

MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 6, Annex 5.2: Offshore Ornithology Displacement Technical Report

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Image of an offshore wind farm

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Contents

1	OFFSHORE ORNITHOLOGY DISPLACEMENT TECHNICAL REPORT	1
1.1	Introduction	1
1.1.1	Background	1
1.1.2	Aim of report.....	2
1.2	Consultation	3
1.2.2	Evidence Plan process.....	3
1.3	Methodology	6
1.3.2	Screening species for displacement assessment	6
1.3.3	Seasonality	10
1.3.4	Buffers for displacement	10
1.3.5	Abundance estimates.....	13
1.3.6	Displacement parameters	16
1.4	Results	17
1.4.1	Common guillemot	17
1.4.2	Razorbill	19
1.4.3	Atlantic puffin	23
1.4.4	Northern gannet	25
1.4.5	Black-legged kittiwake.....	27
1.4.6	Manx shearwater.....	30
1.4.7	Red-throated diver.....	33
1.5	Summary Tables.....	36
1.6	References	42

Figures

Figure 1.1:	The Mona Offshore Ornithology Array Area study area, Mona Array Area plus associated buffers for displacement and the Mona Offshore Ornithology Offshore Cable Corridor	12
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Tables

Table 1.1:	Summary of key topics and issues raised during consultation activities undertaken for the Mona Offshore Wind Project relevant to offshore ornithology displacement technical report of the Environmental Statement.	4
Table 1.2:	Displacement screening based on species abundance within the Mona Array Area plus a 2km to 4km buffer during the site-specific surveys, displacement vulnerability, and connectivity to designated site.....	7
Table 1.3:	Seasonal definitions as the basis for assessment, from Furness (2015).	10
Table 1.4:	Mean peak abundances for use in the assessment for each season.	14
Table 1.5:	Displacement and mortality rates for use in the assessment during the operations and maintenance phase.	16
Table 1.6:	Displacement and mortality rates for use in the assessment during the construction and decommissioning phases.	17
Table 1.7:	Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).	18
Table 1.8:	Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).	18
Table 1.9:	Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).	19
Table 1.10:	Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase).	19
Table 1.11:	Mean predicted razorbill mortality for the Mona Array plus 2 km buffer during Spring migration (construction and decommissioning).	20

MONA OFFSHORE WIND PROJECT

Table 1.12: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).	20
Table 1.13: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).	20
Table 1.14: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).	21
Table 1.15: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).	21
Table 1.16: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).	22
Table 1.17: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).	22
Table 1.18: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase).	22
Table 1.19: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).	23
Table 1.20: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning). All entries are zero.	23
Table 1.21: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).	24
Table 1.22: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase). All entries are zero.	24
Table 1.23: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).	25
Table 1.24: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).	25
Table 1.25: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).	26
Table 1.26: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).	26
Table 1.27: Mean predicted northern gannet mortality for the Mona Array Area 2 km buffer during the breeding season (operations and maintenance phase).	27
Table 1.28: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).	27
Table 1.29: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).	28
Table 1.30: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).	28
Table 1.31: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).	28
Table 1.32: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).	29
Table 1.33: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).	29
Table 1.34: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).	30
Table 1.35: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Spring migration (construction and decommissioning).	30
Table 1.36: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).	31
Table 1.37: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Autumn migration (construction and decommissioning).	31
Table 1.38: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Spring migration (operations and maintenance phase).	32
Table 1.39: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).	32

MONA OFFSHORE WIND PROJECT

Table 1.40: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Autumn migration (operation and maintenance phase).	32
Table 1.41: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during the Spring migration (construction and decommissioning). All entries are zero.	33
Table 1.42: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during the Autumn migration (construction and decommissioning). All entries are zero.	33
Table 1.43: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during non-breeding season (construction and decommissioning). All entries are zero.	34
Table 1.44: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during Spring migration (operations and maintenance phase). All entries are zero.	34
Table 1.45: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during Autumn migration (operations and maintenance phase). All entries are zero.	35
Table 1.46: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during non-breeding period (operations and maintenance phase). All entries are zero.	35
Table 1.47: Seasonal displacement estimates for the Mona Array Area plus 2 km buffer (or Mona Array Area plus 4 km buffer if appropriate for the species) during construction and decommissioning.	36
Table 1.48: Seasonal displacement estimates for the Mona Array Area plus 2 km buffer (or Mona Array Area plus 4 km buffer if appropriate for the species) during operation and maintenance	39

Appendices

APPENDIX A : BIRD DATA FOR DISPLACEMENT	44
A.1 Monthly abundance estimates	44
APPENDIX B : UPPER AND LOWER CONFIDENCE INTERVAL ABUNDANCE ESTIMATES	51
B.1 Upper peak abundance estimates	51
B.2 Lower peak abundance estimates	53
APPENDIX C : UPPER AND LOWER CONFIDENCE INTERVAL MATRICES	55
C.1 Common guillemot	55
C.2 Razorbill	58
C.3 Atlantic puffin	64
C.4 Northern gannet	67
C.5 Black-legged kittiwake	71
C.6 Manx shearwater	76
C.7 Red-throated diver	80

Glossary

Term	Meaning
Season	Bird behaviour and abundance is recognised to differ across a calendar year, with particular months recognised as being part of different seasons. The biologically defined minimum population scale (BDMPS) seasons used in this report are based on those described in Furness (2015). Separate seasons are recognised in this technical report in order to establish the level of importance any seabird species has within the study area during any particular period of time.
Disturbance sensitivity	Species disturbance sensitivity to wind farm structures, ship and helicopter traffic factors are compiled by Bradbury <i>et al.</i> (2014). They used scores from 1 (limited escape behaviour and a very short flight distance when approached) to 5 (strong escape behaviour at a large response distance).
Habitat specialisation	The habitat specialisation factor represents the range of habitats species are able to use and whether they use these as specialists or generalists. Species habitat specialisation scores used in this Technical Report have been compiled by Bradbury <i>et al.</i> (2014). This score classifies species into categories from 1 (tend to forage over large marine areas with little known association with particular marine features) to 5 (tend to feed on very specific habitat features, such as shallow banks with bivalve communities, or kelp beds).
Ornithology	Ornithology is a branch of zoology that concerns the study of birds.
Significant effect	The significance of an effect is determined by considering the overall importance of the receptor and the magnitude of the effect using a matrix-based approach.
Statutory Nature Conservation Bodies (SNCBs)	Comprised of Joint Nature Conservation Committee, Natural Resources Wales, Department of Agriculture, Environment and Rural Affairs/Northern Ireland Environment Agency, Natural England and Scottish Natural Heritage, these agencies provide advice in relation to nature conservation to the government.

Acronyms

Term	Meaning
BDMPS	Biologically Defined Minimum Population Scale
BTO	British Trust for Ornithology
EWG	Expert Working Group
LCI/UCI	Lower/Upper Confidence Interval
MRSea	Marine Renewables Strategic environmental assessment
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
VORs	Valued Ornithological Receptors

MONA OFFSHORE WIND PROJECT

Units

Unit	Description
%	Percent
km	Kilometres
km ²	Kilometres squared

1 Offshore ornithology displacement technical report

1.1 Introduction

1.1.1 Background

- 1.1.1.1 Seabirds can be impacted by offshore wind farm developments in a number of ways, including collision, displacement, barrier effects and disturbance, as well as indirect impacts such as changes to prey availability.
- 1.1.1.2 Disturbance can exist when a bird's normal pattern of activity is interrupted by anthropogenic activity (i.e. vessel movements and increase noise from construction activities). Birds using a given area of sea for feeding, resting and/or commuting may therefore be disturbed by these activities in or near those areas. As the result of disturbance, displaced seabirds may move to areas already occupied by other seabirds and thus face higher intra/inter-specific competition due to a higher density of individuals competing for the same resource. Alternatively, displaced seabirds may be forced to move into areas of lower quality (e.g. areas of lower prey availability). Such disturbance and resulting avoidance could ultimately affect their demographic fitness (i.e. survival rates and breeding productivity) as well as potentially impacting on other birds in areas that displaced birds move to. Disturbance is typically considered a temporary effect, with impacts reducing once the activity causing disturbance stops.
- 1.1.1.3 Furness *et al.* (2013) defines displacement as 'a reduced number of birds occurring within or immediately adjacent to an offshore wind farm' due to the presence of turbines. Displacement, as an effect, may occur both in the area of the disturbance or development and to some distance beyond it, which is known as a 'buffer' (e.g. Mendel *et al.* 2014). Displacement is considered to be a permanent effect, with birds facing adverse effects due to the removal of feeding areas, resulting in birds having to travel to more distant areas of sea for feeding and/or resting opportunities.
- 1.1.1.4 Species differ greatly in their susceptibility to disturbance and displacement. Species sensitivity to disturbance in response to offshore wind farms has been quantified by Garthe and Hüppop (2004), Furness *et al.* (2013), Bradbury *et al.* (2014) and Wade *et al.* (2016). In a review of studies from 20 operational offshore wind farms in Europe, Dierschke *et al.* (2016) assessed the extent of displacement or attraction of a number of seabird species. Whilst diver species and northern gannet *Morus bassanus* showed consistent and strong avoidance behaviour of operational wind farms, northern fulmar *Fulmarus glacialis*, common scoter *Melanitta nigra*, Manx shearwater *Puffinus puffinus*, razorbill *Alca torda*, common guillemot *Uria aalge*, little gull *Larus minutus* and sandwich tern *Thalasseus sandvicensis* showed less consistent displacement.
- 1.1.1.5 The Statutory Nature Conservation Bodies (SNCBs) have produced guidelines to assess seabird displacement associated with offshore wind farms (JNCC *et al.*, 2022). The guidelines promote the use of a displacement matrix approach (i.e. representing proportions of seabirds potentially displaced/dying as a result of offshore wind farm development). The SNCB note (JNCC *et al.*, 2022) details that the effects from disturbance and displacement is expected to be spatially limited to the offshore wind farm footprint and close proximity (birds are impacted by displacement up to 2 km from the wind farm footprint for most species, with displacement up to 4 km considered for divers and seaducks (and in some cases up to 10 km) due to being the most sensitive species groups to disturbance from sound, boat and helicopter traffic).

MONA OFFSHORE WIND PROJECT

1.1.1.6 The displacement assessment for the Mona Offshore Wind Project makes use of the SNCB Matrix table approach, which was agreed during consultation with the Offshore Ornithology Expert Working Group (EWG) on 13 July 2022 as part of the Evidence Plan process (Evidence Plan sent to stakeholders on 26 May 2022, responses received on 24 June 2022 from Natural England and JNCC, and 7 July from Natural Resource Wales).

1.1.2 Aim of report

1.1.2.1 This report presents the method and results of the SNCB Matrix table approach to seabird displacement assessment resulting from the Mona Offshore Wind Project during the construction, operations and maintenance and decommissioning phases. The report considers the most abundant seabird species recorded during the digital aerial surveys carried out between March 2020 and February 2022 to characterise the baseline for the assessment. The full methods and results of the digital aerial surveys are presented in Volume 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement.

1.2 Consultation

1.2.1.1 A summary of the key issues raised during consultation activities undertaken to date specific to offshore ornithology is presented in Table 1.1 below, together with how these issues have been considered in the production of this technical report as part of the Environmental Statement.

1.2.2 Evidence Plan process

1.2.2.1 The purpose of the Evidence Plan process is to agree the information the Mona Offshore Wind Project needs to supply to the Secretary of State, as part of a DCO application for the Mona Offshore Wind Project. The Evidence Plan seeks to ensure compliance with EIA. The development and monitoring of the Evidence Plan and its subsequent progress is being undertaken by the Steering Group. The Steering Group will comprise of the Planning Inspectorate, the Applicant, NRW, Natural England, JNCC and the MMO as the key regulatory and SNCBs. To inform the EIA process during the pre-application stage of the Mona Offshore Wind Project, Expert Working Groups (EWGs) were also set up to discuss and agree topic specific issues with the relevant stakeholders. Consultation was undertaken via the Offshore Ornithology EWG, with meetings held in February 2022, July 2022, November 2022, February 2023, June 2023, October 2023 and December 2023.

1.2.2.2 The responses provided and changes suggested by the stakeholders through the EWG are summarized in Table 1.1 together with changes implemented in the technical report of the Environmental Statement.

1.2.2.3 A number of comments were received during the S42 consultation following submission of the PEIR chapter. All the responses provided, and changes suggested by the stakeholders are presented in the consultation report (Document reference E.3) together with changes implemented in the technical reports underpinning the Environmental Statement.

1.2.2.4 A summary of the key responses with changes implemented in the technical report of the Environmental Statement are presented in Table 1.1.

MONA OFFSHORE WIND PROJECT

Table 1.1: Summary of key topics and issues raised during consultation activities undertaken for the Mona Offshore Wind Project relevant to offshore ornithology displacement technical report of the Environmental Statement.

Date	Consultee and type of response	Topics and issues raised	Response to issue raised and/or where considered in this chapter
June 2022	Scoping Opinion JNCC	Displacement and barrier effects to seabirds occurring during O&M should also be assumed to occur during both construction and decommissioning. Table 4.19 indicates that displacement will be considered during construction and decommissioning phases, but not barrier effects. In the absence of evidence to the contrary, then an assumption of a mean annual mortality of 50% of that assessed during O&M should be applied to the construction and decommissioning phases.	Displacement assessment was carried out for the construction, operations and maintenance, and decommissioning phases assuming that 50% of the annual displacement impact resulting from the operations and maintenance phase will occur during construction and decommissioning phases. Approach and results are presented in sections 1.3 and 1.4.
July 2022	Offshore Ornithology Expert Working Group 2: Attended by: Natural England, JNCC, NRW, RSPB, TWT	Agreed on the approach to displacement as set out in the Mona Displacement technical paper, taking into account clarifications to be provided by SNCBs.	It was agreed that kittiwake would be included in displacement along with the combined estimate of birds on the water and in flight for Manx shearwater.
June 2023	S42 Consultation NRW, JNCC	NRW recommend that a worked example of the approach for a species assessed by MRSea for collision (for example kittiwake) and for a species assessed for displacement (for example guillemot) be included, that details how unidentified birds and availability bias have been corrected for and how estimates of birds in flight have been made from all birds estimates.	Methodology has been further clarified in response to S42 consultation and therefore the requirement for a worked example is no longer necessary.
		NRW do not recommend that displacement is assessed for kittiwake as we currently consider the evidence base to be insufficient hence we have not provided advice/comment on this.	Although black-legged kittiwake are considered to have low sensitivity to displacement, this species has been considered following an agreement through the Evidence Plan Process and at the recommendation of JNCC.

MONA OFFSHORE WIND PROJECT

Date	Consultee and type of response	Topics and issues raised	Response to issue raised and/or where considered in this chapter
		NRW seek clarification as to whether the monthly abundance estimates presented in Tables A.122-A.128 of Annex 5.2 are actually a mix of design-based and model-based (MRSea) estimates or whether all are model-based (MRSea) or all design-based.	Monthly species abundances are a mix of MRSea and design-based abundances, with MRSea estimates used in instead of design-based estimates wherever possible. Further explanations are provided in section 1.3.
		NRW states that it appears that for the species where MRSea estimates have been generated for some of the surveys, the quantitative impact assessments (for example of displacement and collision risk) have been based on a mix of MRSea estimates for months where these are available and design-based estimates where MRSea estimates are not available. NRW advise that whilst this approach seems sensible and uses the best available data, this hierarchy of approach needs to be clearly stated in the documents.	Monthly species abundances are a mix of MRSea and design-based abundances, with MRSea estimates used instead of design-based estimates wherever possible. Further explanations are provided in section 1.3.
		NRW advise that the guillemot seasonal abundances included for Mona in Table 10.73 are double-checked, as they are not consistent with the seasonal abundances presented in Volume 6, Annex 5.2: Offshore ornithology displacement technical report of the Environmental Statement, Table 1.15 Common guillemot bio-season displacement estimates for the Mona Array Area plus 2km buffer during the operations and maintenance phase.	Common guillemot seasonal abundances have been checked in Volume 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement and in this technical report.
		JNCC seek clarification as to which method(s) have been used to generate the monthly abundance estimates presented in Tables A.122-A.128 of Volume 6 Chapter 5.2.	Monthly species abundances are a mix of MRSea and design-based abundances, with MRSea estimates used in place of design-based estimates wherever possible. Further explanations are provided in section 1.3.

1.3 Methodology

1.3.1.1 As sensitivity to displacement differs considerably between seabird species, species were screened and progressed for the Matrix table approach using 'Disturbance Sensitivity' and 'Habitat Specialization' scores from Bradbury *et al.* (2014) (expanded from Furness *et al.*, 2013) as recommended by the Joint SNCB Interim Displacement Advice Note (JNCC *et al.*, 2022) (the SNCB Note). As recommended by the SNCB Note (JNCC *et al.*, 2022), the assessment is based on the mean seasonal peak number of seabirds (average of the highest seasonal value in the two years of survey) in the Mona Array Area with the appropriate buffer zone.

1.3.1.2 Displacement matrices were populated based on the displacement and mortality values recommended by the SNCB Note (JNCC *et al.*, 2022) and the displaced population was assessed against the relevant regional population for each season.

