



Record of a Habitats Regulations Assessment of a project

March 2016

OGN 200 Form 1

Document owner: Protected Sites Team, KSP

Version History:

Document Version	Date Published	Summary of Changes
1.0	March 2016	Document created

Review Date: February 2017

Record of a Habitats Regulations Assessment of a project

1. Project Details

1(a): Project details where an external party has applied to NRW for any form of authorisation	
Application reference number (if applicable)	ORML1938v1 (changes to ORML1938 HRA are in green font. The conservation advice packages for the sites have also been updated)
Date application received	Application accepted 13 October 2025
Applicant details	<i>Menter Môn Morlais Limited Neuadd Y Dref, Buckley Square, Llangefni, Gwynedd, Ynys Môn, LL77 7LR</i>
Activity proposed	<p>The Morlais Project (the Project) is a tidal stream demonstration project, which will have an installed capacity (MW) of 240 MW.</p> <p>The development of the Project will provide a consented tidal technology demonstration zone, specifically designed for the installation and commercial demonstration of multiple arrays of tidal energy devices. The Project will include permanent communal infrastructure for tidal technology developers which provides a shared route to a local grid connection via up to nine export cable tails, an onshore landfall substation at Ty Mawr, and an onshore electrical cable route to a grid connection substation at Orthios via a switchgear building at Parc Cybi.</p> <p>The Project will comprise an offshore development area including the Morlais Demonstration Zone (MDZ) covering an area of 35 km² in the eastern Irish Sea, combined with an export cable corridor with an area of 4.75 km² with landfall near Penrhos Feilw, plus associated onshore infrastructure contained within an onshore development area of 1 km².</p>

The Project encompasses both **offshore** (from MHWS seaward) and **onshore** works.

However, in line with Regulation 67(2) of the Habitat and Species Regulations this HRA does not consider the works outside the marine licensable area (i.e. landward of MHWS). As the landward works fall outside the marine licensable area, and will be assessed as part of the HRA assessment conducted by another Competent Authority as part of the TWA Order determination. Accordingly, only the marine elements of the proposal are given consideration unless there is a realistically conceivable impact pathway from the 'onshore' elements to a qualifying marine feature of a European/Ramsar site.

Marine project elements

Construction of the following

- Up to nine export cables;
- Up to nine export cable tails (shared with onshore components);
- Navigation and environmental monitoring equipment;
- Mooring and foundation structures; and
- Offshore electrical infrastructure, including submerged, floating or surface emergent hubs.
- Up to 620 tidal devices, each comprising:
 - Foundation or anchors on or within the seabed;
 - A supporting substructure or mooring;
 - One or more Tidal Energy Convertors (TEC); and
 - Cable connections.

As per variation application received in September 2025, the marine project is to include a device type that is a hybrid of the devices already described, being both Surface Emergent and Seabed Mounted (SESM).

The project description and design envelope parameters change are described in the following documents:

- [ORML1938v1 2. MOR-RHDHV-DOC-0004 ES Vol I Ch4 Project Description vF5.0](#)
- [ORML1938v1 - MOR-RHDHV-DOC-0127b Morlais Variation PDE Matrix V2](#)

A phased approach to deployment of tidal devices is proposed:

The Project will install arrays of tidal devices up to a potential maximum installed capacity of 240 MW. Build out to the Project's maximum installed capacity will be through a series of phases, with the number and scale of each phase of deployment linked to the agreed measures of the Environmental Mitigation and Monitoring Plan (EMMP), which is provided in **outline** (v.10) to support the Environmental Statement and consent application for

the Project. The implementation of mitigation, monitoring and management measures will be agreed with regulators. Indicative examples of potential phases of deployment are outlined below:

- *Phase 1*: Installed capacity (MW) at which no significant impact is predicted on marine mammals or diving birds using the MDZ. This commitment ensures an initial level of mitigation is in place at the start of the EMMP.

The scale of the Phase 1 deployment (MW) will be determined by the outcome of modelling of potential collision and encounter risk for marine mammals and diving birds, which is in turn dependent upon:

- The type of Tidal Energy Converters (TECs) to be installed in the array.
- The physical characteristics of the location of the array.

Phase 1 of deployment will be defined by the Potential Biological Removal (PBR) for bottlenose dolphin and the species collision limits provided by NRW advisory (2020), to ensure no significant impact on marine mammals or adverse effect on any designated sites with marine mammals as a qualifying feature.

- *Phase 2*: If the results of monitoring of the first phase of deployment do not indicate a significant effect on marine mammals (or birds), then the next phase of deployment would begin. An example of a commercial level of deployment for a second phase of deployment is suggested in the ES as 40MW;

- *Phase 3*: An example of the next commercial level of deployment of 100 MW is suggested, however, this is indicative;

- *Phase 4*: Deployment to the maximum installed capacity of 240 MW.

Repowering

During the life of the Project, several repowering events are predicted, during which up to half of the installed capacity (MW) may be replaced. This prediction allows for the ongoing development of tidal technology over time. A repowering event would also be subject to consideration under the EMMP.

The onshore elements of the development are provided for completion, acknowledging that it is the marine (offshore) elements that are the focus of this HRA (see above). Onshore development encompasses:

- Landfall works including transition pits;

	<ul style="list-style-type: none"> • Landfall substation at Ty Mawr (referred to as the Landfall Substation); • Cable installation from landfall to Landfall Substation; • Switchgear building at Parc Cybi (referred to as the Switchgear Building); • Grid connection substation at Orthios (referred to as the Grid Connection Substation); • Cable installation from Landfall Substation to Grid Connection Substation, via the Switchgear Building, including cable junction pits; • Temporary road and right of way closures; • Temporary laydown and construction areas, including fencing / walls, and accommodation; • Levelling works; and • Parking areas (including electric vehicle charging points) and site access.
Relevant legislation	<ul style="list-style-type: none"> • The Marine Licence application is under the Marine and Coastal Access Act (MCAA) 2009 and the Marine Works (EIA) Regulations • An application has also been made to the Planning Inspectorate Wales for a Transport and Works Act Order under the Transport and Works Act (TWA) 1992 <p>Other relevant legislation</p> <p>An application for deemed planning permission having due regard to the requirements of the Planning (Wales) Act 2015.</p> <p>An application for an EPS licence may be required for species listed under Annex IV of the Habitats Directive.</p> <p>The Town and Country Planning (EIA) (Wales) Regulations 2017</p>
Location	The location of the project is in the sea to the west of Holy Island on Anglesey. Shapefiles are provided in the document 'ORML1938 Morlais project location shapefile'
Application documents	The application is described in the following documents:

- Application for a Licence to undertake Marine Energy Works
- Environmental Statement (ES Volumes 1-3)
- Environmental Statement Non-Technical Summary
 - English version
 - Welsh version
- Information to Support a Habitats Regulations Assessment (**ISHRA**) MOR/RHDHV/DOC/0067(02)
- Water Framework Directive (WFD) Compliance Assessment (MOR/RHDHV/APP/00126a)

Since application, further information requests to the applicant have resulted in various updates and additional information being provided to support the application. Documents are highlighted within the report *01_MOR-RHDHV-DOC0107_Morlais Project Additional Environmental Information* which details those documents specifically relevant to the HRA as well as additional relevant documents received in February 2021, namely:

- HR Wallingford Coastal Processes Modelling report (MOR/HRW/DOC/0001)
- Metocean and Physical Processes ES Supplementary Note (MOR/RHDHV/DOC/0111)
- Metocean and Physical Processes Numerical Modelling Supplementary Note (MOR/RHDHV/DOC/0112)
- Marine Ornithology collision risk modelling note (MOR/RHDHV/DOC/0115) (03)
- Marine Ornithology revised collision risk modelling signposting document (MOR-RHDV-DOC-0153)
- Underwater noise modelling report (MOR/RHDHV/DOC/0116)
- Marine Mammals Underwater Noise modelling note (MOR/RHDHV/DOC/0117)
- Marine Mammals Addition collision risk modelling (MOR/RHDHV/DOC/0118)(02)
- Environmental Statement Non-Technical Summary addendum (MOR/RHDHV/DOC/0131)
- Cumulative Impact Assessment Matrix (MOR-RHDHV-DOC-0125) (04)
- Additional Information to Support Morlais Habitats Regulations Assessment (migratory fish) (MOR-MSP-DOC-003).
- Marine Mammals Revised Collision Risk Modelling signposting document (MOR-RHDHV-DOC-0154)

In addition to:

- Outline Environmental Mitigation and Monitoring Plan (oEMMP) (MOR/RHDHV/DOC/0072 v10)
- Outline Construction Environment Management Plan (CEMP)
- Marine Mammal Mitigation Protocol (MMMP)

Under the TWA Order a public inquiry was held between December 2020 and February 2021. At the inquiry closings a key document submitted by NRW was the 'Morlais Closing – NRW (Inquiry Doc 148). This is referred to within this HRA.

	<p>The following documents have been submitted/updated in support of variation ORML1938v1:</p> <ul style="list-style-type: none"> • ORML1938v1 1. MOR-MM-DOC-0135 Morlais ES Addendum v1.0 • ORML1938v1 2. MOR-RHDHV-DOC-0004 ES Vol I Ch4 Project Description vF5.0 • ORML1938v1 3. MOR-MM-DOC-0136 ES Vol II Ch4 Figure 4-5_Restricted_areas_plan_v5 • ORML1938v1 4. MOR-SLR-DOC-0004 Addendum to ES Vol I Chapter 24 SLVIA • ORML1938v1 5. MOR-SLR-DOC-0005 Addendum to ES Vol II Chapter 24 SLVIA Appendix A • ORML1938v1 6. MOR-SLR-DOC-0006 Addendum to ES Vol II Chapter 24 SLVIA Appendix B • ORML1938v1 - MOR-RHDHV-DOC-0127b Morlais Variation PDE Matrix V2
Environmental Statement	<p>Environmental Statement (ES Volumes 1-3) Further information submitted (see <i>01_MOR-RHDHV-DOC0107_Morlais Project Additional Environmental Information</i>)</p>
Pre-application correspondence	<p>Various as described in ES Volume 1: Chapter 6 (Consultation) <i>This included a Scoping Report (SC1804) and Scoping Opinion</i></p>
NRW team responsible for drafting this HRA report, and name of lead officer	<p>NRW Marine Licensing Team Maria Alvarez</p>

2. Determining the need for a Habitats Regulations Assessment

2.1 Is the whole of the project directly connected with or necessary to the management of one or more SPA, SAC or Ramsar sites, for the purposes of conserving the habitats or species for which the site(s) is/are designated?	No
2.2 Is there a possibility that the project could affect a different SPA, SAC or Ramsar site to the one(s) the project is intended to conserve?	n/a
2.3 Is it necessary to carry out an HRA?	Yes The application has received a Scoping Opinion (SC2502) on 01 July 20 which concludes that the assessment remains unchanged (valid) as a result of this variation.

3. Considering the likelihood of a significant effect (LSE)

3.1 Renewal of a permission on the same or more restrictive terms as the extant permission

Is this project a renewal of a current permission which complies with NRW approved criteria for ruling out significant effects of renewals (see section 6.2A of OGN 200) without conducting a project-specific LSE test?	No
---	-----------

3.2 Likelihood of significant effects (LSE) test

3.2.1 Which SPA, SAC or Ramsar sites might be affected by the seaward activities of the Project?	<p>Based on the project specification or information provided in the application, it is concluded that a number of SPA, SAC or Ramsar sites have features which could be affected by the Project. The LSE test was carried out against each of the relevant features of all sites listed below.</p> <p>SPA, SAC or Ramsar sites in bold indicate where a LSE was concluded for one or more qualifying features of the site:</p> <p>SACs</p> <p>Afon Eden - Cors Goch Trawsfynydd SAC Afon Gwyrfai a Llyn Cwellyn SAC Bristol Channel Approaches SAC Cardigan Bay/ Bae Ceredigion SAC Cemlyn Bay SAC Dee Estuary/ Aber Dyfrdwy SAC Glannau Mon: Cors heli / Anglesey Coast: Saltmarsh SAC Lleyn Peninsula and the Sarnau SAC Lundy SAC Murlough SAC North Anglesey Marine SAC North Channel SAC Pembrokeshire Marine/ Sir Benfro Forol SAC River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC The Maidens SAC West Wales Marine SAC Y Twyni o Abermenai i Aberffraw/ Abermenai to Aberffraw Dunes SAC</p> <p>SPAs and Ramsars</p> <p>Aberdaron Coast and Bardsey Island SPA Ailsa Craig SPA Anglesey Terns SPA</p>
---	---

Copeland Islands SPA

Dee Estuary SPA

Grassholm SPA

Irish Sea Front SPA

Liverpool Bay SPA

Morecambe Bay and Duddon Estuary SPA

Morecambe Bay Ramsar

Northern Cardigan Bay SPA

Puffin Island SPA

Ribble and Alt Estuaries SPA

Ribble and Alt Estuaries Ramsar

Skomer, Skokholm and the Seas off Pembrokeshire SPA

Transboundary

Lambay Island SAC

Lambay Island SPA

Howth Head Coast SPA

Ireland's Eye SPA

Roaringwater Bay and Islands SAC

Rockabill to Dalkey Island SAC

Saltee Islands SAC

Saltee Islands SPA

The potential for the proposal to affect the following European/Ramsar sites was also initially considered, but has been ruled out without further consideration within the screening assessment:

SACs:

Afon Teifi/River Teifi SAC (121km) (habitats, river lamprey, sea lamprey, brook lamprey, Atlantic salmon, otter, bullhead, floating water-plantain)

- Following screening assessment of SACs nearer to the proposal that encompassed one or more of these features (i.e. Afon Eden SAC, Afon Gwyrfa i Llyn Cwellyn SAC, River Dee and Bala Lake SAC, Dee Estuary SAC) and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, this more distant site was ruled out from further consideration.

Afon Tywi/ River Tywi SAC (~153km) (shad, river lamprey, sea lamprey, brook lamprey, otter, bullhead)

	<ul style="list-style-type: none"> • Following screening assessment of SACs nearer to the proposal that encompassed one or more of these features (i.e. Dee Estuary, River Dee and Bala Lake, Pembrokeshire Marine SAC) and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, this more distant site was ruled out from further consideration. <p>Cleddau Rivers SAC (~150km) (habitats, river lamprey, sea lamprey, brook lamprey, otter, bullhead)</p> <ul style="list-style-type: none"> • Following screening assessment of SACs nearer to the proposal that encompassed these features (i.e. Dee Estuary, River Dee and Bala Lake) and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, this more distant site was ruled out from further consideration. <p>Carmathen Bay and Estuaries SAC (>160km) (habitats, shad, river lamprey, sea lamprey, otter)</p> <ul style="list-style-type: none"> • As above <p>Endrick water SAC (>300km) (brook lamprey, river lamprey, Atlantic salmon)</p> <ul style="list-style-type: none"> • As above <p>Isles of Scilly Complex SAC (380km) (habitats, non-motile species, grey seal)</p> <ul style="list-style-type: none"> • Following screening assessment of SACs nearer to the proposal that encompassed one or more of these features (i.e. Afon Gwyrfai a Llyn Cwellyn SAC and Lundy SAC (Grey Seal)) and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, this more distant site was ruled out from further consideration. <p>Lleyn Seacliffs SAC (>35km) (habitats)</p> <ul style="list-style-type: none"> • Following screening assessment of SACs nearer to the proposal that encompassed habitat features e.g. Lleyn Peninsula and the Sarnau SAC (34km) and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, this more distant site was ruled out from further consideration <p>Menai Strait and Conwy Bay SAC (>25km) (habitats)</p> <ul style="list-style-type: none"> • Following screening assessment of SACs nearer to the proposal that encompassed habitat features, including soft sediment habitat features e.g. Abermenai to Aberffraw Dunes SAC and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, this more distant site was ruled out from further consideration. <p>River Bladnoch SAC (>160km) (Atlantic salmon)</p> <ul style="list-style-type: none"> • As above <p>River Camel SAC (>280km) (habitats, bullhead, otter, A. salmon)</p> <ul style="list-style-type: none"> • As above <p>River Derwent and Bassenthwaite Lake (160km) (habitats, non-motile species (floating water-plantain), river lamprey, sea lamprey, brook lamprey, otter, A. salmon)</p> <ul style="list-style-type: none"> • As above. This SAC also encompasses marsh fritillary butterfly; however, there is no conceivable impact pathway to this feature. <p>River Usk/ Afon Wysg SAC (>150km) (shad, river lamprey, sea lamprey, brook lamprey, otter, bullhead, A. salmon)</p> <ul style="list-style-type: none"> • As above
--	--

River Wye/ Afon Gwy SAC (>150km) (habitats, shad, river lamprey, sea lamprey, brook lamprey, otter, bullhead, A. salmon, white clawed crayfish)

- As above

Severn Estuary/ Môr Hafren SAC (>220km) (habitats, sea lamprey, river lamprey, twaite shad)

- As above

Solway Firth SAC (>175km) (habitats, sea lamprey, river lamprey)

- As above

Strangford Lough SAC (>120km) (habitats, non-motile species, harbour seal)

- Following screening assessment of SACs nearer to the proposal that encompassed habitats, non-motile species (e.g. Afon Gwyrfai a Llyn Cwellyn SAC) and harbour seal (e.g. Murlough SAC) it was concluded that there was no credible mechanism for an impact pathway from the proposal to lead to a likely significantly affect on harbour seal. Hence, the harbour seal feature from this more distant site is ruled out from further consideration.

A number of SACs located within the Celtic Seas OSPAR Region III which had grey seal as a qualifying feature but were beyond 200km from the MDZ, were initially considered. However, as the screening assessment of Lundy SAC (~260km) concluded no LSE for grey seal, these more distant SACs were not considered further.

- **Duvillaun Islands SAC**
- **Horn Head and Rinclevan SAC**
- **Inishbofin and Inishshark SAC**
- **Inishkea Islands SAC**
- **Monach Islands SAC**
- **Slieve Tooley/Tormore Island/Loughros Beg Bay SAC**
- **Slyne Head Islands SAC**
- **Treshnish Isles SAC**

Transboundary SACs:

Blasket Islands SAC (>510km) (habitats, otter, harbour porpoise, grey seal)

- Following screening assessment of SACs nearer to the proposal that encompassed **habitats** and **otter** (i.e. Afon Gwyrfai a Llyn Cwellyn SAC) and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, these features from this more distant site are ruled out from further consideration.
- Following screening assessment of Roaringwater Bay and Islands SAC (>400km), it was concluded that there was no credible mechanism for an impact pathway from the proposal to lead to a LSE on **grey seal** or **harbour porpoise**. Hence, these features from this more distant site are ruled out from further consideration.

Abers – Côtes des Légendes SAC (544km) (harbour porpoise)

- Initially considered as this site encompasses **harbour porpoise** from the Celtic and Irish Seas (CIS) marine mammal management unit. Following screening assessment of Roaringwater Bay and Islands SAC (>400km), it was concluded that there was no credible mechanism for an impact pathway from the proposal to lead to a LSE on **harbour porpoise**. Therefore, this more distant site was ruled out from further consideration, there being no credible mechanism to have an adverse effect on the harbour porpoise or any other features from this site.

Baie de Morlaix SAC (553km) (harbour porpoise, grey seal)

- as detailed for Abers – Côtes des Légendes SAC (see above).

Chaussee de Sein SAC (559km)

- as detailed for Abers – Côtes des Légendes SAC (see above).

Côte de Granit Rose-Sept-Iles SAC (551km)

- as detailed for Abers – Côtes des Légendes SAC (see above).

Mers Celtiques - Talus du golfe de Gascogne SAC (>500km) (harbour porpoise)

- as detailed for Abers – Côtes des Légendes SAC (see above).

Nord Bretagne SAC (>500km) (harbour porpoise)

- as detailed for Abers – Côtes des Légendes SAC (see above).

Ouessant- Molène SAC (540km)

- as detailed for Abers – Côtes des Légendes SAC (see above).

Slaney River Valley SAC (>140km) (habitats, lamprey, shad, A. salmon, freshwater pearl mussel, otter, harbour seal)

- As detailed for Strangford Lough SAC, Afon Teifi/River Teifi SAC and Afon Tywi/ River Tywi SAC (see above).

Tregor Goëlo SAC (578km)

- as detailed for Abers – Côtes des Légendes SAC (see above).

SPAs and Ramsars:

Lavan Sands, Conway Bay SPA (45 km) (oystercatcher, curlew, red breasted merganser, great crested grebe, redshank)

- Following screening assessment of SPAs nearer to the proposal that encompassed waterbirds and waders e.g. Liverpool Bay SPA, and the conclusion that there would be no credible mechanism for an impact pathway from the proposal to significantly affect these features, this more distant site was ruled out from further consideration.

Dee Estuary Ramsar (>75 km) (waterbirds)

- This site overlaps with the Dee Estuary SPA. However, unlike the SPA it only encompasses waterbirds. There is no mechanism for a impact pathway to occur on these Ramsar features and this site is not considered further.

3.2.2 Screening assessment

The screening assessment indicates the possible pathways through which the proposal may impact upon relevant designated sites (SPA, SAC or Ramsar) which have a marine feature. The assessment is made in view of the conservation objectives for the SPA, SAC or Ramsar site(s) concerned, as set out in either the current NRW Core Management Plan, or in NRW's extant advice issued under Regulation 35 (or 37) of the Conservation of Habitats and Species Regulations 2010 (or 2017) for a SPA, SAC or Ramsar site.

Relevant SPA, SAC or Ramsar sites, and their corresponding features, were initially considered and a screening assessment carried out upon each feature. Where a credible pathway, or pathways, existed which had the potential for a LSE on a feature or features of a designated site, then these were highlighted and carried through to the Appropriate Assessment (section 4).

Conversely, where no credible impact pathway(s) existed which could result in a LSE on a qualifying feature, or type of feature (e.g. habitats), then this feature was highlighted accordingly and not taken through to Appropriate Assessment.

