



codling
wind park

EIAR Addendum

Appendix 10-J
Parameterisation of Red-
throated Diver Displacement
Rates



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APPENDIX 10-J PARAMETERISATION OF RED-THROATED DIVER DISPLACEMENT RATES

1 Introduction

1. Codling Wind Park Limited (CWPL) is proposing to develop the Codling Wind Park (CWP) Project, which is located in the Irish sea approximately 13 - 22 km off the east coast of Ireland, at County Wicklow.
2. On Friday 6th September 2024 CWPL (referred to hereafter as the 'Applicant') applied for planning permission to An Coimisiún Pleanála (ACP) (referred to hereafter as the 'Commission') under Section 291 of the Planning and Development Act (PDA) 2000, as amended, for the construction, operation and decommissioning of the CWP Project.
3. On 1st August 2025, having reviewed the application documentation, including the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement (NIS), the Commission issued a Further Information Request (FIR) in relation to the CWP Project.
4. This appendix forms part of the Applicant's response to Item 7k of the Commission's FIR (see **FIR Response Document**) and supports **Section 10.10.3** (Magnitude of impact – Red-throated diver) of the **EIAR Addendum**. Specifically, this document outlines the Applicant's approach to the parameterisation of displacement rates for red-throated diver with increasing distance from the proposed array site to a 10 km buffer, as requested in Item 7k of the Commission's FIR.

2 Parameterisation of red-throated diver displacement rates

5. In accordance with ACP's request, additional empirical data were obtained from suitable red-throated diver (*Gavia stellata*) habitat within a 10 km buffer from the array site, utilising a DAS methodology. During the 2024/25 non-breeding season areas of suitable red-throated diver habitat were surveyed within an area covering The Murrough SPA, the array site, a 10 km buffer to the west of the array site and a 4km buffer to the north, east and south of the array site (see **Figure** below).
6. DAS site selection was informed by available information on bathymetry (i.e. areas within 10 km of the array site with water depths of approximately 20 m or less) as well as existing records of red-throated diver obtained during the baseline survey period and other data sources (Jessopp *et al.*, 2018; Bray Offshore Wind Limited & Kish Offshore Wind Limited, 2025; MacArthur Green & GoBe Consultants, 2024). Additional contemporary DAS data was collected within the array site and a 10 km buffer in all surrounding directions during the 2025/26 non-breeding season, with unprocessed count data from this second season used to validate distribution patterns observed during the 2024/25 non-breeding season.
7. Red-throated diver habitat is typically characterised by shallower water depths (~20 m or less) and sandy substrates (JNCC, 2024; Webb & Durinck, 1992). Aerial survey data pertaining to red-throated diver distribution in the wester Irish Sea as part of the ObSERVE I survey campaign (Jessopp; 2018) show that birds exhibit a strong preference for water depths of ~20 m or less. The distribution of red-throated diver during the winter 2024/25 DAS campaign aligns with the findings of ObSERVE I, with birds recorded round inshore waters and in association with shallower water depths. This is corroborated by the patterns of distribution observed during baseline surveys (see EIAR Appendix 10.8: Baseline Characterisation Report). Additional contemporary DAS data collected during winter 2025/26 (from the array site and a 10 km buffer in all surrounding directions) further corroborate this pattern of distribution. Furthermore, baseline characterisation surveys carried out in relation to the

nearby Dublin Array and Arklow OWFs also recorded very few divers within deeper waters (Bray Offshore Wind Limited & Kish Offshore Wind Limited, 2025; MacArthur Green & GoBe Consultants, 2024).

2.1 Survey methodology

8. Survey flights were undertaken on a monthly basis during winter 2024/2025. **Figure 1** shows the areas of suitable red-throated diver habitat within 10 km of the array site (purple shading) which have been surveyed during the recent winter DAS campaigns. Surveys took place between November 2024 and April 2025 and utilised HiDef's standard DAS methodology. Sixteen transects were spaced 1.5 km apart and orientated in an east-west fashion, perpendicular to the coast. Survey flights were flown at a height of 500 m above sea level, and survey coverage sampled approximately 16% of the total survey area (~357 km²).

