

# MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS

## Annex 3.9 to the Applicant's response to the Relevant Representation by Natural England (RR-026.B.36)

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Image of an offshore wind farm

**MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS**

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**Prepared by:**

**RPS**

**Prepared for:**

**Morgan Offshore Wind Limited.**

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### Glossary

Term	Meaning
Applicant	Morgan Offshore Wind Limited.
Biologically Defined Minimum Population Scales	Seasonal subdivision of bird population size. The rationale behind these subdivisions is that the likely origin of a bird in a particular location depends on the time of year.
Collision risk	Risk of a bird lethally colliding with a wind turbine within a wind farm.
Collision risk model	A model that calculates collision risk for a species within a wind farm based on a set of wind farm and bird species specific parameters. Collision risk models can be run deterministically or stochastically.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Morgan Array Area	The area within which the wind turbines, foundations, inter-array cables, interconnector cables, scour protection, cable protection and offshore substation platforms (OSPs) forming part of the Morgan Offshore Wind Project: Generation Assets will be located.
Morgan Offshore Wind Project: Generation Assets	This is the name given to the Morgan Generation Assets project as a whole (includes all infrastructure and activities associated with the project construction, operations and maintenance, and decommissioning).
Parameter	Parameters are the input elements of a model that together affect the output of a model. In collision risk models, examples of parameters are the number of wind turbines and the length of the bird.
The Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.

### Acronyms

Acronym	Description
BDMPS	Biologically Defined Minimum Population Scales
CRM	Collision Risk Modelling
EIA	Environmental Impact Assessment
EWG	Expert Working Group
ExA	Examining Authority
JNCC	Joint Nature Conservation Committee
NRW	Natural Resources Wales
PEIR	Preliminary Environmental Information Report
SNCB	Statutory Nature Conservation Body

### Units

Unit	Description
km	Kilometres

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<b>Unit</b>	<b>Description</b>
%	Percentage

# 1 REGIONAL BREEDING POPULATIONS

## 1.1 Introduction

1.1.1.1 This document has been prepared in response to Natural England’s Relevant Representation (Reference 026.B.36) addressed to the Applicant. The question is as follows:

### 1.1.1.2 **Table 1 Summary of Key Issues – Offshore Ornithology**

1.1.1.3 Analysis, Modelling and Reporting B12 [APP-053], 1.3.3.9

1.1.1.4 Calculation of the total regional breeding population - Despite engagement on this issue through the EWG including the provision of detailed SNCB advice (Annex 3), the Applicant has persisted with calculating regional populations using a method that the SNCBs do not agree with.

1.1.1.5 We note and agree that, excepting Manx shearwater and gannet, the Applicants preferred regional populations are smaller, and therefore could be considered “more precautionary” in terms of impact assessment against them. Natural England highlight that throughout the submitted documents the Applicant frequently criticises or characterises specific aspects of SNCB advice or best practice guidance as being too precautionary, often proposing an alternative approach. Thus, it is somewhat confusing that SNCB guidance which would result in reductions to project alone impacts is not adopted.

1.1.1.6 Furthermore, we would highlight the value in considering SNCB advice holistically and urge caution in specific critiques of elements of that guidance considered in isolation (e.g. see NE Ref: B23, B32 relating to the Applicant’s review of flight speed parameters in CRM).

1.1.1.7 Critically, we note the fundamental problem with the projects definition of regional populations being incompatible with cumulative assessments, in which case the SNCB method is adopted. Thus, impacts are being assessed against two different regional populations for no apparent benefit.

### 1.1.1.8 **Natural England’s Recommendations to Resolve Issues.**

1.1.1.9 While we accept that the project conclusions will be unchanged, Natural England continue to advise that it would be preferable for the SNCB method (supplied as written advice to the EWG) to be adopted. This ensures consistency with other projects, as well as within the project for the alone and cumulative assessments.

1.1.1.10 We welcome consideration of the SNCB advised regional population figures for Manx shearwater and gannet in the project alone assessments, and for all species in the cumulative assessment.



