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Eich cyf/Your ref: EN01012
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Dyddiad/Date: 26/11/2024

Er sylw / For the attention of: Robert Jackson

Annwyl / Dear Robert,

PROPOSED MORECAMBE OFFSHORE WINDFARM GENERATION ASSETS

CYFEIRNOD YR AROLYGIAETH GYNLLUNIO / PLANNING INSPECTORATE

REFERENCE: EN010121

EIN CYFEIRNOD / OUR REFERENCE: 20049962

RE: NATURAL RESOURCES WALES' WRITTEN SUBMISSION FOR DEADLINE 1

Thank you for your Rule 8 letter, dated 23rd September 2024 requesting Cyfoeth Naturiol Cymru / Natural Resources Wales' (NRW) comments regarding the above project.

This letter comprises the following submission from NRW:

a) Written Representations – see Annex A.

The comments provided in this submission, including the associated Annexes, comprise NRW's response as a Statutory Party under the Planning Act 2008 and Infrastructure Planning (Interested Parties) Regulations 2015 and as an 'Interested Party' under s102(1) of the Planning Act 2008.

The comments are made without prejudice to any further comments NRW may wish to make in relation to this application and examination whether in relation to the Environmental

Statement (ES) and associated documents, provisions of the draft Development Consent Order ('DCO') and its Requirements, or other evidence and documents provided by Morecambe Offshore Windfarm Ltd ('the Applicant'), the Examining Authority or other Interested Parties.

NRW are in active and on-going engagement with the Applicant. As previously communicated with the Applicant and the Planning Inspectorate, for the Morecambe Offshore Windfarm Generation Assets DCO, NRW registered as an interested party for Marine Mammals, Marine Ornithology, and in-combination and cumulative effects but were not in the position to provide detailed comments at pre-examination, namely for Relevant Representations. NRW's detailed comments can be found in Annex A.

The Rule 8 letter requested Initial Statements of Common Ground (SoCG) to be submitted at Deadline 1. NRW have taken the decision to only review the first and final iterations of any SoCG with the Applicant. This decision has been made to ensure that we are able to direct our focus on further written submissions, questions put forward to NRW by the Examining Authority, responses to other Interested Party submissions, responses required under Rule 17. NRW (A) continue to work with the Applicant and believe that they intend to submit the first draft iteration of the SoCG for examination at Deadline 3.

With respect to the advice contained within this document relating to nature conservation within Welsh inshore waters, reference to Welsh Offshore waters and English Onshore / Offshore waters may be made in view of mobile species, Zones of Influence and potential cross-border and cumulative / in-combination impacts on the Welsh inshore marine area and protected sites. Where potential impacts are wholly within Welsh offshore waters or English Onshore / Offshore waters, NRW (A) defer to comments provided by the Joint Nature Conservation Committee (JNCC) and Natural England (NE) respectively.

Please do not hesitate to contact Rebekah Newstead [redacted]@cyfoethnaturiolcymru.gov.uk and Bridget Randall-Smith [redacted]@cyfoethnaturiolcymru.gov.uk should you require further advice or information regarding these representations.

Yn gywir / Yours sincerely,

[redacted]

Andrea Winterton
Marine Services Manager
Natural Resources Wales

[CONTINUED]

Contents

Annex A – Written Representations

1. Summary

Marine Ornithology

1. NRW (A) are unable to agree with conclusions on project alone impacts for features of Welsh SPAs due to concerns regarding the Applicants underlying methodology together with discrepancies in seasonal definitions and mean seasonal abundance at EIA scale which affect apportioned impacts to designated sites. Where data gaps exist in cumulative and in-combination assessments we are unable to comment on the potential significance of in combination impacts to Welsh Designated Sites. There is a lack of consideration of a range of % mortality rates in gannet displacement assessments and a lack of quantitative assessments for features of Pen y Gogarth / Great Orme's Head SSSI.

Marine Mammals

2. NRW (A) do not agree with the conclusions of the Cumulative Effects Assessment (CEA) and subsequently do not agree with the in-combination assessment, given that the conclusions are based on the CEA. NRW (A) provides detailed review and feedback of the various methodologies used for the CEA with recommendations. An identified Key Issue is that the Applicant is relying on the Marine Mammal Mitigation Plan (MMMP) to avoid conclusions of significant impact for the project alone and in the CEA, and maintains that mitigation can be achieved, but does not specify the measures relied upon to conclude no adverse effect. NRW (A) provides additional comment on the Applicants response to Relevant Representations.

2. Detailed Comments

3. This section of our Written Representation covers issues associated with matters considered to be cumulative and in-combination effects in relation to Welsh designated sites and/or mobile species. NRW (A) are therefore focussing on Marine Mammals and Marine Ornithology only. All other matters pertaining to the development will be deferred to Natural England/the Joint Nature Conservation Committee (JNCC). Our response draws on the information contained in the original application documents submitted by the Applicant. NRW registered as an interested party but were not in the position to provide detailed comments at pre-examination, namely relevant representations. Hence, NRW do not have any outstanding issues to respond to from the Applicant as part of our written representations. In our Written Representations, NRW (A) set out the main issues in relation to the application. We also provide advice on the Applicant's approach which, although suitable for this application, it may not be for other situations and should not set a precedent for further offshore wind applications coming up in the same area. We are also progressing a draft SoCG between NRW and the Applicant, which is planned for

submission (by the Applicant) at Deadline 3. This SoCG will highlight progress made and those matters that are still outstanding / ongoing between the two parties.

3. Marine Ornithology

4. This section of NRW (A)'s Written Representation covers issues relating to offshore ornithology associated with the Morecambe Generation Assets application and draws on the information contained in the original application documents and further submissions from the Applicant at Procedural Deadline A.

5. As the Morecambe Generation Assets project is located wholly in English waters, NRW (A)'s primary area of interest for offshore ornithology for this project is on impacts to Welsh designated sites and hence the advice provided focuses on Welsh designated sites and cumulative/in-combination assessments. However, we have also provided advice on the overall methodological approaches taken for offshore ornithology as these are relevant to the assessment of impacts to Welsh designated sites.

6. Following a review of the information submitted by the Applicant, NRW (A) have identified the key issues as:

- We have concerns regarding the Applicants approach together with discrepancies in seasonal definitions and mean seasonal peak abundances at EIA scale, which have the potential to feed through to apportioned impacts to designated sites (SPAs/Ramsar's) and hence mean we are unable to confidently agree to conclusions regarding project alone impacts for some features of Welsh SPAs. See ***Sections and 3.1.5***.

- Lack of consideration of a range of % mortality rates in gannet displacement assessments. Although we do note that full displacement matrices for the Grassholm SPA are provided in APP-070 and hence, the predicted impacts for the advised range can be accessed. See ***Sections 3.1.2 and 3.1.5***.

