LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr 1 Floating Offshore Wind Farm

Addendum to the Environmental Statement

November 2024

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FLOVENTIS ENERGY

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Acronyms and abbreviations

Acronym or abbreviation	Definition	Acronym or abbreviation	Definition
AA	Appropriate Assessment	NRW (A)	Natural Resources Wales Advisory
CEMP	Construction Environmental Management Plan	ORE Catapult	Offshore Renewable Energy Catapult
CRM	Collision Risk Model	ORJIP	Offshore Renewables Joint Industry Programme
DDV	Drop Down Video	PCNPA	Pembrokeshire Coast National Park Authority
EDRs	Effective Deterrent Ranges	PCNP	Pembrokeshire Coast National Park
EIA	Environmental Impact Assessment	RaDIN	Range dependent nature of impulsive noise
HRA	Habitats Regulations Appraisal	RIAA	Report to Inform Appropriate Assessment
iPCoD	Interim Population Consequences of Disturbance	ROV	Remotely Operated Vehicle
JNCC	Joint Nature Conservation Committee	SAC	Special Area of Conservation
KP	Kilometre Point	sCRM	Stochastic Collision Risk Model
LSE	Likely Significant Effect	SLVIA	Seascape, Landscape and Visual Impact Assessment
LVIA	Landscape and Visual Impact Assessment	SNCB	Statutory Nature Conservation Bodies
MBES	Multi-beam Echosounder	SPA	Special Protection Area
NRW	Natural Resources Wales	UXO	Unexploded Ordinance
NRW MLT	Natural Resources Wales Marine Licencing Team	VP	Vantage Point

Contents

1. Purpose of this Document

This addendum document provides responses to questions and issues raised by stakeholders during the Natural Resources Wales (NRW) 'Fitness Check' process with respect to the Llŷr 1 Floating Offshore Wind project. The NRW Fitness Check is process where NRW Marine Licencing Team (MLT) undertake an extended validation of the documents provided before they fully accept a Marine Licence application. The process includes a standard questionnaire that seeks views from the statutory consultees as whether sufficient information has been provided to ensure a full assessment of the issues associated with the application.

This document addresses the queries raised by stakeholders on each technical issue raised. The information in this addendum should be read in conjunction with the Llŷr 1 Floating Offshore Wind Environmental Statement

2. Ornithology

Fitness Question 1	Do you agree with the approach taken to assess the impact of the Project on the ES?
Natural Resources Wales Advisory (NRW (A))	*The approach to the assessment of impacts from the project alone is generally ok. There are a few issues where non-standard approaches have been used (Inlabru modelling, SeabORD displacement approach), although these have been discussed and agreed with caveats by NRW during the pre-application process, or the alternative NRW advised approach is also presented and assessed alongside. Note issues/concerns regarding use of Inlabru density estimates and how they are entered in sCRM under point 2.1 below.* *We agree with the Welsh designated seabird sites screened in for LSE in the screening report through the coarse screening filter approach. We have queries/concerns regarding the approach to the further refinement of LSE screening presented in the RIAA (see paras 543-547 and Table 8-32) – as the threshold used for screening site/feature combinations out of AA is currently unclear and we note this is not based on the proportion of baseline mortality of the site that the predicted impact equates to and hence we currently cannot make a judgement on the conclusions – see also comments in Point 7.* *However, the approach to cumulative/in-combination assessment is not adequate (see Fitness Question 6).*
Joint Nature Conservation Committee (JNCC)	*The approach taken is broadly correct regarding ornithology, and largely seems to have followed SNCB advice. We note some errors in the Report to Inform Appropriate Assessment, and in particular regarding Table 8-32: We advise that all of the 'long list' in this table be screened in and that the estimated mortalities and significance of, be a first step in the Appropriate Assessment. We do not think that a full cumulative nor in-combination analysis has been undertaken and there is available evidence which has not been incorporated (see our response to Fitness Question 5) and so arguably the approach taken on the ES is not correct because the cumulative assessment is not complete. We have answered yes to this question because as a whole, the approach is correct but lacks some information as detailed in response to further questions below.*
Llŷr Project Response	**Table 8-32** in the Report to Inform Appropriate Assessment (RIAA) should be read in conjunction with **Table 22E-2 in Appendix 22E – Marine Ornithology Project Alone and Cumulative Impact Scenarios** as this provides the Special Protection Area (SPA) 1% baseline mortality thresholds. Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA (UK9014051) and Grassholm / Ynys Gwales SPA (UK9014041) have been screened in on this basis. However, for all other SPAs presented in **Table 8-32**, apportioned impacts for their qualifying interests are significantly less than a single bird (in every instance bar one, less than half a bird) so clearly do not exceed any 1% baseline mortality thresholds because these will never be less than a single bird.

Fitness Question 2.1	Have all factors required for you to assess the modelling approach been provided so you can advise on the modelling outputs and impact assessment?
NRW (A)	*Largely yes, although during pre-application we raised concerns over Inlabru density estimates and that it does not allow the data to be entered into the sCRM in the way we would recommend. We requested a full comparison, including CRM outputs, of the Applicants approach with our advised approach to allow us to assess biases and risks with using the Inlabru approach. Only some of this has been provided (comparison of density estimates and not collision predictions). Ideally this information should be provided to support a robust assessment. If it isn't, given the likely small predicted impacts from the project alone, we could likely come to conclusions, but it would limit the confidence/certainty we could place in these.*
JNCC	*No - We have some significant concerns about the density modelling (specifically INLABRU) and the fact that it does not provide density outputs in a form that we would recommend for use as inputs into collision risk modelling (CRM). We have asked for a full comparison of Llŷr's approach with the approach that we would normally advise, through to CRM outputs for an example species, to allow us to assess any biases and risks from the INLABRU approach regarding predicted collisions. Only some of the information we requested has been provided.*
Llŷr Project Response	**Technical paper 3** included in **Annex B of Appendix 22E** is where the requested comparison is made; **Accounting for Uncertainty in Monthly Seabird Density Estimates and Mean Seasonal Peaks**. Although the focus of comparison (for CRM) is in relation to monthly input densities, we should have made clear that the numbers provided in **Table 2.1** of the paper (for gannet and kittiwake as the relevant, focal species) are actually the estimated **collision mortalities** modelled from each of the three types of input density. In this regard, the two rows marked with an asterisk give the collision mortality figures used in assessment (based on input densities derived from inlabru), corresponding to **Table 22-A2 (kittiwake)** and **Table 22-A6 (gannet)** in **Appendix 22C: Marine Ornithology Collision Risk Modelling**. They are the worst-case 10 turbine scenario for each species, and using the 14.9 ms-1 flight speed for gannet. The CRM input and output logs have already been provided for these, however, we now also provide the logs for the comparative approaches requested on uncertainty, as set out in **Technical paper 3**. These excel files are provided as attachments to this addendum and are named as: • Kittiwake CRM (design-based trunc norm).zip • Kittiwake CRM (design-based bootstrap sampling).zip • Gannet CRM (design-based trunc norm).zip • Gannet CRM (design-based bootstrap sampling).zip

Fitness Question 2.2	Is the modelling approach used appropriate?
NRW (A)	*Largely yes but note comments to the Fitness Question 2.1 above regarding Inlabru density estimates and sCRM.*
JNCC	*No - See our response to the Fitness Question 2.1 regarding the density modelling and specifically outputs from this to inform/become inputs for collision risk modelling.*
Llŷr Project Response	Clarification to the modelling approach regarding density estimates and sCRM is provided within the Fitness Question 2.1 response above.