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**1.1.2 Background**

- 1.1.2.1 During the pre-application consultation process undertaken through both the Evidence Plan Process and the consultation process for the Preliminary Environmental Information Report (PEIR), the Statutory Nature Conservation Bodies (SNCBs) highlighted that they did not agree with the methodology used to calculate regional populations in the breeding season used to assess impacts in Volume 2, Chapter 5: Offshore ornithology (APP-023) (please see details provided in E4 - Technical engagement plan (APP-094) and E4.4 - Technical engagement plan appendices Part 4 (Appendix D) (APP-092)).
- 1.1.2.2 Natural Resources Wales (NRW) alongside Natural England and the Joint Nature Conservation Committee (JNCC) provided an advice note to the Applicant. The Applicant applied the proposed approach as part of the cumulative assessments undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) but did not consider the approach to be appropriately precautionary or ecologically representative of the regional populations that could interact with the Morgan Generation Assets during the breeding season. This issue has no impact on the assessments provided as part of the Morgan Generation Assets HRA process which utilises populations for individual colonies within assessments.
- 1.1.2.3 Due to these concerns, the Applicant therefore applied their methodology for the assessment of the project alone (the approach typically used for offshore wind farm assessments) within Volume 2, Chapter 5: Offshore ornithology (APP-023).

**1.1.3 Derivation of regional breeding populations**

- 1.1.3.1 The regional populations calculated by the Applicant incorporate breeding adults associated with the breeding colonies for which the Morgan Generation Assets are within foraging range, and immature birds. The population of immature birds for each species is calculated utilising the adult:immature ratios representing a stable population as calculated in Furness (2015). These two components of the populations are then summed to provide a total regional population during the breeding season. An example of this approach is provided in Table 1.1 with a full description provided in Volume 4, Annex 5.1: Offshore ornithology baseline characterisation (APP-053).

**Table 1.1: Calculation of the regional breeding population for gannet when applying the Applicant’s approach.**

Population component	Source	Calculation steps	Population (no. of birds)
Breeding adults	All breeding adult birds within the mean-maximum foraging range of gannet (Woodward <i>et al.</i> , 2019). Populations sourced from the Seabird Monitoring Programme database (JNCC <i>et al.</i> , 2024).	179,996 * 2 (breeding pairs * 2)	359,992
Immature birds	Furness (2015) states there are 0.81 immatures per adult	0.81 * 359,992	291,594
<b>Total</b>			<b>651,586</b>



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1.1.3.2 The approach applied by the Applicant applies the method to calculating regional breeding populations that has been used within the assessments for previous offshore wind farm applications, summing all breeding populations for a given species that are located within the relevant foraging range of the species from the project in question. Until recently, this population comprised breeding adult birds only however, more recent assessments have also attempted to incorporate immature birds, a proportion of which will be present in UK waters during the breeding season. This ensures that the regional populations calculated for the breeding season are comparable in composition to those used for assessing impacts in non-breeding seasons.

1.1.3.3 For the Expert Working Group (EWG) approach, the NRW advice note stated: “... we advise that regional baseline population sizes for the breeding period can be derived from the relevant BDMPS tables in Appendix A of Furness (2015) by summing the adult and immature population estimates for all colonies that sit within a given regional scale”. Included in the advice note was a worked example for gannet, which is copied in Table 1.2 (E4.4 - Technical engagement plan appendices Part 4 (Appendix D) (APP-092)).