1.3.2 Screening species for displacement assessment

1.3.2.1 A review of all species of seabirds recorded during the two years of Digital Aerial Surveys (DAS) undertaken at the Mona Offshore Ornithology Array Area study area was conducted to identify Valued Ornithological Receptors (VORs) for displacement analysis based on their abundance in surveys and vulnerability to impacts. A further step refined this list of VORs based on whether they are features of nearby designated sites in order to identify species of importance.

1.3.2.2 To inform the identification of VORs the following criteria are defined for each species:

- Known to be vulnerable to displacement impacts (based on Bradbury *et al.*, 2014 and Wade *et al.*, 2016).
- Where the population of the species observed is considered to be of importance (i.e. high abundance recorded within the Mona Array Area plus 2 km (or 4 km buffer if appropriate for the species)).
 - Low = <100 birds in all individual surveys
 - Moderate = 100 to 500 birds in at least one survey
 - High = > 500 birds in at least one survey.
- Are a feature of a designated site(s) within that species mean-max foraging range (as shown in Volume 6, Annex 5.1: Offshore Ornithology Baseline Characterisation Technical Report of the Environmental Statement).

1.3.2.3 VORs were identified and progressed to the displacement matrix table stage when the vulnerability of a species was moderate or high and the population importance of a species was also moderate or high. Species identified and taken forward to the collision risk assessment have been highlighted within Table 1.1 below.

1.3.2.4 Species such as Manx shearwater and black-legged kittiwake are considered to have low sensitivity to displacement however at the request of JNCC as part of the Offshore Ornithology EWG (EWG meeting 2, 13 July 2022), displacement for these species has been considered. Red-throated diver were also included within the assessment despite their low presence at the request of the EWG (EWG meeting 3, 30 November 2022).

MONA OFFSHORE WIND PROJECT

Table 1.2: Displacement screening based on species abundance within the Mona Array Area plus a 2km to 4km buffer during the site-specific surveys, displacement vulnerability, and connectivity to designated site.

1. Cells highlighted indicate species in yellow has been screened in.

Species	Observed within the Mona Array Area plus 2 km buffer (or 4 km buffer if appropriate for the species)	Population importance	Vulnerability to displacement impacts	Designated site qualifying feature (within range of the Mona Array Area)	Displacement analysis required (Yes/No)
European shag <i>Phalacrocorax aristotelis</i>	No	Low	Moderate	Yes	No - species absent from the Mona Array Area plus 2 km buffer
Great cormorant <i>Phalacrocorax carbo</i>	Yes - peak average abundance of 6 birds.	Low	High	Yes	No - species recorded in low population numbers in the Mona Array Area plus 2 km buffer
Red-throated diver <i>Gavia stellata</i>	No	Low	High	Yes	Yes –assessment carried out following JNCC request to include species in displacement assessment (Second EWG meeting on 13 July 2022).
Common guillemot	Yes - peak average abundance of 5,739 birds.	High	Moderate	Yes	Yes - species recorded in high numbers in the Mona Array Area plus 2 km buffer, species has a moderate level of vulnerability to displacement, species is a qualifying feature of nearby designated sites.
Razorbill	Yes - peak average abundance of 2,305 birds.	High	Moderate	Yes	Yes - species recorded in high numbers in the Mona Array Area plus 2 km buffer, species has a moderate level of vulnerability to displacement, species is a qualifying feature of nearby designated sites.

MONA OFFSHORE WIND PROJECT

Species	Observed within the Mona Array Area plus 2 km buffer (or 4 km buffer if appropriate for the species)	Population importance	Vulnerability to displacement impacts	Designated site qualifying feature (within range of the Mona Array Area)	Displacement analysis required (Yes/No)
Atlantic puffin <i>Fratercula arctica</i>	Yes - peak average abundance of 44 birds.	Low	Moderate	Yes	Yes - species has a moderate level of vulnerability to displacement, species is a qualifying feature of nearby designated sites.
Northern fulmar	Yes - peak average abundance of 149 birds.	Moderate	Very Low	Yes	No - species has a very low vulnerability to displacement
Manx shearwater	Yes - peak average abundance of 2,173 birds.	High	Very Low	Yes	Yes - assessment carried out following EWG request
Northern gannet	Yes - peak average abundance of 293 birds.	Moderate	Low	Yes	Yes - species recorded in moderate numbers in the Mona Array Area plus 2 km buffer, species is a qualifying feature of nearby designated sites.
Black-legged kittiwake <i>Rissa tridactyla</i>	Yes - peak average abundance of 907 birds.	High	Low	Yes	Yes - assessment carried out following JNCC request
Herring gull <i>Larus argentatus</i>	Yes - peak average abundance of 68 birds.	Low	Low	Yes	No - species has a low vulnerability to displacement
Lesser black-backed gull <i>Larus fuscus</i>	Yes - peak average abundance of 27 birds.	Low	Low	Yes	No - species has a low vulnerability to displacement
Great black-backed gull <i>Larus marinus</i>	Yes - peak average abundance of 174 birds.	Moderate	Low	Yes	No - species has a low vulnerability to displacement
Black-headed gull <i>Chroicocephalus ridibundus</i>	Yes - peak average abundance of 7 birds.	Low	Low	Yes	No - species has a low vulnerability to displacement

MONA OFFSHORE WIND PROJECT

Species	Observed within the Mona Array Area plus 2 km buffer (or 4 km buffer if appropriate for the species)	Population importance	Vulnerability to displacement impacts	Designated site qualifying feature (within range of the Mona Array Area)	Displacement analysis required (Yes/No)
Common gull <i>Larus canus</i>	Yes - peak average abundance of 20 birds.	Low	Low	Yes	No - species has a low vulnerability to displacement
Little gull	Yes - peak average abundance of 14 birds.	Low	Low	Yes	No - species has a low vulnerability to displacement
Great skua <i>Stercorarius skua</i>	Yes - peak average abundance of 7 birds.	Low	Very Low	No	No - species has a very low vulnerability to displacement
Arctic skua <i>Stercorarius parasiticus</i>	Yes - peak average abundance of 11 birds.	Low	Very Low	No	No - species has a very low vulnerability to displacement
Common tern <i>Sterna hirundo</i>	Yes - peak average abundance of 7 birds.	Low	Low	Yes	No - species has a low vulnerability to displacement
Sandwich tern	Yes - peak average abundance of 15 birds.	Low	Moderate	Yes	No - species has a low vulnerability to displacement
Arctic tern <i>Sterna paradisaea</i>	No	Low	Low	No	No - species has a low vulnerability to displacement

MONA OFFSHORE WIND PROJECT

1.3.3 Seasonality

- 1.3.3.1 Seasons used within the displacement assessment were defined according to the breeding, non-breeding and migratory periods (autumn and spring migration) based on Furness (2015) (Table 1.3) and as per Offshore Ornithology EWG advice (based on the second EWG meeting and Evidence Plan sent to Statutory Nature Conservation Bodies (SNCBs) on 27 May 2022, advice received on 24 June from Natural England and JNCC, and on 7 July 2022 from NRW).
- 1.3.3.2 If a month fell within two seasons (e.g., March for gannet is included in both the pre-breeding and breeding seasons in Furness (2015)), priority was given to the breeding season. In cases where a peak abundance was estimated during a month spanning two seasons, such as 100 birds observed in March for northern gannets, the peak of 100 birds was attributed to the breeding period. This approach was applied based on advice from JNCC during EWG meeting 2 (held on 13 July 2022), which discouraged the use of the migration-free breeding period in the displacement assessments. Consequently, some months were present in more than one season. To avoid underestimating the impact during the breeding season therefore, a precautionary approach was taken to prioritizing it due to the significant importance of this time and any potential impacts during this period having a profound impact on the regional population. If two months fell across two periods (e.g. March and April for kittiwake overlapping the pre-breeding and breeding season) then the first month was assigned to the pre-breeding and the second assigned to the breeding. This approach was taken as birds are still undergoing migration in March (Furness, 2015) and would likely overestimate impacts if all birds were considered to be breeding during the migration period.

Table 1.3: Seasonal definitions as the basis for assessment, from Furness (2015).

Species	Pre-breeding season/spring migration	Breeding season	Post breeding season/autumn migration	Non-breeding/winter season
Common guillemot	N/A	March to July	N/A	August to February
Razorbill	January to March	April to July	August to October	November to December
Atlantic puffin	N/A	April to August	N/A	September to March
Northern gannet	December to February	March to September	October to November	N/A
Black-legged kittiwake	January to March	April to August	September to December	N/A
Manx shearwater	March	April to August	September to October	N/A
Red-throated diver	February to April	May to August	September to November	December to January

1.3.4 Buffers for displacement

- 1.3.4.1 For the purpose of the displacement assessment, the monthly abundance of seabirds within the Mona Array Area, the Mona Array Area plus 2 km buffer and, if appropriate for the species, the Mona Array plus 4 km buffer, including upper and lower 95%

MONA OFFSHORE WIND PROJECT

confidence limits, were generated from the data collected through the programme of digital aerial surveys carried out in the Mona Offshore Ornithology Array Area study area (Figure 1.1). The Mona Array Area plus 2 km buffer covers 449.59 km², and the Mona Array Area plus 4 km buffer covers 622.46 km².

MONA OFFSHORE WIND PROJECT

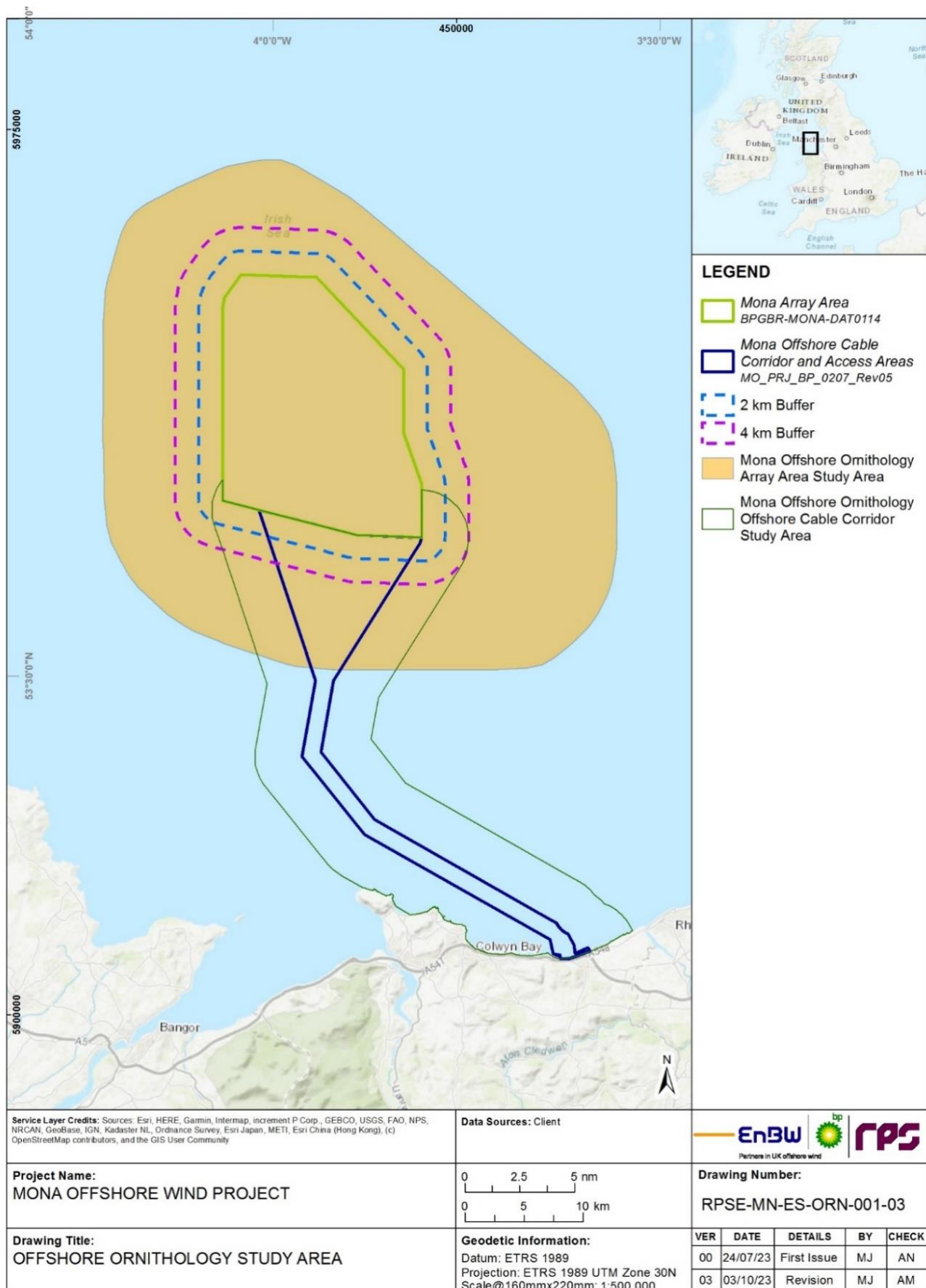


Figure 1.1: The Mona Offshore Ornithology Array Area study area, Mona Array Area plus associated buffers for displacement and the Mona Offshore Ornithology Offshore Cable Corridor

1.3.5 Abundance estimates

- 1.3.5.1 Density/population estimates were generated from the site specific digital aerial surveys carried out in the Mona Offshore Ornithology Array Area study area, which extended up to 16.5 km outside the Mona Array Area. Full details of the digital aerial survey methods and results are presented in Volume 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement.
- 1.3.5.2 Model-based estimates using the Marine Renewables Strategic environmental assessment (MRSea) package were produced in order to predict numbers across the digital aerial survey area alongside 95% confidence intervals to provide a level of uncertainty. Design-based estimates for bird numbers and densities in each month were also generated and compared to the MRSea estimates to provide additional validation of the MRSea outputs and to provide estimates for months where low raw abundances prevented the use of the MRSea model. Monthly species abundances are therefore a mix of MRSea and design-based abundances, with MRSea estimates used in lieu of design-based estimates wherever possible. For example, MRSea was only able to run for razorbill for the months of March 2020, July 2020, September 2020, December 2020 to April 2021 and December 2021 to February 2022, and so MRSea estimates are used for those months, with design-based estimates only used for April 2020 to June 2020, August 2020, October 2020 to November 2020 and May 2021 to November 2021. The only species that had MRSea estimates used for all months was common guillemot as there were sufficient observations recorded during digital aerial surveys for MRSea models to run.
- 1.3.5.3 The primary data that informs the basis for the assessment of displacement effects are seasonal mean peak population estimates including seabirds both recorded on the surface (sitting) and in flight. Mean seasonal peak population estimates of each species were calculated using the defined seasons by Furness (2015) to provide the number of seabirds at risk of displacement impacts, including upper and lower 95% confidence intervals. Peak abundances in each season for each species considered within the displacement assessment are outlined in bold within Appendix A.
- 1.3.5.4 As an example, the mean seasonal peak population calculation for common guillemot which breeds from March to July is presented. The average was taken of the peak count for the breeding season in Year 1 of the digital aerial surveys within the Mona Array Area plus 2 km buffer (which occurred in March) and the peak count in the breeding season of Year 2 (which occurred in April).
- 1.3.5.5 In accordance with SNCB (2022), displacement was estimated as affecting seabirds present both in flight and sitting on the water (whether foraging or loafing), having accounted for availability bias (seabirds that may be underwater at the time of the survey). Therefore, abundance estimates of seabirds recorded in flight and sitting were combined to derive the mean seasonal peak population at risk of displacement. Where possible, data relating to age classes of each species is also reported, although the values used in the matrices will relate to all individuals. Mean seasonal peak abundances and how they were derived are presented in Table 1.4. For Lower Confidence Intervals (LCI) and Upper Confidence Intervals (UCI), see Appendix B.

MONA OFFSHORE WIND PROJECT

Table 1.4: Mean peak abundances for use in the assessment for each season.

Species	Pre-breeding season/spring migration	Breeding season	Post breeding season/autumn migration	Non-breeding/winter season
Common guillemot				
Peak Year 1	N/A	5,739	N/A	4,415
Peak Year 2	N/A	2,702	N/A	3,097
Mean peak	N/A	4,220	N/A	3,756
Razorbill				
Peak Year 1	1,543	35	173	223
Peak Year 2	2,305	130	9	619
Mean peak	1,924	83	91	421
Atlantic puffin				
Peak Year 1	N/A	30	N/A	0
Peak Year 2	N/A	0	N/A	0
Mean peak	N/A	15	N/A	0
Northern gannet				
Peak Year 1	34	209	26	N/A
Peak Year 2	21	293	89	N/A
Mean peak	28	251	58	N/A
Black-legged kittiwake				
Peak Year 1	907	264	242	N/A
Peak Year 2	861	445	879	N/A
Mean peak	884	355	560	N/A

MONA OFFSHORE WIND PROJECT

Species	Pre-breeding season/spring migration	Breeding season	Post breeding season/autumn migration	Non-breeding/winter season
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Manx shearwater

Peak Year 1	0	324	32	N/A
Peak Year 2	6	2,173	331	N/A
Mean peak	3	1,249	182	N/A

Red-throated diver

Peak Year 1	0	N/A	0	0
Peak Year 2	0	N/A	0	0
Mean peak	0	N/A	0	0

MONA OFFSHORE WIND PROJECT

1.3.6 Displacement parameters

- 1.3.6.1 Table 1.5 presents the displacement and mortality ranges for the species considered in the displacement assessment. The most likely displacement and mortality rates during the operational period for common guillemot, razorbill and northern gannet have been obtained from the SNCB Note (JNCC *et al.* 2022). For auk species such as common guillemot, razorbill and Atlantic puffin the SNCBs advise a displacement level of 30 to 70%. Black-legged kittiwake rates have been taken from the relevant literature (Table 1.5).
- 1.3.6.2 As Manx shearwater have a disturbance susceptibility score of one, the recommended rates of 1 to 10% for displacement and 1 to 10% mortality from the SNCB Note (JNCC *et al.* 2022) guidance were originally considered. However, the Offshore Ornithology EWG (meeting held 13 July 2022) advised that the 30% to 70% rates be applied (the same rates for auk species) instead.