Fitness Question 3	Have the appropriate data sources been used?
NRW (A)	*Mostly yes although note comments on Fitness Question 6 below regarding cumulative assessments and additional data sources that should be used.*
JNCC	*Mostly yes, although Appropriate data sources have been used throughout the assessment with the exception of the cumulative assessment. See our response to Fitness Question 5 regarding cumulative assessment and additional data sources that should be utilised.*
Llŷr Project Response	NRW (A) and JNCC comments on marine ornithological cumulative assessment are addressed under Fitness Question 6 below.

Fitness Question 4	Have any agreements reached at pre-application been considered?
NRW (A)	*NRWs pre-application advice and agreements have largely been followed, with exception of the issue noted in point 2.1 above regarding Inlabru densities and CRM and having not provided the requested collision prediction comparisons.* *Additionally, NRW provided suggestions on an approach to filling gaps in the cumulative/in-combination assessments. Although, the Applicant did not subsequently discuss this with NRW and no agreement on any approach was reached.*
JNCC	*Yes - JNCC's pre-application advice was to provide a comparison of collision outputs based on Llŷr's INLABRU density modelling approach with the approach that we would normally advise, through to CRM outputs. We also have provided (with NRW) suggestions re cumulative assessment (question 5). Both of these were framed as suggested approaches and no agreement was reached.*
Llŷr Project Response	CRM input densities are addressed in Fitness Question 2.1 above. Cumulative assessment is addressed in Fitness Question 6 response.

Fitness Question 5	Has the appropriate guidance been followed?
NRW (A)	*Yes*
JNCC	*Published guidance has been followed, e.g. NE's Best Practice. However, specific pre-application advice given, e.g. demonstrating suitability of INLABRU CRM outputs and the approach to take to in-combination assessment has not been followed.*
Llŷr Project Response	CRM input densities addressed in the response to Fitness Question 2.1 above. Comments on cumulative assessment addressed under Fitness Question 6 response below.

Fitness Question 6	Is the cumulative assessment adequate?
NRW (A)	*No. The Applicant's cumulative and in-combination impact assessments are insufficient. Whilst there has been some attempt to extract mortality estimates for relevant projects, there are several projects where there are data available that has not been included. Many operational projects are dismissed as having limited data available and only considered qualitatively. Therefore, the assessments are not sufficient to give us confidence in the conclusions drawn with respect to the level of significance of accumulating scale of impacts to some species. A suggested approach to filling the gaps was sent to the Applicant by NRW (14th Nov 2023), but the Applicant has made no attempt to discuss this/progress this. We note that a gap filling approach is being completed by the Round 4 Irish Sea projects currently in examination. As a minimum this can be utilised in Llŷr's cumulative assessment.*
JNCC	*No - Whilst there has been some attempt to extract mortality estimates for relevant species for existing projects, this is insufficient. Many operational projects have been dismissed as having limited data available and therefore only considered qualitatively. JNCC advocate a gap-filling exercise, and a suggested approach has been provided to Llŷr (14th Nov 2023). This is being undertaken by R4 projects currently at examination and this information can be utilised as part of Llŷr's cumulative assessment.*
Llŷr Project Response	A thorough review was undertaken of available information for operational and consented wind farms and the same known data gaps encountered as for Erebus and Awel y Mor. **Figure 22-2** of **Chapter 22 – Marine Ornithology** (duplicated as **Figure 22E-1** of **Appendix 22E: Marine Ornithology Project Alone and Cumulative Impact Scenarios**) shows all the development which was considered in the cumulative assessment, with **Table 22-36** setting out further detail on project status and how each project was considered in assessment (EIA/HRA). Receipt of the Natural England 'gap-filling' paper was acknowledged in **Table 22-5** of **Chapter 22 – Marine Ornithology**: **Pre-application consultation undertaken for marine ornithology**. While this paper was reviewed, its status was unclear, given that cumulative assessment is as much a regulatory matter as it is a technical one. There was no apparent 'sign-off' from NRW MLT that this was an approach they considered

	informative, and no apparent liaison with the MMO in relation to it. The paper itself was vague and non-specific, with the acknowledgement that *'the approach detailed below is flawed'*. Given that these data gaps relate to Liverpool Bay wind farms, the Applicant judged that NRW MLT was unlikely to require Llŷr (a ten turbine demonstration project) to attempt such an exercise, when it had not been requested of Awel y Mor, a commercial-scale project of up to 50 turbines, which is actually located in Liverpool Bay and is an extension of Gwynt y Mor - one of the projects in question with a known data gap (no. 16 and 17 on **Figure 22-2**). NRW (A) / JNCC noted that the Round 4 Northern Wales and Irish Sea projects (Mona, Morecambe and Morgan, no. 21, 22 and 24 on **Figure 22-2**) have now been requested to follow NE's gap-filling approach, however, it is unclear whether this will be a single agreed compilation, or three different sets of numbers generated independently. These known data gaps are a strategic concern for offshore wind consenting in Wales, and it does not seem appropriate to require multiple parties to attempt to address the matter; it needs a co-ordinated approach. The Llŷr applicant had previously checked the Round 4 plan-level HRA and there were no significant concerns or risks identified for any of the Pembrokeshire SPA seabird colonies of key concern for Llŷr. Apportioning (where available) also showed minimal levels of impact to be attributed from Liverpool Bay projects to Pembrokeshire SPAs, and of course the SPA colony counts can themselves be checked, and show no discernible change in population status or population trend for any of the focal species at the SPAs under assessment for Llŷr , i.e., none of the wind farms in Liverpool Bay have had any significant impact on Pembrokeshire seabirds (as noted in **Table 22-36** of **Chapter 22 – Marine Ornithology**).