**Table 1.2: Worked example for calculation for gannet ‘UK western waters’ breeding season reference population calculation (all information taken from Tables 15 and 17 of Furness (2015)).**

Population	Most recent count	Breeding adults	Immatures	Total
Sule Skerry and Sule Stack	2004	9,350	7,574	16,924
North Rona and Sula Sgeir	2004	18,450	14,944	33,394
St Kilda	2004	119,244	96,588	215,832
Ailsa Craig	2004	54,260	43,951	98,211
Grassholm	2009	78,584	63,653	142,237
UK western non-Special Protection Area (SPA) colonies	2004	9,000	7,290	16,290
<b>TOTAL</b>		<b>288,888</b>	<b>234,000</b>	<b>522,888</b>

1.1.3.4 The main difference between the populations calculated by the Applicant and the EWG is the area from which the populations of breeding adult birds are totalled. For the Applicant’s approach, this area is represented by the foraging range of the species in question, whereas for the EWG’s approach, it is represented by the Biologically Defined Minimum Population Scales (BDMPS) area defined in Furness (2015). The BDMPS areas in Furness (2015) were defined for non-breeding seasons and reflect the areas within which breeding adult birds may occur in relevant non-breeding seasons and not the areas in which breeding birds from individual colonies will occur during the breeding season.

1.1.3.5 The Applicant has applied the EWG’s recommended approach in the cumulative assessment where the zone of influence of all cumulative projects is much larger and the reference population must therefore also be larger to account for the total population of birds that may interact with all cumulative projects. However, for the

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project alone assessment where the impact arises from the project alone, the population of birds that may be affected by the project is much smaller due to birds being constrained due to the necessity to provision young during this period. Whilst it could be argued that this impact should also be considered against the breeding season metapopulation for a species, where the metapopulation is significantly larger than the reference population affected by an individual project, this risks large impacts being identified as insignificant when in fact impacts are significant for individual colonies for which the project is within foraging range. For example, if a project were located adjacent to a seabird breeding colony, a large collision risk estimate could be predicted. This collision risk estimate could represent a significant proportion of the adjacent breeding colony. However, if there are a further 20 breeding colonies in the metapopulation, applying the EWG recommended approach to estimating regional populations it is assumed that the project affects all 20 populations thus diluting the impact and suggesting that the impact is not as significant as would be suggested by using a regional population comprising only birds for which the project is within foraging range.

- 1.1.3.6 The calculation of the immature bird population in both the Applicant's and EWG's approaches follows the same calculation principle, multiplying the associated breeding adult population by the adult:immature ratio as derived by Furness (2015). However, as the area used to define the breeding adult population differs between the two approaches, the resulting immature population is also different. The EWG's approach also assumes that all immature birds associated with a breeding colony will be present in UK waters during the breeding season, however, it is known that a proportion of each immature age class remains in wintering areas during the breeding season with this proportion reducing as age increases (e.g. Coulson 2011; Wernham *et al.*, 2002).
- 1.1.3.7 There is agreement between the Applicant and EWG on the methodology underpinning the calculation of regional populations for all species outside of the breeding season.

## 2 REGIONAL POPULATION COMPARISON

2.1.1.1 Table 2.1 presents the regional populations calculated by the Applicant and the EWG.

**Table 2.1: Breeding season regional populations for all species included in the Morgan Generation Assets EIA calculated by the Applicant and the EWG.**

Species	Regional populations (no. of birds)	
	Applicant	EWG
Kittiwake	130,017	245,234
Great black-backed gull	999	44,753
Herring gull	24,286	217,167
Lesser black-backed gull	87,807	240,750
Guillemot	76,129	1,145,528
Razorbill	7,891	198,969
Fulmar	231,423	Not provided
Manx shearwater	2,230,698	1,821,544
Gannet	651,586	522,888

2.1.1.2 For the majority of species, the regional populations calculated by the Applicant are lower than those calculated by the EWG. This means that when comparing predicted impacts in the breeding season to the regional population, the assessment conducted by the Applicant in Volume 2, Chapter 5: Offshore ornithology (APP-023) will predict a higher magnitude of impact than if the impact were compared to the regional population calculated by the EWG. These species are therefore discounted from further consideration within this note. The implications for the assessments presented for the Morgan Generation Assets alone for Manx shearwater and gannet are provided in section 3.

