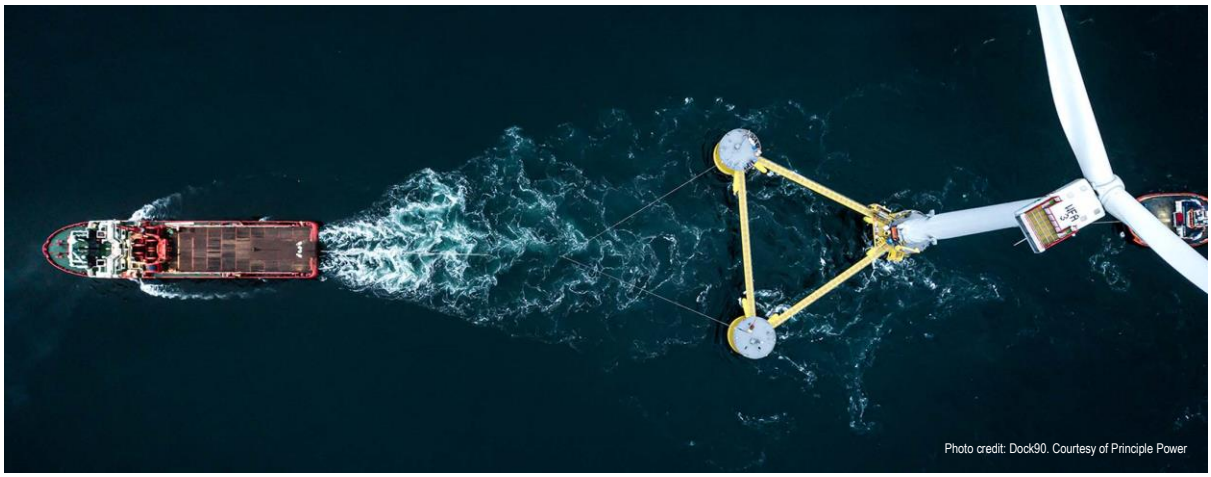

Project Erebus: Further Clarifications

Document Notes

Confidentiality Notice and Disclaimer

Document History

Rev	Date	Authored	Reviewed	Approved	Modifications
01	2022-11-08	Lara Lawrie	Dafydd Lloyd Jones	Jonny Lewis	[Add list of modifications]

Contents

Chapter 1 Introduction

1.1 Request for Further Information

1.1.1.1 This report has been produced in response to Natural Resources Wales (NRW) Marine Licensing's email dated 17 November 2022, requesting clarifications and amendments under the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) for Marine Licence application ORML2170 Project Erebus. The Project is a demonstration scale Floating Offshore Wind (FLOW) development in the Celtic Sea region, proposed by the developer, Blue Gem Wind (BGW), a joint venture between Simply Blue Energy (SBE) and TotalEnergies.

1.1.1.2 The application for consent under Section 36 of the Electricity Act 1989 (and deemed planning consent under the Town and Country Planning Act 1990) and application for a Marine Licence under Part 4 of the Marine and Coastal Access Act 2009, were submitted in December 2021. Public notices were issued for both applications, and a period of statutory public consultation followed, which was extended to 22 April 2022.

1.1.1.3 NRW Marine Licensing issued a letter, dated 29 June 2022, requesting further information following the first round of public consultation. This request was met by the production of a Supplementary Environmental Information (SEI) Addendum (and accompanying ORML2170 Technical and General Consultation Responses spreadsheet SEI Response) which was submitted to NRW Marine Licensing on 24 August 2022.

1.1.1.4 A second round of public consultation on the SEI Addendum, and accompanying spreadsheet, commenced on 07 September 2022, for a period of 42 days. A high-level summary of responses received is presented below:

- The Crown Estate – no objection;
- Royal Commission on the Ancient and Historic Monuments in Wales (RCAHMW) – no objection;
- Cadw – no objection;
- Maritime and Coastguard Agency (MCA) – no objection;
- BEIS – no objection;
- National Federation of Fisherman's Organisations (NFFO) – disagreement on the significance of effect resulting from exclusion of fishing;
- Royal Society for the Protection of Birds (RSPB) – disagree with rates/approaches (agreed with NRW Advisory/Joint Nature Conservation Committee (JNCC)) for additional ornithological modelling/assessment; request Manx and Balearic shearwaters are scoped in; and concerns regarding wet storage. RSPB also queried the outcomes of the Socio-Economic Chapter in respect of jobs and Gross Value Added (GVA) effects in Wales;
- Wildlife Trust of South and West Wales (WTSWW) – note concerns regarding cable protection and impact on Annex I sandbanks as a feature of the Pembrokeshire Marine Special Area of Conservation (SAC); and seek clarity on certain points in the draft Outline Environmental Monitoring Plan (OEMP); and
- Royal Yachting Association (RYA) – no objection.

1.1.1.5 Responses were also received from JNCC and NRW Advisory. In summary, NRW Advisory agree with the approach and, therefore, conclusions presented for ornithology and marine mammals, and do not require any further action. JNCC also agree with the approach for marine mammals and ornithology and no key issues remain, however, they have requested additional scenarios be taken forward to Population Viability Analysis (PVA) for additional assurance.

1.1.1.6 NRW Advisory have stated they have outstanding concerns regarding coastal processes, benthic ecology and Seascape and Landscape Visual Impact Assessment (SLVIA). These points are considered in the following sections:

- Chapter 2: Marine and Coastal Processes (including benthic ecology);
- Chapter 3: Marine Water Quality;
- Chapter 4: Ornithology;
- Chapter 5: SLVIA; and
- Chapter 6: Post-Consent Requirements.

1.1.1.7 Where comments are outstanding in the accompanying ORML2170 Technical and General Consultation Responses spreadsheet, responses have been provided directly into the spreadsheet.

1.1.1.8 To accompany the Further Clarifications report, the following documents have been submitted:

- ORML2170 Technical and General Consultation Responses spreadsheet Further Clarifications v2.0; and
- Project Erebus Additional Bathymetric Analysis.

1.2 Technical Group Meeting

1.2.1.1 Following review of the NRW Advisory response, Technical Group Meetings were requested with NRW Coastal Processes and Benthic Technical Advisors (TA) and the Seascape and Landscape TA. These meetings were held on 19 October 2022 and 28 October 2022, respectively; and provided an opportunity to clarify outstanding concerns and identify actions to address concerns. Additional clarifications resulting from these meetings are presented in this report.

1.3 Next Steps

1.3.1.1 The Project is seeking a Marine Licence and S.36 Consent (with deemed planning permission), ahead of February 2023, to meet the deadline for an application in the Contracts for Difference (CfD) Auction Round 5 (AR5). This is a key project deadline, and during comprehensive engagement with regulators and stakeholders since 2019, the Applicant has stressed the relevance and importance of this milestone.

1.3.1.2 Since submission, where possible the Applicant has expedited the consent process and made all efforts to maintain the programme and respond to the extensive consultation in a timely manner. In this instance the Applicant has responded to NRW Marine Licensing's request for clarifications within 24 hours.

1.3.1.3 In submitting this clarification response, the Applicant has addressed outstanding concerns raised via the SEI consultation responses but would submit that some responses lacked an objective basis, request contextual rather than required information, and are disproportionate to the scale and level of impact of the project. However, the Applicant has sought to provide further confidence through the clarifications presented here and anticipates, that as the regulator, NRW Marine Licensing will now be in a position to determine the EIA and subsequent Marine Licence on a reasoned objective basis, informed by the best scientific assessment available as presented by the Applicant in Project Erebus ES, SEI and further clarifications.

1.3.1.4 Following submission of this Further Clarifications Report, it is understood that NRW Marine Licensing will liaise with the relevant TA. The Applicant understands that no further public consultation is anticipated to be required.

1.3.1.5 The Applicant would request that should any outstanding issues require clarification, these be raised at the earliest possible convenience to enable an expedited determination process in order to meet the February 2023 deadline.

Chapter 2 Marine and Coastal Processes

2.1 Purpose

2.1.1.1 As part of the EIA process, the Applicant and NRW Advisory have been in discussions to address NRW Advisory's concerns with respect to the potential changes in marine and coastal processes (waves, hydrodynamics and sediment transport) arising from the proposed development. All concerns have been addressed, apart from "*Placement of Concrete Mattresses – Cable Protection – NRW have low confidence in the assessment of Morphological Form and Function of Annex 1 Sand Bank Feature* [Turbot Bank] *of Pembrokeshire Marine SAC*". As a result, "*NRW are not able to agree a conclusion of no adverse effect on integrity to Pembrokeshire Marine SAC due to uncertainty regarding impacts to Annex I Sandbank feature" (*NRW Marine Advice Memo dated 10 October 2022).

2.1.1.2 NRW Advisory's statement is based upon a concern that there is insufficient evidence (principally recent multibeam bathymetric survey data) to support the understanding of the marine and coastal processes governing Turbot Bank. Due to this perceived lack of evidence, NRW Advisory has stated that it is unable to conclude no adverse effect on the Annex I sandbank feature known as Turbot Bank.

2.1.1.3 As evidenced in this Report, the Applicant has provided a robust assessment using a combination of analytical techniques. The assessments have used all the evidence available, and it was agreed by NRW Advisory that no other assessment approaches could be provided.

2.1.1.4 This Report sets out NRW Advisory's two outstanding comments with respect to Turbot Bank, along with the Applicant's rebuttal on the points raised by NRW Advisory. All evidence and assessments referred to in the Applicants rebuttal have previously been submitted within this application process. In addition to the response provided in this report supplementary bathymetric analysis has been undertaken and is summarised in the accompanying report Project Erebus Additional Bathymetric Analysis to Inform Process Understanding of Turbot Bank (Blue Gem Wind, 2022).

2.1.1.5 This Report sets out the Applicants case that NRW Advisory's outstanding objections lack an objective basis and seek a degree of absolute certainty, which the Courts have made clear is not required, and which therefore represents an unreasonable and disproportionate position (see Section 2.9.1.1).

2.2 Project Design Considerations

2.2.1.1 The Applicant would like to take the opportunity to reiterate that the Project undertook an extensive programme of route optioneering work to support site selection for the export cable corridor. Minimisation of environmental impacts was central to this process, and the chosen route presented in the Project Erebus ES (Chapter 4: Site Selection and Alternatives, Section 3.10.2) reflects the outcome of this work. Whilst complete avoidance of Turbot Bank was not possible, the chosen route sought to avoid the main body of the sand bank and only interacts with its extreme western margin (Figure 2-1).

2.2.1.2 Notwithstanding the above, localised sections of external cable protection are predicted to be required, and especially in the vicinity of Turbot Bank. The proposed locations of the predicted areas of external berm cable protection are shown in Figure 2-1 and an overview of ongoing engineering studies is provided below in Section 2.3.

2.2.1.3 Importantly, Figure 2-1 shows that the external cable protection will not be continuous along the route. Moreover, even in those areas where the potential for cable protection is highlighted, coverage will not be 100% with the final extent being informed by further geotechnical surveys. The latest iteration of the ongoing cable protection engineering design work also suggests that there is potential for reducing the actual height of the cable protection rock berm from 'up to 2.0 m', to 'up to 1.5 m' for those sections of cable protection to the north and south of Turbot Bank. Further information is presented in Section 2.7.

2.2.1.4 The Applicant would also like to emphasise that the external cable protection engineering solutions being considered for the Project are industry standard designs that have a long history of common use in the offshore wind industry. They have been used on a large number of wind farms around the UK (especially in the southern North Sea and Irish Sea), both on and near to active sand banks, associated with migrating sandwave fields. From this large number of precedent examples, the Applicant is not aware of any evidence in the public domain that the deployment of such cable protection measures has measurably adversely impacted sand bank features through interruption of sediment supply. The Applicant notes that NRW Advisory has not provided data from any example showing such an impact occurring in practice.