Table 1.5: Displacement and mortality rates for use in the assessment during the operations and maintenance phase.

Species	Displacement rates	Mortality rates	Source
Common guillemot	30 to 70%	1 to 10%	SNCB Note (JNCC <i>et al.</i> , 2022)
Razorbill	30 to 70%	1 to 10%	SNCB (JNCC <i>et al.</i> , 2022)
Atlantic puffin	30 to 70%	1 to 10%	SNCB (JNCC <i>et al.</i> , 2022)
Northern gannet	60 to 80%	1 to 10%	Cook <i>et al.</i> (2018), Skov <i>et al.</i> (2018), Leopold <i>et al.</i> (2011) and Furness & Wade (2012)
Black-legged kittiwake	30 to 70%	1 to 10%	Peschko <i>et al.</i> (2020); Vanermen <i>et al.</i> (2016); Leopold <i>et al.</i> (2013)
Manx shearwater	30 to 70%	1 to 10%	SNCBs (discussed at EWG meeting 2, 13 July 2022)
Red-throated diver	100%	1 to 10%	SNCBs (discussed at EWG meeting 2, 13 July 2022)

- 1.3.6.3 Disturbance and subsequent displacement of seabirds during the construction phase can also occur due to vessel traffic and construction and piling activities occurring within the site. These activities may displace individuals that would normally reside within and around the Mona Array Area.
- 1.3.6.4 As actual rates of displacement during the construction phase are difficult to determine, and as recommended by the SNCBs at the Offshore Ornithology EWG, the following methodology is proposed. Given that construction is limited both spatially and temporally and that any potential effects are unlikely to reach the same level as during the operation, the level to be used is half that of the operations and maintenance phase assessments. Table 1.6 shows the displacement and mortality rates used during the construction phase assessment.
- 1.3.6.5 Decommissioning activities within the Mona Array Area are equal to or less than those carried out during the construction phase within the Mona Array Area. Therefore, for the purpose of this assessment it is assumed that the impacts are likely to be similar.

MONA OFFSHORE WIND PROJECT

Table 1.6: Displacement and mortality rates for use in the assessment during the construction and decommissioning phases.

Species	Displacement rates	Mortality rates
Common guillemot	15 to 35%	1 to 10%
Razorbill	15 to 35%	1 to 10%
Atlantic puffin	15 to 35%	1 to 10%
Northern gannet	30 to 40%	1 to 10%
Black-legged kittiwake	15 to 35%	1 to 10%
Manx shearwater	15 to 35%	1 to 10%
Red-throated diver	50%	1 to 10%

1.3.6.6 Data on predicted mortality from displacement of seabirds from the Mona Array Area plus 2 km buffer (and where applicable 4 km buffer), are then presented in the form of a gridded Matrix table (for the mean value and lower and upper confidence intervals). Predicted mortalities are given for each season and each phase. The mean seasonal peak value for the breeding, non-breeding and migratory periods are imputed into a displacement matrix to assess the potential level of impact. The matrix presents a wide range of potential displacement (10 to 100 %) and mortality rates (1 to 100 %), with the most likely displacement levels and mortality scenario cells highlighted in yellow and outlined in red.

1.3.6.7 In addition, cells within each matrix in the following species-specific sections are shaded red to indicate where the displacement mortality would surpass the 1 % threshold of background mortality of the relevant regional or national population for each species. The relevant population against which displacement mortality is compared and the average background mortality for each species (Section 1.4) are presented in each Matrix table.

1.4 Results

1.4.1 Common guillemot

Construction and decommissioning phase

1.4.1.1 Two seasons were defined for common guillemot in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.7 and Table 1.8 for the construction and decommissioning phase. Upper and lower matrices are presented in Appendix C.1.

MONA OFFSHORE WIND PROJECT

Table 1.7: Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	4	8	21	42	84	127	169	211	253	295	338	380	422
	15%	6	13	32	63	127	190	253	317	380	443	506	570	633
	20%	8	17	42	84	169	253	338	422	506	591	675	760	844
	25%	11	21	53	106	211	317	422	528	633	739	844	950	1055
	30%	13	25	63	127	253	380	506	633	760	886	1013	1140	1266
	35%	15	30	74	148	295	443	591	739	886	1034	1182	1329	1477
	40%	17	34	84	169	338	506	675	844	1013	1182	1351	1519	1688
	60%	25	51	127	253	506	760	1013	1266	1519	1773	2026	2279	2532
	80%	34	68	169	338	675	1013	1351	1688	2026	2363	2701	3039	3376
	100%	42	84	211	422	844	1266	1688	2110	2532	2954	3376	3798	4220

Table 1.8: Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	4	8	19	38	75	113	150	188	225	263	300	338	376
	15%	6	11	28	56	113	169	225	282	338	394	451	507	563
	20%	8	15	38	75	150	225	300	376	451	526	601	676	751
	25%	9	19	47	94	188	282	376	469	563	657	751	845	939
	30%	11	23	56	113	225	338	451	563	676	789	901	1014	1127
	35%	13	26	66	131	263	394	526	657	789	920	1052	1183	1315
	40%	15	30	75	150	300	451	601	751	901	1052	1202	1352	1502
	60%	23	45	113	225	451	676	901	1127	1352	1577	1803	2028	2254
	80%	30	60	150	300	601	901	1202	1502	1803	2103	2404	2704	3005
	100%	38	75	188	376	751	1127	1502	1878	2254	2629	3005	3380	3756

Operation and maintenance phase

1.4.1.2 Two seasons were defined for common guillemot in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.9 and Table 1.10 for the operation and maintenance phase. Upper and lower matrices are presented in Appendix C.1.

MONA OFFSHORE WIND PROJECT

Table 1.9: Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	4	8	21	42	84	127	169	211	253	295	338	380	422
	20%	8	17	42	84	169	253	338	422	506	591	675	760	844
	30%	13	25	63	127	253	380	506	633	760	886	1013	1140	1266
	40%	17	34	84	169	338	506	675	844	1013	1182	1351	1519	1688
	50%	21	42	106	211	422	633	844	1055	1266	1477	1688	1899	2110
	60%	25	51	127	253	506	760	1013	1266	1519	1773	2026	2279	2532
	70%	30	59	148	295	591	886	1182	1477	1773	2068	2363	2659	2954
	80%	34	68	169	338	675	1013	1351	1688	2026	2363	2701	3039	3376
	90%	38	76	190	380	760	1140	1519	1899	2279	2659	3039	3419	3798
	100%	42	84	211	422	844	1266	1688	2110	2532	2954	3376	3798	4220

Table 1.10: Mean predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	4	8	19	38	75	113	150	188	225	263	300	338	376
	20%	8	15	38	75	150	225	300	376	451	526	601	676	751
	30%	11	23	56	113	225	338	451	563	676	789	901	1014	1127
	40%	15	30	75	150	300	451	601	751	901	1052	1202	1352	1502
	50%	19	38	94	188	376	563	751	939	1127	1315	1502	1690	1878
	60%	23	45	113	225	451	676	901	1127	1352	1577	1803	2028	2254
	70%	26	53	131	263	526	789	1052	1315	1577	1840	2103	2366	2629
	80%	30	60	150	300	601	901	1202	1502	1803	2103	2404	2704	3005
	90%	34	68	169	338	676	1014	1352	1690	2028	2366	2704	3042	3380
	100%	38	75	188	376	751	1127	1502	1878	2254	2629	3005	3380	3756

1.4.2 Razorbill

Construction and decommissioning phases

1.4.2.1 Four seasons were defined for razorbill in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.11 to Table 1.14 for the construction and decommissioning phase. Upper and lower matrices are presented in Appendix C.

MONA OFFSHORE WIND PROJECT

Table 1.11: Mean predicted razorbill mortality for the Mona Array plus 2 km buffer during Spring migration (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	2	4	10	19	38	58	77	96	115	135	154	173	192
	15%	3	6	14	29	58	87	115	144	173	202	231	260	289
	20%	4	8	19	38	77	115	154	192	231	269	308	346	385
	25%	5	10	24	48	96	144	192	241	289	337	385	433	481
	30%	6	12	29	58	115	173	231	289	346	404	462	520	577
	35%	7	13	34	67	135	202	269	337	404	471	539	606	673
	40%	8	15	38	77	154	231	308	385	462	539	616	693	770
	60%	12	23	58	115	231	346	462	577	693	808	924	1039	1155
	80%	15	31	77	154	308	462	616	770	924	1078	1232	1385	1539
	100%	19	38	96	192	385	577	770	962	1155	1347	1539	1732	1924

Table 1.12: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	2	2	3	4	5	6	7	7	8
	15%	0	0	1	1	2	4	5	6	7	9	10	11	12
	20%	0	0	1	2	3	5	7	8	10	12	13	15	17
	25%	0	0	1	2	4	6	8	10	12	14	17	19	21
	30%	0	0	1	2	5	7	10	12	15	17	20	22	25
	35%	0	1	1	3	6	9	12	14	17	20	23	26	29
	40%	0	1	2	3	7	10	13	17	20	23	26	30	33
	60%	0	1	2	5	10	15	20	25	30	35	40	45	50
	80%	1	1	3	7	13	20	26	33	40	46	53	59	66
	100%	1	2	4	8	17	25	33	41	50	58	66	74	83

Table 1.13: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	2	3	4	5	5	6	7	8	9
	15%	0	0	1	1	3	4	5	7	8	10	11	12	14
	20%	0	0	1	2	4	5	7	9	11	13	15	16	18
	25%	0	0	1	2	5	7	9	11	14	16	18	20	23
	30%	0	1	1	3	5	8	11	14	16	19	22	25	27
	35%	0	1	2	3	6	10	13	16	19	22	25	29	32
	40%	0	1	2	4	7	11	15	18	22	25	29	33	36
	60%	1	1	3	5	11	16	22	27	33	38	44	49	55
	80%	1	1	4	7	15	22	29	36	44	51	58	66	73
	100%	1	2	5	9	18	27	36	45	55	64	73	82	91

MONA OFFSHORE WIND PROJECT

Table 1.14: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	4	8	13	17	21	25	29	34	38	42
	15%	1	1	3	6	13	19	25	32	38	44	50	57	63
	20%	1	2	4	8	17	25	34	42	50	59	67	76	84
	25%	1	2	5	11	21	32	42	53	63	74	84	95	105
	30%	1	3	6	13	25	38	50	63	76	88	101	114	126
	35%	1	3	7	15	29	44	59	74	88	103	118	133	147
	40%	2	3	8	17	34	50	67	84	101	118	135	151	168
	60%	3	5	13	25	50	76	101	126	151	177	202	227	252
	80%	3	7	17	34	67	101	135	168	202	236	269	303	337
	100%	4	8	21	42	84	126	168	210	252	295	337	379	421

Operations and maintenance phase

1.4.2.2 Four seasons were defined for razorbill in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.15 to Table 1.18 for the operations and maintenance phase. Upper and lower matrices are presented in Appendix C.

Table 1.15: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	2	4	10	19	38	58	77	96	115	135	154	173	192
	20%	4	8	19	38	77	115	154	192	231	269	308	346	385
	30%	6	12	29	58	115	173	231	289	346	404	462	520	577
	40%	8	15	38	77	154	231	308	385	462	539	616	693	770
	50%	10	19	48	96	192	289	385	481	577	673	770	866	962
	60%	12	23	58	115	231	346	462	577	693	808	924	1039	1155
	70%	13	27	67	135	269	404	539	673	808	943	1078	1212	1347
	80%	15	31	77	154	308	462	616	770	924	1078	1232	1385	1539
	90%	17	35	87	173	346	520	693	866	1039	1212	1385	1559	1732
	100%	19	38	96	192	385	577	770	962	1155	1347	1539	1732	1924

MONA OFFSHORE WIND PROJECT

Table 1.16: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	2	2	3	4	5	6	7	7	8
	20%	0	0	1	2	3	5	7	8	10	12	13	15	17
	30%	0	0	1	2	5	7	10	12	15	17	20	22	25
	40%	0	1	2	3	7	10	13	17	20	23	26	30	33
	50%	0	1	2	4	8	12	17	21	25	29	33	37	41
	60%	0	1	2	5	10	15	20	25	30	35	40	45	50
	70%	1	1	3	6	12	17	23	29	35	40	46	52	58
	80%	1	1	3	7	13	20	26	33	40	46	53	59	66
	90%	1	1	4	7	15	22	30	37	45	52	59	67	74
	100%	1	2	4	8	17	25	33	41	50	58	66	74	83

Table 1.17: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	2	3	4	5	5	6	7	8	9
	20%	0	0	1	2	4	5	7	9	11	13	15	16	18
	30%	0	1	1	3	5	8	11	14	16	19	22	25	27
	40%	0	1	2	4	7	11	15	18	22	25	29	33	36
	50%	0	1	2	5	9	14	18	23	27	32	36	41	45
	60%	1	1	3	5	11	16	22	27	33	38	44	49	55
	70%	1	1	3	6	13	19	25	32	38	45	51	57	64
	80%	1	1	4	7	15	22	29	36	44	51	58	66	73
	90%	1	2	4	8	16	25	33	41	49	57	66	74	82
	100%	1	2	5	9	18	27	36	45	55	64	73	82	91

Table 1.18: Mean predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	4	8	13	17	21	25	29	34	38	42
	20%	1	2	4	8	17	25	34	42	50	59	67	76	84
	30%	1	3	6	13	25	38	50	63	76	88	101	114	126
	40%	2	3	8	17	34	50	67	84	101	118	135	151	168
	50%	2	4	11	21	42	63	84	105	126	147	168	189	210
	60%	3	5	13	25	50	76	101	126	151	177	202	227	252
	70%	3	6	15	29	59	88	118	147	177	206	236	265	295
	80%	3	7	17	34	67	101	135	168	202	236	269	303	337
	90%	4	8	19	38	76	114	151	189	227	265	303	341	379
	100%	4	8	21	42	84	126	168	210	252	295	337	379	421

MONA OFFSHORE WIND PROJECT

1.4.3 Atlantic puffin

Construction and decommissioning phases

1.4.3.1 Two seasons were defined for puffin in in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.19 and Table 1.20 for the construction and decommissioning phase. Upper and lower matrices are presented in Appendix C.3.

Table 1.19: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	1	1	1	1	1	1	2
	15%	0	0	0	0	0	1	1	1	1	2	2	2	2
	20%	0	0	0	0	1	1	1	2	2	2	2	3	3
	25%	0	0	0	0	1	1	2	2	2	3	3	3	4
	30%	0	0	0	0	1	1	2	2	3	3	4	4	5
	35%	0	0	0	1	1	2	2	3	3	4	4	5	5
	40%	0	0	0	1	1	2	2	3	4	4	5	5	6
	60%	0	0	0	1	2	3	4	5	5	6	7	8	9
	80%	0	0	1	1	2	4	5	6	7	8	10	11	12
	100%	0	0	1	2	3	5	6	8	9	11	12	14	15

Table 1.20: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning). All entries are zero.

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Operations and maintenance phase

1.4.3.2 Two seasons were defined for puffin in in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.21 and Table 1.22 for the operations and maintenance phase. Upper and lower matrices are presented in Appendix C.3.

Table 1.21: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	1	1	1	1	1	1	2
	20%	0	0	0	0	1	1	1	2	2	2	2	3	3
	30%	0	0	0	0	1	1	2	2	3	3	4	4	5
	40%	0	0	0	1	1	2	2	3	4	4	5	5	6
	50%	0	0	0	1	2	2	3	4	5	5	6	7	8
	60%	0	0	0	1	2	3	4	5	5	6	7	8	9
	70%	0	0	1	1	2	3	4	5	6	7	8	10	11
	80%	0	0	1	1	2	4	5	6	7	8	10	11	12
	90%	0	0	1	1	3	4	5	7	8	10	11	12	14
	100%	0	0	1	2	3	5	6	8	9	11	12	14	15

Table 1.22: Mean predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase). All entries are zero.

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

1.4.4 Northern gannet

Construction and decommissioning phases

1.4.4.1 Three seasons were defined for gannet in in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.23 to Table 1.25 for the construction and decommissioning phase. Upper and lower matrices are presented in Appendix C.4.