In many cases, the same features, or types of features (e.g. habitats, non-motile species), were encompassed by multiple sites. Where it was assessed that no LSE would occur on a qualifying feature of a site, if this same feature occurred at a site further from the proposal, then this was generally removed from further consideration (see section 3.2.1). Such an approach avoided duplication of screening assessment upon qualifying features where no LSE had already been concluded at a site closer to the proposal. Consequent application of this approach meant that some sites were completely removed from the screening assessment process (see list provided in section 3.2.1).

Given the extensive ranges of marine mammals, migratory fish and seabirds, and the potential connectivity between designated sites, a number of SPA, SAC or Ramsar sites located 100 km or more from the proposal were considered within the screening assessment. Many of these more distant sites encompassed other designated features (habitats/species) in addition to those features with extensive ranges. The approach outlined above, allowed such features (habitats, non-motile species etc.) to be removed from the screening assessment, these having already been considered at sites closer to the proposal. For example, it was concluded that there was no credible mechanism for an impact pathway from the proposal to significantly affect habitats, floating water-plantain (non-motile species) and otter qualifying features of the Afon Gwyrfa i Llyn Cwellyn SAC (~33 km from the proposal). Hence, where these features existed as qualifying features of other more distant SAC or Ramsar sites, screened in due to the presence of migratory fish or marine mammal features, they were not considered further within the screening assessment (e.g. Afon Eden - Cors Goch Trawsfynydd SAC).

Other than marine mammals and seabird features, the screening assessment concluded that the proposal would not lead to a LSE on any qualifying features beyond 100 km from the development (see below). Beyond 200 km from the proposal, the screening assessment concluded that there was no credible mechanism for an impact pathway from the proposal to result in a LSE on any qualifying feature other than harbour porpoise (i.e. Bristol Channel Approaches SAC) and gannet (Ailsa Craig SPA). Beyond 400 km it was determined that there was no credible mechanism for an impact pathway to significantly affect any qualifying feature of a SPA, SAC or Ramsar site.

Since submission of the Marine Licence application by Menter Môn in November 2019, a peer-reviewed update to the Thaxter *et al* (2012) seabird foraging ranges has been published (Woodward *et al.*, 2019). In a number of instances the mean max foraging range for a species of seabird has changed, with many ranges showing an increase compared to those previously accepted (see Thaxter *et al.*, 2012). For example, the mean max foraging range for Manx Shearwater increased from 330km (Thaxter *et al.*, 2012) to 1346km (Woodward *et al.*, 2019).

Although this HRA acknowledges the updates to the mean max foraging range, given the approach outlined above, where qualifying seabird feature(s) of a site were assessed as no LSE then the same qualifying features at sites further from the development were not considered. Such an approach allowed a logical justification for not considering those sites beyond the limit of any reasonable impact pathway within the screening stage.

Impact pathways

Where there exists a reasonable mechanism for one or more impact pathways from the proposal to affect a qualifying feature of a SPA, SAC or Ramsar site, then an explanation of the pathway has been provided. If it was concluded that there is no credible mechanism for an impact pathway to occur on a qualifying feature then a full justification is given.

The impact pathways encompassed the following categories:

- Physical loss/gain of habitat
- Physical damage to habitat
- Physical damage to species
- Non-physical disturbance
- Toxic contamination
- Non-toxic contamination
- Biological disturbance

Generic text was then used to detail the impact pathway(s) identified as relevant to a qualifying feature or type of feature (e.g. habitats).

Colour coding of the '**impact pathway**' in column II was used as follows:

= There is no impact pathway from the proposal to the designated feature

= There is an impact pathway in principle, but significant effects from the proposal when considered alone can be ruled out

= There is an impact pathway and significant effects cannot be ruled out

Due to the large number of designated sites with one or more features which could be affected by the Project, the sites have been grouped alphabetically by SAC and then SPA/Ramsar

		Assessment of likelihood of significant effect	
		I Relevant conservation objectives	II Potential impact pathway
<p>Afon Eden - Cors Goch Trawsfynydd SAC (>100km) <i>(Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats, non-motile species and otter.)</i></p>			
<p>Atlantic salmon <i>Salmo salar</i></p>	<p>CONSERVATION OBJECTIVES FOR N2K SITES</p>	<p>This designated site is >100km to the southeast of the proposal. Therefore, there would be no direct or indirect disturbance of A. salmon at the location of the SAC or the supporting habitat (watercourse).</p> <p>There is no credible mechanism for an impact pathway from the proposal to significantly affect the watercourse and natural range of the SAC.</p> <p>Returning adult salmon may approach the SAC from a broad variety of directions i.e. from the south, up the Irish Sea, from the east through the Menai Strait, from the west across the Irish Sea and from the north and would therefore not be restricted to passage through the proposal site. Similarly, smolt leaving the SAC would not be constrained in their migratory pathways.</p> <p>It has been concluded during Appropriate Assessment that there would be no AEOSI, in relation to A. salmon, at the nearer site Afon Gwyrfai. Since it can be concluded</p>	

		that there is no LSE or no AEOSI for Afon Gwyrfai, then given the greater geographical distance to this site (Afon Eden - Cors Goch Trawsfynydd) and the numerous migration routes available it can be concluded that the risk to this site is also not significant.
Freshwater pearl mussel <i>Margaritifera margaritifera</i>	CONSERVATION OBJECTIVES FOR N2K SITES	<p>The favourable conservation status of this feature is partly dependent on the status of the A. salmon population of this SAC.</p> <p>It was assessed that there was no credible mechanism for an impact pathway from the proposal to significantly affect the watercourse or A. salmon of this SAC (see above). Hence, there is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC.</p>
Afon Gwyrfai a Llyn Cwellyn SAC (33km)		
<i>Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and /or of the Isoteo-Nanojuncetea</i>	CORE MANAGEMENT PLAN INCLUDING CONSERVATION OBJECTIVES FOR Afon Gwyrfai a Llyn Cwellyn Special Area of Conservation	There is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC.
<i>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation</i>	CORE MANAGEMENT PLAN INCLUDING CONSERVATION OBJECTIVES FOR Afon Gwyrfai a Llyn Cwellyn Special Area of Conservation	There is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC.

<p>Atlantic salmon <i>Salmo salar</i></p>	<p>CORE MANAGEMENT PLAN INCLUDING CONSERVATION OBJECTIVES FOR Afon Gwyrfai a Llyn Cwellyn Special Area of Conservation</p>	<p>This designated site is approximately 33km to the southeast of the proposal. Therefore, there would be no direct or indirect disturbance of A. salmon at the location of the SAC or upon the supporting habitat (watercourse).</p> <p>Returning adult salmon may approach the SAC from a broad variety of directions i.e. from the south, up the Irish Sea, from the west through the Menai Strait, and from the north and would therefore not be restricted to passage through the proposal site. Similarly, smolt leaving the SAC would not be constrained in their migratory pathways.</p> <p>As there is a large expanse of suitable migratory routes extending around the proposal and the estuary and the proposal does not lie on a direct migratory corridor (i.e. the mouth of the estuary) it is considered that salmon likely to be present in the MDZ which are associated with the SAC would be low in number. However, given that there is potential, albeit minimal, for a collision impact it is concluded that the proposal could lead to a likely significant effect on the Atlantic salmon feature of this site.</p> <p>Accordingly, the following impact pathway is considered relevant to this feature:</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>
<p>Floating water-plantain <i>Luronium natans</i></p>	<p>CORE MANAGEMENT PLAN INCLUDING CONSERVATION OBJECTIVES FOR Afon Gwyrfai a Llyn Cwellyn Special Area of Conservation</p>	<p>There is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC</p>
<p>European otter <i>Lutra lutra</i></p>	<p>CORE MANAGEMENT PLAN INCLUDING CONSERVATION OBJECTIVES FOR Afon Gwyrfai a Llyn Cwellyn Special Area of Conservation</p>	<p>This designated site is approximately 33km to the southeast of the proposal. Therefore, there would be no direct or indirect disturbance of otter at the site location.</p>

		<p>Modelling has predicted that any changes to coastal processes and hydrodynamics as a consequence of the proposal and associated activities would be negligible within the 'far-field' zone (Morlais ES, Chapter 7).</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on this feature</p>
<p>Bristol Channel Approaches SAC (222 km)</p>		
<p>Harbour Porpoise (<i>Phocoena phocoena</i>)</p>	<p>Bristol Channel Approaches pSAC: Draft Conservation Objectives and Advice on Activities</p>	<p>The proposed MDZ lies approximately 222km from the edge of this SAC. At this distance from the SAC there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC.</p> <p>The Celtic and Irish Seas Management Unit encompasses this designated site, acknowledging that individuals from this SAC have connectivity between other Welsh SACs (i.e. West Wales Marine SAC and North Anglesey Marine SAC), in addition to those beyond Welsh waters.</p> <p>Accordingly a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see impact pathways identified for the Bottlenose Dolphin feature for Cardigan Bay SAC below). These pathways are also relevant for Harbour Porpoise</p> <p>It is concluded that the proposal could lead to a likely significant effect on the Harbour Porpoise feature of this site.</p>

Cardigan Bay SAC (~100km) Note: screening assessments of designated sites nearer to the proposal than Cardigan Bay SAC has concluded no LSE for habitats and lamprey. Hence, these features are not considered further

**Grey seal
*Halichoerus
grypus***

[final-r37-cardigan-sac.pdf](#)

The largest grey seal breeding population in Wales is located along the West Wales coast, and the majority of pups are recorded on Ramsey Island, Skomer Island and along the North Pembrokeshire mainland between St David's Head and the Teifi Estuary (Strong *et al.* 2006).

As grey seal can travel extensive distances during their lifecycle the currently accepted management unit for this feature covers a large area (as depicted by OSPAR Region III). The management unit encompasses this SAC. It is acknowledged that individuals from this SAC have connectivity between relevant Welsh SACs proximal to the proposal (i.e. Llyn Peninsula and the Sarnau SAC (34km))

During 24 monthly surveys, carried out by Natural Power, of the MDZ between November 2016 and October 2018, four species of marine mammal were recorded in the survey area: harbour porpoise, Risso's dolphin *Grampus griseus*, bottlenose dolphin and grey seal. Harbour porpoise was the most frequently sighted marine mammal species and comprised 93% of all marine mammals recorded. A relatively small number of grey seals were recorded (3% of total sightings) throughout the survey period, with two individuals present within the Morlais Demonstration Zone.

During the 18 SEACAMS surveys conducted between January 2015 and December 2016, four species of marine mammal were also recorded in the survey area: harbour porpoise (88% of 142 sightings), bottlenose dolphin (2% of sightings), Risso's dolphin (3% of sightings) and grey seal (7% of sightings).

The distance of this SAC from the proposal is approximately 100km by sea. Therefore, there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the

		<p>SAC. This includes seal haul out locations associated with this SAC.</p> <p>Although distant from the proposal there is reasonable potential for grey seals from this SAC to utilise the MDZ area, this due to their connectivity between other Welsh SACs (e.g. Lleyn Peninsula and the Sarnau) and their extensive foraging ranges (see SCOS, 2014).</p> <p>The following impact pathways are considered relevant for this feature when they are beyond the SAC and within the MDZ:</p> <p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g.</p>
--	--	--

		<p>piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p> <p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p> <p>Given the above it is concluded that the proposal could lead to a likely significant effect on the grey seal feature of this site.</p>
--	--	---

**Bottlenose
dolphin**

For bottlenose dolphin, initial connectivity was considered possible between the project and any SAC within the Irish Sea MU (IAMMWG, 2015) i.e. the Lley Peninsula and the Sarnau SAC and Cardigan Bay SAC (~100km).

Lley Peninsula and the Sarnau SAC is the nearest designated site to the proposal that has bottlenose dolphin as a qualifying feature (~34km). However, there is recognised connectivity between each of the SAC populations. Previous studies have indicated that many of the bottlenose dolphins recorded off the north coast of Anglesey had previously been recorded from the Lley Peninsula and the Sarnau SAC and Cardigan Bay SAC (e.g. Veneruso and Evans, 2012 a).

During 24 monthly surveys, carried out by Natural Power, of the MDZ between November 2016 and October 2018, four species of marine mammal were recorded in the survey area: harbour porpoise, Risso's dolphin *Grampus griseus*, bottlenose dolphin and grey seal. Harbour porpoise was the most frequently sighted marine mammal species and comprised 93% of all marine mammals recorded

One group of bottlenose dolphin, consisting of an estimated 12 individuals, were recorded during the February 2018 survey (accounting for less than 1% of the total marine mammal sightings).

During the 18 SEACAMS surveys conducted between January 2015 and December 2016, four species of marine mammal were also recorded in the survey area: harbour porpoise (88% of 142 sightings), bottlenose dolphin (2% of sightings), Risso's dolphin (3% of sightings) and grey seal (7% of sightings).

The distance of this SAC from the proposal is approximately 100km by sea. Therefore, there would be no direct or indirect disturbance of this feature, or its

		<p>supporting habitats and species, at the location of the SAC.</p> <p>However, the impact pathways detailed for grey seal (see above) are all considered relevant for this feature when they are beyond the SAC and within the MDZ.</p> <p>Given the above it is concluded that the proposal could lead to a likely significant effect on the bottlenose dolphin feature of this site.</p>
<p>Cemlyn Bay SAC (~20km)</p>		
<p>Coastal Lagoons</p>	<p><u>BAE CEMLYN / CEMLYN BAY</u></p>	<p>At ~20km from the MDZ there would be no direct disturbance of these features at the location of the SAC.</p> <p>The features of this SAC are reliant in the long-term on the sustained percolating properties of the shingle ridge.</p> <p>Using the tidal resource modelling carried out by HR Wallingford (see Appendix 7.1, ES Volume III) the conclusions of the ES (chapter 7, ES Volume I) state that the magnitude of effects on tidal regime due to presence of turbines was negligible in the far-field zone. The far-field being defined as an area beyond several hundred metres from the project (see Section 7.4.1, para 28 of ES Volume I).</p> <p>The conclusions of the ES assessment were that all effects on coastal processes and therefore sediment transport were negligible in the far-field zone (chapter 7).</p> <p>Further coastal process modelling carried out by HR Wallingford in 2020 (Doc no. MOR/HRW/DOC/0001) has confirmed the assessments.</p> <p>Given the outputs of the qualitative and quantitative assessments carried out on coastal processes (see ES Chapter 7) it is concluded that there is no credible</p>

		<p>mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC.</p> <p>Therefore, there would be no likely significant effect from the proposal on these features</p>
<p>Perennial vegetation of stony banks</p>	<p>BAE CEMLYN / CEMLYN BAY</p>	<p>See above</p>
<p>Dee Estuary SAC (>75km) <i>(Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats and non-motile species. However, the broad habitat 'estuary' is acknowledged – the remaining habitat features all being a component of this broader feature).</i></p>		
<p>Estuary</p>	<p>DEE ESTUARY / ABER DYFRDWY</p>	<p>There is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC or any of the component habitat features.</p>

<p>River lamprey <i>Lampetra fluviatilis</i></p>	<p><u>DEE ESTUARY / ABER DYFRDWY</u></p>	<p>Although river lamprey migrate between freshwater and the sea they typically spend their entire life-cycle within, or in proximity to the mouth of the rivers in which they spawn (see Maitland, 2003). River lamprey migrate from freshwater to coastal waters as juveniles, although some remain permanent freshwater residents.</p> <p>This designated site is more than 75km to the east of the proposal. Therefore, there would be no direct or indirect disturbance of river lamprey at the location of the SAC. It has also been concluded that there would no direct or indirect effects on habitat features of the SAC (see above).</p> <p>This feature's proclivity for its natal river means it is less likely to travel far from this SAC, unlike the congeneric sea lamprey.</p> <p>Given the above, it is concluded that there is no credible mechanism for an impact pathway from the proposal to significantly affect this designated feature of the SAC. Hence, it is therefore concluded that there would be no likely significant effect.</p>
<p>Sea lamprey <i>Petromyzon marinus</i></p>	<p><u>DEE ESTUARY / ABER DYFRDWY</u></p>	<p>This designated site is more than 75km to the east of the proposal. Therefore, there would be no direct or indirect disturbance of sea lamprey at the location of the SAC. It has also been concluded that there would no direct or indirect effects on habitat features of the SAC (see above).</p> <p>Unlike river lamprey, sea lamprey can be dispersed widely from their natal rivers. Their parasitic nature means they are largely dependent on the movement of their host species. However, the comparatively larger sea lamprey often select large pelagic and/or oceanic hosts, such as cetaceans and elasmobranchs, resulting in wide dispersal at sea. According to JNCC factsheets the distribution range of sea lamprey does not cover the Isle of Anglesey (Morlais ES, 2019).</p>

		<p>Given the very low numbers of individuals likely to be present in the MDZ which are associated with the SAC , the very wide dispersal of individuals from the SAC population and that the proposal does not lie on a direct migratory corridor, (for juvenile sea lamprey of this SAC) it is concluded that there would be no likely significant effect, from the proposal, on this feature of the SAC.</p>
<p>Glannau Mon: Cors heli / Anglesey Coast: Saltmarsh SAC (>15km)</p>		
<p>Salicornia and other annuals colonizing mud and sand</p>	<p><u>GLANNAU MON: CORS HELI / ANGLESEY COAST: SALTMARSH</u></p>	<p>At >15km from the MDZ there would be no direct disturbance of these features, or their supporting habitats, at the location of the SAC.</p> <p>The dune habitat features of this SAC are reliant in the long-term on the sustained accretion of sufficient mud and sandy sediment.</p> <p>Using the tidal resource modelling carried out by HR Wallingford (see Appendix 7.1, Morlais ES Volume III) the conclusions of the ES (chapter 7, ES Volume I) state that the magnitude of effects on tidal regime due to presence of turbines was negligible in the far-field zone. The far-field being defined as an area beyond several hundred metres from the project (see Section 7.4.1, para 28 of ES Volume I).</p> <p>The conclusions of the ES assessment were that all effects on coastal processes and therefore sediment transport were negligible in the far-field zone (chapter 7).</p> <p>Further coastal process modelling carried out by HR Wallingford in 2020 (Doc no. MOR/HRW/DOC/0001) has confirmed the assessments.</p> <p>Given the outputs of the qualitative and quantitative assessments carried out on coastal processes (see Morlais ES, Chapter 7) it is concluded that there is no credible mechanism for an impact pathway from the proposal to significantly affect these features of the SAC</p>

		Therefore, there would be no likely significant effect from the proposal on these features
Atlantic salt meadows (Glaucopuccinellietalia maritimae)	GLANNAU MON: CORS HELI / ANGLESEY COAST: SALTMARSH	As above
Estuaries	GLANNAU MON: CORS HELI / ANGLESEY COAST: SALTMARSH	As above
Mudflats and sandflats not covered by seawater at low tide	GLANNAU MON: CORS HELI / ANGLESEY COAST: SALTMARSH	As above
Lambay Island SAC (85km) <i>Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats. Hence, habitat features are not considered further</i>		
Harbour Seal	<p>To maintain the favourable conservation condition of grey seal and harbour seal in Lambay Island SAC, which is defined by the following list of attributes and targets:</p> <ol style="list-style-type: none"> 1. Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use. 2. Breeding behaviour: The breeding sites should be maintained in a natural condition. 3. Moulting behaviour: The moult haul-out sites should be maintained in a natural condition. 4. Resting behaviour: The resting haul-out sites should be maintained in a natural condition 	<p>At 85km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This includes seal haul out locations associated with this SAC.</p> <p>The management unit OSPAR Region III encompasses this SAC.</p> <p>Due to potential foraging range of this species it has been considered that there is potential for LSE within 100km from the MDZ (see Morlais ISHRA, 2019).</p> <p>Given the above, a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see above detail for Cardigan Bay SAC).</p>

	<p>5. Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</p>	<p>It is therefore concluded that the proposal could lead to a likely significant effect on the harbour seal feature of this site.</p>
<p>Grey seal</p>		<p>At 85km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This includes seal haul out locations associated with this SAC.</p> <p>The management unit OSPAR Region III encompasses this SAC. It is acknowledged that individuals from this SAC may have connectivity between relevant Welsh SACs proximal to the proposal with grey seals as a qualifying feature (i.e. Lleyn Peninsula and the Sarnau SAC (34km)</p> <p>Although distant from the proposal there is reasonable potential for grey seals from this SAC to utilise the MDZ area, this due to their connectivity between other relevant SACs (e.g. Lleyn Peninsula and the Sarnau) and their extensive foraging ranges (see SCOS, 2014).</p> <p>Surveys carried out between 2015 and 2018 have recorded grey seal in the vicinity of the MDZ (see above detail for Cardigan Bay SAC).</p> <p>Given the above, a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see above detail for Cardigan Bay SAC).</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the grey seal feature of this site.</p>

<p>Lleyn Peninsula and the Sarnau / Pen Llŷn a'r Sarnau SAC (~34km) <i>Note: screening assessments of designated sites nearer to the proposal than Lleyn Peninsula and the Sarnau SAC has concluded no LSE for habitats. Hence, these features are not considered further</i></p>		
<p>Otter</p>	<p><u>PEN LLYN A'R SARNAU / LLEYN PENINSULA AND THE SARNAU</u></p>	<p>This designated site is approximately 34km to the south of the proposal. Therefore, there would be no direct or indirect disturbance of otter at the site location.</p> <p>Modelling has predicted that any changes to coastal processes and hydrodynamics as a consequence of the proposal and associated activities would be negligible within the 'far-field' zone (Morlais ES, Chapter 7).</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on this feature</p>

Bottlenose dolphin		<p>See above text for Cardigan Bay SAC.</p> <p>The distance of this SAC from the proposal is approximately 34km by sea. There would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC.</p> <p>However, the impact pathways detailed for the bottlenose dolphin feature of Cardigan Bay SAC are all relevant (see above)</p> <p>It is concluded that the proposal could lead to a likely significant effect on the bottlenose dolphin feature of this site.</p>
---------------------------	--	---

<p>Grey seal</p>		<p>The distance of this SAC from the proposal is approximately 34km by sea. There would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This includes seal haul out locations associated with this SAC.</p> <p>However, a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see detail for Cardigan Bay SAC, above).</p> <p>It is concluded that the proposal could lead to a likely significant effect on the grey seal feature of this site.</p>
<p>Lundy SAC (~260km)</p>		
<p>Grey seal</p>	<p>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;</p>	<p>At 260km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This</p>

