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03 August 2022

Annwyl yr/Madam / Dear Sir/Madam

MARINE AND COASTAL ACCESS ACT 2009: PART 4 MARINE LICENSING

Awel-y-Môr Offshore Windfarm

Thank you for your letter dated 22 June 2022 consulting Natural Resources Wales' (NRW) Marine Area Advice and Management Team (NRW Advisory) on the information submitted for the above application. This letter comprises NRW Advisory's (NRW (A)) response to NRW's Permitting Service (NRW PS) on the Awel-y-Môr Marine Licence (ML) application information documents.

Generally, our comments are made without prejudice to any further comments we may wish to make in relation to this application, the Planning Act 2008 Development Consent Order application, the Environmental Statement (ES), Report to Inform Appropriate Assessment (RIAA), or other further evidence and documents provided by the Applicant, NRW PS or other interested parties. Our comments are based solely on the information provided within the application documents to date. At the time of any further consultation there may be new information available which we will need to consider in making a formal response to NRW PS.

NRW (A) has reviewed the ML submission and, notwithstanding our key concerns and other issues raised in this consultation response, considers the submission, on balance, to be comprehensive, thorough and of a good quality. NRW (A) is pleased to note that many of our previous concerns as raised during the pre-application process, have been appropriately addressed.

In our following comments, we identify further information that we consider should be provided and / or matters that should be addressed prior to the determination of the ML application. We also identify conditions that, if applied to any ML consent, would mitigate the effect in question. However, we will set out all recommended conditions in our final response on the ML application when subsequently consulted on any additional information / assessments required.

Our key concerns relate to the potential impacts of the project on designated landscapes and to marine mammals. Our key concerns and our detailed comments are provided in Annex 1 of this letter. Where topic matters are of a key concern we have marked them as such in the relevant sections of the Annex. The following Table of Contents identifies the topics and locations of our detailed comments within Annex 1.

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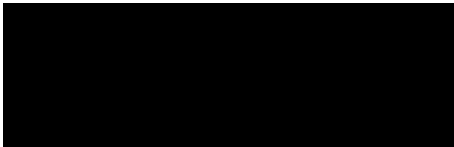
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Please note that NRW (A) provided a Relevant Representation to the Planning Inspectorate on 06 July 2022, as a Statutory Party under the Planning Act 2008 and Infrastructure Planning (Interested Parties) Regulations 2015 and as an ‘interested party’ under s102(1) of the Planning Act 2008. NRW (A) will continue to provide advice to the Applicant on all required matters, through correspondence and meetings, with the aim of reaching as many positions of agreement and common ground as possible prior to the examination of the proposals under the Planning Act 2008. We are engaging in discussions with the applicant regarding some aspects of this and hence some of the detailed comments provided below have already been shared with them directly to allow them to progress preparing further information to address our concerns.

Please consider the advice below, which explains the matters that need to be addressed.

If you have any queries on this letter and detailed comments, please do not hesitate to contact Nia Phillips, Marine Area Advice and Management Team: Nia.Phillips@cyfoethnaturiolcymru.gov.uk

Yn gywir / Yours faithfully,



Andrea Winterton

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Annex 1: NRW Advisory Detailed Comments on the Awel-y-Môr Offshore Windfarm Marine Licence Application

1.0 Physical Processes

1. NRW (A) agrees that the baseline description of physical processes through the desktop review of existing literature, project specific surveys and existing data sources are sufficient to appropriately characterise the study area (Array and Export Cable Corridor and landfall).
2. NRW (A) agrees with the Numerical modelling approach and scenarios conducted in relation to hydrodynamics, waves and sediment transport to inform the potential changes to Constable Bank/Rhyl Flats, designated sites and the adjacent coast arising from the construction, operation and decommissioning of Awel-y-Môr.
3. We agree with the assessment methodology and the assessment conclusions of the potential impacts on physical processes as outlined in the Environmental Statement (ES).
 - *Environmental Statement: Environmental Impact Assessment*
4. NRW (A) notes (Volume 4: Annex 2.3: (6.4.2.3), Pg30: *Marine Geology, Oceanography and Physical Processes Technical Assessment*) that the local dimensions of secondary scour are highly dependent upon the specific shape, design and placement of the scour protection. These parameters are highly variable and so there is no clear quantitative method or evidence base for accurately predicting the dimensions of secondary scour. Given the uncertainty regarding secondary scour, we therefore advise that post-construction monitoring should be considered, in order to ascertain the spatial extent and volume of secondary scour produced from current action and potentially waves if shallow enough. Clarity is required on the most appropriate regulatory mechanism needed to secure the monitoring, but we suggest that a condition of the ML would be appropriate.
5. We acknowledge however that the assessment of primary scour has been undertaken using recognised empirical equations supported by the knowledge of the foundation design and dimensions, and we agree with the assessment as presented for primary scour.
6. ES Volume 2: Chapter 2: (6.2.2): *Marine Geology, Oceanography and Physical Processes* states in Table 8 that “*The project array area and offshore ECC will be licenced as disposal sites for the deposition of dredgings and drill arisings*”. It is not clear from the information provided whether the Export Cable Corridor (ECC) is to be licensed as a disposal site in this licence application, or in a separate licence application associated with the ECC, or both. Clarity is sought on this matter. We note that only the Array area is considered in the current licence application and has been characterised as a potential disposal site (please see document 8.9: *Awel-y-Môr Disposal Site Characterisation Report*). The disposal site report details at paragraph 122 that “*...as a worst case, the total volume of natural material that may require disposal would be up to 12,920,356 m³*”. We understand that this volume relates only to the volume of dredge material associated with the construction activities of the array site. Clarity is therefore sought with respect to where the dredge arisings from the cable laying activities along the ECC (amounting to a volume of 6,281,000m³ (Volume 2: Chapter 1: (6.2.1) *Offshore Project Description*, Table 22: *Design Envelope for Export Cables*)) will be disposed of.
7. We acknowledge the intention that all dredged material from the seabed will be disposed of within these sites in order to ensure that the material is retained within the local sediment

transport system, and, we recommend that retention of material in the local sediment transport system is secured as a condition of the disposal site licence if granted.

- *Report to Inform Appropriate Assessment (RIAA)*

8. NRW (A) agrees with the conclusions of the Report to Inform Appropriate Assessment (RIAA) (5.2).

2.0 Marine Water and Sediment Quality (MW&SQ)

- *Environmental Statement: Environmental Impact Assessment*

9. NRW (A) agrees that there is no impact on Bathing Waters from elevated suspended sediment, during the construction phase.
10. We do not agree with the conclusions made in relation to sediment bound contaminants (Volume 2: Chapter 3: (6.2.3), section 3.7.1, pg 73-79), as further information is required to support the conclusion. Where data are available, the Applicant should report all data in the context of Centre for the Environment, Fisheries and Aquaculture Sciences (CEFAS) Action Levels (ALs). In addition, there is a CEFAS AL relating to polycyclic aromatic hydrocarbon (please see the MMO [website](#) for all ALs) which, although has not been officially accepted, is utilised in the UK as an indicator of an issue and we recommend that this is considered. Once the above information has been provided and updated, we advise that it should be fed through to the RIAA.
11. We do not agree with the approach to assessing impacts to phytoplankton, as the assessment is focussed on nutrients rather than light limitation caused by elevated suspended sediments in the water column. We therefore disagree with the conclusion presented (Volume 2: Chapter 3: (6.2.3), paragraph 112, pg 109). Light limitation, which is impacted by turbidity, can reduce phytoplankton growth. As such, the impact of construction on phytoplankton due to elevated suspended solids, rather than nutrients, will need to be considered and this is what the assessment should focus on. However, we agree there are unlikely to be any inputs of nutrients.
12. We do not agree with the approach to assessing Dissolved Oxygen (DO) (Volume 2: Chapter 3: (6.2.3), paragraph 112, pg 109), as the assessment is focussed on nutrients rather than suspended sediments. DO can be impacted by the remobilisation of anoxic sediments or sediments with organic content and associated bacteria. We therefore disagree with the conclusion presented, and advise that the impact of the construction phase on DO due to elevated suspended solids, rather than nutrients, will need to be considered.
13. We disagree with the Applicant's conclusion that potential spills will only cause temporary issues (Volume 2: Chapter 3: (6.2.3), para 190, pg 129) as these chemicals can persist in the environment for long periods. Therefore, we disagree with the conclusion of the risk of spills being '*negligible adverse*' as the ability to meet Environmental Quality Standards (EQS) could be compromised (Table 6, pg 59); instead, the risk of spills should in our view be '*medium adverse*'. However, we note the mitigation commitments presented to produce a Project Environment Management Plan (PEMP) and Marine Pollution Contingency Plan (MPCP) as part of a ML condition. Providing these conditions are secured and delivered, we can agree that the risk is mitigated to an acceptable level.
14. A number of potential inter-relationships between MW&SQ and other receptors have been overlooked, including but not limited to elevated bacterial counts and their ability to impact human health, which would be of relevance under the Bathing Waters Directive. For completeness, we recommend the ES is updated to ensure these inter-relationships are accounted for.