9. An availability bias correction factor of 0.3 was applied to all records of red-throated diver (Dunn *et al.*, 2024). It is assumed that the number of birds recorded represents 70% of the number of individuals in the region, as divers spend 30% of their time underwater and are therefore unavailable for detection.
10. Following the precedent set by Awel y Môr (which used buffers out to 4 km and 8 km), and the broader evidence base, red-throated diver abundances were calculated using displacement rates specific to regions of suitable habitat identified with increasing distance from the array site.
11. The displacement areas were defined as shown in
12. **Table 1.**

Table 1 Description of red-throated diver displacement areas

Area	Description
Zone 1	Array site
Zone 2	Array site plus a 4 km buffer, with that buffer being 5 km in areas which are within 10 km of The Murrough SPA
Zone 3	Areas within 10 km of the array site which are not included in Zone 1 or Zone 2, but also lie within 10 km of The Murrough SPA

13. With regard to areas within a 4 to 10 km buffer to the north, east and south of the array site, which were not covered during DAS in the 2024/25 non-breeding season, the water depths within 95% of this area (178.9 km²) are deeper than 20 m (with a mean depth of 55 m) and are not considered to be suitable red-throated diver habitat. Therefore, inclusion of the above-described regions to the west and to the north and south of the array site are considered to provide sufficient coverage of red-throated diver habitats within 10 km of the array site.
14. Red-throated diver abundances within each of the areas outlined in **Table 1** were calculated throughout the 2024/25 non-breeding period and can be found in **Appendix 10-I Design-based Density, Abundance Estimates and Distributional Response of the Red-throated Diver** of the **EIAR Addendum**. **Appendix 10-I** also provides displacement matrices for red-throated diver within the distance bands outlined above.
15. The rationale for adopting a banded approach to the assessment of red-throated diver displacement is based on evidence that displacement effects are not uniform across large distances from offshore wind arrays. Studies indicate a clear “decay” in displacement rates with increasing distance from wind turbine clusters, with higher avoidance within the array footprint and progressively lower displacement at greater ranges (Heinänen *et al.*, 2020; Mendel *et al.*, 2019). The Applicant has therefore considered methods to capture this gradient during parameterisation of the displacement assessment. Recent and relevant comparisons come from projects in the Irish Sea, including Gwynt y Môr, Awel y Môr, Oriel, and post-construction monitoring at Liverpool Bay OWF. For example, monitoring at Gwynt y Môr and Awel y Môr demonstrated that while divers were present in low or very low numbers within wind turbine arrays, relatively high densities persisted in adjacent areas, suggesting partial displacement rather than complete exclusion (RWE Renewables, 2022). Similarly, post-construction surveys at Liverpool Bay (Burbo Bank Extension) revealed strong avoidance within 0–4 km of turbines, but densities increased beyond this buffer, supporting the concept of a displacement decay curve (Webb *et al.*, 2015; NIRAS, 2013). Further evidence is also present within the Outer Thames estuary, specifically for projects such as Thanet OWF which has shown partial displacement (73% (Joint SNCB, 2022)) within the array area and no significant displacement within a 2 km area adjacent to the Outer Thames Estuary SPA. Evidence from Oriel Wind Farm’s Environmental Impact Assessment also highlights the importance of cumulative effects and spatial modelling to predict diver distribution shifts across Irish

Sea sandbanks (Parkwind, 2024). Collectively, these findings reinforce the appropriateness of a banded approach, as displacement is greatest near arrays but diminishes with distance, and some areas may even support higher densities post-construction due to redistribution (Allen *et al.*, 2020).

16. A decision was nevertheless made during the parameterisation of displacement rates to apply a 100% displacement rate within the array site. This is considered by the Applicant to be conservative. Given the presence of red-throated diver within array sites as described above, post-construction monitoring data suggest displacement does not occur to the equivalent of a complete exclusion from array sites. In light of the relatively high densities of divers observed to occur just outside array areas, it is the Applicant's evidenced position that an appropriate level of displacement can be taken from a review undertaken by Hall (2022). The author presents a number of representative displacement gradients using available red-throated diver displacement data. The Applicant has used the representative displacement gradient equation that is based on all of the data included in the meta-analysis (i.e. by accounting for the average displacement within every 1 km distance band from a given array site). This calculation yielded displacement rates of 57.175% percent within 0 km to 5 km distance band from the array site and 34.025% within the 5 km to 10 km distance band. The Applicant notes the apparent conservatism of these displacement rates when compared to evidence from OWFs which lie within the bathymetric complexes on the eastern side of the Irish Sea, which further supports the Applicant's well evidenced and demonstrably conservative approach.

3 References

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