2.2.1.5 It is noted that previous discussions between the Applicant and the NRW TA have led to questions being posed about how appropriate it is to compare physical process observations/findings such as the above, from sites in the southern North Sea, with similar processes/observations at sites in the Celtic Sea. Whilst this question has some merit with respect to the main array site (which is in deeper waters and with a greater wave regime than many southern North Sea sites), with regard to this specific issue, i.e. sediment transport around external cable protection features in the vicinity of mobile sandbank features, the situation assessed (environmental setting and berm design), and conclusions presented, within the Erebus ES, the SEI and this Report, is very similar to other sites in the southern North Sea and forms the best available evidence of the in-situ impacts of such measures. Therefore, the Applicant submits that the observations from multiple other projects in the southern North Sea, as detailed above, are directly relevant and should be fully considered.

2.3 Cable Burial and Post-Lay Remediation

2.3.1.1 Chapter 4 of the Project Erebus ES presents findings of the preliminary export cable burial assessment. Within this, following a review of the Project geophysical data, it was assessed that cable burial would be achieved for 84% of the route with a maximum target Depth of Burial (DoB) of 3 m. For the remaining 16% a worst case of surface-lay and rock protection was assumed.

2.3.1.2 However subsequent cable route engineering work has included a more detailed Cable Burial Risk Assessment (CBRA)[1], conducted using the Carbon Trust Guidance[2]. The CBRA has further assessed the required DoB, based on a probabilistic assessment of threats, and the recommendations are significantly shallower than the target burial depth presented as the worst case assessment in the ES.

[1] OWC, 2022, Project Erebus Export and Array Cable Burial Risk Assessment
[2]Carbon Trust, 2015, Cable Burial Risk Assessment Methodology, https://ctprodstorageaccountp.blob.core.windows.net/prod-drupal-files/documents/resource/public/cable-burial-risk-assessment-guidance.pdf

2.3.1.3 A probabilistic assessment of threats is performed in respect to DNV Risk Categories, where DNV Risk Category 1 is a probability of less than 1 in 100,000 years, and DNV Risk Category 2 is a probability of less than 1 in 10,000 years.

2.3.1.4 Within the Project Erebus CBRA, the threat assessment identified the primary hazards faced by the export cable as being benthic fishing gear, emergency anchor strike and future linear infrastructure.

2.3.1.5 Maximum penetration of fishing gear (i.e. Beam trawling, Otter trawling), based on knowledge of fishing methods active in this area, is expected to be 0.3 m below sea floor. To mitigate the risk of fishing gear to DNV Risk Category 2, would require a Depth of Lowering (DoL) of 0.6 m; and to DNV Risk Category 1 would require a DoL of approximately 1.0 m.

2.3.1.6 The main threat, however, that governs the recommended DoL is that of anchor strike from emergency anchoring incidents. Anchor penetration is related to the anchor fluke length, which itself is governed by anchor size and vessel Dead Weight Tonnage (DWT). The Carbon Trust CBRA guidance provides that an anchor may be expected to penetrate 1 × fluke length in sand and stiff clay, and 3 × fluke length in soft clay.

2.3.1.7 An assessment of the Project AIS data includes categorisation of vessels by type, as well as DWT, to allow analysis of probabilities of given anchor penetration (and drag). A probabilistic assessment of an anchor strike incident considers: number of vessels, the time that these vessels are in the area and the probability of an incident occurring; as well as some probability modifiers.

2.3.1.8 The CBRA considered an anchor strike assessment and it demonstrated that Burial (DoL) of >1.6 m would achieve DNV Risk Category 1 in the majority of the export cable route. Considering a factor of safety, recommended burial depths of between 1.25 m and 1.75 m are recommended in the vicinity of Turbot Bank. These recommendations are significantly shallower than the target burial depth within the original worst case assessment in the ES, of 3.0 m (Section 2.3.1.1).

2.3.1.9 For cable installation, it is standard practice for the installation contractor to have a target DoL. In cases where this is not met, post-lay remediation works (including the use of rock berms) are generally required. The implication of the reduction of the ES worst case burial depth recommendation from 3.0 m, to the 1.25 m to 1.75 m recommendation in the CBRA in the vicinity of Turbot Bank, is that the risk of requiring post-lay remediation works due to failure to meet the DoL is significantly reduced.

2.3.1.10 The evidence, assessments and conclusions demonstrating that there will be no adverse effects on integrity due to changes in sediment transportation are reiterated below, but in addition the Applicant has progressed additional engineering studies to further refine rock berm designs in the vicinity of Turbot Bank, based on the findings of the CBRA. The refinements are presented in Section 2.7. It is considered that the findings of the CBRA also demonstrate that the worst case scenario presented in the ES is very conservative, and the subsequent requirement for a berm height of 2 m is unlikely.

2.4 Principal Considerations

2.4.1.1 The Applicant considers that within the ES and SEI, it has demonstrated to an appropriate level of certainty and using the best available evidence that there will be no adverse effects on integrity due to changes in sediment transportation. The Applicant also submits that when considering the specifics of NRW Advisory's concerns, regard must be had to the following points:

- The Applicant's assessment has concluded that, based on morphological analysis of mapped bedforms, sediment transport modelling and other assessments, *there are no direct sediment transport pathways between the areas of seabed where cable protection rock berms might be present[3] and the main body of Turbot Bank*.
- NRW Advisory's concern is that there *may* be a sediment transport pathway between the cable protection rock berm and Turbot Bank and that this sediment pathway *may* become somehow restricted by a significant blockage effect from the berm. The implication is that Turbot Bank (and the sandwave features on it) *might* become less mobile or otherwise evolve with a different (reduced) form or function in the future.
- The Applicant's assessment has concluded that such an impact is highly unlikely, by considering the physical mechanisms (sediment dynamics) that might lead to any potential effects from the berm, from local to regional scales.
- Firstly, the maximum design scenario dimensions and shape of the berm (a maximum of 2 m high in the central crest, with gradually sloped sides) are not sufficiently large to measurably affect the rate or direction of sediment transport past the berm. It is accepted that an initial period of very limited sediment accumulation may occur in any voids between the rocks. The maximum realistic volume that might be accumulated in this way is clearly very small in comparison to the volume of sediment in the bank, in individual sandwaves, and that which is being transported over the seabed on a regular basis. Assuming that sediment accumulates in rock voids up to a volume of 20% of the total cross-sectional space within the berm, the total volume of sediment accumulated by the four sections of berm between KP 4.4 and 20 would be (up to) approximately 21,500 m^3. No additional accumulation outside or adjacent to the berm is expected, as the slopes of the berm (approximately 23 degrees gradient) are less that the angle of repose for sand (approximately 32 degrees), and so sediment will continue to move up slope, and over the berm, with no interruption to transport (once the interstices are filled). Based on volumetric analysis of the 2012 CCW survey of Turbot Bank, the volume of the main central section of the bank, (above a base depth of 32 mLAT), is approximately 65 million m^3. Therefore, the potential total volume of trapped sediment would represent a maximum of approximately 0.03% of the bank volume. This is a highly conservative (large) estimate of the proportion, as this estimated volume of the bank (based on the extent of the CCW, 2012 survey data) does not include additional sediment present elsewhere within the Article 17 boundary of the feature not covered by the survey. When sufficient sediment has accumulated to present a naturally stable sediment slope and surface, sediment transport will continue over the berm at the natural ambient rate and direction. It should be noted that these estimated accumulated sediment volumes do not reflect that the actual height of the cable protection rock berm will be reduced from 'up to 2.0 m' to 'up to 1.5 m'.
- The process described above fundamentally limits the potential for any measurable impact of the rock berm on naturally occurring patterns and rates of sediment transport and, therefore, fundamentally limits the potential for any measurable impact on Turbot Bank. This conclusion is irrespective of other discussions around the evidence base for sediment transport

[3] Between KP 4.6 and KP6.6 (north of the bank) and between KP10 to KP13 and KP 17 to KP20 (south of the bank).

pathways and linkages. **The Applicant submits that there is high confidence in the conclusion that the proposed rock berms have (in absolute terms) a very limited ability to trap sediment.**

- An illustration of the assessed (numerically modelled and interpreted) sediment transport regime is provided as Figure 2-2. This shows that downstream sediment transport pathways from the proposed areas of cable protection do not intersect directly with Turbot Bank. As such, even if a measurable effect were to occur (which is considered unlikely), then there is no identified pathway for the effect to extend from the berm to Turbot Bank. As the pathways have been mapped using a number of complimentary evidence sources (including detailed numerical sediment transport modelling validated using high-resolution bathymetry data of the bank), **the Applicant submits that there is high confidence in the conclusion that downstream sediment transport pathways do not intersect directly with Turbot Bank**
- The Applicant's assessment has also concluded that the maximum design scenario dimensions of the berms would not be sufficiently large, in comparison to the local water depth (<5%), to affect the patterns of currents or waves that pass over the berm (other than nearbed currents very locally, within a few 10's of metres at most), and so will not affect natural patterns of sediment transport elsewhere. (This is discussed further in paragraph 6.6.3.1 *et seq*. of the ES.) This conclusion also fundamentally limits the potential for any impact to Turbot Bank. **The Applicant accordingly submits that there is high certainty in the assessment that the rock berms are too small to affect natural sediment transport patterns elsewhere.**
- Based on the shape of the bedforms (assessed using the high-resolution Countryside Commission for Wales (CCW) Multibeam survey of Turbot Bank (2012)), and in conjunction with the evidence from the high-resolution sediment transport modelling, there is high certainty that the bedforms on Turbot Bank are mobile, which is indicative of active sediment transport and bedform migration within the wider system. This has since been further corroborated, by further analysis and comparison of the CCW (2012) data, and an overlapping area of high-resolution bathymetric data from the Greenlink interconnector cable corridor survey (collected in 2018/19) along the northern flank of Turbot Bank (Greenlink, 2019[4]). Whilst the specific rate of sandwave migration is relevant to the wider understanding of sediment transport on and around Turbot Bank, it is not relevant to the conclusions of the impact assessment, which has concluded that there is no direct sediment pathway to Turbot Bank and the rock berms will not affect natural sediment transport patterns elsewhere. **The Applicant submits that NRW MLT as the decision maker can therefore be satisfied that there is sufficient certainty in the understanding of sandwave migration for the purposes of considering the sediment transport processes on Turbot Bank, and that the best available evidence has been provided which demonstrates, to an appropriate level of certainty, that there will be no significant adverse effects due to changes in sediment transportation.**

[4] Greenlink, 2019, Greenlink Environmental Statement – Wales, Appendix I: Cable Route Survey Report P1975_R4484_RevF1.

- Even if evidence could be provided showing that there is both a direct linkage, and that features are not mobile, it would not follow that Turbot Bank would necessarily be impacted by the cable protection works. This is because any potential change in the sediment transport regime, as a result of the rock berm, would be negligible in the context of the active regional sediment transport regime.

2.4.1.2 The following sections provide the Applicant's response to NRW Advisory's outstanding comments regarding this matter, emphasising the evidence previously submitted, and principles of sediment dynamics, which fundamentally limit the potential for any impact.