Fitness Question 7	**Please add here any justification or additional information to support your assessment**
NRW (A)	*Whilst we have answered 'no' to some of the questions above, we feel for ornithology, addressing these would not be a large amount of work:* • *The adequacy of the cumulative/in-combination assessment (point 6) requires further work and discussion, but can potentially be addressed by a more thorough review and utilisation of the existing data and consideration of the work currently being undertaken by the Round 4 Irish Sea projects in examination.* • *The Inlabru densities in CRM and comparison of outputs (noted in point 2.1) could be addressed by the Applicant simply providing the full comparison through to CRM outputs that NRW requested pre-application.* • *The concerns with the further LSE screening refinement approach could be addressed by simply presenting the annual apportioned impacts to the colonies and presenting information on the % of baseline mortality of the colony/site that these equate to and considering this in terms of whether AEoSI can be ruled out – e.g. where impacts equate to less than 1% of baseline mortality, this could be considered undetectable against background mortality and hence an AEoSI could be ruled out.* • *If the Applicant does undertake further work on the submission, we would also suggest they revisit Table 8-37 of the RIAA as currently it is unclear, does not appear to present the 1% baseline mortality threshold for each species and the impacts assessed for each species are not correct – for example, auks have not been assessed for collision (but impact figures are given) but have been assessed for*

	displacement impacts (which are listed as N/A). We note that as NRW have raised concerns with the appropriateness of SeabORD for displacement assessment for this project, the predicted annual impacts from the displacement matrix should be presented in this table.
JNCC	*Whilst we have answered 'no' to some of the questions above, we feel for ornithology at least, addressing these would not be a large amount of work. The INLABRU/CRM input (question 2.1) could be addressed by simply providing the full comparison through to CRM outputs that JNCC had requested pre-application. The cumulative assessment adequacy (question 5) requires some further work and discussion but can potentially be addressed by a more thorough review and utilisation of existing information, particularly information regarding impacts from existing/planned projects available from Round 4 projects currently going through examination.*
Llŷr Project Response	• Compiling the cumulative impacts baseline and addressing known data gaps for operational wind farm projects in Liverpool Bay is clearly a large amount of work, and appears a disproportionate ask to be made of a small-scale demonstrator project when it is a strategic (not project-specific) concern. If NRW Regulatory is going to be able to get this information as a result of the efforts of the commercial-scale projects actually located in Liverpool Bay, what is the rationale for additionally requesting this from Llŷr? (Given its small size and distance from Liverpool Bay.) • The Inlabru densities in CRM and comparison of outputs information has already been provided within the submitted application, as addressed in the response to Fitness Question 2.1. • Regarding the concerns with the further LSE screening refinement approach, this information (1% baseline mortality thresholds) has been addressed within the submitted application, as identified the response to Fitness Question 1 above. • The comment made by NRW (A) to revisit **Table 8-37** relates to a formatting issue with the column headers, which must have crept in during RIAA compilation. An uncorrupted version of the table is provided below and hopefully this now makes sense! (It should've been the same format as **Table 8-38**, this being the equivalent table for Grassholm SPA.)

RIAA Table 8-37

Table 8-37 Comparison between Project-Alone Impacts and 1% Baseline Mortality Thresholds for SPA Populations

Species	1% of Baseline mortality	Project-alone apportioned annual mortalities		
		Collision	Displacement†	SeabORD‡
Skomer, Skokholm and Seas off Pembrokeshire SPA				
Storm petrel	**Qualitative assessment**			
Lesser black-backed gull	**19**	1.1	N/A	N/A
Manx shearwater	**1,183**	N/A	198.43	N/A
Puffin	**32**	N/A	11.63	37.17
Kittiwake§	**4**	0.7	N/A	N/A
Guillemot	**27**	N/A	92.74	16.33
Razorbill	**18**	N/A	4.17	7.5

†*The figures quoted in this table are the maximum estimates obtained from the colony-apportioned displacement matrices for each species, i.e., the upper end of the range advised by NRW and JNCC; maximum displacement rates / mortality rates of 50% / 10% for Manx shearwater (**Appendix 22D: Marine Ornithology Displacement Assessment**).*

‡*These figures are the (annual) adult mortalities predicted by SeabORD modelling, based on the energetic costs arising from displacement during the chick-rearing period, when these costs are predicted to be most significant in terms of seabird ecology. Displacement or barrier effects that occur during chick-rearing are predicted to impact directly on productivity (i.e., the chick mortalities predicted by SeabORD) as well as reduced fitness of adults entering the non-breeding season. See **Appendix 22D: Marine Ornithology Displacement Assessment - Annex C***

§*Information on kittiwake displacement has been presented in **Appendix 22D: Marine Ornithology Displacement Assessment** at the request of JNCC*

3. Marine Mammals

Fitness Question 1	Do you agree with the approach taken to assess the impact of the Project on the ES?
NRW (A)	*Yes*
JNCC	*In principle, we agree with the approach taken to assess potential impacts on harbour porpoise, common dolphin and minke whale receptors; JNCC defer to NRW-A for matters relating to grey seal and bottlenose dolphin. We note no major concerns at this stage however, some key information is presented in appendices only, and not considered in the ES chapter (see Question 4). This has potential implications regarding mitigation requirements however we will discuss this further when we provide our full advice.*
Llŷr Project Response	Detailed technical information is presented in Appendices as it is relevant to both **Chapter 21 – Marine Mammals** (for Environmental Impact Assessment (EIA)) and the RIAA (for Habitats Regulations Appraisal (HRA)). Judgement is applied on how much of the technical detail to repeat in the Chapter and RIAA. For over-arching assessment, it is usually a summary of the technical information that is given - enough for the general reader to follow the flow and outcome of assessment (EIA and HRA). Technical readers should be reading the Appendices for the full technical detail.

Fitness Question 2.1	Have all factors required for you to assess the modelling approach been provided so you can advise on the modelling outputs and impact assessment?
NRW (A)	*Yes*
JNCC	*Relevant noise sources have been modelled to determine auditory injury and disturbance ranges for all marine mammal hearing groups. Results have been presented as a percentage of the associated management unit to estimate population-level impacts. JNCC accept the approaches used however, piling duration applied in the models is inconsistent within the project design and the iPCoD variables. In addition, some results are only presented in the appendices so not considered when drawing final conclusions. We will discuss this further when we provide our full advice.*
Llŷr Project Response	A piling schedule was not available at the time of Interim Population Consequences of Disturbance (iPCoD) modelling; therefore, the worst-case scenario of 10 days of piling was selected for modelling. The modelling inputs are described in **paragraph 176** on page 75 of **Chapter 21 – Marine Mammals**.

Fitness Question 4	Have any agreements reached at pre-application been considered?
NRW (A)	*In conjunction with JNCC we had previously advised that for Common Dolphin the results for both the Scans III densities and the survey-based densities be used. This is because the survey data accounts for the occasional transitory presence of super pods. We also recommended that results be interpreted based on the schedule of development. For example, conducting all pin-piling in a single block would have less of an impact to any super-pods in the area than a gap of a few days between two or more piling blocks since the latter would allow animals to return to the area introducing the chance of repeated disturbance.* *We acknowledge and welcome that this appears to have been carried out in App 21C Annex B – Common Dolphin Impact Assessment Comparison. The chapter will be fully assessed in due course.*
JNCC	*JNCC's pre-application advice and agreements mostly appear to have been followed for marine mammal receptors with two notable exceptions:* *I. Use of Effective Deterrent Ranges in HRA (see Question 5).* *II. Assessing auditory injury from underwater noise sources: The applicant has assessed injury using both the peak pressure (peak SPL) and cumulative exposure (SELcum) metrics as agreed pre-application. However, they have only presented the peak pressure results in the ES chapter, and only used this metric when determining mitigation requirements. JNCC disagree with this approach and require both metrics to be considered and the most precautionary used to determine mitigation requirements. Information provided in the appendices is sufficient for JNCC to provide appropriate advice when required.* *We acknowledge that common dolphin density estimates discussed pre-application have not been applied however we support the density estimate used as stated in Question 2.*
Llŷr Project Response	The project has followed NRW's advice on approach; however, we have calculated Effective Deterrent Ranges (EDRs) for completeness and are provided below. We believe that the hearing-group specific deterrence as presented in **Chapter 21 – Marine Mammals** is more accurate than the EDR in this context. We don't follow the second part of the JNCC commentary as all relevant metrics have been presented: SPL peak, SELcum for piling (**Table 21-30**), SPLpeak and SELss for UXO (**Tables 21-22** to **25**).