- Data gaps in cumulative/in-combination assessments, meaning that at present we are unable to comment on the potential significance of in-combination impacts to Welsh designated sites. See ***Section 3.1.4***.

- Lack of quantitative assessments for features of Pen y Gogarth / Great Orme's Head SSSI. See ***Section 3.1.6***

- Further detail on each of these issues are set out below.

3.1 Methodological Issues

3.1.1 Seasonal differences and mean peak abundances

7. NRW (A) agree with the shaded seasonal definitions presented by the Applicant in Table 12.16 of Volume 5, Chapter 12, [APP-049]. However, on comparison of the seasonal mean peak abundances presented in Table 12.21 of APP-049 with the array plus 2km buffer abundances presented in the Technical Report [APP-070], there appears to be some inconsistencies in the months assigned to each season for gannet (Table 5.76 of APP-070) and Manx shearwater (Table 5.148 of APP-070). NRW (A) advise that the full breeding season definition is used and then where there is overlap of a month(s) with both a migration season and the breeding season, the month(s) in question should be considered in the breeding season and the non-breeding season definitions in Furness (2015) be adjusted accordingly. The inconsistencies identified are as follows:

- Assigning gannet abundances to seasons following the NRW (A) advised seasonal definition approach would mean that:

  0 gannets were recorded in the wind farm array + 2km buffer in the pre-breeding/spring migration period of December-February, and far fewer gannets (14 rather than 124 as presented in Table 12.21 of APP-049) were recorded in the post-breeding/autumn migration period of October-November.

- Assigning Manx shearwater abundances to seasons following the NRW (A) advised seasonal definitions approach would mean that:

  0 Manx shearwaters were recorded in the wind farm array + 2km buffer in the pre-breeding/spring migration period of March, rather than the 1,617 as presented by the Applicant in Table 12.21 of APP-049.

  5,161 Manx shearwaters were recorded in the wind farm array + 2km buffer in the breeding period of April-August, rather than the 4,705 as presented by the Applicant in Table 12.21 of APP-049.

  376 Manx shearwaters were recorded in the wind farm array + 2km buffer in the post-breeding/autumn migration period of September-October, rather than the 2,650 as presented in Table 12.21 of APP-049.

- We do however note that the correct months as advised by NRW (A) have been used for assigning collision impacts to seasons for gannet.

  NRW (A) note that these inconsistencies/errors in the seasonal mean peaks could have implications for the number of gannets and Manx shearwaters apportioned to designated sites (including Grassholm SPA, Aberdaron Coast and Bardsey Island SPA and Skomer, Skokholm and seas off Pembrokeshire (SSSP) SPA). Therefore, we suggest that the assessments should be reviewed by the Applicant and updated as necessary, including following any updates through to apportionment to designated sites and associated HRA reports, so that the most appropriate figures

for the project for these sites are available for future projects to include in in-combination assessments.

- We note that the Applicant has updated the EIA scale gannet assessments to correct these errors in their Response to the Rule 9 Letter [PD1-010]. We welcome this, but we also consider that these corrected EIA scale abundances should also be taken through to the HRA assessments for the relevant gannet designated sites (including Grassholm SPA) and the assessments updated accordingly.

- NRW (A) also request clarification from the Applicant as to the seasonal definitions used for puffin, as the shaded seasonal definitions presented by the Applicant in Table 12.16 of Volume 5, Chapter 12 [APP-049] suggest definitions of April-August have been used for the full breeding season and September-March as the non-breeding season. However, the text in paragraph 1410 of the Report to Inform Appropriate Assessment (RIAA) [APP-027] in the puffin assessment for the SSSP SPA suggests that a non-breeding season definition of August-March may have been used. We suggest the Applicant checks these definitions and ensures that no months are considered in more than one season, and then where required, the apportioned impacts for the puffin feature of the SSSP SPA (and any other sites that may be affected) are checked and updated.

3.1.2 Collision risk modelling (CRM) and displacement assessments

8. NRW (A) welcome that in the assessments to Welsh SPAs/Ramsars in the RIAA [APP-027], the Applicant has considered a range of predicted apportioned impacts that consider the uncertainty and variability in the Collision Risk Modelling (CRM) input parameters (i.e. consider the range of predicted collision vales from the sCRM tool, rather than just the mean predicted impact) and consider the uncertainty and variability in the potential % displacement and % mortality rates (i.e. have considered a range of % displacement and % mortality rates, as well as the Applicant's preferred rates). We agree with the sCRM input parameters used (i.e. those advised to the Applicant by NE during the Expert Working Group (EWG)) and are largely in agreement with the ranges of % displacement and % mortality rates used by the Applicant. However, we would suggest that a 1-10% range of mortality rates are used for gannet displacement assessment (such as for Grassholm SPA) rather than a single 1% mortality as has been used. Although we do note that full displacement matrices for this site are provided in APP-070 (see *Section 3.1.5* below).

3.1.3 Migratory non-seabird collision risk

9. NRW (A) welcome the consideration of migratory non-seabirds and impact estimates derived by CRM. We note the low levels of predicted impact from the project alone relative to the contributing populations. NRW (A) are satisfied that the project alone will not result in any significant level of impact to migratory non-

seabirds that are qualifying features of the Welsh SPAs/Ramsar sites within 100km of the Project.

3.1.4 Cumulative Effects Assessment (CEA) methodology

10. NRW (A) do not consider the Cumulative Effects Assessment (CEA) (cumulative at EIA scale and in-combination for HRA) to be sufficiently robust. This is due to the lack of quantitative consideration of some historic projects. This issue was raised as a concern by NRW (A) in our Preliminary Environmental Information Report (PEIR) responses. We highlight that NRW (A) advised the Crown Estate Round 4 plan-level Habitats Regulations Assessment (HRA) to undertake quantitative 'gap-filling' for historic projects. It is unfortunate that this advice was not adopted as we do consider this problem would be best tackled at the strategic level. Nonetheless, the SNCBs supplied bespoke advice to the Round 4 projects in the Irish Sea detailing a hierarchical method to 'gap-fill' the Irish Sea cumulative and in-combination assessments, in this case sent by Natural England (NE) to the Applicant. The advice to the Applicant was to generate indicative estimates for currently unknown impacts, which have been assumed to be zero. Adopting an approach that would allow indicative estimates to be made (rather than assuming zero) would then enable more informed expert judgement to be made on the likelihood of adverse effects, and thus if further investigation by a more rigorous assessment was warranted.
11. We note that the Applicant declined to fully follow the SNCB advised approach to 'gap-fill' the CEA, as the Applicant does not believe the consideration of proxy sites with quantified impacts is appropriate. Whilst the Applicant has made useful progress on addressing the data gaps in the assessments presented, we remain concerned that some projects are effectively treated as having 0 impact based on highly uncertain qualitative assessments. Hence, we do not consider that the qualitative assessments presented by the Applicant are sufficient to give confidence in the conclusions drawn with respect to the level of significance of accumulating scale of impacts to some species. Our advice therefore remains as detailed in the original SNCB advice provided to the Applicant. However, we do recognise that for most assessments the legitimate risk of impact on integrity judgements is relatively low.
12. We note that since the PEIR, the Applicant has made useful progress on addressing data gaps and assessing the risks of remaining gaps in the submission documents. However, we question the apportioning approach used by the Applicant in cases where EIA impacts are assigned to SPAs for in-combination assessments (see below). At present, we do not consider that appropriate assessments can be undertaken without further quantification of impacts arising at historic projects.
13. For in-combination assessments, the numbers of mortalities attributed to each project in the region, which the Applicant produced for their cumulative impacts assessment for EIA, have been apportioned to SPAs. In the breeding season, birds are constrained to forage from a single colony, and the distance of a project from a

