Action</u> Please provide a table that details current productivity at local sites and expected increase in productivity.</p>	<p>As noted above (in response to ID 2), breeding success of pairs that relocate should increase from zero to around the average for the Tyne as a whole, so from zero to around 0.8 to 1.3 chicks per nest, depending on whether it is a relatively poor or relatively successful year for Tyne kittiwakes. Table 1 has been updated.</p>
8	<p>Table 1 <u>Excerpt</u> 'To remove failing nest sites and replace them with high quality nest sites nearby.' <u>Requested Action</u> Please clarify the number of failing nest sites that will be removed. Our understanding is that this would be in the region of 13-15 AON. We also question whether productivity values for the south-face of c1 fledgling per pair means that these birds are in fact 'failing'.</p>	<p>The proposal is to remove the south face of the tower to prevent kittiwakes from nesting there in future. That face has space to hold at least 55 nests (as there were 55 nests on one of the north-facing sides in 2021 and each side is equal in capacity). These 55 nest sites will be replaced by two new faces with potential to hold at least 55 nests on each. The north-facing sides in 2021 produced 155 chicks. The south-facing side produced 14 chicks. The aim is to allow kittiwakes to produce 155 chicks on two new faces rather than 14 on the existing south face (while retaining the two successful north-facing sides that</p>

ID	Natural England Comment	Applicant Comment
		produced 155 chicks in 2021). This has the potential to increase chick output by 155-14, or 141 chicks (approximately).
9	<p>Para number 10</p> <p><u>Excerpt</u></p> <p>‘These data provide no evidence at all to suggest that the local population is approaching environmental carrying capacity; if that was the case we might expect density-dependence to reduce the growth rate as numbers approach carrying capacity.’</p> <p><u>Comment</u></p> <p>Neither do they provide any evidence that shortage of suitable nest spaces is applying any brake to the growth of the population. The potential nest spaces in the area have accommodated an ongoing increase in kittiwake numbers, which rather suggests that it may not be a limiting factor – thus far at least.</p> <p><u>Requested Action</u></p> <p>Consider amending report. Bring forward any evidence available that current colonies in the Newcastle Gateshead area are ‘at capacity’.</p>	<p>The Applicant does not consider that Tyne kittiwake numbers are at capacity but rather that the proportion of high quality nest sites is probably decreasing as the population grows and expands onto many buildings that are relatively unsuitable for kittiwakes or where the birds are unwelcome and are actively deterred. This is indicated by the extensive use by kittiwakes of many buildings with deterrents, including anti-kittiwake netting, avishock wires, and other measures, and by the considerable number of nests where breeding success is zero despite evidence that food availability is generally good and many pairs can achieve high breeding success (MacArthur Green 2021).</p>
10	<p>Para number 11</p> <p><u>Excerpt</u></p> <p>‘However, there is little or no indication of density dependent reduction in breeding success as this colony has grown’</p> <p><u>Comment</u></p> <p>Though would you expect this in a population of c2000 pairs? To what extent does small colony size contribute to the high productivity of urban colonies?</p> <p><u>Requested Action</u></p> <p>If evidence of a relationship between colony size and productivity is available, consider bringing this into the report.</p>	<p>It might be debateable whether the Tyne kittiwake population is a single colony or not. However, the Tyne population is probably the third-largest kittiwake population in England after Flamborough & Filey Coast and Farne Islands. So c. 2000 pairs is probably not a “small colony size” in an English context. The Seabird 2000 book (Mitchell et al. 2004) lists only 23 colonies in Britain and Ireland that held more than 2000 pairs in that census, but over 300 colonies of kittiwakes with fewer than 2000 pairs (many of which had fewer than 100 pairs), so even in the context of Britain and Ireland the Tyne kittiwake population must rank as one of the larger ones. The Applicant considers that density-dependence could possibly affect even relatively small kittiwake populations as a consequence of competition if there were only limited numbers of high quality nest sites.</p> <p>It seems likely that a small population size will contribute to high productivity where the population is not subject to high predation</p>

ID	Natural England Comment	Applicant Comment
		<p>impacts but where predation is an issue then larger colony size may be beneficial in reducing predation impact by a dilution effect. However, the evidence of high productivity in urban colonies may relate to the fact that these tend to have fewer avian predators than found at natural coastal colonies (where crows, jackdaws, large gulls, buzzards, peregrines etc can take kittiwake eggs, chicks and in some cases adults), as well as there being less competition for food in the vicinity of urban colonies where those are smaller than natural colonies so have less conspecific competition for food as well as less interspecific competition because most natural colonies have auks and other seabird species present whereas urban colonies of kittiwakes do not.</p>
11	<p>Para number 12 & 13</p> <p><u>Excerpt</u></p> <p>‘The much higher breeding success at Tyne colonies than at many other UK kittiwake colonies will also make this location attractive to potential recruits from many other colonies, further boosting the large pool of potential recruits.’</p> <p>AND</p> <p>‘In 2021, the breeding success achieved at the Tyne was one of the highest on record (Turner 2021). The 2,246 – 2,252 AONs monitored by Dan Turner and colleagues produced 2,898 chicks, or 1.29 chicks per AON.’</p> <p><u>Comment</u></p> <p>This high breeding success could perhaps be taken as indicating there aren’t a large number of sub-optimal sites for relocation to the new north faces. Again, see earlier comments requesting a table presenting the number of sites and productivity at these sites in the Tyne area.</p> <p><u>Requested Action</u></p> <p>Please see comment [ID] 6 above.</p>	<p>The assertion that high breeding success could indicate a lack of sub-optimal sites is incorrect. There are large numbers of pairs failing to breed successfully. In 2021 there were over 100 pairs within 2 km of the Saltmeadows tower that failed even though 2021 was a particularly good breeding season for Tyne kittiwakes overall (Turner 2021).</p>
12	<p>Para number 12</p> <p><u>Excerpt</u></p>	<p>These flocks were mostly counted on the same day during a transect along the river, so these numbers do not represent double-counting of the same individuals at different sites. Undoubtedly individuals will</p>

ID	Natural England Comment	Applicant Comment
	<p>'The 1,000 immature birds counted near Tyne colonies in summer 2021 are likely to seek to recruit into this population in 2022, 2023 and subsequent seasons.'</p> <p><u>Comment</u></p> <p>This assumes that each club flock in the area consists of different individuals, which is questionable – presumably prospecting individuals will visit a number of colonies rather than stick to one. More generally, it would be appropriate to demonstrate that the presence of club flocks of this size is exceptional compared to other colonies.</p> <p><u>Requested Action</u></p> <p>Consider tempering conclusions.</p>	<p>move between sites, but the count was carried out to avoid that influencing the total recorded as much as possible. Paragraph 17 has been updated.</p>
13	<p>Para number 13</p> <p><u>Excerpt</u></p> <p>'Nevertheless, between 396 and 402 nests in which birds attempted to breed in 2021 failed to produce any chicks. This represents about 18% of all nests in this population in 2021. In 2019 this percentage was 28% (484 nests), in 2018 it was 40% (582 nests), in 2017 it was 25% (405 nests).'</p> <p><u>Comment</u></p> <p>This is intriguing – but the data does not consider whether there were other reasons for failure? Inexperienced birds might not rear young for a range of reasons even if they select a suitable nest location, and there are multiple factors that could impinge on all kittiwakes. We do recognise that urban kittiwakes are not always welcome. However, it is unclear how this c.40% compares to equivalent rate in a natural colony? Is this just part of life for kittiwakes, and not necessarily expressing (and therefore solvable by) nest space inadequacies?</p> <p><u>Requested Action</u></p> <p>Consider tempering conclusions</p>	<p>The Applicant agrees that there may be many reasons for some individual breeding failures. A few birds may be infertile, but that seems to be very rare in most bird species. Some inexperienced birds may fail through inexperience. However, kittiwakes are long-lived so the proportion of inexperienced pairs in a population is likely to be relatively small, even in an increasing population such as at the Tyne where perhaps 5% of birds are breeding for the first time (i.e. are inexperienced). That could only account for a small part of the 25% to 40% failure rate observed. The Applicant is not aware of any study of the rate of breeding failure in natural versus urban colonies of kittiwakes. There are some natural colonies where breeding success is zero due to severe shortage of food, so a comparison would need to compare urban and natural colonies with similar foraging conditions. Therefore, this comparison might be difficult to do. Tyne nests have good numbers with two or even with three chicks, which seems to be less prevalent at natural colonies, where many nests have a single chick. But as far as the Applicant is aware, no carefully matched study of this has been carried out.</p>
14	<p>Para number 15</p> <p><u>Excerpt</u></p>	<p>Noted.</p>