15. We consider that the relationships between marine water quality and the onshore works have been considered appropriately and we therefore agree with the conclusions and mitigation suggested.

16. NRW (A) agrees that there will be no transboundary impacts from MW&SQ.

- *Links with Water Framework Directive*

17. We agree with the conclusions in the ES with respect to suspended sediment in Water Framework Directive (WFD) water bodies (Volume 2: Chapter 3: (6.2.3), paragraphs 129 & 132). However, for the purposes of the WFD Compliance Assessment (CA), please see comment 80 below.

3.0 Benthic and Intertidal Ecology

18. NRW (A) agrees that the data collected through the site-specific surveys, through the desktop review of existing literature, and data sources are sufficient to appropriately characterise the benthic ecology throughout the array and ECC. We also agree with the assessment methodology and the assessment conclusions with respect to the potential impacts of the project on benthic receptors, as outlined in the ES.

- *Environmental Statement: Environmental Impact Assessment*

19. From the evidence presented (Volume 2: Chapter 5: (6.2.5) Section 5.7.4, paragraph 95), the areas of low resemblance stony reef do not meet the strong justification criteria in terms of biological communities, that NRW (A) would expect within an Annex I feature. NRW therefore agrees with the conclusion presented by the Applicant that the discrete patches of stony habitats reported in the ECC do not qualify as Annex I stony reef.

20. NRW (A) considers that the magnitude of impact from the potential introduction of marine invasive non-native species (mINNS) should be presented as 'Low' and not 'negligible' (Volume 2: Chapter 5: (6.2.5) Section 5.11.4, paragraph 191) as there is a continuous risk of mINNS being introduced. Notwithstanding this, we consider that the significance of the impact would still be minor and therefore not significant in EIA terms.

21. NRW (A) acknowledges the commitment of the Applicant to produce a biosecurity risk assessment to be conditioned within the ML, as outlined in the Schedule of Mitigation (8.11) and the Marine Licence Principles document (5.4.1). We recommend that the marine biosecurity plan is a free-standing document kept separate to the terrestrial plan as outlined in Volume 3: Chapter 5 (6.3.5). NRW (A) should be consulted on the suitability of a marine biosecurity risk assessment and plan ahead of commencement of activities. Clarity is required on the most appropriate regulatory mechanism needed to secure it.

22. Should the Port of Holyhead be used for the berthing of vessels during construction, operation and/or decommissioning, then we advise that specific management measures may be required on top of standard biosecurity risk assessment protocols. This is due to the presence of the highly invasive carpet seasquirt *Didemnum vexillum*.

23. The sensitivity of subtidal receptors to *long-term habitat loss/change from the presence of foundations, scour protection and cable protection* is considered medium in the cumulative assessment and high in the assessment of impacts alone (Volume 2: Chapter 5: (6.2.5) Section 5.14.3, paragraph 273). Whilst the resultant residual effect would still be minor and therefore not significant (with which we agree) in EIA terms, we advise consistency is kept between these sections.

- *Report to Inform Appropriate Assessment (RIAA)*

24. An appropriate assessment is required as there is the potential for the project to have an impact on the Dee Estuary Special Area of Conservation (SAC) and the Menai Strait and Conwy Bay SAC. The applicant has carried out a RIAA (5.2).

25. We agree with the conclusions of the RIAA that, provided the mitigation measures outlined are adhered to, the project will not have an adverse effect on site integrity (AEOSI) and therefore will not undermine the conservation objectives of the benthic designated features of the Dee Estuary SAC and the Menai Strait and Conwy Bay SAC.

26. We note under section 10.1.1, paragraph 130 that the Applicant discusses the introduction, in 2006, and subsequent eradication of slipper limpet to the mussel lays in the Menai Strait. Please be aware that slipper limpet has recently been found in the Menai Strait and Conwy Bay SAC (please refer to the [NBN Atlas](#) to view records). Notwithstanding, we agree with the conclusion of the RIAA that provided the mitigation measures are adhered to (production of a biosecurity risk assessment and management plan), there will be no AEOSI to the conservation objectives of the Menai Strait and Conwy Bay SAC.

- *Section 7 habitats*

27. We note that the following Section 7 habitats (as identified under the Environment (Wales) Act 2016) have been reported within the development: *Sabellaria alveolata* and peat and clay exposures. Both the small patches of *Sabellaria alveolata* and the piddocks in clay are found in existing pipelines, or, in small patches on the boundary of the cable route and as noted by the applicant, will remain in place and undisturbed. Therefore, we are content that there will be no potential impact to these Section 7 habitats from the development.

- *Marine Conservation Zones*

28. We agree there is no significant risk to the Skomer Marine Conservation Zone (MCZ) from a benthic perspective.

4.0 Coastal Habitats

29. We note that the onshore cable will intersect Atlantic salt meadow at the Clwyd Estuary. Whilst the Clwyd Estuary is not a SAC or Site of Special Scientific Interest (SSSI), saltmarsh is a section 7 habitat under the Environment (Wales) Act 2016. We note that there is a commitment for the use of trenchless techniques (for example, Horizontal Directional Drilling (HDD)) underneath the Clwyd Estuary. Given the Clwyd is a tidal river, we advise that the regulator will need to determine whether the detailed construction methods are to be agreed in the ML or the Development Consent Order (DCO) or both. Confirmation with respect to how the cable will cross the river if it is undergrounded, the techniques to be employed (being deep enough to avoid the saltmarsh and minimise cable exposure), and identification of appropriate entry and exit sites (pits) is recommended.

5.0 Fish and Shellfish Ecology

30. NRW (A) considers that a robust assessment has been carried out to support the overall conclusions of no significant impacts on fish and shellfish receptors.

31. NRW (A) agrees that the data collected through the site-specific surveys, through the desktop review of existing literature, and data sources are sufficient to appropriately characterise the fish and shellfish ecology throughout the array and export cable corridor.

- *Report to Inform Appropriate Assessment (RIAA)*

32. NRW (A) agrees with the conclusion of the RIAA that the project will not undermine the conservation objectives of the designated migratory fish features of the River Dee and Bala Lake SAC and Dee Estuary SAC.

33. The assessment asserts that Atlantic Salmon do not pass through the array area and are therefore unlikely to be exposed to potential impacts from noise. However, we note that evidence supporting the assertion that Atlantic Salmon remain in coastal areas, following the coastline is not available / provided. Nonetheless, NRW (A) agree that Atlantic salmon are not considered to be very sensitive to underwater noise impacts, and furthermore will only be transient in the array area. Therefore, NRW (A) agrees with the overall conclusion of no AEOSI on the River Dee and Bala Lake SAC.

- *Section 7 species*

34. Overall, NRW (A) agrees with the assessment methodology and the assessment conclusions of the potential impacts fish species listed under Section 7 of the Environment (Wales) Act 2016. There are, however, some inaccuracies in the assessment, for example: there appears to be an error used in the calculation of affected spawning area for sandeel (Volume 2: Chapter 6: (6.2.6), Table 18), where the figure from Worst Case Scenario (WCS) monopile piling NW location scenario has been adopted, rather than temporal Maximum Design Scenario (MDS) for multi-leg foundation modelling at the NW location, this has resulted in a smaller impacted spawning area.