	<ul style="list-style-type: none"> • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species, and, • The distribution of qualifying species within the site. 	<p>includes seal haul out locations associated with this SAC.</p> <p>As grey seal can travel extensive distances during their lifecycle the currently accepted management unit for this feature covers a large area (as depicted by OSPAR Region III). The management unit encompasses this SAC.</p> <p>Tracking of individual grey seals has shown that most foraging probably occurs within 100km of a haul-out site.</p> <p>Based on the foraging ranges for grey seal and the assessment of the telemetry data in and around the Irish Sea, it is concluded that at distances beyond 200km from the MDZ, the potential does not exist for a LSE to arise. There being no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC or any of the supporting habitat features.</p>
<p>Murlough SAC (116km) <i>Note: screening assessments of designated sites nearer to the proposal have concluded no LSE for habitat features nor is there any credible mechanism for an impact pathway to occur on marsh fritillary butterfly. Hence, these features are not considered further.</i></p>		
<p>Harbour seal</p>	<p>To maintain the harbour seal to favourable condition as defined by:</p> <p>Maintain (and if feasible enhance) population numbers and distribution of Harbour (Common) Seal.</p> <p>Maintain and enhance, as appropriate, physical features used by Harbour (Common) Seals within the site</p>	<p>At 116km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This includes seal haul out locations associated with this SAC.</p> <p>The management unit OSPAR Region III encompasses this SAC.</p> <p>Harbour seal exhibit relatively short foraging trips from their haul out sites (see Morlais ISHRA, 2019). Surveys carried out between 2015 and 2018 did not record any harbour seal in the vicinity of the MDZ (see above detail for Cardigan Bay SAC).</p>

		<p>Information on harbour seal at-sea movements and habitat use in southwest Ireland suggests a limited range, generally staying within 20 km of their haul-out site (Cronin <i>et al.</i>, 2008). Although occasional longer trips do occur, these are often associated with young animals dispersing from sites, and are not, therefore, considered to indicate repeated connectivity between SAC/Ramsar sites and the proposal (Morlais ISHRA, 2019)</p> <p>Due to the potential foraging range of this species and the lack of any records within the MDZ it has been considered that there is no potential for LSE on harbour seal features beyond 100km from the MDZ (see Morlais ISHRA, 2019).</p>
North Anglesey Marine SAC (0km)		
Harbour Porpoise	<u>NORTH ANGLESEY MARINE / GOGLEDD MÃ”N FOROL</u>	<p>The proposed MDZ lies within the North Anglesey Marine SAC. Therefore there is potential for direct and indirect disturbance of this feature, and its supporting habitats and species, at the location of the SAC.</p> <p>The impact pathways identified for the Bottlenose Dolphin feature of the Cardigan Bay SAC (see text above) are also relevant for the Harbour Porpoise feature.</p> <p>It is concluded that the proposal could lead to a likely significant effect on the Harbour Porpoise feature of this site.</p>
North Channel SAC (98km)		
Harbour Porpoise	To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters.	The proposed MDZ lies approximately 98km from the edge of this SAC. At this distance from the SAC there

	<p>In the context of natural change, this will be achieved by ensuring that:</p> <ul style="list-style-type: none">• Harbour porpoise is a viable component of the site;• There is no significant disturbance of the species; and• The condition of supporting habitats and processes, and the availability of prey is maintained.	<p>would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC.</p> <p>The Celtic and Irish Seas Management Unit encompasses this designated site, acknowledging that individuals from this SAC have connectivity between Welsh SACs (i.e. West Wales Marine SAC and North Anglesey Marine SAC), in addition to those beyond Welsh waters.</p> <p>Accordingly a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see impact pathways identified for the Bottlenose Dolphin feature for Cardigan Bay SAC above). These pathways are also relevant for Harbour Porpoise</p> <p>It is concluded that the proposal could lead to a likely significant effect on the Harbour Porpoise feature of this site.</p>
--	--	--

Pembrokeshire Marine SAC (>150km) Note: screening assessments of designated sites nearer to the proposal than Pembrokeshire Marine SAC has concluded no LSE for habitats, non-motile species, otter and lamprey. Hence, these features are not considered further for this site

Grey Seal

PEMBROKESHIRE MARINE / SIR BENFRO FOROL

The largest grey seal breeding population in Wales is located along the West Wales coast, and the majority of pups are recorded on Ramsey Island, Skomer Island and along the North Pembrokeshire mainland between St David's Head and the Teifi Estuary (Strong *et al.* 2006).

As grey seal can travel extensive distances during their lifecycle the currently accepted management unit for this feature covers a large area (as depicted by OSPAR Region III). The management unit encompasses this SAC. It is acknowledged that individuals from this SAC have connectivity between relevant Welsh SACs proximal to the proposal (i.e. Llyn Peninsula and the Sarnau SAC (34km)).

During 24 monthly surveys, conducted by Natural Power, of the MDZ between November 2016 and October 2018, four species of marine mammal were recorded in the survey area: harbour porpoise, Risso's dolphin *Grampus griseus*, bottlenose dolphin and grey seal. Harbour porpoise was the most frequently sighted marine mammal species and comprised 93% of all marine mammals recorded. A relatively small number of grey seals were recorded (3% of total sightings) throughout the survey period, with two individuals present within the Morlais Demonstration Zone.

During the 18 SEACAMS surveys conducted between January 2015 and December 2016, four species of marine mammal were also recorded in the survey area: harbour porpoise (88% of 142 sightings), bottlenose dolphin (2% of sightings), Risso's dolphin (3% of sightings) and grey seal (7% of sightings).

The distance of this SAC from the proposal is more than 150km by sea. Therefore, there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This

		<p>includes seal haul out locations associated with this SAC.</p> <p>Although distant from the proposal there is reasonable potential for grey seals from this SAC to utilise the MDZ area, this due to the connectivity between closer SACs (e.g. LLeyn Peninsula and the Sarnau) and their extensive foraging ranges (see SCOS, 2014).</p> <p>The following impact pathways are considered relevant for this feature when they are beyond the SAC and within the MDZ:</p> <p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g.</p>
--	--	---

		<p>piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p> <p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/ decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p> <p>Given the above it is concluded that the proposal could lead to a likely significant effect on the grey seal feature of this site.</p>
--	--	---

<p>Twaite Shad</p>		<p>This designated site is >150km to the south of the proposal. Therefore, there would be no direct or indirect disturbance of twaite shad at the location of the SAC or the supporting marine habitat.</p> <p>The main rivers with spawning grounds for twaite shad are located in south Wales e.g. Wye , Usk, Tywi and Severn (NRW, 2018).</p> <p>Although the known distribution of twaite shad covers Anglesey (JNCC species factsheets), the only UK SACs which have shad as qualifying features are in south and southwest wales.</p> <p>Returning adult shad may approach the SAC from a broad variety of directions i.e. from the south, up the Celtic and Irish Sea, from the east, and from the north and would therefore not be restricted to passage through the proposal site area. Similarly, juveniles leaving the SAC would not be constrained in their routes.</p> <p>Given the low numbers of individuals likely to be present in the MDZ which are associated with this SAC, the large expanse of suitable migratory/foraging areas extending around the proposal and Milford Haven, and that the proposal does not lie on a direct migratory corridor lead to the assessment that there is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC.</p>
---------------------------	--	--

<p>Allis Shad</p>		<p>Allis shad are considered rare off the coast of Anglesey and in North Wales. There are no known spawning populations of Allis shad in this region. Nor are there any recent records of this feature in Pembrokeshire Marine SAC or the River Tywi SAC (CCW Core Management Plan, 2008).</p> <p>The rare occurrence of Allis shad, even within the Pembrokeshire Marine SAC or the River Tywi SAC, leads to the conclusion that numbers of Allis shad within the MDZ would not be detectable and there would be no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC.</p> <p>Hence, it is concluded that there would be no likely significant effect from the proposal on the Allis shad feature of this SAC.</p>
<p>River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC (>80km) <i>(Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats, non-motile species (e.g. floating water-plantain) and otter. Hence, these features are not considered further)</i></p>		
<p>Atlantic salmon <i>Salmo salar</i></p>	<p><u>RIVER DEE AND BALA LAKE / AFON DYFRDWY A LLYN TEGID</u></p>	<p>This designated site is >80km to the east of the proposal. Therefore, there would be no direct or indirect disturbance of A. salmon at the location of the SAC or the supporting habitat (watercourse).</p> <p>There is no credible mechanism for an impact pathway from the proposal to significantly affect the watercourse and natural range of the SAC.</p> <p>Returning adult salmon may approach the SAC from a broad variety of directions i.e. from the south, up the Irish Sea, from the west through the Menai Strait, and from the north and would therefore not be restricted to passage through the proposal site. Similarly, smolt leaving the SAC would not be constrained in their migratory pathways.</p>

		<p>It has been concluded during Appropriate Assessment that there would be no AEOSI, in relation to A. salmon, at the nearer site Afon Gwyrfai. Since it can be concluded that there is no LSE or no AEOSI for Afon Gwyrfai, then given the greater geographical distance to this site (River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid) and the numerous migration routes available it can be concluded that the risk to this site is also not significant.</p>
<p>Brook lamprey <i>Lampetra planeri</i></p>	<p><u>RIVER DEE AND BALA LAKE / AFON DYFRDWY A LLYN TEGID</u></p>	<p>Brook lamprey are a resident freshwater species spending its whole lifecycle within the freshwater environment. At >80km from the proposal there is no credible mechanism for an impact pathway from the proposal to significantly affect this designated feature of the SAC or the supporting habitat (watercourse).</p> <p>It is therefore concluded that there is no potential for an LSE on the brook lamprey feature or the supporting habitat (watercourse) of this site.</p>

<p>River lamprey <i>Lampetra fluviatilis</i></p>		<p>Although river lamprey migrate between freshwater and the sea they typically spend their entire life-cycle within, or in proximity to the mouth of the rivers in which they spawn (see Maitland, 2003). River lamprey migrate from freshwater to coastal waters as juveniles, although some remain permanent freshwater residents.</p> <p>This designated site is >80km to the east of the proposal. Therefore, there would be no direct or indirect disturbance of river lamprey at the location of the SAC nor any effect on the supporting habitat (watercourse).</p> <p>This feature's proclivity for its natal river means it is less likely to travel far from River Dee SAC, unlike the congeneric sea lamprey.</p> <p>Given the above, it is concluded that there is no credible mechanism for an impact pathway from the proposal to significantly affect this designated feature of the SAC or the supporting habitat (watercourse) of this site. Therefore, no likely significant effect on this feature.</p>
<p>Sea lamprey <i>Petromyzon marinus</i></p>		<p>This designated site is more than 80km to the east of the proposal. Therefore, there would be no direct or indirect disturbance of sea lamprey at the location of the SAC. It has also been concluded that there would no direct or indirect effects on habitat features of the SAC (see above).</p> <p>Unlike river lamprey, sea lamprey can be dispersed widely from their natal rivers. Their parasitic nature means they are largely dependent on the movement of their host species. However, the comparatively larger sea lamprey often select larger pelagic and/or oceanic hosts, such as cetaceans and elasmobranchs, resulting in wide dispersal at sea.</p>

		Given the low numbers of individuals likely to present in the MDZ which are associated with the SAC , the very wide dispersal of individuals from the SAC population and that the proposal does not lie on a direct migratory corridor, (for juvenile sea lamprey of this SAC) it is concluded that there would be no likely significant effect, from the proposal, on this feature of the SAC.
Bullhead <i>Cottus gobio</i>	<u>RIVER DEE AND BALA LAKE / AFON DYFRDWY A LLYN TEGID</u>	There is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC. It is therefore concluded that there is no potential for an LSE on this designated species feature or the supporting habitat (watercourse) of the site.
Roaringwater Bay and Islands SAC (409km) <i>Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats and otter. Hence, habitat and otter features are not considered further</i>		
Harbour Porpoise	To maintain the favourable conservation condition of Harbour porpoise in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets: <i>Species range within the site should not be restricted by artificial barriers to site use</i> <i>Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site</i> The favourable conservation status of a species is achieved when:	The proposed MDZ lies approximately 409km from the edge of this SAC. At this distance from the SAC there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. The Celtic and Irish Seas Management Unit encompasses this designated site, and it is acknowledged that individuals from this SAC may have connectivity between SACs located closer to the MDZ but within the same MU. However, the next nearest SAC

	<ul style="list-style-type: none"> • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis 	<p>with Harbour Porpoise as a qualifying feature is the Bristol Channel Approaches SAC, this being almost 300km distant from the Roaringwater Bay and Islands SAC.</p> <p>Considering the high daily energy demands of harbour porpoise (Kastelein <i>et al.</i>, 1997) it has been estimated that a harbour porpoise could conceivably cover 400km in three days; however, this is considered unlikely and would make dependency or utilisation of the MDZ area highly unlikely for individuals from this SAC (see Morlais ISHRA, 2019).</p> <p>Given the above, it is concluded that there is no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC or any of the supporting habitat features.</p>
<p>Grey Seal</p>	<p>To maintain the favourable conservation condition of grey seal in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets:</p> <p><i>Species range within the site should not be restricted by artificial barriers to site use</i></p> <p><i>The breeding sites should be maintained in a natural condition</i></p> <p><i>The moult haulout sites should be maintained in a natural condition</i></p> <p><i>The resting haulout sites should be maintained in a natural condition</i></p> <p><i>The grey seal population occurring within this site should contain adult, juvenile and pup cohorts annually</i></p> <p><i>Human activities should occur at levels that do not adversely affect the grey seal population at the site</i></p> <p>The favourable conservation status of a species is achieved when:</p> <ul style="list-style-type: none"> • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and 	<p>The proposed MDZ lies approximately 409km from the edge of this SAC. At this distance from the SAC there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC.</p> <p>The largest grey seal breeding population in Wales is located along the West Wales coast, and the majority of pups are recorded on Ramsey Island, Skomer Island and along the North Pembrokeshire mainland between St David's Head and the Teifi Estuary (Strong <i>et al.</i> 2006). As grey seal can travel extensive distances during their lifecycle the currently accepted management unit for this feature covers a large area (as depicted by OSPAR Region III). The management unit encompasses this SAC.</p> <p>Tracking of individual grey seals has shown that most foraging probably occurs within 100km of a haul-out site. Based on the foraging ranges for grey seal and the assessment of the telemetry data in and around the Irish</p>

	<ul style="list-style-type: none"> • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis 	<p>Sea, it is concluded that at distances beyond 200km from the MDZ, the potential does not exist for a LSE to arise. There being no credible mechanism for an impact pathway from the proposal to significantly affect this feature of the SAC or any of the supporting habitat features.</p>
<p>Rockabill to Dalkey Island SAC (81 km) Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats. Hence, habitats features are not considered further</p>		
<p>Harbour Porpoise</p>	<p>To maintain the favourable conservation condition of Harbour porpoise in Rockabill to Dalkey Island SAC, which is defined by the following list of attributes and targets:</p> <p><i>Species range within the site should not be restricted by artificial barriers to site use</i></p> <p><i>Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site</i></p> <p>The favourable conservation status of a species is achieved when:</p> <ul style="list-style-type: none"> • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	<p>The proposed MDZ lies approximately 81km from the edge of this SAC. At this distance from the SAC there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC.</p> <p>The Celtic and Irish Seas Management Unit encompasses this designated site, acknowledging that individuals from this SAC have connectivity between Welsh SACs (i.e. West Wales Marine SAC and North Anglesey Marine SAC), in addition to those beyond Welsh waters.</p> <p>Accordingly a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see impact pathways identified for the Bottlenose Dolphin feature for Cardigan Bay SAC above). These pathways are also relevant for Harbour Porpoise. It is concluded that the proposal could lead to a likely significant effect on the Harbour Porpoise feature of this site.</p>
<p>Saltee Islands SAC (>170km) Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats. Hence, habitat features are not considered further</p>		

<p>Grey seal</p>	<p>To maintain the favourable conservation condition of grey seal and harbour seal in Saltee Islands SAC, which is defined by the following list of attributes and targets:</p> <ol style="list-style-type: none"> 1. Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use. 2. Breeding behaviour: The breeding sites should be maintained in a natural condition. 3. Moulting behaviour: The moult haul-out sites should be maintained in a natural condition. 4. Resting behaviour: The resting haul-out sites should be maintained in a natural condition 5. Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site. 	<p>At >170km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This includes seal haul out locations associated with this SAC.</p> <p>The management unit OSPAR Region III encompasses this SAC. It is acknowledged that individuals from this SAC could have connectivity between relevant Welsh SACs closer to the proposal with grey seals as a qualifying feature (i.e. Llyn Peninsula and the Sarnau SAC (34km)</p> <p>So although distant from the proposal, there is reasonable potential for grey seals from this SAC to utilise the MDZ area, due to their connectivity between other Welsh SACs (e.g. Llyn Peninsula and the Sarnau) and their extensive foraging ranges (see SCOS, 2014).</p> <p>Surveys carried out between 2015 and 2018 have recorded grey seal in the vicinity of the MDZ (see above detail for Cardigan Bay SAC).</p> <p>Given the above, a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see above detail for Cardigan Bay SAC).</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the grey seal feature of this site.</p>
------------------	--	---

The Maidens SAC (185km) <i>Note: screening assessments of designated sites nearer to the proposal than this SAC have concluded no LSE for habitats. Hence, habitat qualifying features are not considered further</i>		
Grey Seal	<p>The Conservation Objectives for The Maidens SAC (DAERA, 2017) for grey seal are:</p> <ul style="list-style-type: none"> • To maintain (or restore where appropriate) the grey seal to favourable condition. • To maintain (and if feasible enhance) population numbers and the distribution of grey seal. • To maintain and enhance, as appropriate, physical features used by grey seal within the site. 	<p>At 185km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC. This includes seal haul out locations associated with this SAC.</p> <p>The management unit OSPAR Region III encompasses this SAC. It is acknowledged that individuals from this SAC could have connectivity between relevant Welsh SACs closer to the proposal with grey seals as a qualifying feature (i.e. Lleyn Peninsula and the Sarnau SAC (34km)</p> <p>So although distant from the proposal, there is reasonable potential for grey seals from this SAC to utilise the MDZ area, due to their connectivity between other Welsh SACs (e.g. Lleyn Peninsula and the Sarnau) and their extensive foraging ranges (see SCOS, 2014).</p> <p>Surveys carried out between 2015 and 2018 have recorded grey seal in the vicinity of the MDZ (see above detail for Cardigan Bay SAC).</p> <p>Given the above, a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within, or in the vicinity of, the MDZ (see above detail for Cardigan Bay SAC).</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the grey seal feature of this site.</p>
West Wales Marine SAC (~32km)		
Harbour Porpoise	<u>WEST WALES MARINE / GORLLEWIN CYMRU FOROL</u>	The proposed MDZ lies approximately 32km from the edge of this SAC. At this distance from the SAC there

<p>(Phocoena phocoena)</p>		<p>would be no direct or indirect disturbance of this feature, or its supporting habitats and species, at the location of the SAC.</p> <p>The Celtic and Irish Seas Management Unit encompasses this designated site, acknowledging that individuals from this SAC have connectivity between other Welsh SACs (i.e. Bristol Channel Approaches SAC and North Anglesey Marine SAC), in addition to those beyond Welsh waters.</p> <p>Accordingly, a number of impact pathways are considered relevant for this feature when they are beyond the SAC and within the MDZ (see detail for Cardigan Bay SAC above).</p> <p>The impact pathways identified for the Bottlenose Dolphin feature of the Cardigan Bay SAC (see text above) are also relevant for this feature (Harbour Porpoise).</p> <p>It is concluded that the proposal could lead to a likely significant effect on the Harbour Porpoise feature of this site.</p>
<p>Y Twyni o Abermenai i Aberffraw/ Abermenai to Aberffraw Dunes SAC (>20km)</p>		
<p>Embryonic shifting dunes</p>	<p><u>Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES</u></p>	<p>At >20km from the MDZ there would be no direct disturbance of these features at the location of the SAC</p> <p>The dune habitat features of this SAC are reliant in the long-term on the sustained accretion of sufficient sandy sediment.</p> <p>Using the tidal resource modelling carried out by HR Wallingford (see Appendix 7.1, Morlais ES Volume III) the conclusions of the ES (chapter 7, ES Volume I) state that the magnitude of effects on tidal regime due to</p>

		<p>presence of turbines was negligible in the far-field zone. The far-field being defined as an area beyond several hundred metres from the project (see Section 7.4.1, para 28 of ES Volume I).</p> <p>The conclusions of the ES assessment were that all effects on coastal processes and therefore sediment transport were negligible in the far-field zone (chapter 7).</p> <p>Further coastal process modelling carried out by HR Wallingford in 2020 (Doc no. MOR/HRW/DOC/0001) has confirmed the assessments.</p> <p>Given the outputs of the qualitative and quantitative assessments carried out on coastal processes (see Morlais ES Chapter 7) it is concluded that there is no credible mechanism for an impact pathway from the proposal to significantly affect these features of the SAC.</p> <p>Therefore, there would be no likely significant effect from the proposal on these features</p>
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")	Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES	As above
Fixed dunes with herbaceous vegetation ('grey dunes')* (Habitats Directive priority feature)	Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES	As above
Dunes with <i>Salix repens</i>		As above

ssp. argentea (Salicion arenariae)	<u>Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES</u>	
Humid dune slacks	<u>Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES</u>	As above
Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition-</i> type vegetation	<u>Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES</u>	See above
Petalwort <i>Petallophyllum</i> <i>ralfsii</i>	<u>Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES</u>	<p>The FCS of this feature is dependent on the continued FCS of the humid dune slacks.</p> <p>The coastal processes assessments (see ES chapter 7) have concluded that the magnitude of effects in the far-field would be negligible and therefore the habitat features of this SAC would not be affected (see above)</p> <p>Further coastal process modelling carried out by HR Wallingford in 2020 (Doc no. MOR/HRW/DOC/0001) has confirmed the assessments.</p> <p>Therefore, there would be no likely significant effect from the proposal on this feature</p>
Shore dock <i>Rumex</i> <i>rupestris</i>	<u>Y TWYNI O ABERMENAI I ABERFFRAW / ABERMENAI TO ABERFFRAW DUNES</u>	<p>The FCS of this feature is linked to the continued FCS of the habitat features of this SAC.</p> <p>The coastal processes assessments (see ES chapter 7) have concluded that the magnitude of effects in the far-field would be negligible and therefore the habitat features of this SAC would not be affected (see above)</p>

