Natura Impact Statement

NISA

North Irish Sea Array

Volume 2: Appendices

Appendix 14

Method Statement - Offshore Wind Ornithology Assessment for East Coast Phase 1 Projects

Statkraft CIP Copenhagen Infrastructure Partners GoBe APEM Group ARUP

Method Statement - Offshore Wind Ornithology Assessment for East Coast Phase 1 Projects.

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ARUP

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Acronyms

Term	Definition
AESI	Adverse Effect on Site Integrity
BDMPS	Biologically Defined Minimum Population Scales
BTO	British Trust for Ornithology
CGR	Counterfactual of population growth rate
CRM	Collision Risk Modelling
CPS	Counterfactual of population size
CWP	Codling Wind Park
DAS	Digital Aerial Survey
EIAR	Environmental Impact Assessment Report
ES	Environmental Statement
GIS	Geographic Information Systems
I-WeBS	Irish Wetland Bird Survey
MMF	Mean-Maximum Foraging
MSS	Marine Scotland Science
NIS	Natura Impact Statement
NISA	North Irish Sea Array
OWF	Offshore Wind Farm
PVA	Population Viability Analysis
SD	Standard Deviation
SNCBs	Statutory Nature Conservation Bodies
SOSS	Strategic Ornithological Support Services

1 Introduction

1.1 Background

1.1.1 This Offshore Ornithology Assessment Methodology Note has been prepared in order to reduce the number of documents from individual Phase 1 projects seeking agreement with NPWS (within similar project timeframes) on the approaches and input parameters for ornithological assessment within the jurisdiction of the Republic of Ireland.

1.1.2 The objective of this note is to inform and consult stakeholders of the intended approach to all major aspects of the ornithological assessment, including collision risk modelling (CRM), displacement analysis and population viability analysis (PVA). It also presents methodologies for more specific analyses such as apportioning and for migratory birds.

1.1.3 The east coast Irish Phase 1 Projects that have been involved in developing this note include Arklow Bank Wind Park; Codling Wind Park (CWP); Oriel Wind Farm; Dublin Array and North Irish Sea Array (NISA) ("the Projects").

1.2 Approach

Collaboration

1.2.1 All assessment methods proposed by the Projects have been agreed within a collaborative forum and will be undertaken following an evidence-led process, and current industry best-practise and guidance. This Note aims to facilitate agreement between projects, and with regulators and stakeholders on the process and contents detailed below.

1.2.2 The Projects will continue to engage with stakeholders throughout the assessment process to agree the planned approach.

Methodologies

1.2.3 This Note sets out the proposed assessment methods, key species and essential parameters, where currently known. Importantly, it also highlights where differences in assessment approaches are likely to exist and explains how these differences are justified.

1.2.4 To establish the proposed assessment methods, the Projects undertook a review of available Irish Guidance and best practice along with wider offshore renewable industry best-practice and aligned their methodologies to be appropriate for the assessment of potential impacts on marine ornithology receptors in the western Irish Sea. Being the closest established industry, the methodologies reported here largely draw on UK (Natural England and Nature Scot) guidance, which is heavily supported by substantive and robust research and evidence. Should NPWS consider it necessary that the methodologies are further aligned to meet the requirements in the Republic of Ireland the Projects welcome engagement and advice regarding this.

1.2.5 The following sections provide a high-level description of the proposed impact assessment methods which will be applied to offshore ornithological receptors during the assessment of the Projects.

2 Collision risk

2.1.1 The Projects propose to use the Band (2012) model or the Marine Scotland Science (MSS) Stochastic Collision Risk Model Shiny Application ("sCRM App"; Donovan, 2017), which is based on the Band (2012) model. This could be run deterministically (i.e., setting error variables to zero within the app for each run), with separate runs for a central estimate, minimum estimate, and maximum estimate. Alternatively, the model can be run stochastically, taking into consideration known variation in parameter values. Each project will provide a mean output which can be used in the cumulative/in-combination impact assessment. These approaches have been agreed with SNCBs in the UK for other recent projects (e.g., Hornsea Four, Awel y Môr) and so, in the absence of any novel models or methods, the Projects consider this to be an appropriate CRM methodology for projects in the Republic of Ireland. The approach also allows consistency between projects when considered in-combination at a regional transboundary level.