### 3 ASSESSMENT

3.1.1.1 The implications for the assessments presented for the Morgan Generation Assets alone for Manx shearwater and gannet are provided in the following sections. These are the only two species for which the EWG’s approach to calculating regional populations for the breeding season provides a lower value which may increase the predicted magnitude of effects. The populations for these species have been taken from the EWG advice note provided to the Applicant as part of EWG meeting 5 (30 June 2023) (see E4.4 - Technical engagement plan appendices Part 4 (Appendix D) (APP-092)).

### 3.2 Manx shearwater

#### 3.2.1 Disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure

##### Construction phase

3.2.1.1 The estimated mortality (when considering a displacement rate range of 15% to 35% and a mortality rate range of 1% to 10%) resulting from displacement during construction was assessed for each season and on an annual basis by combining seasonal impacts and comparing them against the largest regional seasonal population (Table 3.1).

3.2.1.2 In all seasons and on an annual basis, even when using the upper displacement and mortality rates in the ranges recommended by JNCC *et al.*, (2022), the predicted increase in the baseline mortality rate does not surpass the 1% threshold.

3.2.1.3 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

**Table 3.1: Manx shearwater seasonal and annual displacement estimates for the Morgan Array Area plus 2 km buffer during construction.**

Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population		Number of Manx shearwater subject to mortality (indiv.)	Increase in baseline mortality (%)
		Population	Baseline mortality		
Pre-breeding	0	1,580,895	205,516	0	0.00
Breeding	1,254	1,821,544	236,801	2 to 44	<0.01 to 0.02
Post-breeding	911	1,580,895	205,516	1 to 32	<0.01 to 0.02
Annual	-	1,821,544	236,801	3 to 76	<0.01 to 0.03

3.2.1.4 The assessment presented in Volume 2, Chapter 5: Offshore ornithology (APP-023) identified Manx shearwater as a receptor with a medium sensitivity to impacts associated with disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure. A negligible impact magnitude and a medium sensitivity leads to a conclusion of negligible significance of effect, which is not significant in EIA terms. This conclusion is consistent with the conclusion reached for Manx shearwater in relation to impacts from disturbance and displacement from

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airborne noise, underwater sound, and presence of vessels and infrastructure during the construction phase reached in Volume 2, Chapter 5: Offshore ornithology (APP-023).

3.2.1.5 For comparison, the assessment undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) is presented in Table 3.2. The increase in baseline mortality predicted in Volume 2, Chapter 5: Offshore ornithology (APP-023) is essentially the same as predicted in Table 3.1.

**Table 3.2: Increase in baseline mortality associated with construction phase displacement impacts on Manx shearwater as assessed in Volume 2, Chapter 5: Offshore ornithology (APP-023).**

Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population		Number of Manx shearwater subject to mortality (indiv.)	Increase in baseline mortality (%)
		Population	Baseline mortality		
Pre-breeding	0	1,580,895	205,516	0	0.00
Breeding	1,254	2,230,698	289,991	2 to 44	<0.01 to 0.02
Post-breeding	911	1,580,895	205,516	1 to 32	<0.01 to 0.02
Annual	-	2,230,698	289,991	3 to 76	<0.01 to 0.03

**Operations and maintenance phase**

3.2.1.6 The estimated mortality (when considering a displacement rate of 30% to 70% and a mortality rate of 1% to 10%) resulting from displacement during the operations and maintenance phase was assessed for each season and for the combined seasons (Table 3.3) as detailed in Volume 4, Annex 5.2: Offshore ornithology displacement technical report (APP-054).

3.2.1.7 In all three seasons and on an annual basis, the predicted increase in baseline mortalities does not surpass the 1% threshold.