35. Furthermore, NRW (A) does not consider that the assumptions used when modelling spawning fish as fleeing receptors are realistic, for example, we do not consider that a swim speed of 1.5m/s^{-1} is realistic for sole. Consequently, it is our view that the figures presented for the Valued Ecological Receptor (VER) affected spawning potential do not represent realistic scenarios for some fish receptors, including species which are listed under Section 7 (please also see comment 37 below).

36. Nonetheless, NRW (A) recognises that regardless of this, the resulting area impacted by noise from piling activities remains relatively minor, when compared to the widely available spawning habitat in the region. NRW (A) are therefore able to agree that the significance of effect on VERs remain '*minor adverse*' and therefore not significant in EIA terms.

Detailed comments

37. The Applicant has assessed the impacts from the project on a range of fish and shellfish Valued Ecological Receptors (VERs), some of which are listed under Section 7 of the 2016 Act. A range of impact pathways have been assessed, including detailed quantitative assessments of impact from underwater construction noise on spawning and nursery habitat for VER species with known spawning/nursery grounds within the project area. These species are: sandeel, sole, plaice, mackerel, cod and whiting.

38. The Applicant has modelled impacts from both mono-pile and pin-piled foundation types at two locations within the array and identified a worst-case scenario or MDS as pin-piling at the NW array location. The Applicant has submitted a Noise Modelling report (Volume 4: Annex 6.2: (6.4.6.2) which describes how underwater noise has been modelled for the projects, the assumptions used in the models and the thresholds for mortality, injury and disturbance used for various fish species, grouped by hearing capabilities.

39. NRW (A) are in broad agreement with the modelling approach and the guidelines used for setting the thresholds. However, NRW (A) does not consider that the assumptions used when modelling spawning fish as fleeing receptors are realistic. NRW (A) raised the issue of modelling fish as fleeing receptors in previous consultations and at Expert Topic Group meetings, and advised that the final ES should make clear where receptors are treated as stationary versus fleeing, particularly for some spawning receptors, as they are better treated as mostly static.
40. Section 2.2.2 (pages 6-9) and section 4.3 (pages 19-22) of the Underwater Noise Technical Report (6.4.6.2) describes how fleeing receptors are modelled and the assumptions used. These include:
- All fish will maintain a constant swimming speed of 1.5 m/sec^{-1}
 - All fish will at first hammer strike initiate swimming *directly* away from the noise source,
 - Fish will sustain the swimming speed and direction for the duration of the piling operation of 272 minutes.

Addressing these assumptions:

41. The noise report states that '*For those species that flee, the speed chosen for this study of 1.5 m/s is relatively slow in relation to data from Hirata (1999) and thus is considered somewhat conservative.*' It has not been possible to consult the reference Hirata, K. (1999) (it would be beneficial to receive a copy of this paper), and no other references for swim speed has been provided. NRW (A) do not dispute that some of the VER fish species are capable of swimming speeds in excess of 1.5 m/sec^{-1} , but swimming speed varies considerably, for example, between fish species, fish size, with temperature, stimulus, as well as varying with the activity of the fish. In addition, the terminology and units used in scientific literature to describe fish swimming ability varies; some describe fish swimming speed in body length per second (bl/S^{-1}), some in meters or centimetres/ sec^{-1} , or km/hour^{-1} . Beamish (1978) grouped fish swimming performance into three main distinct categories: *Sustained*; which is speeds that can be maintained for >200 minutes; *Prolonged*; speeds that fish can maintain for 20 seconds to 200 minutes and ends in fatigue, and; *Burst*; high speeds which can be deployed for a short time, typically <15sec.
42. Fish fleeing from a perceived danger would be expected to move at a higher speed than when engaging in feeding or migratory behaviour, however this higher activity level would require more effort, and therefore a fleeing activity can only be sustained for a short amount of time i.e. not prolonged. For a fish to be modelled as "*fleeing*" it would therefore need to be able to sustain a swim speed of 1.5 m/sec^{-1} for the 272 minutes, as used in the modelling. This is not realistic.

Literature Review of swim speeds for flatfish, demersal and pelagic fishes:

43. Winger *et al* (1999) reported trial of swimming abilities sustained for >200 minutes for Atlantic cod of 0.6 and 0.8m/s, and of 1.76 bl/S^{-1} (equivalent to 0.7 m/sec^{-1}) for American plaice. The authors also cite research from other authors on critical swim speeds for other flatfish species (the maximum speed attained just prior to exhaustion in a controlled laboratory experiment) of 1.5 bl/S^{-1} for European flounder, 1.3 bl/S^{-1} for common dab, and 1.10 bl/S^{-1} for lemon sole.
44. Swim speeds calculated for adult plaice using selective tidal transport are reported in a paper by Buckley & Arnold (2001) as 0.6 bl/S^{-1} and latterly, He (2003) reported swimming behaviour for winter flounder (*Pleuronectes americanus*), captured from underwater video, where an average swimming speed of 0.95 bl/S^{-1} was recorded.

45. He and Wardle (1988) report maximum sustained swim speeds for mackerel, herring and two size classes of saithe. Herring was recorded at 4.06 bl/S^{-1} (1.03 m/sec^{-1}), mackerel of 3.5 bl/S^{-1} (1.16 m/sec^{-1}), and Saithe of 3.5 bl/S^{-1} (0.88 m/sec^{-1}) for a 25cm fish, and 2.2 bl/S^{-1} (1.1 m/sec^{-1}) for fish of 50cm.
46. More recently Breen *et al* (2004) estimated maximum sustained swim speeds for two sizes of haddock as between 0.38 and 0.62 m/sec^{-1} , while Winger *et al.* (2000) found that the maximum sustained swimming speed for cod was predicted to be 0.66 m/sec^{-1} , and that the risk of exhaustion, was found to increase rapidly with increasing swimming speed.
47. Finally, high swimming speeds of 1.46 m/sec^{-1} have been reported in herring shoals by Nøttestad *et al* (1996). It should be noted however, that these speeds were calculated based on up to one hour of observations.
48. Given that swim ability is a function of body form, it is not surprising that fusiform fish, such as herring and mackerel, outpace demersal and flatfish. The Applicant, however, has applied a uniform rate of 1.5 m/sec^{-1} irrespective of the species being modelled, which is higher than any of the swim speeds cited from literature above. Even if fish are fleeing, and therefore would potentially move faster than their sustained swim speed, the assumption in the model is that this speed is sustained for the duration of piling i.e., 272 minutes. For the reasons above NRW (A) does not consider this a plausible scenario.
49. Another key assumption in the model is that fish swim directly away from the noise source. As for swimming ability, a range of behaviours have been observed in literature depending on species - from changes in shoaling behaviour, such as shoal dispersing or change of swimming depth (e.g., Hawkins *et al*, 2014) to startling or freezing behaviour.
50. The COWRIE technical report (Mueller-Benkle *et al*, 2010) carried out comprehensive experiments on reactions of cod and sole exposed to pile driving noise, and found that reactions varied between individuals but could broadly be categorised into three behaviours: (1) fish increased their overall swim speed in the 10 min sound exposure period; (2) fish slowed down at onset of playback, indicating a freezing response, and; (3) fish sped up after the playback was switched off which was sometimes combined with a freezing reaction during sound. The study also found evidence that a directional response to the sound was mostly observed when sound was presented for the first time. The COWRIE report also reviews other data and evidence for fish reactions to anthropogenic noise and notes that reactions vary significantly across species, and that fish behaviour is likely to vary according to the behaviour engaged in at the time. Skaret *et al*, (2005), showed that noise from a passing survey vessel did not elicit a fleeing reaction by herring engaged in spawning activity, whereas herring undertaking feeding or migration activity would react by fleeing; the authors concluded that the motivation to spawn overruled the fleeing instinct. However, herring is not amongst the species for which quantitative assessment has been carried out and it should not be assumed that impulsive noise will not disrupt other spawning species. Cod, for instance vocalise during spawning and are sensitive to masking from low frequency anthropogenic noise, such as piling (de Jong *et al* 2020).
51. In conclusion, NRW (A) advises that the assumptions used in the quantitative assessment of spawning area impacted by pile driving noise for sole, plaice, cod and whiting are not supported by evidence, and consequently we do not agree that the figures presented for area of affected spawning habitat presents worst case scenarios on which to base conclusions of significance of impacts.
52. NRW (A) has however, carried out alternative worst case scenarios calculations using the Applicants figures for fish as stationary receptors. Based on these calculations, the otherwise conservative assumptions in the noise modelling, and the limited spatial and temporal extend

of the impacts, NRW (A) agrees that impacts to Section 7 fish species is not likely to be significant in EIA terms.