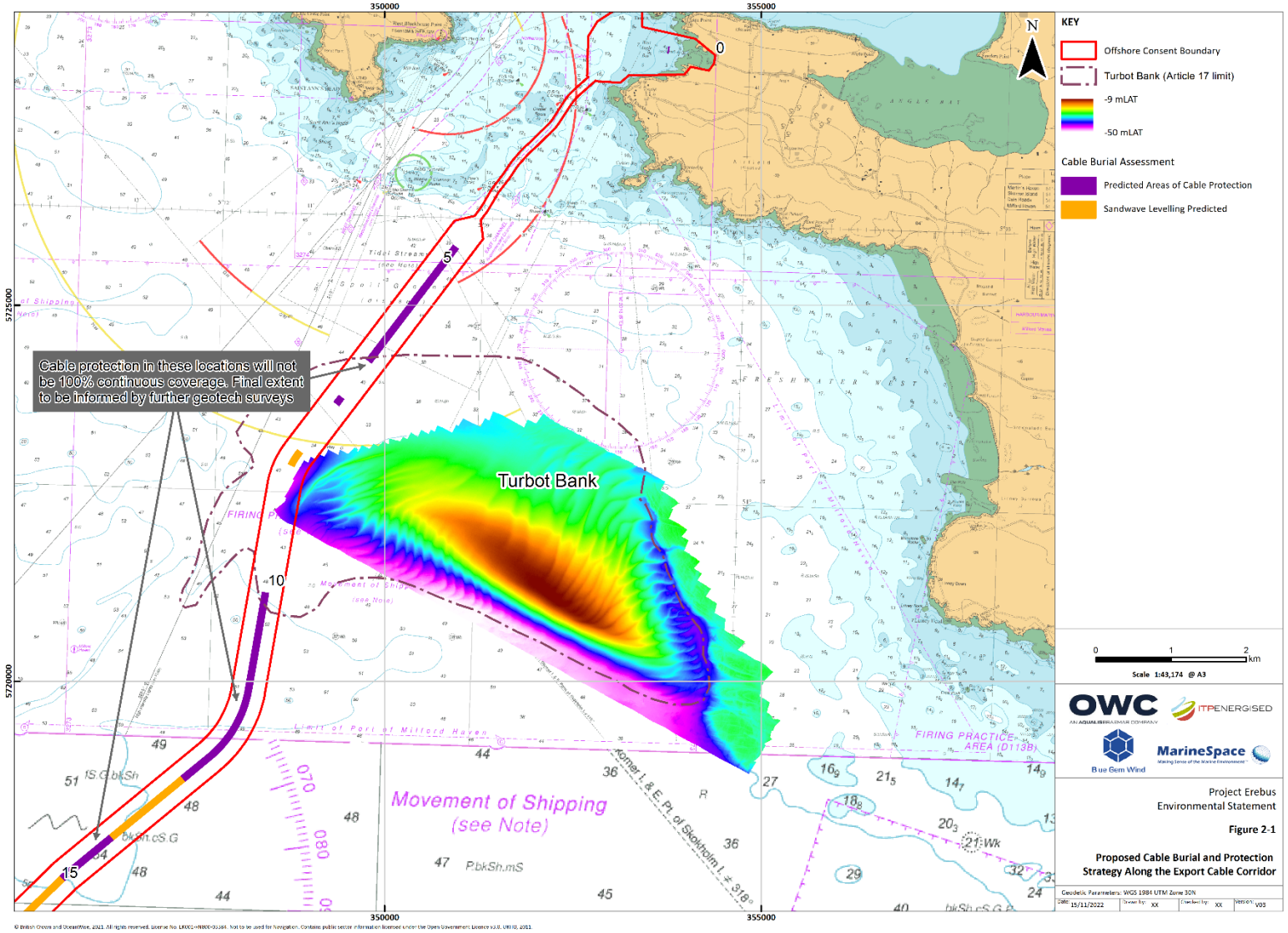

Figure 2-1: Proposed location of predicted areas of cable protection (purple) in the vicinity of Turbot Bank

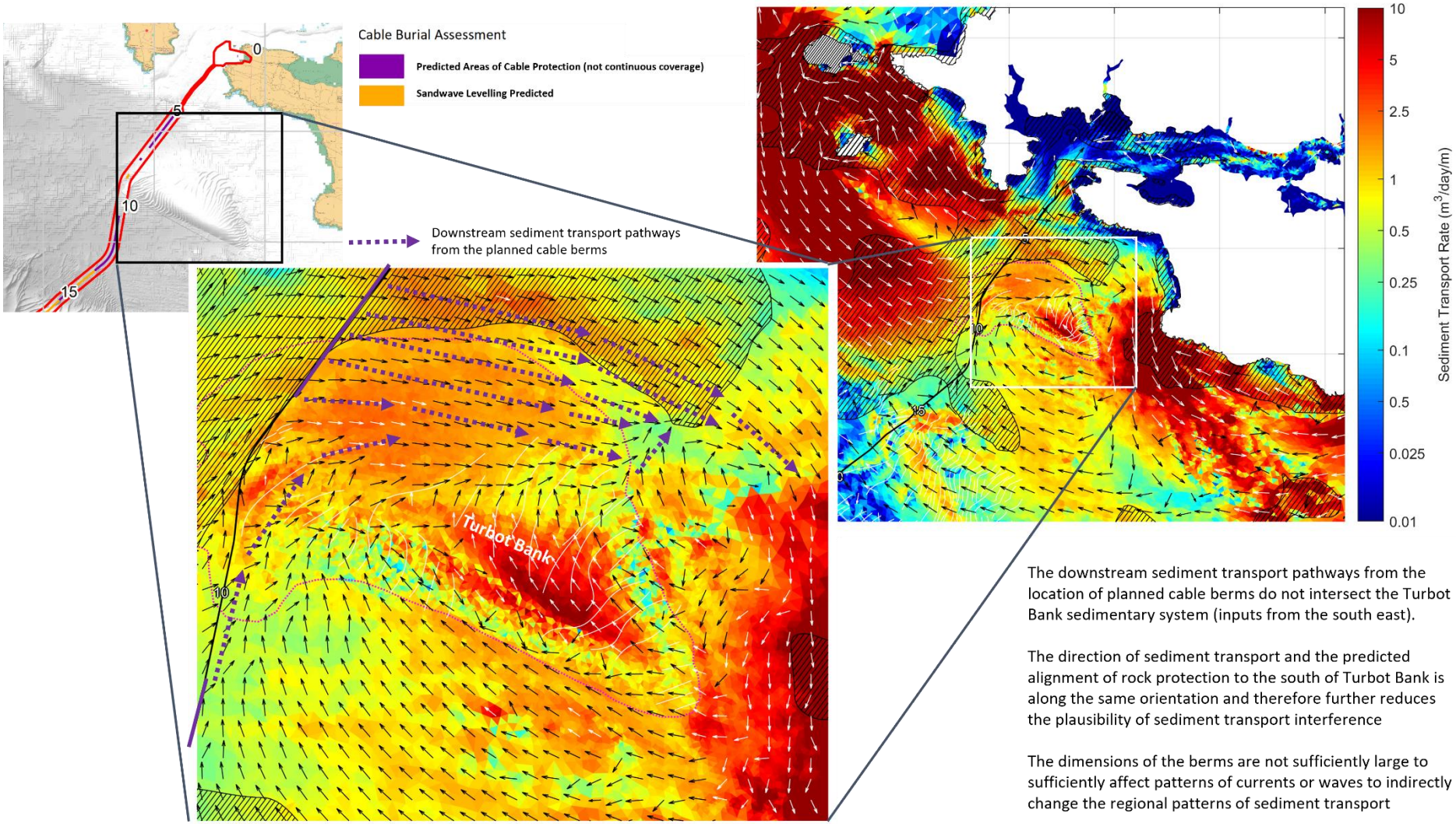

Figure 2-2: Predicted patterns of long-term sediment transport pathways in nearshore areas and detail around Turbot Bank

2.5 NRW Advisory Comments and Applicant Rebuttal

2.5.1.1 NRW Advisory's comments are set out in the comments log '*ORML1270 Project Erebus Technical and General Consultation Responses_SEI Response_NRW, Response'* dated 10 October 2022, and summarised in the Marine Advice Memo of the same date. The comments relating to Turbot Bank are set out below.

2.5.1.2 With regard to 'range', NRW Advisory comments "… *it is clear the loss of 0.004% of Annex I Sandbank feature would not contribute to an increase in feature distribution or extent*." The Applicant notes this advice which concurs with its assessment.

2.5.1.3 The comments, and the submission below also address Comment 1 Loss of Annex 1 Sandbank with respect to 'structure and function' of the feature.

2.5.2 ORML2170 NRW Advisory Response 44 (part a)

2.5.2.1 NRW Advisory Comment "*We acknowledge that the ES assessment provided a reasonable theoretical conclusion on the basis of the evidence available without further survey. We note that in pre-application discussions on the Geophysical Survey specification we did advise the applicant that any large features such as Large and Very Large Subaqueous Dunes should be captured in their entirety to allow an understanding of volume changes and direction of travel. This was not undertaken, if it had been then it would have reduced the uncertainties we have in relation to the baseline understanding of sand wave migration rates on Turbot Bank and the detail of sediment transport pathways and linkages in the wider area that make up the form and function of the Annex 1 sand bank features of Turbot Bank*."

2.5.2.2 Applicant response:

2.5.2.3 In reviewing the Project geophysical Scope of Works (13/03/2020), NRW Advisory requested that "*any large features such as Large and Very Large Subaqueous Dunes be captured in their entirety to allow an understanding of volume changes and direction of travel if found"*. The Applicant followed normal Offshore Windfarm (OWF)EIA survey protocols by ensuring 100% (high resolution) bathymetric coverage of the export cable corridor and, therefore, full coverage of all large (e.g. dune and sandwave) features where they directly intersect with, or fall within, the project Red Line Boundary.

2.5.2.4 However, in recent communications, NRW Advisory's letter (10 October 2022) and follow-up Expert Technical Group (ETG) meeting (19 October 2022), the earlier NRW request was interpreted by NRW Advisory to mean the Applicant should have carried out a full geophysical survey of Turbot Bank itself, but instead chose not to. The Applicant does not agree that this would have been or is a reasonable request, either in the earlier consultation, or as a clarification at this late stage. An additional survey covering such a large geographic area outside of the project Red Line Boundary is entirely disproportionate to the scale of the project and (to the best of the Applicant's knowledge) would be without precedent in the OWF industry. Furthermore, had the geophysical survey had a larger spatial extent, i.e. the entire bank feature, this would only have been a one-off survey and would not have provided any time-series data necessary to have enhanced the "*understanding of volume changes and direction of (sediment) travel*". The survey requested, while disproportionate in and of itself, would therefore not have achieved the stated objective of the request.

2.5.2.5 To inform the assessments, the project has used high resolution (1 m gridded) multibeam bathymetric survey data (CCW Multibeam survey of Turbot Bank (2012)), which resolves sandwave and smaller megaripple bedform features superimposed on the bank itself (Figure 2-3) to undertake morphological analysis. The extent of the data is understood to encompass nearly the full area of active sediment transport maintaining the bank. The data and analysis corroborate the results of the numerical sediment transport modelling undertaken to support the assessment.

2.5.2.6 During the ETG (dated 19 October 2022) NRW Advisory incorrectly assumed the CCW data to be of 'low resolution'. In fact, the CCW data have been collected to a comparable resolution and spatial extent to that requested by NRW.

2.5.2.7 **In conclusion, the high-resolution nature of the 2012 CCW Turbot Bank bathymetric data has enabled detailed morphological analysis of the bank to be carried out, enabling robust baseline understanding**. Whilst the lack of bathymetric surveys of Turbot Bank from different epochs precludes quantification of sandwave migration rates in all areas on and around the bank, the conclusions of the Applicant's assessment, do not require, or rely upon, a specific bedform migration rate around Turbot Bank. This is accordingly not a reasonable basis on which to assert that the Applicant's assessment is deficient.