Table 1.23: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	1	2	2	2	2	3
	15%	0	0	0	0	1	1	2	2	2	3	3	4	4
	20%	0	0	0	1	1	2	2	3	3	4	4	5	6
	25%	0	0	0	1	1	2	3	3	4	5	6	6	7
	30%	0	0	0	1	2	2	3	4	5	6	7	7	8
	35%	0	0	0	1	2	3	4	5	6	7	8	9	10
	40%	0	0	1	1	2	3	4	6	7	8	9	10	11
	60%	0	0	1	2	3	5	7	8	10	12	13	15	17
	80%	0	0	1	2	4	7	9	11	13	15	18	20	22
	100%	0	1	1	3	6	8	11	14	17	19	22	25	28

Table 1.24: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	1	3	5	8	10	13	15	18	20	23	25
	15%	0	1	2	4	8	11	15	19	23	26	30	34	38
	20%	1	1	3	5	10	15	20	25	30	35	40	45	50
	25%	1	1	3	6	13	19	25	31	38	44	50	56	63
	30%	1	2	4	8	15	23	30	38	45	53	60	68	75
	35%	1	2	4	9	18	26	35	44	53	61	70	79	88
	40%	1	2	5	10	20	30	40	50	60	70	80	90	100
	60%	2	3	8	15	30	45	60	75	90	105	120	135	150
	80%	2	4	10	20	40	60	80	100	120	140	160	180	200
	100%	3	5	13	25	50	75	100	125	150	175	200	226	251

MONA OFFSHORE WIND PROJECT

Table 1.25: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	1	2	2	3	3	4	5	5	6
	15%	0	0	0	1	2	3	3	4	5	6	7	8	9
	20%	0	0	1	1	2	3	5	6	7	8	9	10	12
	25%	0	0	1	1	3	4	6	7	9	10	12	13	14
	30%	0	0	1	2	3	5	7	9	10	12	14	16	17
	35%	0	0	1	2	4	6	8	10	12	14	16	18	20
	40%	0	0	1	2	5	7	9	12	14	16	18	21	23
	60%	0	1	2	3	7	10	14	17	21	24	28	31	35
	80%	0	1	2	5	9	14	18	23	28	32	37	41	46
	100%	1	1	3	6	12	17	23	29	35	40	46	52	58

Operations and maintenance phase

1.4.4.2 Three seasons were defined for gannet in in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.26 to Table 1.28 for the operations and maintenance phase. Upper and lower matrices are presented in Appendix C.4.

Table 1.26: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	1	2	2	2	2	3
	20%	0	0	0	1	1	2	2	3	3	4	4	5	6
	30%	0	0	0	1	2	2	3	4	5	6	7	7	8
	40%	0	0	1	1	2	3	4	6	7	8	9	10	11
	50%	0	0	1	1	3	4	6	7	8	10	11	12	14
	60%	0	0	1	2	3	5	7	8	10	12	13	15	17
	70%	0	0	1	2	4	6	8	10	12	13	15	17	19
	80%	0	0	1	2	4	7	9	11	13	15	18	20	22
	90%	0	0	1	2	5	7	10	12	15	17	20	22	25
	100%	0	1	1	3	6	8	11	14	17	19	22	25	28

MONA OFFSHORE WIND PROJECT

Table 1.27: Mean predicted northern gannet mortality for the Mona Array Area 2 km buffer during the breeding season (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	1	3	5	8	10	13	15	18	20	23	25
	20%	1	1	3	5	10	15	20	25	30	35	40	45	50
	30%	1	2	4	8	15	23	30	38	45	53	60	68	75
	40%	1	2	5	10	20	30	40	50	60	70	80	90	100
	50%	1	3	6	13	25	38	50	63	75	88	100	113	125
	60%	2	3	8	15	30	45	60	75	90	105	120	135	150
	70%	2	4	9	18	35	53	70	88	105	123	140	158	175
	80%	2	4	10	20	40	60	80	100	120	140	160	180	200
	90%	2	5	11	23	45	68	90	113	135	158	180	203	226
	100%	3	5	13	25	50	75	100	125	150	175	200	226	251

Table 1.28: Mean predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	1	2	2	3	3	4	5	5	6
	20%	0	0	1	1	2	3	5	6	7	8	9	10	12
	30%	0	0	1	2	3	5	7	9	10	12	14	16	17
	40%	0	0	1	2	5	7	9	12	14	16	18	21	23
	50%	0	1	1	3	6	9	12	14	17	20	23	26	29
	60%	0	1	2	3	7	10	14	17	21	24	28	31	35
	70%	0	1	2	4	8	12	16	20	24	28	32	36	40
	80%	0	1	2	5	9	14	18	23	28	32	37	41	46
	90%	1	1	3	5	10	16	21	26	31	36	41	47	52
	100%	1	1	3	6	12	17	23	29	35	40	46	52	58

1.4.5 Black-legged kittiwake

Construction and decommissioning phases

1.4.5.1 Three seasons were defined for black-legged kittiwake in in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.29 to Table 1.31 for the construction and decommissioning phase. Upper and lower matrices are presented in Appendix C.5.

MONA OFFSHORE WIND PROJECT

Table 1.29: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	4	9	18	27	35	44	53	62	71	80	88
	15%	1	3	7	13	27	40	53	66	80	93	106	119	133
	20%	2	4	9	18	35	53	71	88	106	124	141	159	177
	25%	2	4	11	22	44	66	88	110	133	155	177	199	221
	30%	3	5	13	27	53	80	106	133	159	186	212	239	265
	35%	3	6	15	31	62	93	124	155	186	217	247	278	309
	40%	4	7	18	35	71	106	141	177	212	247	283	318	354
	60%	5	11	27	53	106	159	212	265	318	371	424	477	530
	80%	7	14	35	71	141	212	283	354	424	495	566	636	707
	100%	9	18	44	88	177	265	354	442	530	619	707	795	884

Table 1.30: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	4	7	11	14	18	21	25	28	32	35
	15%	1	1	3	5	11	16	21	27	32	37	43	48	53
	20%	1	1	4	7	14	21	28	35	43	50	57	64	71
	25%	1	2	4	9	18	27	35	44	53	62	71	80	89
	30%	1	2	5	11	21	32	43	53	64	74	85	96	106
	35%	1	2	6	12	25	37	50	62	74	87	99	112	124
	40%	1	3	7	14	28	43	57	71	85	99	114	128	142
	60%	2	4	11	21	43	64	85	106	128	149	170	192	213
	80%	3	6	14	28	57	85	114	142	170	199	227	255	284
	100%	4	7	18	35	71	106	142	177	213	248	284	319	355

Table 1.31: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	1	3	6	11	17	22	28	34	39	45	50	56
	15%	1	2	4	8	17	25	34	42	50	59	67	76	84
	20%	1	2	6	11	22	34	45	56	67	78	90	101	112
	25%	1	3	7	14	28	42	56	70	84	98	112	126	140
	30%	2	3	8	17	34	50	67	84	101	118	134	151	168
	35%	2	4	10	20	39	59	78	98	118	137	157	176	196
	40%	2	4	11	22	45	67	90	112	134	157	179	202	224
	60%	3	7	17	34	67	101	134	168	202	235	269	302	336
	80%	4	9	22	45	90	134	179	224	269	314	358	403	448
	100%	6	11	28	56	112	168	224	280	336	392	448	504	560

MONA OFFSHORE WIND PROJECT

Operations and maintenance phase

1.4.5.2 Three seasons were defined for black-legged kittiwake in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.32 to Table 1.34 for the operations and maintenance phase. Upper and lower matrices are presented in Appendix C.5.

Table 1.32: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	4	9	18	27	35	44	53	62	71	80	88
	20%	2	4	9	18	35	53	71	88	106	124	141	159	177
	30%	3	5	13	27	53	80	106	133	159	186	212	239	265
	40%	4	7	18	35	71	106	141	177	212	247	283	318	354
	50%	4	9	22	44	88	133	177	221	265	309	354	398	442
	60%	5	11	27	53	106	159	212	265	318	371	424	477	530
	70%	6	12	31	62	124	186	247	309	371	433	495	557	619
	80%	7	14	35	71	141	212	283	354	424	495	566	636	707
	90%	8	16	40	80	159	239	318	398	477	557	636	716	795
	100%	9	18	44	88	177	265	354	442	530	619	707	795	884

Table 1.33: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	4	7	11	14	18	21	25	28	32	35
	20%	1	1	4	7	14	21	28	35	43	50	57	64	71
	30%	1	2	5	11	21	32	43	53	64	74	85	96	106
	40%	1	3	7	14	28	43	57	71	85	99	114	128	142
	50%	2	4	9	18	35	53	71	89	106	124	142	160	177
	60%	2	4	11	21	43	64	85	106	128	149	170	192	213
	70%	2	5	12	25	50	74	99	124	149	174	199	223	248
	80%	3	6	14	28	57	85	114	142	170	199	227	255	284
	90%	3	6	16	32	64	96	128	160	192	223	255	287	319
	100%	4	7	18	35	71	106	142	177	213	248	284	319	355

MONA OFFSHORE WIND PROJECT

Table 1.34: Mean predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	1	3	6	11	17	22	28	34	39	45	50	56
	20%	1	2	6	11	22	34	45	56	67	78	90	101	112
	30%	2	3	8	17	34	50	67	84	101	118	134	151	168
	40%	2	4	11	22	45	67	90	112	134	157	179	202	224
	50%	3	6	14	28	56	84	112	140	168	196	224	252	280
	60%	3	7	17	34	67	101	134	168	202	235	269	302	336
	70%	4	8	20	39	78	118	157	196	235	274	314	353	392
	80%	4	9	22	45	90	134	179	224	269	314	358	403	448
	90%	5	10	25	50	101	151	202	252	302	353	403	454	504
	100%	6	11	28	56	112	168	224	280	336	392	448	504	560

1.4.6 Manx shearwater

Construction and decommissioning phases

1.4.6.1 Three seasons were defined for Manx shearwater in in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.35 and Table 1.37 for the construction and decommissioning phase. Upper and lower matrices are presented in Appendix C.6.

Table 1.35: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Spring migration (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	1	1
	25%	0	0	0	0	0	0	0	0	0	1	1	1	1
	30%	0	0	0	0	0	0	0	0	1	1	1	1	1
	35%	0	0	0	0	0	0	0	1	1	1	1	1	1
	40%	0	0	0	0	0	0	0	1	1	1	1	1	1
	60%	0	0	0	0	0	1	1	1	1	1	1	2	2
	80%	0	0	0	0	0	1	1	1	1	2	2	2	2
	100%	0	0	0	0	1	1	1	2	2	2	2	3	3

MONA OFFSHORE WIND PROJECT

Table 1.36: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	6	12	25	37	50	62	75	87	100	112	125
	15%	2	4	9	19	37	56	75	94	112	131	150	169	187
	20%	2	5	12	25	50	75	100	125	150	175	200	225	250
	25%	3	6	16	31	62	94	125	156	187	219	250	281	312
	30%	4	7	19	37	75	112	150	187	225	262	300	337	375
	35%	4	9	22	44	87	131	175	219	262	306	350	393	437
	40%	5	10	25	50	100	150	200	250	300	350	400	450	500
	60%	7	15	37	75	150	225	300	375	450	524	599	674	749
	80%	10	20	50	100	200	300	400	500	599	699	799	899	999
	100%	12	25	62	125	250	375	500	624	749	874	999	1124	1249

Table 1.37: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Autumn migration (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	5	7	9	11	13	15	16	18
	15%	0	1	1	3	5	8	11	14	16	19	22	25	27
	20%	0	1	2	4	7	11	15	18	22	25	29	33	36
	25%	0	1	2	5	9	14	18	23	27	32	36	41	45
	30%	1	1	3	5	11	16	22	27	33	38	44	49	54
	35%	1	1	3	6	13	19	25	32	38	44	51	57	64
	40%	1	1	4	7	15	22	29	36	44	51	58	65	73
	60%	1	2	5	11	22	33	44	54	65	76	87	98	109
	80%	1	3	7	15	29	44	58	73	87	102	116	131	145
	100%	2	4	9	18	36	54	73	91	109	127	145	163	182

Operations and maintenance phase

1.4.6.2

Three seasons were defined for Manx shearwater in in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.38 and Table 1.40 for the operations and maintenance phase. Upper and lower matrices are presented in Appendix C.6.

MONA OFFSHORE WIND PROJECT

Table 1.38: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Spring migration (operations and maintenance phase).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	1	1
	30%	0	0	0	0	0	0	0	0	1	1	1	1	1
	40%	0	0	0	0	0	0	0	1	1	1	1	1	1
	50%	0	0	0	0	0	0	1	1	1	1	1	1	2
	60%	0	0	0	0	0	1	1	1	1	1	1	2	2
	70%	0	0	0	0	0	1	1	1	1	1	2	2	2
	80%	0	0	0	0	0	1	1	1	1	2	2	2	2
	90%	0	0	0	0	1	1	1	1	2	2	2	2	3
	100%	0	0	0	0	1	1	1	2	2	2	2	3	3

Table 1.39: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	6	12	25	37	50	62	75	87	100	112	125
	20%	2	5	12	25	50	75	100	125	150	175	200	225	250
	30%	4	7	19	37	75	112	150	187	225	262	300	337	375
	40%	5	10	25	50	100	150	200	250	300	350	400	450	500
	50%	6	12	31	62	125	187	250	312	375	437	500	562	624
	60%	7	15	37	75	150	225	300	375	450	524	599	674	749
	70%	9	17	44	87	175	262	350	437	524	612	699	787	874
	80%	10	20	50	100	200	300	400	500	599	699	799	899	999
	90%	11	22	56	112	225	337	450	562	674	787	899	1012	1124
	100%	12	25	62	125	250	375	500	624	749	874	999	1124	1249

Table 1.40: Mean predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during the Autumn migration (operation and maintenance phase).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	5	7	9	11	13	15	16	18
	20%	0	1	2	4	7	11	15	18	22	25	29	33	36
	30%	1	1	3	5	11	16	22	27	33	38	44	49	54
	40%	1	1	4	7	15	22	29	36	44	51	58	65	73
	50%	1	2	5	9	18	27	36	45	54	64	73	82	91
	60%	1	2	5	11	22	33	44	54	65	76	87	98	109
	70%	1	3	6	13	25	38	51	64	76	89	102	114	127
	80%	1	3	7	15	29	44	58	73	87	102	116	131	145
	90%	2	3	8	16	33	49	65	82	98	114	131	147	163
	100%	2	4	9	18	36	54	73	91	109	127	145	163	182

MONA OFFSHORE WIND PROJECT

1.4.7 Red-throated diver

Construction and decommissioning phases

1.4.7.1 Three seasons were defined for red-throated diver in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.41 to Table 1.43 for the construction and decommissioning phase. Upper and lower matrices are presented in Appendix C.7.

Table 1.41: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during the Spring migration (construction and decommissioning). All entries are zero.

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1.42: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during the Autumn migration (construction and decommissioning). All entries are zero.

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table 1.43: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during non-breeding season (construction and decommissioning). All entries are zero.

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

1.4.7.2 Operations and maintenance phase Table 1.44 Three seasons were defined for red-throated diver in Chapter 6, Annex 5.1: Offshore ornithology baseline characterisation technical report of the Environmental Statement. Displacement matrices for each of these seasons, using the mean-peak populations presented in Table 1.4 are presented in Table 1.44 to Table 1.46 for the operations and maintenance phase. Upper and lower matrices are presented in Appendix C.7.

Table 1.44: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during Spring migration (operations and maintenance phase). All entries are zero.

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table 1.45: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during Autumn migration (operations and maintenance phase). All entries are zero.

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1.46: Mean predicted red-throated diver mortality for the Mona Array Area plus 4 km buffer during non-breeding period (operations and maintenance phase). All entries are zero.

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

1.5 Summary Tables

1.5.1.1 Results from the matrix tables in section 1.3 are summarised below for the construction and decommissioning phases (Table 1.47) and for the operations and maintenance phase (Table 1.48).