Effective Deterrent Ranges (EDRs)

UXO – EDR = 26 km				
Species	Density (n/km^2)	Area Impacted (km^2)	Number Impacted	% of MU Impacted
Grey Seal	0.011	2123.72	24	0.038
Harbour porpoise	0.137	2123.72	291	0.465
Common Dolphin	0.841	2123.72	1787	1.741
Bottlenose Dolphin	0.4195	2123.72	891	8.139
Minke Whale	0.011	2123.72	24	0.119

Pin-pile – EDR = 15 km				
Species	Density (n/km^2)	Area Impacted (km^2)	Number Impacted	% of MU Impacted
Grey Seal	0.011	706.86	8	0.013
Harbour porpoise	0.137	706.86	97	0.155
Common Dolphin	0.841	706.86	595	0.580
Bottlenose Dolphin	0.4195	706.86	297	2.713
Minke Whale	0.011	706.86	8	0.040

Geophysical survey – EDR = 26km				
Species	Density (n/km^2)	Area Impacted (km^2)	Number Impacted	% of MU Impacted
Grey Seal	0.011	78.54	1	0.002
Harbour porpoise	0.137	78.54	11	0.018
Common Dolphin	0.841	78.54	67	0.065
Bottlenose Dolphin	0.4195	78.54	33	0.301
Minke Whale	0.011	78.54	1	0.005

Fitness Question 5	Has the appropriate guidance been followed?
NRW (A)	*Yes*
JNCC	*SNCB guidance for managing noise disturbance within harbour porpoise SACs was published in 2020. This describes thresholds above which an adverse effect will be concluded and advocates the use of EDRs when assessing how much of a site is unavailable to harbour porpoise due to underwater noise. There are two harbour porpoise sites within the Bristol Channel, both of which are jointly managed by JNCC. Pre-application, JNCC advised the EDRs should be used for HRA purposes but agreed other methods could be presented alongside for comparison purposes. However, Appendix 8E has only used EDRs when assessing potential impacts from pre-installation geophysical surveys (Table 8-17), with alternative thresholds use for impact piling and UXO clearance. JNCC advocate the use of EDRs as these are based on empirical evidence opposed to disturbance ranges estimated on modelling which carries considerable uncertainty. We are aware NRW-A prefer alternative thresholds be used when assessing how much of the site is unavailable however, we maintain our advice that EDRs also be applied and believe the addition of this to the assessment will create minimal work.*
Llŷr Project Response	As noted in the response to Fitness Question 4, EDRs have now been calculated and are presented above.

Fitness Question 6	Is the cumulative assessment adequate?
NRW (A)	*The overall methodological approach to the cumulative assessment appears to be adequate but this will be fully assessed in due course.* *We do not agree with the decision to screen out several impact pathways, and we may require assessment through supplementary information and / or more detailed justification:* • *Auditory injury (PTS-onset)* • *Disturbance from UXO clearance* • *Collision with vessels* • *Barrier effects* • *Entanglement* *Finally, we note that Table 21-58 may need to be updated as the status of some projects has changed (e.g. Mona and Morgan have submitted their applications).*

JNCC	*The cumulative effects assessment is not deemed adequate at this stage. We do not agree with the screening out of several impacts: auditory injury, disturbance from UXO clearance, collision with vessels, barrier effects, entanglement. We believe further assessment is required, particularly regarding impacts from projects currently going through examination or post-consent.*
Llŷr Project Response	These impacts are described and included in the project alone assessment. Reasons for these impact pathways being screened out for cumulative assessment are provided in **Table 21-56** of **Chapter 21 – Marine Mammals**. All relevant projects were included for cumulative assessment where there was publicly available information at the time of assessment (**Table 21-58**). Consideration must be given on the amount of work and time given to undertaking assessments, producing, reviewing and processing of data before submitting an application and the practicalities of introducing new information at a late stage in the process; meaning that information that may be available to the regulator/stakeholder at the time the application is presented is not necessarily available to the applicant within a reasonable timeframe before the application is made.

Fitness Question 7	**Please add here any justification or additional information to support your assessment**
NRW (A)	• ***Environmental Statement Volume 3 Chapter 21 Marine Mammals: 21.5 Baseline – Harbour porpoise (par 46, pg 41)****: Applicant has incorrectly stated that NRW(A) and JNCC advised the use of single point densities for harbour porpoise obtained via Evans and Waggitt (2023). NRW(A) would like to clarify that data from Evans and Waggitt (2023) can be queried as a density surface in GIS – which was the intended manner of use in which this data source was suggested.* • ***Volume 6 Appendix 21C Marine Mammal UW Noise Assessment: 21.4.1 Geophysical surveys (par 47, pg 18)****: While the assessment of disturbance clearly states that this was calculated "at any one time (static source)", the overall quantitative assessment appears to have been based on said static estimate at any one time rather than some form of total. Since survey vessels move, this conclusion is only valid if recovery is assumed to be quasi-instantaneous.* • ***Volume 6: Appendix 21B - Underwater Noise Report – Behavioural impacts (p34)****: The literature review on methods to assess disturbance could be strengthened by including an explanation of effective deterrence ranges (EDRs). We note further that the approach to assessing disturbance recommended by NRW in our position statement (NRW 2023) is neither a further development, nor an alternative approach. NRW recommend a combination of dose response, fixed noise thresholds, and EDRs – all of which are considered to be standard methods.* • ***Volume 6: Appendix 21B - Underwater Noise Report: Acoustic propagation loss modelling (par 196, pg 67)*** *– We recommend the applicant refer to the work being carried out through ORJIP's Range dependent nature of impulsive noise (RaDIN) project rather than Southall et al (2019).*

JNCC	*Whilst we have answered 'no' to some of the questions above, we feel, addressing these would not be a large amount of work.*
Llŷr Project Response	• Volume 3 Chapter 21 Marine Mammals: 21.5 Baseline – Harbour porpoise (par 46, pg 41) – Applicant notes the clarification on the advice. • Volume 6 Appendix 21C Marine Mammal Underwater Noise Assessment: 21.4.1 Geophysical surveys (par 47, pg 18): The EDR relates to disturbance, not auditory injury, and therefore, it can be reasonably assumed that recovery from disturbance is immediate or very close to. Marine mammals are highly mobile, there are no habitats in the Project Study to which they are specifically tied, and so disturbance from geophysical underwater sound sources will be of a small magnitude. This is particularly true since with a soft-start before any sound sources are activated, and a natural soft-start due to the slow and continuous movement of the vessel, any behavioural response is expected to be low level, short-lived and to not be repeated. Expert elicitation has come up with durations for recovery from impact piling for use in iPCoD modelling (e.g. 6 hours for harbour porpoise), but the level of impact from piling would be considerably greater than a geophysical survey. To our knowledge, there is no duration for recovery from geophysical surveys, so it can't readily be assessed should it be considered necessary. • Volume 6: Appendix 21B - Underwater Noise Report – Behavioural impacts (p34) – the applicant notes the feedback. The EDRs have now been calculated and are provided above. • Volume 6: Appendix 21B - Underwater Noise Report: Acoustic propagation loss modelling (par 196, pg 67) – The NRW and JNCC did not raise this point during pre-application dialogue for Llŷr and the RaDIN report was not published at the time the marine mammal's assessment was carried out. It became publicly available in May 2024, which post-dates the project's underwater noise modelling by over six months and the Llŷr project marine mammals' assessment (interpreting the Underwater Noise model outputs) by four months.