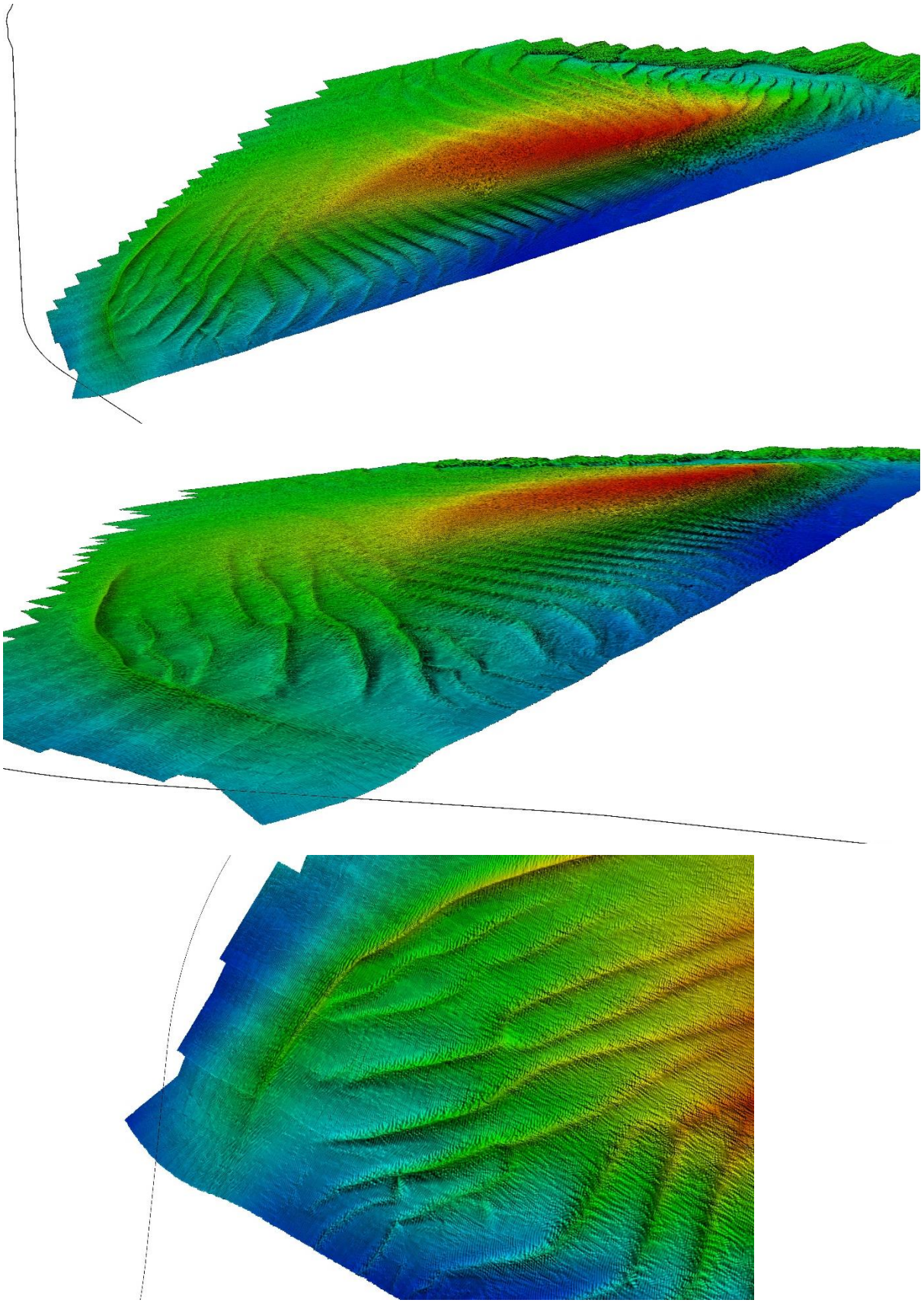

Figure 2-3: 3D visualisations of Turbot Bank derived from the high resolution multibeam data collected by CCW in 2012. The proposed cable route is shown as a black line.

2.5.3 ORML2170 NRW Advisory Response 44 (part b)

2.5.3.1 NRW Advisory comment: "*The assessment (based on expert judgement) notes that the external cable protection rock berms fundamentally have little to no potential to block or otherwise change the magnitude or direction of long-term sediment transport locally, or regionally elsewhere, indirectly through changes to patterns of currents or waves. Even though this could potentially be the case, there is a degree of uncertainty in the assessment due to remaining uncertainty in the details of the final impact description that relate to the baseline understanding of sand wave migration rates on Turbot Bank (ideally requiring additional historical survey data, which do not exist, to the applicant's knowledge) and the finer detail of sediment transport pathways and linkages in the wider area (presently supported by regional tidally driven sediment transport modelling) which is a tide only model and does not include the contribution of waves*."

2.5.3.2 Applicant response:

2.5.3.3 The Applicant's assessment is based upon the combined expert judgement of two Principal Consultants with PhDs in sediment dynamics, and over 15 years' experience each, in assessing the potential effects of offshore windfarms on hydrodynamic, metocean and sediment marine processes. The assessment is underpinned by the following project specific analysis that uses methods proven within the scientific community:

- Morphological analysis of historic and contemporary high-resolution bathymetric data for Turbot Bank and the proposed cable corridor;
- High-resolution hydrodynamic numerical modelling. This modelling incorporated all available bathymetric data, including the high-resolution multibeam survey of Turbot Bank;
- High-resolution sediment (sand) transport numerical modelling. It should be noted that such detailed modelling and analysis is not routinely undertaken for other UK offshore wind export cable EIA assessments in similarly mobile settings characterised by active banks and sandwave fields;
- Semi-quantitative assessments of the potential for blockage or modification of waves and/or currents by the berm;
- Semi-quantitative assessments of the potential for sediment transport blockage by the berm, with reference to spatial maps of sediment transport pathways from the high-resolution sand transport model; and
- Evidence from analogous projects including other OWFs and subsea cables.

2.5.3.4 The Applicant has separately undertaken a detailed seabed mobility assessment, to inform the project CBRA, to ensure realistically appropriate cable burial depths and proportionate / targeted use of rock protection. This study has compared the Project-specific bathymetric data with older bathymetric data (including the high-resolution data from Turbot Bank) to inform a baseline understanding of the rates of bedform migration in the wider project study area and, therefore, seabed level change over time.

2.5.3.5 A detailed description of physical processes both within the Project Red Line Boundary and across the wider study area has previously been provided in the Erebus ES (Blue Gem Wind, 2019). An illustration of the sediment transport processes using the output from the sediment transport model (including the inferred direction and magnitude of sediment transport) is shown in Figure 2-2. The modelling has been validated to be in good agreement with morphological (bathymetric) evidence of bedform shape and asymmetry, which are reliable proxy indicators for both general mobility and direction of migration[5].

2.5.3.6 The statement that the sediment modelling is a *"tide only model and does not include the contribution of waves"* is correct. Turbot Bank, and the sand waves which migrate on and around it, are predominantly tidally controlled bedforms. Whilst occasional wave effects at the seabed will result in short-term episodes of enhanced sediment transport rate, the effects of waves are non-directional and do not measurably control the overall regional patterns of (ultimately tidally controlled) sediment transport. The modelling approach, therefore, provides a detailed and quantitative basis for this aspect of the assessment. NRW Advisory, in concluding that there is some (undefined) degree of uncertainty, does not identify any flaw in the assessment undertaken or provide any evidence which would demonstrate that the conclusions reached are unsound. **The Applicant submits that there is high certainty in the assessment that the tidally driven sediment transport modelling provides a sufficiently reliable and robust description of natural sediment transport patterns on and around Turbot Bank.**

2.5.3.7 In conclusion, the Applicant submits that NRW Advisory's reference to 'expert judgement' and the numerical modelling 'not including waves', suggests that the assessment is not sufficiently complete or robust. The Applicant strongly refutes this implication and notes that this position appears to be based on only the author's judgement with no evidential basis for that position given.

2.6 Confidence Assessment

2.6.1.1 The Applicant has submitted an assessment based upon the best available scientific evidence. There is high confidence in both the project analysis and its conclusions. To quantify this level of confidence, a confidence matrix (Table 2-1) is presented, that is based on the scientific principles underpinning the systems or processes (sediment dynamics) and regional and scientific literature (y-axis), and the quality and availability of data which has underpinned the project specific analysis (x-axis). Each of these is scored between 1 and 3, and multiplied within the matrix to produce confidence scores between 1 (Low Confidence) and 9 (High Confidence).

2.6.1.2 NRW Advisory has provided no competing evidence for their view, which lacks an objective basis and appears to be seeking a degree of absolute certainty which is not reasonable or required (see section 2.9.1.1).

2.6.1.3 NRW Advisory has not, in its further response, identified any evidence, references or objective reasoning for their conclusion that unacceptable uncertainty remains. There is no evidential basis provided for that conclusion which is simply asserted.

[5] Standard industry analysis as discussed in, for example, Offshore Tidal Sands: Processes and deposits 1982 (Edited by Stride) and Barnard, et al. 2013, Sediment transport patterns in the San Francisco Bay Coastal System from cross-validation of bedform asymmetry and modeled residual flux, Marine Geology, Vol. 345 Pages 72-95. https://www.sciencedirect.com/science/article/pii/S0025322712002344?via%3Dihub.

Table 2-1: Confidence Matrix

Scientific principles of sediment dynamics	High	3	6	9
	Moderate	2	4	6
	Low	1	2	3
Confidence Assessment 6 to 9 = **High Confidence** 3 to 4 = **Medium Confidence** 1 to 2 = **Low Confidence**		Little or no data	Extensive Low-resolution or more limited high-resolution data	Extensive high-resolution data
		Data quality and availability		

2.6.1.4 Table 2-1 applies this confidence matrix to the Project's assessment of the form and function of the Annex I Sand Bank Feature, Turbot Bank and the potential impacts of rock berms on Turbot Bank. Through this table, a quantitative, objective assessment of confidence in the interpretation of no adverse effect on the integrity to the Annex I feature Turbot Bank is provided, in a direct refutation of NRW Advisory's "*low confidence in the assessment of form and function of Annex I Sand Bank Feature [Turbot Bank] of Pembrokeshire SAC*" (NRW Marine Advice Memo dated 10 October 2022). The quantitative assessment of confidence in the project analysis and assessment is presented in Table 2-2 below.