3.2.1.8 The impact is predicted to be of local spatial extent, medium term duration, continuous and reversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

**Table 3.3: Manx shearwater seasonal and annual displacement estimates for the Morgan Array Area plus 2 km buffer during operation.**

Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population		Number of Manx shearwater subject to mortality (indiv.)	Increase in baseline mortality (%)
		Population	Baseline mortality		
Pre-breeding	0	1,580,895	205,516	0	0.00
Breeding	1,254	1,821,544	236,801	4 to 88	<0.01 to 0.04
Post-breeding	911	1,580,895	205,516	3 to 64	<0.01 to 0.03
Annual	-	1,821,544	236,801	6 to 152	<0.03 to 0.06

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- 3.2.1.9 The assessment presented in Volume 2, Chapter 5: Offshore ornithology (APP-023) identified Manx shearwater as a receptor with a medium sensitivity to impacts associated with disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure. A negligible impact magnitude and a medium sensitivity leads to a conclusion of negligible significance of effect, which is not significant in EIA terms. This conclusion is consistent with the conclusion reached for Manx shearwater in relation to impacts from disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure during the operations and maintenance phase reached in Volume 2, Chapter 5: Offshore ornithology (APP-023).
- 3.2.1.10 For comparison, the assessment undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) is presented in Table 3.4. The increase in baseline mortality predicted in Volume 2, Chapter 5: Offshore ornithology (APP-023) is slightly lower than that predicted in Table 3.3 but this difference is immaterial in assessment terms.

**Table 3.4: Increase in baseline mortality associated with operations and maintenance phase displacement impacts on Manx shearwater as assessed in Volume 2, Chapter 5: Offshore ornithology (APP-023).**

Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population		Number of Manx shearwater subject to mortality (indiv.)	Increase in baseline mortality (%)
		Population	Baseline mortality		
Pre-breeding	0	1,580,895	205,516	0	0.00
Breeding	1,254	2,230,698	289,991	4 to 88	<0.01 to 0.03
Post-breeding	911	1,580,895	205,516	3 to 64	<0.01 to 0.03
Annual	-	2,230,698	289,991	6 to 152	<0.01 to 0.05

**3.2.2 Collision risk**

**Operations and maintenance phase**

- 3.2.2.1 In all three seasons (pre-breeding, breeding and post-breeding) and on an annual basis the estimated increase in baseline mortality remains well below the 1% increase threshold.
- 3.2.2.2 The total collision risk impact is predicted to be of local spatial extent, medium to long term duration, continuous and reversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

**Table 3.5: Assessment of predicted collision risk estimates for Manx shearwater on seasonal and annual bases against the baseline mortality of relevant regional populations.**

Season	Regional baseline population	Baseline mortality	Collision mortality (number of birds)	Increase in baseline mortality (%)
Pre-breeding	1,580,895	205,516	0	0.00
Breeding	1,821,544	236,801	<0.01	<0.01
Post-breeding	1,580,895	205,516	<0.01	<0.01



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Season	Regional baseline population	Baseline mortality	Collision mortality (number of birds)	Increase in baseline mortality (%)
Annual	1,821,544	236,801	<0.01	<0.01

3.2.2.3 The assessment presented in Volume 2, Chapter 5: Offshore ornithology (APP-023) identified Manx shearwater as a receptor with a medium sensitivity to collision risk impacts. A negligible impact magnitude and a medium sensitivity leads to a conclusion of negligible significance of effect, which is not significant in EIA terms. This conclusion is consistent with the conclusion reached for Manx shearwater in relation to collision risk impacts during the operations and maintenance phase reached in Volume 2, Chapter 5: Offshore ornithology (APP-023).

3.2.2.4 For comparison, the assessment undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) is presented in Table 3.6. The increase in baseline mortality predicted in Volume 2, Chapter 5: Offshore ornithology (APP-023) is essentially the same as predicted in Table 3.5.