2.1.2 Species to be included within CRM will be selected on a project-by-project basis, informed by a review of the raw counts and density estimates within the array from site-specific boat-based and/or digital aerial survey (DAS). The following vulnerable species have been identified for potential inclusion within CRM (Project dependent):

- Arctic tern (*Sterna paradisaea*);
- Black headed gull (*Chroicocephalus ridibundus*);
- Black-legged kittiwake (*Rissa tridactyla*);
- Common gull (*Larus canus*);
- Common tern (*Sterna hirundo*);
- Great black-backed gull (*Larus marinus*);
- Herring gull (*Larus argentatus*);
- Lesser black-backed gull (*Larus fuscus*);
- Little gull (*Hydrocoloeus minutus*);
- Northern gannet (*Morus bassanus*);
- Roseate tern (*Sterna dougallii*); and
- Sandwich tern (*Thalasseus sandvicensis*).

2.1.3 Where species present within a project array have been excluded from CRM, rationale will be provided on a species-by-species basis.

2.1.4 Nocturnal activity rates and avoidance rates will be based on the best available published evidence, including Furness (2018), Bowgen and Cook (2018) and the latest Natural England interim advice (Natural England, 2022), with all parameters evidenced in full within a CRM technical appendix which will be submitted as part of the Natura Impact Statement (NIS) and the Environmental Impact Assessment Report (EIAR). Nocturnal activity factors are used within the model to account for birds that are active at night, and addresses uncertainty with regards surveys not directly accounting for activity at night. Values for these parameters is evidenced from tracking data and an appropriate level of precaution will be used.

2.1.5 The use of Band models will be selected on a project-by-project basis. As advocated by SNCBs in the UK, results from Band option 2 (which uses generic flight height data from Johnston *et al.* (2014) will be presented for all projects. Site-specific flight heights may be used to inform the proportion of birds at collision risk height (Band option 1; Band, 2012) if robust data is available from DAS or boat-based surveys. The proposed seabird parameter values for a variety of bird species are presented in Table 2.1.

2.1.6 It is the intention of all projects to account for displacement of gannet from the array area in the CRM results to avoid double counting the impact from displacement and CRM. Projects will present CRM results accounting over a range of 65 – 85% displacement (Natural England, 2022). If new evidence or guidance for avoidance rates becomes available, the projects will reassess their position at this time.

Table 2.1. Proposed seabird parameter values to be used in collision risk modelling for 11 species.

Species	Body length (SD) (m); Robinson (2005)	Wingspan (SD) (m); Robinson (2005)	Flight speed (SD) (m/s); Pennycuick (1987), Alerstam (2007), Skov *et al.* (2018)	Nocturnal Activity Factor (%); Garthe and Huppop (2004), Furness *et al.* (2018), MacArthur Green (2015)	Avoidance rate (Band / Stochastic)	
					Previous guidance Cook *et al.* (2014), JNCC *et al.* (2014), Bowgen and Cook (2018);	Latest updated Natural England (2022)
Black-headed gull	0.37	1.10	11.9	25 – 50 37.5 (0.0637)	0.992	0.995 / 0.995 (±0.0002)
Common gull	0.41	1.20	13.4		0.992 (±0.003)	
Gannet	0.94 (0.0325)	1.72 (0.0375)	14.9 (0) or 13.33	8 / 8 (10)	0.989 / 0.995 (±0.002)	0.992 / 0.993 (±0.0003)
Great black-backed gull	0.71 (0.035)	1.58 (0.0375)	13.7 (1.20)	25 – 50 37.5 (0.0637)	0.995 (±0.001)	0.994 / 0.994 (±0.0004)
Herring gull	0.60 (0.0225)	1.44 (0.03)	12.8 (1.80)			
Lesser black-backed gull	0.58 (0.03)	1.42 (0.0375)	13.1 (1.90)			
Kittiwake	0.39 (0.005)	1.08 (0.0625)	13.1 (0.40) or 8.71		0.989 / 0.990 (±0.002)	0.992 / 0.993 (±0.0003)
Arctic tern	0.33	0.87	10.5	0	0.990	0.990 / 0.991 (±0.0004)
Common tern	0.33	0.87	10.5			
Roseate tern	0.36	0.76	10.5			
Sandwich tern	0.38 (0.005)	1.00 (0.04)	10.3 (3.4)			