colony becomes highly influential in determining how many birds should be apportioned to that colony. Calculation of breeding season apportioning values using the NatureScot method involves working out the distance from a project to every colony within the foraging range of a given species. Rather than do this for every historic project for which apportioning values are not available, the Applicant has chosen instead to use newer projects as proxies for the older ones. This is reasonable in cases where a proxy is in a similar location to another project. However, in some cases the Applicant has used a project that is a significant distance away both from other projects, and from key SPA colonies, as a proxy. This may lead to severe underestimation of in-combination impacts.

14. NRW (A) also highlight inconsistencies in figures used for some projects compared to those in other assessments (e.g. Morgan Generation Assets and Mona Offshore Wind Farms (OWF)). We advise that the Round 4 Irish Sea OWFs should be collaborating to use the same data to conduct their cumulative and in-combination assessments. This is important both with respect to historic projects and the current projects themselves, given these projects are in examination simultaneously and the impact estimates are subject to change.

15. Therefore, based on the issues outlined above, we are unable to comment on the potential significance of in-combination impacts to Welsh designated sites presented at this stage.

16. We note that NE also raised the issue of gaps in the cumulative/in-combination assessments in their Relevant Representations [RR-061]. From the Applicant's response to NE's Relevant Representations [see points RR-061-26, RR-061-70 of PD1-011], we understand that the Applicant will provide an update to cumulative/in-combination assessments at Deadline 1 (agreed with the ExA within its Rule 6 Letter [PD-007]), to incorporate additional information for historic projects, for species where NE has identified this requirement. We also understand from PD1-011 that the Applicant confirms that discussions with the other Round 4 Irish Sea offshore windfarms (OWFs) (Mona Offshore Wind Project and Morgan Offshore Wind Project Generation Assets) are ongoing to ensure collaboration across the projects, which is welcomed. We will therefore provide further advice regarding in-combination impacts to Welsh designated sites following full review of the information submitted by the Applicant.

17. NRW (A) also note that the Applicant has taken a general approach of where the background mortality is predicted to increase by less than 0.1% and/or apportioned mortality is significantly below one individual, it has been assumed that changes would be undetectable against natural variation, and no contribution by the project to in-combination effects has been assumed. Whilst this approach may be appropriate for this project where predicted impacts from the project alone are likely very small, it may not be appropriate in other situations, including for designated sites where in-combination impacts are already close to/at levels that are already considered to be of an adverse effect; or for designated sites considered to be in unfavourable condition/have restore conservation objectives. It also does not mean that impacts from the Morecambe Generation Assets project should be excluded from in-combination totals for future project assessments. We do however welcome

that the Applicant has taken designated sites through to in-combination assessment where the predicted impact from the project alone exceeds their 0.1% baseline mortality threshold anywhere across the full range of predicted impacts assessed.

3.1.5 IMPACTS TO WELSH DESIGNATED SITES

Welsh Special Protection Areas (SPAs) and Ramsar sites

18. NRW (A) welcomes the Applicant's approach to HRA, in which a comprehensive list of SPAs/Ramsars has been considered for impacts and agree with the Welsh SPA/Ramsar sites screened into the assessment in the HRA Screening Report [APP-028]. We note that due to the location of the Morecambe Generation Assets project, protected sites from the other devolved administrations are screened into the assessment. We highlight that NRW are the relevant SNCB to consult on impacts to Welsh sites, but it would not be appropriate for us to advise on integrity judgements on sites located outside of Wales. We advise that the Applicant consult the relevant SNCBs regarding impacts to non-Welsh sites.
19. NRW (A) are content with the Applicant's methods used to calculate the breeding season and non-breeding season(s) apportionment values for impacts from the project alone to SPAs and Ramsars. We do note NE's concerns raised in their Relevant Representations [RR-061] regarding the apportionment of lesser black-backed gull colonies in the breeding season, but we note that any updates to this would not alter the apportioned impacts from the project alone for this species to the Skomer, Skokholm and seas off Pembrokeshire SPA as no breeding season impacts have been apportioned to this colony.
20. We agree with the Applicant that for the Welsh SPAs/Ramsar site assessed the predicted impacts from the Morecambe Generation Assets project alone are small and equate to less than 1% of baseline mortality of the respective population and would not be detectable against background mortality and hence can agree that an adverse effect on site integrity (AEoSI) can be ruled out for these sites and feature combinations. However, there are some exceptions to this, which are detailed in *paragraphs 31- 36 b*elow.

Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island (AC & BI) SPA: Manx shearwater

21. NRW (A) draw attention to our comments in *Section 3.1,* above regarding the apparent errors in the mean peak seasonal abundance figures for EIA scale Manx shearwater. Whilst, we expect that these errors are unlikely to alter the Applicant's conclusions of no AEoSI from the project alone, the figures should be checked and corrected for this site/feature combination where appropriate before we can definitely reach agreed conclusions.

Sgomer, Sgogwm a Moroedd Penfro / Skomer, Skokholm and the Seas off Pembrokeshire (SSSP) SPA: Manx shearwater, puffin

22. NRW (A) draw attention to our comments in *Section 3.1* above regarding the apparent errors in the mean peak seasonal abundance figures for EIA scale Manx shearwater. Whilst, we expect that these errors are unlikely to alter the Applicant's conclusions of no AEoSI from the project alone, the figures should be checked and corrected for this site/feature combination where appropriate before we can definitely reach agreed conclusions.

23. We also note our comments in *Section 3.1,* above the seasonal definitions used for puffin in this assessment and the potential for errors in the mean peak seasonal abundance figures used in the apportionment of abundance estimates to the SPA. Whilst we expect that these errors are unlikely to alter the Applicant's conclusions of no AEoSI from the project alone, the figures should be checked and corrected for this site/feature combination where appropriate before we can definitely reach agreed conclusions.