**Table 3.6: Increase in baseline mortality associated with collision impacts on Manx shearwater as assessed in Volume 2, Chapter 5: Offshore ornithology (APP-023).**

Season	Regional baseline population	Baseline mortality	Collision mortality (number of birds)	Increase in baseline mortality (%)
Pre-breeding	1,580,895	205,516	0	0.00
Breeding	2,230,698	289,991	<0.01	<0.01
Post-breeding	1,580,895	205,516	<0.01	<0.01
Annual	2,230,698	289,991	<0.01	<0.01

### 3.3 Gannet

#### 3.3.1 Disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure

##### Construction phase

3.3.1.1 The estimated mortality (when considering a displacement rate range of 30% to 40% and a mortality rate range of 1% to 10%) resulting from displacement during construction was assessed for each season and on an annual basis by combining seasonal impacts and comparing them against the largest regional seasonal population (Table 3.7).

3.3.1.2 In all seasons and on an annual basis, even when using the upper displacement and mortality rates in the ranges recommended by JNCC *et al.*, (2022), the predicted increase in the baseline mortality rate does not surpass the 1% threshold.

3.3.1.3 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

**Table 3.7: Gannet seasonal and annual displacement estimates for the Morgan Array Area plus 2 km buffer during construction.**



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Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population		Number of gannet subject to mortality (indiv.)	Increase in baseline mortality (%)
		Population	Baseline mortality		
Pre-breeding	35	661,888	127,577	0 to 1	<0.01 to <0.01
Breeding	154	522,888	100,785	0 to 6	<0.01 to 0.01
Post-breeding	65	545,954	105,231	0 to 3	<0.01 to <0.01
Annual	-	661,888	127,577	1 to 10	<0.01 to 0.01

3.3.1.4 The assessment presented in Volume 2, Chapter 5: Offshore ornithology (APP-023) identified gannet as a receptor with a medium sensitivity to impacts associated with disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure. A negligible impact magnitude and a medium sensitivity leads to a conclusion of negligible significance of effect, which is not significant in EIA terms. This conclusion is consistent with the conclusion reached for gannet in relation to impacts from disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure during the construction phase reached in Volume 2, Chapter 5: Offshore ornithology (APP-023).

3.3.1.5 For comparison, the assessment undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) is presented in Table 3.8. The increase in baseline mortality predicted in Volume 2, Chapter 5: Offshore ornithology (APP-023) is slightly lower than that predicted in Table 3.7 but this difference is immaterial in assessment terms.

**Table 3.8: Increase in baseline mortality associated with collision impacts on gannet as assessed in Volume 2, Chapter 5: Offshore ornithology (APP-023).**

Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population		Number of gannet subject to mortality (indiv.)	Increase in baseline mortality (%)
		Population	Baseline mortality		
Pre-breeding	35	661,888	127,577	0 to 3	<0.01 to <0.01
Breeding	154	651,586	125,591	0 to 6	<0.01 to <0.01
Post-breeding	65	545,954	105,231	0 to 1	<0.01 to <0.01
Annual	-	661,888	127,577	1 to 10	<0.01 to 0.01

**Operations and maintenance phase**

3.3.1.6 The estimated mortality (when considering a displacement rate of 60% to 80% and a mortality rate of 1% to 10%) resulting from displacement during the operations and maintenance phase was assessed for each season and on an annual basis (Table 3.9).

3.3.1.7 In all three seasons and on an annual basis, the predicted increase in baseline mortalities remains well the below the 1% threshold.

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3.3.1.8 The impact is predicted to be of local spatial extent, medium term duration, continuous and reversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

**Table 3.9: Gannet seasonal and annual displacement estimates for the Morgan Array Area plus 2 km buffer during operation.**

Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population Population	Baseline mortality	Number of Gannet subject to mortality (indiv.)	Increase in baseline mortality (%)
Pre-breeding	35	661,888	127,577	0 to 3	<0.01 to <0.01
Breeding	154	522,888	100,785	1 to 12	<0.01 to 0.01
Post-breeding	65	545,954	105,231	0 to 5	<0.01 to <0.01
Annual	-	661,888	127,577	2 to 20	<0.01 to 0.02

3.3.1.9 The assessment presented in Volume 2, Chapter 5: Offshore ornithology (APP-023) identified gannet as a receptor with a medium sensitivity to impacts associated with disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure. A negligible impact magnitude and a medium sensitivity leads to a conclusion of negligible significance of effect, which is not significant in EIA terms. This conclusion is consistent with the conclusion reached for gannet in relation to impacts from disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure during the operations and maintenance phase reached in Volume 2, Chapter 5: Offshore ornithology (APP-023).