3 Disturbance and Displacement

3.1.1 In line with general guidance, the Projects propose to use a matrix approach, presenting a complete range of displacement and mortality rates for each species. This approach has been agreed with UK SNCBs for other recent projects (e.g., Hornsea Four; Awel y Môr etc.) and so, in the absence of any novel models or methods, the Projects have agreed that this is the preferred solution in the Republic of Ireland. The most probable ranges for each species will be highlighted and form the basis of the impact assessment. The area over which displacement impacts will occur, will be based on the best available evidence for each species.

3.1.2 Recent Natural England guidance (Parker *et al.,* 2022c; SNCB, 2022) recommends using the overall mean seasonal peak numbers of birds (averaged over the years of survey) in the development footprint and appropriate buffer for displacement assessment. Extremely high abundances of birds within the array plus buffer during peak months during the non-breeding season may lead to predictions indicating unrealistically high numbers of birds being displaced across all projects. To reduce this bias and to provide a more representative abundance and density estimate for the seven-month non-breeding bio-season, a weighted-mean approach to estimating abundance during the non-breeding season is currently being considered by projects.

3.1.3 Sensitivity to displacement differs considerably between seabird species. As stated in the guidance (Parker *et al.,* 2022c; SNCB, 2022), species will be ranked according to their sensitivity to displacement and the degree of habitat specialisation. Species to be assessed for displacement will be selected on a project-by-project basis. Displacement analysis will be performed on any species scoring at least three in either category (see SNCB, 2022), based on a review of count data gathered during site-specific surveys, and associated expert ornithological judgement on those species likely to be sensitive to displacement (e.g., Bradbury *et al.*, 2014; Dierschke *et al.*, 2016), the following species may be included within the analysis: (Project dependent):

- Gannet;
- Common guillemot (*Uria aalge*);
- Razorbill (*Alca torda*);
- Puffin (*Fratercula arctica*);
- Red-throated diver (*Gavia stellata*); and
- Great northern diver (*Gavia immer*).

3.1.4 Kittiwake will not be assessed for displacement because they have low habitat use specificity and have considerably large foraging ranges over which they are likely to find alternative favourable foraging habitat. Additionally, there is limited evidence that they are displaced by wind farms, Likewise Manx shearwater have vast foraging ranges and have very low vulnerability to displacement by offshore wind farms, scored 1 by Bradbury *et al.* (2014) and given a species concern index value of 2 by Furness *et al.* (2013).

3.1.5 Individual projects will present an agreed displacement range for species displacement rates to facilitate the cumulative / in-combination assessment. Where species have been excluded from displacement assessment, rationale will be provided by Projects on a species-by-species basis, where relevant.

Table 3.1. Agreed range over which to present displacement mortality to facilitate in-combination impact assessments.

Species	Displacement range	Mortality range
Gannet	60% - 80%	1%
Guillemot	30% – 70%	1% – 5%
Razorbill	30% – 70%	1% – 5%
Puffin	30% – 70%	1% – 5%
Red-throated diver	90% - 100%	1% – 5%
Great northern diver	90% - 100%	1% – 5%

3.2 Barrier Effects

3.2.1 In general, it is acknowledged that the displacement assessment captures much of the potential impact from barrier effects. However, individual projects may provide a further analysis of the possibility that barriers to movement could have a detrimental effect on populations.

4 Breeding seasons

4.1.1 The biologically defined seasons will be used throughout the assessments to determine the seasonal impact on ornithological features. Bio-seasons will be defined from Furness, (2015). It is likely that the ornithological species present in the western Irish Sea will have similar biological traits to the same species in England and Wales, due to proximity. However, projects are likely to redefine seasons for some species if obvious trends are found within the site-specific survey data (e.g. early post-breeding migration is detected). We anticipate projects to present results based on both the migration-free breeding season and full breeding season as this will provide a more precautionary approach to assessment.