Table 2-2: Confidence in project analysis and assessment within the Turbot Bank Area

Item	Parameter	ES Interpretation	Evidential Basis	Confidence in Interpretation (see Table 1)	Confidence Basis
1	Form of Turbot Bank	Sandbank with superimposed mobile sandwaves and ripples (Figure 1)	Regional multibeam bathymetry [Turbot Bank Survey 1 m – CCW (2012)], project Bathymetry and seabed imagery. Interpretation of migration activity and direction on the basis of bedform geometry. Sandwave migration rate and direction on the northern flank of Turbot Bank has since been corroborated by further analysis and comparison of the CCW (2012) data and an overlapping area of high-resolution bathymetric data from the Greenlink interconnector cable corridor survey (collected in 2018/19) (Greenlink, 2019)	Score = 9 **High Confidence**	Data = 3 (Extensive and high resolution) • 1 m resolution Turbot Bank bathymetry • Contours derived from high resolution bathymetry data • Project Specific data (geophysical and geotechnical) • Good regional knowledge of sediment composition Principles of Sediment Dynamics = 3 (High) • Sand banks and sandwaves are a well understood feature in sedimentology and sediment transport
2	Sediment transport pathways	Clockwise circulation around Turbot Bank (Figure 2)	Modelled results, produced from the Project's hydrodynamic model. Interpretation of bedform morphology, based on high-resolution bathymetry.	High = 9 **High Confidence**	Data = 3 (Extensive and high resolution) • 1 m resolution Turbot Bank bathymetry • Project specific hydrodynamic sediment transport model • Good regional knowledge of metocean climate Principles of Sediment Dynamics = 3 (High) • Sand banks and sandwaves are a well understood feature in sedimentology and sediment transport
3	Cable protection rock berm geometry	Berms defined in project ES. Maximum height of 2 m, 1:3 adjacent slopes. Rock berms in the vicinity of Turbot Bank are undergoing further engineering refinement (Section 2.4)	Cable engineering works being undertaken for the Project. Berm geometry will be reduced as the Project undergoes further refinement.	High = 9 **High Confidence**	Data = 3 (Extensive and high resolution) • Rock berm locations informed by project geophysical and geotechnical data • Depth of Lowering recommendations from probabilistic threat assessment based on vessel AIS data and Carbon Trust methodology Cable Burial Risk Assessment Principles of Sediment Dynamics = 3 (High) • Rock berm design is based on cable engineering and naval architecture

Item	Parameter	ES Interpretation	Evidential Basis	Confidence in Interpretation (see Table 1)	Confidence Basis
4	Potential impact of rock berm on net sediment transport and form and function of Turbot Bank	Stated in Section 2.1, an initial period of very limited sediment accumulation may occur in any voids between the rocks. Following this, sediment transport will continue over the berm at the natural ambient rate and direction.	Understanding of the above points. Figure 2 shows that downstream sediment transport pathways from the proposed areas rock berms do not intersect directly with Turbot Bank.	High = 9 **High Confidence**	Data = 3 (Extensive and high resolution) • Combined understanding from Items 1 to 3 described above Principles of Sediment Dynamics = 3 (High) • Specific understanding of sediment transport pathways in the vicinity of Turbot Bank • Understanding of bedload sediment transport theory is high, including fluid dynamics, sediment entrainment and deposition

2.6.1.5 In conclusion, NRW Advisory have suggested that an adverse effect cannot be ruled out, and in the meeting on 19 October 2022 stated that there was "*reasonable scientific doubt*". However, that advice disregards the best scientific advice available and which has been relied upon in the assessments provided. The advice does not identify a proper 'gap' in the evidence and does not provide a basis on which the evidence provided by the Applicant should be set aside. NRW Advisory, in this approach, is effectively seeking 'absolute certainty'; an approach which has been determined by the Courts to be not appropriate, see Section 2.9.1.1. The unsubstantiated doubt identified is not, therefore, reasonable scientific doubt, as it lacks an objective evidential basis.

2.7 Rock Berm Refinements

2.7.1.1 Despite the Applicant demonstrating in the ES, SEI and summarised in the preceding sections that it can be concluded there will be no adverse impact on sediment transport, to further reassure NRW Advisory, the Applicant is committing to a maximum berm height of 1.5m for lengths of cable protection to the north and south of Turbot Bank.

2.7.1.2 As discussed in Section 2.3.1.10, the Applicant has progressed additional studies to refine the proposed rock berms in the vicinity of Turbot Bank. This scope has been advanced to provide a level of reassurance and in response to the Coastal Processes TA's uncertainty that there may be an adverse impact on sediment transport.

2.7.1.3 Chapter 4 of the Project Erebus ES (BGW, 2019) outlined a proposed rock berm with a potential elevation of up to 2.0 m above mean undisturbed seabed, with the slopes of the berm lowering to adjacent seabed at a 1:3 gradient. This berm height is conservative, and a preliminary design verification assessment has been undertaken to determine whether a reduction in berm height to 1.5 m is viable in the vicinity of Turbot Bank.

2.7.1.4 The assessment, undertaken by OWC[6] has considered the level of protection of the rock berm against potential falling objects; the hydraulic stability for the rock berm on the seabed in the 10 and 100 years return period environmental scenario; and shipping and fishing anchor and chain drag protection. The last of these points being the most critical and the driving design criteria.

2.7.1.5 Following this preliminary outline design exercise, OWC concluded there is potential for reducing the height of the rock berms in the vicinity of Turbot Bank from the up to 2.0 m value originally indicated in the Erebus ES, to up to 1.5 m. No further lowering can be achieved until geotechnical surveys are completed in 2023 due to the consideration of the following hazards:

- The level of protection of the rock berm against potential falling objects;
- The hydraulic stability for the rock berm on the seabed in the 10 and 100 years return period environmental scenario; and
- Shipping and Fishing anchor and chain drag protection.

2.7.1.6 On the basis of the additional engineering study (OWC[6]) the Applicant has now committed to a maximum berm height of 1.5 m for the lengths of cable protection to the north and south of Turbot Bank.

[6] OWC, 2022, Turbot Bank Preliminary Export Cable Rock Protection Outline.

2.8 Benthic Ecology and Turbot Bank

2.8.1 Overview

2.8.1.1 The original assessments presented in the Project Erebus ES Volume 1 Chapter 9: Marine and Coastal Ecology, considered potential impacts, direct and indirect, on the Annex I sandbank feature of Turbot Bank. The assessment of potential physical impacts to Turbot Bank was informed by the original assessments undertaken for coastal processes (Chapter 6: Marine and Coastal Processes). This allowed a consideration of any potential impacts from the installation of external cable protection (rock berms), on the physical components for this protected feature (footprint loss and changes to marine processes) which, in turn, may be of significance in supporting benthic habitats and communities.

2.8.1.2 Sections 2.8.2 to 2.8.3 present the Applicant's response to NRW Advisory's outstanding concerns regarding benthic ecology, specifically that NRW Advisory are not able to agree a conclusion of no adverse effect, on the integrity of Pembrokeshire Marine SAC, due to uncertainty of potential impacts to the Annex I Sandbank Turbot Bank.

2.8.2 Typical Species

2.8.2.1 NRW Advisory have confirmed, response dated 21 April 2022, that they are satisfied there will be no adverse impact on 'Typical Species' as a result of external cable protection at the Greenlink cable crossing.

2.8.3 Structure and Function, and Range

2.8.3.1 It is understood that NRW Advisory are satisfied that with regards to 'Structure and Function', the effects from the presence of the external cable protection at the Greenlink Crossing alone is unlikely to result in any changes in sediment type and hydrodynamics, to influence the bank's long-term ability to maintain its necessary function. However, NRW Advisory maintains that "*uncertainty still remains over the nature and scale of the combined impacts from the cable protection required to the north and south of Turbot Bank*."

2.8.3.2 NRW Advisory further state that any impacts to the structure and function could potentially impede other conservation objectives such as ''range'.

2.8.3.3 Sections 2.4, 2.5 and 2.6 summarise the original assessments presented in the Project Erebus ES, and remain valid with respect to the conclusion presented for coastal ecology. On the basis of the arguments presented above, the Applicant maintains that there is high confidence in the conclusion that the proposed rock berms have (in absolute terms) a very limited ability to trap sediment; there is high confidence in the conclusion that downstream sediment transport pathways do not intersect directly with Turbot Bank; there is high certainty in the assessment that the rock berms are too small to affect natural sediment transport patterns elsewhere; that there is sufficient certainty in the understanding of sandwave migration for the purposes of considering the sediment transport processes on Turbot Bank; and that the best available evidence has been provided which demonstrates, to an appropriate level of certainty, that there will be no significant adverse effects due to changes in sediment transportation.

2.8.3.4 Therefore, the Applicant maintains that there will be no adverse impact on the structure and function of Turbot Bank, and that there is no reasonable uncertainty regarding impacts from proposed external cable protection in the vicinity of Turbot Bank, either alone, or in combination with the Greenlink cable crossing, impacting the potential range of the feature.

2.9 Conclusion

2.9.1.1 NRW Marine Licensing, as the decision maker is not obliged to follow the advice of NRW Advisory; this principle is clearly set out in *Sustainable Shetland v Scottish Ministers*[7]. In considering the outstanding concerns raised by NRW Advisory on coastal processes and benthic ecology, the Applicant submits that NRW MLT should not follow their advice in this case for the reasons set out below. The Applicant considers that it has provided the best evidence available, which demonstrates to a high level of certainty that there will be no adverse effects on integrity due to changes in sediment transportation. The Applicant notes that NRW Advisory has provided no competing evidence for their view (see Sections 2.5.2 and 2.5.3), which view lacks an objective basis.

2.9.1.2 All decisions must be made on a reasoned objective basis, not "*gut instinct*". Where the Habitats Regulations are engaged, in order to grant consent the Competent Authority needs to be convinced that the project will not adversely affect the integrity of the site concerned. It must reach that conclusion on the basis of objective information, as set out in the *Waddenzee* decision[8].

2.9.1.3 It is not disputed that it is for the Applicant to provide the information necessary for the Competent Authority to be able to carry out the Appropriate Assessment (regulation 63(2)). However, the Competent Authority must act reasonably regarding the level of information or evidence to be required, which must be required for the purposes of the assessment, not information which may be relevant or contextual, rather than being required. Information provided must be based on the best available scientific evidence and, as set out Section 2.4, 2.5 and 2.6, the Applicant considers they have provided an assessment based on the best evidence available.

2.9.1.4 In considering what is required, the Court in *Mynydd*[9] determined that: "*Certain*", here, also has a particular meaning. For a Competent Authority to "*have made certain that* [the project] *will not adversely affect the integrity of the* [European] *site*", it must be satisfied that there is no real (as opposed to merely hypothetical) risk to the integrity of the site. The Courts, in considering the standard required, have stated that "*the conclusion to be reached under an 'appropriate assessment' under the second limb of article 6(3)* ***cannot realistically require ascertainment of absolute certainty*** *that there will be no adverse effects*"[10] (emphasis added).

[7] Sustainable Shetland v. The Scottish Ministers +Viking Energy Partnership 2013 [CSIH] 116
[8] C-127/02
[9] *R. (on the application of Mynydd y Gwynt Ltd) v Secretary of State for Business, Energy and Industrial Strategy* [2017] Env. L.R. 14
[10] *Smyth v Secretary of State for Communities and Local Government* [2015] EWCA Civ 174, as quoted and affirmed in *Mynydd*

2.9.1.5 The evidence which is to be required must be reasonable to the level of risk identified. The Applicant notes NRW Advisory's position that "*any large features such as Large and Very Large Subaqueous Dunes should be captured in their entirety to allow an understanding of volume changes and direction of travel*"[11]. As set out Section 2.5.2.3 the Applicant followed standard OWF EIA survey protocols and NRW Advisory's suggested level of survey is entirely disproportionate to the scale of the Project and (to the best of the Applicant's knowledge) would be without precedent in the OWF industry.

2.9.1.6 The Applicant has, as agreed by NRW Advisory, provided the best scientific assessment available. NRW Advisory have not, in their further response, identified any evidence, references or objective reasoning for their conclusion that unacceptable uncertainty remains. There is no evidential basis provided for that conclusion, which is simply asserted.

2.9.1.7 The Applicant notes that where certainty cannot be reached, it is acceptable to use assumptions and estimates, however they must be "*identified and reasoned*"[12]. The Applicant has set out in detail that:

- There is high confidence in the conclusion that the proposed rock berms have (in absolute terms) a very limited ability to trap sediment;
- There is high confidence in the conclusion that downstream sediment transport pathways do not intersect directly with Turbot Bank;
- There is sufficient certainty in the understanding of sandwave migration for the purposes of considering the sediment transport processes on Turbot Bank; and
- The best available evidence has been provided which demonstrates to an appropriate level of certainty that there will be no significant adverse effects due to changes in sediment transportation.

2.9.1.8 NRW Advisory, in contrast, have provided no identifiable, reasoned basis for their conclusions. The remaining doubt expressed by NRW Advisory is hypothetical, no scientific basis has been provided for that conclusion.

2.9.1.9 NRW Advisory have suggested that an adverse effect cannot be ruled out. However, that advice disregards the best scientific advice that is available and that has been provided. The advice does not identify a proper 'gap' in the evidence and does not provide a basis on which the evidence provided by the Applicant should be set aside. NRW Advisory in this approach is effectively seeking 'absolute certainty'; as determined by the Courts, that is not an appropriate approach. The unsubstantiated doubt identified is not, therefore, reasonable scientific doubt, as it lacks an objective evidential basis.