3.3.1.10 For comparison, the assessment undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) is presented in Table 3.10. The increase in baseline mortality predicted in Volume 2, Chapter 5: Offshore ornithology (APP-023) is essentially the same as predicted in Table 3.9.

**Table 3.10: Increase in baseline mortality associated with collision impacts on gannet as assessed in Volume 2, Chapter 5: Offshore ornithology (APP-023).**

Season	Seasonal Abundance (Morgan Array Area + 2 km buffer)	Regional baseline population Population	Baseline mortality	Number of gannet subject to mortality (indiv.)	Increase in baseline mortality (%)
Pre-breeding	35	661,888	127,577	0 to 3	<0.01 to <0.01
Breeding	154	651,586	125,756	1 to 12	<0.01 to 0.01
Post-breeding	65	545,954	105,369	0 to 5	<0.01 to <0.01
Annual	-	661,888	127,577	2 to 20	<0.01 to 0.02

### 3.3.2 Collision risk

#### Operations and maintenance phase

3.3.2.1 In all three seasons (pre-breeding, breeding and post-breeding) and on an annual basis the estimated increase in baseline mortality remains well below the 1% increase threshold.

3.3.2.2 The total collision risk impact is predicted to be of local spatial extent, medium to long term duration, continuous and reversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

**Table 3.11: Assessment of predicted collision risk estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations.**

Season	Regional baseline population	Baseline mortality	Collision mortality (number of birds)	Increase in baseline mortality (%)
Pre-breeding	661,888	127,577	<1 to <1	<0.01 to <0.01
Breeding	522,888	100,785	1 to 1	<0.01 to <0.01
Post-breeding	545,954	105,231	<1 to <1	<0.01 to <0.01
Annual	661,888	127,577	1 to 1	<0.01 to <0.01

3.3.2.3 The assessment presented in Volume 2, Chapter 5: Offshore ornithology (APP-023) identified gannet as a receptor with a high sensitivity to collision risk impacts. A negligible impact magnitude and a high sensitivity leads to a conclusion of minor adverse significance of effect, which is not significant in EIA terms. This conclusion is consistent with the conclusion reached for gannet in relation to collision risk impacts during the operations and maintenance phase reached in Volume 2, Chapter 5: Offshore ornithology (APP-023).

3.3.2.4 For comparison, the assessment undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) is presented in Table 3.11. The increase in baseline mortality predicted in Volume 2, Chapter 5: Offshore ornithology (APP-023) is essentially the same as predicted in Table 3.12.

**Table 3.12: Increase in baseline mortality associated with collision impacts on gannet as assessed in Volume 2, Chapter 5: Offshore ornithology (APP-023).**

Season	Regional baseline population	Baseline mortality	Collision mortality (number of birds)	Increase in baseline mortality (%)
Pre-breeding	661,888	127,577	<1 to <1	<0.01 to <0.01
Breeding	651,586	125,591	1 to 1	<0.01 to <0.01
Post-breeding	545,954	105,231	<1 to <1	<0.01 to <0.01
Annual	661,888	127,577	1 to 1	<0.01 to <0.01

### 3.3.3 Combined displacement and collision risk

#### Operations and maintenance phase

- 3.3.3.1 The combined estimated mortality (when considering a displacement rate of 30% to 70% and a mortality rate of 1% to 10%) and a range of collision risk estimates was assessed for each season and on an annual basis (Table 3.13).
- 3.3.3.2 In all three seasons and on an annual basis, the predicted increase in baseline mortality remains well below the 1% threshold.
- 3.3.3.3 The impact is predicted to be of local spatial extent, medium term duration, continuous and reversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