5 Apportionment

5.1.1 This apportioning methodology will be used to estimate the proportion of collision and displacement induced mortalities from the Projects that will be attributed to each screened in designated conservation site.

5.1.2 There is currently a lack of data available to inform the Republic of Ireland bio-geographical populations that should be used during the non-breeding season apportioning assessment (within UK assessments, bio-geographical populations are presented within Furness (2015), there is no data presented for the Republic of Ireland). The Projects are currently analysing methods to calculate non-breeding season bio-geographical populations that represent the Republic of Ireland. This methodology will be shared with NPWS once finalised.

5.2 Breeding season

Methodology

5.2.1 Apportioning impacts from the Projects to specific designated (breeding) seabird populations during the breeding season is to be undertaken using the interim guidance from NatureScot, (2018)[1]. Breeding adults are limited in the distance and number of days over which they can forage by the need to return regularly to the nest site, therefore it can be expected that a high proportion of adult birds potentially affected by offshore wind farm impacts can be attributed to colonies within foraging range. The NatureScot (2018) guidance is an evidence led approach which uses this principle and thus calculates which colonies estimated collision and displacement induced mortalities are likely to be attributed to during the breeding bio-season. This guidance is deemed the most appropriate to use for assessing the impact from Irish Projects. Additionally, this approach is widely used and well established for use in the UK. The guidance calculates an estimated proportion of breeding adults associated with each colony based on the following parameters:

- The population size of each colony;
- The distance from each colony (geometric centre) to Project arrays (geometric centre); and
- The proportion of sea within the mean-maximum foraging (MMF) range or MMF range +1 Standard Deviation (SD) of the colony, as published by Woodward *et al.* (2019).

5.2.2 NatureScot (2018) guidance states using the following equation for apportioning calculations:

$$Weight = \left(\frac{Colony\ Population}{Sum\ of\ Populations}\right) \times \left(\frac{Sum\ of\ Distance^2}{Colony\ Distance^2}\right) \times \left(\frac{\frac{1}{Colony\ Sea\ Proportion}}{Sum\ of\ \frac{1}{Sea\ Proportions}}\right)$$

5.2.3 The guidance (NatureScot, 2018) suggests including colonies in the apportioning calculations that are within the MMF range of the species. However, it is worth noting that in the UK, it is becoming more widely expected that designated sites should be screened based on the MMF range +1SD presented in Woodward *et al.* (2019).

[1] https://www.nature.scot/doc/interim-guidance-apportioning-impacts-marine-renewable-developments-breeding-seabird-populations

5.2.4 The Projects considered screening in sites that are within +1SD of the MMF range (Woodward *et al.*, 2019). On this basis, for the apportioning, the Projects do not deem it appropriate to include all colonies (designated and non-designated) within MMF range +1SD within the apportioning as this would dilute impacts to colonies closer to the Projects, where most impacts are likely to come from.

5.2.5 The Projects therefore propose to include all colonies within MMF range (both designated and non-designated) and additionally those designated colonies within MMF range +1SD. This is a more precautionary approach than additionally including all non-designated colonies within +1SD foraging range, as breeding adults apportioned to a small number of colonies means that estimated impacts on the (closer/at risk) colonies will be higher.

Colony population sizes

5.2.6 Colony sizes will be based on data provided in the Cummins *et al.* (2019) NPWS report and the Seabird Monitoring Programme Database (JNCC, 2020), with data used from the year/s corresponding to the baseline surveys or the closest year available. Where more than one colony count is available during the baseline survey years, the average of all counts will be used. All counts will be converted into the number of individual breeding adults.