ID	Natural England Comment	Applicant Comment
	<p>'The new tower proposed by RWE might possibly hold about 200 nests'</p> <p><u>Comment</u></p> <p>The 'kittiwakery' is scheduled to be delivered in 2023, several years before SEP and DEP plan to install theirs. If it proves attractive, there is the potential for the new tower to be the principal destination for space seeking kittiwakes in the near future.</p> <p><u>Requested Action</u></p> <p>Given the relatively straightforward nature of the works required to augment the Gateshead Saltmeadows Tower, we recommend that these are implemented as soon as possible, rather than the proposed installation date.</p>	
15	<p>Para number 15</p> <p><u>Excerpt</u></p> <p>'The enhancement of the Saltmeadows tower proposed by the Applicant is intended to provide at least 100 high quality nest sites and potentially about 150 high quality nest sites.'</p> <p><u>Comment</u></p> <p>Given the relative simplicity of the measure, it would be helpful if SEP and DEP could be more specific about how many nest spaces will be created, and whether nest spaces or predicted AON is the metric here.</p> <p><u>Requested Action</u></p> <p>Please Clarify</p>	<p>The Applicant anticipates that the two new faces of the Saltmeadows tower that will be added to replace the existing south face will be closely similar in size and in provision of ledges to the existing faces. Since the successful north-facing sides hold about 55 nests in a good year, the capacity of each face seems to be about 55 AONs. It is possible that larger numbers might occupy each face, but based on the evidence up to now it seems reasonable to infer a capacity of about 55 nests per face. The metric is therefore actual (predicted) AONs based on the use of existing faces rather than theoretical numbers that might be possible to be on each face.</p> <p>During the development of concept designs, nest provision estimates will be determined. This information will be shared with Natural England and submitted into Examination at the appropriate deadline.</p>
16	<p>Para number 15</p> <p><u>Excerpt</u></p> <p>'The planned compensation measure from SEP and DEP will increase breeding success which will be achieved by birds that move from failing sites onto the new high quality nest sites, whilst the RWE tower will provide new additional nest sites.'</p> <p><u>Comment</u></p>	<p>Yes, it is correct that the numbers moved off the south face will be smaller than numbers moving off failing sites on other buildings/structures. See response to ID 2 of this table.</p>

ID	Natural England Comment	Applicant Comment
	<p>'Only 13-15 kittiwakes use the south face of the Saltmeadows tower currently, so most of the 100-150 nests will be 'new' to the tower. In that sense surely they are the same as the nests provided by RWE, and the proportion of zero productivity vs. new recruits is likely to be more or less the same.'</p> <p><u>Requested Action</u></p> <p>See previous comments on table 1.</p>	
17	<p>Para number 17</p> <p><u>Excerpt</u></p> <p>'SEP and DEP is required to compensate for 17.0 adult kittiwakes per year based on the most recent upper 95% confidence interval estimates of collision risk (mean = 6.4).'</p> <p><u>Comment</u></p> <p>Based on what parameters? This should be briefly detailed or a reference provided to the relevant report. Also need to specify what the 95% CI is relating to.</p> <p><u>Requested Action</u></p> <p>Please provide detail on CRM and/or reference relevant report.</p>	<p>A reference to the Apportioning and HRA Updates Technical Note (Revision B) [REP2-036] which has recalculated kittiwake collisions based on the parameters provided by Natural England within Appendix B1 of their Relevant representation [RR-063] has been provided.</p>
18	<p>Para number 17</p> <p><u>Excerpt</u></p> <p>'...since approximately 50% of fledglings survive to recruit as breeding adults.'</p> <p><u>Requested Action</u></p> <p>Please expand on which survival rates have been used/how this figure is reached.</p>	<p>Demographic data are taken from Horswill and Robinson (2015) using their recommended values for age of first breeding and immature survival. Section 7.1 has been updated.</p>
19	<p>Para number 18</p> <p><u>Excerpt</u></p> <p>'Approximately half of those extra fledglings can be anticipated to recruit into colonies in the national site network for breeding kittiwake (The Joint Nature Conservation Committee (JNCC) 3rd review of the SPA network estimated that in</p>	<p>Noted.</p>

ID	Natural England Comment	Applicant Comment
	<p>the early 2010s approximately 57% of the UK breeding kittiwakes breed in SPAs where kittiwake is a breeding feature; Stroud et al. 2016).’</p> <p><u>Comment</u></p> <p>We welcome the intention of factoring in the need to provide recruits into the national site network. Natural England will consider whether the proposed approach is appropriate in due course.</p>	
20	<p>Para number 19</p> <p><u>Excerpt</u></p> <p>‘...the compensation that could be achieved could be estimated using the method generally favoured of considering the difference in productivity between the artificial sites and the SPA, i.e., 0.42 chicks per nest higher productivity at the Tyne’</p> <p><u>Requested Action</u></p> <p>Given this is not the method utilised by SEP and DEP, this paragraph causes some confusion. We consider it could be removed without detriment to the report.</p>	Noted. This text has been removed.
21	<p>Para number 19</p> <p><u>Excerpt</u></p> <p>‘The Applicant’s plan to provide high quality nest sites for about 150 pairs of kittiwakes.’</p> <p><u>Comment</u></p> <p>Para 15 says ‘is intended to provide at least 100 high quality nest sites and potentially about 150 high quality nest sites</p> <p><u>Requested Action</u></p> <p>Clarity is required regarding the intended provision, and whether that relates to the number of nest spaces offered or predicted AON.</p>	<p>It is considered that 100 AONs is highly likely based on the numbers using the existing successful faces of the tower, if the new faces were identical to the existing ones but oriented northwards. Possibly 150 AONs might fit onto the structure, especially if the new faces are designed to have greater capacity than the existing ones. The exact number will be determined during the design phase which has not yet been completed and will need to be agreed with Gateshead Council. See the Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B) [document reference 13.7] submitted at Deadline 3 for further information regarding the onward delivery programme for this compensatory measure.</p>
22	<p>Para number 20</p> <p><u>Excerpt</u></p>	Correct. This was an error and should be 140 rather than 126 as identified by Natural England. Paragraph 26 has been updated.

ID	Natural England Comment	Applicant Comment
	<p>'The Applicant's plan to replace the south face with two faces, both oriented northwards, is anticipated to increase output by up to about 126 chicks per year.'</p> <p><u>Comment</u></p> <p>Would this not be 'up to about 140 chicks' – $77+77=154$. $154 - 14 = 140$. It appears that 14 has been subtracted twice.</p> <p><u>Requested Action</u></p> <p>Consider and amend if needed.</p>	
23	<p>Para number 21</p> <p><u>Excerpt</u></p> <p>'About 50% of fledglings are expected to survive to recruit as breeding adults based on the best available demographic data for UK kittiwake'</p> <p><u>Requested Action</u></p> <p>Please reference</p>	<p>This takes recommended demographic values from Horswill and Robinson (2015). This reference has been included in paragraph 29.</p>
24	<p>Para number 21</p> <p><u>Excerpt</u></p> <p>'120 chicks represents increased recruitment of about 60 adults per year, slightly over 30 of which could be expected to breed in SPA colonies.'</p> <p><u>Comment</u></p> <p>It would be helpful to explain how this relates to the comment that it will produce 'at least 100 high quality nest sites and potentially about 150 high quality nest sites' [Para. 15] – the measurement unit has changed from nest sites to fledged chicks. It would be good to have the relationship clearly detailed. The existing north faces have about 50 sites each, so it suggests that this is based on current performance and assuming the same number of sites/ breeding success on the two new faces.</p> <p><u>Requested Action</u></p> <p>Please Clarify.</p>	<p>Noted. This is based on current performance rather than assuming better performance from improved design of new faces. In reality it should be possible to produce new faces with greater capacity than the existing ones but the precautionary approach taken has been to use current performance as the yardstick. See ID 15 and 21 of this table.</p>