Table 1.47: Seasonal displacement estimates for the Mona Array Area plus 2 km buffer (or Mona Array Area plus 4 km buffer if appropriate for the species) during construction and decommissioning

		Seasonal mean peak population (Mona Array Area plus 2 km buffer or Mona Array plus 4 km if appropriate for the species)	Displacement rates (%)		Number of birds subject to mortality (individuals)
Species	Season			Mortality rates(%)	
Common guillemot	Breeding	4,220	15%	1%	6
			30%	10%	148
	Non-breeding	3,756	15%	1%	6
			30%	10%	131
Razorbill	Pre-breeding season/spring migration	1,924	15%	1%	3
			30%	10%	67
	Breeding	83	15%	1%	0
			30%	10%	3
	Post breeding season/autumn migration	91	15%	1%	0
			30%	10%	3
	Non-breeding/winter season	421	15%	1%	1
			30%	10%	15
Atlantic puffin	Breeding	15	15%	1%	0
			30%	10%	1

MONA OFFSHORE WIND PROJECT

		Seasonal mean peak population (Mona Array Area plus 2 km buffer or Mona Array plus 4 km if appropriate for the species)			Number of birds subject to mortality (individuals)
Species	Season		Displacement rates (%)	Mortality rates(%)	
Northern gannet	Non-breeding/winter season	0	15%	1%	0
			30%	10%	0
	Pre-breeding season/spring migration	28	30%	1%	0
			40%	10%	1
	Non-breeding/winter season	251	30%	1%	1
			40%	10%	10
	Post breeding season/autumn migration	58	30%	1%	0
			40%	10%	2
Black-legged kittiwake	Pre-breeding season/spring migration	884	15%	1%	1
			35%	10%	31
	Breeding	355	15%	1%	1
			35%	10%	12
	Post breeding season/autumn migration	560	15%	1%	1
			35%	10%	20
Manx shearwater	Pre-breeding season/spring migration	3	15%	1%	0
			35%	10%	0
	Breeding	1,249	15%	1%	2
			35%	10%	44
		182	15%	1%	0

MONA OFFSHORE WIND PROJECT

		Seasonal mean peak population (Mona Array Area plus 2 km buffer or Mona Array plus 4 km if appropriate for the species)	Displacement rates (%)		Number of birds subject to mortality (individuals)
Species	Season			Mortality rates(%)	
Red-throated diver	Post breeding season/autumn migration				
			35%	10%	6
	Pre-breeding season/spring migration	0	50%	1%	0
			50%	10%	0
	Post breeding season/autumn migration	0	50%	1%	0
			50%	10%	0
Non-breeding/winter season	0	50%	1%	0	
		50%	10%	0	

MONA OFFSHORE WIND PROJECT

Table 1.48: Seasonal displacement estimates for the Mona Array Area plus 2 km buffer (or Mona Array Area plus 4 km buffer if appropriate for the species) during operation and maintenance

Species	Season	Seasonal mean peak population (Mona Array Area plus 2 km buffer or Mona Array plus 4 km if appropriate for the species)	Displacement rates (%)	Mortality rates(%)	Number of birds subject to mortality (individuals)
Common guillemot	Breeding	4,220	30%	1%	13
			70%	10%	295
	Non-breeding	3,756	30%	1%	11
			70%	10%	263
Razorbill	Pre-breeding season/spring migration	1,924	30%	1%	6
			70%	10%	135
	Breeding	83	30%	1%	0
			70%	10%	6
	Post breeding season/autumn migration	91	30%	1%	0
			70%	10%	6
	Non-breeding/winter season	421	30%	1%	1
			70%	10%	29
Atlantic puffin	Breeding	15	30%	1%	0
			70%	10%	1
	Non-breeding/winter season	0	30%	1%	0
			70%	10%	0
Northern gannet		28	60%	1%	0

MONA OFFSHORE WIND PROJECT

		Seasonal mean peak population (Mona Array Area plus 2 km buffer or Mona Array plus 4 km if appropriate for the species)			
Species	Season		Displacement rates (%)	Mortality rates(%)	Number of birds subject to mortality (individuals)
	Pre-breeding season/spring migration		80%	10%	2
	Non-breeding/winter season	251	60%	1%	2
			80%	10%	20
	Post breeding season/autumn migration	58	60%	1%	0
			80%	10%	5
	Black-legged kittiwake	Pre-breeding season/spring migration	884	30%	1%
70%				10%	62
Breeding		355	30%	1%	1
			70%	10%	25
Post breeding season/autumn migration		560	30%	1%	2
			70%	10%	39
Manx shearwater	Pre-breeding season/spring migration	3	30%	1%	0
			70%	10%	0
	Breeding	1,249	30%	1%	4
			70%	10%	87
	Post breeding season/autumn migration	182	30%	1%	1
			70%	10%	13
Red-throated diver		0	100%	1%	0

MONA OFFSHORE WIND PROJECT

		Seasonal mean peak population (Mona Array Area plus 2 km buffer or Mona Array plus 4 km if appropriate for the species)			
Species	Season		Displacement rates (%)	Mortality rates(%)	Number of birds subject to mortality (individuals)
	Pre-breeding season/spring migration		100%	10%	0
	Post breeding season/autumn migration	0	100%	1%	0
			100%	10%	0
	Non-breeding/winter season	0	100%	1%	0
			100%	10%	0

1.6 References

- Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W. and Hume, D. (2014) Mapping seabird sensitivity to offshore wind farms. PloS one, 9(9), p.e106366.
- Cook, A.S.C.P, Humphreys, E.M., Bennet, F., Masden, E.A., and Burton, N.H.K. (2018) Quantifying avian avoidance of offshore wind turbines: Current evidence and key knowledge gaps. Marine Environmental Research, 140: 278-288.
- Dierschke V., Furness R.W. & Garthe S. (2016) Seabirds and offshore wind farms in European waters: Avoidance and attraction. Biological Conservation 202: 59-68.
- Furness, R.W., Wade, H.M. and Masden, E.A. (2013) Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management, 119, 56-66.
- Furness, R.W. (2015) Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, No. 164. Available at: <http://publications.naturalengland.org.uk/publication/6427568802627584>. Accessed August 2023
- Furness, B. and Wade, H. (2012) Vulnerability of Scottish Seabirds to Offshore Wind Turbines. Report for Marine Scotland, The Scottish Government.
- Garthe, S and Hüppop, O. (2004) Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology, 41, 724-734.
- Heinänen S, Žydelis R, Kleinschmidt B, Dorsch M, Burger C, Morkūnas J, Quillfeldt P, Nehls G. (2020) Satellite telemetry and digital aerial surveys show strong displacement of red-throated divers (*Gavia stellata*) from offshore wind farms', Marine Environmental Research, 160, p. 104989. doi:10.1016/j.marenvres.2020.104989.
- Horswill, C. and Robinson R. A. (2015) Review of seabird demographic rates and density dependence. JNCC Report No. 552. Joint Nature Conservation Committee, Peterborough.
- Joint Nature Conservation Committee (JNCC). (2023) Seabird Monitoring Programme. Available at <https://app.bto.org/seabirds>
- Kaiser, M., Elliott, A., Galanidi, M., Ivor, E., Rees, S., Caldow, R., Stillman, R., Sutherland, W. and Showler, D. (2002) Predicting the Displacement of Common Scoter *Melanitta nigra* from Benthic Feeding Areas Due to Offshore Windfarms (Report No. COWRIE-BEN-03-2002). Report by Bangor University. Report for Collaborative Offshore Wind Research into the Environment (COWRIE).
- Krijgsveld, K.L., Fijn, R.C., Japink, M., van Horssen, P.W., Heunks, C., Collier, M.P., Poot, M.J.M., Beuker, D. and Dirksen, S. (2011) Effect Studies Offshore Wind Farm Egmond aan Zee: Final report on fluxes, flight altitudes and behaviour of flying birds. Bureau Waardenburg Report No 10-219.
- Leopold, M.F., Dijkman, E.M. and Teal, L. (2011) Local birds in and around the Offshore Wind farm Egmond aan Zee (OWEZ) (T-0 & T-1, 2002-2010). NoordzeeWind report OWEZ_R_221_T1_20110915_localbirds_final. Imares / NoordzeeWind, Wageningen /IJmuiden.
- Marine Industry Group for Ornithology (MIG-Birds) (2022) Joint SNCB Interim Advice on the Treatment of Displacement for Red-Throated Diver (2022).
- Natural England (2021) Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase III: Expectations for data analysis and presentation at examination for offshore wind applications.
- Peschko, V., Mendel, B., Mercker, M., Dierschke, J. and Garthe, S. (2021) Northern gannets (*Morus bassanus*) are strongly affected by operating offshore wind farms during the breeding season. J.

MONA OFFSHORE WIND PROJECT

Environ. Manag. 279, 111509. Available at: <https://doi.org/10.1016/j.jenvman.2020.111509>. Accessed August 2022.

Pettifor, R.A., Caldow, R.W.G., Rowcliffe J.M., Goss-Custard, J.D. and Black, J.M. (2000) Spatially explicit, individual-based, behavioural models of the annual cycle of two migratory goose populations. *J. Appl. Ecol.* 37:103–35.

Searle, K., Mobbs, D., Butler, A., Bogdanova, M., Freeman, S., Wanless, S. and Daunt, F. (2014) Population consequences of displacement from proposed offshore wind energy developments for seabirds breeding at Scottish SPAs (CR/2012/03). Report to Scottish Government.

Skov, H., Heinänen, S., Norman, T., Ward, R.M., Méndez-Roldán, S. and Ellis, I. (2018) ORJIP Bird Collision and Avoidance Study. Final report – April 2018. The Carbon Trust, United Kingdom.

SMP (2023). Latest SMP productivity estimates. Data supplied (on request) by the British Trust for Ornithology (BTO).

Joint Nature Conservation Committee (JNCC). (2022) Joint SNCB Note Interim Displacement Advice Note.

Topping, C. and Petersen, I.K. (2011) Report on a red-throated diver agent-based model to assess the cumulative impact from offshore wind farms. Report commissioned by Vattenfall A/S. Aarhus University, DCE - Danish Centre for Environment and Energy.

Vanermen, N., Stienen, E.W.M., Courtens, W., Onkelinx, T., Van de walle, M. and Verstraete, H. (2016) Bird monitoring at offshore wind farms in the Belgian part of the North Sea - Assessing seabird displacement effects. *Rapporten van het Instituut voor Natuur- en Bosonderzoek 2013* (INBO.R.2013.755887). Instituut voor Natuur- en Bosonderzoek, Brussels.

Wade, H.M., Masden E.M., Jackson, A.C. and Furness, R.W. (2016) Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments. *Marine Policy*, 70, 108-113.

West, A.D., Goss-Custard, J.D., McGrorty, S., Stillman, R.A., Durell, S.E.A. le V. dit, Stewart, B., Walker, P., Palmer, D.W. and Coates, P. (2003) The Burry shellfishery and oystercatchers: using a behaviour-based model to advise on shellfishery management policy. *Marine Ecology Progress Series*, 248: 279-292.

Woodward, I., Thaxter, C.B., Owen, E. and Cook, A.S.C.P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. BTO Report 724 for The Crown Estate.

MONA OFFSHORE WIND PROJECT

Appendix A: Bird data for displacement

A.1 Monthly abundance estimates

Table A. 1: Common guillemot modelled abundance (all behaviours and all ages classes) within the Mona Array Area plus associated buffer. Calendar Years 1, 2 and 3 for surveys: March 2020 to February 2022. Peak figures used in displacement assessment in each season are outlined in bold.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mona Array Area plus 2 km												
Year 1	N/A	N/A	5,739	519	154	713	436	200	215	20	1,171	642
LCI	N/A	N/A	4,895	375	88	477	301	121	144	1	815	466
UCI	N/A	N/A	6,657	683	247	1,000	601	306	313	124	1,569	839
Year 2	1,162	4,415	2,702	1,919	203	458	836	50	14	408	41	1,763
LCI	791	3,738	1,953	1,605	118	338	664	18	3	291	12	1,464
UCI	1,569	5,201	3,570	2,261	309	599	1,026	113	44	552	98	2,091
Year 3	3,097	1,648	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCI	2,565	1,352	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UCI	3,665	1,978	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MONA OFFSHORE WIND PROJECT

Table A. 2: Razorbill modelled abundance (all behaviours and all ages classes) within the Mona Array Area plus associated buffer. Calendar Years 1, 2 and 3 for surveys: March 2020 to February 2022. Peak figures used in displacement assessment in each season are outlined in bold.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mona Array Area plus 2 km												
Year 1	N/A	N/A	1,543	8	35	11	23	55	173	0	223	60
LCI	N/A	N/A	1,104	0	0	0	6	15	58	0	94	10
UCI	N/A	N/A	2,078	26	72	34	79	103	413	0	350	793
Year 2	387	2,305	1,097	130	10	17	41	9	0	0	0	619
LCI	172	1,547	769	57	0	0	0	0	0	0	0	409
UCI	735	3,219	1,484	256	28	36	99	26	0	0	0	870
Year 3	619	960	515	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCI	409	623	357	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UCI	870	1,391	721	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MONA OFFSHORE WIND PROJECT

Table A. 3: Atlantic Puffin modelled abundance (all behaviours and all ages classes) within the Mona Array Area plus associated buffer. Calendar Years 1, 2 and 3 for surveys: March 2020 to February 2022. Peak figures used in displacement assessment in each season are outlined in bold.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mona Array Area plus 2 km												
Year 1	N/A	N/A	44	8	0	0	30	0	0	0	0	0
LCI	N/A	N/A	7	0	0	0	0	0	0	0	0	0
UCI	N/A	N/A	80	23	0	0	63	0	0	0	0	0
Year 2	0	0	0	0	0	0	0	0	0	0	0	0
LCI	0	0	0	0	0	0	0	0	0	0	0	0
UCI	0	0	0	0	0	0	0	0	0	0	0	0
Year 3	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCI	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UCI	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MONA OFFSHORE WIND PROJECT

Table A. 4: Northern gannet modelled abundance (all behaviours and all ages classes) within the Mona Array Area plus associated buffer. Calendar Years 1, 2 and 3 for surveys: March 2020 to February 2022. Peak figures used in displacement assessment in each season are outlined in bold.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mona Array Area plus 2 km												
Year 1	N/A	N/A	77	52	11	13	209	144	26	26	26	0
LCI	N/A	N/A	31	19	0	0	142	91	6	6	6	0
UCI	N/A	N/A	124	83	27	32	282	221	50	52	53	0
Year 2	34	0	117	212	59	13	34	66	293	89	13	12
LCI	6	0	64	138	26	0	15	30	188	59	0	0
UCI	61	0	191	302	95	32	64	121	422	131	27	38
Year 3	6	21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCI	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UCI	20	42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MONA OFFSHORE WIND PROJECT

Table A. 5: Black-legged kittiwake modelled abundance (all behaviours and all ages classes) within the Mona Array Area plus associated buffer. Calendar Years 1, 2 and 3 for surveys: March 2020 to February 2022. Peak figures used in displacement assessment in each season are outlined in bold.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mona Array Area plus 2 km												
Year 1	N/A	N/A	548	132	5	264	127	55	0	0	242	214
LCI	N/A	N/A	337	85	0	176	80	20	0	0	146	126
UCI	N/A	N/A	822	190	16	374	188	92	0	0	367	326
Year 2	287	258	907	391	199	124	445	0	0	28	112	879
LCI	204	175	644	274	51	73	240	0	0	7	65	574
UCI	385	356	1,239	526	167	195	744	0	0	56	179	1,285
Year 3	676	861	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCI	428	592	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UCI	1,014	1,208	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MONA OFFSHORE WIND PROJECT

Table A. 6: Manx shearwater modelled abundance (all behaviours and all ages classes) within the Mona Array Area plus associated buffer. Calendar Years 1, 2 and 3 for surveys: March 2020 to February 2022. Peak figures used in displacement assessment in each season are outlined in bold.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mona Array Area plus 2 km												
Year 1	N/A	N/A	N/A	0	0	7	324	32	25	0	0	0
LCI	N/A	N/A	N/A	0	0	0	80	6	0	0	0	0
UCI	N/A	N/A	N/A	0	0	20	820	57	55	0	0	0
Year 2	0	0	0	6	0	2,173	1,355	331	1	0	0	0
LCI	0	0	0	0	0	589	550	115	0	0	0	0
UCI	0	0	0	20	0	5,538	2,575	685	9	0	0	0
Year 3	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCI	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UCI	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MONA OFFSHORE WIND PROJECT

Table A. 7: Red-throated diver modelled abundance (all behaviours and all ages classes) within the Mona Array Area plus associated buffer. Calendar Years 1, 2 and 3 for surveys: March 2020 to February 2022. Peak figures used in displacement assessment in each season are outlined in bold.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mona Array Area plus 4 km												
Year 1	N/A	N/A	0	0	0	0	0	0	0	0	0	0
LCI	N/A	N/A	0	0	0	0	0	0	0	0	0	0
UCI	N/A	N/A	0	0	0	0	0	0	0	0	0	0
Year 2	0	0	0	0	0	0	0	0	0	0	0	0
LCI	0	0	0	0	0	0	0	0	0	0	0	0
UCI	0	0	0	0	0	0	0	0	0	0	0	0
Year 3	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCI	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UCI	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix B: Upper and lower confidence interval abundance estimates

B.1 Upper peak abundance estimates

Table B. 1: Upper confidence limit peak abundances for use in the assessment for each season.

Species	Pre-breeding season/spring migration	Breeding season	Post breeding season/autumn migration	Non-breeding/winter season
Common guillemot				
Peak Year 1	N/A	6,657	N/A	5,201
Peak Year 2	N/A	3,570	N/A	3,665
Mean peak	N/A	5,113	N/A	4,433
Razorbill				
Peak Year 1	2,078	72	413	793
Peak Year 2	3,219	256	26	870
Mean peak	2,649	164	220	831
Atlantic puffin				
Peak Year 1	N/A	63	N/A	0
Peak Year 2	N/A	0	N/A	0
Mean peak	N/A	31	N/A	0
Northern gannet				
Peak Year 1	121	191	302	n/a
Peak Year 2	42	422	131	n/a
Mean peak	82	306	217	n/a
Black-legged kittiwake				

MONA OFFSHORE WIND PROJECT

Species	Pre-breeding season/spring migration	Breeding season	Post breeding season/autumn migration	Non-breeding/winter season
Peak Year 1	1,239	374	367	N/A
Peak Year 2	1,208	744	1,285	N/A
Mean peak	1,223	559	826	N/A
Manx shearwater				
Peak Year 1	0	820	57	N/A
Peak Year 2	20	5,538	685	N/A
Mean peak	10	3,179	371	N/A
Red-throated diver				
Peak Year 1	0	N/A	0	0
Peak Year 2	0	N/A	0	0
Mean peak	0	N/A	0	0

B.2 Lower peak abundance estimates

Table B. 2: Lower confidence limit peak abundances for use in the assessment for each season.