Grassholm SPA: Gannet

24. NRW (A) note our comments in *Section 3.1* above regarding the apparent errors in the mean peak seasonal abundance figures for EIA scale gannet. Therefore, we advise the Applicant checks these figures and updates the apportioned figures for this feature of the colony and associated assessment accordingly. We also note that in the displacement assessment, the Applicant has only considered a 1% mortality rate. To account for uncertainty in mortality rates resulting from displacement we would recommend that the Applicant also considers the 1-10% mortality rate ranges for this species as has been done for other species displacement assessments. Although, we do note that the Applicant has presented full displacement matrices for apportioned impacts (which need to be corrected for errors in seasonal apportioned abundances) for this site for the project alone in Tables 3.230-3.237 of APP-070 and if updated, then the numbers for our advised range could be extracted to inform our advice. Whilst, we expect that these issues are unlikely to alter the Applicant's conclusions of no AEoSI from the project alone, the figures should be checked and corrected for this site/feature combination where appropriate before we can definitely reach agreed conclusions.

Liverpool Bay SPA

25. Given that the Morecambe Generation Assets project is located wholly in English waters, we defer comment/advice regarding predicted impacts and integrity judgements of the project alone and in-combination for all qualifying features of the Liverpool Bay SPA to NE.

26. However, we do note that in paragraph 479 of the RIAA [APP-027] the Applicant states that: 'It is noted that in the HRA of the Awel y Môr OWF project (DESNZ, 2023a), the Secretary of State (SoS) concluded that an adverse effect on the integrity on the red-throated diver feature of the SPA from the Awel y Môr project in-combination with other projects could be excluded.' Hence, the Applicant concludes that it is unlikely that the SoS would reach a materially different conclusion in this

regard. With regard to this point, we note that NRW/JNCC advice provided during the Awel y Môr project related to specific factors and data relating to that particular area of the SPA. The advice specifically related to the low numbers of divers encountered in the area and the findings of the post-construction monitoring of the Gwynt y Môr windfarm. As a result, NRW/JNCC concluded that Awel y Môr would not significantly affect the distribution of red-throated diver in this particular area of the SPA. In our Written Representations for the Awel y Môr project (NRW 2022), we note that the lack of displacement of red-throated diver in this part of Liverpool Bay SPA is not consistent with what has been observed in other areas of Liverpool Bay SPA as well as in other areas of the UK and Europe where strong displacement of RTD by offshore windfarms have been observed. Given this anomaly we advised that comprehensive validation monitoring before, during, and after construction of Awel y Môr is needed to confirm that it is the case that supporting habitat (as identified in the sites conservation objectives) has not been lost. It should therefore be borne in mind that the proposed Morecambe Generation Assets project will be impacting the northern part of the SPA, whereas the Awel y Môr project is located in the southern part of the SPA.

3.1.6 Welsh Sites of Special Scientific Interest (SSSIs)

Pen-y-Gogarth / Great Orme's Head SSSI

27. In our PEIR comments, NRW (A) highlighted that as the Morecambe Generation Assets project is located within foraging range of the guillemot, razorbill and kittiwake features of the Pen-y-Gogarth / Great Orme's Head SSSI, there was a need for the Applicant to present a full quantitative assessment of impacts from the proposed project on these features of the site. Whilst the Applicant presents a very high-level qualitative assessment of impacts to SSSIs in paragraphs 12.423-12.424 of Volume 5, Chapter 12 [APP-049], no quantitative assessment has been made in the submission of impacts to the guillemot, razorbill (both for displacement) or kittiwake (collision) features of this site. Therefore, the Applicant has not carried out assessment of potential impacts to this site sufficiently in order to enable the effects on the features of the site to be assessed.
28. The proposed location for the Morecambe Generation Assets array area is approximately 52km from Pen-y-Gogarth / Great Ormes Head Site SSSI (*Figure 1*). The cliffs host a large colony of breeding seabirds, and the site is designated for breeding kittiwake, guillemot and razorbill. This is the second largest kittiwake breeding colony in Wales and the largest in North Wales, supporting approximately 790 pairs (5-year mean of peak counts 2018-2022, excluding 2020 when no data were collected due to the COVID-19 pandemic). In addition, the site supports around 1,500 guillemots and 150 razorbills each year (figures also based on 5-year mean peak 2018-2022 excluding 2020).