ID	Natural England Comment	Applicant Comment
Comments Provided in REP2-061		
<i>Headline Comments</i>		
25	2. Natural England’s advice to offshore windfarm developers has been that due to the number of projects already required to provide artificial nest structures (ANS) along the East Anglian and North East coastlines as compensation, further ANS should be located offshore rather than onshore. Offshore there is more likely to be a shortage of suitable nest spaces and the opportunity to access offshore foraging grounds that coastal kittiwakes are less able to access. In particular, we have advised this to the Hornsea 4 Examination and to the Crown Estate as part of our engagement with the Round 4 plan-level Habitats Regulations Assessment (HRA).	Noted.
26	3. This remains Natural England’s general position. However, Natural England has reviewed the Applicant’s submission ‘Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects - Gateshead Kittiwake Tower Modification – Quantification of Productivity Benefits’ and have reached an in-principle conclusion that in this instance, an onshore measure (augmenting the existing Gateshead Saltmeadows tower on the Tyne with two new nest faces) has the potential to provide appropriate compensation for SEP and DEP. However, this is subject to the Applicant providing: <ul style="list-style-type: none"> • more information on the structure design (submission scheduled for Deadline 2 or 3); • more detailed understanding of the ‘baseline’ for productivity in and around the existing tower; • more detailed stress testing of the possible scenarios as regards mortality debt. 	Regarding the structure design, the Applicant is aiming to submit outline designs into the Examination at Deadline 5. Productivity of kittiwakes at Saltmeadows tower is reported annually by Daniel Turner. However, these reports do not present data disaggregated by orientation of the three faces of the tower, so do not provide the ideal ‘baseline’ for how the tower will perform after modification. Nevertheless, productivity (chicks per AON) at Saltmeadows tower (including the few nests on the South face) was 1.02 in 2022, 1.34 in 2021, 0.79 in 2019, 0.46 in 2018, 0.73 in 2017, 0.73 in 2016. See response to ID 30 for data on numbers of failing nests in the vicinity.
27	4. Natural England considers an onshore intervention is appropriate in this particular case for the following reasons:	Noted. See ID 30, data showing the numbers of failed nests at artificial sites within 2km of the Saltmeadows tower has been added at Table 3 .

ID	Natural England Comment	Applicant Comment
	<ul style="list-style-type: none"> • The predicted contribution of SEP and DEP to the in-combination adverse effect are comparatively small – a predicted central value of 6.4 adult collisions per annum. This is relatively low compared to the equivalent central values of some other projects when based on the same parameters (Hornsea Three, 65-73; Vanguard, 21; Hornsea Four, 71). This indicates that the compensation will only need to produce a modest number of additional recruits into the national site network, in turn indicating that an onshore ANS, whilst compromised by the likely availability of other nest spaces in the general area, still has the potential to be successful. • The submission, whilst not demonstrating that nest space availability is currently a limitation at the Tyne colony, does make a reasonable case that every year a substantial number of kittiwakes fail to produce any young on the Tyne and therefore may seek an alternative nest site the following year. This is unsurprising at an urban colony where kittiwake are not always welcome. Whilst some of those unsuccessful kittiwakes may relocate to another colony entirely, it is plausible that others will seek new sites on the Tyne. • None of the consented offshore wind projects requiring compensation are developing ANS proposals on the Tyne, whereas Lowestoft, the Suffolk coast and elsewhere in the NorthEast are scheduled to see substantial provision in the future. 	
28	<p>5. Planning permission has been granted for an experimental 'kittiwakery' directly adjacent to the Gateshead Saltmeadows tower, which is of a similar scale to the SEP and DEP intervention. In light of the evidence presented regarding a substantial number of failing breeders on the Tyne every year, we consider that the presence of the 'kittiwakery' in advance of the SEP and DEP intervention is, on balance, unlikely to preclude the SEP and DEP intervention from providing compensatory benefits. There remains an element of risk around this occurring however, and therefore advise SEP and DEP to carefully consider the need to progress their proposals as soon as possible, to minimise the potential for mortality debt to build up as a result of the competing 'offer' of the RWE proposal.</p>	<p>See the Applicant's response at ID C of this table.</p>

ID	Natural England Comment	Applicant Comment
29	6. We stress that Natural England’s advice to projects or plans with more substantial impacts than SEP and DEP continues to be ANS should be located offshore, to ensure that they have good prospects for delivering sufficient recruits into the national site network. We will continue to appraise the potential for onshore ANS to compensate for future offshore wind projects with smaller in-contribution contributions on a case-by-case basis.	Noted.
<i>Detailed Comments</i>		
30	7. Paragraphs 6 and 7: To increase confidence by improving the understanding of ‘baseline conditions’ for the compensation measure, Natural England seeks a table presenting the number of ‘unsatisfactory/sub optimal nest sites’ (and productivity of these sites) in the wider area that are considered likely candidates for relocation to the new high-quality sites, and a clear indication of what level of increased productivity is likely to be achieved. A longer dataset for the face of the tower that will be replaced should also be presented. In both instances, data presented should span several years (with data held by local colony monitors sought where required) and include distance of each sub-optimal nest site area from the Saltmeadows tower.	<p>Data on the percentage of nests that fail to produce any chicks are published annually by Daniel Turner on the Natural History Society of Northumbria web site. The most recent data, for 2022, show that 24.8% of nests on artificial sites on the Tyne in 2022 failed (503 nests). These included 6 on the High Level Bridge, 2 on St Mary’s Heritage Centre Gateshead, 263 on the Tyne Bridge, 43 on buildings in Newcastle Quayside, 13 on Newcastle Guildhall, 22 on the Dean Street Railway Bridge, 37 on Baltic Arts Centre, 1 on Baltic quayside. All 387 of these failed nests are within 2km of the Saltmeadows tower so are likely candidates for birds relocating to the new faces on the tower. Clearly, the new faces could only support a small proportion of this total; there are far more failing nest sites nearby than there will be capacity on the modified tower. The 2022 data are reasonably typical; average productivity at 1.08 chicks per nest was higher in 2022 than in many earlier years. Similar, although often somewhat higher, numbers of nests at these sites failed in other years. Data on productivity at Saltmeadows tower are not presented separately for the three faces by Turner. However, in 2021 productivity on the West and East faces was 155 chicks from 105 nests (1.48 chicks per nest). Clearly, a pair of kittiwakes moving from a failing nest site elsewhere onto the Saltmeadows tower new faces would be able to increase productivity very considerably. Data showing the numbers of failed nests at artificial sites within 2km of the Saltmeadows tower has been added at Table 3 as requested.</p> <p>The Applicant is grateful to the Gateshead Council Ecologist, Peter Shield, for making available data on kittiwake numbers on each face of the Saltmeadows tower. These data are unpublished and were</p>

ID	Natural England Comment	Applicant Comment																																				
		<p>collected by Northumbria Ringing Group (NRG) for Gateshead Council. NRG visit the tower once per year, in early July, to count and ring kittiwake chicks. They do not monitor numbers of pairs nesting on the tower (which would require visits earlier in the season to count Apparently Occupied Nests, as mandated by JNCC seabird monitoring guidance). No ringing of chicks occurred in 2013, 2014 or 2015. Numbers of kittiwake chicks on each face of the tower each year for 2016 to 2022 are given in the following table:</p> <table border="1" data-bbox="1243 582 2072 1077"> <thead> <tr> <th>Year</th> <th>Kittiwake chicks on West face</th> <th>Kittiwake chicks on East face</th> <th>Kittiwake chicks on South face</th> </tr> </thead> <tbody> <tr> <td>2016</td> <td>28</td> <td>30</td> <td>9</td> </tr> <tr> <td>2017</td> <td>41</td> <td>39</td> <td>10</td> </tr> <tr> <td>2018</td> <td>48</td> <td>31</td> <td>0</td> </tr> <tr> <td>2019</td> <td>43</td> <td>41</td> <td>4</td> </tr> <tr> <td>2020</td> <td>40</td> <td>19</td> <td>1</td> </tr> <tr> <td>2021</td> <td>92</td> <td>65</td> <td>14</td> </tr> <tr> <td>2022</td> <td>74</td> <td>62</td> <td>5</td> </tr> <tr> <td>TOTALS</td> <td>366</td> <td>287</td> <td>43</td> </tr> </tbody> </table> <p>Production is lower on the South face in every year, so the pattern is consistent although somewhat variable from year to year. Over these seven years the South face has produced only 12% as many chicks as the West face and 15% as many as the East face. This is the reason for suggesting replacing the existing South face by two new faces oriented Northwards. This Table has also been added to the text as requested.</p>	Year	Kittiwake chicks on West face	Kittiwake chicks on East face	Kittiwake chicks on South face	2016	28	30	9	2017	41	39	10	2018	48	31	0	2019	43	41	4	2020	40	19	1	2021	92	65	14	2022	74	62	5	TOTALS	366	287	43
Year	Kittiwake chicks on West face	Kittiwake chicks on East face	Kittiwake chicks on South face																																			
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2020	40	19	1																																			
2021	92	65	14																																			
2022	74	62	5																																			
TOTALS	366	287	43																																			
31	8. Stress-testing/ Scenario Exploration: Natural England advises that more detailed stress-testing/scenario exploration should be carried out to demonstrate the replacement of the sub-optimal face with two new faces is sufficient, and to	Consideration of the different assumptions on which the calculation of the likely increase in the number of chicks produced per annum as a result of the nest site enhancement is set out below in Section 7.2 .																																				