- *Cumulative Assessment*

53. NRW (A) notes the cumulative environmental assessment (CEA) undertaken for fish receptors, but requires further information on how the cumulative impacts to fish populations over multiple spawning seasons from underwater noise arising from consecutive construction activity from several offshore windfarm projects in Liverpool Bay has been considered.
54. In Section 6.13.2 (Volume 2: Chapter 6 (6.2.6) the Applicant has undertaken an assessment of the potential cumulative effects from construction noise and vibration on fish receptors. NRW (A) agrees with the projects identified in scope.
55. However, some of the reasoning provided to support the conclusion of minor adverse effect are speculative, e.g., paragraph 359 states: *'It is noted that there is a broadscale push from regulators and Statutory Nature Conservation Body's (SNCBs) within the UK towards the use of technologies to reduce the noise emitted during offshore wind construction works. The method used or the mechanism by which this may be enforced is yet to be determined however it may comprise using non-piled structures (e.g., GBS or suction bucket structures) or at source noise mitigation (e.g., bubble curtains or the BLUE piling system).* NRW do not consider it appropriate to rely on potential future regulations or mitigation in the cumulative assessment.
56. Similarly, subsequent paragraph 360 states that *'Based on the noise modelling for AyM, the greatest impact range for TTS (186 dB SELcum) for fish is 36 km (assuming a stationary receptor, simultaneous piling of piles). As such, it is possible that, if AyM and the other projects were to pile simultaneously that there would be an overlap between TTS impacts for the projects. However, this would only occur for the most hearing sensitive fish species (e.g., herring), with other, non-hearing specialist fish species, considered to be less at risk. It should be noted that the assumptions herein that these projects are constructed simultaneously is unlikely due to the planning process timescales in the UK and the availability of construction vessels (often very limited, particularly considering the other offshore wind projects which have overlapping construction timescales (e.g., those planned in the UK North Sea and worldwide).* NRW (A) does not agree that there is no potential for either simultaneous, partly overlapping, and sequential construction noise from planned Offshore windfarms projects to adversely affect consecutive spawning seasons of Section 7 fish species. Atlantic cod are amongst the most hearing sensitive fish, are sensitive to anthropogenic noise, masking or disrupting mating and spawning behaviour, and have high intensity spawning and nursery grounds throughout Liverpool Bay (Ellis *et al* 2012). Consequently, NRW (A) advises that further information is sought from the applicant on the potential for cumulative effects from construction noise on VERs with spawning grounds in Liverpool Bay.

- *Water Framework Directive (WFD)*

57. NRW (A) agrees with the conclusions that the project will not impact Water Framework Directive (WFD) fish status in the affected Transitional waterbodies.

6.0 Marine Ornithology

58. NRW (A) advises that a detailed assessment of the potential impacts of the project on the breeding seabird features of Pen-y-Gogarth / Great Orme's Head Site of Special Scientific Interest (SSSI) is needed. These features are Common Guillemot, Razorbill and Black-legged Kittiwake. Currently this has not been carried out sufficiently to assess effects on these features. NRW (A) advises that the effects of displacement on auks and collision risk

mortality of kittiwakes should be further assessed. Displacement and collision risk will then need to be apportioned using the Nature Scot [apportioning tool](#) in order to understand the effects on the features of Pen-y-Gogarth / Great Orme's Head SSSI. If apportionment is greater than or equal to 1% then a Population Viability Analysis (PVA) will also be required.

59. From the evidence provided, it does appear that the extent of the supporting habitat for red-throated diver (RTD) within the Liverpool Bay Special Protection Area (SPA) will be maintained if the project is constructed and therefore there will be no adverse effect on the RTD feature of Liverpool Bay SPA from loss of habitat.
60. However, we note that the displacement of RTD 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.
61. Given this anomaly in observation, NRW (A) advises that comprehensive validation monitoring before, during, and after construction is needed to confirm that it is the case that supporting habitat (as identified in the sites conservation objectives) has not been lost.
62. NRW (A) notes that the Furness *et al* (2015) stable age structure assessment method has been applied. Whilst NRW would have preferred that stable age structure is calculated from the local surveys, or, by adopting a precautionary approach by counting all birds as adults, we do not consider that this impacts the final assessments. Therefore, NRW (A) agrees with the conclusions presented.
63. By looking at the range of figures presented for displacement and mortality, NRW (A) were able to make an assessment (on a precautionary level) at higher levels of displacement and mortality than were chosen by the Applicant. By looking at the full range of variability of displacement and mortality, we do not consider this to be an issue.

- *Report to Inform Appropriate Assessment*

64. The RIAA (5.2) states on page 60 that: "*There is currently no planned vessel routes, therefore a quantitative assessment cannot be undertaken alone or in-combination for this impact on any feature*" and Section 10.3 states that: "*Vessel movements during the operation of the wind farm for maintenance activities have the potential to disturb common scoter. However, within the confines of the wind farm site and the 4 km buffer, the magnitude of displacement due to the AyM wind farm itself (assessed as 100%) is such that there would be virtually no additional effect caused by vessel movements (as all individuals will already have been displaced). Therefore, no further assessment for operational vessel movements within the AyM wind farm site and 4 km buffer is required*".
65. NRW (A) advises that a vessel traffic management plan is needed. RTD and Common Scoter are features of Liverpool Bay SPA, and Common Scoter are included as a priority species in Section 7 of the Environment (Wales) Act 2016. Both species are sensitive to anthropogenic disturbance and displacement (Fliessbach 2019; Kaiser *et al.* 2002). We advise that the vessel traffic management plan is secured as a condition of the ML. We advise that the plan uses measures such as (but not limited to) restricting vessel movements to existing navigation routes. This is necessary in order to avoid or reduce disturbance, and therefore displacement. As requested by the Applicant, we will work with the Applicant to produce and implement the plan. Providing an appropriate vessel traffic management plan is agreed, in writing, with NRW (A) as a condition of the ML, we consider it to be unlikely that there will be an adverse effect on Liverpool Bay SPA.

- *Marine Conservation Zones*

66. We agree there is no significant risk to the Skomer MCZ from an ornithological perspective, as this is covered by the assessment of Skomer, Skokholm & Seas off Pembrokeshire SPA.

7.0 Marine Mammals – KEY CONCERN

67. Except for the points made below (in particular comments 71-75), the Applicant has provided an otherwise comprehensive assessment of the impacts of the project on marine mammals.
68. The proposal has the potential to impact marine mammal Annex II, European Protected Species (EPS) and Section 7 Species.
69. Section 7 cetacean species are also EPS and therefore strictly protected under the Habitats Regulations.
70. An EPS licence may be required for unmitigated auditory injury Permanent Threshold Shift (PTS) and disturbance. We anticipate that the activities will not compromise species Favourable Conservation Status (FCS).
71. NRW (A) considers that the assessment, in the ES and RIAA, of the impacts of underwater noise on marine mammals, such as auditory injury and associated disturbance, is insufficient and should be improved in order to enable the risks to be fully and adequately assessed, for the reasons noted in 71 a - d (inclusive) below.