		<p>Further coastal process modelling carried out by HR Wallingford in 2020 (Doc no. MOR/HRW/DOC/0001) has confirmed the assessments.</p> <p>Therefore, there would be no likely significant effect from the proposal on this feature</p>
<p>Aberdaron Coast and Bardsey Island SPA (~45km) Note: screening assessments of designated sites nearer to the proposal have concluded no LSE for habitat features (e.g. Lleyn Peninsula and the Sarnau SAC). Hence, habitat features which have functional linkages for these species are not considered further</p>		
Chough	<p><u>GLANNAU ABERDARON AC YNYS ENLLI / ABERDARON COAST AND BARDSEY ISLAND</u></p>	<p>At 45km from the MDZ there would be negligible disturbance of this feature, or its supporting habitats, at the location of the SPA.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this bird feature of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on this feature</p>
Manx shearwaters	<p><u>GLANNAU ABERDARON AC YNYS ENLLI / ABERDARON COAST AND BARDSEY ISLAND</u></p>	<p>At 45km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats, at the location of the SPA.</p> <p>The theoretical method of apportioning (SNH, 2018) indicates that >40% of the Manx shearwaters present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019).</p> <p>Hence, there are credible mechanisms for impact pathways to affect this mobile feature as result of the proposal (as identified for the Manx shearwater feature of the Irish Sea Front SPA, see above).</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the Manx Shearwater feature of this site</p>

Ailsa Craig SPA (210km)		
<p>Guillemot</p> <p>Kittiwake</p> <p>Herring gull</p> <p>Lesser black-backed gull</p> <p>Seabird breeding assemblage</p>	<p>To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and</p> <p>To ensure for the qualifying species that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species 	<p>At 210km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be beyond the range of all qualifying bird features of this site except gannet (see below).</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect these bird features of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features</p>
<p>Gannet</p>		<p>At 210km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be within the range of gannet (315km) originating from this SPA.</p> <p>Theoretical method apportioning (SNH, 2018) based on the Thaxter <i>et al</i> (2012) mean max foraging range indicated that approximately 34% of the gannets present in the MDZ and buffer zone are likely to originate from this SPA (Morlais ISHRA, 2019). Acknowledging the revised mean max foraging range (Woodward <i>et al.</i>, 2019), it is considered that a slightly increased proportion of this species present at the MDZ may originate from this SPA.</p>

		<p>Hence, there are credible mechanisms for impact pathways to significantly affect this mobile feature as a result of the proposal (impact pathways are as previously identified for the Manx shearwater feature of the Irish Sea Front SPA, see above).</p> <p>Therefore, it is concluded that the proposal could lead to a likely significant effect on the gannet feature of this site</p>
<p>Anglesey Terns SPA (0km – overlaps with MDZ)</p>		
<p>Arctic Tern</p>	<p><u>ANGLESEY TERNS / MORWENOLIAID YNYS MÃ’N</u></p>	<p>The proposed MDZ overlaps with the Anglesey Terns SPA. Therefore there is potential for direct and indirect disturbance of this feature, and its supporting habitats, at the location of the SPA.</p> <p>The Anglesey Terns SPA extended the Ynys Feurig, Cemlyn Bay and The Skerries SPA. At these specific locations the area above MHWs is also encompassed by the SPA.</p> <p>Both Ynys Feurig and The Skerries are approximately 10km from the MDZ. Terns use the maritime grassland present at each of these locations for nesting.</p> <p>The following impact pathways from the proposal are considered for these species:</p> <p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Construction, operation or decommissioning activities resulting in changes to prey availability. Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed (including intertidal and coastal areas) from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p>

		<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p> <p>It is concluded that the proposal could lead to a likely significant effect on the Arctic Tern feature of this site.</p>
Common Tern		As above
Sandwich Tern		As above
Roseate Tern		As above
Copeland Islands SPA (160km)		
Arctic Tern		

	<p>To maintain or enhance the population of the qualifying species Fledging success sufficient to maintain or enhance population To maintain or enhance the range of habitats utilised by the qualifying species To ensure that the integrity of the site is maintained; To ensure there is no significant disturbance of the species and To ensure that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species 	<p>At 160km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Thaxter <i>et al.</i>, 2012) indicates that the nearest point of the MDZ would be far beyond the range of Arctic Tern (24km).</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this bird feature of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on this feature</p>
<p>Manx Shearwater</p>		<p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be within the range of Manx Shearwater (1347km) originating from this SPA.</p> <p>Based on the Thaxter <i>et al</i> (2012) mean max foraging range, the theoretical method of apportioning (SNH, 2018) indicated that <1.5% of the Manx shearwaters present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019). Acknowledging the Woodward <i>et al</i> (2019) revised mean max foraging range for Manx Shearwater it is considered that a slightly increased proportion of the Manx Shearwater present may originate from this SPA.</p> <p>However, densities of Manx Shearwater recorded at the MDZ suggest that the proposal site is not an important foraging area for this species (see Morlais ISHRA, 2019).</p> <p>Given the above, it is concluded that there are impact pathways in principle but significant effects from the proposal when considered alone can be ruled out.</p>

		<p>The impact pathways taken forward for consideration for in-combination assessment are:</p> <p><i>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</i></p> <p><i>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</i></p>
<p>Dee Estuary SPA (~81km) <i>Note: screening assessments of designated sites nearer to the proposal (i.e. Liverpool Bay SPA) have concluded no LSE for waterbird features. Hence, waterbird features are not considered further</i></p>		
<p>Common tern (breeding)</p> <p>Little tern (breeding)</p> <p>Sandwich tern (passage)</p>	<p><u>THE DEE ESTUARY</u></p>	<p>At ~81km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be far beyond the range of Sandwich Tern (34km); Common Tern (18km); Little Tern (5km).</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this bird feature of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on this feature</p>
<p>Grassholm SPA (170km)</p>		
<p>Gannet</p>	<p><u>GRASSHOLM</u></p>	<p>At 170km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019)</p>

		<p>indicated that the nearest point of the MDZ would be within the range of gannet (315km) originating from this SPA.</p> <p>Theoretical method apportioning (SNH, 2018) based on the Thaxter <i>et al</i> (2012) mean max foraging range indicated that approximately 54% of the gannets present in the MDZ and buffer zone are likely to originate from this SPA (Morlais ISHRA, 2019). Acknowledging the revised mean max foraging range (Woodward <i>et al.</i>, 2019), the proportion is likely to be higher.</p> <p>Given the above, there are credible mechanisms for impact pathways to significantly affect this mobile feature as a result of the proposal (as previously identified for the Manx shearwater feature of the Irish Sea Front SPA, see above).</p> <p>Therefore, it is concluded that the proposal could lead to a likely significant effect on the gannet feature of this site</p>
Howth Head Coast SPA (80km)		
Kittiwake	<p>The conservation objective of this SPA (NPWS, 2017a) is to maintain or restore the favourable conservation status of species of special conservation interests, which for the purposes of this assessment covers a single species; kittiwake. This is achieved when:</p> <ul style="list-style-type: none"> • Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; • The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and • There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	<p>At 80km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats, at the location of the SPA.</p> <p>Theoretical method apportioning (SNH, 2018) indicated that >13% of the kittiwakes present in the MDZ and ECC may originate from this SPA (Morlais ISHRA, 2019).</p> <p>Hence, there are credible mechanisms for impact pathways to affect this mobile feature as result of the proposal (as given for the Manx shearwater feature of the Irish Sea Front SPA, see above).</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the Kittiwake feature of this site</p>

Ireland's Eye SPA (80km)		
Cormorant	<p>The conservation objective of this SPA (NPWS, 2018) is to maintain or restore the favourable conservation status of species of special conservation interests, which for the purposes of this assessment covers all qualifying bird species. This is achieved when:</p> <ul style="list-style-type: none"> • Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; • The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and • There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	<p>At 80km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2012) indicates that the nearest point of the MDZ would be beyond the range of Cormorant, Herring Gull and Guillemot from this SPA. Therefore, individuals from this SPA would not be expected to occur in the vicinity of the project.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect these bird features of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features</p>
Herring Gull		
Guillemot		
Razorbill		
Kittiwake		
		<p>A review by Woodward <i>et al.</i> (2019) resulted in mean max foraging range of these species changing from that used in ISHRA (Morlais, 2019) and derived from Thaxter <i>et al.</i> (2012). Kittiwake and Razorbill mean max range increased to 156km and 88.7km respectively. Guillemot decreased to 73.2km.</p> <p>The theoretical method of apportioning (SNH, 2018) indicated that <1% of the Kittiwakes present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019). Acknowledging the increased mean max range it is assumed that a slightly higher number of individuals from kittiwake population may be present in MDZ. A small number of razorbill may also be present. However, based on the relatively low numbers of individuals from either the kittiwake or razorbill populations that would use the MDZ area for foraging a LSE can be ruled out for all impact pathways on the</p>

		<p>basis that impacts on this SPA, if they did occur, are not concluded to lead to a LSE on these populations</p> <p>Given the above, it is concluded that there are impact pathways in principle, but significant effects from the proposal when considered alone can be ruled out.</p> <p>The impact pathways taken forward for consideration for in-combination assessment are:</p> <p><i>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</i></p> <p><i>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</i></p>
<p>Irish Sea Front SPA (~35km)</p>		
<p>Manx Shearwater</p>	<p>The conservation objective for this species is “to avoid significant deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, subject to natural change, thus ensuring that the integrity of the site is maintained in the long term and makes an appropriate contribution to achieving the aims of the Birds Directive for each of the qualifying species”. This would be achieved by delivering the following objectives:</p> <ul style="list-style-type: none"> • Avoid significant mortality, injury and disturbance of the qualifying features, so that the distribution of the species and ability to use the site are maintained in the long-term; • Maintain the habitats and food resources of the qualifying features in favourable condition; and • Ensure access to the site from linked breeding colonies. 	<p>At ~35km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats, at the location of the SPA.</p> <p>However, there are credible mechanisms for a number of impact pathways to affect this mobile feature as result of the proposal:</p> <p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Construction, operation or decommissioning activities resulting in changes to prey availability.</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed (including intertidal and coastal areas) from scour (including</p>

		<p>vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the Manx Shearwater feature of this site.</p>
<p>Lambay Island SPA (80km)</p>		
<p>Greylag Goose</p>	<p>The conservation objective of this SPA (NPWS, 2017a) is to maintain or restore the favourable conservation status of species of special conservation interests, which for the purposes of this assessment covers all qualifying bird species. This is achieved when:</p> <ul style="list-style-type: none"> • Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; • The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and • There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	<p>At 80km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats, at the location of the SPA.</p> <p>This features is not a marine bird species.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this bird feature of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on this feature</p>

<p>Cormorant</p> <p>Shag</p> <p>Herring Gull</p> <p>Guillemot</p>		<p>At 80km from the MDZ there would be no direct or indirect disturbance of these features, or its supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2012) indicates that the nearest point of the MDZ would be beyond the range of Cormorant, Shag, Herring Gull and Guillemot from this SPA. Therefore, individuals from this SPA would not be expected to occur in the vicinity of the project.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect these bird features of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features</p>
<p>Fulmar</p> <p>Lesser Black-backed Gull</p> <p>Razorbill</p> <p>Puffin</p>		<p>At 80km from the MDZ there would be no direct or indirect disturbance of these features, or its supporting habitats, at the location of the SPA.</p> <p>Theoretical method apportioning (SNH, 2018) indicated that approximately <1% of fulmars, 2% of lesser black-backed gulls and 2% of puffins present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019). A review by Woodward <i>et al.</i> (2019) resulted in mean max foraging range of these species changing from that used in ISHRA (Morlais, 2019) and derived from Thaxter <i>et al.</i> (2012).</p> <p>Acknowledging the changes to mean max range it is assumed that a slightly higher number of individuals from the fulmars, kittiwake and puffin populations and lower numbers of lesser black-backed gulls may be present in the MDZ. A small number of razorbill may also be present. However, based on the relatively low numbers of individuals from these populations that would use the MDZ area for foraging a LSE can be ruled out for all</p>

		<p>impact pathways on the basis that impacts on this SPA, if they did occur, are not concluded to lead to a LSE on these populations</p> <p>Given the above, it is concluded that there are impact pathways in principle on fulmar, razorbill, lesser black backed gull and puffin features, but significant effects from the proposal when considered alone can be ruled out.</p> <p>The impact pathways taken forward for consideration for in-combination assessment are:</p> <p><i>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</i></p> <p><i>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</i></p>
<p>Kittiwake</p>		<p>Theoretical method apportioning (SNH, 2018) indicated that approximately 16% of kittiwake present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019). However, a recent review by Woodward <i>et al.</i> (2019) resulted in mean max foraging range increasing for this species from that considered in ISHRA (Morlais, 2019) and derived from Thaxter <i>et al.</i> (2012).</p> <p>Given that >16% of kittiwakes present in the MDZ and ECC are likely to originate from this SPA (see above) it is concluded that the proposal could lead to a likely significant effect on the Kittiwake feature of this site. This is because there exists credible mechanisms for impact pathways to significantly affect this mobile feature as result of the proposal (see impact pathways as previously identified for the Manx shearwater feature of the Irish Sea Front SPA, see <i>above</i>).</p>

Liverpool Bay SPA (~35km)		
<p>Red throated diver (non-breeding)</p> <p>Common scoter (non-breeding)</p> <p>Little gull (non-breeding)</p> <p>Common tern (breeding)</p> <p>Little tern (breeding)</p> <p>Waterbird assemblage</p>	<p><u>LIVERPOOL BAY / BAE LERPWL</u></p>	<p>At ~35km from the MDZ there would be no direct or indirect disturbance of these features, or supporting habitats, at the location of the SPA.</p> <p>Both the Liverpool SPA and Northern Cardigan Bay SPA are designated for red throated diver. The boundaries for the SPAs were defined following kernel density estimation and maximum curvature analysis (Natural England and Countryside Council for Wales, 2010; NRW, 2015a). As such, the SPA boundaries represent a defined and justifiable cut-off point for their respective populations.</p> <p>Similarly, the Liverpool Bay SPA boundary represents a defined and justifiable cut-off point for the SPA population of Common Scoter.</p> <p>Little gull are passage birds to Britain and Ireland which do not usually breed here. Liverpool Bay representing a stop off point from countries such as Russia. Therefore, individuals from this SPA would be unlikely to be affected by the project.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be beyond the range of both tern features from this SPA. Therefore, individuals from this SPA would not be expected to occur in the vicinity of the project.</p> <p>The main components of the assemblage include all of the non-breeding qualifying features listed above, as well as an additional two species present in numbers exceeding 1% of the GB total: red-breasted merganser <i>Mergus serrator</i> and great cormorant <i>Phalacrocorax carbo</i>. At a distance of 35km from the MDZ, none of the waterbirds would be affected by the development. Currently accepted and published literature on mean</p>

		<p>max foraging ranges of seabirds (Woodward <i>et al.</i>, 2012) indicates that the nearest point of the MDZ would be beyond the range of the cormorant feature from this SPA.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect the bird features of this SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features.</p>
<p>Morecambe Bay and Duddon Estuary SPA (120km) <i>Note: screening assessments of designated sites nearer to the proposal (i.e. Liverpool Bay SPA) have concluded no LSE for waterbird features. Hence, waterbird features are not considered further</i></p>		
<p>Common Tern</p> <p>Little Tern</p> <p>Sandwich Tern</p> <p>Herring Gull</p> <p>Breeding seabird assemblage</p>	<p>The conservation objective of this SPA (Natural England, 2019) is, subject to natural change, to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</p> <ul style="list-style-type: none"> • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and • The distribution of the qualifying features within the site. 	<p>At 120km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>The breeding seabird assemblage supports a regular aggregation of 13,250 breeding pairs of seabirds (5 year peak mean 2011-2015), a decline from the original citation in 1997 of 20,336 pairs. The assemblage comprises of gulls and terns of the following species: black-headed gulls, lesser black-backed gulls, herring gulls, great black-backed gulls, little terns, Sandwich terns, common terns and arctic terns.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be beyond the range of black-headed gulls, herring gull and all tern features from this SPA. Therefore, individuals from this SPA would not be expected to occur in the vicinity of the project. Published data on great black-backed gull foraging ranges is not available. However, during the breeding season it is considered that none of these species would forage within the MDZ.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect these</p>

		<p>bird features of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features</p>
<p>Lesser black-backed gull</p>		<p>At 120km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>The theoretical method of apportioning (SNH, 2018) indicated that approximately 6% of the lesser black-backed gulls present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019). A review by Woodward <i>et al.</i> (2019) resulted in mean max foraging range of this species decreasing from that used in ISHRA (Morlais, 2019) and derived from Thaxter <i>et al.</i> (2012). However, the mean max for lesser black-backed gull is 127km and therefore overlaps with the MDZ. Therefore, individuals from this SPA are expected to occur in the vicinity of the project, although in slightly lower numbers than predicted through the apportioning method (Morlais ISHRA, 2019).</p>

		<p>Given that >5% of lesser black-backed gull present in the MDZ and ECC could originate from this SPA (see above) it is concluded that the proposal could lead to a likely significant effect on this feature of the site. This is because there exists credible mechanisms for impact pathways to significantly affect this mobile feature as result of the proposal (see impact pathways as previously identified for the Manx shearwater feature of the Irish Sea Front SPA, <i>see above</i>).</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the lesser black-backed gull feature of this site</p>
<p>Morecambe Bay Ramsar (120km) <i>Note: screening assessments of designated sites nearer to the proposal (e.g. Liverpool Bay SPA, Lambay Island SPA, Dee Estuary SAC) have concluded no LSE for waterbird features, habitat features and other relevant seabirds (i.e. cormorant). Hence, these features of the Ramsar are not considered further</i></p>		
<p>Sandwich Tern</p> <p>Herring Gull</p> <p>Breeding seabird assemblage</p>	<p>For these features the high level conservation objectives are as given for the Morecambe Bay and Duddon Estuary SPA above.</p>	<p>As above (see Morecambe Bay and Duddon Estuary SPA).</p>
<p>Lesser black-backed gull</p>		<p>As above (see Morecambe Bay and Duddon Estuary SPA).</p>
<p>Northern Cardigan Bay SPA (~45km)</p>		
<p>Red throated diver</p>	<p><u>NORTHERN CARDIGAN BAY / GOGLEDD BAE CEREDIGION</u></p>	<p>At 45km from the MDZ there would be no direct or indirect disturbance of this feature, or its supporting habitats, at the location of the SPA.</p> <p>Non-breeding red-throated diver is designated as a qualifying feature of the Northern Cardigan Bay SPA, the</p>

		<p>nearest boundary of which is located approximately 45 km to the south from the centroid of the MDZ, and the Liverpool Bay SPA, the nearest boundary of which is located approximately 35 km to the east from the centroid of the MDZ.</p> <p>Both SPAs are designated for concentrations of red-throated diver. The boundaries for the SPAs were defined following kernel density estimation and maximum curvature analysis (Natural England and Countryside Council for Wales, 2010; NRW, 2015a). As such, the SPA boundaries represent a defined and justifiable cut-off point for their respective populations (Morlais ISHRA, 2019)</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this bird feature of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on this feature</p>
<p>Puffin Island SPA (~55km)</p>		
<p>Cormorant</p>	<p><u>YNYS SEIRIOL / PUFFIN ISLAND</u></p>	<p>At ~55km from the MDZ there would be no direct or indirect disturbance of this feature at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2012) indicates that the nearest point of the MDZ would be beyond the accepted foraging range of cormorants (mean max 25km).</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect this bird features of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features</p>

<p>Ribble and Alt Estuaries SPA (120km) Note: screening assessments of designated sites nearer to the proposal (i.e. Liverpool Bay SPA) have concluded no LSE for waterbird features. Hence, waterbird features are not considered further</p>		
<p>Common Tern</p>	<p>The conservation objective of this SPA (Natural England, 2019) is, subject to natural change, to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</p>	<p>At 120km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p>
<p>Black headed gull</p>	<ul style="list-style-type: none"> • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and • The distribution of the qualifying features within the site. 	<p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2012) indicates that the nearest point of the MDZ would be beyond the range of black-headed gull and common tern features from this SPA. Therefore, individuals from this SPA would not be expected to occur in the vicinity of the project.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect these bird features of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features</p>
<p>Lesser black-backed gull</p>		<p>At 120km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>The theoretical method of apportioning (SNH, 2018) indicated that approximately 12% of the lesser black-backed gulls present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019). A review by Woodward <i>et al.</i> (2019) resulted in mean max foraging range of this species decreasing from that used in ISHRA (Morlais, 2019) and derived from Thaxter <i>et al.</i> (2012). However, the mean max for lesser black-backed gull is 127km and therefore overlaps with the MDZ. Therefore, individuals from this SPA are expected to occur in the vicinity of the project, although in slightly lower numbers than predicted through the apportioning method (Morlais ISHRA, 2019).</p>

		<p>Given that >10% of lesser black-backed gull present in the MDZ and ECC are likely to originate from this SPA (see above) it is concluded that the proposal could lead to a likely significant effect on this feature of the site. This is because there exists credible mechanisms for impact pathways to significantly affect this mobile feature as result of the proposal (see impact pathways as previously identified for the Manx shearwater feature of the Irish Sea Front SPA, see <i>above</i>).</p> <p>It is therefore concluded that the proposal could lead to a likely significant effect on the lesser black-backed gull feature of this site</p>
<p>Ribble and Alt Estuaries Ramsar (120km) <i>Note: screening assessments of designated sites nearer to the proposal (e.g. Liverpool Bay SPA, Lambay Island SPA, Dee Estuary SAC) have concluded no LSE for waterbird features, habitat features and other relevant seabirds (i.e. cormorant). Hence, these features of the Ramsar are not considered further</i></p>		
<p>Common Tern</p> <p>Black headed gull</p>	<p>For these features the high level conservation objectives are as given for the Ribble and Alt estuaries SPA above.</p>	<p>As above (Ribble and Alt Estuaries SPA)</p>
<p>Lesser black-backed gull</p>		<p>As above (Ribble and Alt Estuaries SPA)</p>