ID	Natural England Comment	Applicant Comment
	<p>identify how long the measure should be in place, to ensure compensation fully accounts for the mortality debt accrued. These scenarios should include realistic worse and likely case scenarios in regards colony establishment time, initial establishment size, colony growth rate, colony size and productivity. Natural England advises that this kind of approach has previously been presented at Norfolk Boreas (Norfolk Boreas Offshore Wind Farm In Principle Habitats Regulations Derogation Provision of Evidence Appendix 1 FFC SPA), and commented on by Natural England (Natural England's advice on the FFC SPA in principle compensation measures 20th August 2021). This broad method could be adapted to reflect the Tyne area vital rates and related metrics to demonstrate the adequacy of the proposal and the predicted time it will take to 'pay back' the mortality debt accrued by SEP and DEPs predicted impact.</p>	<p>This considers the basis for assumptions on the time taken to colonise nest sites on the new faces of the tower, the colonisation rate and the level of chick production (which will be affected both by the 'final' number of nesting pairs (i.e. 'colony size') and the breeding success from the nests on the new faces of the tower).</p> <p>This relies upon; (i) the existing evidence and experience from the Tyne colonies that nesting kittiwake will colonise such structures rapidly; and (ii) upon several years of data on chick production from the three different faces of the Saltmeadows tower to assess the confidence that the delivery of the compensation will be on a sufficient scale. As such, it provides a more reliable determination of the adequacy of the compensation than would be achieved by undertaking stress-testing on the basis of hypothetical scenarios.</p>

5 Historical Evidence on the Number of Kittiwakes Breeding along the Tyne

14. Kittiwakes colonised the Tyne in 1949 when four pairs started nesting on the window ledges of a warehouse in North Shields (Coulson 2011). The population grew throughout the 1950s and 1960s, reaching about 100 pairs in the late 1960s (**Plate 1**) and was studied for several decades in detail by John Coulson and his research students (Coulson and Thomas 1985, Coulson 2011). This was the only breeding site for kittiwakes on the Tyne until the 1970s, with birds then spreading to several other sites, including on buildings far up the river at Gateshead and Newcastle Quayside, and on bridges, especially the Tyne Bridge joining central Newcastle with Gateshead. The spread was described by Turner (2010) who monitored numbers throughout the Tyne from 1994 to 2021 (Turner 2010). Numbers increased from around 500 Apparently Occupied Nests (AON) in the late 1990s to over 2,000 AONs in 2021 (**Plate 1**).

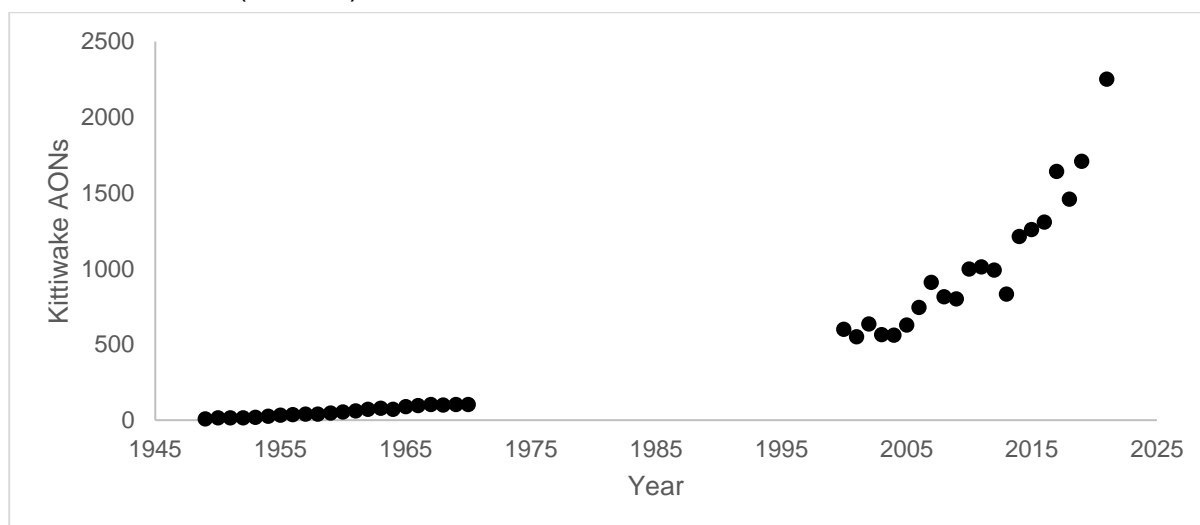


Plate 1: Numbers of kittiwake AONs at colonies at the Tyne from 1949 to 2021. Data from Coulson 2011, Coulson and Thomas 1985, Turner 2010 and annual reports of kittiwake numbers and breeding success for 2001 to 2021

6 Tyne Kittiwake Population Growth Rate and Likely Further Growth

15. Plotting the logarithm of breeding numbers against year allows the rate of growth of the population to be described. The initial growth when the colony was very new and small was faster than subsequent growth (**Plate 2**) which indicates that immigration caused the early high growth of the local population (Coulson 2011). However, the growth rate from about 1955 to 2021 has consistently been close to the best fit linear regression (**Plate 2**), indicating an almost constant growth rate through this period. There is a gap from the early 1970s to the late 1990s during which no complete census of all Tyne kittiwake colonies was carried out, but from 2000 onwards there has been a complete census every year, although no data were published for 2020. Considering only the years of complete annual counts coordinated by Dan Turner (2000 to 2021) the growth of the population remains well

described by a constant growth rate (**Plate 3**). This remains the case for the most recent years (2014 to 2021) as shown in **Plate 4**. These data provide no evidence at all to suggest that the local population is approaching environmental carrying capacity; if that was the case we might expect density-dependence to reduce the growth rate as numbers approach carrying capacity. This is not indicated in Plates 2, 3 or 4. This implies that the numbers of kittiwakes in the Tyne probably have scope to continue to increase further before an environmental carrying capacity is reached. However, the proportion of high quality nest sites is probably decreasing as the population grows and expands onto many buildings that are relatively unsuitable for kittiwakes or where the birds are unwelcome and are actively deterred. This is indicated by the extensive use at many buildings of deterrents, including anti-kittiwake netting, avishock wires, and other measures, and by the considerable number of nests where breeding success is zero despite evidence that food availability is generally good and many pairs can achieve high breeding success.