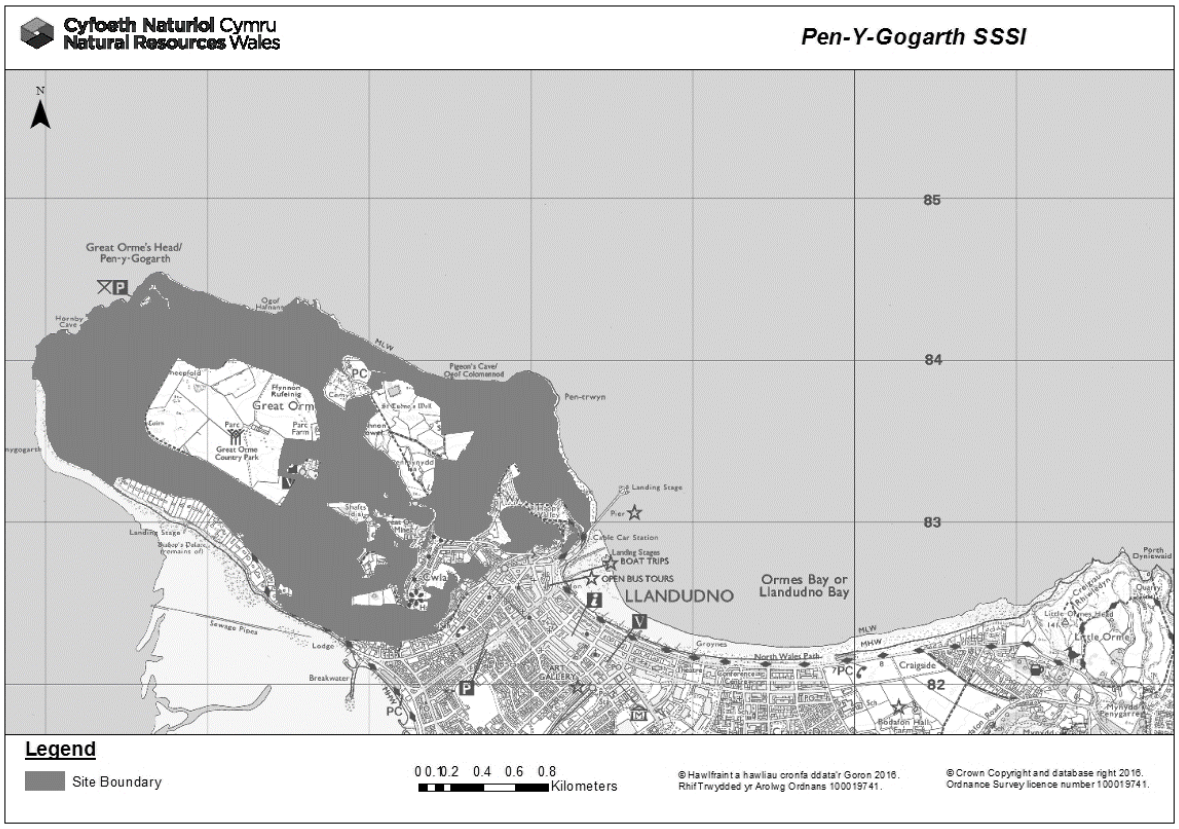

Figure 1 Location of Pen y Gogarth / Great Orme's Head SSSI

29. NRW (A) advise that the Applicant should undertake full quantitative assessments of predicted impacts of displacement of the guillemot and razorbill and collision of the kittiwake features of the Pen-y-Gogarth / Great Orme's Head SSSI. We advise that displacement and collision risk impacts are apportioned to the site using the same approaches as used for the SPA/Ramsar assessment, i.e. to follow the NatureScot approach (as has already been done in Annex 2 of APP-070) for the breeding season and use the information in the respective Appendix A tables from Furness (2015) for the non-breeding seasons – as the SSSI colony will not be specifically listed in the Furness (2015) tables, we suggest that apportionment is informed by use of the adult proportion of birds for the 'western non SPA colonies' in the Furness 2015 Appendix A tables. We would be happy to discuss appropriate approaches further with the Applicant if required.

30. Guillemot and razorbill displacement assessments should be based on the displacement matrix approach and due to the uncertainty around specific displacement and mortality rates the assessments should consider a range of displacement rates (i.e. for auks 30-70% displacement and 1-10% mortality), as has been undertaken by the Applicant in their other assessments. Kittiwake collision assessments should be based on the stochastic collision risk model (sCRM) as used by the Applicant for their other collision assessments, using the same input parameters for bird biometrics, flight speeds, avoidance rates, nocturnal activity etc (as was provided to the Applicant by NE). If apportioned impacts equate to 1% or greater of baseline mortality then further consideration should be given through

PVA. If this is the case, NRW (A) can discuss and advise appropriate input parameters with the Applicant.

31. NRW (A) also advise that the Applicant considers assessment of cumulative impacts to this SSSI of the Morecambe Generation Assets project cumulatively with other plans and projects. This is particularly as the Awel y Môr, Mona and Morgan generation assets projects are all located within foraging range of all three features of the Pen y Gogarth / Great Orme's Head SSSI.

32. We note that quantitative assessments of impacts to this site have been conducted by the Awel-y-Môr Applicant in their Deadline 3a submission: Deadline 3a assessment and are also being undertaken by the Mona project and Morgan Generation Assets Applicants. We note that a recent update to the Mona assessment for this site has been submitted by the Applicant at Deadline 4. Whilst we have not yet fully reviewed this document, we understand that this includes cumulative assessments. We suggest that the Morecambe Generation Assets Applicant discusses approaches with the Mona and Morgan Generation Applicants to ensure consistent approaches are undertaken.

4. Marine Mammals

33. This section of NRW (A)'s Written Representation covers issues relating to marine mammals associated with the Morecambe Generation Assets application and draws on the information contained in the original application documents and further submissions from the Applicant at Procedural Deadline A.

34. As the Morecambe Generation Assets project is located wholly in English waters, NRW (A)'s primary area of interest for marine mammals for this project is on impacts to Welsh designated sites and Marine Mammal Management Units (MMMU). Hence the advice provided focuses on Welsh designated sites, MMMUs and cumulative/in-combination assessments. However, we have also provided advice on the overall methodological approaches taken for marine mammals as these are relevant to the assessment of impacts to Welsh designated sites.

35. Following a review of the information submitted by the Applicant, NRW (A) have identified the key issues as:

- NRW (A) do not agree with the conclusions of the Cumulative Effects Assessment (CEA). Several aspects of the CEA need updating and potentially re-assessment before we can agree to the conclusions.
- NRW (A) do not agree with the conclusions of the in-combination assessment, given that these are based on the CEA. If the CEA is updated, we may be able to agree on the conclusions in the in-combination assessment.
- The Applicant is relying on the Marine Mammal Mitigation Plan (MMMP) to avoid conclusions of significant impact for the project alone and in the CEA. The Applicant has maintained that any effects may be suitably mitigated through further design refinement and other embedded mitigation however has not stated the precise

mitigation measures that are being relied upon to conclude no adverse effect. The Applicant should make a stronger commitment to several mitigation options.

- Further detail on each of these issues is set out below.

4.1 Detailed comments

36. NRW (A) has previously stated that other than for the Cumulative Effects Assessment (CEA) and transboundary assessment, we would be deferring to Natural England (NE). However, given that currently the Applicant is relying on the Marine Mammal Mitigation Plan (MMMP) to avoid conclusions of significant impact for the project alone and the CEA, regarding the MMMP and the proposed outline underwater sound management strategy NRW (A)'s comments are as follows:

37. The Applicant is relying on the MMMP to avoid conclusions of significant impact for the project alone and in the CEA. The Applicant has maintained that any effects may be suitably mitigated through further design refinement and other embedded mitigation but has not stated the precise mitigation measures that are being relied upon to conclude no adverse effect. NRW (A) advise that the Applicant should make a stronger commitment to several mitigation options such as the use of bubble curtains and other noise abatement systems (NAS).

38. NRW (A) recommend that the Applicant consider one of the key findings in Offshore Renewables Joint Industry Programme's (ORJIP) Range dependent nature of impulsive noise (RaDIN) project (ORJIP 2024). The purpose of this project was to improve our understanding of how the impulsiveness of sounds produced during pile driving and unexploded ordnance (UXO) clearances changes with increasing distance from the source, and to help refine the estimation of auditory injury impact ranges for marine mammals to reduce conservatism during noise impact assessments. One of the major findings from this project was that the time between subsequent pile strikes was found to have the largest effect on hearing injury onset ranges, where increasing the time between pile strikes significantly reduced the range of injury onset. A freely available software tool was developed by the project, which allows the user to estimate permanent hearing damage impact ranges from impact pile driving by considering a variety of factors including source level, timing between pile strikes, fleeing speed of the animal, and the assumed distance at which sound becomes non-impulsive. Work is currently ongoing to further develop the tool to be able to include ramp-up procedures, and the potential for the auditory system to recover between pile strikes. NRW (A) understands that at the application stage, consent must be considered based on the maximum design envelope which considers both a realistic worst case in accordance with the precautionary principle and to maximise flexibility in construction if consent is awarded. In addition, detailed information and further refinements of the piling schedule are normally only available further along the consenting process. Thus post-consent, once more information on the piling schedule is available, there may be the potential to consider using the permanent hearing threshold shift (PTS) software tool developed

from RaDIN to test the effect of altering the temporal pattern of pile strikes on PTS impact range and potentially use the temporal pattern of pile strikes as a primary mitigation method. NRW (A) believe this could be particularly useful for mitigating impacts on Minke whale (Low Frequency (LF) hearing group) the species with the largest PTS impact range.