Species	Pre-Breeding season/spring migration	Breeding season	Post Breeding season/autumn migration	Non-breeding/winter season
Common guillemot				
Peak Year 1	N/A	4,895	N/A	3,738
Peak Year 2	N/A	1,953	N/A	2,565
Mean peak	N/A	3,424	N/A	3,151
Razorbill				
Peak Year 1	1,104	15	58	94
Peak Year 2	1,547	57	0	409
Mean peak	1,326	36	29	252
Atlantic puffin				
Peak Year 1	N/A	0	N/A	0
Peak Year 2	N/A	0	N/A	0
Mean peak	N/A	0	N/A	0
Northern gannet				
Peak Year 1	6	142	6	N/A
Peak Year 2	0	188	59	N/A
Mean peak	3	165	32	N/A
Black-legged kittiwake				
Peak Year 1	644	176	146	N/A

MONA OFFSHORE WIND PROJECT

Species	Pre-Breeding season/spring migration	Breeding season	Post Breeding season/autumn migration	Non-breeding/winter season
Peak Year 2	592	240	574	N/A
Mean peak	618	208	360	N/A
Manx shearwater				
Peak Year 1	0	80	6	0
Peak Year 2	0	589	115	0
Mean peak	0	334	61	0
Red-throated diver				
Peak Year 1	0	N/A	0	0
Peak Year 2	0	N/A	0	0
Mean peak	0	N/A	0	0

Appendix C: Upper and lower confidence interval matrices

C.1 Common guillemot

Table C. 1: LCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	3	7	17	34	68	103	137	171	205	240	274	308	342
	15%	5	10	26	51	103	154	205	257	308	359	411	462	514
	20%	7	14	34	68	137	205	274	342	411	479	548	616	685
	25%	9	17	43	86	171	257	342	428	514	599	685	770	856
	30%	10	21	51	103	205	308	411	514	616	719	822	924	1027
	35%	12	24	60	120	240	359	479	599	719	839	959	1078	1198
	40%	14	27	68	137	274	411	548	685	822	959	1096	1233	1369
	60%	21	41	103	205	411	616	822	1027	1233	1438	1643	1849	2054
	80%	27	55	137	274	548	822	1096	1369	1643	1917	2191	2465	2739
	100%	34	68	171	342	685	1027	1369	1712	2054	2397	2739	3081	3424

Table C. 2: UCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	5	10	26	51	102	153	205	256	307	358	409	460	511
	15%	8	15	38	77	153	230	307	383	460	537	614	690	767
	20%	10	20	51	102	205	307	409	511	614	716	818	920	1023
	25%	13	26	64	128	256	383	511	639	767	895	1023	1150	1278
	30%	15	31	77	153	307	460	614	767	920	1074	1227	1381	1534
	35%	18	36	89	179	358	537	716	895	1074	1253	1432	1611	1790
	40%	20	41	102	205	409	614	818	1023	1227	1432	1636	1841	2045
	60%	31	61	153	307	614	920	1227	1534	1841	2147	2454	2761	3068
	80%	41	82	205	409	818	1227	1636	2045	2454	2863	3272	3681	4090
	100%	51	102	256	511	1023	1534	2045	2557	3068	3579	4090	4602	5113

MONA OFFSHORE WIND PROJECT

Table C. 3: LCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	3	6	16	32	63	95	126	158	189	221	252	284	315
	15%	5	9	24	47	95	142	189	236	284	331	378	425	473
	20%	6	13	32	63	126	189	252	315	378	441	504	567	630
	25%	8	16	39	79	158	236	315	394	473	551	630	709	788
	30%	9	19	47	95	189	284	378	473	567	662	756	851	945
	35%	11	22	55	110	221	331	441	551	662	772	882	993	1103
	40%	13	25	63	126	252	378	504	630	756	882	1008	1135	1261
	60%	19	38	95	189	378	567	756	945	1135	1324	1513	1702	1891
	80%	25	50	126	252	504	756	1008	1261	1513	1765	2017	2269	2521
	100%	32	63	158	315	630	945	1261	1576	1891	2206	2521	2836	3151

Table C. 4: UCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	4	9	22	44	89	133	177	222	266	310	355	399	443
	15%	7	13	33	66	133	199	266	332	399	465	532	598	665
	20%	9	18	44	89	177	266	355	443	532	621	709	798	887
	25%	11	22	55	111	222	332	443	554	665	776	887	997	1108
	30%	13	27	66	133	266	399	532	665	798	931	1064	1197	1330
	35%	16	31	78	155	310	465	621	776	931	1086	1241	1396	1551
	40%	18	35	89	177	355	532	709	887	1064	1241	1418	1596	1773
	60%	27	53	133	266	532	798	1064	1330	1596	1862	2128	2394	2660
	80%	35	71	177	355	709	1064	1418	1773	2128	2482	2837	3192	3546
	100%	44	89	222	443	887	1330	1773	2216	2660	3103	3546	3989	4433

Table C. 5: LCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (operation).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	3	7	17	34	68	103	137	171	205	240	274	308	342
	20%	7	14	34	68	137	205	274	342	411	479	548	616	685
	30%	10	21	51	103	205	308	411	514	616	719	822	924	1027
	40%	14	27	68	137	274	411	548	685	822	959	1096	1233	1369
	50%	17	34	86	171	342	514	685	856	1027	1198	1369	1541	1712
	60%	21	41	103	205	411	616	822	1027	1233	1438	1643	1849	2054
	70%	24	48	120	240	479	719	959	1198	1438	1678	1917	2157	2397
	80%	27	55	137	274	548	822	1096	1369	1643	1917	2191	2465	2739
	90%	31	62	154	308	616	924	1233	1541	1849	2157	2465	2773	3081
	100%	34	68	171	342	685	1027	1369	1712	2054	2397	2739	3081	3424

MONA OFFSHORE WIND PROJECT

Table C. 6: UCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the breeding season (operation).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	5	10	26	51	102	153	205	256	307	358	409	460	511
	20%	10	20	51	102	205	307	409	511	614	716	818	920	1023
	30%	15	31	77	153	307	460	614	767	920	1074	1227	1381	1534
	40%	20	41	102	205	409	614	818	1023	1227	1432	1636	1841	2045
	50%	26	51	128	256	511	767	1023	1278	1534	1790	2045	2301	2557
	60%	31	61	153	307	614	920	1227	1534	1841	2147	2454	2761	3068
	70%	36	72	179	358	716	1074	1432	1790	2147	2505	2863	3221	3579
	80%	41	82	205	409	818	1227	1636	2045	2454	2863	3272	3681	4090
	90%	46	92	230	460	920	1381	1841	2301	2761	3221	3681	4142	4602
	100%	51	102	256	511	1023	1534	2045	2557	3068	3579	4090	4602	5113

Table C. 7: LCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operation).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	3	6	16	32	63	95	126	158	189	221	252	284	315
	20%	6	13	32	63	126	189	252	315	378	441	504	567	630
	30%	9	19	47	95	189	284	378	473	567	662	756	851	945
	40%	13	25	63	126	252	378	504	630	756	882	1008	1135	1261
	50%	16	32	79	158	315	473	630	788	945	1103	1261	1418	1576
	60%	19	38	95	189	378	567	756	945	1135	1324	1513	1702	1891
	70%	22	44	110	221	441	662	882	1103	1324	1544	1765	1985	2206
	80%	25	50	126	252	504	756	1008	1261	1513	1765	2017	2269	2521
	90%	28	57	142	284	567	851	1135	1418	1702	1985	2269	2553	2836
	100%	32	63	158	315	630	945	1261	1576	1891	2206	2521	2836	3151

Table C. 8: UCI predicted common guillemot mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operation).

Guillemot		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	4	9	22	44	89	133	177	222	266	310	355	399	443
	20%	9	18	44	89	177	266	355	443	532	621	709	798	887
	30%	13	27	66	133	266	399	532	665	798	931	1064	1197	1330
	40%	18	35	89	177	355	532	709	887	1064	1241	1418	1596	1773
	50%	22	44	111	222	443	665	887	1108	1330	1551	1773	1995	2216
	60%	27	53	133	266	532	798	1064	1330	1596	1862	2128	2394	2660
	70%	31	62	155	310	621	931	1241	1551	1862	2172	2482	2793	3103
	80%	35	71	177	355	709	1064	1418	1773	2128	2482	2837	3192	3546
	90%	40	80	199	399	798	1197	1596	1995	2394	2793	3192	3590	3989
	100%	44	89	222	443	887	1330	1773	2216	2660	3103	3546	3989	4433

MONA OFFSHORE WIND PROJECT

C.2 Razorbill

Table C. 9: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	3	7	13	27	40	53	66	80	93	106	119	133
	15%	2	4	10	20	40	60	80	99	119	139	159	179	199
	20%	3	5	13	27	53	80	106	133	159	186	212	239	265
	25%	3	7	17	33	66	99	133	166	199	232	265	298	331
	30%	4	8	20	40	80	119	159	199	239	278	318	358	398
	35%	5	9	23	46	93	139	186	232	278	325	371	418	464
	40%	5	11	27	53	106	159	212	265	318	371	424	477	530
	60%	8	16	40	80	159	239	318	398	477	557	636	716	795
	80%	11	21	53	106	212	318	424	530	636	742	848	954	1060
	100%	13	27	66	133	265	398	530	663	795	928	1060	1193	1326

Table C. 10: UCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	3	5	13	26	53	79	106	132	159	185	212	238	265
	15%	4	8	20	40	79	119	159	199	238	278	318	358	397
	20%	5	11	26	53	106	159	212	265	318	371	424	477	530
	25%	7	13	33	66	132	199	265	331	397	463	530	596	662
	30%	8	16	40	79	159	238	318	397	477	556	636	715	795
	35%	9	19	46	93	185	278	371	463	556	649	742	834	927
	40%	11	21	53	106	212	318	424	530	636	742	848	953	1059
	60%	16	32	79	159	318	477	636	795	953	1112	1271	1430	1589
	80%	21	42	106	212	424	636	848	1059	1271	1483	1695	1907	2119
	100%	26	53	132	265	530	795	1059	1324	1589	1854	2119	2384	2649

MONA OFFSHORE WIND PROJECT

Table C. 11: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	1	2	2	2	3	3
	15%	0	0	0	0	1	1	2	2	3	3	3	4	4
	20%	0	0	0	1	1	2	2	3	3	4	5	5	6
	25%	0	0	0	1	1	2	3	4	4	5	6	6	7
	30%	0	0	0	1	2	3	3	4	5	6	7	8	9
	35%	0	0	0	1	2	3	4	5	6	7	8	9	10
	40%	0	0	1	1	2	3	5	6	7	8	9	10	11
	60%	0	0	1	2	3	5	7	9	10	12	14	15	17
	80%	0	0	1	2	5	7	9	11	14	16	18	20	23
	100%	0	1	1	3	6	9	11	14	17	20	23	26	28

Table C. 12: UCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	3	5	7	8	10	11	13	15	16
	15%	0	0	1	2	5	7	10	12	15	17	20	22	25
	20%	0	1	2	3	7	10	13	16	20	23	26	30	33
	25%	0	1	2	4	8	12	16	20	25	29	33	37	41
	30%	0	1	2	5	10	15	20	25	30	34	39	44	49
	35%	1	1	3	6	11	17	23	29	34	40	46	52	57
	40%	1	1	3	7	13	20	26	33	39	46	52	59	66
	60%	1	2	5	10	20	30	39	49	59	69	79	89	98
	80%	1	3	7	13	26	39	52	66	79	92	105	118	131
	100%	2	3	8	16	33	49	66	82	98	115	131	148	164

MONA OFFSHORE WIND PROJECT

Table C. 13: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	1	2	2	2	3	3
	15%	0	0	0	0	1	1	2	2	3	3	4	4	4
	20%	0	0	0	1	1	2	2	3	4	4	5	5	6
	25%	0	0	0	1	1	2	3	4	4	5	6	7	7
	30%	0	0	0	1	2	3	4	4	5	6	7	8	9
	35%	0	0	1	1	2	3	4	5	6	7	8	9	10
	40%	0	0	1	1	2	4	5	6	7	8	9	11	12
	60%	0	0	1	2	4	5	7	9	11	12	14	16	18
	80%	0	0	1	2	5	7	9	12	14	16	19	21	23
	100%	0	1	1	3	6	9	12	15	18	20	23	26	29

Table C. 14: UCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	7	9	11	13	15	18	20	22
	15%	0	1	2	3	7	10	13	16	20	23	26	30	33
	20%	0	1	2	4	9	13	18	22	26	31	35	40	44
	25%	1	1	3	5	11	16	22	27	33	38	44	49	55
	30%	1	1	3	7	13	20	26	33	40	46	53	59	66
	35%	1	2	4	8	15	23	31	38	46	54	61	69	77
	40%	1	2	4	9	18	26	35	44	53	61	70	79	88
	60%	1	3	7	13	26	40	53	66	79	92	105	119	132
	80%	2	4	9	18	35	53	70	88	105	123	141	158	176
	100%	2	4	11	22	44	66	88	110	132	154	176	198	220

Table C. 15: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	1	3	5	8	10	13	15	18	20	23	25
	15%	0	1	2	4	8	11	15	19	23	26	30	34	38
	20%	1	1	3	5	10	15	20	25	30	35	40	45	50
	25%	1	1	3	6	13	19	25	31	38	44	50	57	63
	30%	1	2	4	8	15	23	30	38	45	53	60	68	75
	35%	1	2	4	9	18	26	35	44	53	62	70	79	88
	40%	1	2	5	10	20	30	40	50	60	70	80	91	101
	60%	2	3	8	15	30	45	60	75	91	106	121	136	151
	80%	2	4	10	20	40	60	80	101	121	141	161	181	201
	100%	3	5	13	25	50	75	101	126	151	176	201	226	252

MONA OFFSHORE WIND PROJECT

Table C. 16: UCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	4	8	17	25	33	42	50	58	67	75	83
	15%	1	2	6	12	25	37	50	62	75	87	100	112	125
	20%	2	3	8	17	33	50	67	83	100	116	133	150	166
	25%	2	4	10	21	42	62	83	104	125	145	166	187	208
	30%	2	5	12	25	50	75	100	125	150	175	200	224	249
	35%	3	6	15	29	58	87	116	145	175	204	233	262	291
	40%	3	7	17	33	67	100	133	166	200	233	266	299	333
	60%	5	10	25	50	100	150	200	249	299	349	399	449	499
	80%	7	13	33	67	133	200	266	333	399	466	532	599	665
	100%	8	17	42	83	166	249	333	416	499	582	665	748	831

Table C. 17: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Spring migration (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	3	7	13	27	40	53	66	80	93	106	119	133
	20%	3	5	13	27	53	80	106	133	159	186	212	239	265
	30%	4	8	20	40	80	119	159	199	239	278	318	358	398
	40%	5	11	27	53	106	159	212	265	318	371	424	477	530
	50%	7	13	33	66	133	199	265	331	398	464	530	597	663
	60%	8	16	40	80	159	239	318	398	477	557	636	716	795
	70%	9	19	46	93	186	278	371	464	557	650	742	835	928
	80%	11	21	53	106	212	318	424	530	636	742	848	954	1060
	90%	12	24	60	119	239	358	477	597	716	835	954	1074	1193
	100%	13	27	66	133	265	398	530	663	795	928	1060	1193	1326

Table C. 18: UCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Spring migration (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	3	5	13	26	53	79	106	132	159	185	212	238	265
	20%	5	11	26	53	106	159	212	265	318	371	424	477	530
	30%	8	16	40	79	159	238	318	397	477	556	636	715	795
	40%	11	21	53	106	212	318	424	530	636	742	848	953	1059
	50%	13	26	66	132	265	397	530	662	795	927	1059	1192	1324
	60%	16	32	79	159	318	477	636	795	953	1112	1271	1430	1589
	70%	19	37	93	185	371	556	742	927	1112	1298	1483	1669	1854
	80%	21	42	106	212	424	636	848	1059	1271	1483	1695	1907	2119
	90%	24	48	119	238	477	715	953	1192	1430	1669	1907	2145	2384
	100%	26	53	132	265	530	795	1059	1324	1589	1854	2119	2384	2649

MONA OFFSHORE WIND PROJECT

Table C. 19: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the breeding season (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	1	2	2	2	3	3
	20%	0	0	0	1	1	2	2	3	3	4	5	5	6
	30%	0	0	0	1	2	3	3	4	5	6	7	8	9
	40%	0	0	1	1	2	3	5	6	7	8	9	10	11
	50%	0	0	1	1	3	4	6	7	9	10	11	13	14
	60%	0	0	1	2	3	5	7	9	10	12	14	15	17
	70%	0	0	1	2	4	6	8	10	12	14	16	18	20
	80%	0	0	1	2	5	7	9	11	14	16	18	20	23
	90%	0	1	1	3	5	8	10	13	15	18	20	23	26
	100%	0	1	1	3	6	9	11	14	17	20	23	26	28