16. How much further the numbers may increase before reaching carrying capacity is uncertain. The trend in breeding success might give some indication of this. However, there is little or no indication of density-dependent reduction in breeding success as this colony has grown. In 1954-1990 breeding success was monitored each year by John Coulson and students (**Plate 5**). Over those years breeding success averaged 1.21 chicks per pair that laid eggs in these 37 years. In 1991 to 2021 breeding success was monitored by Dan Turner and colleagues. In their 30-year dataset, breeding success averaged 0.94 chicks per AON, with no clear evidence of any decrease in breeding success with increase in breeding numbers during 1991 to 2021 (**Plate 6**). It is important to note that the unit monitored differed between these two periods, with the unit of AONs including more nests than the unit monitored by John Coulson, so that the productivity data cannot be directly compared between these two different time periods. Coulson's data for 1954-1990 exclude AONs where there was no evidence of eggs being laid (Coulson and Thomas 1985), so will produce slightly higher estimates of breeding success of the population as a whole compared to the data provided by Dan Turner, which counts chick production in relation to the total number of AONs which will include some nests where no eggs were laid. However, the breeding success data do not indicate clear evidence of density-dependent reduction in breeding success as the colony has reached its current size. In particular, there is certainly no trend of decreasing breeding success in the period from 1991 to 2021, which is when the colony got to its largest size (**Plate 6**). **Plate 7** presents the breeding success in relation to the total number of AONs at the Tyne from 1991 to 2021.

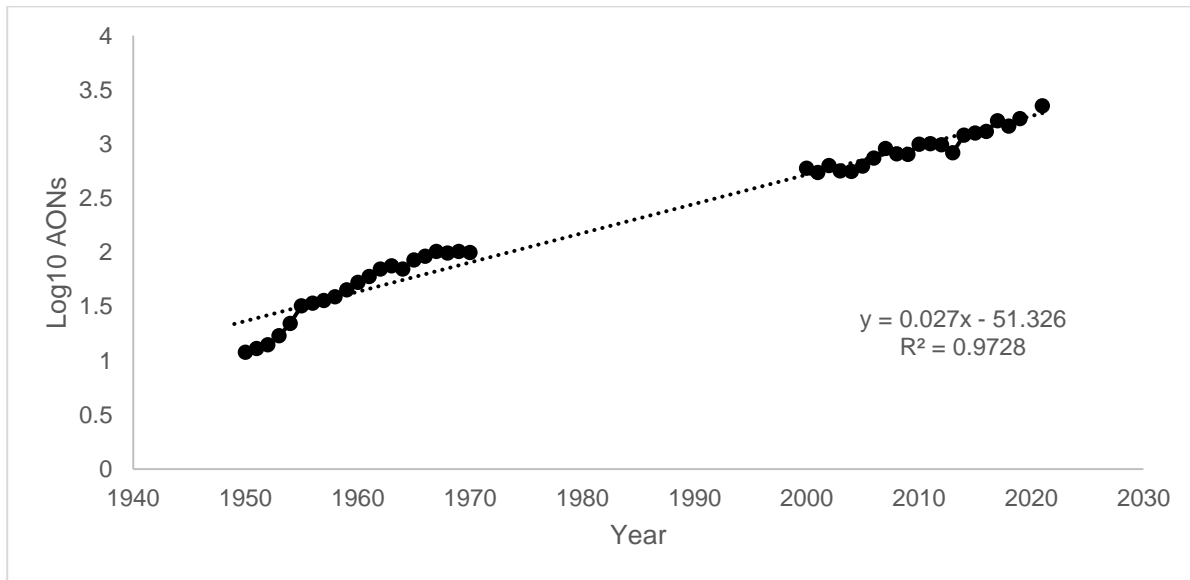


Plate 2: Number of kittiwake AONs at colonies at the Tyne from 1949 to 2021 plotted on a Log_{10} scale. The dotted line is the best fit linear regression

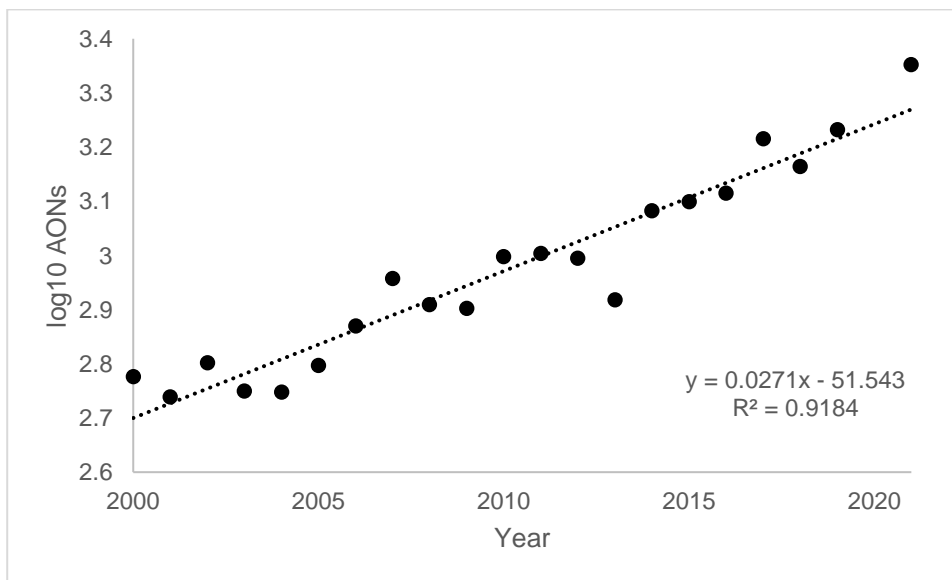


Plate 3: Number of kittiwake AONs at colonies at the Tyne from 2000 to 2021 plotted on a Log_{10} scale. The dotted line is the best fit linear regression

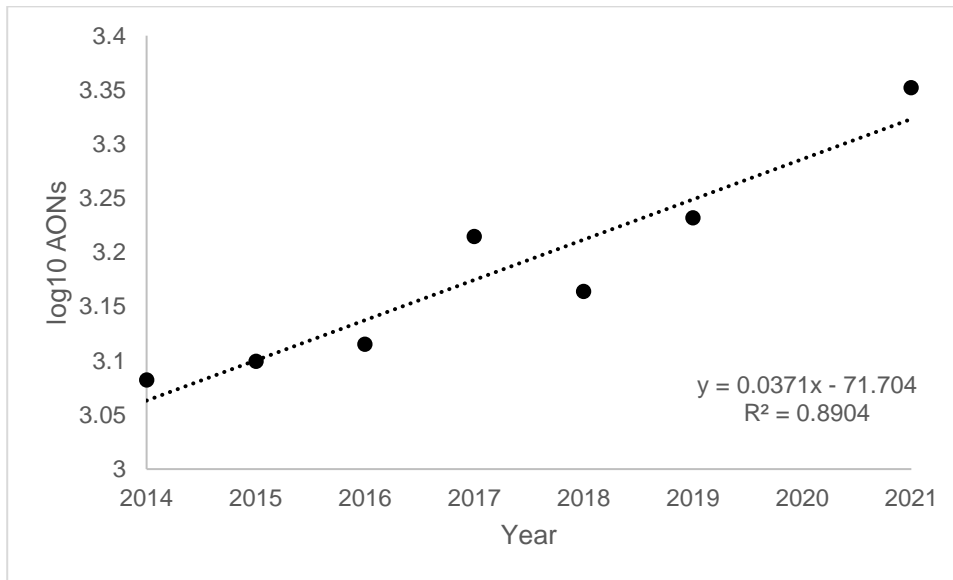


Plate 4: Number of kittiwake AONs at colonies at the Tyne from 2014 to 2021 plotted on a Log₁₀ scale. The dotted line is the best fit linear regression

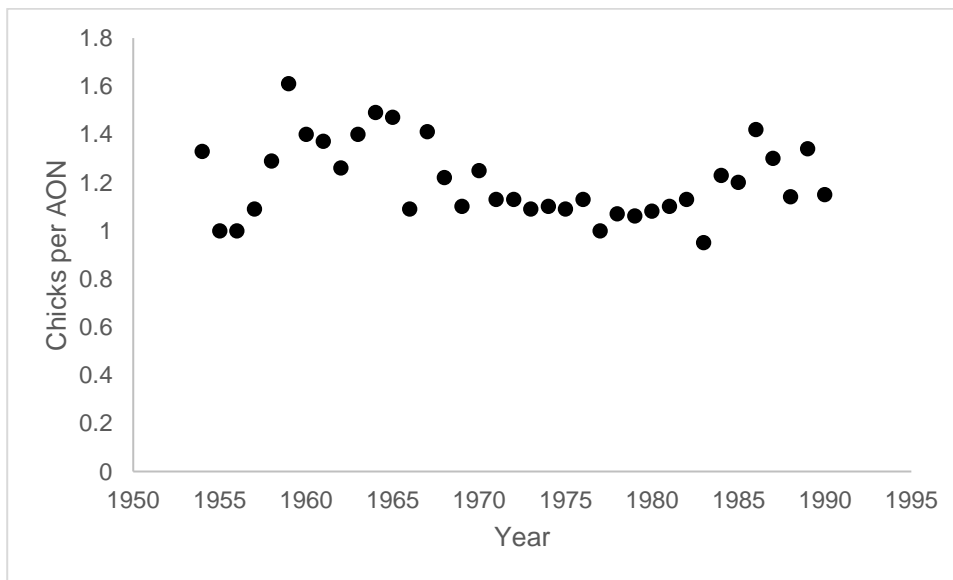


Plate 5: Breeding success reported for the North Shields colony 1954 to 1990. Data from Coulson 2011. Mean breeding success for 1954-1990 was 1.206 chicks per pair that laid eggs (n=37 years)