- a. **To allow a more comprehensive analysis of PTS and disturbance, NRW considers that additional modelling should be carried out and additional model details provided to inform assessments of underwater noise and PTS onset. This includes carrying out Interim Population Consequences of Disturbance (iPCoD) modelling for harbour porpoise disturbance and PTS injury, including detail of the modelling parameters used, which unlike for other species, was not included in the ES.**

NRW (A) have conducted some in-house iPCOD modelling for harbour porpoise (using the beta (unpublished) Cumulative Effects Framework project web-based portal [[CEF \(ceh.ac.uk\)](http://ceh.ac.uk)] – this is a web based interface that allows iPCOD v5.2 to be used in a more ‘user friendly’ way). The population input parameters used were those from Sinclair *et al* (2020) and Evans & Cordes (in prep) (the latter being Welsh / regionally relevant population demographics) and the development parameters as those presented in the Awel-y-Môr ES. A piling schedule was created by randomising 201 piling days through a single year. The worst-case P2TS SEL (83) and disturbance prediction (2112: Seawatch density scenario) (see Volume 2: Chapter 7 (6.2.7): Tables 20 and 28 (p131 and 137) of the ES) were modelled. The results indicate negligible effect from the combination of PTS and disturbance to the population and we concluded no AEOSI on any harbour porpoise SAC in the Celtic and Irish Seas (CIS) Marine Mammal Management Unit (MMMU). We advise that the Applicant provides their own full modelling to support the conclusion of minor / negligible effect and no AEOSI on North Anglesey Marine SAC; this is in view of Conservation Objective 1: Population viability conservation objective. Until this modelling is undertaken by the Applicant, the evidence submitted is insufficient to allow a conclusions of no AEOSI.

Additionally for harbour porpoise, we recommend (as described below in section 71d), determining the maximum area ensonified out to a behavioural threshold (e.g. 143 dB or similar (see below)) (by modelling at the furthest corners/nodes of the array footprint) and express this maximal area as a proportion of the CIS MMMU area. This would provide an indication of the area of habitat within the MMMU that could be potentially disturbed / displaced. The area is implicitly functionally linked to the harbour porpoise features of the SACs in the MMMU and the impact pathway manifests as displacement (albeit temporary – 1 year) from functionally linked habitat. NRW (A) does not anticipate this resulting in AEOSI but cannot conclude no AEOSI in the absence of such information. Such information should be presented by the Applicant to NRW (PS) to demonstrate this.

b. There is insufficient justification for the absence of assessment of cumulative PTS in the Habitats Regulations Assessment (HRA); as such we consider the assessment incomplete.

Cumulative PTS (SEL_{cum}) has been modelled in the ES but results not included in the HRA and is required in the HRA to support the Appropriate Assessment and conclusion of no AEOSI. Using the values in the ES (Volume 2: Chapter 7 (6.2.7): Table 20 (p127), 21 (p128), and 23 (p131) for harbour porpoise, bottlenose dolphin and grey seal respectively), NRW (A) modelled the effect of cumulative PTS on the relevant MMMU population for each Annex II species using iPCOD (via the CEF web-based portal: [CEF \(ceh.ac.uk\)](http://ceh.ac.uk)). Results suggested that PTS SEL on its own is highly unlikely to result in a significant effect on the population (of the MMMU) and therefore no AEOSI in view of Population viability conservation objectives of any of the relevant SACs. Nevertheless, we advise that the Applicant will need to present such information for NRW (PS) to be able to consider cumulative PTS in the HRA and rule out the likelihood of AEOSI.

c. There are insufficient grounds to conclude that PTS-onset risk has a negligible impact on harbour porpoise because cumulative PTS-onset has been excluded from the Marine Mammal Mitigation Protocol (MMMP).

The MMMP (Volume 4: Annex 7.2 (6.4.7.2) states: “*The primary aim of this draft Outline MMMP is to set out the measures proposed to reduce the risk of Permanent Threshold Shift (PTS) auditory injury to any marine mammal species in close proximity to the pile driving for the installation of AyM foundation structures to negligible (as defined in Section 1.5 in Volume 2, Chapter 5: Marine Mammals).*”

While the industry standard protocol for minimising the risk of injury to marine mammals ([Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise | JNCC Resource Hub](#)) is proposed (with a slightly enhanced observation zone of 640m (cf the usual 500m)), this would not ‘mitigate’ against cumulative PTS for harbour porpoise when considering the proposed WCS (Multileg 2 at 1 location: NW [see Volume 2: Chapter 7 (6.2.7): Table 20 p127 of ES]), which suggests cumulative PTS will extend to 6.3km (and for the next Worst Case [monopiles at NW location] suggests cumulative PTS extends to 4.3km). Cumulative PTS for other Annex II species is predicted to extend to less than 100m and as such, standard mitigation is sufficient.

However, our in-house modelling using iPCOD (on Annex II species only – see 71a above) suggests there would not be an AEOSI, or significant effect (in EIA terms) as a result of cumulative PTS (with or without the additional pathway of disturbance). Thus, the protocols for minimising injury (i.e., ‘mitigation’) would not be formally required for the purposes of removing AEOSI in HRA or significant effects in EIA. Instead, the ‘mitigation’ is generally included as industry best practise to reduce effects, especially in relation to EPS (deliberate injury). The industry standard mitigation would adequately mitigate against instantaneous PTS but not cumulative PTS in harbour porpoise. Therefore, although mitigation for cumulative PTS may not be a requirement for AA / EIA in this case (to be confirmed after additional modelling aforementioned is undertaken), the use of the mitigation protocols is generally required to minimise risk of injury in relation to EPS and the Applicant is encouraged to apply for an EPS licence for injury (to individuals) (see comment 70).

Modelling of cumulative PTS in iPCOD should be included in the MMMP to allow NRW PS to confirm no effect (or otherwise) and evaluate any mitigation requirements/ recommendations.

It is NRW (A)’s understanding that the reason cumulative PTS was not included in the MMMP is that the Applicant argued that the assumptions that underpin the PTS SEL_{cum} metric (i.e. the equal energy hypothesis) lead to precautionary ranges, and that SEL_{cum} is therefore not valid (see ETG Clarification Note: Marine Mammal Cumulative PTS Onset 26 November

2021 Revision A: [here](#)). While there has been research to try to find an alternative to the equal energy hypothesis, the general consensus is that there isn't enough data yet to support a departure from this model. The Southall (2019) thresholds recommends the use of dual metric criteria (i.e. SPL and SEL) so even in its current form, SEL_{cum} gives precautionary results and is the best way we currently have of assessing multiple consecutive impulsive noise. We therefore advise that the Applicant continues to use the Southall 2019 thresholds and includes instantaneous PTS (SPL) and cumulative PTS (SEL) in the assessments (EIA, HRA) and the MMMP.

- d. NRW does not recommend the use of dose/response (D/R) curves to conduct an area-based assessment to estimate area of harbour porpoise habitat disturbed; D/R curves are used to estimate the number of animals affected, not the habitat/area affected. Given that disturbance for harbour porpoise SACs is defined through spatial and temporal thresholds of 20% daily and 10% seasonal disturbance, as set out in the supporting advice for the disturbance conservation objective (CO2) for porpoise sites, we advise that an area-based assessment should be carried out where the extent of habitat that is ensonified to a level that might produce significant disturbance is determined. Although there is a strong link between area lost and numbers disturbed, directly equating the probability of population response to loss of habitat / loss of habitat quality (i.e. using a D/R curve to calculate habitat loss) is currently not possible.**

For harbour porpoise, NRW (A) recommends an unweighted noise threshold of 143 dB re 1µPa (un-weighted) single strike sound exposure level (Brandt *et al* 2018; Heinis *et al* 2019) is used as the extent of disturbance for impulsive noise sources. This threshold is the modelled average of six different studies of full-scale pile driving operations and thereby represents the largest amount of empirical data (Tougaard 2021). Other threshold values might be suitable (e.g. 140 dB re 1µPa single strike SEL - ASCOBANS, 2014; or 145 dB re 1µPa single strike SEL - Lucke *et al* 2009). The 143 dB re 1µPa noise contour / isopleth is overlaid onto a map of the area to determine the extent of overlap with NAM SAC, and the extent of the area of the SAC that is ensonified to a level that could be considered significant disturbance can then be determined. The extent of the overlap is then compared against the 20%/10% thresholds set out in the conservation objectives for the site (CO2: significant disturbance).