39. The Outline Vessel Traffic Management Plan (VTMP) [APP-153] does not currently reference mitigation for collision risk or disturbance. While Section 6.2.2.2 of the Outline Project Environmental Management Plan [APP-146] does mention mitigation for collision risk, no measures which specifically address mitigation of disturbance from vessel noise (construction and maintenance) are listed.

APP-048: Volume 5, Chapter 11 – Environment Statement - Marine Mammals

40. The Interim Population Consequences of Disturbance (iPCoD) framework can be used to assess population-level effects from multiple impact pathways (King et al. 2015). The primary output from iPCoD is an iteratively simulated population growth rate, in the presence and absence of a development (Harwood et al. 2014; King et al. 2015).

41. The definitions of magnitude as described in paragraphs 11.51-11.59 and significance as described in paragraph 11.60–11.63 suggest strongly that the outputs obtained from iPCoD would inform a conclusion of the significance of an effect, and not a conclusion on the magnitude. Furthermore, the factors listed in paragraph 11.52 overlap significantly with the disturbance inputs for the iPCoD model (namely: duration of piling, number of operations, days of residual disturbance, number of animals disturbed, number of animals injured). Thus, NRW (A) disagree with Applicant's use of iPCoD to inform the magnitude of the impact in the assessment. The assessment should be revised with iPCoD results being used to inform the significance of the effect.

42. Furthermore, while NRW (A) agree that iPCoD is a useful tool to assess the potential impacts of disturbance, given that there is no standardised method for quantifying disturbance, iPCoD can be one of multiple tools that together can be used to inform a decision on significance. It should never be the sole basis for any decision.

43. NRW (A) disagrees with the use of a Temporary Threshold Shift (TTS) threshold to estimate the number of animals disturbed from piling for dolphin species. The use of a TTS threshold is not sufficiently precautionary to assess disturbance except when assessing disturbance from UXO clearance (Sinclair et al. 2022; NRW 2023).

44. NRW (A) acknowledge and welcome the efforts made by the Applicant to undertake an assessment of the disturbance impact from Acoustic Deterrent Device (ADD) activation. However, NRW (A) do not agree that the effect ranges of ADDs will be limited to the (minimum) distance the receptor can swim in the time that the ADD is

active. ADDs are often used to deter marine mammals from pile driving operations that may otherwise cause hearing injury. These devices work by emitting a noise to which the target animal is sensitive, and at a level loud enough or for a long enough period to elicit a behavioural reaction sufficient for the animal to swim away to a safe distance – i.e. a deterrence range. This deterrence range can be altered based on the expected PTS impact range.

45. NRW (A) note that evidence from Elmegaard et al. (2023), Graham et al. (2023), Voβ et al. (2023), and Brandt et al. (2013) demonstrates that harbour porpoise shows very strong flight and physiological responses to ADD use even at low received levels and often far beyond the intended mitigation zone. This evidence is corroborated by data collected on porpoise response (displacement) to chronic and long-term exposure to ADDs at aquaculture sites (Findlay et al. 2024). Such energetic responses to noise may have a cumulative effect on health if they occur frequently enough, particularly for porpoise who are thought to need to forage constantly to meet their energy demands. NRW (A) believe that there is a risk that to reduce the number of animals injured, a reliance on ADD deployment over other forms of mitigation will increase the number of animals disturbed, particularly harbour porpoise. A deterrence sound must be efficient in clearing an area of animals, yet it should not cause disruptions at scales larger than necessary. Thus, consideration should be given to proportionate and judicious application of ADDs in terms of deployment duration.

46. NRW (A) welcome the quantification of impacts from vessel noise through the use of a 4 km buffer, and note that while this assessment adequately represents a worst case scenario with 37 vessels on site at a single point in time, it does not capture repeated instances of disturbance over a specific time period e.g. a 24 hour period. The methodology appears to assume that either (1) disturbed animals will leave the area, and/or (2) no new animals will be disturbed (or repeatedly disturbed) other than those within the 285.4 km2 area. NRW (A) advise that the Applicant should clarify the assumptions made in their assessment.

47. NRW (A) welcome the approach taken in the CEA to combine the assessments for the generation and transition assets, however NRW (A) have several major reservations regarding the overall approach taken for a number of aspects of the CEA (see below paragraphs 48-58):

48. Other than the section on Population modelling for cumulative disturbance from OWF projects, assessments appear to have been based on numbers disturbed from a single event of a given activity. Thus the (potential) cumulative impact of repeated disturbance events on the same population over time has not been captured.

49. In paragraph 11.764 [APP-048] the Applicant states that: *“The approach to the CEA for piling at OWFs was based on the potential for single piling activity at each windfarm at the same time as single piling activity at the Project windfarm site. This approach*

allowed for some of the OWFs to not be undertaking piling activities at the same time, while others could be simultaneously undertaking piling activities (further information is available in Appendix 11.4). This was considered to be the most realistic worst-case scenario, as it is highly unlikely that all other windfarms would be simultaneously undertaking piling activities at exactly the same time as piling activity at the Project, especially given the limited active piling time."

50. Our understanding is that this implies that the overall approach taken by the Applicant for this CEA was to present a worst-case snapshot scenario of animals that may be disturbed simultaneously at any one point in time by the project and other OWFs. Our view is that this is essentially a simultaneous assessment, but not necessarily a cumulative one.

51. However, NRW (A) note that this approach contradicts the population modelling conducted using iPCoD to assess the cumulative impact of piling from multiple projects [paragraph 11.767-11.794]. iPCoD allows the user to specify piling schedules for each operation within each project and thus captures the number of animals predicted to be disturbed by these activities and their extent in time and space. While we agree with the Applicant's decision to prioritise the results of iPCoD modelling, we would be grateful for more clarity regarding the decision to also present the approach in paragraph 11.764.

52. For the project alone, separate assessments have been provided for the different phases of the project; construction vs operation and maintenance phase. These should be summed to capture the cumulative impact for the project overall.

53. Separate cumulative assessments have been provided for each of the different impact pathways, with individual cumulative assessment conclusions for each. The impacts of these separate assessments do not appear to have been summed/considered in the same model, thus the impact of multiple pathways of disturbance on the same populations has not been captured. While effects of these impacts acting in concert may not necessarily be additive, no justification has been provided to support this assumption.