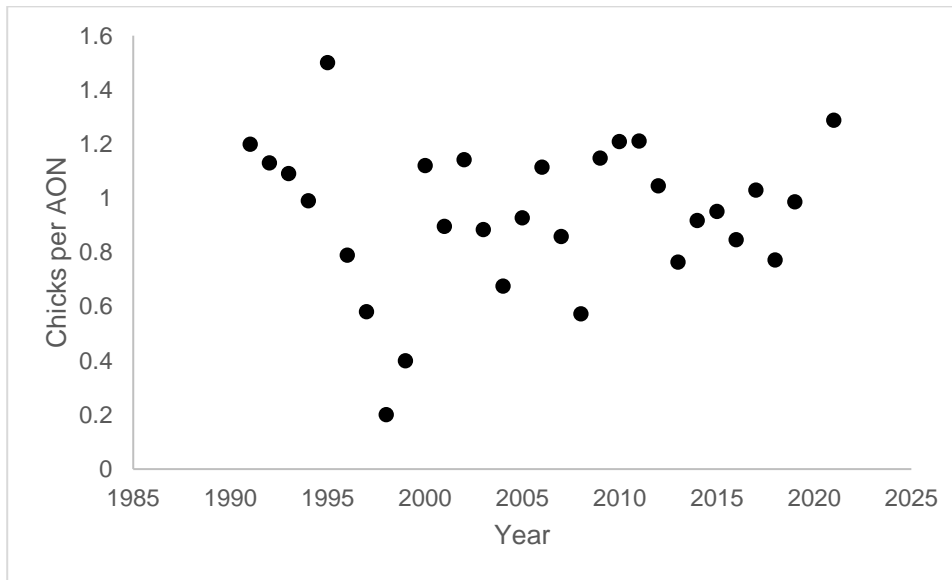


Plate 6: Breeding success reported for the Tyne colonies 1991 to 2021. Data from Turner 2010 and annual reports of kittiwake numbers and breeding success for 2001 to 2021 Mean breeding success for 1991-2021 was 0.941 chicks per AON (n=30 years; data not available for 2020)

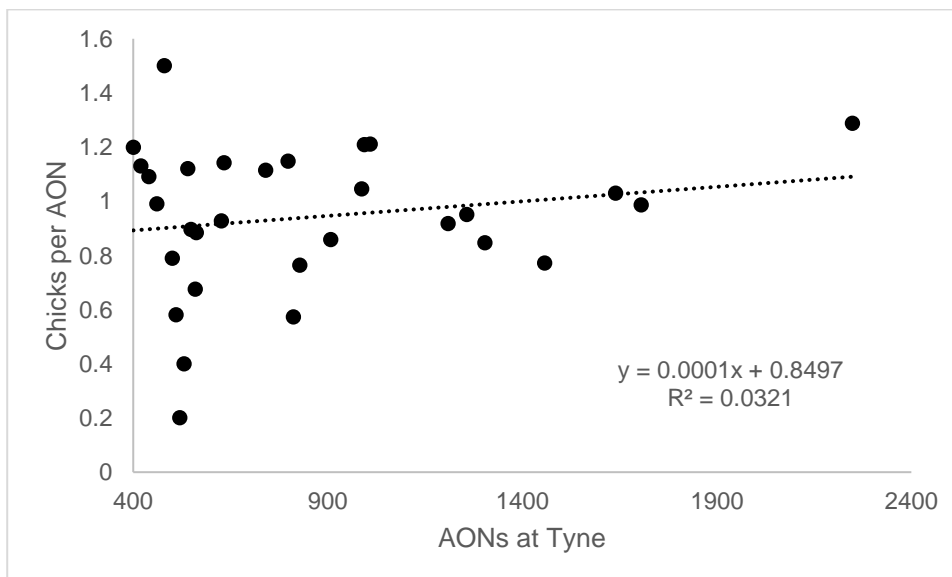


Plate 7: Breeding success in relation to the total number of AONs at the Tyne from 1991 to 2021. The slope of the regression trend line is not significantly different from zero, indicating no evidence of a density-dependent effect on breeding success over the range of population size prevailing in this period. Data from Turner 2010 and annual reports of kittiwake numbers and breeding success for 2001 to 2021

17. Observations at the Tyne confirm that large numbers of immature kittiwakes are present in the immediate vicinity of the Tyne kittiwake colonies (MacArthur Green

2021). In May-June 2021 (i.e. after recruitment of birds into the 2021 breeding population had already occurred and increased breeding numbers to their highest ever level), there were 150 birds in a 'club' flock at Tynemouth (local population about 350 pairs), 150 at Akzo Nobel (local population about 220 pairs), 180 at Saltmeadows (local population about 120 pairs), 180 at Baltic Flour Mill (local population about 200 pairs) and 350 near Tyne Bridge (local population including Newcastle Quayside around 900 pairs). These flocks of nonbreeders were mostly counted on the same day during a transect along the Tyne so should not include double-counting of the same individual birds at different sites. However, the Applicant recognises that it is possible that individuals will join different flocks on different occasions, possibly even within one day, and so there is a risk of double-counting birds. Every effort was made to minimise that risk. The data suggest that there is a healthy pool of nonbreeders that are seeking to join the breeding populations. That, of course, must have been the case in previous years to have provided the numbers that have been added to this population each year in recent years, but it indicates that there is still a good reserve of immature birds seeking to continue this increase further. The 1,000 immature birds counted near Tyne colonies in summer 2021 are likely to seek to recruit into this population in 2022, 2023 and subsequent seasons. The much higher breeding success at Tyne colonies than at many other UK kittiwake colonies will also make this location attractive to potential recruits from many other colonies, further boosting the large pool of potential recruits. Despite this high average breeding success, many pairs failed to rear any chicks, suggesting that they were using poor quality nest sites where successful breeding was difficult to achieve.

18. If the population continues to grow at the current rate, then there are likely to be around 200 to 250 new nests per year added to the local population for each of the next few years. In addition to these new nest sites being added each year, a proportion of the birds will choose to move from their chosen nest site to another site. Whereas kittiwakes that breed successfully normally return to exactly the same nest site year after year (Coulson 2011), birds that experience unsuccessful breeding attempts are likely to move to try to find a better nest site or a more compatible partner (Coulson 2011). In 2021, the breeding success achieved at the Tyne was one of the highest on record (Turner 2021). The 2,246 – 2,252 AONs monitored by Dan Turner and colleagues produced 2,898 chicks, or 1.29 chicks per AON. Nevertheless, between 396 and 402 nests in which birds attempted to breed in 2021 failed to produce any chicks. This represents about 18% of all nests in this population in 2021. In 2019 this percentage was 28% (484 nests), in 2018 it was 40% (582 nests), in 2017 it was 25% (405 nests). This high number of failing nests is despite the average breeding success of the Tyne kittiwake population being higher than at most natural colonies of kittiwakes in the UK, but no directly comparable counts of the proportions of nests containing 0, 1, 2 or 3 chicks have been made at natural colonies to compare with urban colonies subject to the same environmental conditions so it is uncertain whether the high proportion of failing nests at the Tyne is much greater than at natural colonies. However, some 400 to 600 nests each year at the Tyne are likely to hold pairs that have a high probability of choosing to move to a different nest site to try to achieve higher breeding success. This number can be expected to increase as the colony grows further, even if the

percentage of failed nests does not increase. In practice, it also seems likely that the percentage of failed nests will be likely to increase if the colony starts to approach environmental carrying capacity. **Table 3** shows numbers of kittiwake nests at artificial sites within 2km of the Saltmeadows tower that failed to produce any chicks (no data are available for 2020).