The Applicant has used harbour porpoise D/R curve as a proxy for other species of cetacean. The indication from the literature suggests that bottlenose dolphin and minke whale are more tolerant to noise than harbour porpoise. Anecdotal / qualitative observations also suggest that these species behave very differently from harbour porpoise. Therefore, applying a D/R curve from a more sensitive species to a less sensitive species is likely to result in overestimates of disturbance, which might be considered an overly precautionary approach. Of course, consideration should be given that the sound energy of pile driving is highest in the low frequency range and overlaps more with the hearing range of a minke whale than that of a harbour porpoise - pile strikes of the same unweighted single-strike SEL (SELs) are louder for a minke whale than a harbour porpoise. For minke whale, though, evidence from studies with sonar seems to point out that they are less sensitive by ca 40-50 dB (Tougaard 2021). NRW (A) acknowledges that the Applicant has used a method known to be precautionary for other species and justified it in some detail. Although NRW (A) would not recommend this approach, given that other threshold options are available for other species (e.g. Level B harassment), we do not explicitly rule this method out and are satisfied that the method and assessment used is acceptable.

NRW (A) suggests an analysis using a fixed threshold, such as 160 dB SPL_{rms} (151 dB SS SEL Un-W) for impulsive noise for bottlenose dolphin (Level B harassment: NMFS 1995, 2016, 2018 and references therein), would be useful to compare against the results of a proxy

D/R analyses. This is because D/R curves are developed from fine scale behaviour – therefore even if these species started to respond at similar sound levels, there is no guarantee that the probability curve will have the same shape for different species.

There currently isn't enough data to establish a D/R curve or a definite threshold for grey seal. NRW (A) agrees that using harbour seal D/R curves as a proxy for grey seal is appropriate, since there is evidence that grey seal show similar reactions to harbour seals and are within the same hearing group (Aarts *et al* 2017, Gotz and Janik 2010).

72. There is insufficient justification to support a conclusion of no Likely Significant Effect (LSE) from vessel collision for bottlenose dolphin, grey seal or harbour porpoise features of relevant SACs. The submitted Report 5.2 RIAA (see Table 4 p105) lists only underwater noise as the pathway with LSE for all mammal species/SAC combinations. NRW (A) previously advised that an LSE for vessel collision should not be ruled out.
 73. Page 65; Table 1: *Summary of consultation relating to the HRA process of the RIAA (5.2)* states that *“The Applicant acknowledges this feedback. The Project is making a commitment to minimise the risk of collisions. The adoption of best practice vessel handling protocols (e.g. following the Codes of Conduct provided by the WiSe Scheme, Scottish Marine Wildlife Watching Code or Guide to Best Practice for Watching Marine Wildlife) will minimise the potential for any impact. The final codes of conduct will be discussed and agreed with NRW and JNCC through the marine licence conditions.”*
 74. While NRW (A) acknowledges and encourages the intention to minimise the risk of collisions with vessels and to adopt best practise, as per our advice on the Preliminary Environmental Information Report (PEIR) and RIAA comments log, we consider that the potential for an LSE cannot be ruled out and should be taken forward to Appropriate Assessment to analyse the risk formally / appropriately. The information provided by the Applicant would likely be sufficient to inform an Appropriate Assessment; had vessel collision been included in the RIAA, NRW (A) would not anticipate an AEOSI from this pathway with the listed mitigation (including best practise and codes of conduct) in place.
 75. We note the commitment by the Applicant to produce and implement a Vessel Traffic Management Plan in consultation with NRW (A). Whilst it appears that this relates solely to ornithological interests, we recommend that the Plan also appropriately considers marine mammal interests. We advise that such a plan is secured as a condition in the ML.
 76. A number of figures in the revised marine mammal Chapter 7 (6.2.7) appear to be incorrect. For example, Figure 21 is supplied in place of Figure 19, and Figure 21 does not contain all the necessary data layers either time it is presented. Corrected figures should be supplied alongside confirmation of the nature of any revisions from the original version – this will provide NRW (A) with confidence that the revisions and assessments have been applied correctly.
- *Marine Conservation Zones*
77. We agree there is no significant risk to the Skomer MCZ from a marine mammal perspective. The analysis for seals in the ES and RIAA includes effects on seals – a feature of the MCZ – at the wider scale MMMU which encompasses Skomer MCZ. An assessment has also been made for Pembrokeshire Marine SAC and this also adequately covers the requirements of the MCZ assessment.

8.0 Water Framework Directive (Coastal and Transitional Water Bodies)

- North Wales Coastal Water Body

78. NRW (A) agrees with the assessment of the potential impacts upon the hydromorphology resulting from the presence of physical structures as provided in Volume 2, Chapter 2: Marine Geology, Oceanography and Physical Processes (6.2.2). We can therefore agree with the conclusion of the WFD CA (Volume 4: Annex 3.1 (6.4.3.1) for the hydromorphology element – that the proposed activities will not result in deterioration of status of the water body or jeopardise the attainment of its objectives.
79. NRW (A) agrees with the characterisation of the biology, assessment methodology and the assessment conclusions of the potential impacts on benthic receptors as outlined in Volume 2, Chapter 5: Benthic Subtidal and Intertidal Ecology (6.2.5). We therefore agree with the conclusions of the WFD CA for biology: habitats within the water body - that the biological elements associated with this would not be at risk of deterioration as a result of the Awel-y-Môr project.
80. In relation to water quality, we note that the information presented in the MW&SQ chapter (6.2.3) has not been transposed into the WFD CA with respect to water clarity (suspended sediment) and contaminated sediment, and as such, we cannot agree with the conclusions of the CA with respect to those aspects of the assessment at present.
81. In relation to water quality, we do not agree with the conclusions with respect to phytoplankton and dissolved oxygen (DO) as the assessment focusses on nutrients rather than water clarity (please see comments 11 and 12 above). Water clarity is the main impact pathway arising from the proposed works which could affect the phytoplankton and DO status of the North Wales water body and therefore the assessment should focus on this.

- Clwyd Transitional Water body

82. Based on the statement made at para 128 and in Table 9 of Volume 4 - Annex 3.1 (6.4.3.1) that “*there are no current intentions to install structures which may alter the hydromorphology of the Clwyd transitional waterbody*”, NRW (A) agrees with the conclusions of the WFD CA for the hydromorphology element within the Clwyd water body.
83. NRW (A) agrees with the WFD CA conclusions for biology – habitats within the water body, that provided that no direct interaction with the biological habitats in the Clwyd transitional waterbody will occur due to the proposed trenchless techniques, the project will not cause deterioration to the biological elements within the water body, or jeopardise the attainment of Good Ecological Potential (GEP).
84. NRW (A) agrees with the WFD CA conclusions for water quality within the water body, that due to the trenchless techniques proposed, the project will not cause deterioration to the water quality within the water body or jeopardise the attainment of Good Ecological Potential.
85. We advise that if the proposal to employ trenchless techniques changes, then the WFD CA will need to be revisited and any impacts properly assessed.
86. NRW (A) agrees with the proposal to produce a biosecurity risk assessment and for it to be secured as a condition of the ML.

9.0 Decommissioning

87. We acknowledge the commitment to produce a Decommissioning Plan as identified in the ES and in the Marine Licence Principles document (5.4.1).
88. We note, from the ES, the intention to completely remove all infrastructure at the end of the operational lifetime of the project, unless, closer to the time of decommissioning it is decided that removal would lead to a greater environmental impact than leaving some components *in situ*.
89. NRW (A) considers that offshore renewable projects should produce decommissioning plans that retain all decommissioning options (maintain, full removal and partial removal); the options for which can be assessed and refined closer to the time of decommissioning itself in consultation with NRW (A). NRW (A) reserves its position until a draft plan is submitted at which point we will provide further advice.
90. We advise that the Applicant follows the industry decommissioning guidance produced by [BEIS](#).
91. We note the requirement for the production of a Decommissioning Plan for the offshore works is referenced in the draft DCO for the project. We recognise that there are issues that substantively overlap between the determination of the DCO and ML, however, given that the respective consents are determined under separate and distinct legislative processes, we consider it would be prudent to understand how decommissioning plans (for both the offshore and onshore aspects of this project) will be dealt with. Clarity is required on what the appropriate regulatory mechanism would be to secure decommissioning plans, unless it is considered that the DCO needs to address both aspects because the consent is ultimately for the project which includes both offshore and onshore elements.