Saltee Islands SPA (170km)		
Cormorant Shag Lesser Black-backed Gull Herring Gull Guillemot Razorbill Puffin Kittiwake	<p>To maintain the favourable conservation condition of the following bird species:</p> <ul style="list-style-type: none"> • Cormorant • Shag • Lesser black-backed gull • Guillemot • Razorbill • Puffin • Gannet • Fulmar • Kittiwake <p>in the Saltee Islands SPA, as defined by the list of attributes and targets (see NPWS, 2011 (https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004002.pdf))</p>	<p>At 170km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be beyond the range of all these bird features.</p> <p>Given that there is no credible mechanism for an impact pathway from the proposal to significantly affect these bird features of the SPA or any of the supporting habitat features, it is concluded that there would be no likely significant effect from the proposal on these features</p>
Fulmar		<p>At 170km from the MDZ there would be no direct or indirect disturbance of this feature, or supporting habitats, at the location of the SPA.</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be within the range of gannet (315km) and fulmar (542km) originating from this SPA.</p> <p>Theoretical method apportioning (SNH, 2018) based on the Thaxter <i>et al</i> (2012) mean max foraging range indicated that approximately 4% of the gannets and <1% of the fulmars present in the MDZ and buffer zone are likely to originate from this SPA (Morlais ISHRA, 2019). Acknowledging the revised mean max foraging range</p>

		<p>(Woodward <i>et al.</i>, 2019), it is considered that a slightly increased proportion of these species present at the MDZ may originate from this SPA.</p> <p>As it is expected that <5% of fulmars present in the MDZ and ECC will originate from this SPA, and the densities of birds recorded suggest that this is not an important subtidal area for this species in general (Morlais ISHRA, 2019), it is concluded that there are impact pathways in principle but significant effects from the proposal when considered alone can be ruled out.</p> <p>The impact pathways taken forward for consideration for in-combination assessment are:</p> <p><i>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</i></p> <p><i>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</i></p>
<p>Gannet</p>		<p>At 170km from the MDZ there would be no direct or indirect disturbance of this feature, or supporting habitats, at the location of the SPA.</p> <p>However, as >5% of gannets present in the MDZ and ECC could originate from this SPA it is concluded that the proposal could lead to a likely significant effect on the gannet feature of this site.</p> <p>Impact pathways for gannet are as previously identified for the Manx shearwater feature of the Irish Sea Front SPA (see above).</p>

Skomer, Skokholm and the Seas off Pembrokeshire SPA (160km) <i>Note: screening assessments of designated sites nearer to the proposal (i.e. Liverpool Bay SPA) have concluded no LSE for waterbird features. Hence, waterbird features are not considered further</i>		
Lesser black-backed gull Puffin Breeding seabird assemblage	<u>SKOMER, SKOKHOLM AND THE SEAS OFF PEMBROKESHIRE / SGOMER, SGOGWM A MOROEDD PENFRO</u>	<p>At 160km from the MDZ there would be no direct or indirect disturbance of these features, or their supporting habitats, at the location of the SPA.</p> <p>During the breeding season this site regularly supports a total population of 394,260 seabirds including Razorbill, Guillemot, Kittiwake, Puffin, Lesser black-backed gull, Manx shearwater and Storm petrel</p> <p>Currently accepted and published literature on mean max foraging ranges of seabirds (Woodward <i>et al.</i>, 2019) indicates that the nearest point of the MDZ would be beyond the range of all species listed above except Manx Shearwater (mean max foraging range of 1346km) and Storm Petrel (336km). Therefore, with the exception of Manx Shearwater and Storm Petrel, seabird features from this SPA would not be expected to occur in the vicinity of the project</p>
Storm petrel		<p>The mean max foraging range of these species extends from this site into the MDZ. The theoretical method of apportioning (SNH, 2018) indicated that approximately 56% of the Manx shearwaters present in the MDZ and ECC are likely to originate from this SPA (Morlais ISHRA, 2019).</p>
Manx shearwater		<p>The theoretical method of apportioning was not carried out on Storm Petrel (Morlais ISHRA, 2019) as no mean max foraging range was previously available from the Thaxter <i>et al</i> (2012) study. However, as the MDZ is well within the Woodward <i>et al</i> (2019) mean max foraging range it is considered that many of the Storm Petrel present in the MDZ could originate from this site.</p>

		<p>Hence, there are credible mechanisms for impact pathways to significantly affect these mobile features as a result of the proposal (as previously identified for the Manx shearwater feature of the Irish Sea Front SPA, see above).</p> <p>Therefore, it is concluded that the proposal could lead to a likely significant effect on the Manx shearwater and Storm Petrel features of this site</p>
<p>BDMPS (UK Western Waters and Channel)</p>		
	<p>The following BDMPS bird populations were considered in the screening assessment:</p> <ul style="list-style-type: none"> • Fulmar • Guillemot • Gannet • Kittiwake • Puffin • Razorbill 	<p>Approximately 50% of the fulmars in the UK Western Waters BDMPS that are present in the MDZ and 2 km buffer zone during the non-breeding season may originate from one of 20 SPAs (Furness, 2015). During the non-breeding season, fulmar are present at very low density on the sea in the MDZ and ECC; <0.05 birds/km². As only half of a very small number of birds present are from a relatively large number of SPAs, LSE due to all impact pathways can be ruled out because any impacts, if they occur, are not likely to be significant for any of the SPAs in question (Morlais ISHRA, 2019).</p> <p>The UK Western Waters BDMPS for guillemot consists of 1,139,220 birds originating from approximately 26 SPAs. Approximately 76% of the population are from SPAs where guillemot is a qualifying feature (Furness, 2015). The density of birds on the sea within the MDZ during the non-breeding season is 3.506 birds/km². It is possible that due to the relatively close proximity of the MDZ and ECC to a non-designated breeding site, that lower numbers of SPA-qualifying birds are present than suggested by Furness (2015). Due to this, and the fact that a relatively small number of birds present are from a relatively large number of SPAs, LSE due to all impact pathways can be ruled out because any impacts, if they occur, are not likely to be significant for any of the SPAs in question (Morlais ISHRA, 2019).</p>

		<p>The gannets present in the MDZ during the non-breeding season will largely consist of birds from the UK Western Waters BDMPS. This population consists of >500,000 birds, of which >90% originate from SPAs (Furness, 2015). Gannet densities on the sea in the MDZ during the non-breeding are low; <0.1 birds/km². Despite the relatively low number of SPAs represented in this population, and the high proportion of birds from those SPAs within it, the low number of gannets present during the non-breeding season means that LSE due to all impact pathways can be ruled out because any impacts, if they occur, are not likely to be significant for any of the SPAs in question (Morlais ISHRA, 2019).</p> <p>Approximately 40-50% of kittiwakes present in the MDZ and 2 km buffer are likely to originate from a combination of >30 SPAs during the non-breeding season (Furness, 2015). During migration the population of the UK Western Waters plus Channel BDMPS is >900,000 birds, whilst during the winter period it is >600,000 birds. On-sea densities of this species were low outside the breeding season; <0.1 birds/ km². As only half of a very small number of birds present are from a large number of SPAs, LSE due to all impact pathways can be ruled out because any impacts, if they occur, are not likely to be significant for any of the SPAs in question (Morlais ISHRA, 2019).</p> <p>Puffins present in the MDZ and ECC during the non-breeding season will largely consist of birds from the UK Western Waters BDMPS. This population consists of 304,577 birds, of which approximately 92% are thought to originate from around 20 SPAs for which puffin is a designated feature. Puffin were absent on the sea in the MDZ at very low densities during the non-breeding season; and recorded at densities of <0.01 birds/km² in the 2 km buffer. As only half of a very small number of birds present are from a relatively large number of SPAs, LSE due to all impact pathways can be ruled out because any impacts, if they occur, are not likely to be</p>
--	--	---

		<p>significant for any of the SPAs in question (Morlais ISHRA, 2019).</p> <p>In the migration season the razorbill UK Western Waters BDMPS population consists of 606,914 birds, of which 71% originate from non-designated breeding sites. The non-breeding season population consists of 341,222 birds, of which approximately 81% of birds are from colonies in countries outside the Emerald site network or from non-SPA colonies within the UK (2%). The density of birds on the sea within the MDZ during the non-breeding season is 1.586 birds/km². As relatively small number of birds present are from a relatively large number of non-designated populations, LSE due to all impact pathways can be ruled out because any impacts, if they occur, are not likely to be significant for any SPAs represented in this population (Morlais ISHRA, 2019).</p> <p>Given the above, no LSE was concluded for all seabird populations considered in the screening assessment.</p>
--	--	--

3.2.3 Screening decision of the project 'alone'

The project is likely have a significant effect on one or more SPA, SAC or Ramsar sites and therefore an Appropriate Assessment is required.

4. Appropriate assessment of the project when considered alone

4.1 Assessment of project as currently defined

SPA, SAC or Ramsar sites were grouped according to qualifying features where screening had concluded a LSE was possible or could not be ruled out i.e. marine mammals, fish, seabirds and habitats. These were then ordered according to proximity of the designated site to the development, nearest to most distant.

Grouping by feature type facilitates advisor consultation. For example, all sites with harbour porpoise are considered first, followed by sites which encompassed bottlenose dolphin, grey seal or harbour seal. Cross-reference to a relevant assessment is facilitated through the grouping of features.

SPA, SAC or Ramsar designated site feature (from Table 3.2.2 – Amber rows only)	Impact pathway(s) and description of impact	Assessment in view of conservation objectives	Can adverse effect on site integrity be ruled out?
North Anglesey Marine SAC (0km)			
Harbour Porpoise	Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The supporting habitats and processes relevant to harbour porpoises and their prey are maintained. To avoid deterioration of the habitats of the harbour porpoise.</i></p> <p>The offshore development area (MDZ plus ECC) covers 39.75km² much of which is subtidal. The worst case scenario for temporary and permanent habitat loss is 0.42km² and 2.18km² respectively (Table 8-12, Morlais ISHRA).</p> <p>The harbour porpoise density estimate used in the assessments is 0.783 harbour porpoise per km² based on the SEACAMS data. This was agreed with NRW at the Marine Mammal Technical Working Group Meetings.</p>	Yes

		<p>The Gogledd Môn Forol/North Anglesey Marine SAC site covers an area of 3,249km² has been designated because of its importance to harbour porpoises in the summer months (April to September; 183 days) (JNCC <i>et al.</i>, 2019a).</p> <p>At any one time the maximum area of potential displacement of harbour porpoise as a result for changes in prey availability and temporary habitat loss could be up to 0.013% of the Gogledd Môn Forol/North Anglesey Marine SAC area, and from permanent habitat loss 0.07% of the SAC.</p> <p>Chapter 10 of the ES (section 10.6.5.2 – habitat loss effects; section 10.6.5.6 – collision risk effects) concluded minor adverse effects on fish receptors from the operational phase.</p> <p><i>It is concluded that the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Harbour Porpoise</p>	<p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The supporting habitats and processes relevant to harbour porpoises and their prey are maintained. To avoid deterioration of the habitats of the harbour porpoise.</i></p> <p>Using the tidal resource modelling carried out by HR Wallingford (see Appendix 7.1, ES Volume III) the conclusions of the ES (chapter 7, ES Volume I) state that the magnitude of effects on tidal regime due to presence of turbines would be negligible in the far-field zone. The far-field being defined as an area beyond several hundred metres from the project (see Section 7.4.1, para 28 of ES Volume I and the Metocean and Physical Processes ES Supplementary Note (document MOR/RHDHV/DOC/0111))</p> <p>The supplementary HR Wallingford report (document no. MOR/HRW/DOC/0001) supports the zones of influence considered in the ES and it is concluded that the HRA screening remains appropriate. The Metocean and Physical Processes Numerical Modelling Supplementary Note (document no. MOR/RHDHV/DOC/0112) confirm the findings of the assessment presented in the ES.</p> <p>Considering the vast foraging ranges of this feature, the general lack of soft sediment subtidal habitat features in the vicinity of the MDZ (with the exception</p>	<p>Yes</p>

		<p>of the sand bank to the north of the development), it is concluded that changes to habitat features beyond the near field zone, as a result of this pathway, would not affect the relevant conservation objective.</p> <p><i>As the achievement of the conservation objectives will not be affected, there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Harbour Porpoise</p>	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site.</i></p> <p>This assesses against potential vessel collision only</p> <p>Based on up to 16 vessels on site at any one time, with up to 16 vessel movements to and from the site per day. The maximum area of potential risk has been estimated based on construction vessels in indicative examples of the two largest potential deployment areas (3 km² and 3 km²); plus, vessels in ECC area (4.75 km²). In addition, increased collision risk has also been estimated based on the potential vessel route area to and from Holyhead Harbour, based on a precautionary 250 m buffer either side of the vessels (4.34 km²).</p> <p>Harbour porpoise are small and highly mobile and given their responses to vessel noise (e.g. Thomsen <i>et al.</i>, 2006; Evans <i>et al.</i>, 1993; Polacheck and Thorpe, 1990), are expected to largely avoid vessel collisions. The Heinänen and Skov (2015) report indicates a negative relationship between the number of ships and the distribution of harbour porpoise in the Celtic and Irish Seas, suggesting that the species could exhibit avoidance behaviour which reduces the risk of strikes.</p> <p>Of the 274 reported harbour porpoise strandings in 2015 (latest UK Cetacean Stranding's Investigation Programme (CSIP) Report currently available), 53 were investigated at post mortem (27 were conducted in England, 13 in Scotland and 13 in Wales). A cause of death was established in 51 examined individuals (approximately 96% of examined cases). Of these, four (8%) had died from physical trauma of unknown cause, which could have been vessel strikes (CSIP, 2015). Approximately 4% of all harbour porpoise post mortem examinations from the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS area) are thought to have evidence of interaction with vessels (Evans <i>et al.</i>, 2011).</p>	<p>Yes</p>

		<p>There is limited information on which to quantify the collision risk of marine mammals with vessels. Although the risk of collision is likely to be low, as a precautionary worse-case scenario, the number of harbour porpoise that could be at increased collision risk with vessels has been assessed based on precautionary 5% to 10% of the number of individuals, based on the strandings data, that could be present in the area potentially being at increased collision risk.</p> <p>As a worst-case scenario 0.59-1.18 harbour porpoise could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port.</p> <p>Using the SCANS III and Irish ObSERVE surveys from 2016 results in a population estimate of 62,506 for the Celtic & Irish Seas (CIS) MU. This estimate suggests a decline in the population by 36,301 over an 11 year period (IAMMWG, 2015).</p> <p>Thus the worst case scenario represents 0.0009-0.002% of the CIS MU. Rounding the values up from 0.59 and 1.18 to 1 and 2 individuals would represent 0.002 and 0.003 % of the CIS MU.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Harbour Porpoise</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site.</i></p> <p>This assesses against turbine collision (operation)</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>Predictive modelling was used. This stage of the assessment is based on the 240MW scenario and does not acknowledge '<i>phased development</i>' which is considered a key mitigation measure. An avoidance rate of 98% has been assumed</p>	<p>No</p>

		<p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 408 individuals per year (0.65% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 519 individuals per year (0.83% of the MU).</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 0.83% of the harbour porpoise MU (519 harbour porpoise) could be at risk, based on 98% avoidance without mitigation including the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>Bycatch in fisheries is the biggest source of anthropogenic mortality for several marine mammal species. In the case of harbour porpoise and grey seals, estimates of bycatch occurring in the relevant MU indicate that these populations may already be suffering anthropogenic mortality which exceeds sustainable levels calculated either through Potential Biological Removal (PBR) or a 1% threshold. Under Article 17 of the Habitats Directive, individual Member States' report FCS using Favourable, Unfavourable Inadequate or Unfavourable-Bad categories to which quantitative definitions/thresholds have been ascribed. A 1% change per year is used to define whether there is a significant change to the population.</p> <p>Based on the information provided there is considerable uncertainty regarding the affect on the harbour porpoise population from the removal of 519 harbour porpoise per annum.</p> <p><i>Given the above conclusions for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and the conservation objectives for the North Anglesey Marine SAC</i></p>	
<p>Harbour Porpoise</p>	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p>	<p>No</p>

	phase) resulting in physical damage (or mortality) to species from collision	<p>This assesses against collision risk from vessels and turbines</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the North Anglesey Marine SAC</i></p>	
Harbour Porpoise	Presence of turbine mooring lines resulting in entanglement	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p> <p>To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling <i>et al.</i>, 2013; Isaacman and Daborn, 2011)</p> <p>Work by Benjamins <i>et al.</i> (2014) provides a qualitative assessment of relative entanglement risk across different marine megafauna groups, concluding that for the mooring scenarios which most represent those likely to be used at MDZ (i.e. catenary & chain or tension mooring, with or without accessory buoy), the risk to harbour porpoise is low.</p> <p>The tidal devices and moorings would receive regular checks (approximately 15 times annually for both planned and unplanned maintenance activities), this would ensure that there was no material such as discarded nets, ropes or other debris which could increase the risk of entanglement for marine mammals or interfere with the optimal operation of the tidal devices.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	Yes
Harbour Porpoise	Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury	<p>Relevant conservation objective(s) to impact pathways:</p> <p><i>The species is a viable component of the site</i></p> <p>The assessments within the HRA have been based on the worst-case scenario for similar activities at similar sites at the nearby Wylfa Newydd Development Area, the Perpetuus Tidal Energy Centre (PTEC) off the coast of the Isle of Wight, MeyGen in the Inner Sound of the Pentland Firth and offshore wind farms in the Southern North Sea (further details of the underwater noise</p>	Yes

		<p>modelling undertaken for these sites is provided in Chapter 12, Marine Mammals, Volume I of the ES).</p> <p>As a worst-case scenario, based on two percussive drilling rigs, two cable laying activities, two rock placement activities and up to 16 large vessels in the MDZ, the maximum area for potential risk of auditory injury in harbour porpoise, without any mitigation, is 0.12km², which could affect up to 0.09 individuals (0.00014% for the MU). This represents up to 0.004% of the Gogledd Môn Forol/North Anglesey Marine SAC area.</p> <p>Underwater noise modelling specific to the development was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Harbour Porpoise</p>	<p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There is no significant disturbance of the species. Significant defined as excluding harbour porpoise from more than:</i></p> <ul style="list-style-type: none"> • 20% of the relevant area of the site in any given day, and • an average of 10% of the relevant area of the site over a season <p>As a precautionary approach the maximum area of potential disturbance has been assessed for underwater water noise from operational turbines for the full deployment (240MW) at the same time as underwater water noise from any construction activities, maintenance and repowering activities and vessels, based on the worst-case scenarios and maximum potential ranges for two drilling activities, two cable laying activities, two cable protection activities and up to 16 vessels. It has been assumed that these activities could be undertaken throughout the summer period.</p>	<p>No</p>

		<p>Underwater noise modelling was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p>However, given the lack of information on the range of potential disturbance impact, and the uncertainty over accuracy of the information presented (MOR/RHDHV/DOC/0116 and MOR-RHDHV-DOC-0117), it is not currently possible to assess the likely impact footprint of disturbance from operational noise, which will occur for the duration of the project.</p> <p><i>Given the above conclusions an AEOSI cannot be ruled out upon the harbour porpoise population and the conservation objectives for the North Anglesey Marine SAC</i></p>	
<p>Harbour Porpoise</p>	<p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There is no significant disturbance of the species. Significant defined as excluding harbour porpoise from more than:</i></p> <ul style="list-style-type: none"> • 20% of the relevant area of the site in any given day, and • an average of 10% of the relevant area of the site over a season <p>Acoustic deterrent devices (ADDs) may be used as part of the mitigation plan to deter marine mammals for coming too close to operational turbines and to reduce the potential collisions risk.</p> <p>Their use is assumed here even though this links to mitigation which is not usually encompassed within this section of the HRA</p> <p>There is currently considerable uncertainty over the accuracy of information presented on ADDs, including the disturbance range from up to 40 devices, the likely deployment and configuration of the ADD array. It is therefore not possible to assess the likely impacts from ADDs</p> <p><i>Given the above conclusions an AEOSI cannot be ruled out upon the harbour porpoise population and the conservation objectives for the North Anglesey Marine SAC</i></p>	<p>No</p>

<p>Harbour Porpoise</p>	<p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There is no significant disturbance of the species</i></p> <p>Underwater noise could have the potential to create a barrier effect, preventing movement or migration of marine mammals between important feeding and / or breeding areas, or potentially increasing swimming distances if marine mammals avoid the site and go around it. Similarly, the physical presence of the tidal array could have the potential to create a physical barrier.</p> <p>The worst-case scenario in relation to barrier effects as a result of underwater noise is based on the maximum spatial and temporal (i.e. longest duration) scenarios. This assumes the maximum potential disturbance and possible barrier effects that there could be at any one time.</p> <p>The maximum area of potential disturbance for underwater water noise from operational turbines for the full deployment (240MW) at the same time as underwater water noise from any construction activities, maintenance and repowering activities and vessels, based on the worst case scenarios and maximum potential ranges for two drilling activities, two cable laying activities, two cable protection activities and up to 16 vessels is up to 19.24km², which could affect up to 15 individuals (0.02% of the MU)</p> <p>At any one time the maximum area of potential disturbance could be up to 0.6% of the Gogledd Môn Forol/North Anglesey Marine SAC area. Assuming that these activities, as a worst-case scenario, would be undertaken throughout the summer period (183 days), the maximum seasonal average would be 0.6%. Any displacement of harbour porpoise would not exceed 20% of the seasonal component of the SAC area in any given day or on average exceed 10% of the seasonal component of the SAC area over the duration of that season..</p> <p>The estimated maximum area taken up by all arrays, including spaces between devices (i.e. not the seabed footprint) of up to 12.5km² for the full 240MW capacity project. The number of harbour porpoise that could be at risk of potential barrier effects based on the maximum area of 12.5km² is 10 individuals (0.016% of the MU). At any one time the maximum area of potential disturbance as a result of potential physical barrier effects could be up to 0.4% of the Gogledd Môn Forol/North Anglesey Marine SAC area. Based on the</p>	<p>Yes</p>