Distance from colony to Projects

5.2.7 Distances will be calculated using Geographic Information Systems (GIS) and will be measured from geometric centre of the colony to geometric centre of the Project's array. Where there were multiple colonies for an SPA within MMF range or MMF range +1SD then each colony will be considered separately, therefore distances will be based on the centre of each colony rather than the centre of the SPA. Note that assessing from geometric centre is the proposed approach given within the NatureScot (2018) apportioning guidance. However, where sites are within MMF range +1SD from edge of colony to edge of array, but are beyond MMF range +1SD when going from centre to centre, these SPAs will still be included in the apportioning analysis as there is still potential connectivity with the wind farm.

Proportion of sea within foraging range

5.2.8 The area of suitable foraging habitat within the sea for each species from each colony will be calculated as follows: using GIS, a buffer around each colony will be drawn for each species which equals their MMF range or MMF range +1SD. The foraging area used for all species will only consider the sea area, therefore any land, estuaries or freshwater bodies of water will be excluded. Where areas of sea are within foraging range from the colony by straight line, but are further than foraging range when assuming birds only travel over sea, these areas will be excluded manually. The resultant area will then be converted into a proportion by dividing this area by the area of the circle with radius equal to the foraging range.

5.2.9 Using the calculation and parameters described above, a resultant weighting for each colony within foraging range will be calculated. In order to then calculate the proportion of impact consequent mortalities that would be attributed to each SPA, the NatureScot (2018) apportioning tool requires the number of breeding adults that are impacted by the OWF (as opposed to individuals which are calculated by CRM and displacement). Unless robust site-specific adult age proportions exist, projects will apply generic age proportions of adult birds from Furness (2015).

5.2.10 This then gives a resultant proportion of mortalities for each colony. Where an SPA consists of more than one colony, the total number of birds apportioned to that SPA is the sum of birds apportioned to each constituent colony.

Adult proportions

5.2.11 The age ratios used within the assessments may be derived from site-specific age proportions where robust survey data exists or from Furness (2015) or Horswill and Robinson (2015).

5.3 Non-breeding season

5.3.1 Outside of the breeding bio-season, the population of birds contains a mix of individuals from Irish breeding colonies and from further away, therefore, a much lower percentage of birds can be attributed to any particular breeding colony population. Apportionment for the Projects during the non-breeding bio-seasons will be undertaken through calculating the proportion that each colony population contributes to the non-breeding bio-geographical population. Additionally, this approach is used within other well established OWF industries such as the UK and is agreed the best current practice by UK SNCBs. This approach will use the following data:

- Defined bio-seasons taken from Furness (2015);
- SPA breeding adult populations (to be determined based on the BDMPS equivalent approach);
- Non-breeding season population sizes (currently still being considered by the Projects); and
- Proportions of SPA adult population remaining in relevant regions during the non-breeding bio-seasons (where there is a lack of information for colonies on the proportion that remain in the region during the non-breeding bio-seasons, this will be assumed to be 100% unless a justification for a lower proportion can be made).

5.3.2 Proportions of mortality impacts attributed for each relevant designated site will be then calculated using the following equation:

$$\frac{Designated\ site\ population\ size}{Regional\ population\ size} \times Proportion\ of\ population\ that\ remain\ during\ season$$

6 Population Viability Analysis (PVA)

6.1.1 PVA is used within the assessment process to estimate the effect of predicted impacts on specific populations. There is currently limited advice regarding the use of PVA for assessments within the Republic of Ireland. It is anticipated that the modelling and assessment of potential impacts will be carried out using the Seabird PVA Tool provided by Natural England (Mobbs *et al.*, 2020) following the user guide. Species that require a PVA will depend on the apportioned impacts from individual projects to colonies and SPAs. In general, PVA is undertaken when the impact from a single OWF or cumulative/in-combination with other projects impact to a population, SPA or colony is estimated to exceed 1% of baseline annual mortality.

6.1.2 The Seabird PVA Tool uses a Leslie matrix approach to construct a PVA model (Caswell, 2000), which compares the population trend over two or more scenarios (e.g. impacted and unimpacted) based on the parameters input by the user. It is anticipated that the model will incorporate environmental and demographic stochasticity with up to 5,000 simulations for each scenario to generate robust estimates of variance in the predictions. It is expected that for all species the model will be run over the predicted lifespan of the specific project.