Table C. 20: UCI predicted razorbill mortality for the Mona Array Area 2 km buffer during the breeding season (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	3	5	7	8	10	11	13	15	16
	20%	0	1	2	3	7	10	13	16	20	23	26	30	33
	30%	0	1	2	5	10	15	20	25	30	34	39	44	49
	40%	1	1	3	7	13	20	26	33	39	46	52	59	66
	50%	1	2	4	8	16	25	33	41	49	57	66	74	82
	60%	1	2	5	10	20	30	39	49	59	69	79	89	98
	70%	1	2	6	11	23	34	46	57	69	80	92	103	115
	80%	1	3	7	13	26	39	52	66	79	92	105	118	131
	90%	1	3	7	15	30	44	59	74	89	103	118	133	148
	100%	2	3	8	16	33	49	66	82	98	115	131	148	164

Table C. 21: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	1	2	2	2	3	3
	20%	0	0	0	1	1	2	2	3	4	4	5	5	6
	30%	0	0	0	1	2	3	4	4	5	6	7	8	9
	40%	0	0	1	1	2	4	5	6	7	8	9	11	12
	50%	0	0	1	1	3	4	6	7	9	10	12	13	15
	60%	0	0	1	2	4	5	7	9	11	12	14	16	18
	70%	0	0	1	2	4	6	8	10	12	14	16	18	20
	80%	0	0	1	2	5	7	9	12	14	16	19	21	23
	90%	0	1	1	3	5	8	11	13	16	18	21	24	26
	100%	0	1	1	3	6	9	12	15	18	20	23	26	29

MONA OFFSHORE WIND PROJECT

Table C. 22: UCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	7	9	11	13	15	18	20	22
	20%	0	1	2	4	9	13	18	22	26	31	35	40	44
	30%	1	1	3	7	13	20	26	33	40	46	53	59	66
	40%	1	2	4	9	18	26	35	44	53	61	70	79	88
	50%	1	2	5	11	22	33	44	55	66	77	88	99	110
	60%	1	3	7	13	26	40	53	66	79	92	105	119	132
	70%	2	3	8	15	31	46	61	77	92	108	123	138	154
	80%	2	4	9	18	35	53	70	88	105	123	141	158	176
	90%	2	4	10	20	40	59	79	99	119	138	158	178	198
	100%	2	4	11	22	44	66	88	110	132	154	176	198	220

Table C. 23: LCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	1	3	5	8	10	13	15	18	20	23	25
	20%	1	1	3	5	10	15	20	25	30	35	40	45	50
	30%	1	2	4	8	15	23	30	38	45	53	60	68	75
	40%	1	2	5	10	20	30	40	50	60	70	80	91	101
	50%	1	3	6	13	25	38	50	63	75	88	101	113	126
	60%	2	3	8	15	30	45	60	75	91	106	121	136	151
	70%	2	4	9	18	35	53	70	88	106	123	141	158	176
	80%	2	4	10	20	40	60	80	101	121	141	161	181	201
	90%	2	5	11	23	45	68	91	113	136	158	181	204	226
	100%	3	5	13	25	50	75	101	126	151	176	201	226	252

Table C. 24: UCI predicted razorbill mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operation).

Razorbill		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	4	8	17	25	33	42	50	58	67	75	83
	20%	2	3	8	17	33	50	67	83	100	116	133	150	166
	30%	2	5	12	25	50	75	100	125	150	175	200	224	249
	40%	3	7	17	33	67	100	133	166	200	233	266	299	333
	50%	4	8	21	42	83	125	166	208	249	291	333	374	416
	60%	5	10	25	50	100	150	200	249	299	349	399	449	499
	70%	6	12	29	58	116	175	233	291	349	407	466	524	582
	80%	7	13	33	67	133	200	266	333	399	466	532	599	665
	90%	7	15	37	75	150	224	299	374	449	524	599	673	748
	100%	8	17	42	83	166	249	333	416	499	582	665	748	831

MONA OFFSHORE WIND PROJECT

C.3 Atlantic puffin

Table C. 25: LCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 26: UCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	2	2	2	3	3	3
	15%	0	0	0	0	1	1	2	2	3	3	4	4	5
	20%	0	0	0	1	1	2	3	3	4	4	5	6	6
	25%	0	0	0	1	2	2	3	4	5	5	6	7	8
	30%	0	0	0	1	2	3	4	5	6	7	8	8	9
	35%	0	0	1	1	2	3	4	5	7	8	9	10	11
	40%	0	0	1	1	3	4	5	6	8	9	10	11	13
	60%	0	0	1	2	4	6	8	9	11	13	15	17	19
	80%	0	1	1	3	5	8	10	13	15	18	20	23	25
	100%	0	1	2	3	6	9	13	16	19	22	25	28	31

MONA OFFSHORE WIND PROJECT

Table C. 27: LCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 28: UCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (construction and decommissioning).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 29: LCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table C. 30: UCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	2	2	2	3	3	3
	20%	0	0	0	1	1	2	3	3	4	4	5	6	6
	30%	0	0	0	1	2	3	4	5	6	7	8	8	9
	40%	0	0	1	1	3	4	5	6	8	9	10	11	13
	50%	0	0	1	2	3	5	6	8	9	11	13	14	16
	60%	0	0	1	2	4	6	8	9	11	13	15	17	19
	70%	0	0	1	2	4	7	9	11	13	15	18	20	22
	80%	0	1	1	3	5	8	10	13	15	18	20	23	25
	90%	0	1	1	3	6	8	11	14	17	20	23	25	28
	100%	0	1	2	3	6	9	13	16	19	22	25	28	31

Table C. 31: LCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 32: UCI predicted Atlantic puffin mortality for the Mona Array Area plus 2 km buffer during the non-breeding season (operations and maintenance phase).

Puffin		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

C.4 Northern gannet

Table C. 33: LCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	1	1	1
	25%	0	0	0	0	0	0	0	0	0	1	1	1	1
	30%	0	0	0	0	0	0	0	0	1	1	1	1	1
	35%	0	0	0	0	0	0	0	1	1	1	1	1	1
	40%	0	0	0	0	0	0	1	1	1	1	1	1	1
	60%	0	0	0	0	0	1	1	1	1	1	2	2	2
	80%	0	0	0	0	1	1	1	1	2	2	2	2	3
	100%	0	0	0	0	1	1	1	2	2	2	3	3	3

Table C. 34: UCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	2	2	3	4	5	6	7	7	8
	15%	0	0	1	1	2	4	5	6	7	9	10	11	12
	20%	0	0	1	2	3	5	7	8	10	11	13	15	16
	25%	0	0	1	2	4	6	8	10	12	14	16	18	20
	30%	0	0	1	2	5	7	10	12	15	17	20	22	24
	35%	0	1	1	3	6	9	11	14	17	20	23	26	29
	40%	0	1	2	3	7	10	13	16	20	23	26	29	33
	60%	0	1	2	5	10	15	20	24	29	34	39	44	49
	80%	1	1	3	7	13	20	26	33	39	46	52	59	65
	100%	1	2	4	8	16	24	33	41	49	57	65	73	82

MONA OFFSHORE WIND PROJECT

Table C. 35: LCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	3	5	7	8	10	12	13	15	17
	15%	0	0	1	2	5	7	10	12	15	17	20	22	25
	20%	0	1	2	3	7	10	13	17	20	23	26	30	33
	25%	0	1	2	4	8	12	17	21	25	29	33	37	41
	30%	0	1	2	5	10	15	20	25	30	35	40	45	50
	35%	1	1	3	6	12	17	23	29	35	40	46	52	58
	40%	1	1	3	7	13	20	26	33	40	46	53	59	66
	60%	1	2	5	10	20	30	40	50	59	69	79	89	99
	80%	1	3	7	13	26	40	53	66	79	93	106	119	132
	100%	2	3	8	17	33	50	66	83	99	116	132	149	165

Table C. 36: UCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	3	6	9	12	15	18	21	25	28	31
	15%	0	1	2	5	9	14	18	23	28	32	37	41	46
	20%	1	1	3	6	12	18	25	31	37	43	49	55	61
	25%	1	2	4	8	15	23	31	38	46	54	61	69	77
	30%	1	2	5	9	18	28	37	46	55	64	74	83	92
	35%	1	2	5	11	21	32	43	54	64	75	86	97	107
	40%	1	2	6	12	25	37	49	61	74	86	98	110	123
	60%	2	4	9	18	37	55	74	92	110	129	147	165	184
	80%	2	5	12	25	49	74	98	123	147	172	196	221	245
	100%	3	6	15	31	61	92	123	153	184	214	245	276	306

Table C. 37: LCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	2	2	2	3	3	3
	15%	0	0	0	0	1	1	2	2	3	3	4	4	5
	20%	0	0	0	1	1	2	3	3	4	5	5	6	6
	25%	0	0	0	1	2	2	3	4	5	6	6	7	8
	30%	0	0	0	1	2	3	4	5	6	7	8	9	10
	35%	0	0	1	1	2	3	5	6	7	8	9	10	11
	40%	0	0	1	1	3	4	5	6	8	9	10	12	13
	60%	0	0	1	2	4	6	8	10	12	14	16	18	19
	80%	0	1	1	3	5	8	10	13	16	18	21	23	26
	100%	0	1	2	3	6	10	13	16	19	23	26	29	32

MONA OFFSHORE WIND PROJECT

Table C. 38: UCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	7	9	11	13	15	17	20	22
	15%	0	1	2	3	7	10	13	16	20	23	26	29	33
	20%	0	1	2	4	9	13	17	22	26	30	35	39	43
	25%	1	1	3	5	11	16	22	27	33	38	43	49	54
	30%	1	1	3	7	13	20	26	33	39	46	52	59	65
	35%	1	2	4	8	15	23	30	38	46	53	61	68	76
	40%	1	2	4	9	17	26	35	43	52	61	69	78	87
	60%	1	3	7	13	26	39	52	65	78	91	104	117	130
	80%	2	3	9	17	35	52	69	87	104	121	139	156	173
	100%	2	4	11	22	43	65	87	108	130	152	173	195	217

Table C. 39: LCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	1	1	1
	30%	0	0	0	0	0	0	0	0	1	1	1	1	1
	40%	0	0	0	0	0	0	1	1	1	1	1	1	1
	50%	0	0	0	0	0	0	1	1	1	1	1	1	2
	60%	0	0	0	0	0	1	1	1	1	1	2	2	2
	70%	0	0	0	0	0	1	1	1	1	2	2	2	2
	80%	0	0	0	0	1	1	1	1	2	2	2	2	3
	90%	0	0	0	0	1	1	1	1	2	2	2	3	3
	100%	0	0	0	0	1	1	1	2	2	2	3	3	3

Table C. 40: UCI predicted northern gannet mortality for the Mona Array Area 2 km buffer during Spring migration (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	2	2	3	4	5	6	7	7	8
	20%	0	0	1	2	3	5	7	8	10	11	13	15	16
	30%	0	0	1	2	5	7	10	12	15	17	20	22	24
	40%	0	1	2	3	7	10	13	16	20	23	26	29	33
	50%	0	1	2	4	8	12	16	20	24	29	33	37	41
	60%	0	1	2	5	10	15	20	24	29	34	39	44	49
	70%	1	1	3	6	11	17	23	29	34	40	46	51	57
	80%	1	1	3	7	13	20	26	33	39	46	52	59	65
	90%	1	1	4	7	15	22	29	37	44	51	59	66	73
	100%	1	2	4	8	16	24	33	41	49	57	65	73	82

MONA OFFSHORE WIND PROJECT

Table C. 41: LCI predicted northern gannet mortality for the Mona Array Area 2 km buffer during the breeding season (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	3	5	7	8	10	12	13	15	17
	20%	0	1	2	3	7	10	13	17	20	23	26	30	33
	30%	0	1	2	5	10	15	20	25	30	35	40	45	50
	40%	1	1	3	7	13	20	26	33	40	46	53	59	66
	50%	1	2	4	8	17	25	33	41	50	58	66	74	83
	60%	1	2	5	10	20	30	40	50	59	69	79	89	99
	70%	1	2	6	12	23	35	46	58	69	81	93	104	116
	80%	1	3	7	13	26	40	53	66	79	93	106	119	132
	90%	1	3	7	15	30	45	59	74	89	104	119	134	149
	100%	2	3	8	17	33	50	66	83	99	116	132	149	165

Table C. 42: UCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	3	6	9	12	15	18	21	25	28	31
	20%	1	1	3	6	12	18	25	31	37	43	49	55	61
	30%	1	2	5	9	18	28	37	46	55	64	74	83	92
	40%	1	2	6	12	25	37	49	61	74	86	98	110	123
	50%	2	3	8	15	31	46	61	77	92	107	123	138	153
	60%	2	4	9	18	37	55	74	92	110	129	147	165	184
	70%	2	4	11	21	43	64	86	107	129	150	172	193	214
	80%	2	5	12	25	49	74	98	123	147	172	196	221	245
	90%	3	6	14	28	55	83	110	138	165	193	221	248	276
	100%	3	6	15	31	61	92	123	153	184	214	245	276	306

Table C. 43: LCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	1	1	1	2	2	2	3	3	3
	20%	0	0	0	1	1	2	3	3	4	5	5	6	6
	30%	0	0	0	1	2	3	4	5	6	7	8	9	10
	40%	0	0	1	1	3	4	5	6	8	9	10	12	13
	50%	0	0	1	2	3	5	6	8	10	11	13	15	16
	60%	0	0	1	2	4	6	8	10	12	14	16	18	19
	70%	0	0	1	2	5	7	9	11	14	16	18	20	23
	80%	0	1	1	3	5	8	10	13	16	18	21	23	26
	90%	0	1	1	3	6	9	12	15	18	20	23	26	29
	100%	0	1	2	3	6	10	13	16	19	23	26	29	32

MONA OFFSHORE WIND PROJECT

Table C. 44: UCI predicted northern gannet mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).

Gannet		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	7	9	11	13	15	17	20	22
	20%	0	1	2	4	9	13	17	22	26	30	35	39	43
	30%	1	1	3	7	13	20	26	33	39	46	52	59	65
	40%	1	2	4	9	17	26	35	43	52	61	69	78	87
	50%	1	2	5	11	22	33	43	54	65	76	87	98	108
	60%	1	3	7	13	26	39	52	65	78	91	104	117	130
	70%	2	3	8	15	30	46	61	76	91	106	121	137	152
	80%	2	3	9	17	35	52	69	87	104	121	139	156	173
	90%	2	4	10	20	39	59	78	98	117	137	156	176	195
	100%	2	4	11	22	43	65	87	108	130	152	173	195	217

C.5 Black-legged kittiwake

Table C. 45: LCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	1	3	6	12	19	25	31	37	43	49	56	62
	15%	1	2	5	9	19	28	37	46	56	65	74	83	93
	20%	1	2	6	12	25	37	49	62	74	86	99	111	124
	25%	2	3	8	15	31	46	62	77	93	108	124	139	154
	30%	2	4	9	19	37	56	74	93	111	130	148	167	185
	35%	2	4	11	22	43	65	86	108	130	151	173	195	216
	40%	2	5	12	25	49	74	99	124	148	173	198	222	247
	60%	4	7	19	37	74	111	148	185	222	259	297	334	371
	80%	5	10	25	49	99	148	198	247	297	346	395	445	494
	100%	6	12	31	62	124	185	247	309	371	432	494	556	618

MONA OFFSHORE WIND PROJECT

Table C. 46: UCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	6	12	24	37	49	61	73	86	98	110	122
	15%	2	4	9	18	37	55	73	92	110	128	147	165	183
	20%	2	5	12	24	49	73	98	122	147	171	196	220	245
	25%	3	6	15	31	61	92	122	153	183	214	245	275	306
	30%	4	7	18	37	73	110	147	183	220	257	294	330	367
	35%	4	9	21	43	86	128	171	214	257	300	343	385	428
	40%	5	10	24	49	98	147	196	245	294	343	391	440	489
	60%	7	15	37	73	147	220	294	367	440	514	587	661	734
	80%	10	20	49	98	196	294	391	489	587	685	783	881	979
	100%	12	24	61	122	245	367	489	612	734	856	979	1101	1223

Table C. 47: LCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	6	8	10	12	15	17	19	21
	15%	0	1	2	3	6	9	12	16	19	22	25	28	31
	20%	0	1	2	4	8	12	17	21	25	29	33	37	42
	25%	1	1	3	5	10	16	21	26	31	36	42	47	52
	30%	1	1	3	6	12	19	25	31	37	44	50	56	62
	35%	1	1	4	7	15	22	29	36	44	51	58	66	73
	40%	1	2	4	8	17	25	33	42	50	58	67	75	83
	60%	1	2	6	12	25	37	50	62	75	87	100	112	125
	80%	2	3	8	17	33	50	67	83	100	116	133	150	166
	100%	2	4	10	21	42	62	83	104	125	146	166	187	208