		<p>effects throughout the summer period (183 days), the maximum seasonal average would be 0.4%. Any displacement of harbour porpoise would not exceed 20% of the seasonal component of the SAC area in any given day or on average exceed 10% of the seasonal component of the SAC area over the duration of that season.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
Harbour Porpoise	<p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There is no significant disturbance of the species</i></p> <p>Potential pathways for effects from electromagnetic fields (EMF) would be from the presence of cables within the MDZ and ECC. Modelling of expected magnetic fields by Normandeau <i>et al.</i> (2011) indicates that the predicted fields were strongest directly over the cables and decreased rapidly with vertical and horizontal distance from the cables.</p> <p>As a precautionary approach, the number of harbour porpoise that could be affected by any potential EMF effects is up to 0.03 individuals (0.00005% of the MU) based on the maximum cable area (0.042km²) in the MDZ and ECC.</p> <p>At any one time the maximum area of potential disturbance as a result of potential physical barrier effects could be up to 0.0013% of the Gogledd Môn Forol/North Anglesey Marine SAC area. Based on the effects throughout the summer period (183 days), the maximum seasonal average would be 0.0013%. Any displacement of harbour porpoise would not exceed 20% of the seasonal component of the SAC area in any given day or on average exceed 10% of the seasonal component of the SAC area over the duration of that season.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	Yes
Harbour Porpoise	<p>Spillage of fluids, fuels and/or construction materials during</p>	<p>Relevant conservation objective(s) to impact pathway:</p>	Yes

	<p>installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>	<p><i>There is no significant disturbance of the species</i></p> <p><i>The supporting habitats and processes relevant to harbour porpoises and their prey are maintained. To avoid deterioration of the habitats of the harbour porpoise.</i></p> <p>The maximum envisaged effect associated with sediment plumes arising from the foundation installation activities will cause a small increase in suspended sediment concentration (typically less than 1mg/l a short distance from the release point) over only a small geographical area (a few hundred metres). The effects will be temporary, with a return to very low background concentrations occurring rapidly upon cessation of installation activities (i.e. the effect is temporary only).</p> <p>The free-laying of cables and the placement of cable protection would not cause plumes along the offshore sections of the cable corridor because the sea bed is characterised by bedrock or, where sparse sediment cover does exist, by sediments with a particle size that cannot be suspended in the water column.</p> <p>In the nearshore, the bedrock is overlain by sand which has the potential to be disturbed. The assessment in Chapter 8, Marine Water and Sediment Quality (Volume I of the ES), indicates that there could be a minor adverse (not significant) impact via increased suspended sediments in the area around the sandwave field and close to shore. However, the likely increase in suspended sediment concentration in areas with sand cover nearer to shore (including at the landfall) will remain within the natural variation that are governed by storm waves and surge effects. Any increase in suspended sediments would reduce rapidly with distance from the point of disturbance to a few mg/l over a small geographical area (within a few hundred metres, along the axis of tidal currents). Furthermore, these effects will be one-off and temporary in duration, with a return to the very low background concentrations occurring rapidly upon cessation of installation.</p> <p>The re-suspension of sediments during construction activities could also lead to the release of any contaminants that may be present within them. Sediment contamination within the MDZ is low, due to the dynamic hydrological regime and generally low level of industrial activity in this region. The low proportion of fine sediments within the MDZ is another factor that indicates low sediment contamination levels. Therefore, the assessment determined a negligible impact on general water quality in the MDZ via release of contaminated sediments, as even though mobilisation of the relatively limited amount of sediments in the</p>	
--	--	---	--

		<p>MDZ will occur via construction works, none of these sediments are known to have high levels of contaminants.</p> <p>During construction there is the potential for changes in water quality as a result of accidental discharge and spillage of oils, fuels and materials. However, Menter Môn is committed to the use of best practice and pollution prevention guidelines at all times. A Marine Pollution Contingency Plan (MPCP) would be in place and agreed with NRW in line with the Integrated Pollution Prevention and Control (IPPC) Directive such that any potential risk is minimised. Any permitted discharges would be small volumes, intermittent and dilute and disperse quickly. If any such substances were accidentally released/leaked, quantities would likely be small due to relatively small amounts being present in individual devices. Due to the dynamic nature of the tidal and wave regime in and around the MDZ, lateral and vertical dispersion rates of any spilled substances would be expected to be high.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
West Wales Marine SAC (32km)			
Harbour Porpoise	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage</p>	<p>The relevant conservation objectives are the same as above for North Anglesey Marine SAC for each Impact Pathway listed.</p> <p>As the MDZ is not located in the Gorllewin Cymru Forol/West Wales Marine SAC, there is no potential disturbance effects in relation to the area of the SAC.</p> <p>As the West Wales Marine SAC is within the same MU for harbour porpoise and only 32 km distant from the MDZ, the potential effects on the Gorllewin Cymru Forol/West Wales Marine SAC are the same as given for the project alone for Gogledd Môn Forol/North Anglesey Marine SAC (see above).</p> <p><i>The assessment concluded that the achievement of the conservation objectives will not be affected and there will be no AEOSI resulting from any of these impact pathways.</i></p>	Yes (for all Impact Pathways listed)

	<p>(or mortality) to species from collision</p> <p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of</p>		
--	--	--	--

	suspended sediments during installation/removal of structures		
Harbour Porpoise	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p> <p>This assesses against collision risk from turbines only</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>This assessment is based on the 240MW scenario and does not consider 'phased development'. This being considered as a mitigation measure within the ISHRA and ES.</p> <p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 408 individuals per year (0.65% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 519 individuals per year (0.83% of the MU).</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 0.83% of the harbour porpoise MU (519 harbour porpoise) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>Bycatch in fisheries is the biggest source of anthropogenic mortality for several marine mammal species. In the case of harbour porpoise and grey seals, estimates of bycatch occurring in the relevant MU indicate that these populations may already be suffering anthropogenic mortality which exceeds</p>	No

		<p>sustainable levels calculated either through Potential Biological Removal (PBR) or a 1% threshold. However, both the population and bycatch estimates of harbour porpoise are highly uncertain.</p> <p>Under Article 17 of the Habitats Directive, individual Member States' report Favourable Conservation Status using Favourable, Unfavourable Inadequate or Unfavourable-Bad categories to which quantitative definitions/thresholds have been ascribed. A 1% change per year is used to define whether there is a significant change to the population.</p> <p>Based on the information provided there is considerable uncertainty regarding the affect on the harbour porpoise population from the removal of 519 harbour porpoise per annum.</p> <p><i>Given the above conclusions for the 240 MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the West Wales Marine SAC</i></p>	
Harbour Porpoise	Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p> <p>This assesses against collision risk from vessels and turbines</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the West Wales Marine SAC</i></p>	No
Harbour Porpoise	Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There is no significant disturbance of the species. Significant defined as excluding harbour porpoise from more than:</i></p> <ul style="list-style-type: none"> • <i>20% of the relevant area of the site in any given day, and</i> • <i>an average of 10% of the relevant area of the site over a season</i> <p>As a precautionary approach the maximum area of potential disturbance has been assessed for underwater water noise from operational turbines for the full deployment (240MW) at the same time as underwater water noise from any construction activities, maintenance and repowering activities and vessels,</p>	No

		<p>based on the worst-case scenarios and maximum potential ranges for two drilling activities, two cable laying activities, two cable protection activities and up to 16 vessels. It has been assumed that these activities could be undertaken throughout the summer period.</p> <p>Underwater noise modelling was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p>However, given the lack of information on the range of potential disturbance impact, and the uncertainty over accuracy of the information presented (MOR/RHDHV/DOC/0116 and MOR-RHDHV-DOC-0117), it is not currently possible to assess the likely impact footprint of disturbance from operational noise, which will occur for the duration of the project.</p> <p><i>Given the above conclusions an AEOSI cannot be ruled out upon the harbour porpoise population and the conservation objectives for the West Wales Marine SAC</i></p>	
<p>Harbour Porpoise</p>	<p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There is no significant disturbance of the species. Significant defined as excluding harbour porpoise from more than:</i></p> <ul style="list-style-type: none"> • 20% of the relevant area of the site in any given day, and • an average of 10% of the relevant area of the site over a season <p>Acoustic deterrent devices (ADDs) may be used as part of the mitigation plan to deter marine mammals for coming too close to operational turbines and to reduce the potential collisions risk.</p> <p>Their use is assumed here even though this links to mitigation which is not usually encompassed within this section of the HRA</p> <p>There is currently considerable uncertainty over the accuracy of information presented on ADDs, including the disturbance range from up to 40 devices, the</p>	<p>No</p>

		likely deployment and configuration of the ADD array. It is therefore not possible to assess the likely impacts from ADDs <i>Given the above conclusions an AEOSI cannot be ruled out upon the harbour porpoise population and the conservation objectives for the West Wales Marine SAC</i>	
Rockabill to Dalkey Island SAC (81 km)			
Harbour Porpoise	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p>	<p>The Rockabill to Dalkey Island SAC is within the same MU for harbour porpoise and 81 km distant from the MDZ</p> <p>The conservation objectives for harbour porpoise at the Rockabill to Dalkey Island SAC (NPWS, 2013a) are:</p> <p>To maintain the favourable conservation condition of harbour porpoise in Rockabill to Dalkey Island SAC, which is defined by the following list of attributes and targets:</p> <ul style="list-style-type: none"> • Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use. • Disturbance: human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. <p>The favourable conservation status of a species is achieved when:</p> <ul style="list-style-type: none"> • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. <p>As the MDZ is located some distance (>80km) from the Rockabill to Dalkey Island SAC, there is no potential for barrier or disturbance effects to occur within the SAC.</p> <p><i>With the exception of the impact pathways highlighted below, the assessment concluded that the achievement of the conservation objectives will</i></p>	Yes (for all Impact Pathways listed)

	<p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of</p>	<p><i>not be affected and there will be no adverse effect on the integrity of the site through these impact pathways.</i></p>	
--	--	---	--

	suspended sediments during installation/removal of structures		
Harbour Porpoise	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> <i>Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats</i> <p>This assesses against collision risk from turbines only</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>This assessment is based on the 240MW scenario and does not consider 'phased development'. Phasing being considered as a key mitigation measure within ISHRA and ES.</p> <p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 408 individuals per year (0.65% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 519 individuals per year (0.83% of the MU).</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 0.83% of the harbour porpoise MU (519 harbour porpoise) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>Bycatch in fisheries is the biggest source of anthropogenic mortality for several marine mammal species. In the case of harbour porpoise and grey seals, estimates of bycatch occurring in the relevant MU indicate that these populations may already be suffering anthropogenic mortality which exceeds</p>	No

		<p>sustainable levels calculated either through Potential Biological Removal (PBR) or a 1% threshold. However, both the population and bycatch estimates of harbour porpoise are highly uncertain.</p> <p>Under Article 17 of the Habitats Directive, individual Member States' report Favourable Conservation Status using Favourable, Unfavourable Inadequate or Unfavourable-Bad categories to which quantitative definitions/thresholds have been ascribed. A 1% change per year is used to define whether there is a significant change to the population.</p> <p>Based on the information provided there is considerable uncertainty regarding the affect on the harbour porpoise population from the removal of 519 harbour porpoise per annum.</p> <p><i>Given the above conclusions for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the Rockabill to Dalkey Island SAC</i></p>	
Harbour Porpoise	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> <i>Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats</i> <p>This assesses against collision risk from vessels and turbines</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the Rockabill to Dalkey Island SAC</i></p>	No
North Channel SAC (98 km)			
Harbour Porpoise	Pathways are as listed above for Rockabill to Dalkey Island SAC	<p>The relevant conservation objectives against each Impact Pathway are the same as given above for the North Anglesey Marine SAC</p> <p>As the MDZ is >90km distant from the North Channel SAC, there is no potential for barrier or disturbance effects in relation to the area of the SAC.</p> <p><i>Therefore, with the exception of the impact pathways highlighted below, the assessment concluded that the achievement of the conservation objectives will</i></p>	Yes (for all Impact Pathways except those listed below)

		<i>not be affected and there will be no adverse effect on the integrity of the site through these impact pathways (see Rockabill to Dalkey Island SAC).</i>	
Harbour Porpoise	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p> <p>This assesses against collision risk from turbines only</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>This assessment is based on the 240MW scenario and does not consider 'phased development'. Phasing being considered as a key mitigation measure within ISHRA and ES.</p> <p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 408 individuals per year (0.65% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 519 individuals per year (0.83% of the MU).</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 0.83% of the harbour porpoise MU (519 harbour porpoise) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>Bycatch in fisheries is the biggest source of anthropogenic mortality for several marine mammal species. In the case of harbour porpoise and grey seals, estimates of bycatch occurring in the relevant MU indicate that these populations may already be suffering anthropogenic mortality which exceeds sustainable levels calculated either through Potential Biological Removal (PBR)</p>	No

		<p>or a 1% threshold. However, both the population and bycatch estimates of harbour porpoise are highly uncertain.</p> <p>Under Article 17 of the Habitats Directive, individual Member States' report Favourable Conservation Status using Favourable, Unfavourable Inadequate or Unfavourable-Bad categories to which quantitative definitions/thresholds have been ascribed. A 1% change per year is used to define whether there is a significant change to the population.</p> <p>Based on the information provided there is considerable uncertainty regarding the affect on the harbour porpoise population from the removal of 519 harbour porpoise per annum.</p> <p><i>Given the above conclusions for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the North Channel SAC</i></p>	
Harbour Porpoise	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p> <p>This assesses against collision risk from vessels and turbines</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the North Channel SAC</i></p>	No
Bristol Channel Approaches SAC (222 km)			
Harbour Porpoise	<p>Impact Pathways are as listed above for Rockabill to Dalkey Island SAC</p>	<p>The relevant conservation objectives against each Impact Pathway are the same as given above for the North Anglesey Marine SAC</p> <p>As the MDZ is not located in the Bristol Channel Approaches SAC, there is no potential for barrier or disturbance effects in relation to the area of the SAC.</p> <p><i>Therefore, with the exception of the impact pathways highlighted below, the assessment concluded that the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through these impact pathways</i></p>	Yes (for all impact pathways listed)

<p>Harbour Porpoise</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p> <p>This assesses against collision risk from turbines only</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>This assessment is based on the 240MW scenario and does not consider 'phased development'. Phasing being considered as a key mitigation measure within ISHRA and ES.</p> <p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 408 individuals per year (0.65% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for harbour porpoise, without mitigation, could be up to 519 individuals per year (0.83% of the MU).</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 0.83% of the harbour porpoise MU (519 harbour porpoise) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>Bycatch in fisheries is the biggest source of anthropogenic mortality for several marine mammal species. In the case of harbour porpoise and grey seals, estimates of bycatch occurring in the relevant MU indicate that these populations may already be suffering anthropogenic mortality which exceeds sustainable levels calculated either through Potential Biological Removal (PBR) or a 1% threshold. However, both the population and bycatch estimates of harbour porpoise are highly uncertain.</p>	<p>NO</p>
--------------------------------	---	---	------------------

		<p>Under Article 17 of the Habitats Directive, individual Member States' report Favourable Conservation Status using Favourable, Unfavourable Inadequate or Unfavourable-Bad categories to which quantitative definitions/thresholds have been ascribed. A 1% change per year is used to define whether there is a significant change to the population.</p> <p>Based on the information provided there is considerable uncertainty regarding the affect on the harbour porpoise population from the removal of 519 harbour porpoise per annum.</p> <p><i>Given the above conclusions for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the Bristol Channel Approaches SAC</i></p>	
Harbour Porpoise	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species is a viable component of the site</i></p> <p>This assesses against collision risk from vessels and turbines</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out upon the harbour porpoise population and conservation objectives for the Bristol Channel Approaches SAC</i></p>	NO
Lleyn Peninsula and the Sarnau/Pen Llŷn a'r Sarnau SAC (34km)			
Bottlenose Dolphin	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> 	Yes

		<p>Photo-identification studies have revealed that the dolphins present in this site travel between the Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC and Bae Ceredigion/Cardigan Bay SAC. Both these sites are within Cardigan Bay and their population should be considered together.</p> <p>The Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC and MDZ are located within the Irish Sea MU for bottlenose dolphin. Using the results of the SCANS III data from 2016, the Irish Sea MU has an estimated bottlenose dolphin abundance of 288 (95% CI = 0-664).</p> <p>The offshore development area (MDZ plus ECC) covers 39.75km² much of which is subtidal. The worst case scenario for temporary and permanent habitat loss is 0.42km² and 2.18km² respectively (Table 8-33, Morlais ISHRA).</p> <p>As a worst-case scenario, up to 0.0084 bottlenose dolphin (0.003% of the MU) by temporary habitat loss and up to 0.04 bottlenose dolphin (0.014% of the MU) from permanent habitat loss.</p> <p>Chapter 10 of the ES (section 10.6.5.2 – habitat loss effects; section 10.6.5.6 – collision risk effects) concluded minor adverse effects on fish receptors from operational phase.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> 	<p>Yes</p>

		<p>Using the tidal resource modelling carried out by HR Wallingford (see Appendix 7.1, ES Volume III) the conclusions of the ES (chapter 7, ES Volume I) state that the magnitude of effects on tidal regime due to presence of turbines would be negligible in the far-field zone. The far-field being defined as an area beyond several hundred metres from the project (see Section 7.4.1, para 28 of ES Volume I and the Metocean and Physical Processes ES Supplementary Note (document MOR/RHDHV/DOC/0111))</p> <p>The supplementary HR Wallingford report (document no. MOR/HRW/DOC/0001) supports the zones of influence considered in the ES and it is concluded that the HRA screening remains appropriate. The Metocean and Physical Processes Numerical Modelling Supplementary Note (document no. MOR/RHDHV/DOC/0112) confirm the findings of the assessment presented in the ES.</p> <p>Considering the vast foraging ranges of this feature, the general lack of soft sediment subtidal habitat features in the vicinity of the MDZ (with the exception of the sand bank to the north of the development), it is concluded that changes to habitat features beyond the near field zone, as a result of this pathway, would not affect the relevant conservation objective.</p> <p><i>As the achievement of the conservation objectives will not be affected, there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against potential vessel collision only</p>	<p>Yes</p>

		<p>Based on up to 16 vessels on site at any one time, with up to 16 vessel movements to and from the site per day. The maximum area of potential risk has been estimated based on construction vessels in indicative examples of the two largest potential deployment areas (3 km² and 3 km²); plus, vessels in ECC area (4.75 km²). In addition, increased collision risk has also been estimated based on the potential vessel route area to and from Holyhead Harbour, based on a precautionary 250 m buffer either side of the vessels (4.34 km²).</p> <p>There is limited information on which to quantify the collision risk of marine mammals with vessels. Although the risk of collision is likely to be low, as a precautionary worse-case scenario, the number of bottlenose dolphin and grey seal that could be at increased collision risk with vessels has been assessed based on precautionary 5% to 10% of the number of individuals, that could be present in the area potentially being at increased collision risk.</p> <p>As a worst-case scenario 0.015-0.031 bottlenose dolphin (0.004-0.01% of MU) could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against turbine collision (operation)</p>	<p>No</p>

		<p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>Predictive modelling was used. This stage of the assessment is based on the 240MW scenario and does not acknowledge '<i>phased development</i>' which is considered a key mitigation measure. An avoidance rate of 98% has been assumed (see ISHRA (MOR/RHDHV/DOC/0067) and Marine Mammals Additional collision risk modelling (MOR/RHDHV/DOC/0118)</p> <p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for bottlenose dolphin, without mitigation, could be up to 18.2 individuals per year (6.3% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for bottlenose dolphin, without mitigation, could be up to 25 individuals per year (8.7% of the MU)</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 8.7% of the bottlenose dolphin MU (25 dolphins) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>There has been limited bycatch of bottlenose dolphin in UK waters from observed fishing vessels (Northridge 2018). NRW monitoring in the wider Cardigan Bay area indicates that the population has declined significantly over the last 10 years (Lohrengel <i>et al</i> 2018). However, it is unknown whether this decline is related to movement of animals outside of the survey area or a real decline.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Given the small and potentially declining population of bottlenose dolphin in the Irish Sea Management Unit (MU), even a low level of mortality (as a result of collision impacts) could cause further population decline, and compromise the SAC Conservation Objectives.</p> <p>There is a fairly good understanding of the Irish Sea population of bottlenose dolphins from animal movements, distribution, seasonality and population dynamics; the population estimates appear to be robust and relatively</p>	
--	--	---	--

		<p>consistent between survey types (SCANS III, NRW monitoring); and bycatch is negligible.</p> <p>Knowing the relatively small population size and potential population decline, which is considered to be occurring, it is concluded that the MU population could not sustain multiple losses per year.</p> <p><i>Given the above conclusions for the 240MW proposal an AEOSI cannot be ruled out upon the bottlenose dolphin population and conservation objectives for the Lleyn Peninsula and the Sarnau SAC</i></p>	
Bottlenose Dolphin	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against turbine collision and vessels</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out upon the bottlenose dolphin population and conservation objectives for the Lleyn Peninsula and the Sarnau SAC</i></p>	No
Bottlenose Dolphin	<p>Presence of turbine mooring lines resulting in entanglement</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> 	Yes

		<p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling <i>et al.</i>, 2013; Isaacman and Daborn, 2011)</p> <p>Work by Benjamins <i>et al.</i> (2014) provides a qualitative assessment of relative entanglement risk across different marine megafauna groups, concluding that for the mooring scenarios which most represent those likely to be used at MDZ (i.e. catenary & chain or tension mooring, with or without accessory buoy), the risk to bottlenose dolphin is low.</p> <p>The tidal devices and moorings would receive regular checks (approximately 15 times annually for both planned and unplanned maintenance activities), this would ensure that there was no material such as discarded nets, ropes or other debris which could increase the risk of entanglement for marine mammals or interfere with the optimal operation of the tidal devices.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>The assessment within the ISHRA (MOR/RHDHV/DOC/0067) concluded no AEOSI from this impact pathway.</p>	<p>Yes</p>