10.0 Seascape and Landscape – KEY CONCERN

- *Seascape, Landscape and Visual Effects*

92. NRW (A) advises that the offshore works are likely to have numerous and extensive significant adverse effects on seascape, landscape and visual receptors within the Isle of Anglesey Area of Outstanding Natural Beauty (AONB) and Snowdonia National Park (NP) and within their settings. Special Qualities set out in the respective management plans for the areas which support the designations, would be adversely affected. NRW considers that there would be non-significant, but adverse effects on the Clwydian Range and Dee Valley AONB as well as other non-significant but adverse effects on the Isle of Anglesey AONB and Snowdonia NP. These concerns relate to all Maximum Design Scenarios (MDS) i.e. those relating to MDS of the smaller number of Wind Turbine Generators (WTGs) and the MDS relating to the larger number of WTGs as detailed in the offshore project descriptions (Volume 2: Chapter 1: (6.2.1))
93. The ES chapter *Seascape, Landscape and Visual Impact Assessment* (Volume 2: Chapter 10: (6.2.10)) acknowledges that the proposal will have significant adverse effects on views from the Isle of Anglesey AONB and Snowdonia NP, along sections of the Wales Coast Path within these designations, and on a number of landscape character areas (LCA) within these designations. In addition, the ES notes significant adverse effects on the community of Moelfre and Benllech and on several special qualities of the Isle of Anglesey AONB. The ES also acknowledges significant adverse effects on 7 Seascape Character Areas (SCA) (see comments 98-100 below) which form part of the setting of the two designated landscapes. The ES acknowledges adverse, but non-significant effects on the Clwydian Range and Dee Valley AONB.

94. NRW considers that there has been an under-estimation of some seascape, landscape, and visual effects on designated landscape receptors within the Seascape Landscape and Visual Impact Assessment (SLVIA).
95. The ES also notes that proposals are likely to have adverse night-time visual effects on the Isle of Anglesey AONB and Snowdonia NP. Dark skies are a noted feature of the Peace & Tranquillity Special Quality within the Anglesey AONB.
96. NRW (A) are concerned that adverse incremental, combined cumulative seascape, landscape and visual effects may arise on the Isle of Anglesey AONB and Snowdonia NP because of plans and projects both offshore and onshore.

- *Seascape Impact*

97. **SCAF:** is described in the ES as having an industrialised character, due to existing offshore wind farms, oil & gas platforms, dredging and shipping routes & lack of landscape designation. Sensitivity is described as medium-low, with the proposal reinforcing the industrialised character and effects as non-significant. The seascape area lies within the setting of the Great Orme Heritage Coast, and Anglesey AONB & we consider that part of this area is likely to be of medium sensitivity. We agree, however, that the overall effects are likely to be non-significant.
98. **SCA 28:** is described in the ES as having medium sensitivity. Given it forms part of the setting of Anglesey AONB and Snowdonia NP we consider parts of the area to be of high sensitivity (and not all medium) and agree that there are likely to be significant effects. The visual effects are likely to be far reaching as illustrated by the prominence of the turbines from Viewpoints 66 and 67.
99. **SCA 3-7:** We agree that there are likely to be significant effects. The SLVIA considers the significant effects on SCA 5 would be limited to the north coastal part of the SCA5, however we consider significant effects are likely to occur across a substantial part of this SCA, as the majority of the SCA occurs across the north coast.
100. **SCA 2:** We agree that there are likely to be significant effects. The SLVIA considers the significant effects to be limited to the Great Orme, however we consider the significant effects are likely to extend over a greater area, given that the SCA forms part of the seascape setting of Anglesey AONB and Snowdonia NP and part of the coastal upland of the national park.
101. **SCA C & D:** We agree that effects on these areas are likely to be non-significant, although the effect would be nevertheless adverse and intensify the effect of wind farms through the increased scale and extent of the proposal and by filling a gap between existing arrays in some views from the coast.

- *Landscape & Visual Impact – Isle of Anglesey AONB*

Landscape Character Impacts

102. **LCA 6:** We agree that effects on this area are likely to be non-significant.
103. **LCA 8, 9, 10, 11:** We agree that there are likely to be significant effects. Within **LCAs 8, 9 & 10** significant effects are described as limited in extent to the coastline and immediate coastal hinterland and non-significant elsewhere. We consider that adverse effects are likely to extend further across these LCAs, as indicated by the Zone of Theoretical Visibility (ZTV). The coastline and immediate hinterland are of high sensitivity in our view, rather than medium-high and these areas are also the most sensitive parts of the LCAs.

Visual Impacts

104. **Viewpoints (VP) 1-3 & 41:** The SLVIA describes the effects as non-significant. We are concerned that the effects have been under-estimated and that effects may be Significant, not non-significant as described in the ES for the following reasons. Susceptibility is described as medium-high due to the distance from the receptor, however distance is an aspect of magnitude of change, as described in Guidance for Landscape and Visual Impact Assessment 3rd Edition (2013) (GLVIA3), not of susceptibility or sensitivity of the receptor. Although large-scale sea views, the scale and nature of the development makes it very noticeable and will focus attention on it. Sea views are the key focus in the predominantly coastal AONB and are currently empty and untrammelled by development, apart from the occasional transient ship. The existing wind farms to the east are difficult to discern from these viewpoints, even in fine weather.
105. **VPs 4-8 & 14, 16, & 28:** We agree that the effects at these viewpoints are likely to be Significant.
106. **VPs 42-43:** We agree that the effects at these viewpoints are likely to be non-significant, however the effects are likely to be adverse.
107. The village of **Moelfre** lies within the AONB and we agree that there would be some significant adverse effects on this community.
108. The village of **Benllech** lies within the AONB and we agree that there would be some significant adverse effects on this community.
109. We agree that there would be some adverse effects on the villages of Amlwch, Llandona and Beaumaris but these are likely to be non-significant.
110. **Wales Coast Path (WCP) Sections A, B & G & NCR 5:** We agree that effects along these sections are likely to be non-significant.
111. **WCP Sections C, D, E & F:** We agree that effects along these sections are likely to be Significant. Reduced susceptibility is described due to the transient nature of the viewers; however, these are slow-moving receptors and likely to stop and rest to appreciate scenic views. The scenic views of the sea and coast are likely to be the focus of walkers on a national coastal trail. We consider these receptors within an AONB to be of high susceptibility and sensitivity.
- *Landscape & Visual Impacts – Snowdonia National Park*

Landscape Character Impacts

112. **LCA 01 Northern Uplands:** The SLVIA describes the effects as moderate but non-significant. We are concerned that the effects have been underestimated and that the effects may be significant. Viewpoints 12, 36, 38 and 40 are within this LCA and effects at all these viewpoints would be significant in our opinion. The scale of the turbines in views and the likely extent of effects over the upland area, as indicated by the ZTV, suggest likely significant adverse effects over a large part of this LCA.
113. **LCA 02:** We agree that effects on this area are likely to be non-significant.

Visual Impacts

114. **VPs 10, 12, 38 & 40:** We agree that effects at these viewpoints are likely to be significant.
115. **VP 34 Snowdon Summit:** We agree that effects at this viewpoint are likely to be non-significant. However, we consider that sensitivity to be very high at this important viewpoint,

not medium-high as described in the ES & that visibility extends over a wider area than the summit, including Crib y Ddysgul.

116. **VP36 Tal y Fan:** We consider that the effects at this viewpoint have been underestimated and are significant. Sensitivity at this summit is likely to be high, with viewers focussed on the landscape and sea views. The wind farm would be prominent, and the scale would interfere with the appreciation of the views of the Great Orme landform and the relationship between the seas, Conwy Bay & headland.

117. **WCP Section 1:** We agree that effects along parts of this section are likely to be Significant.

