Awel y Môr Offshore Wind Farm

Marine Water and Sediment Quality Clarification Note

Deadline 1

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Offshore Wind Farm

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1 Introduction

1 This clarification note has been prepared to provide additional justification and explanation to allay the concerns raised by Natural Resources Wales (NRW) through its Relevant Representations (PINS ref: RR-015) and technical consultation on the Marine Licence application. Following receipt of the NRW feedback, a meeting was held on 13 September 2022 between Awel y Môr Offshore Wind Farm Limited (the Applicant) and NRW. It was agreed as an outcome of this meeting that this note would be produced with the aim of providing sufficient clarification to resolve the concerns raised.

2 Polycyclic Aromatic hydrocarbons

2 As part of the Evidence Plan Process, the locations sampled for contaminants analysis and the contaminants that would be analysed were agreed with NRW prior to the sampling in 2020 (see the Evidence Plan Report (APP-301)).

3 NRW has requested that sediment contaminant data should be presented against the Cefas Action Levels where possible. In particular, to present Polycyclic Aromatic Hydrocarbons (PAHs) against the Cefas Action Levels. Volume 2, Chapter 3: Marine Water and Sediment Quality (PINS ref: APP-049) presents the various analysed metals against the Cefas Action Levels and therefore this note does not seek to replicate this information.

4 It should be noted that the Applicant and NRW agree that the survey results for PAHs are low and should not have implications on the assessment conclusions presented in Volume 2, Chapter 3: Marine Water and Sediment Quality (PINS ref: APP-049).

5 There are no specific Cefas Action Levels for individual PAHs. Therefore, the Applicant sought to present these concentrations against the Canadian sediment quality guidelines (Threshold Effect Levels (TELs) and Probable Effect Levels (PELs)) as the most appropriate thresholds and to provide the most useful indication of sediment quality. This approach was considered to be in accordance with the advice in the NRW Scoping Opinion consultation response (see Table 2 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049).

6 Table 1 provides an audit of the sediment analysis for PAHs against both the Cefas Action levels and the Canadian sediment quality guidelines for the samples within the array. MA_ST12 exceeded the Cefas Action Level 1 for both Fluoranthene and Pyrene. Fluroanthene also exceeded the TEL threshold whereas Pyrene did not.

7 Table 2 provides an audit of the sediment analysis for PAHs against both the Cefas Action Levels and the Canadian sediment quality guidelines for the samples within the offshore Export Cable Corridor (ECC). All of the sampled stations in the offshore ECC reported PAH concentrations below the respective TEL threshold and Cefas Action Level 1.

8 The Applicant maintains that the rationale for the magnitude of impact and so the conclusions of assessment presented in Section 3.10.3 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049) remain valid. Therefore, it remains the Applicant's position that the potential impact of the release of sediment bound contaminants is not significant in terms of the Environmental Impact Assessment (EIA) Regulations.

Table 1: Polycyclic aromatic hydrocarbons sediment analysis results from the array.

CONTAMINANT	CANADIAN MARINE SEDIMENT QUALITY GUIDELINES (µG/KG)		CEFAS ACTION LEVELS (MG/KG)		PAH (µG/KG OF DRY SEDIMENT)									
	TEL	PEL	LEVEL 1	LEVEL 2	MA_ST04	MA_ST12	MA_ST22	MA_ST25	MA_ST43	MA_ST47	MA_ST59	MA_ST61	MA_ST65	MA_ST66
Acenaphthene	6.71	88.9	0.1	N/A	0.1	12.9	0.1	0.1	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Acenaphthylene	5.87	128	0.1	N/A	<0.1	0.2	< 0.1	< 0.1	0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
Anthracene	46.9	245	0.1	N/A	0.2	24	0.1	0.1	0.3	0.1	< 0.1	0.4	< 0.1	< 0.1
Benzo(a)anthracene	74.8	693	0.1	N/A	0.7	61.4	0.7	0.6	1.2	0.3	0.1	1.9	0.1	0.2
Benzo(a)pyrene	88.8	763	0.1	N/A	0.8	77.5	0.6	0.6	1.4	0.2	0.1	2.3	0.1	0.1
Benzo(b)fluoranthene	N/A	N/A	0.1	N/A	2.3	84.3	1.6	2.1	3.5	0.8	0.5	5.3	0.3	0.6
Benzo(ghi)perylene	N/A	N/A	0.1	N/A	1.4	54.5	0.9	1.1	2.3	0.5	0.2	3.6	0.1	0.3
Benzo(k)fluoranthene	N/A	N/A	0.1	N/A	0.7	33.1	0.4	0.6	1.1	0.2	0.1	1.7	0.1	0.1
Chrysene	108	846	0.1	N/A	1	53.9	0.9	0.9	1.6	0.4	0.2	2.2	0.1	0.2
Dibenzo(a,h)anthracene	6.22	135	0.01	N/A	0.3	11.1	0.2	0.2	0.5	0.1	< 0.1	0.8	< 0.1	< 0.1
Fluoranthene	113	1494	0.1	N/A	1.4	137	1.2	1.3	2.2	0.5	0.3	3.3	0.2	0.3
Fluorene	21.2	144	0.1	N/A	0.4	7.9	0.2	0.3	0.5	0.1	0.1	0.7	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	N/A	N/A	0.1	N/A	1.6	59.7	0.9	1.2	2.5	0.4	0.2	3.7	0.1	0.2
Naphthalene	34.6	391	0.1	N/A	0.8	6.6	0.7	0.6	1.8	0.2	0.1	1.4	< 0.1	0.1
Phenanthrene	86.7	544	0.1	N/A	1.6	76	1.9	1.7	2.7	0.4	0.6	3.2	0.1	0.2
Pyrene	153	1398	0.1	N/A	1.1	120	1.2	1	1.8	0.5	0.3	2.9	0.1	0.4
	Above TEL													
	Above Cefas Action Level 1 (note, 0.1 mg/kg = 100 µg/kg; 0.01 mg/kg = 10 µg/kg)													
N/A	Not threshold defined under the Canadian Marine Sediment Quality Guidelines and/ or Cefas Action Levels													