		<p>The assessment within the ISHRA (MOR/RHDHV/DOC/0067) (02) was based on the worst-case scenario for similar activities at similar sites the nearby Wylfa Newydd Development Area, the Perpetuus Tidal Energy Centre (PTEC) off the coast of the Isle of Wight, MeyGen in the Inner Sound of the Pentland Firth and offshore wind farms in the Southern North Sea (further details of the underwater noise modelling undertaken for these sites is provided in Chapter 12, Marine Mammals, Volume I of the ES).</p> <p>The maximum predicted ranges for the risk of PTS for drilling is for two percussive drilling rigs at the Wylfa Newydd Development Area using the non-impulsive NMFS (2018) criteria (198 and 201 dB re 1 μPa_{2s} Weighted SEL_{cum} for bottlenose dolphin and grey seal, respectively), assuming a stationary animal remaining in the vicinity over a 24-hour period</p> <p>The maximum predicted ranges for the risk of PTS for cable laying and cable protection (rock placement) are based on modelling for Southern North Sea offshore wind farm sites using the impulsive NMFS (2018) criteria (185 dB re 1 μPa_{2s} Weighted SEL_{cum} for bottlenose dolphin and grey seal). This assessment uses a fleeing animal model, which is more realistic as it assumes that the animal exposed to high noise levels will swim away from the noise source. For this a constant fleeing speed of 1.5m/s has been assumed. This is considered 'worst-case' as marine mammals are expected to be able to swim much faster under stress conditions. The modelling ranges smaller than 100m (cumulative) were not been presented for the Southern North Sea sites and could therefore be a lot less than 100m, however, as a worst-case scenario, ranges of up to 100m have been assumed</p> <p>The maximum predicted ranges for the risk of PTS from vessels is for large vessels at the Wylfa Newydd Development Area using the non-impulsive NMFS (2018) criteria (198 and 201 dB re 1 μPa_{2s} Weighted SEL_{cum} for bottlenose dolphin and grey seal, respectively), assuming a stationary animal remaining in the vicinity over a 24-hour period</p> <p>The noise measurements and modelling for a range of different operational tidal devices, indicates that the noise levels would not be sufficient to result in any auditory injury (see Chapter 12, Marine Mammals, Volume I of the ES). Therefore, there is no risk of PTS from the underwater noise of operational turbine devices and it has not been included in this assessment.</p>	
--	--	--	--

		<p>A review of ADDs in Chapter 12, Marine Mammals (Volume I of the ES), indicates that the noise levels would not be sufficient to result in any auditory injury. Therefore, there is no risk of PTS and they have not been included in this assessment.</p> <p>As a worst-case scenario, based on two percussive drilling rigs, two cable laying activities, two rock placement activities and up to 16 large vessels in the MDZ, the maximum area for potential risk of auditory injury, without any mitigation, is 0.12km², which could affect up to 0.0024 bottlenose dolphin (0.0008% of the 288 dolphins in the MU). Rounding up to one dolphin this would affect 0.034% of the dolphins in the MU.</p> <p>A report by subacoustech in March 2020 details the acoustic propagation modelling for underwater noise from proposed operational tidal turbines, drilling and acoustic deterrent devices (ADDs) carried out for the MDZ (MOR/RHDHV/DOC/0116).</p> <p>Underwater noise modelling specific to the development was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments carried out in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> 	<p>Yes</p>

		<ul style="list-style-type: none"> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p><i>As part of this objective it should be noted that:</i></p> <p><i>Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour</i></p> <p>The assessment within the ISHRA (MOR/RHDHV/DOC/0067) (02) concluded no AEOSI from this impact pathway based on the following:</p> <p>As a precautionary approach the maximum area of potential disturbance has been assessed for underwater water noise from operational turbines for the full deployment (240MW) at the same time as underwater water noise from any construction activities, maintenance and repowering activities and vessels, based on the worst-case scenarios and maximum potential ranges for two drilling activities, two cable laying activities, two cable protection activities and up to 16 vessels.</p> <p>For full deployment (240MW) the assessment has been based on the possible strong avoidance (90 dBht (Species)) range from the modelling for PTEC. The assessment for the full deployment has been based on arrays rather than individual tidal devices, as individual marine mammals would be more likely to be disturbed by the closest turbine they approach rather than all individual turbines within the array. As an indicative precautionary worst-case, the assessment has been based on up to 10 arrays, however the maximum number of arrays at the MDZ is likely to be eight. The areas are based on an area of a circle and assessment also assumes no overlap in disturbance areas between arrays / groups of turbines. For bottlenose dolphin and grey seal the maximum predicted area of disturbance has been estimated at up to 0.28km² and 0.18km², respectively.</p> <p>A report by subacoustech in March 2020 details the acoustic propagation modelling for underwater noise from proposed operational tidal turbines, drilling and acoustic deterrent devices (ADDs) carried out for the MDZ (MOR/RHDHV/DOC/0116).</p> <p>Underwater noise modelling specific to the development was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments carried out in the ES and ISHRA (MOR-RHDHV-DOC-0117). The</p>	
--	--	---	--

		<p>assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p><i>The MDZ is ~35km from this SAC. While infrequent disturbance may occur on bottlenose dolphin it is concluded that the conservation objectives of this site would not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p><i>As part of this objective it should be noted that:</i></p> <p><i>Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour</i></p> <p>Acoustic deterrent devices (ADDs) may be used as part of the mitigation plan to deter marine mammals for coming too close to operational turbines and to reduce the potential collisions risk.</p> <p>Their use is assumed here even though this links to mitigation which is not usually encompassed within this section of the HRA</p> <p>The assessment within the ISHRA (MOR/RHDHV/DOC/0067) concluded no AEOSI from this impact pathway. As a precautionary approach, the ISHRA (MOR/RHDHV/DOC/0067) based the assessment on a potential average disturbance range of approximately 1km (3.14km²) for a range of ADD devices,</p>	<p>Yes</p>

		<p>based on the JNCC guide for the selection and deployment of acoustic deterrent devices (McGarry <i>et al.</i>, 2018)</p> <p>Underwater noise modelling specific to the development was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments carried out in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p><i>As the MDZ is located some ~35km from the SAC, there is minimal potential for barrier or disturbance effects to occur within the SAC. While infrequent disturbance may occur on bottlenose dolphin it is concluded that the conservation objectives of this site would not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future:</i></p> <ul style="list-style-type: none"> • <i>Their range within the SAC and adjacent inter-connected areas is not constrained or hindered.</i> • <i>There are appropriate and sufficient food resources within the SAC and beyond.</i> • <i>The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing.</i> <p>Underwater noise could have the potential to create a barrier effect, preventing movement or migration of marine mammals between important feeding and / or breeding areas, or potentially increasing swimming distances if marine mammals avoid the site and go around it. Similarly, the physical presence of the tidal array could have the potential to create a physical barrier.</p>	<p>Yes</p>

		<p>The worst-case scenario in relation to barrier effects as a result of underwater noise is based on the maximum spatial and temporal (i.e. longest duration) scenarios. This assumes the maximum potential disturbance and possible barrier effects that there could be at any one time.</p> <p>The maximum area of potential disturbance for underwater water noise from operational turbines for the full deployment (240MW) at the same time as underwater water noise from any construction activities, maintenance and repowering activities and vessels, based on the worst case scenarios and maximum potential ranges for two drilling activities, two cable laying activities, two cable protection activities and up to 16 vessels is up to 19.24km².</p> <p>As a worst-case scenario, up to 0.008 bottlenose dolphin individuals (0.003% of the MU) could be affected</p> <p>The estimated maximum area taken up by all arrays, including spaces between devices (i.e. not the seabed footprint) of up to 12.5km² for the full 240MW capacity project.</p> <p>As a worst-case scenario, up to 0.25 bottlenose dolphin (0.086% of the MU;) could be affected.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future:</i></p> <ul style="list-style-type: none"> • <i>Their range within the SAC and adjacent inter-connected areas is not constrained or hindered.</i> • <i>There are appropriate and sufficient food resources within the SAC and beyond.</i> • <i>The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing.</i> 	<p>Yes</p>

		<p>Potential pathways for effects from electromagnetic fields (EMF) would be from the presence of cables within the MDZ and ECC. Modelling of expected magnetic fields by Normandeau <i>et al.</i> (2011) indicates that the predicted fields were strongest directly over the cables and decreased rapidly with vertical and horizontal distance from the cables.</p> <p>Currently there is no evidence to suggest that existing subsea cables have influenced bottlenose dolphin or grey seal movements. In addition, data from operational windfarms show no evidence of exclusion of bottlenose dolphin or grey seal.</p> <p>As a precautionary approach, the number bottlenose dolphin that could be affected by any potential EMF effects is up to 0.001 individuals (0.0003% of the MU) and the number of grey seal that could be affected is up to 0.01 individuals (0.0001% of the MU), based on the maximum cable area (0.042 km²) in the MDZ and ECC.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Bottlenose Dolphin</p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>	<p><i>Relevant conservation objective(s) to impact pathway:</i></p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and</i></p>	<p>Yes</p>

		<p><i>populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p><i>As part of this objective it should be noted that:</i></p> <p><i>Contamination of potential prey species should be below concentrations potentially harmful to their physiological health</i></p> <p>The maximum envisaged effect associated with sediment plumes arising from the foundation installation activities will cause a small increase in suspended sediment concentration (typically less than 1mg/l a short distance from the release point) over only a small geographical area (a few hundred metres). The effects will be temporary, with a return to very low background concentrations occurring rapidly upon cessation of installation activities (i.e. the effect is temporary only).</p> <p>The free-laying of cables and the placement of cable protection would not cause plumes along the offshore sections of the cable corridor because the sea bed is characterised by bedrock or, where sparse sediment cover does exist, by sediments with a particle size that cannot be suspended in the water column.</p> <p>In the nearshore, the bedrock is overlain by sand which has the potential to be disturbed. The assessment in Chapter 8, Marine Water and Sediment Quality (Volume I of the ES), indicates that there could be a minor adverse (not significant) impact via increased suspended sediments in the area around the sandwave field and close to shore. However, the likely increase in suspended sediment concentration in areas with sand cover nearer to shore (including at the landfall) will remain within the natural variation that are governed by storm waves and surge effects. Any increase in suspended sediments would reduce rapidly with distance from the point of disturbance to a few mg/l over a small geographical area (within a few hundred metres, along the axis of tidal currents). Furthermore, these effects will be one-off and temporary in duration, with a return to the very low background concentrations occurring rapidly upon cessation of installation.</p>	
--	--	---	--

		<p>The re-suspension of sediments during construction activities could also lead to the release of any contaminants that may be present within them. Sediment contamination within the MDZ is low, due to the dynamic hydrological regime and generally low level of industrial activity in this region. The low proportion of fine sediments within the MDZ is another factor that indicates low sediment contamination levels. Therefore, the assessment determined a negligible impact on general water quality in the MDZ via release of contaminated sediments, as even though mobilisation of the relatively limited amount of sediments in the MDZ will occur via construction works, none of these sediments are known to have high levels of contaminants.</p> <p>During construction there is the potential for changes in water quality as a result of accidental discharge and spillage of oils, fuels and materials. However, Menter Môn is committed to the use of best practice and pollution prevention guidelines at all times. A Marine Pollution Contingency Plan (MPCP) would be in place and agreed with NRW in line with the Integrated Pollution Prevention and Control (IPPC) Directive such that any potential risk is minimised. Any permitted discharges would be small volumes, intermittent and dilute and disperse quickly. If any such substances were accidentally released/leaked, quantities would likely be small due to relatively small amounts being present in individual devices. Due to the dynamic nature of the tidal and wave regime in and around the MDZ, lateral and vertical dispersion rates of any spilled substances would be expected to be high.</p> <p>Any potential in changes in marine water quality as a result of sediment re-suspension caused by seabed disturbance; mobilisation of contaminants adsorbed onto potentially re-suspended seabed sediments; and accidental discharge and spillage of oils, fuels and materials are likely to be localised, dispersed quickly, temporary and would have a negligible effect.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway</i></p>	
<p>Grey Seals</p>	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and</i></p>	<p>Yes</p>

		<p><i>populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p>Grey seals present at this site are thought to be a part of the wider north Wales population (between 700 and 750 in winter and up to 1,100 in summer) and that the persistent breeding individuals form part of the larger Irish Sea population. The Pen Llyn a'r Sarnau/Lleyn Peninsula and Sarnau SAC had an estimated population of 365 grey seals (in 2002) and has the largest breeding colony in north Wales with a number of important pupping sites, including Bardsey Island (CCW, 2009a).</p> <p>The Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC and MDZ are located within the South and West England and Wales MU for grey seal (IAMMWG, 2013). The SW England, Wales and Ireland region has an estimated population size of 10,250 (SCOS, 2018).</p> <p>The offshore development area (MDZ plus ECC) covers 39.75km² much of which is subtidal. The worst case scenario for temporary and permanent habitat loss is 0.42km² and 2.18km² respectively (see Table 8-33, Morlais ISHRA).</p> <p>As a worst-case scenario, up to 0.07 grey seal (0.0006% of the region) could be temporarily affected and 0.34 grey seal (0.003% of the region) could be permanently affected</p> <p>Chapter 10 of the ES (section 10.6.5.2 – habitat loss effects; section 10.6.5.6 – collision risk effects) concluded minor adverse effects on fish receptors from operational phase.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
Grey Seals		Relevant conservation objective(s) to impact pathway:	Yes

	<p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p>	<p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p>Using the tidal resource modelling carried out by HR Wallingford (see Appendix 7.1, ES Volume III) the conclusions of the ES (chapter 7, ES Volume I) state that the magnitude of effects on tidal regime due to presence of turbines would be negligible in the far-field zone. The far-field being defined as an area beyond several hundred metres from the project (see Section 7.4.1, para 28 of ES Volume and the Metocean and Physical Processes ES Supplementary Note (document MOR/RHDHV/DOC/0111))</p> <p>The supplementary HR Wallingford report (document no. MOR/HRW/DOC/0001) supports the zones of influence considered in the ES and it is concluded that the HRA screening remains appropriate. The Metocean and Physical Processes Numerical Modelling Supplementary Note (document no. MOR/RHDHV/DOC/0112) confirm the findings of the assessment presented in the ES.</p> <p>Considering the vast foraging ranges of this feature, the general lack of soft sediment subtidal habitat features in the vicinity of the MDZ (with the exception of the sand bank to the north of the development), it is concluded that changes to habitat features beyond the near field zone, as a result of this pathway, would not affect the relevant conservation objective.</p> <p><i>As the achievement of the conservation objectives will not be affected, there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Grey Seals</p>	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p>	<p>Yes</p>

	<p>(or mortality) to species from collision</p>	<ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> • <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against potential vessel collision only</p> <p>Based on up to 16 vessels on site at any one time, with up to 16 vessel movements to and from the site per day. The maximum area of potential risk has been estimated based on construction vessels in indicative examples of the two largest potential deployment areas (3 km² and 3 km²); plus, vessels in ECC area (4.75 km²). In addition, increased collision risk has also been estimated based on the potential vessel route area to and from Holyhead Harbour, based on a precautionary 250 m buffer either side of the vessels (4.34 km²).</p> <p>There is limited information on which to quantify the collision risk of marine mammals with vessels. Although the risk of collision is likely to be low, as a precautionary worse-case scenario, the number of bottlenose dolphin and grey seal that could be at increased collision risk with vessels has been assessed based on precautionary 5% to 10% of the number of individuals, that could be present in the area potentially being at increased collision risk.</p> <p>As a worst-case scenario 0.117-0.237 grey seal (0.0011%-0.0023% of MU) could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port</p>	
--	---	---	--

		<p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Grey Seals</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> • <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against potential turbine collision only</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>Predictive modelling was used. This stage of the assessment is based on the 240MW scenario and does not acknowledge '<i>phased development</i>' which is considered a key mitigation measure. An avoidance rate of 98% has been assumed (see ISHRA (MOR/RHDHV/DOC/0067) and Marine Mammals Additional collision risk modelling (MOR/RHDHV/DOC/0118)</p>	<p>No</p>

		<p>For HRAs covering developments in Welsh waters, typically consideration will be given to all SACs in the large South and West England and Wales Management Unit because it provides the currently agreed spatial scale of the population and its management and is underpinned by evidence of connectivity among colonies within the MU (e.g. Baines <i>et al</i> 1995; Keily <i>et al</i> 2000; Pomeroy <i>et al</i> 2015; SCOS 2013, 2014; Thompson 2011; Vincent <i>et al</i> 2005).</p> <p>There is no population estimate for the OSPAR III Region. The most recent estimate for the SW England, Wales and Ireland region (SCOS 2018), which is likely to be considerably smaller than that of the wider region, is 10,250. Indications are that the population of grey seals is increasing at the UK scale (SCOS 2018)</p> <p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for grey seal, without mitigation, could be up to 85 individuals per year.</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for bottlenose dolphin, without mitigation, could be up to 112 individuals per year.</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 112 grey seal/annum could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>Grey seals present at this SAC are thought to be a part of the wider north Wales population (between 700 and 750 in winter and up to 1,100 in summer) and that the persistent breeding individuals form part of the larger Irish Sea population. The Pen Llyn a'r Sarnau/Lleyn Peninsula and Sarnau SAC had an estimated population of 365 grey seals (in 2002) and has the largest breeding colony in north Wales with a number of important pupping sites, including Bardsey Island (CCW, 2009a).</p> <p>Interpretation of the conservation objectives suggests 'population' size is maintained and not reduced. Across the UK grey seal populations have shown an increase in recent years. Recent estimate for pup production in Wales (2014) was 1,650 (SCOS, 2017). It is acknowledged that grey seal have connectivity</p>	
--	--	--	--

		<p>with other SACs and, on account of their large range, SACs beyond Welsh waters.</p> <p>The estimated 112 grey seal (values have to be rounded up) would represent >5% of the estimated Welsh pup production in 2014. While consideration against the SW England, Wales and Ireland population i.e. 10,250 grey seal; gives a maximum of 1.1% loss of seals each year within the MU.</p> <p>However, there is much uncertainty regarding actual 'growth rate' of the population although it is considered to be increasing on the whole. There is also uncertainty regarding how many grey seals are being caught within by-catch although it is approximated as 5% of the population each year (~ 550). At a more localised level it is considered that an additional loss of 112 grey seals per year would be detectable in North Wales.</p> <p>Given the above, there is considerable uncertainty over how this loss would affect the achievement of the relevant conservation objectives.</p> <p><i>Hence, for the 240MW proposal, an AEOSI from this impact pathway cannot be ruled out.</i></p>	
<p>Grey Seals</p>	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> • <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> 	<p>No</p>

		<p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against turbine collision and vessels</p> <p>As a worst-case scenario 0.117-0.237 grey seal (0.0011%-0.0023% of MU) could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port</p> <p>For turbine collision, as a worst-case, the assessment for the indicative 240MW scenario indicates that up to 1.1% of the grey seal MU (112 grey seal) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>Therefore the combination of the effects from these two scenarios predicts up to 112 seal (1.1% of the MU).</p> <p>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out as a consequence of the effects on the grey seal population.</p>	
<p>Grey Seals</p>	<p>Presence of turbine mooring lines resulting in entanglement</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> • <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> 	<p>Yes</p>

		<p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling <i>et al.</i>, 2013; Isaacman and Daborn, 2011)</p> <p>Work by Benjamins <i>et al.</i> (2014) provides a qualitative assessment of relative entanglement risk across different marine megafauna groups, concluding that for the mooring scenarios which most represent those likely to be used at MDZ (i.e. catenary & chain or tension mooring, with or without accessory buoy), the risk to bottlenose dolphin is low.</p> <p>The tidal devices and moorings would receive regular checks (approximately 15 times annually for both planned and unplanned maintenance activities), this would ensure that there was no material such as discarded nets, ropes or other debris which could increase the risk of entanglement for marine mammals or interfere with the optimal operation of the tidal devices.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Grey Seals</p>	<p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> 	<p>Yes</p>

		<p>• <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i></p> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>The assessment within the ISHRA (MOR/RHDHV/DOC/0067) concluded no AEOSI from this impact pathway. The assessment within the ISHRA (MOR/RHDHV/DOC/0067) was based on the worst-case scenario for similar activities at similar sites the nearby Wylfa Newydd Development Area, the Perpetuus Tidal Energy Centre (PTEC) off the coast of the Isle of Wight, MeyGen in the Inner Sound of the Pentland Firth and offshore wind farms in the Southern North Sea (further details of the underwater noise modelling undertaken for these sites is provided in Chapter 12, Marine Mammals, Volume I of the ES).</p> <p>As a worst-case scenario, based on two percussive drilling rigs, two cable laying activities, two rock placement activities and up to 16 large vessels in the MDZ, the maximum area for potential risk of auditory injury in harbour porpoise, without any mitigation, is 0.12km², which could affect up to 0.019 grey seal (0.00019% of the 10,250 seals in the MU)</p> <p>A report by subacoustech in March 2020 details the acoustic propagation modelling for underwater noise from proposed operational tidal turbines, drilling and acoustic deterrent devices (ADDs) carried out for the MDZ (MOR/RHDHV/DOC/0116).</p> <p>Underwater noise modelling specific to the development was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments carried out in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
--	--	---	--