- *Landscape & Visual Impacts – Clwydian Range & Dee Valley AONB*

Landscape Character Impacts

118. **Landscape Character Type (LCT) 2 & 5:** We agree that effects at these viewpoints are likely to be non-significant.

Visual Impacts

119. **VP24 Graig Fawr & VP26 & 54:** We agree that effects at these viewpoints are likely to be non-significant. However, we consider that there would be adverse effects on views, through an intensification of wind farm development in the views.

120. **Offa's Dyke National Trail Long Distance Path:** We agree that effects along the path within the AONB are likely to be non-significant.

- *Night-time Visual Impacts*

121. The proposal would have likely adverse night-time visual effects on the Isle of Anglesey AONB, including from viewpoints at Moelfre (4), Point Lynas (2), Red Wharf Bay (5)m Benllech Bay (16) Penmon Point (7), Trwyn y Penrhyn (28) and Beaumaris (8), and from beaches at Traeth Lligwy, Traeth Bycant, Penrhyn. Dark skies are a noted feature of the Peace & Tranquillity Special Quality within the AONB.

122. The proposal would have likely adverse night-time visual effects on some views within the National Park, through intensification of light pollution e.g., from viewpoint 60, where red lights would be visible in an otherwise dark sea beyond the Great Orme. There would be no adverse effect on the Core Areas of the Dark Sky Reserve, however.

- *Cumulative effects*

123. NRW (A) are concerned that adverse incremental, combined cumulative seascape, landscape and visual effects may arise on the Isle of Anglesey AONB and Snowdonia NP because of plans and projects both offshore and onshore.

124. The proposal would substantially increase the baseline of offshore wind farms affecting designated landscapes along the North Wales coast, such that significant adverse effects would be widespread across this area.

125. Further offshore leasing areas are planned (Round 4) to the north of the proposal which could add to adverse effects.

126. The Morlais tidal energy scheme is approved, and it has been acknowledged that this would have a significant adverse effect on another part of the Isle of Anglesey AONB.

127. As well as two pre-assessed areas for wind energy developments (onshore) are identified in Future Wales: 2040 (*Policy 17: Renewable and Low carbon Energy and Associated Infrastructure: Pre-assessed Areas for Wind Energy*) to the east of Snowdonia NP, there is a further area (3) to the south east of the NP. Developments in area 3 have the potential for significant adverse effects on another part of the NP.
128. The increasing scale of both offshore and onshore wind energy developments, as illustrated by this proposal, means that adverse visual effects are increasingly likely when they are located in areas that were planned when turbine heights were considerably smaller.
- *Effects on Designated Landscapes*
129. NRW (A) are concerned that the proposal will result in **unacceptable adverse effects** on the Isle of Anglesey AONB and Snowdonia NP designated landscapes through conflict with the purpose of conservation and enhancement of natural beauty, which is enshrined in the purposes of these designated landscapes. The proposal is contrary to Planning Policy Wales (Edition 11, paragraphs 6.3.5 – 6.3.9) and the vision and strategy set out in the Isle of Anglesey AONB Management Plan 2015-2020 and Cynllun Eryri Snowdonia National Park Partnership Plan 2020.
130. NRW (A) considers that the number of likely significant adverse effects and the widespread nature of these effects, extending along the coast from Bull Bay in northeast Anglesey to Conway Mountain in Snowdonia National Park, inland to the northern uplands of the Carneddau and within the seascape setting of two designated landscapes would **result in an unacceptable level of harm** to these nationally designated landscapes. In addition, NRW considers that there would be non-significant, but adverse effects on the Clwydian Range and Dee Valley AONB as well as other non-significant but adverse effects on the Isle of Anglesey AONB and Snowdonia NP.
131. Overall, **adverse effects would be experienced along a substantive part** of the North Wales coastline from Anglesey in the west to the Clwydian Range and Dee Valley AONB in the east and including the Great Orme Heritage Coast.
132. Much of the eastern coastline of Anglesey and northern uplands of Snowdonia include areas assessed by LANDMAP to be of ‘*Outstanding*’ and ‘*High*’ value for their visual and sensory aspects. The entire area is popular with visitors for coastal recreation, both water and land based. The area includes the Isle of Anglesey Coastal Path (Wales Coast Path), the North Wales Path, other public rights of way, open access land, beaches, headlands, islands, and coastal upland. The juxtaposition of the coastal and mountain scenery with open sea views combine to make the area of exceptional scenic quality. The seascape setting forms a crucial part of how the public experience the character and special qualities of the area.
133. The Special Qualities of the Isle of Anglesey AONB considered in the ES are: Expansive views, Peace & Tranquillity, Islands around Anglesey. We agree that there would be significant adverse effects on these Special Qualities.
134. The Special Qualities of Snowdonia National Park considered in the ES are Diverse Landscapes and Tranquillity & Solitude – Peaceful Areas. We agree that the effects on these Special Qualities are non-significant. Nevertheless, the effects are adverse and would detract from these qualities and on scenic views in the northern part of the park. Scenic views are a characteristic of Snowdonia’s landscapes, as noted in the SNP Partnership Plan 2020.
135. The Special Qualities of the Clwydian Range & Dee Valley AONB considered in the ES are: Landscape Character and Quality – Tranquillity and Landscape Character and Quality – Remoteness & Wildness. We agree that the likely effects on these special qualities

would be non-significant. However, we consider that there would be adverse effects, through an intensification of wind farm development within views from the AONB and erosion of the special qualities.

136. The ES considers that the acknowledged harmful effects would not affect the overall integrity of the Isle of Anglesey AONB or Snowdonia National Park or their inherent natural beauty. NRW (A) does not agree and considers that the degree of harm to nationally designated landscapes is **substantial and unacceptable** and is contrary to the purpose of conservation and enhancement of natural beauty.

- *Mitigation and opportunities for enhancement*

137. Whilst we acknowledge the embedded mitigation of the reduced western extent of the array, and that a reduction in the number of WTGs has been applied, **we do not consider it sufficient to reduce the likely significant effects at the numerous viewpoints within Isle of Anglesey AONB and Snowdonia NP**. The visual impacts will lead to **significant adverse effects** on landscape character within these Nationally Designated Landscapes and within their seascape settings. The ES acknowledges that the likely significant effects on these landscapes has not diminished because of the reduction in the extent and number of turbines.

138. The Welsh National Marine Plan SOC_6: Designated Landscapes and SOC_07: Seascapes notes that significant adverse impacts should be: (a) avoided; (b) minimised, and: (c) where they cannot be minimised, mitigated.

139. In terms of mitigation, **a further substantial reduction in array area and/or scale or number of turbines would be required** to minimise adverse effects on the Isle of Anglesey AONB and Snowdonia NP. Further consideration of NRW's evidence base "[Seascape & visual sensitivity to offshore wind farms in Wales: Strategic assessment and guidance](#)" and references therein, would assist in informing an appropriate reduction.

140. NRW (A) advises that opportunities for enhancement of the designated landscapes should be considered in accordance with Welsh National Marine Plan Policy SOC_06: Designated Landscapes. NRW (A) considers enhancements represent compensation and/or offsetting and not mitigation for adverse effects, as any enhancements would not be directly related to the impacts.

11.0 Air Quality

141. NRW (A) notes that no assessment of any air quality impacts arising from marine vessel emissions has been undertaken. It is unclear whether marine vessels will operate within proximity to sensitive coastal onshore habitat (that may support features of SSSIs/SACs/Ramsar). We advise that the Applicant provides additional information to demonstrate that there will not be significant impacts from marine vessel emissions.

12.0 Flood Risk

142. Having reviewed the submitted documentation, we are of the view that flood risk issues for the project are all covered by the DCO process and all associated with the onshore works.

13.0 Schedule of Mitigation and Marine Licence Principles

143. There are a number of inconsistencies between the Schedule of Mitigation (8.11) and the Marine Licence Principles document (5.4.1) that require clarification. For example (but not limited to), the Schedule of Mitigation refers to a *Cable Specification and Installation Plan* to be secured as part of the ML, but which is not recognised in the Marine Licence Principles document as a specific document (albeit cable management plans are noted). This potentially results in confusion as to the exact measures that are to be secured as part of the project mitigation.

14.0 References

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