54. In paragraph 11.796 [APP-048] the Applicant states that: *"Construction activities (such as seabed preparation, cable installation and vessel activities) could occur at the same time as piling activities at the Project. Projects where piling overlap was considered have not been included in regard to other construction noise."* Here, the Applicant has screened out any activities based on piling overlap. This appears to assume that there will be no days where, for instance, piling does not occur, but other activities do. It further assumes that all animals disturbed will be displaced from the area, ruling out the possibility that impact radii for different pathways may overlap, with potentially additive impacts.

55. NRW (A) note that the assessment of construction activities (other than piling) could be assessed using the same method used for piling noise (i.e. an iPCoD model). King et al. (2015) suggests that other impact pathways (such as noise from seismic surveys and/ or vessels) can be included in the same manner by using estimates of the number of animals predicted to be disturbed by these activities and their extent in time and space.

56. The conclusions in paragraph 11.715 [APP-048] indicate that *"while all effects are additive between the Project and the Transmission Assets, due to the localised effects there is no material change in significance of effects when considering the majority of impacts together (see impact screening summary)."* Here, the additive nature of the impacts does not appear to have been considered, and a conclusion of no material change has been made based on "localised effects". NRW (A) advise that the assessment should either be based on a summation of the effects, or a much stronger justification should be provided.

57. The conclusions on disturbance from vessel noise in paragraph 11.736 [APP-048] appear to have been based on estimates of numbers of animals disturbed at a single point in time. NRW (A) believe that this does not adequately capture the overall additional disturbance introduced by repeated disturbance events over the different phases of the project. While we understand that disturbance from vessel noise is relatively short lived, the fact that an animal recovers sometime after a disturbance event does not mean the event should no longer be counted as disturbance. Thus, if the intent is to calculate the cumulative number of animals disturbed, to propose basing the CEA on a snapshot estimate invites the risk of significant underestimates. There is a risk that impact pathways which consist of chronic, but individually relatively small (in terms of effect) disturbance events are overlooked on account of these individual disturbance events being short lived. NRW (A) believe it is important to consider the overall additional stressor load introduced when making a conclusion on the magnitude of an impact pathway. NRW (A) advise that the Applicant should either revise the conclusions or provide mitigation measures which specifically address disturbance from vessel noise.

58. *"The long-term population consequences were assessed as low for bottlenose dolphin and negligible for all species for the next 25 years (standard modelling period; details in Appendix 11.2)".* NRW (A) suggests that the modelled results at the ~5-6-year interval would be more suitable and biologically relevant, as this accounts for cumulative impacts / any shorter to medium term changes as a result of construction.

APP-068: Vol. 5 App. 11.4, CEA Project Screening

59. NRW (A) do not agree with the Applicant's assumption that all projects with unknown construction timelines will not overlap with the Morecambe construction period. We consider that it would be conservative to assume that construction for consented

projects could overlap with the project, if an operational date is known (as presented in Table 4.1 for the projects listed in Paragraph 53) and is like the Morecambe project's operational date. The projects listed in Paragraph 53 should be included in the CEA.

60. NRW (A) do not agree that PTS should be screened out of the CEA. The Project has identified a residual PTS impact that it has not committed to fully mitigate at this stage. It is not sufficient to say that mitigation for the Project would be put in place post-consent, as this is not guaranteed or secured. If the Project can take the approach of not mitigating the full PTS zone, then it follows that other projects can take the same approach, hence other projects' PTS risk should be assessed in the CEA too. NRW (A) advise that the Applicant assess cumulative PTS impact in the CEA or commit to sufficient mitigation to reduce the risk of a residual PTS impact further.

61. NRW (A) further note the Applicant's response to RR-061-202 [PD1-011] that: *"The Applicant is committed to this requirement to be secured in the final MMMP but maintains the position that the effects may be suitably mitigated through further design refinement and embedded mitigation before commitment to additional mitigation. This is a commitment made by all neighbouring projects, which have also proposed to secure mitigation measures through Outline MMMPs submitted with their DCO applications to ensure the reduction of risk of PTS. As such there should be no potential cumulative effects."*

62. The Applicant is relying on the MMMP to avoid conclusions of significant impact or residual impact for the project alone and in the CEA. The Applicant has maintained that any effects may be suitably mitigated through further design refinement and other embedded mitigation however has not stated the precise mitigation measures that are being relied upon to conclude no adverse effect. We note that there has been commitment by Awel Y Mor, Morgan, and Mona projects to the potential use of other NAS methods such as bubble curtains if required.

63. NRW (A) also note the Applicant's response that: *"As a precautionary approach, PTS numbers were included in the population modelling for the cumulative assessment, in the Cumulative Effect 1a, Section 11.7.3.2 of Chapter 11 Marine Mammals (APP-048)), so while not looked at individually, the potential impact has been given consideration in the significance of effect at a cumulative level."* Given that PTS numbers were included in the population modelling, we can consider the specific issue of assessing PTS impacts in the CEA closed. However, PTS should still be considered as an impact and screened in, with assessment conclusions provided specifically for that pathway.

64. NRW (A) does not agree with the decision to screen out underwater noise from OWFs maintenance activities and decommissioning activities. Here, the Applicant has argued that the impact footprint from the construction phase will exceed the impact footprint from the operational phase concluding that this makes inclusion of the operational phase unnecessary. However, a cumulative assessment should consider the entire

additional impact load introduced by another project and not simply the largest at any one point. Thus, although the construction phase may have a larger impact footprint, the Applicant is not currently assessing the additional (largely chronic) impact load introduced over the operational phase of other projects. There is a risk that the resulting CEA is under precautionary.

65. The Applicant further argues that a lack of information on impacts from decommissioning justifies the decision to screen out impacts from this phase. However, a lack of information does not preclude the possibility of making precautionary assumptions about the impact load that might be expected. The Applicant is not currently including any additional impact load introduced over the decommissioning phase of other projects, and there is a risk that the resulting CEA is under precautionary.

66. NRW (A) does not agree with the decision to screen out all shipping from further consideration, particularly given that it is expected that construction of other NSIPs in the vicinity will overlap with the Morecambe project. NRW (A) draw attention to the fact that PINS (2019) Advice Note 17 states that only projects expected to be completed before construction of the proposed NSIP should be considered part of the baseline.

67. NRW (A) does not agree with the decision to screen out all aggregate extraction and dredging projects within the Celtic and Irish Sea (CIS) Management Unit (MU), in particular we disagree that the assumption that the impact ranges from such activities would only cause localised effects on short, perhaps medium-term behavioural reactions justifies their omission. NRW (A) argue that the Applicant may be overlooking individually smaller impact pathways based on their individually smaller impact, despite their affecting the same management unit population.

68. NRW (A) agree with the assumption made by the Applicant that up to one seismic survey, and up to two geophysical surveys may overlap with the construction phase of the project.