2.9.1.10 The Applicant is cognisant of the considerable weight which must be given by the decision maker to the views of NRW Advisory as the appropriate Statutory Nature Conservation Body (SNCB) within 12 nm, however the Applicant submits that if NRW Marine Licensing relies on the advice of NRW Advisory in this matter, then it would be acting unreasonably. NRW Marine Licensing could not give proper and intelligible reasons for reaching a conclusion if it relies solely on NRW Advisory's advice, as that advice itself sets out no objective, evidential basis for its conclusions. It accordingly cannot form the basis of a reasoned, objective decision.

[11] Referred to in the response dated 10 October 2022
[12] Wadenzee, C-127/02

Chapter 3 Marine Water Quality – Maerl

3.1 Introduction

3.1.1.1 NRW TA have responded to the SEI in respect of potential impacts to the Maerl beds from suspended sediments generated during export cable installation (either HDD or open cut trenching (OCT)). NRW TA suggest that any impacts to Maerl should be mitigated for and request a post-consent requirement for installation activities to be conducted over a Neap tide.

3.1.1.2 Sediment plume modelling (reported in SEI Report, August 2022) was undertaken to quantify the suspended sediment concentration (SSC) and deposition thickness as a result of realistic worst case cable trenching and HDD activities at or from the landfall, and within the area of effect for water quality in Milford Haven. The modelling considered scenarios of the sediment release occurring or starting at various points in the tidal cycle (times relative to high water/low water/peak flood/peak ebb, etc), also for representative neap (smaller) and spring (larger) tidal conditions. The conclusions of the modelling focus specifically on the resulting conditions within the area of the Maerl beds within Milford Haven.

3.1.1.3 The concern of NRW relate specifically to the 'potential impacts to the Maerl beds from smothering and/or sediment deposition'. The modelling work concluded that, for all tidal scenarios (including spring and neap tides), "Sediment deposition thickness in and around the area of the live and/or dead Maerl beds is predicted to be <1 mm (<1 g/m²) in all cases, which is not measurable in practice and will be, at most, comparable to normally occurring patterns as a result of natural processes and other vessel movement related disturbances". In many cases the results could be more explicitly described as zero sediment deposition in some or all of the Maerl bed areas. **The modelling therefore indicates no meaningful difference in the potential sediment deposition thickness in the area of the Maerl beds if the construction activities occur on spring or neap tides, or at any particular point in the tidal cycle.**

3.1.1.4 The modelling also indicated the possibility of a low magnitude (<10-20mg/l, up to 30mg/l max), short-term (tens of minutes for higher, to 1-4 hours for lower SSC effects), temporary (single occurrence at the time of the activity) and localised (only in some parts of the Maerl bed area) increase in SSC. The potential changes to SSC are a result from the same model simulations, and so will not cause any additional sediment deposition over the (negligible) amounts described above. Such a change in SSC is small in both relative and absolute terms, in the context of occasional storm events or other seasonal variation in Milford Haven, and in similar marine and estuarine environments in the UK generally.

3.1.1.5 On the basis of the above conclusions, the justification for NRW TAs request is unclear as the SEI clearly demonstrates that there will be no measurable amount of sediment accumulation on the Maerl beds as a result of installation activities.

3.1.1.6 It is agreed that Maerl are very sensitive to even low levels of sediment deposition. The benchmark for "low levels of sediment deposition" is up to 5cm depth. The additional assessment, presented in the SEI, predicted level of sediment deposition (<<1mm (<1 g/m²) in all cases for cable burial activities close to landfall and <1mm (<20 g/m²) in all cases for HDD at landfall) and NRW acknowledged that "no measurable amount of sediment accumulation will occur on the Maerl beds" (Row 31, ORML2170 Technical and General Consultation Responses spreadsheet Further Clarifications v2.0). Although Maerl is highly sensitive, the Applicant submits that it is highly unlikely that an infrequent short duration release of sediment, which is predicted to result in deposition which is not measurable in practice will have any effect. Accordingly, the Applicant submits that the proposed restrictive Marine Licence condition in respect of the potential impact is unreasonable and disproportionate to the predicted effect.

3.1.1.7 The Applicant **strongly** opposes the suggested post-consent requirement to limit HDD or trenching activities to a Neap tide and in addition to the above has sought advice from the project Engineering Team who have identified this as presenting a significant technical risk to the project, specifically in respect to HDD which is the projects preferred option. HDD is a continuous process requiring constant monitoring of the drilling fluid as well as several technical parameters which are critical to the operational success. Stopping the operations partway through completion to comply with such a restrictive condition, would constitute an exception to standard engineering practice and have potentially fundamental implications on the operational success of the HDD through detrimental impacts on the HDD bore path stability (as well as causing issues with drilling fluids return).

3.1.1.8 Diverting from standard operational procedures during HDD would introduce significant additional risks to the HDD operation that may result in HDD failure. This could have catastrophic consequences for project commissioning which are unreasonable given no measurable amount of sediment accumulation will occur on the Maerl beds.

3.1.1.9 The Applicant submits that the suggested restrictive consent condition proposed is both technically unworkable and unjustified given the lack of measurable impact. The assessment presented in the SEI concludes no measurable amount of sediment accumulation will occur on the Maerl beds, which NRW Advisory have acknowledged. Even noting that Maerl are very sensitive to low levels of sediment deposition, as the HDD/trenching activities will result in **no** measurable amount of accumulation it does not translate that they be unreasonably restricted

Chapter 4 Ornithology

4.1 Introduction

4.1.1.1 This section provides supplementary information and further clarifications on the ornithology section of the SEI Addendum in response to specific queries raised by JNCC. The SEI Addendum, submitted to the relevant bodies in August 2022, contained updated displacement assessments for the three auk species (common guillemot *Uria aalge*, razorbill *Alca torda*, and Atlantic puffin *Fratercula arctica*), alongside detailed responses to other queries raised by NRW Advisory, JNCC, RSPB, and The Wildlife Trust.

4.1.1.2 As part of the updated displacement assessment for the auk species, apportioning of non-identified auks was conducted, and a range of displacement rates (40% and 60%) and mortality rates (1%, 3%, 5%, and 10%) were assessed, with the outputs presented alongside the full displacement matrices (1-100% displacement and mortality rates). Following review of the assessments presented in the SEI, JNCC requested that the worst case displacement scenarios derived from the matrices were assessed. The scenarios JNCC requested to be assessed and taken forward to Population Viability Analysis (PVA) were:

- 70% displacement combined with the lowest mortality rate which results in mortalities above the threshold; and
- 70% displacement combined with a 10% mortality rate.

4.1.1.3 Following the criteria above ensures that the full range of worst case scenarios is assessed. The specific scenarios requested, based on the full displacement matrices presented, are outlined in Table 4-1.

Table 4-1: Additional PVA scenarios requested by JNCC

Species	Threshold Mortality	Impact Scenario	Scenario Displacement Rate	Scenario Mortality Rate	Scenario Breeding Season Mortality
Common guillemot	33	1	70%	1%	37
		2	70%	10%	370
Razorbill	11	3	70%	10%	13
Atlantic puffin	36	4	70%	4%	40
		5	70%	10%	99

4.2 Population Viability Analysis for the Auk Reassessment

4.2.1 Auk Displacement Mortality Estimates for Population Viability Analysis

4.2.1.1 The PVA tool recommended by the SNCBs (Searle *et al.*, 2019) was used to run the five additional scenarios. The displacement mortalities modelled under PVA are summarised in Table 4-2. The displacement and mortality rates (70% and 1-10%, respectively) are applied to the breeding and non-breeding seasons, which are then summed to give an annual total.

Table 4-2: Auk estimated displacement mortalities to be modelled under PVA

Impact Scenario	Displacement/ Mortality Rate	Displacement Mortality Estimates				
		Breeding	Autumn Migration	Non-breeding	Spring Migration	Annual Total
Common guillemot						
1	70% / 1%	37	N/A	6	N/A	43
2	70% / 10%	370	N/A	52	N/A	422
Razorbill						
3	70% / 10%	13	3	1	2	19
Atlantic puffin						
4	70% / 4%	40	N/A	1	N/A	41
5	70% / 10%	99	N/A	1	N/A	100

4.2.2 Population Viability Analysis Reference Populations

4.2.2.1 Table 4-3 presents the reference populations used for the three auk species assessed in the PVA modelling. The reference populations are unchanged from those submitted in the original Project Erebus ES and the SEI Addendum.

Table 4-3: Reference populations for each auk species at the Skomer, Skokholm and the Seas off Pembrokeshire SPA

Species	Special Protection Area	Population used in Assessment	
		Breeding Individuals	Year(s) of Consensus
Guillemot	Skomer, Skokholm and the Seas off Pembrokeshire	29,744	2017-2019
Razorbill		10,694	2018-2019
Puffin		38,342	2018

4.2.3 Population Viability Analysis Model Options

4.2.3.1 The PVA tool (Searle *et al.*, 2019[13]) includes several options for auk PVA, including survival rates specific to the Skomer colonies, as well as national default rates. Although the tool does not include rates for the entire Skomer, Skokholm and the Seas off Pembrokeshire SPA, the Skomer rates were used, as the island supports the largest population of each auk species within the SPA.

4.2.3.2 For the SEI, PVAs were also run using the national and default values in the tool, as well as a further PVA for guillemot using the adult survival rate determined by Birkhead (2021). The results of the various PVAs run were compared with one another, and with known population trends, in order provide a sense check and to identify the most appropriate model for inclusion in the assessment.

4.2.3.3 The best fitting PVA models were determined to be the Skomer rates for guillemot and puffin, and the national default values for razorbill.

4.2.3.4 Further details on the specifics of each of the PVA models tested are provided in the ES, Technical Appendix 11.5: Population Modelling, and the SEI. The approach taken in for the additional five PVA scenarios has not differed.

4.2.3.5 The demographic parameters input into the PVA tool for the five additional scenarios are outlined in Table 4-4.

Table 4-4: Summary of demographic rates for PVA species (common guillemot and Atlantic puffin use Skomer values and razorbill the national defaults, as recorded in the NE PVA tool)

Parameter	Common guillemot		Razorbill		Atlantic puffin	
	Mean	SD	Mean	SD	Mean	SD
Adult survival	0.930	0.043	0.895	0.067	0.906	0.047

[13] Searle, K., Mobbs, D., Daunt, F., and Butler, A. (2019). A Population Viability Analysis Modelling Tool for Seabird Species. Natural England Commissioned Reports No. 274.

Parameter	Common guillemot		Razorbill		Atlantic puffin	
	Mean	SD	Mean	SD	Mean	SD
Productivity (per pair)	0.687	0.078	0.642	0.271	0.754	0.070
Recruitment age	6		5		5	
Brood size (per pair)	1		1		1	
Survival (0-1)	0.560	0.058	0.630	0.209	0.709	0.108
Survival (1-2)	0.762	0.152	0.630	0.209	0.709	0.108
Survival (2-3)	0.917	0.098	0.895	0.064	0.709	0.108
Survival (3-4)	0.938	0.107	0.895	0.064	0.760	0.093
Survival (4-5)	0.930	0.043	0.895	0.064	0.805	0.083
Survival (5-6)	0.930	0.043				

4.2.4 Age Classes

4.2.4.1 Similar to the PVA models in the SEI Addendum, age-dependent survival rates were used, utilising values from Skomer, as provided within the PVA tool. Displacement mortality estimates from the matrices were proportionally divided between adult and immature age classes, and the 'burn-in' function in the PVA tool was enabled to obtain a stable population age structure at the beginning of the model. The age class proportions are summarised in Table 4-5.