4. Benthic Ecology

Fitness Question 3	**Have the appropriate data sources been used?**
NRW (A)	*All relevant and appropriate data sources have been utilised in the assessment to date and NRW (A) acknowledge the additional geophysical and ground truthing DDV surveys that have been undertake to better inform the assessment process. It should be noted however, although the data and evidence presented to date seems to suggest that identifying a cable corridor route avoiding impact on Annex 1 reef and other sensitive features is likely, it is not possible to undertake a comprehensive assessment until the full geophysical and ground truthing surveys have been completed (post-consent). Therefore, the applicant should be willing to carry this burden of risk and a possible scenario where impacts on the site integrity of the Pembrokeshire Marine SAC cannot be rule out. As such, this should be accurately communicated and captured in relevant conditions associated to the Marine Licence.*

JNCC	*In respect to JNCC's offshore remit (beyond the territorial limit) JNCC consider the data sources provided and used to be suitable for benthic receptors. Site specific surveys have been undertaken for the array area and the offshore extent of the Offshore Export Cable Corridor. Desktop studies considered are also appropriate.*
Llŷr Project Response	The potential for impact on the site integrity is addressed under Fitness Question 7 response below.

Fitness Question 4	**Have any agreements reached at pre-application been considered?**
NRW (A)	*NRW (A) Welcome to approach to use 'articulated cable' as opposed to rock/concrete matressing cable protection in areas where cable burial is not possible on areas of mixed and/or stony/bedrock reef, potentially minimising the risks associated to any habitat features.* *Pre-discussion between the applicant and NRW(A) highlighted the need to demonstrate with evidence the efficacy of the articulated cable in the context of the current application and localised environmental conditions. i.e. tidal flow, depth, deployment substratum etc. However, it is not evident that this information has been provided as part of the current application. We strongly advise that this information is included as part of the formal submission.*
JNCC	*No pre-application engagement, other than provision of advice on the original Scoping Report (advice dated 18 May 2022), was undertaken between JNCC and the applicant in relation to the offshore benthic and physical processes aspects of the Llŷr 1 Floating Offshore Wind Farm*
Llŷr Project Response	Further information on the efficacy of the articulated cable is provided in Appendix 1.

Fitness Question 6	**Is the cumulative assessment adequate?**
NRW (A)	*The approach to the cumulative assessment appears to be adequate but this will be full assessed in due course.*
JNCC	*The applicant alludes to "Annex 5A CEA Long List" which does not appear to have been provided. Without this information JNCC cannot confirm whether the project short list and associated impacts are appropriate, nor can we confirm whether impacts have been included for the correct stages of the development. We do note, however, that some impacts that JNCC would expect to be included (e.g. habitat alternation) have not been considered within the Chapter 19: Benthic Ecology in relation to EIA or CEA.*
Llŷr Project Response	The "Annex 5A CEA Long List" did not upload onto the NRW ShareFile system correctly. **Volume 6: Annex 5A Indicative Llŷr Long List** has been re-uploaded and is now available on the NRW ShareFile.

Fitness Question 7	Please add here any justification or additional information to support your assessment
NRW (A)	*NRW(A) would like to reiterate that the burden of risk for fully demonstrating the proposal will not adversely affect the integrity of the site and associated benthic habitat features lies with the applicant. And this will only be fully realised once the additional geophysical and ground-truthing surveys have been completed in-line with NRW(A) agreement. This element should be adequately captured and conditioned as part of the Marine Licence consent.*
Llŷr Project Response	As per the Llŷr Environment Statement **Volume 3 Chapter 19 Benthic Ecology: 19.8.1 Construction Effects paragraph 122** "*Reef habitat in the nearshore region (between the HDD exit point at Kilometre Point (KP) 48 and KP41.5 at the top of Turbot Bank) has been avoided by routing through sediment and non-Annex 1 reef habitats east of the reef in Freshwater West and installation along an identified sediment channel in the reef with some micro-routing around small areas of outcropping rock that sits within a mosaic of rock and sediment habitats. The cables will be surface laid, using iron articulated pipe protection, in a westerly direction avoiding encroachment onto potential Annex 1 reef between KP46 and KP41.8. No other cable protection measures are proposed within this area*." **Paragraph 288** states "*The 2024 Drop Down Video (DDV) Survey works and the additional 2024 Multi-beam Echosounder (MBES) surveys have confirmed the identification of the presence of significant channels and regions of sediment that are not categorised as reef. These data show there is high confidence that a potential route through the nearshore area, including a large east-west channel in the reef, that will not require the cable to laid on Annex I Reef will be available. The final pre-installation geophysical survey works will facilitate micrositing of the cables in sediment regions surrounding the main channels identified*." and **paragraph 321** "*The proposed Project has identified that it shall commit to no cable installation on Annex 1 reef and no cable protection, other than articulated iron pipe, in Annex I sandbanks, both of which are designating features of the Pembrokeshire Marine SAC.*" This demonstrates that the project shall be undertaken without adversely affect the integrity of the site and associated benthic habitat features.

5. Environment Team

Fitness Question 7	Please add here any justification or additional information to support your assessment
NRW (A)	*I have no comments regarding water quality at this stage, however during determination I would expect to be consulted on a bathing water quality mitigation plan.*
Llŷr Project Response	A specific bathing water quality mitigation plan has not been offered during the determination period nor as part of the series of post consent mitigation plans to be agreed. However a Water Quality and Pollution Prevention Management Plan (including an Emergency Incident Response Plan) to be agreed with NRW post consent and prior to construction activities are committed as part of the embedded mitigation measures identified in S**ection 10.8 Embedded Mitigation, Management Plans and Good Practice** of **Volume 2: Chapter 10 Terrestrial Water**

	Environment and in **Section 18.7 Embedded Mitigation, Management Plans and Good Practice** in **Volume 3: Chapter 18 Marine Water and Sediment Quality**. Further details are provided in the **Outline Construction Environmental Management Plan (CEMP), Volume 6, Appendix 4A, Section 4.3.4**.