**Table 3.13: Combined displacement and collision impacts.**

Impact	Pre-breeding	Breeding	Post-breeding	Annual
Displacement (60 to 80% displacement and 1 to 10% mortality)	0 to 3	1 to 12	0 to 5	2 to 20
Collision risk	0 to 0	1 to 1	0 to 0	1 to 1
Combined estimate	0 to 3	2 to 14	1 to 5	4 to 42
Regional population	661,888	522,888	545,954	661,888
Regional population baseline mortality	127,577	100,785	105,231	127,577
<b>Increase in baseline mortality (%)</b>	<b>&lt;0.01 to &lt;0.01</b>	<b>&lt;0.01 to 0.01</b>	<b>&lt;0.01 to 0.01</b>	<b>&lt;0.01 to 0.03</b>

- 3.3.3.4 The assessment presented in Volume 2, Chapter 5: Offshore ornithology (APP-023) identified gannet as a receptor with an overall high sensitivity to combined displacement and collision impacts. A negligible impact magnitude and a high sensitivity leads to a conclusion of minor significance of effect, which is not significant in EIA terms. This conclusion is consistent with the conclusion reached for gannet in relation to collision risk impacts during the operations and maintenance phase reached in Volume 2, Chapter 5: Offshore ornithology (APP-023).
- 3.3.3.5 For comparison, the assessment undertaken in Volume 2, Chapter 5: Offshore ornithology (APP-023) is presented in Table 3.13. The increase in baseline mortality predicted in Volume 2, Chapter 5: Offshore ornithology (APP-023) is essentially the same as predicted in Table 3.14.

**Table 3.14: Increase in baseline mortality associated with combined displacement and collision impacts on gannet as assessed in Volume 2, Chapter 5: Offshore ornithology (APP-023).**

Impact	Pre-breeding	Breeding	Post-breeding	Annual
Displacement (60 to 80% displacement and 1 to 10% mortality)	0 to 3	1 to 12	0 to 5	2 to 20
Collision risk	0 to 0	1 to 1	0 to 0	1 to 1
Combined estimate	0 to 3	2 to 14	1 to 5	4 to 42

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<b>Impact</b>	<b>Pre-breeding</b>	<b>Breeding</b>	<b>Post-breeding</b>	<b>Annual</b>
Regional population baseline mortality	127,577	125,591	105,231	127,577
<b>Increase in baseline mortality (%)</b>	<b>&lt;0.01 to &lt;0.01</b>	<b>&lt;0.01 to 0.01</b>	<b>&lt;0.01 to 0.01</b>	<b>&lt;0.01 to 0.03</b>

## 4 CONCLUSION

4.1.1.1 A comparison of the assessment conclusions reached in Volume 2, Chapter 5: Offshore ornithology (APP-023) and this report when applying the regional breeding populations advocated by the Applicant and the EWG, respectively are presented in Table 4.1. The assessments presented result in the same assessment conclusions which are all not significant in EIA terms.

4.1.1.2 The Applicant considers that the regional reference populations calculated for the breeding season as used in Volume 2, Chapter 5: Offshore ornithology (APP-023) more accurately reflect the abundance and distribution of the relevant population cohorts present whilst remaining suitably precautionary.

**Table 4.1: Assessment conclusions reached in Volume 2, Chapter 5: Offshore ornithology (APP-023) and this report for Manx shearwater and gannet when applying different regional breeding populations.**

Species	Impact	Project phase	Assessment conclusion	
			Volume 2, Chapter 5: Offshore ornithology (APP-023)	This report
Manx shearwater	Disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure	Construction	Negligible	Negligible
		Operations and maintenance	Negligible	Negligible
	Collision risk	Operations and maintenance	Negligible	Negligible
Gannet	Disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure	Construction	Negligible	Negligible
		Operations and maintenance	Negligible	Negligible
	Collision risk	Operations and maintenance	Minor	Minor
	Combined displacement and collision	Operations and maintenance	Minor	Minor

## 5 REFERENCES

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