Table 4-5: Auk age class proportions for the Skomer, Skokholm and the Seas off Pembrokeshire SPA colonies, as used in the PVA models

Species	Adult Proportion	Immature Proportion
Common guillemot	0.49	0.51
Razorbill	0.60	0.40
Atlantic puffin	0.48	0.52

4.2.5 Model Duration

4.2.5.1 Similar to the PVA models included in the SEI Addendum, the additional five models were run from 2018-2019, with impacts assumed to commence in 2028 (a commissioning date of October 2027). The scenarios were modelled to run for 25 years of impacts, with the model ending in 2053.

4.2.5.2 Following advice received from NRW Advisory regarding future impact assessments, the PVA models were run 5,000 times, in order to establish uncertainty due to environmental and demography stochasticity. It should be noted that running the model 5,000 times resulted in negligible difference to running 1,000 times, as done for the ES and SEI Addendum PVA models.

4.2.6 Impact Scenarios

4.2.6.1 Table 4-6 presents the five additional impact scenarios modelled under PVA, derived from the annual displacement mortality estimates for each species and the number of adult and immature birds derived from the age class proportions.

4.2.6.2 Relative mortality rates are utilised as recommended by SNCBs and within the PVA tool documentation, which are scaled according to the population size throughout the model period (i.e. up to 2053). As previously highlighted in the SEI Addendum, no other projects predicted mortality to the Skomer, Skokolm and the Seas off Pembrokeshire auk populations, and Collision Risk Modelling (CRM) estimated zero/negligible impact to common guillemot, razorbill, and Atlantic puffin. Therefore, the following PVA scenarios are considered to be inclusive of impacts associated with Project Erebus as well as all projects included in the Cumulative Effects Assessment (CEA).

Table 4-6: Additional modelled impact scenarios for auks

Scenario	Impacts Modelled	Absolute Mortalities[14]			Relative Mortality Rate[15]	
		Total	Adult	Immature	Adult	Immature
Common guillemot						
1	70% / 1%	43	21	22	0.56×10^{-3}	0.56×10^{-3}
2	70% / 10%	422	208	214	5.50×10^{-3}	5.50×10^{-3}
Razorbill						
3	70% / 10%	19	10	9	1.05×10^{-3}	1.05×10^{-3}

[14] Absolute mortalities = estimated annual number of mortalities, rounded to the nearest whole number.
[15] Relative mortality rates = absolute mortalities as a proportion of the 2027 pre-impact baseline.

Scenario	Impacts Modelled	Absolute Mortalities[14]			Relative Mortality Rate[15]	
		Total	Adult	Immature	Adult	Immature
Atlantic puffin						
4	70% / 4%	41	20	21	0.56×10^{-3}	0.56×10^{-3}
5	70% / 10%	100	48	52	1.36×10^{-3}	1.36×10^{-3}

4.2.7 Population Viability Analysis Outputs

4.2.7.1 The population growth rate and population size counterfactuals are described as the ratios of the impacted to unimpacted (baseline) scenarios (Searle *et al.*, 2019), which allows the predicted population-level effects to be understood (Cook and Robinson, 2016[16]). The PVA outputs for the five additional scenarios are presented in Table 4-7.

4.2.7.2 Cook and Robinson (2016) suggested that counterfactual growth rate can be used to determine impacts regardless of the population size. The counterfactuals of population size can be used to estimate the population-level effects of both stable and increasing populations, and can also provide context to the counterfactual growth rate.

Table 4-7: Metrics and counterfactuals for 5,000 PVA simulations with 25 years of impact

Scenario	Relative Mortality		Median Population Size at Model End Period (2053) (individuals)	Median Counterfactuals (95% confidence intervals in parentheses)[17]	
	Adult	Immature		CGR	CPS
Common guillemot					
1	0.56×10^{-3}	0.56×10^{-3}	74,358	0.999 (0.999-1.000)	0.984 (0.951-1.002)
2	5.50×10^{-3}	5.50×10^{-3}	64,300	0.994 (0.993-0.994)	0.851 (0.835-0.867)

[16] Cook, A.S.C.P, and Robinson, R.A. (2016). *Testing sensitivity of metrics of seabird population response to offshore wind farm effects*. JNCC Report No. 553. JNCC, Peterborough

[17] CGR = counterfactual growth rate; CPS = counterfactual population size.

Scenario	Relative Mortality		Median Population Size at Model End Period (2053) (individuals)	Median Counterfactuals (95% confidence intervals in parentheses)[17]	
	Adult	Immature		CGR	CPS
Razorbill					
3	1.05×10^{-3}	1.05×10^{-3}	7,196	0.999 (0.997-1.001)	0.969 (0.918-1.020)
Atlantic puffin					
4	0.56×10^{-3}	0.56×10^{-3}	27,020	0.999 (0.998-1.000)	0.983 (0.956-1.010)
5	1.36×10^{-3}	1.36×10^{-3}	26,349	0.998 (0.997-0.999)	0.959 (0.933-0.986)

4.2.8 Comparison with Previous Population Viability Analysis

4.2.8.1 The worst case scenarios of the additional PVA models are not significantly greater than the worst case scenarios modelled in the SEI Addendum, assuming a 60% displacement rate and a 10% mortality rate. A comparison of the outputs is presented in Table 4-8.

4.2.8.2 An increase from 60% to 70% displacement results in a minimal change to both the counterfactual growth rate and counterfactual population size for all three auk species. The maximum impact for common guillemot shows the largest change, with an increase from 13.0% to 14.9%; whereas razorbill and Atlantic puffin show smaller changes (2.7% to 3.1% and 3.7% to 4.1%, respectively). The range of worst case impacts are discussed in the following section.

Table 4-8: Comparison between additional worst case (70% displacement/10% mortality) and previous worst case (60% displacement/10% mortality) metrics and counterfactuals for PVA with 25 years of impact (note: previous PVAs are based on 1,000 simulations; additional PVAs are based on 5,000 simulation)

Scenario (Displacement/ Mortality Rate)	Relative Mortality		Median Population Size at Model End Period (2053) (individuals)	Median Counterfactuals (95% confidence intervals in parentheses)[18]	
	Adult	Immature		CGR	CPS
Common guillemot					
60% / 10%	4.72×10^{-3}	4.72×10^{-3}	68,973	0.995 (0.994-0.995)	0.870 (0.854-0.887)
70% / 10%	5.50×10^{-3}	5.50×10^{-3}	64,300	0.994 (0.993-0.994)	0.851 (0.835-0.867)
Razorbill[19]					
60% / 10%	0.88×10^{-3}	0.88×10^{-3}	7,280	0.999 (0.997-1.001)	0.973 (0.923-1.027)
70% / 10%	1.05×10^{-3}	1.05×10^{-3}	7,196	0.999 (0.997-1.001)	0.969 (0.918-1.020)
Atlantic puffin					
60% / 10%	1.17×10^{-3}	1.17×10^{-3}	27,349	0.999 (0.998-1.000)	0.963 (0.937-0.989)
70% / 10%	1.36×10^{-3}	1.36×10^{-3}	26,349	0.998 (0.997-0.999)	0.959 (0.933-0.986)

4.2.9 Population Viability Analysis Output Interpretation and Conclusions

4.2.9.1 Table 4-9 presents the range of potential impacts above the baseline population.

[18] CGR = counterfactual growth rate; CPS = counterfactual population size.

[19] The modelled impact scenarios for razorbill presented in the SEI Addendum were displayed incorrectly; however, it is only the relative mortality that was incorrectly presented; and these rates **were not** carried forward to the PVA outputs; therefore, the assessment conclusions were not affected. Further information is provided in Section 4.3 of this Further Clarifications Report.

Table 4-9: Range of population-size impacts above baseline mortality threshold

Species	Minimum Reduction in Population (above threshold mortality [20] at model end period) compared with Unimpacted Baseline	Maximum Reduction in Population (at model end period) compared with Unimpacted Baseline
Common guillemot	1.6%	14.9%
Razorbill	3.1%	3.1%
Atlantic puffin	1.7%	4.1%

4.2.9.2 For common guillemot, estimated mortalities were above the baseline mortality threshold for 70% displacement and 1% mortality rates associated with the Project (Table 4-1), as such, PVA was run for this scenario, as well as the maximum worst case scenario (70% displacement and 10% mortality rates). These two scenarios predict a worst case range of impacts resulting in a 1.6%-14.9% decrease in population size at model end period (2053) compared with the unimpacted (baseline) scenario. Predicted impacts to population growth rate also show a decrease, with worst case impacts ranging from 0.1% to 0.6% (Table 4-7).

4.2.9.3 For razorbill and Atlantic puffin, the maximum worst case range of impacts (i.e. those based on mortality rates above the threshold (Table 4-1)) are less than those of common guillemot. Only the 70% displacement combined with 10% mortality resulted in estimated mortalities above the threshold for razorbill; and this scenario results in a predicted 3.1% decrease in population size and 0.1% decrease in growth rate compared with the unimpacted scenario (Table 4-7). For puffin, 70% displacement rate combined with 4% mortality rate resulted estimated mortalities above the threshold. The worst case range of impacts to the modelled 2053 population is a predicted 1.7% to 4.1% decrease in population size and 0.1% to 0.2% decrease in growth rate, compared with the unimpacted scenario (Table 4-7).

[20] Minimum reduction in population compared with unimpacted baseline, based on the minimum displacement and mortality rate combination which predicted mortalities above the 1% threshold mortality rate (refer to Table 4-1).

4.2.9.4 The estimates discussed above represent the upper limits of an extreme worst case scenario and were assessed through PVA at request of JNCC. Previous OWF projects have typically used lower displacement and mortality rates in PVA scenarios. As discussed in the SEI Addendum, and assessed in the Project Erebus ES (BGW, 2021), a 60% displacement rate and a 3% mortality rate are considered to be more realistic of the true impacts, and represent a likely worst case scenario. These rates are based on expert judgement and take into account the 'disturbance susceptibility' scores outlined in SNCB guidance (SNCB, 2017[21]), based on Furness *et al.* (2013[22]) and Bradbury *et al.* (2014[23]). Previous OWF projects in the UK have applied disturbance rates of 50% (e.g. Hornsea Three and Awel y Môr) to 60% (as advised for Scottish projects). Additionally, the mean seasonal peak populations used in the PVA scenarios are based on the array area plus 2 km buffer, resulting in an area approximately 33% larger than the actual size of the array (~43 km² compared with ~66 km²) when, in reality, displacement within the buffer region is likely to be lower than that within the array itself.

4.2.9.5 As such, the levels of displacement in the scenarios presented within this Further Clarifications Report are considered to be overestimates of the realistic displacement mortality and associated population-level impacts. A realistic worst case scenario, assuming a 60% displacement rate and 5% mortality rate produces an estimated 6.7% decrease in common guillemot population size and 0.3% decrease in population growth rate compared with the unimpacted (baseline) scenario (refer to the SEI Addendum). Similarly, for razorbill and Atlantic puffin, realistic worst case rates result in estimated much reduced population-level impacts compared with the extreme worst case.

4.2.9.6 Therefore, the Applicant maintains that the discussions and the conclusion presented in the SEI Addendum remain valid: the assessment confirms that there will be **no adverse effect on site integrity** arising from the Project on the common guillemot, razorbill, or Atlantic puffin populations as qualifying interests of the Skomer, Skokholm and the Seas off Pembrokeshire Special Protection Area.

4.3 Razorbill Relative Mortality Rate Corrections

4.3.1.1 During reassessment of auk displacement impacts and running additional PVA scenarios, errors in the tables relating to razorbill in the SEI Addendum were identified. These errors relate solely to the relative mortality rates and **were not** carried through the PVA outputs and, as such, the final estimates and the discussions in the SEI remain valid.