Table 3: Number of kittiwakes nests at artificial sites within 2km of the existing Saltmeadows kittiwake tower that failed to produce chicks in the years 2016-2022 (excluding 2020 in which no data are available)

Site	Number of nests that failed to produce any chicks each year at sites within 2 km of Saltmeadows tower					
	2016	2017	2018	2019	2021	2022
High level bridge	No nest	1	1	1	6	6
St Mary's	No nest	No nest	No nest	1	1	2
Tyne Bridge	197	199	274	189	176	263
Newcastle quayside	18	14	18	22	36	56
Dean Street bridge	6	11	24	15	16	22
Baltic quayside	No nest	No nest	No nest	No nest	1	1
Baltic Art Centre	16	15	36	21	16	37
Total number	237	240	353	249	252	387

19. It can therefore be concluded from the data reviewed above that around 600 pairs of kittiwakes will be looking for a new nest site on the Tyne each year (about 200 new pairs recruiting into the population each year and probably about 400 pairs that have decided to abandon an unsuccessful nest site to move to an alternative site). The number could be larger than this estimate if 250 new pairs join and the breeding success of the population is less than average such that perhaps 600 pairs might seek to move to a better nest site if they can find one. Even if birds only moved to sites within 2 km of their failed attempt, about 200 to 400 pairs would potentially be seeking better nest sites within that limited area each year.

7 Capacity of New and Modified Structures in the Context of Population Trend

20. The provision of new structures as offshore wind farm compensation measures at the Tyne represents only a relatively small number of potential new high quality nest sites in this context. The new tower proposed by RWE might possibly hold about 200 nests.¹ The enhancement of the Saltmeadows tower proposed by the Applicant

¹ At present there is a lack of information with respect to the number of nests that the RWE structure would provide however it is understood that the structure is based on the pilot tower being developed by Shoney Wind. It is understood that this tower is intending to deliver approximately 160 nests which is provided as a mid-range figure that the tower can realistically support. Therefore, an assumption of up to 200 nests is considered to be an appropriate number of nests to consider within the context of the SEP and DEP proposals.

is intended to provide at least 100 high quality nest sites that will be occupied (i.e. will be AONs) based on the new faces being designed to match the existing successful faces, and potentially about 150 high quality nest sites if the new faces can be designed to have greater capacity than the existing faces. This additional high quality nest site provision is less than the number of new sites that can be expected to be taken up in any one year over the next few years by immature individuals recruiting into this population. The planned compensation measure from SEP and DEP will increase breeding success which will be achieved by birds that move from failing sites onto the new high quality nest sites, whilst the RWE tower will provide new additional nest sites. However, both will not be enough to provide high quality nest sites for all the birds that can be expected to seek new nest sites in this expanding population even in a single year.

21. It is important to note that none of the consented offshore wind projects requiring compensation are developing ANS proposals on the Tyne, whereas Lowestoft, the Suffolk coast and Hartlepool are scheduled to see substantial provision in the future.
22. Although the evidence indicates a continuing increase in kittiwake breeding numbers at the Tyne, the Applicant's plan to provide high quality nest sites would still be effective if the population was not increasing. The large number of birds at sites on the Tyne that have zero breeding success provides a large potential to increase productivity of the population by permitting these birds to relocate onto high quality nest sites where they can achieve high breeding success.

7.1 Estimating the Scale of Compensation Available from a Modified Saltmeadows tower

23. SEP and DEP is required to compensate for 17.0 adult kittiwakes per year based on the most recent upper 95% confidence interval (CI) estimates of collision risk (mean = 6.4) (see the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036]). That number of adults is equivalent to the production of twice as many (i.e. 34) fledglings four years earlier since approximately 50% of fledglings survive to recruit as breeding adults (based on demographic parameter values recommended by Horswill and Robinson 2015).
24. The predicted contribution of SEP and DEP to the in-combination adverse effect on the Flamborough and Filey Coast SPA kittiwake feature is comparatively small – a predicted central value of 6.4 adult collisions per annum. This is relatively low compared to the equivalent central values of some other recent projects (e.g. Hornsea Three, 65 – 73; Norfolk Vanguard, 21; Hornsea Four, 71). This indicates that the compensation will only need to produce a modest number of additional recruits into the national site network.
25. The Applicant notes the Natural England Relevant Representation position that the number of kittiwakes required to be compensated for should be based on those that will recruit into the national site network rather than into the biogeographic population. Approximately half of those extra fledglings can be anticipated to recruit into colonies in the national site network for breeding kittiwake (The Joint Nature Conservation Committee (JNCC) 3rd review of the SPA network estimated that in the early 2010s approximately 57% of the UK breeding kittiwakes breed in SPAs

where kittiwake is a breeding feature; Stroud et al. 2016). This percentage would be higher if only considering England rather than the whole UK, because FFC SPA holds such a high proportion of all the kittiwakes breeding in England, so using the UK total is precautionary. It is known that kittiwakes mostly recruit into colonies other than that in which they were born (Coulson 2011) and that recruits may come from natal colonies up to 1,600 km away, though few move that far (Coulson 2011). Approximately four kittiwakes need to fledge from the compensation structure to replace an adult into the SPA network (50% of fledglings survive to recruit as breeding adults, 50% of which will recruit into the SPA network). Compensation into the SPA network should therefore aim to produce four times as many fledglings (i.e. 68) as the number of adults to be compensated.

26. The south face of Saltmeadows tower consistently attracts far smaller numbers of kittiwakes and achieves much lower productivity. The Applicant is grateful to the Gateshead Council Ecologist, Peter Shield, for making available data on kittiwake numbers on each face of the Saltmeadows tower. These data are unpublished and were collected by Northumbria Ringing Group (NRG) for Gateshead Council. NRG visit the tower once per year, in early July, to count and ring kittiwake chicks. They do not monitor numbers of pairs nesting on the tower (which would require visits earlier in the season to count Apparently Occupied Nests, as mandated by JNCC seabird monitoring guidance). No ringing of chicks occurred in 2013, 2014 or 2015. Numbers of kittiwake chicks on each face of the tower each year 2016 to 2022 are given in the following table.

Table 4: Numbers of kittiwake chicks on each face of the Saltmeadows kittiwake tower from 2016-2022

Year	Kittiwake chicks on West face	Kittiwake chicks on East face	Kittiwake chicks on South face
2016	28	30	9
2017	41	39	10
2018	48	31	0
2019	43	41	4
2020	40	19	1
2021	92	65	14
2022	74	62	5
TOTALS	366	287	43

27. Production is lower on the South face in every year, so the pattern is consistent although somewhat variable from year to year. Over these seven years the South face has produced only 12% as many chicks as the West face and 15% as many as the East face. This is the reason for suggesting replacing the existing South face by two new faces oriented Northwards.
28. Over the past 20 years it has produced more than 50% fewer fledglings than each of the other two faces. In 2021 the south face produced 14 chicks, whereas the other two faces produced an average of 77 chicks each. Therefore, removing the south face and adding one additional north face should increase output by about 63

chicks. The Applicant's plan to replace the south face with two faces, both oriented northwards, is anticipated to increase output by about 140 chicks per year (an average of 77 chicks per face on each of the two new faces minus the 14 no longer produced on the removed south face). That is the more relevant metric the Applicant recommends for consideration in terms of the gain to be achieved by replacing failing nesting habitat with high quality nesting habitat.

29. About 50% of fledglings are expected to survive to recruit as breeding adults based on the best available demographic data for UK kittiwake (Horswill and Robinson 2015), so the increase of about 140 chicks represents increased recruitment of about 70 adults per year, slightly over 35 of which could be expected to breed in SPA colonies.
30. Productivity of kittiwakes nesting on each of the three faces of the Saltmeadows tower has been monitored in detail almost every year since it was constructed in 1998, and continued monitoring will demonstrate the increase in output of young from this structure after modification to create four northwards-facing faces, so will provide robust evidence of the effectiveness of this compensation.