6.1.3 For seabird populations, it is widely agreed that some form of compensatory density dependence acts on populations (Horswill *et al.*, 2017). However, the mechanisms as to how this operates are largely uncertain, and, if mis-specified in an assessment, the modelled predictions may be unreliable. Density independent models are typically considered more precautionary, for example because the difference between exponential baseline and impacted population trajectories will be larger than those obtained from a density dependent simulation and there is no inherent means in a density independent model by which a simulated population can recover in size if the growth rate is reduced below 1 (i.e. a declining trend). Therefore, as a minimum density independent model results will be presented, with density dependent outputs also presented for species and populations where justified on the basis of supporting evidence. Both the counterfactual of population size (CPS) and population growth rate (CGR) will be provided in the results.

6.2 Species-specific values

6.2.1 Initial population sizes inputted into all PVAs for the biogeographic scale will be taken from the most appropriate source or the BDMPS equivalent or from the latest NPWS or SMP colony counts for SPAs. The most up to date productivity values presented within Horswill and Robinson (2015) will be used for all species unless robust site-specific values are available. The survival rates for gannet, kittiwake, guillemot, razorbill and puffin will be taken from the overall mean values presented in Horswill and Robinson (2015), which are pre-formulated within the Natural England PVA tool. When assessing impacts on specific SPAs it may be appropriate to adjust demographic parameters to obtain population trends reflecting those observed at that SPA colony (although it should be noted that the counterfactual metrics are a preferred output from the PVA precisely because they are comparatively insensitive to the demographic parameter values used and hence such adjustment is unlikely to affect impact assessment conclusions).

6.2.2 The survival rates for great black-backed gull presented in Horswill and Robinson (2015) are based on an old study by Glutz von Blotzheim & Bauer (1982). Due to the limited amount of data Horswill and Robinson (2015) recommended using the survival rates of other large gull species when conducting population modelling for great black-backed gull. Therefore, the survival rates for great black-backed gull used for the PVA will be based on adult and juvenile rates for herring gull as presented in Horswill & Robinson (2015).

7 Migratory Non-Seabirds and Seabirds

7.1.1 The migratory assessment will vary by Project due to the locations of the proposed OWFs relative to the migratory routes of bird species. Initially, individual projects will complete a screening exercise to identify any migratory species that may pass through or nearby to their array area and screen out those that were unlikely to pass through the array in any meaningful numbers. A review of site-specific survey data, migration surveys, local bird reports and other ornithological literature will help to identify the birds to take on to the next stage of modelling. The results of the initial screening, including rationale as to why species were screened out, will be presented.

7.2 Strategic Ornithological Support Services (SOSS) Approach

7.2.1 Assessments will follow the British Trust for Ornithology's (BTOs) Strategic Ornithological Support Services (SOSS) '05' project approach to assessment for migratory seabirds (Wright *et al.*, 2012) as a modelling tool to quantify any risk to migrating birds. Information on the numbers of birds over-wintering or breeding at Irish and UK SPAs is known from frequent surveys (Irish Wetland Bird Survey (I-WeBS); Frost *et al.*, 2020; Dean *et al.*, 2003). The origins of some or all of these migratory birds are known from ringing or tagging data, as well as other literature, and include transboundary migrations (Wernham *et al.* 2002). A general migration route or zone can therefore be defined for a given population of birds. Furthermore, data from continental sites (e.g. staging posts, observatories) can be used to further refine the likely migration fronts, as well as to provide information on temporal components of migration (for example, daily passage rate and duration of migration events). It is therefore possible to estimate the numbers of birds associated with one SPA, with a defined group of SPAs, or with a regional suite of SPAs that will encounter one or more wind farms by defining appropriate migratory corridors.

8 Questions to stakeholders

- Do you agree with the collision risk species proposed by the Projects and the range of methods specified?
- Do you agree with the input parameters provided for CRM?
- Do you agree with the displacement risk species and parameters proposed by the Projects?
- Do you know of any guidance updates or have any concerns about the assessments methodologies or parameters used?

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