4.3.1.2 Table 4-10 and Table 4-11 present corrected relative mortality rates for razorbill for clarity. Amendments are highlighted in **red**, and as observed in Table 4-11, no changes have been made to the counterfactuals of population size or population growth rate.

[21] SNCB (2017). Joint SNCB Interim Displacement Advice Note. Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm (OWF) development.
[22] Furness, R.W., Wade, H.M., and Masden, E.A. (2013). Assessing vulnerability of marine bird populations to offshore wind farms. *Journal of Environmental Management*, 119: pp.56-66
[23] Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W.G., and Hume. D. (2014). Mapping seabird sensitivity to offshore wind farms. *PLoS one*, 9: p.e106366

Table 4-10: Corrected modelled impact scenarios for razorbill (updated values in red)

Displacement/ Mortality Rate	Absolute Mortalities[24]			Relative Mortalities[25]	
	Total	Adult	Immature	Adult	Immature
40% / 1%	4	**2.1**	**1.9**	**0.22×10^{-3}**	**0.22×10^{-3}**
60% / 1%	5	**2.7**	**2.3**	**0.28×10^{-3}**	**0.28×10^{-3}**
40% / 3%	6	**3.2**	**2.8**	**0.33×10^{-3}**	**0.33×10^{-3}**
60% / 3%	7	**3.7**	**3.3**	**0.39×10^{-3}**	**0.39×10^{-3}**
40% / 5%	7	**3.7**	**3.3**	**0.39×10^{-3}**	**0.39×10^{-3}**
60% / 5%	9	**4.8**	**4.2**	**0.50×10^{-3}**	**0.50×10^{-3}**
40% / 10%	11	**5.9**	**5.1**	**0.61×10^{-3}**	**0.61×10^{-3}**
60% / 10%	16	**8.5**	**7.5**	**0.88×10^{-3}**	**0.88×10^{-3}**

Table 4-11: Corrected razorbill metrics and counterfactuals for 1,000 PVA simulations with 25 years of impact (updated values in red)

Displacement/ Mortality Rate	Relative Mortality		Median Population Size at Model End Period (2053) (individuals)	Median Counterfactuals (95% confidence intervals in parentheses)[26]	
	Adult	Immature		CGR	CPS
40% / 1%	**0.22×10^{-3}**	**0.22×10^{-3}**	7,377	1.000 (0.998-1.001)	0.993 (0.942-1.045)
60% / 1%	**0.28×10^{-3}**	**0.28×10^{-3}**	7,349	1.000 (0.998-1.001)	0.992 (0.939-1.049)

[24] Absolute mortalities = estimated annual number of bird mortalities.
[25] Relative mortality rates = absolute mortalities as a proportion of the 2027 baseline.
[26] CGR = counterfactual growth rate; CPS = counterfactual population size.

Displacement/ Mortality Rate	Relative Mortality		Median Population Size at Model End Period (2053) (individuals)	Median Counterfactuals (95% confidence intervals in parentheses)[26]	
	Adult	Immature		CGR	CPS
40% / 3%	**0.33×10^{-3}**	**0.33×10^{-3}**	7,339	1.000 (0.998-1.001)	0.991 (0.940-1.042)
60% / 3%	**0.39×10^{-3}**	**0.39×10^{-3}**	7,302	1.000 (0.998-1.001)	0.988 (0.937-1.039)
40% / 5%	**0.39×10^{-3}**	**0.39×10^{-3}**	7,305	1.000 (0.998-1.001)	0.989 (0.937-1.044)
60% / 5%	**0.50×10^{-3}**	**0.50×10^{-3}**	7,303	0.999 (0.998-1.001)	0.985 (0.934-1.037)
40% / 10%	**0.61×10^{-3}**	**0.61×10^{-3}**	7,315	0.999 (0.997-1.001)	0.983 (0.933-1.037)
60% / 10%	**0.88×10^{-3}**	**0.88×10^{-3}**	7,280	0.999 (0.997-1.001)	0.973 (0.923-1.027)

Chapter 5 Seascape and Landscape Visual Impact

5.1 Principal Seascape and Landscape Visual Considerations

5.1.1.1 The Applicant notes that in NRW's advice of 10 October 2022 (Marine Advice Memo), NRW Advisory have reiterated their original seascape and landscape visual impact concerns:

"NRW consider the proposals would have numerous and extensive adverse effects on seascape and visual receptors within the National Park. NRW are concerned that the assessment has under-estimated some seascape and visual effects on some receptors within the National Park".

5.1.1.2 The Applicant held a further consultation meeting with NRW Advisory to discuss and resolve these comments on seascape, landscape and visual effects. (dated 28 October 2022). While there is considerable common ground on the assessment approach and findings, there is some difference in professional opinion around the threshold of significance and adversity of some of the assessed effects.

5.1.1.3 The Applicant considers that NRW Advisory have over-stated the extent and adversity of effects arising from the Project on the Pembrokeshire Coast National Park (PCNP) and considers that effects assessed in the SLVIA have been assessed objectively and have not been under-estimated. It should be noted that PCNPA, in its consultation response, dated 20 April 2022, does not object to this proposed development. Furthermore, following the submission of the SEI and subsequent round of consultation PCNPA maintained their position of no objection to the proposal (01 November 2022)

5.1.1.4 Based on NRW Advisory clarifications provided in meeting dated 28 October 2022, the Applicant is aware that NRW Advisory's position on SLVIA has an element of strategic cumulative concern attached to itin relation to the introduction of new projects to the current wind farm free seascape baseline off the PCNP, potentially 'paving the way' for further rounds of development in the Celtic Sea. The Applicant maintains that the Project should be considered with regard to its impacts and merits arising, and weighed in the planning balance and not against a background of hypothetical cumulative impacts for which no assessment can be undertaken.The Applicant does not agree that certain seascape, landscape and visual effects have been under-estimated but understands there can be differences in professional judgement around the threshold of significance. This may occur particularly where moderate levels of effect arise, some of which may be considered significant, while others can be justified as not significant. There is a threshold that hinges around professional judgement, which is applied to the relevant assessments. Moderate levels of effect have potential, subject to the assessor's professional judgement, to be considered as significant or not significant, depending on the sensitivity and magnitude of change factors evaluated.

5.1.1.5 These ‘moderate’ effect assessments are explained in detail in the SLVIA as part of the assessments of relevant receptors, where they occur, and have been further justified in the Applicant’s response to consultation comments, including those receptors falling along the closest sections of coastline, for example the seascape character areas SCA 25 Skokholm and SCA 26 Skomer. Despite the high sensitivity of the relevant receptors, the magnitude of change resulting from the Proposed Development on the closest receptors along the PCNP coastline was found to be either low or medium-low magnitude, and effects moderate/minor or moderate and not significant. **This is due to a number of factors influencing magnitude (and therefore significance), including the low numbers of turbines proposed, their long distance offshore, limited frequency of visibility in the prevailing conditions, the narrow field of view effected and retained panoramic views to the sea, along the coastline and to the islands of Skomer and Skokholm, and the presence of other man-made elements that are visible and already influence perceived character**. The Proposed Development would not have a defining effect on the relevant seascape character receptors or views and its effect is considered not significant on balance.

5.1.1.6 The geographic extent of effects within the PCNP is shown graphically in the Zone of Theoretical Visibility (ZTV). There are widespread areas of the PCNP with no visibility, where there will be no effects, particularly the landscape set back from the coastal edge. The main areas with visibility of the Proposed Development are described in the SLVIA as the south-west facing coastlines of the PCNP where effects are relatively contained to the coastal edges of specific areas at long distance from the Proposed Development, particularly between Skomer/Skokholm Islands, the Marloes and Dale coastline, parts of Outer Milford Haven and Freshwater West/Castlemartin. This does not represent the PCNP as a whole.

5.1.1.7 The maximum design scenario assessed in the SLVIA is for only seven turbines, located approximately 35 km from the mainland PCNP coastline, with a relatively small apparent scale and contained lateral spread on the horizon. Effects will only occur in certain weather and visibility conditions (‘very good’ or ‘excellent’ visibility). Not significant adverse effects of low or medium-low magnitude may be caused to certain special qualities of the PCNP in these areas, however these are limited to certain special qualities, such as its 'coastal splendour' and 'remoteness, tranquillity and wildness' and not all of the PCNP's special qualities. **Effects would not compromise the purposes of the PCNP designation, which will remain an area of high natural beauty with opportunities for understanding and enjoyment of its special qualities. The reasons for designating it as such would remain**. The residual effects are not sufficient in magnitude or frequency to compromise the purposes of designation or undermine the integrity of the PCNP.

5.1.1.8 The Applicant would point to the recent decision by the Secretary of State for the East Anglia TWO project (a 60--wind turbine offshore wind farm located approximately 32km from the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB)), which provides a relevant precedent (although one for a considerably larger project). The Examining Authority concluded that while there would be significant adverse effects on a number of special qualities and receptors of the AONB, these would not undermine the statutory purpose of the AONB and would not compromise the purposes of its designation. This is covered in the Secretary of State’s decision letter (para 7.29 – 7.35).

Chapter 6 Post-Consent Requirements

6.1 Purpose

6.1.1.1 The following sections clarify the Applicants position on post-consent requirements requested by NRW Advisory.

6.1.1.2 **Bathing Water Mitigation Plan** – the Applicant accepts the suggested post-consent requirement to submit a Bathing Water Mitigation Plan.

6.1.1.3 **HDD/Trenching Activities** – as presented under Chapter 3, the Applicant strongly opposes the post-consent requirement suggested by NRW Advisory for HDD activities (or OCT) to be limited to a Neap tide. This suggestion is unreasonable, disproportionate, technically unworkable and unnecessary for the scale of the potential impact. The assessment presented in the SEI concludes no measurable amount of sediment accumulation will occur on the Maerl beds, which NRW Advisory have acknowledged (Row 31, ORML2170 Technical and General Consultation Responses spreadsheet Further Clarifications v2.0). Even noting that Maerl are very sensitive to low levels of sediment deposition, as the HDD or trenching activities will result in **no** measurable amount of accumulation it does not translate that they be unreasonably restricted. For the projects preferred method at landfall this requirement would have implications on the operational success of the HDD, impact the bore path stability and introduce additional risks associated with the HDD operation that may result in HDD failure. This would have catastrophic consequences on project commissioning and is unreasonable given **no measurable amount of sediment accumulation will occur on the Maerl beds.**

6.1.1.4 **Multibeam Bathymetric Surveys** - the Applicant accepts a post-consent requirement for pre-construction and post construction monitoring to be carried out 1, 3 and 5 years after commissioning of the Project with a detailed morphological assessment carried out at year 5.

6.1.1.5 **Marine Biodiversity Enhancement Strategy** - the Applicant accepts a post-consent requirement that should trenching occur, as part of the Applicants commitment to account for any loss, a Marine Biodiversity Enhancement Strategy would be developed in consultation and agreement with NRW Advisory.

6.1.1.6 **Marine Mammal Mitigation Plan** – the SEI Addendum presented the Applicants commitment to adopting a piling mitigation zone of 500 m and the Applicant accepts that the MMMP will be updated with the information presented in the SEI post-consent. The Applicant also accepts that if UXO clearance is required a separate MMMP will be required.

6.1.1.7 **Outline Environmental Management Plan (Ornithology)** – The Applicant notes WTSWW response and has replied in the accompanying spreadsheet. However, the OEMP was drafted as a high level, outline plan and specifically those type of questions and issues would be resolved post-consent, via a working group including SNCBs and environmental non-governmental organisations such as WTSWW. Therefore, the Applicant reiterates its acceptance of a post-consent requirement that the final draft of the OEMP will be agreed in consultation with a working group comprising those organisations listed above.