7.2 Assessing Confidence in the Level Of Compensation

31. The details provided above in **Section 7.1** suggest that the proposed enhancement of the Saltmeadows nesting tower will provide sufficient numbers of recruits to compensate for the predicted collision mortality of adult kittiwake from the Flamborough and Filey Coast SPA as a result of SEP and DEP. The upper 95% CI for the predicted collision mortality due to SEP and DEP is 17.0 adult kittiwakes per annum from the SPA (with the mean value being 6.4). On the basis of the 2021 breeding success data for the Saltmeadows tower, it is estimated that the compensatory measure would provide an additional 140 chicks per year. Given that the average age of first breeding in kittiwake is 4 years (Coulson 2011), that 79% of fledglings are estimated to survive to the end of their first year and that annual survival rates for older birds are estimated as 85.4% (Horswill and Robinson 2015), then the production of 140 chicks is estimated to result in 70 adult birds which are available to recruit into breeding populations. Of these, it is expected that at least 50% (i.e. 35) would recruit into SPA colony populations.
32. The recruitment of an additional 35 adult birds into populations within the national site network means that the compensation would be provided at a ratio 2:1 when related to the upper 95% CI estimate of the collision mortality, and at more than 5:1 when related to the mean estimate of the collision mortality. This suggests that the proposed enhancement of the Saltmeadows tower will deliver compensation at a level which substantially exceeds the predicted collision mortality.
33. The extent to which this level of compensation is realised could be affected by several factors, notably the time taken for the enhanced nest sites to be colonised by kittiwakes, the colonisation rate, the 'final' number of new nesting pairs and the levels of breeding productivity. Consideration is given to each of these different aspects below and, where relevant, the effect on the level of compensation that would be achieved by varying the assumptions.

34. As noted in the **Kittiwake Compensation Document** [APP-072], based on the current project programme, the Applicant intends to implement the measures as soon as possible, but at least three breeding seasons prior to first power. Subject to obtaining the necessary permissions, it is considered highly likely that measures could be implemented sooner than this, noting the relative simplicity of the measures in design and implementation. An update on recent progress and the delivery programme is provided in the **HRA Derogation and Compensatory Measures Update (Revision B)** [document reference 3.1]. It is therefore anticipated, although not certain, that the works required to enhance the nesting structures on the tower will be completed four years ahead of the onset of operation for SEP and DEP, and that these would be maintained to provide suitable nest sites for kittiwakes for the duration of the operational period of SEP and DEP. This would mean that the additional adult birds are available to recruit into breeding populations by the time any collision mortality associated with SEP and DEP occurs, and that this production of additional potential recruits continues for the full period over which there could be collision mortality due to SEP and DEP.
35. As detailed above, the experience from relocating artificial nest sites on the River Tyne, combined with the extent to which birds are known to occupy unsuitable nest sites within 2km of the Saltmeadows tower, strongly suggests that colonisation of the enhanced nest-sites will occur in the first breeding season following completion of the required modifications. Also, in view of the fact that substantial numbers of kittiwakes already nest on the structure, it seems inconceivable that other breeding pairs will not also actively prospect for suitable nest sites on the structure and subsequently occupy any that are available. The same evidence-base also suggests that the colonisation rate would be high, and it is considered highly likely that the two new faces on the tower would hold close to, or more than, 100 nesting pairs within a few breeding seasons of becoming available.
36. In the unlikely event of colonisation taking longer than expected, a mortality debt could accrue. If this occurred, the two new faces of the tower could be maintained beyond the operational period of SEP and DEP and for a sufficient number of years to balance the accrued collision mortality debt. A slow rate of colonisation would have a similar effect and would be addressed in the same way. However, if throughout the operational phase of SEP and DEP, the scale of compensation being provided increased to a level sufficient to offset any mortality debt accrued in the early years, then this extended period of maintenance would not be required.
37. If fewer pairs ultimately end up nesting on the new faces of the tower or if the average breeding success from these nests is lower than in 2021, this will reduce the additional number of chicks produced. The available data on the number of chicks produced from the existing northwest and northeast faces of the tower can be used to investigate the effects of assuming lower levels of chick production (irrespective of whether these are due to fewer nesting pairs or lower breeding success per nest).
38. The data in **Table 4** show that the number of chicks produced from the existing northwest and northeast faces of the tower was greater in 2021 than in other years between 2016 and 2022. Using the data for 2016 to 2022, the average number of chicks produced per year is 52.2, 40.7 and 6.1 for the northwest, northeast and

south faces, respectively. If it is assumed that these levels of chick production are likely to be representative of the levels that would be achieved on the two new faces of the tower (as opposed to basing this upon the 2021 data), this would suggest that the enhancement of the nest sites would provide an additional 87 chicks per year (i.e. 93 minus the six that would have been produced on the south face). This, in turn, would be estimated to lead to an additional 43 adult birds that would be available to recruit into breeding populations, of which 22 would be expected to recruit into SPA colony populations. Recruitment into the national site network at this level means that the compensation would be provided at a ratio of approximately 1.3:1 when related to the upper 95% CI estimate of the collision mortality, and of more than 3:1 when related to the mean estimate of the collision mortality.

39. Based upon **Table 4**, whilst the data from 2016 may be taken to represent the worst-case scenario for any one year, the overall breeding success for the Tyne colonies was relatively low in 2016 (with lower breeding success being recorded in only eight other years between 1991 and 2021 - **Plate 6**). As such, the 2016 data on the numbers of chicks produced at the Saltmeadows tower is not representative of the average productivity over a longer period and therefore cannot be considered as a reasonable worst-case scenario.
40. Finally, in relation to the need to ensure delivery of compensation on a sufficient scale, a programme of monitoring and adaptive management is proposed as set out in the **Outline Compensation Implementation and Monitoring Plan (CIMP)** [APP-073], and this provides the appropriate mechanism for identifying and responding to any shortfall in the delivery of the compensation (which based on the evidence and calculations set out above is considered highly unlikely). Any requirement to increase the scale of compensation (as well as steps to reduce it again once any deficit has been reduced to zero, in the event of the accrual of a mortality debt) will be confirmed through the suggested programme of monitoring and adaptive management as agreed with the Kittiwake Compensation Steering Group (KCSG).

8 Conclusion

41. Based on the evidence of Tyne kittiwake productivity detailed in **Section 6**, the required levels of compensation and anticipated productivity benefit detailed in **Section 7** (and summarised in **Table 5**), it has been demonstrated that the productivity benefits afforded by SEP and DEP's Saltmeadows kittiwake tower modification proposal are sufficient to offset the predicted effects of the Projects. In addition, it has been evidenced that RWE's proposal does not represent a barrier to this being achieved.

Table 5: Summary of SEP and DEP kittiwake mortality estimates apportioned to the FFC SPA, compensation requirements and anticipated quantification of productivity benefit

SEP and DEP Kittiwake Mortality Estimates Apportioned to FFC SPA	Compensation Requirement	Anticipated Quantification of Productivity Benefit (based on 2021 data)	Anticipated Quantification of Productivity Benefit (based on mean of 2016-2022 data)
<p>Mean precautionary estimate based on latest estimate of avoidance = 6.4 adults per year.</p> <p>Upper 95% confidence limit of the precautionary estimate = 17.0 adults per year.</p>	<p>17.0 adults per year = an additional 34 fledglings produced per year.</p> <p>Assuming that half of these fledglings join the national site network and half join the rest of the biogeographical population in colonies outside the national site network would require compensation to provide an extra 68 fledglings per year rather than 34 if compensation is to the SPA suite alone and not simply to the biogeographical population.</p>	<p>Approximately 140 extra chicks per year on the two new faces of the Saltmeadows tower = -70 adults per year = >35 recruited into SPA colonies (based on demographic parameter values recommended by Horswill and Robinson 2015).</p>	<p>Approximately 87 extra chicks per year on the two new faces of the Saltmeadows tower = 43 adults per year = >22 recruited into SPA colonies (based on demographic parameter values recommended by Horswill and Robinson 2015).</p>

42. Finally, it should be noted that the principles of the Applicant’s compensation proposals described within this note in the context of the Saltmeadows tower, Gateshead and the Tyne, are also applicable to the Applicant’s proposal for nest site improvements at Lowestoft.

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