6. Seascape, Landscape and Visual Impact Assessment (SLVIA)

Fitness Question 4	Have any agreements reached at pre-application been considered?
NRW (A)	*Tables 23-4 in the SLVIA and 7-4 in LVIA summarise the applicant's response to requests made by NRW at Scoping and through the DAS.* *Regarding the identification of assessment viewpoints, my record is that the draft viewpoints were not definitively agreed, only that we advised further viewpoints were necessary (with suggestions) and that further information was required for us to reach an agreement on the final viewpoint list. I understand the Applicant sought further DAS on this matter but believe this wasn't provided as it occurred during the time when NRW paused the provision of DAS to the Applicant, awaiting payment for previous advice(?).* *Having now received the final viewpoint list, crucially in combination with a copy of the baseline photographs, we are concerned about the choice of at least one LVIA VP (C), and the lack of representation within the SLVIA viewpoint photographs of certain, relevant aspects of the PCNP. For example, there is no photographic representation of Marloes Sands (Beach).* *Other locations / micro-siting, and contextual photos highlight existing built structures in the landscape but omit relevant seascape views in other directions e.g. Viewpoint 6: St Ann's Head.*
Llŷr Project Response	The applicant has engaged with the NRW(A) team on a number of occasions to discuss and comment on proposed viewpoints, particularly for the offshore SLVIA elements. The project has addressed all the comments NRW(A) have provided, including the range of additional viewpoints suggested. The applicant did attempt to get final confirmation of the Vantage Point (VP) locations from NRW(A), but they did not provide a response. The Pembrokeshire Coast National Park Authority (PCNPA) responded to the same request confirming they were content with the final list of viewpoints. This is the first occasion that the applicant has been made aware of the NRW(A) S/LVIA concerns. However, without further detail from NRW, the applicant does have the following observations in relation to the points raised: • Onshore LVIA (VP) C – NRW(A) have indicated they have a concern but without further detail, the applicant assumes that the concern relates to fencing in the foreground. The technical author agrees the presence of the fence in the foreground is not ideal, however the fence is a feature of baseline views from very small part of the coast path within the north of the study area with theoretical visibility of the Proposed Onshore Substation..

	• In relation to lack of representation of certain, relevant aspects of the Pembrokeshire Coast National Park (PCNP). The SLVIA includes a series of 15 representative viewpoint locations, 13 of which are located within the PCNP, with an additional viewpoint located within the sea adjacent to the PCNP. These viewpoints cover a range of visual receptor types and locations along the coast, on adjacent islands, within the sea and inland and are considered to provide a representative cross section of views and visual effects from the PCNP. The SLVIA also includes a detailed assessment of potential effects on each of the defined special qualities of the PCNP and on relevant landscape and seascape character areas within the PCNP. • Marloes Sands - This is the first time that NRW(A) have asked for a viewpoint from Marloes Sands beach. While this specific location is not included, the SLVIA does include a viewpoint at Hoopers Point (VP 05), located on the coast approximately 350m south of Marloes Sands beach. VP 05 is in an elevated location and therefore would gain greater visibility of the Proposed WTGs than would be experienced from the beach. Effects from the beach would be the same or less than those at VP05 (minor adverse). • The final comment in the feedback is slightly confusing. The baseline section of the assessment provides a description of views experienced from each location. A range of baseline panoramas and visualisations from the assessment viewpoints are provided with the LVIA and SLVIA. It is important that these are viewed alongside the baseline descriptions provided in the assessment and on site at the viewpoint locations in order to get a full understanding of the existing context. Again, this issue has only been raised now, although we do not think the issue is material to the adequacy of the application at it does not impair the ability to make a judgement on the assessment of effects.

Fitness Question 6	**Is the cumulative assessment adequate?**
NRW (A)	*In terms of the general process, the cumulative assessment includes the necessary schemes, and provides commentary on the 'additional' and 'total/combined' cumulative effects. We note the consented offshore scheme (Erebus) is only considered in the cumulative assessment and is excluded from the baseline environment in the SLVIA. Further review is required to understand adequacy of the cumulative assessment.*
Llŷr Project Response	The applicant considers that it is inappropriate from a technical point of view to include Erebus in the current baseline, as it has not been constructed nor installed - indeed the final turbine technology, layout or floating platform design decision has not been made publicly available. Whilst consented, at this point in time there is no guarantee that the project will proceed (there are a number of financial, technical and engineering variables that still need to be addressed) and this approach is consistent with good SLVIA practice guidance.

7. Appendix 1

Response NRW(A) request for further information on the efficacy of the articulated cable in the context of the current application and localised environmental conditions

1. Background

Articulated cast iron cable protection is particularly beneficial in several types of deployment substratum due to its unique properties. Provided below are some key environments where it has been used effectively:

- **Soft or Sandy Seabed:** On a sandy seabed the weight of the cast iron helps to keep the cables in place, preventing them from being displaced by currents or seabed movements. The heavy nature of cast iron ensures that the cables remain buried or securely positioned, reducing the risk of exposure and damage.
- **Areas with Strong Currents:** The robust and heavy nature of cast iron provides excellent stability in areas with strong currents, preventing the cables from being swept away or movement which could result in sediment scour. The articulated design allows the protection system to flex and adapt to the seabed topography while maintaining the position of the cables with the heavy ballasting effect of the cast iron casings.

  In tidal zones the extremely durable nature of the cast iron segments provides excellent protection against any potential mechanical damage caused by movements of debris.
- **Seabed with High Sediment Movement:** Cast iron protection systems can withstand significant sediment movement, ensuring that the cables remain protected even as the seabed shifts. The durability and weight of cast iron helps it resist movement of potential by shifting sediments, maintaining consistent protection whether it was initially buried or uncovered / surface laid.
- **Sensitive Reef Areas:** Preventing the movement of the cable by using the cast iron protection system helps avoid damage to sensitive reef ecosystems. The stability is provided by the weighted cast iron segments which reduces the risk of cables dragging across the seabed and harming delicate marine habitats.

The articulated design allows the protection system to conform to the uneven surfaces of rocky seabed channels, providing stability and reducing the risk of cable damage from abrasion. The weight and flexibility of cast iron shells help anchor the cables securely, preventing movement and wear caused by the rough terrain.

2. Key Benefits

i. Minimized Physical Disturbance

The articulated cast iron shells provide robust protection for subsea cables, ensuring they remain securely in place. The weight and stability offered by these systems significantly reduces the risk of cable movement, which can otherwise cause physical damage to delicate reef structures. By preventing cable displacements, it protects the reef's biodiversity and maintains its ecological integrity. The stability provided by cast iron reduces the risk of cables dragging across the seabed and harming delicate marine habitats. Protecting the reef's physical structure supports the overall health and resilience of the marine ecosystem.

ii. Enhanced Durability

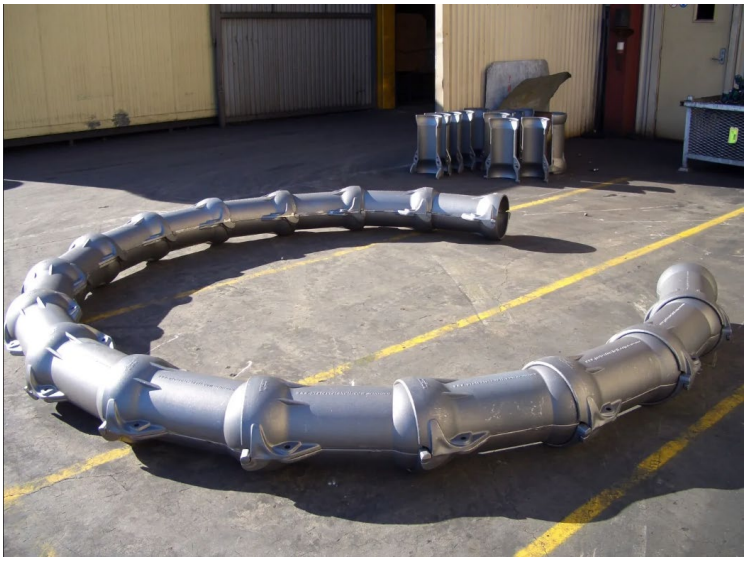
Cast iron as a material is known for its durability and resistance to mechanical damage. These properties ensure long-term protection for cables, even in harsh marine conditions. The durable protection systems reduce the need for frequent maintenance and repairs, thereby minimizing human intervention in sensitive reef areas.