Table 2: Polycyclic aromatic hydrocarbons sediment analysis results from the offshore export cable corridor.

CONTAMINANT	CANADIAN MARINE SEDIMENT QUALITY GUIDELINES (µG/KG)		CEFAS ACTION LEVELS (MG/KG)		PAH (µG/KG OF DRY SEDIMENT)							
	TEL	PEL	LEVEL 1	LEVEL 2	E_ST04	E_ST09	E_ST13	E_ST15	E_ST16	E_ST18	E_ST20	E_ST23
Acenaphthene	6.71	88.9	0.1	N/A	0.3	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1
Acenaphthylene	5.87	128	0.1	N/A	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	46.9	245	0.1	N/A	0.7	0.1	<0.1	0.1	0.2	0.1	0.3	0.1
Benzo(a)anthracene	74.8	693	0.1	N/A	2.8	0.2	0.2	0.2	0.9	0.3	1.1	0.2
Benzo(a)pyrene	88.8	763	0.1	N/A	3.2	0.2	0.2	0.2	1.1	0.5	1.3	0.2
Benzo(b)fluoranthene	N/A	N/A	0.1	N/A	6.9	0.8	0.7	0.8	3.1	1.4	3.4	0.8
Benzo(ghi)perylene	N/A	N/A	0.1	N/A	4.8	0.4	0.3	0.4	1.5	0.9	1.3	0.3
Benzo(k)fluoranthene	N/A	N/A	0.1	N/A	2.1	0.2	0.2	0.2	0.9	0.4	1	0.2
Chrysene	108	846	0.1	N/A	3.4	0.3	0.2	0.2	1	0.4	1.3	0.2
Dibenzo(a,h)anthracene	6.22	135	0.01	N/A	1.1	0.1	0.1	0.1	0.3	0.2	0.3	0.1
Fluoranthene	113	1,494	0.1	N/A	4.9	0.4	0.3	0.4	1.7	0.6	2	0.3
Fluorene	21.2	144	0.1	N/A	1.1	0.1	0.1	0.1	0.3	0.1	0.4	0.1
Indeno(1,2,3-cd)pyrene	N/A	N/A	0.1	N/A	4.8	0.4	0.4	0.5	1.9	1.1	1.8	0.4
Naphthalene	34.6	391	0.1	N/A	2.3	0.1	0.1	0.1	0.6	0.2	0.9	0.1
Phenanthrene	86.7	544	0.1	N/A	6.6	0.4	0.2	0.2	1.4	0.5	1.9	0.3
Pyrene	153	1,398	0.1	N/A	4.5	0.4	0.3	0.3	1.5	0.5	1.7	0.3
	Above TEL											
	Above Cefas Action Level 1 (note, 0.1 mg/kg = 100 µg/kg; 0.01 mg/kg = 10 µg/kg)											
N/A	Not threshold defined under the Canadian Marine Sediment Quality Guidelines											

3 Increased suspended sediment assessment

3.1 Phytoplankton

3.1.1 Marine Water and Sediment Quality

9 NRW requested through its Relevant Representations (PINS ref: RR-015) that potential impacts on phytoplankton should be considered in the context of suspended solids as well as changes in nutrient availability. This section seeks to clearly define the potential impact pathways between the increases in suspended sediment concentrations (SSC) and light limitation on phytoplankton.

10 Section 3.10.1 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049) provides a summary of the project-specific modelling of SSC. Full details are provided in Volume 4, Annex 2.3: Physical Processes Modelling Results (APP-077).

11 As acknowledged in paragraph 110 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049), *"Increases in SSC and so turbidity may result in a decrease in the depth to which natural light can penetrate into the water column. This in turn may result in a reduction in primary productivity and/ or an increase in bacterial growth"*. Paragraph 113 summarises the elevated suspended sediments in the water column. Whilst not explicitly stated for phytoplankton, the conclusions of paragraph 115 remain valid for light limitation in the water column, including the predicted dilution levels, the temporary nature of the activities, and SSC dispersion from tidal currents in the water column would be in the order of days. These potential changes are within the natural variation of the marine environment in the study area during high energy low frequency events and the high observed concentrations which coincide with the North Atlantic Oscillation (NAO).