APP-034: Volume 4 - Habitats Regulations Assessment Screening Report

69. NRW (A) can agree with the list of potential effects scoped in for Likely Significant Effects (LSE) and the list of Special Areas of Conservation (SAC) scoped in for the assessment.

APP-027: Volume 4 - Report to Inform the Appropriate Assessment

70. NRW (A) do not agree with the conclusions of the in-combination assessment [APP-034], given that these are based on the CEA. If the CEA is updated, we may be able to agree on the conclusions in the in-combination assessment.

PD1-011: The Applicant's response to Relevant Representations

71. RR-061-185 – NRW (A) agree with Natural England (NE) on this point. We note the Applicant's response and acknowledge and welcome the changes made, raising the sensitivity from low to medium for dolphins and seals.

72. RR-060-188 – NRW (A) agree with NE on this point. We note the Applicant's response, and their acknowledgement that there is a potential for barrier effects to extend to the coast during piling in the Applicant's Errata sheet [PD1-012].

73. RR-061-189 – NRW (A) agree with NE that the sensitivity of all marine mammals to collision risk should be amended to medium. We acknowledge that the Applicant will be providing further information on the sensitivity of marine mammals to collision risk in deadline 1.

74. RR-061-192 – NRW (A) agree with NE on this point. While we agree that iPCoD is an appropriate tool to assess the potential impacts of disturbance, given that there is no standardised method for quantifying disturbance iPCoD can be one of multiple tools that together can be used to inform a decision on significance. We further note that in some cases iPCoD modelling was used to inform the magnitude rather than the significance of an impact. Significance of each impact should be presented for each method.

75. RR-061-200 – NRW (A) agree with NE on this point. We do not agree with the Applicant's assumption that all projects with unknown construction timelines will not overlap with the Morecambe construction period. The Applicant should include the projects listed in Paragraph 53 in the CEA.

76. RR-061-202 – NRW (A) agree with NE on this issue.

77. RR-061-204 – NRW (A) agree with NE over this issue. The use of a TTS threshold is not sufficiently precautionary to assess disturbance except when assessing disturbance from UXO clearance (NRW 2023). NRW (A) do not accept the argument presented by the Applicant that the density of common dolphin in the area essentially balances out the under-precautionary nature of the TTS threshold, given that White Cross project is a known to be situated in a high-density area for common dolphin. Other projects have recorded site specific densities of 15.97 animals/km2 (Llyr project), and 1.52 animals/km2 (Erebus project) which indicates a high level of variability in the area which we believe is due to the presence of transitory super-pods in the area.

78. RR-061-209 – NRW (A) agree with NE over this issue. In their response, the Applicant has argued that:

    "It is noted the Project is outside of any MPAs, with the nearest SAC for marine mammals being 45 km away (North Anglesey Marine (Gogledd Môn Forol) SAC) and in

the UK thus far, offshore wind developers are not known to have been required to employ NAS."

79. NRW (A) notes that despite the nearest SAC for marine mammals being 45 km away, animals that form part of the same management unit may be found in or near the project area and thus could be impacted by the development. Furthermore, while other offshore wind project may not have necessitated deployment of NAS, there has been commitment by Awel Y Mor, Morgan, and Mona projects to the potential use of other NAS methods such as bubble curtains if required.

80. RR-061-210 – NRW (A) agree with NE that the Outline Vessel Traffic Management Plan (VTMP) (APP-153) does not reference mitigation for collision risk or disturbance. We further note that while 6.2.2.2 of the Outline Project Environmental Management Plan [APP-146] does mention mitigation for collision risk, no measures which specifically address mitigation of disturbance from vessel noise (construction and maintenance) are listed.

81. RR-061-213 – NRW (A) agree with NE over this point.

82. RR-061-214 – NRW (A) agree with NE over these issues.

83. RR-061-215 – NRW (A) agree with NE over these issues.

84. RR-061-217 – NRW (A) agree with NE over this issue.

85. RR-061-224 – NRW (A) agree with NE. All comments with respect to the CEA also apply to the in-combination assessment.

86. RR-061-225 – NRW (A) agree with NE regarding the need for additional monitoring. In view of the overall conclusions in this assessment and given the: (1) residual impacts from some pathways, and (2) lack of pre-consent commitment to sufficient mitigation to reduce the risk of these residual impacts, we recommend that marine mammal monitoring to test the predictions made within the impact assessment is carried out. Any additional data collection over and above that is carried out by the Applicant would of course be welcome.

87. RR-061-228 – NRW (A) agree with NE and believe that an indicative ADD duration should still be provided.

88. RR-061-229 – NRW (A) agree with NE and believe that the Applicant should make a stronger commitment to several mitigation options.

89. RR-061-231 – NRW (A) agree with NE that there are certain impact pathways in the ES that the Applicant is relying on the MMMP to avoid significant impact. The Applicant should make a stronger commitment to several mitigation options.

90. RR-061-232 – NRW (A) agree with NE over this issue.

91. RR-061-234 – NRW (A) agree with NE over this issue.

92. RR-061-235 – NRW (A) agree with NE over this issue.

4.2 Minor points / Recommendations for future assessment

93. In paragraph 203 of APP-066 the Applicant states that: *"Should the OSPAR III region population be used in the impact assessment, the increase in population numbers would cause a dilution of animals affected in the assessment and was likely to underestimate effects. As such the most precautionary approach (to use the reference population set out in Section 5.7.3.2 above) has been taken."*

94. Whilst NRW (A) can confirm that the decision to use the reference population set out in section 5.7.3.2 does not impact the overall result, we would advise that a dilution would only occur if projects within the smaller reference population borders are screened in and used against the larger OSPAR III population, as opposed to also screening all projects in the larger OSPAR III (see also paragraph 95). NRW (A) wishes to clarify that when we recommended the use of the OSPAR III population as a potential option, the OSPAR III border was intended to be used for screening in projects for assessment as well.

95. Thus, we would not necessarily agree with the statement that the OSPAR III region is "less precautionary" due to various nuances that make such a conclusion difficult to make. Although a smaller population number may be more sensitive to modelled impacts, a larger screening area would include projects much further afield capturing broader cumulative impacts.

96. NRW (A) advise that the Applicant should also be conscious of the uncertainty being introduced when selecting a smaller (pragmatic) population boundary which uses political borders and that may not necessarily match the actual (likely larger) population boundary. NRW are currently finalising a population modelling report which as part of the scope of work carried out sensitivity analyses for various models and recommends population parameters for harbour porpoise, bottlenose dolphin, and grey seal. We draw attention to one of the major conclusions of this work: that all the models depended upon an appropriately defined population management unit. If the population boundaries assigned do not align with the true biological population (and there is movement of animals in or out), then this will affect whether the abundance estimate is

appropriate and likewise the observed population trends when modelling demographic responses to human impacts.

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