Table C. 48: UCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	1	3	6	11	17	22	28	34	39	45	50	56
	15%	1	2	4	8	17	25	34	42	50	59	67	75	84
	20%	1	2	6	11	22	34	45	56	67	78	89	101	112
	25%	1	3	7	14	28	42	56	70	84	98	112	126	140
	30%	2	3	8	17	34	50	67	84	101	117	134	151	168
	35%	2	4	10	20	39	59	78	98	117	137	157	176	196
	40%	2	4	11	22	45	67	89	112	134	157	179	201	224
	60%	3	7	17	34	67	101	134	168	201	235	268	302	335
	80%	4	9	22	45	89	134	179	224	268	313	358	402	447
	100%	6	11	28	56	112	168	224	279	335	391	447	503	559

MONA OFFSHORE WIND PROJECT

Table C. 49: LCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	4	7	11	14	18	22	25	29	32	36
	15%	1	1	3	5	11	16	22	27	32	38	43	49	54
	20%	1	1	4	7	14	22	29	36	43	50	58	65	72
	25%	1	2	4	9	18	27	36	45	54	63	72	81	90
	30%	1	2	5	11	22	32	43	54	65	76	86	97	108
	35%	1	3	6	13	25	38	50	63	76	88	101	113	126
	40%	1	3	7	14	29	43	58	72	86	101	115	130	144
	60%	2	4	11	22	43	65	86	108	130	151	173	194	216
	80%	3	6	14	29	58	86	115	144	173	201	230	259	288
	100%	4	7	18	36	72	108	144	180	216	252	288	324	360

Table C. 50: UCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	4	8	17	25	33	41	50	58	66	74	83
	15%	1	2	6	12	25	37	50	62	74	87	99	112	124
	20%	2	3	8	17	33	50	66	83	99	116	132	149	165
	25%	2	4	10	21	41	62	83	103	124	145	165	186	207
	30%	2	5	12	25	50	74	99	124	149	173	198	223	248
	35%	3	6	14	29	58	87	116	145	173	202	231	260	289
	40%	3	7	17	33	66	99	132	165	198	231	264	297	330
	60%	5	10	25	50	99	149	198	248	297	347	397	446	496
	80%	7	13	33	66	132	198	264	330	397	463	529	595	661
	100%	8	17	41	83	165	248	330	413	496	578	661	744	826

Table C. 51: LCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	1	3	6	12	19	25	31	37	43	49	56	62
	20%	1	2	6	12	25	37	49	62	74	86	99	111	124
	30%	2	4	9	19	37	56	74	93	111	130	148	167	185
	40%	2	5	12	25	49	74	99	124	148	173	198	222	247
	50%	3	6	15	31	62	93	124	154	185	216	247	278	309
	60%	4	7	19	37	74	111	148	185	222	259	297	334	371
	70%	4	9	22	43	86	130	173	216	259	303	346	389	432
	80%	5	10	25	49	99	148	198	247	297	346	395	445	494
	90%	6	11	28	56	111	167	222	278	334	389	445	500	556
	100%	6	12	31	62	124	185	247	309	371	432	494	556	618

MONA OFFSHORE WIND PROJECT

Table C. 52: UCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Spring migration (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	2	6	12	24	37	49	61	73	86	98	110	122
	20%	2	5	12	24	49	73	98	122	147	171	196	220	245
	30%	4	7	18	37	73	110	147	183	220	257	294	330	367
	40%	5	10	24	49	98	147	196	245	294	343	391	440	489
	50%	6	12	31	61	122	183	245	306	367	428	489	550	612
	60%	7	15	37	73	147	220	294	367	440	514	587	661	734
	70%	9	17	43	86	171	257	343	428	514	599	685	771	856
	80%	10	20	49	98	196	294	391	489	587	685	783	881	979
	90%	11	22	55	110	220	330	440	550	661	771	881	991	1101
	100%	12	24	61	122	245	367	489	612	734	856	979	1101	1223

Table C. 53: LCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	1	2	4	6	8	10	12	15	17	19	21
	20%	0	1	2	4	8	12	17	21	25	29	33	37	42
	30%	1	1	3	6	12	19	25	31	37	44	50	56	62
	40%	1	2	4	8	17	25	33	42	50	58	67	75	83
	50%	1	2	5	10	21	31	42	52	62	73	83	94	104
	60%	1	2	6	12	25	37	50	62	75	87	100	112	125
	70%	1	3	7	15	29	44	58	73	87	102	116	131	146
	80%	2	3	8	17	33	50	67	83	100	116	133	150	166
	90%	2	4	9	19	37	56	75	94	112	131	150	168	187
	100%	2	4	10	21	42	62	83	104	125	146	166	187	208

Table C. 54: UCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during the breeding season (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	1	1	3	6	11	17	22	28	34	39	45	50	56
	20%	1	2	6	11	22	34	45	56	67	78	89	101	112
	30%	2	3	8	17	34	50	67	84	101	117	134	151	168
	40%	2	4	11	22	45	67	89	112	134	157	179	201	224
	50%	3	6	14	28	56	84	112	140	168	196	224	252	279
	60%	3	7	17	34	67	101	134	168	201	235	268	302	335
	70%	4	8	20	39	78	117	157	196	235	274	313	352	391
	80%	4	9	22	45	89	134	179	224	268	313	358	402	447
	90%	5	10	25	50	101	151	201	252	302	352	402	453	503
	100%	6	11	28	56	112	168	224	279	335	391	447	503	559

MONA OFFSHORE WIND PROJECT

Table C. 55: LCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	0	1	2	4	7	11	14	18	22	25	29	32	36
	20%	1	1	4	7	14	22	29	36	43	50	58	65	72
	30%	1	2	5	11	22	32	43	54	65	76	86	97	108
	40%	1	3	7	14	29	43	58	72	86	101	115	130	144
	50%	2	4	9	18	36	54	72	90	108	126	144	162	180
	60%	2	4	11	22	43	65	86	108	130	151	173	194	216
	70%	3	5	13	25	50	76	101	126	151	176	201	227	252
	80%	3	6	14	29	58	86	115	144	173	201	230	259	288
	90%	3	6	16	32	65	97	130	162	194	227	259	291	324
	100%	4	7	18	36	72	108	144	180	216	252	288	324	360

Table C. 56: UCI predicted black-legged kittiwake mortality for the Mona Array Area plus 2 km buffer during Autumn migration (operations and maintenance phase).

Kittiwake		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	1	2	4	8	17	25	33	41	50	58	66	74	83
	20%	2	3	8	17	33	50	66	83	99	116	132	149	165
	30%	2	5	12	25	50	74	99	124	149	173	198	223	248
	40%	3	7	17	33	66	99	132	165	198	231	264	297	330
	50%	4	8	21	41	83	124	165	207	248	289	330	372	413
	60%	5	10	25	50	99	149	198	248	297	347	397	446	496
	70%	6	12	29	58	116	173	231	289	347	405	463	520	578
	80%	7	13	33	66	132	198	264	330	397	463	529	595	661
	90%	7	15	37	74	149	223	297	372	446	520	595	669	744
	100%	8	17	41	83	165	248	330	413	496	578	661	744	826

MONA OFFSHORE WIND PROJECT

C.6 Manx shearwater

Table C. 57: LCI predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 58 UCI predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during Spring migration (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	1	1	1	1	1
	15%	0	0	0	0	0	0	1	1	1	1	1	1	1
	20%	0	0	0	0	0	1	1	1	1	1	2	2	2
	25%	0	0	0	0	0	1	1	1	1	2	2	2	2
	30%	0	0	0	0	1	1	1	1	2	2	2	3	3
	35%	0	0	0	0	1	1	1	2	2	2	3	3	3
	40%	0	0	0	0	1	1	2	2	2	3	3	4	4
	60%	0	0	0	1	1	2	2	3	4	4	5	5	6
	80%	0	0	0	1	2	2	3	4	5	6	6	7	8
	100%	0	0	0	1	2	3	4	5	6	7	8	9	10

MONA OFFSHORE WIND PROJECT

Table C. 59 LCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Breeding														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	0	1	2	3	7	10	13	17	20	23	27	30	33
	15%	1	1	3	5	10	15	20	25	30	35	40	45	50
	20%	1	1	3	7	13	20	27	33	40	47	53	60	67
	25%	1	2	4	8	17	25	33	42	50	58	67	75	84
	30%	1	2	5	10	20	30	40	50	60	70	80	90	100
	35%	1	2	6	12	23	35	47	58	70	82	94	105	117
	40%	1	3	7	13	27	40	53	67	80	94	107	120	134
	60%	2	4	10	20	40	60	80	100	120	140	160	180	201
	80%	3	5	13	27	53	80	107	134	160	187	214	241	267
	100%	3	7	17	33	67	100	134	167	201	234	267	301	334

Table C. 60: UCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer during the breeding season (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Breeding														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	3	6	16	32	64	95	127	159	191	223	254	286	318
	15%	5	10	24	48	95	143	191	238	286	334	381	429	477
	20%	6	13	32	64	127	191	254	318	381	445	509	572	636
	25%	8	16	40	79	159	238	318	397	477	556	636	715	795
	30%	10	19	48	95	191	286	381	477	572	668	763	858	954
	35%	11	22	56	111	223	334	445	556	668	779	890	1001	1113
	40%	13	25	64	127	254	381	509	636	763	890	1017	1144	1272
	60%	19	38	95	191	381	572	763	954	1144	1335	1526	1717	1907
	80%	25	51	127	254	509	763	1017	1272	1526	1780	2034	2289	2543
100%	32	64	159	318	636	954	1272	1589	1907	2225	2543	2861	3179	

Table C. 61: LCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer during Autumn migration (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	1	2	2	3	4	4	5	5	6
	15%	0	0	0	1	2	3	4	5	5	6	7	8	9
	20%	0	0	1	1	2	4	5	6	7	8	10	11	12
	25%	0	0	1	2	3	5	6	8	9	11	12	14	15
	30%	0	0	1	2	4	5	7	9	11	13	15	16	18
	35%	0	0	1	2	4	6	8	11	13	15	17	19	21
	40%	0	0	1	2	5	7	10	12	15	17	19	22	24
	60%	0	1	2	4	7	11	15	18	22	25	29	33	36
	80%	0	1	2	5	10	15	19	24	29	34	39	44	48
	100%	1	1	3	6	12	18	24	30	36	42	48	55	61

MONA OFFSHORE WIND PROJECT

Table C. 62: UCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer Autumn migration (construction and decommissioning).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	4	7	11	15	19	22	26	30	33	37
	15%	1	1	3	6	11	17	22	28	33	39	45	50	56
	20%	1	1	4	7	15	22	30	37	45	52	59	67	74
	25%	1	2	5	9	19	28	37	46	56	65	74	83	93
	30%	1	2	6	11	22	33	45	56	67	78	89	100	111
	35%	1	3	6	13	26	39	52	65	78	91	104	117	130
	40%	1	3	7	15	30	45	59	74	89	104	119	134	148
	60%	2	4	11	22	45	67	89	111	134	156	178	200	223
	80%	3	6	15	30	59	89	119	148	178	208	237	267	297
	100%	4	7	19	37	74	111	148	186	223	260	297	334	371

Table C. 63: LCI predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during Spring migration (operation).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 64: UCI predicted Manx shearwater mortality for the Mona Array Area plus 2 km buffer during Spring migration (operation).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	1	1	1	1	1
	20%	0	0	0	0	0	1	1	1	1	1	2	2	2
	30%	0	0	0	0	1	1	1	1	2	2	2	3	3
	40%	0	0	0	0	1	1	2	2	2	3	3	4	4
	50%	0	0	0	0	1	1	2	2	3	3	4	4	5
	60%	0	0	0	1	1	2	2	3	4	4	5	5	6
	70%	0	0	0	1	1	2	3	3	4	5	6	6	7
	80%	0	0	0	1	2	2	3	4	5	6	6	7	8
	90%	0	0	0	1	2	3	4	4	5	6	7	8	9
	100%	0	0	0	1	2	3	4	5	6	7	8	9	10

MONA OFFSHORE WIND PROJECT

Table C. 65: LCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer during breeding (operation).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	3	7	10	13	17	20	23	27	30	33
	20%	1	1	3	7	13	20	27	33	40	47	53	60	67
	30%	1	2	5	10	20	30	40	50	60	70	80	90	100
	40%	1	3	7	13	27	40	53	67	80	94	107	120	134
	50%	2	3	8	17	33	50	67	84	100	117	134	150	167
	60%	2	4	10	20	40	60	80	100	120	140	160	180	201
	70%	2	5	12	23	47	70	94	117	140	164	187	211	234
	80%	3	5	13	27	53	80	107	134	160	187	214	241	267
	90%	3	6	15	30	60	90	120	150	180	211	241	271	301
	100%	3	7	17	33	67	100	134	167	201	234	267	301	334

Table C. 66: UCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer during breeding (operation).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	3	6	16	32	64	95	127	159	191	223	254	286	318
	20%	6	13	32	64	127	191	254	318	381	445	509	572	636
	30%	10	19	48	95	191	286	381	477	572	668	763	858	954
	40%	13	25	64	127	254	381	509	636	763	890	1017	1144	1272
	50%	16	32	79	159	318	477	636	795	954	1113	1272	1430	1589
	60%	19	38	95	191	381	572	763	954	1144	1335	1526	1717	1907
	70%	22	45	111	223	445	668	890	1113	1335	1558	1780	2003	2225
	80%	25	51	127	254	509	763	1017	1272	1526	1780	2034	2289	2543
	90%	29	57	143	286	572	858	1144	1430	1717	2003	2289	2575	2861
	100%	32	64	159	318	636	954	1272	1589	1907	2225	2543	2861	3179

Table C. 67 LCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer during Autumn migration (operation).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	1	1	2	2	3	4	4	5	5	6
	20%	0	0	1	1	2	4	5	6	7	8	10	11	12
	30%	0	0	1	2	4	5	7	9	11	13	15	16	18
	40%	0	0	1	2	5	7	10	12	15	17	19	22	24
	50%	0	1	2	3	6	9	12	15	18	21	24	27	30
	60%	0	1	2	4	7	11	15	18	22	25	29	33	36
	70%	0	1	2	4	8	13	17	21	25	30	34	38	42
	80%	0	1	2	5	10	15	19	24	29	34	39	44	48
	90%	1	1	3	5	11	16	22	27	33	38	44	49	55
	100%	1	1	3	6	12	18	24	30	36	42	48	55	61

MONA OFFSHORE WIND PROJECT

Table C. 68 UCI predicted Manx shearwater mortality for the Morgan Array Area plus 2 km buffer during Autumn migration (operation).

Manx Shearwater		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	1	2	4	7	11	15	19	22	26	30	33	37
	20%	1	1	4	7	15	22	30	37	45	52	59	67	74
	30%	1	2	6	11	22	33	45	56	67	78	89	100	111
	40%	1	3	7	15	30	45	59	74	89	104	119	134	148
	50%	2	4	9	19	37	56	74	93	111	130	148	167	186
	60%	2	4	11	22	45	67	89	111	134	156	178	200	223
	70%	3	5	13	26	52	78	104	130	156	182	208	234	260
	80%	3	6	15	30	59	89	119	148	178	208	237	267	297
	90%	3	7	17	33	67	100	134	167	200	234	267	301	334
	100%	4	7	19	37	74	111	148	186	223	260	297	334	371

C.7 Red-throated diver

Table C. 69: LCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Autumn migration (construction and decommissioning).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table C. 70: UCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Autumn migration (construction and decommissioning).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 71: LCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Spring migration (construction and decommissioning).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table C. 72: UCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Spring migration (construction and decommissioning).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Spring migration		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 73: LCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the non-breeding season (construction and decommissioning).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table C. 74: UCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the non-breeding season (construction and decommissioning).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	15%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	25%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	45%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 75: LCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Autumn migration (operations phase).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table C. 76: UCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Autumn migration (operations phase).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Autumn migration														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 77: LCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Spring migration (operations phase).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Spring migration														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 78: UCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the Spring migration (operations phase).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Spring migration														
Displacement level (% at risk of displacement)		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

MONA OFFSHORE WIND PROJECT

Table C. 79: LCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the non-breeding season (operations phase).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0

Table C. 80: UCI predicted red-throated diver mortality for the Morgan Array Area plus 4 km buffer during the non-breeding season (operations phase).

Red-throated diver		Mortality level (% of displaced birds at risk of mortality)												
Non-breeding		1%	2%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Displacement level (% at risk of displacement)	10%	0	0	0	0	0	0	0	0	0	0	0	0	0
	20%	0	0	0	0	0	0	0	0	0	0	0	0	0
	30%	0	0	0	0	0	0	0	0	0	0	0	0	0
	40%	0	0	0	0	0	0	0	0	0	0	0	0	0
	50%	0	0	0	0	0	0	0	0	0	0	0	0	0
	60%	0	0	0	0	0	0	0	0	0	0	0	0	0
	70%	0	0	0	0	0	0	0	0	0	0	0	0	0
	80%	0	0	0	0	0	0	0	0	0	0	0	0	0
	90%	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	0	0	0	0	0	0	0	0	0	0	0	0	0