12 Therefore, the effect of light limitation on phytoplankton caused by elevated SSC in the water column from the proposed activities is not significant in terms of the EIA Regulations.

3.1.2 Water Framework Directive

13 It is acknowledged that phytoplankton is a biological quality element under the Water Framework Directive (WFD), forming part of the ecological status of a water body. As described above for Marine Water and Sediment Quality, given the transient and short-lived nature of the potential impacts, no water body scale effects are anticipated with regards to phytoplankton. Therefore, the proposed activities associated with the elevated SSCs in the water column will not result in a deterioration of the current status of these waterbodies or jeopardise the attainment of good status/future objectives.

3.2 Dissolved oxygen

14 This section seeks to clearly define the potential impact pathways between the potential increases in SSCs and dissolved oxygen.

3.2.1 Nutrients and bacteria

15 The Applicant acknowledged that dissolved oxygen levels can decrease due to various factors, including release of anoxic sediments, rapid changes in temperature and salinity, as well as from the respiration of organic matter (paragraph 111 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049). The dissolved oxygen assessment was focused on the potential for nutrient inputs into the water column. This was considered the most likely potential pathway by which dissolved oxygen could be impacted as a result of the proposed activities.

16 In addition, it is acknowledged that bacteria and other decomposer organisms use oxygen to break down the available organic matter, thus locally reducing dissolved oxygen concentrations in the water (paragraph 111 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049). However, given the predicted dilution levels, the temporary nature of the activities, and SSC dispersion from tidal currents (i.e., transient), it is expected that any bacterial increases in the water column would be in the order of days, i.e. as long as the plumes persisted. Following the sediment plumes' dispersion, and subsequent increases in UV light, the bacterial counts in the water column will return to "do-nothing" baseline conditions (paragraph 115 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049).

17 No source-receptor-pathways were identified for a deterioration of dissolved oxygen as a result of the proposed construction activities (paragraph 112 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049), and so the effects are not significant in terms of the EIA Regulations.

3.2.2 Release of anoxic sediments

18 To further supplement the conclusions of the EIA, further consideration is provided on the potential pathway for the release of any anoxic sediments which may alter dissolved oxygen levels.

19 Section 3.10.1 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049) provides a summary of the project-specific modelling of SSC. Full details are provided in Volume 4, Annex 2.3: Physical Processes Modelling Results (APP-077).

20 As demonstrated by the project-specific modelling, any disturbed anoxic sediments are predicted to be rapidly diluted and dispersed. It should also be noted that the water column will be oxygenated and will oxidise any anoxic sediments rapidly. As such, if anoxic sediments were present, the proposed activities are not expected to cause a measurable reduction in the dissolved oxygen in the water column. Therefore, effects of the release of anoxic sediments (if present and disturbed) from the proposed activities would not be significant in terms of the EIA Regulations.

3.2.3 Water Framework Directive

21 It is acknowledged that dissolved oxygen is a physico-chemical quality element under the WFD, forming part of the ecological status of a water body. Given that no measurable reductions in dissolved oxygen are anticipated from any of the identified potential pathways, no water body scale effects are anticipated with regards to dissolved oxygen. Therefore, the proposed activities associated with the elevated SSCs in the water column will not result in a deterioration of the current status of these waterbodies or jeopardise the attainment of good status/ future objectives.

4 Accidental releases or spills

22 The Applicant undertook an assessment of the accidental releases or spills of materials or chemicals as part of the EIA on the basis that the provision of a Project Environmental Management Plan (PEMP) and Marine Pollution Contingency Plan (MPCP) would be secured through the Marine Licence and implemented accordingly. This assessment concluded that the potential impacts of accidental pollution would not be significant in terms of the EIA Regulations (paragraphs 129 and 130 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049)). It was agreed with NRW during the meeting, held on 13 September 2022, that this is an appropriate conclusion with the measures secured and in place.

23 However, NRW did not agree that the impact magnitude could be described as 'temporary' and therefore 'negligible' without these measures. In the absence of mitigation, moderate adverse significance (i.e. significant in terms of the EIA Regulations) could result for certain sensitive features (e.g. bathing waters) in the event of an accidental release/spill and thus it is necessary to implement mitigation measures to reduce the residual significance to minor at worst. While this does not change the overall conclusion of the assessment (given the implementation of appropriate measures), this position is acknowledged by the Applicant.

24 The Applicant is committed to the use of best practice, due diligence and pollution prevention guidelines at all times. As outlined in Table 16 of Volume 2, Chapter 3: Marine Water and Sediment Quality (APP-049), a MPCP (to be included within the PEMP) is anticipated to be in place and agreed with NRW (through conditions in the Marine Licence) in line with the Integrated Pollution Prevention and Control (IPPC) Directive (Directive 2008/1/EC or equivalent at that time) such that any potential risk is minimised to acceptable/negligible levels. The Applicant will continue to consult with NRW to ensure that the provision of a PEMP and MPCP are conditioned appropriately within any Marine Licence granted (see Table 1 of the Marine Licence Principles documents (AS-023)).

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