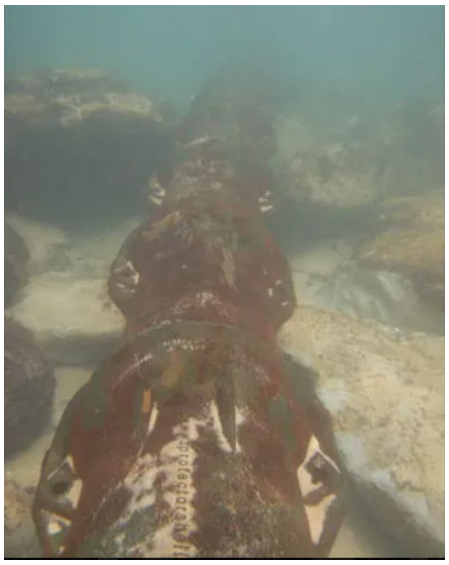
iii. Corrosion Resistance

With appropriate protective coatings, cast iron can withstand the corrosive effects of saltwater environments. This resistance ensures the longevity of the protection system, maintaining its effectiveness over time. Long-lasting protection reduces the environmental footprint of maintenance activities and ensures continuous safeguarding of the reef.

iv. Adaptability to Seabed Contours

The articulated design of these systems allows them to conform to the natural contours of the seabed. This adaptability ensures that cables are securely anchored, even in uneven or rocky seabed conditions. Secure anchoring prevents cables from moving and causing damage to the reef, thus preserving the natural habitat.

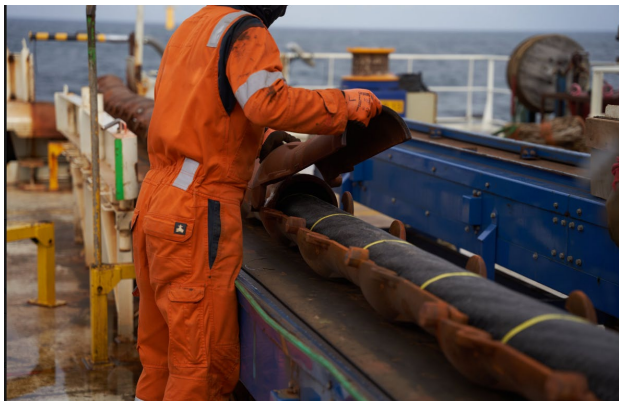




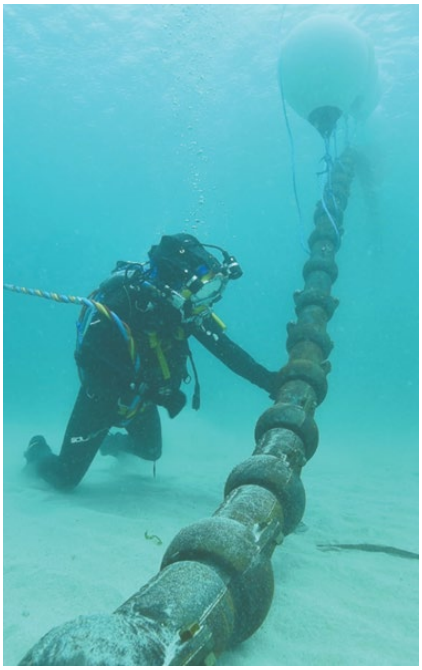
Source: Articulated Pipe | Cable Protection System (protectorshell.com)

v. Ease of Installation

The articulated cast iron systems are designed for straightforward installation, often without the need for complex tools or procedures. Articulated systems are suited to conventional installation processes from the back of a cable laying vessel or where precise placement is required the use of Remotely Operated Vehicles (ROVs) and/or divers can be used to deploy this type of cable protection system. This efficient installation minimises disruption to the marine environment and ensures rapid deployment of protective measures.



Source: Articulated Pipe | Cable Protection System (protectorshell.com)



Source: Windsystemsmag.com/the-latest-advancements-in-submarine-cables-protection/

3. Disadvantages

There are some disadvantages to using cast iron protection in nearshore environments:

- Cast iron is quite heavy, which can make handling and installation more challenging. Proper planning of the installation is required using specific cable installation vessels, anchor point at turns in the cable run and the use of ROVs in areas where precise positioning is required, for example where it is to be installed in the trench area through the reef.
- The weight of the protection system can also cause the protected cable to sink into softer sediment over time if not buried.
- Although cast iron is generally resistant to corrosion, it can still rust over time, especially if exposed to harsh marine conditions without adequate protective coatings.
- Cast iron is relatively brittle compared to other materials. This means it can crack or break under sudden impacts or heavy loads, which might be a concern in dynamic marine environments. Burial or positioning in the reef channels will support in the mitigation of such events.
- While cast iron is durable, any damage or degradation over time could potentially release iron particles into the marine environment, which might affect local ecosystems. As discussed above this can be mitigated by burial or positioning in the reef channels to protect against damage or by the use of appropriate protective coatings to mitigate against degradation.
- The initial cost of cast iron protection systems can be higher compared to other materials. Additionally, the weight and handling requirements can increase installation and maintenance costs however this is balance by the benefits that the system brings to sensitive seabed areas.

4. Conclusion

The use of articulated cast iron cable protection systems in reef environments offers significant benefits, including minimized physical disturbance, enhanced durability, corrosion resistance, adaptability to seabed contours, environmental protection, and ease of installation. These advantages make them an effective solution for safeguarding subsea cables while preserving the integrity of sensitive reef ecosystems. Some examples of projects using articulated iron protection are provided below.

Example 1- Skye - Harris Subsea Cable Replacement by Scottish Hydro Electric Power Distribution plc

- Link to Project Description: Skye - Harris Subsea Cable Replacement
- Link to the note of completion: Skye Harris subsea cable

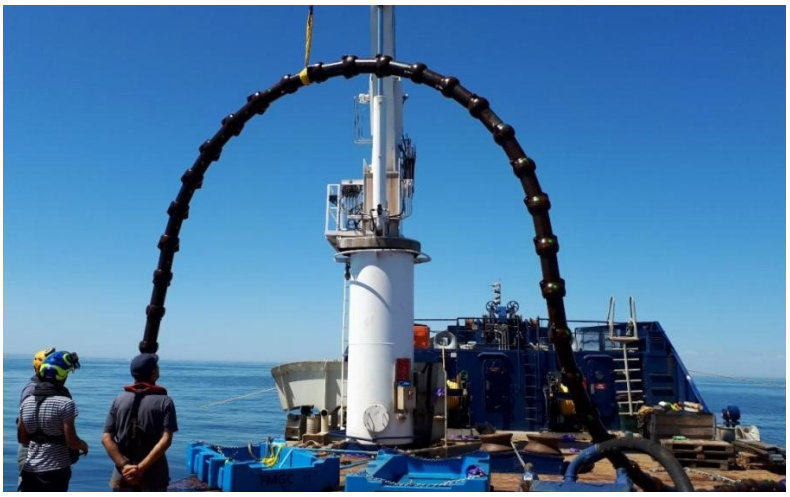
This project description sets out the installation methodology proposed to undertake the cable replacement works. The report (section 5.5.5) details the use of articulated cast iron pipe cable protection of up to approximately 500m at a weight of 59 kg/m. The report (Table 4-1) details use of the articulated pipe detailing its location, length and installation method i.e. where it was buried or surface laid.

The cable will be laid in articulated pipe at the both the landing areas. At Skye, articulated pipe is approximately 255 m long, with around 217 m at Harris both buried and surface laid.

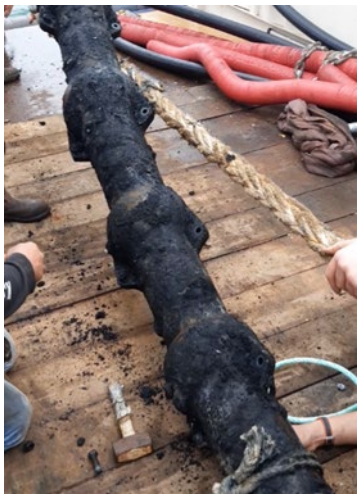
Example 2 - Centrale Nantes SEM-REV offshore test site

FMGC installed the cast iron shells (IBOCS) – developed to ballast subsea electrical cables – at a depth of 30 meters on the Centrale Nantes SEM-REV offshore test site in 2018. The ballast submarine electrical cables were successfully removed from the SEM-REV test site in 2022. They were immersed on site for 3½ years, with regular monitoring throughout the experiment within the European FORESEA and OCEAN DEMO programmes. The trials demonstrated strong cable stability and protection, even under difficult storm conditions. The shells also showed good resistance to corrosion and bio-colonisation.

- Ocean-power-cable-protection-put-to-test-in-France
- FMGC Trials Ballast System for Subsea Cables at SEM-REV Site - Installation 2018
- FMGC Trials Ballast System for Subsea Cables at SEM-REV Site - Retrieval 2022



Installation



Removal

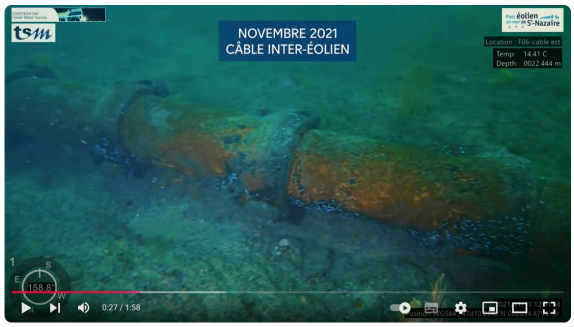
Example 3 - Saint-Nazaire, France by EDF Renewables and EIH S.à.r.l,

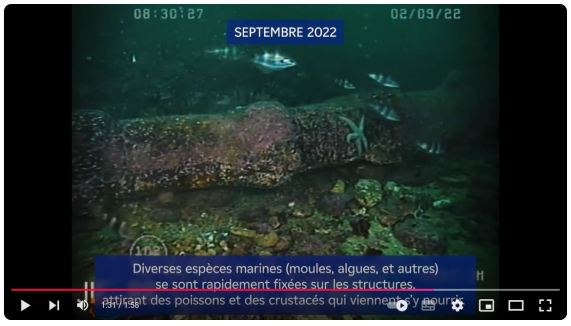
The Sant Nazaire offshore wind farm in Brittany used around 110 km of protectorshell.

The video titled "*Focus sur la bio-colonisation des fondations et câbles*" highlights the use of articulated cable protection in the Saint-Nazaire Offshore Wind Farm.

The articulated cable protection is designed to safeguard subsea cables from physical damage and ensure their stability on the seabed. These protectors are typically made from durable materials like cast iron or concrete, which can withstand harsh marine conditions. The articulated design allows for flexibility and movement, which helps in adapting to the seabed's contours and reducing stress on the cables. The video emphasizes the natural process of bio-colonization, where marine organisms attach to the cable protectors. This process can enhance the stability of the cables by adding weight and reducing movement. The bio-colonization process is monitored to ensure it does not negatively impact the local marine ecosystem. In fact, it can create new habitats for marine life, contributing positively to biodiversity.

- Link to Film – Saint-Nazaire offshore wind farm - Focus on the bio-colonization of foundations and cables





Video Extracts

Example 4 - Environmental Impact Report examples

CHARACTERISATION OF THE POTENTIAL IMPACTS OF SUBSEA POWER CABLES ASSOCIATED WITH OFFSHORE RENEWABLE ENERGY PROJECTS - SPECIES project (2017-2020): Review and perspectives.

Available online from: https://tethys.pnnl.gov/sites/default/files/publications/Taormina-et-al-2021-Impacts-of-Subsea-Power-Cables.pdf. ***NOTE**: use the search facility for "cast iron".*

The aim of the report was to provide a synthesis of the results of the SPECIES project and the perspectives arising from it. Some specific studies and observations relating to articulated cast iron cable protection are noted below:

- The reef effect of power cables – **Section 5.1**

  With regard to the reef effect associated with subsea power cables, a distinction must be made between the cable itself, whether unprotected or with a protection shell. The cables and associated structures constitute hard substrates, they are subject to colonisation.

- Paimpol-Bréhat tidal energy test site power cable – **Section 2.1**

  Due to the strong currents in the area and a seabed dominated by hard substrates, a section measuring 11 km was not buried but simply laid on the bottom. This section of the cable was protected by cast iron shells and stabilised by 120 concrete mattresses installed in 2013

- Fromveur tidal energy test site cable – **Section 2.1**

  Looks at a 200 m section covered by cast iron shells. Initial energising of the cable took place between mid-October and the end of December 2018 on a continuous basis, and then on an as-needed basis until April 2019.

- To study the succession of epibenthic communities colonising artificial structures associated with a subsea power cable in a highly hydrodynamic environment. – **Fact Sheet 6**.

  Reviews two types of artificial structures (cast iron protection shells and stabilising concrete mattresses) associated with the export cable of the Paimpol-Bréhat tidal energy test site were monitored over a period of five years at a frequency of every six months. Monitoring showed epibenthic communities colonise the artificial substrates but had not reached a climax at the end of the monitoring period. The authors report that these artificial structures provided a habitat for structurally complex communities that could potentially generate a local increase in diversity.