	<p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p><i>As part of this objective it should be noted that:</i></p> <p><i>Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour</i></p> <p>The assessment within the ISHRA (MOR/RHDHV/DOC/0067) concluded no AEOI from this impact pathway. As a precautionary approach the maximum area of potential disturbance has been assessed for underwater water noise from operational turbines for the full deployment (240MW) at the same time as underwater water noise from any construction activities, maintenance and repowering activities and vessels, based on the worst-case scenarios and maximum potential ranges for two drilling activities, two cable laying activities, two cable protection activities and up to 16 vessels.</p> <p>For full deployment (240MW) the assessment has been based on the possible strong avoidance (90 dBht(Species) range from the modelling for PTEC. The assessment for the full deployment has been based on arrays rather than individual tidal devices, as individual marine mammals would be more likely to be disturbed by the closest turbine they approach rather than all individual turbines within the array. As an indicative precautionary worst-case, the assessment has been based on up to 10 arrays, however the maximum number of arrays at the MDZ is likely to be eight. The areas are based on an area of a circle and assessment also assumes no overlap in disturbance areas between arrays / groups of turbines. For bottlenose dolphin and grey seal the maximum</p>	<p>Yes</p>
--	--	--	------------

		<p>predicted area of disturbance has been estimated at up to 0.28km² and 0.18km², respectively.</p> <p>Underwater noise modelling specific to the development was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments carried out in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p><i>The MDZ is ~35km from this SAC. While infrequent disturbance may occur on grey seal it is concluded that the conservation objectives of this site would not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Grey Seals</p>	<p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p><i>As part of this objective it should be noted that:</i></p> <p><i>Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour</i></p> <p>Acoustic deterrent devices (ADDs) may be used as part of the mitigation plan to deter marine mammals for coming too close to operational turbines and to reduce the potential collisions risk.</p>	<p>Yes</p>

		<p>Their use is assumed here even though this links to mitigation which is not usually encompassed within this section of the HRA</p> <p>The assessment within the ISHRA (MOR/RHDHV/DOC/0067) concluded no AEOSI from this impact pathway. As a precautionary approach, the ISHRA (MOR/RHDHV/DOC/0067) based the assessment on a potential average disturbance range of approximately 1km (3.14km²) for a range of ADD devices, based on the JNCC guide for the selection and deployment of acoustic deterrent devices (McGarry <i>et al.</i>, 2018)</p> <p>The assessment was based on a very precautionary scenario of a maximum of 10 ADDs activated at the same time, with a potential disturbance area of up to 31.4km² (assuming no overlap in the disturbance areas for the 10 ADDs or land). It is based on 20 minute activation and the distance marine mammals could be disturbed based on them swimming away for the ADD during this activation time. For bottlenose dolphin and grey seal an average swimming speed of 1.5m/s has been assumed. Therefore, for a 20 minute ADD activation a grey seal could cover 1.8km, an approximate area of 10.18km². Assuming a precautionary, although unlikely scenario of up to 10 ADDs activated at the same time, the potential disturbance area could be up to 101.8km² (assuming no overlap in the disturbance areas for the 10 ADDs or land).</p> <p>The overall maximum area of possible disturbance during ADD activation in-combination with the underwater noise from the operational turbines or other activities and vessels would be the same area as assessed for ADDs, as the ADD areas of disturbance (e.g. 31.4 km² or 101.8 km²) would be greater than the area of potential disturbance for underwater noise from operational turbines and the maximum potential area of disturbance for operational turbines and other activities and vessels</p> <p>According to the ISHRA (MOR/RHDHV/DOC/0067) the maximum number of individuals that could be temporarily disturbed, based on the worst case scenario for 20 minute activation of 10 ADDs is up to 16 grey seal (0.15% of the MU)</p> <p>Underwater noise modelling specific to the development was undertaken in 2020 (MOR/RHDHV/DOC/0116) and a note prepared to compare with the assessments carried out in the ES and ISHRA (MOR-RHDHV-DOC-0117). The assessment of the potential disturbance of marine mammals as a result of underwater noise from drilling, operational turbines and ADDs, based on the</p>	
--	--	--	--

		<p>underwater noise modelling for Morlais (MOR/RHDHV/DOC/0116) is less than those originally assessed in the ISHRA.</p> <p><i>The MDZ is ~35km from this SAC. While infrequent disturbance may occur on grey seal it is concluded that the conservation objectives of this site would not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Grey seal</p>	<p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future:</i></p> <ul style="list-style-type: none"> • <i>Their range within the SAC and adjacent inter-connected areas is not constrained or hindered.</i> • <i>There are appropriate and sufficient food resources within the SAC and beyond.</i> • <i>The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing.</i> <p>Underwater noise could have the potential to create a barrier effect, preventing movement or migration of marine mammals between important feeding and / or breeding areas, or potentially increasing swimming distances if marine mammals avoid the site and go around it. Similarly, the physical presence of the tidal array could have the potential to create a physical barrier.</p> <p>The worst-case scenario in relation to barrier effects as a result of underwater noise is based on the maximum spatial and temporal (i.e. longest duration) scenarios. This assumes the maximum potential disturbance and possible barrier effects that there could be at any one time.</p> <p>The maximum area of potential disturbance for underwater water noise from operational turbines for the full deployment (240MW) at the same time as underwater water noise from any construction activities, maintenance and repowering activities and vessels, based on the worst case scenarios and maximum potential ranges for two drilling activities, two cable laying activities, two cable protection activities and up to 16 vessels is up to 19.24km².</p>	<p>Yes</p>

		<p>As a worst-case scenario, up to 0.11 grey seal (0.001% of the MU) could be affected</p> <p>The estimated maximum area taken up by all arrays, including spaces between devices (i.e. not the seabed footprint) of up to 12.5km² for the full 240MW capacity project.</p> <p>As a worst-case scenario, up to 2 grey seal (0.02% of the MU) could be affected.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Grey seal</p>	<p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future:</i></p> <ul style="list-style-type: none"> • <i>Their range within the SAC and adjacent inter-connected areas is not constrained or hindered.</i> • <i>There are appropriate and sufficient food resources within the SAC and beyond.</i> • <i>The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing.</i> <p>Potential pathways for effects from electromagnetic fields (EMF) would be from the presence of cables within the MDZ and ECC. Modelling of expected magnetic fields by Normandeau <i>et al.</i> (2011) indicates that the predicted fields were strongest directly over the cables and decreased rapidly with vertical and horizontal distance from the cables.</p> <p>Currently there is no evidence to suggest that existing subsea cables have influenced bottlenose dolphin or grey seal movements. In addition, data from operational windfarms show no evidence of exclusion of bottlenose dolphin or grey seal.</p>	<p>Yes</p>

		<p>As a precautionary approach, the number of bottlenose dolphin that could be affected by any potential EMF effects is up to 0.001 individuals (0.0003% of the MU) and the number of grey seal that could be affected is up to 0.01 individuals (0.0001% of the MU), based on the maximum cable area (0.042km²) in the MDZ and ECC.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	
<p>Grey Seal</p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>	<p><i>Relevant conservation objective(s) to impact pathway:</i></p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p><i>As part of this objective it should be noted that:</i></p>	<p>Yes</p>

		<p><i>Contamination of potential prey species should be below concentrations potentially harmful to their physiological health</i></p> <p>The maximum envisaged effect associated with sediment plumes arising from the foundation installation activities will cause a small increase in suspended sediment concentration (typically less than 1mg/l a short distance from the release point) over only a small geographical area (a few hundred metres). The effects will be temporary, with a return to very low background concentrations occurring rapidly upon cessation of installation activities (i.e. the effect is temporary only).</p> <p>The free-laying of cables and the placement of cable protection would not cause plumes along the offshore sections of the cable corridor because the sea bed is characterised by bedrock or, where sparse sediment cover does exist, by sediments with a particle size that cannot be suspended in the water column.</p> <p>In the nearshore, the bedrock is overlain by sand which has the potential to be disturbed. The assessment in Chapter 8, Marine Water and Sediment Quality (Volume I of the ES), indicates that there could be a minor adverse (not significant) impact via increased suspended sediments in the area around the sandwave field and close to shore. However, the likely increase in suspended sediment concentration in areas with sand cover nearer to shore (including at the landfall) will remain within the natural variation that are governed by storm waves and surge effects. Any increase in suspended sediments would reduce rapidly with distance from the point of disturbance to a few mg/l over a small geographical area (within a few hundred metres, along the axis of tidal currents). Furthermore, these effects will be one-off and temporary in duration, with a return to the very low background concentrations occurring rapidly upon cessation of installation.</p> <p>The re-suspension of sediments during construction activities could also lead to the release of any contaminants that may be present within them. Sediment contamination within the MDZ is low, due to the dynamic hydrological regime and generally low level of industrial activity in this region. The low proportion of fine sediments within the MDZ is another factor that indicates low sediment contamination levels. Therefore, the assessment determined a negligible impact on general water quality in the MDZ via release of contaminated sediments, as even though mobilisation of the relatively limited amount of sediments in the MDZ will occur via construction works, none of these sediments are known to have high levels of contaminants.</p>	
--	--	--	--

		<p>During construction there is the potential for changes in water quality as a result of accidental discharge and spillage of oils, fuels and materials. However, Menter Mōn is committed to the use of best practice and pollution prevention guidelines at all times. A Marine Pollution Contingency Plan (MPCP) would be in place and agreed with NRW in line with the Integrated Pollution Prevention and Control (IPPC) Directive such that any potential risk is minimised. Any permitted discharges would be small volumes, intermittent and dilute and disperse quickly. If any such substances were accidentally released/leaked, quantities would likely be small due to relatively small amounts being present in individual devices. Due to the dynamic nature of the tidal and wave regime in and around the MDZ, lateral and vertical dispersion rates of any spilled substances would be expected to be high.</p> <p>Any potential in changes in marine water quality as a result of sediment re-suspension caused by seabed disturbance; mobilisation of contaminants adsorbed onto potentially re-suspended seabed sediments; and accidental discharge and spillage of oils, fuels and materials are likely to be localised, dispersed quickly, temporary and would have a negligible effect.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway</i></p>	
<p>Grey Seal</p>	<p>Disturbance at seal haul out sites a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. maintenance).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The presence, abundance, condition and diversity of habitats and species required to support these species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include:</i></p> <ul style="list-style-type: none"> • <i>Distribution;</i> • <i>Extent;</i> • <i>Structure;</i> • <i>Function and quality of habitat; and</i> • <i>Prey availability and quality.</i> <p><i>As part of this objective it should be noted that:</i></p> <p><i>Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour</i></p>	<p>Yes</p>

		<p>Hauled-out seals are sensitive to disturbance, particularly if they are in their breeding or moult periods. For grey seal, this is from August to December with a peak in October-November.</p> <p>Although the MDZ is not located in the Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC there is the potential for grey seal from the site to be using haul-out sites in the vicinity of the MDZ.</p> <p>Studies on the distance of disturbance, on land or in the water, from hauled-out seals have found that the closer the disturbance, the more likely seals are to move into the water. For the grey seal, mothers responded by moving into the water more due to boat speed rather than as a result of the distance, although movement into the water was generally observed to occur at distances of between 20 and 70m, with no detectable disturbance at 150m (Wilson, 2014; Strong and Morris, 2010). However, grey seals have also been reported to move into the water when vessels are at a distance of approximately 200m to 300m</p> <p>The closest grey seal pupping sites (based on Clarke <i>et al.</i>, 2018) are located at Arw Cleft, 69m from the nearest point of the MDZ cable corridor area, however, no pups were recorded at this site during the 2017 survey. The rest of the grey seal sites are beyond 200m from the nearest point of the MDZ cable area, with the closest located at Parliament House site 220m from the cable corridor area. There are no haul-out sites identified in the area for the proposed landfall at Abraham's Bosom on the west coast of Holy Island</p> <p>Taking into account the distance of the proposed cable corridor area from the nearest grey seal pupping site (over 200m) and the proximity of current vessel movements to these sites there is unlikely to be any increased disturbance at grey seal pupping sites as a result of vessels and any cable laying activity in the MDZ cable corridor area.</p> <p>With the proximity of vessel movements, including current vessel routes to and from Holyhead Port, it is likely that seals hauled-out along these routes and in the area of the port would be habituated to the noise, movements and presence of vessels. Therefore, the sensitivity of grey seals at haul-out sites to disturbance from vessels during construction is likely to be negligible. As a very precautionary approach, it is proposed that sensitivity during the breeding season and annual moult could be slightly higher and has therefore been</p>	
--	--	---	--

		<p>considered as low in this assessment for any activity in the cable corridor area at this time.</p> <p>Vessel movements to the offshore project area would use direct routes and are unlikely to be close to the shore (i.e. within a few hundred metres) except when near the landfall site or port to avoid the risk of collision and grounding.</p> <p><i>Given the above conclusions, the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway</i></p>	
Cardigan Bay SAC (97km)			
Bottlenose Dolphin	<p>The relevant impact pathways are as detailed for Lleyn Peninsula and the Sarnau SAC (assessed above):</p> <p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p>	<p>Cardigan Bay is just over 60km from the Lleyn Peninsula and the Sarnau SAC with one of the biggest resident populations of bottlenose dolphins in the UK, alongside the Moray Firth.</p> <p>Recent analysis shows that nearly 30% of individuals have been identified in both Cardigan Bay SAC and Pen Llŷn a'r Sarnau SAC as well as north of the Lleyn Peninsula around the Isle of Anglesey, indicating large home ranges that most probably extend to the northern Irish Sea and maybe beyond. However, a proportion of the population shows a more local residency pattern, with relatively small home ranges (NRW, 2018a).</p> <p>It was estimated in 2007 that there were 397 individuals within the Bae Ceredigion/Cardigan Bay SAC for the period 2001-2007 (CCW, 2009b). More recent population estimates for the wider Cardigan Bay vary between 254 and 330 animals (CV = 0.25 – 0.28) for the years 2011 and 2013 inclusive (Feingold and Evans, 2014).</p> <p>There is acknowledged connectivity by individuals between this site and the Lleyn Peninsula and the Sarnau SAC (see above).</p> <p>As the MDZ is not located in Cardigan Bay SAC, there is no potential for disturbance effects in relation to the area of the SAC.</p> <p>The conservation objectives for Cardigan Bay SAC are the same as Lleyn Peninsula and the Sarnau SAC:</p>	Yes (for all impact pathways listed)

	<p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p> <p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p>	<p><i>1. The populations are maintained on a long-term basis as a viable component of its natural habitat.</i></p> <p><i>2. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.</i></p> <p><i>3. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing.</i></p> <p>Therefore, the relevant conservation objectives for Cardigan Bay SAC are the same for each impact pathway as identified for Lleyn Peninsula and the Sarnau SAC, as are the assessment conclusions.</p> <p><i>Therefore, with the exception of the impact pathways highlighted below, the assessment concluded that the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site (Cardigan Bay SAC) through these impact pathways (see Lleyn Peninsula and the Sarnau SAC above).</i></p>	
--	---	--	--

	<p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>		
<p>Bottlenose Dolphin</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against turbine collision (operation)</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>Predictive modelling was used. This stage of the assessment is based on the 240MW scenario and does not acknowledge '<i>phased development</i>' which is considered a key mitigation measure. An avoidance rate of 98% has been assumed (see ISHRA (MOR/RHDHV/DOC/0067) and Marine Mammals Additional collision risk modelling (MOR/RHDHV/DOC/0118))</p>	<p>No</p>

		<p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for bottlenose dolphin, without mitigation, could be up to 18.2 individuals per year (6.4% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for bottlenose dolphin, without mitigation, could be up to 25 individuals per year (8.7% of the MU)</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 8.7% of the bottlenose dolphin MU (25 dolphins) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>There has been limited bycatch of bottlenose dolphin in UK waters from observed fishing vessels (Northridge 2018). NRW monitoring in the wider Cardigan Bay area indicates that the population has declined significantly over the last 10 years (Lohrengel <i>et al</i> 2018). However, it is unknown whether this decline is related to movement of animals outside of the survey area or a real decline.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Given the small and potentially declining population of bottlenose dolphin in the Irish Sea Management Unit (MU), even a low level of mortality (as a result of collision impacts) could cause further population decline, and compromise the SAC Conservation Objectives.</p> <p>There is a fairly good understanding of the Irish Sea population of bottlenose dolphins from animal movements, distribution, seasonality and population dynamics; the population estimates appear to be robust and relatively consistent between survey types (SCANS III, NRW monitoring); and bycatch is negligible.</p> <p>Knowing the relatively small population size and potential population decline, which is considered to be occurring, it is concluded that the MU population could not sustain multiple losses per year.</p>	
--	--	--	--

		<p><i>Given the above conclusions for the 240MW proposal an AEOSI cannot be ruled out upon the bottlenose dolphin population and conservation objectives for the Cardigan Bay SAC.</i></p>	
Bottlenose Dolphin	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against turbine collision and vessels</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal an AEOSI cannot be ruled out upon the bottlenose dolphin population and conservation objectives for the Cardigan Bay SAC.</i></p>	No
Grey seal	<p>The relevant impact pathways are as detailed for Lleyn Peninsula and the Sarnau SAC (assessed above):</p> <p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including</p>	<p>Grey seals present within the Bae Ceredigion/Cardigan Bay SAC at any one time do not form a discrete population, but are centred (in terms of abundance) on Cardigan Bay and are considered part of the SW England and Wales management unit (IAMMWG, 2013; NRW, 2018a). This population itself is not isolated but extends from SW Scotland to SW England and SE Ireland (individuals have been photographically recaptured among these regions (e.g. Keily <i>et al.</i> (2000)) and there are movements and exchanges with more distant populations (for example, satellite tracked individuals have been tracked to/from France, west coast of Scotland and Ireland (Cronin (2011)) (NRW, 2018a).</p> <p>To take into account the movement of grey seal and that grey seal in the Pen Llyn a'r Sarnau/Lleyn Peninsula and Sarnau SAC and Bae Ceredigion/Cardigan Bay SAC are part of the wider population the assessments have been put into the context of the South and West England and the Wales MU of 6,000 grey seal (IAMMWG, 2013; SCOS, 2018).</p>	Yes (for all impact pathways listed)

	<p>vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p> <p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Disturbance at seal haul out sites a result of vessel movements construction/decommissioning), construction/ decommissioning</p>	<p>There is acknowledged connectivity by individuals between this site and the Lleyn Peninsula and the Sarnau SAC (see above).</p> <p>As the MDZ is not located in Cardigan Bay SAC (>90km), there is no potential for disturbance effects in relation to the area of the SAC.</p> <p>The conservation objectives for Cardigan Bay SAC are the same as Lleyn Peninsula and the Sarnau SAC:</p> <ol style="list-style-type: none"> 1. <i>The populations are maintained on a long-term basis as a viable component of its natural habitat.</i> 2. <i>The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.</i> 3. <i>The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing.</i> <p>Therefore, the relevant conservation objectives for Cardigan Bay SAC are the same for each impact pathway as identified for Lleyn Peninsula and the Sarnau SAC, as are the assessment conclusions.</p> <p><i>Therefore, with the exception of the impact pathways highlighted below, the assessment concluded that the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through these impact pathways.</i></p>	
--	---	--	--

	<p>activities (e.g. piling, drilling), operation (e.g. maintenance).</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>		
	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> 	<p>No</p>

		<p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none">• <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i>• <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against potential turbine collision only</p> <p>There is acknowledged connectivity by individuals between this site and the Lleyn Peninsula and the Sarnau SAC (assessed above)</p> <p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>Predictive modelling was used. This stage of the assessment is based on the 240MW scenario and does not acknowledge '<i>phased development</i>' which is considered a key mitigation measure. An avoidance rate of 98% has been assumed (see ISHRA (MOR/RHDHV/DOC/0067) and Marine Mammals Additional collision risk modelling (MOR/RHDHV/DOC/0118))</p> <p>For HRAs covering developments in Welsh waters, typically consideration will be given to all SACs in the large South and West England and Wales Management Unit because it provides the currently agreed spatial scale of the population and its management and is underpinned by evidence of connectivity among colonies within the MU (e.g. Baines <i>et al</i> 1995; Keily <i>et al</i> 2000; Pomeroy <i>et al</i> 2015; SCOS 2013, 2014; Thompson 2011; Vincent <i>et al</i> 2005). As such, to take into account the movement of grey seal and that grey seal in the Pen Llyn a'r Sarnau/Lleyn Peninsula and Sarnau SAC and Bae Ceredigion/Cardigan Bay SAC are part of the wider population the assessments have been put into the context of the South and West England and the Wales MU of 10,250 grey seal (IAMMWG, 2013; SCOS, 2018).</p>	
--	--	---	--

		<p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for grey seal, without mitigation, could be up to 84.21 individuals per year (0.82% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for bottlenose dolphin, without mitigation, could be up to 112 individuals per year (1.1% of the MU)</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 1.1% of the grey seal MU (112 grey seal/annum) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population. The JNCC <i>et al.</i> (2010) draft EPS guidance provides some indication on how many animals may be removed from a population without causing detrimental effects to the population at FCS.</p> <p>Grey seals present at this SAC are thought to be a part of the wider north Wales population (between 700 and 750 in winter and up to 1,100 in summer) and that the persistent breeding individuals form part of the larger Irish Sea population. The Pen Llyn a'r Sarnau/Lleyn Peninsula and Sarnau SAC had an estimated population of 365 grey seals (in 2002) and has the largest breeding colony in north Wales with a number of important pupping sites, including Bardsey Island (CCW, 2009a).</p> <p>Interpretation of the conservation objectives suggests 'population' size is maintained and not reduced. Across the UK grey seal populations have shown an increase in recent years. Recent estimate for pup production in Wales (2014) was 1,650 (SCOS, 2017). It is acknowledged that grey seal have connectivity with other SACs and, on account of their large range, SACs beyond Welsh waters.</p> <p>The estimated 112 grey seal (values have to be rounded up) would represent >5% of the estimated Welsh pup production in 2014. Consideration against the wider population of the large South and West England and the Wales MU i.e. 10250 grey seal; gives a maximum of 1.1% loss of seals each year within the MU. There is much uncertainty regarding actual 'growth rate' of the population although it is considered to be increasing on the whole. There is also uncertainty regarding how many grey seals are being caught as by-catch. At a</p>	
--	--	---	--

		<p>more localised level it is considered that an additional loss of 85 grey seals per year would be detectable in north wales.</p> <p>Given the above, there is considerable uncertainty over how this loss could affect the achievement of the relevant conservation objectives.</p> <p><i>Hence, for the 240MW proposal, an AEOSI from this impact pathway cannot be ruled out.</i></p>	
	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> • <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against turbine collision and vessels</p> <p>As a worst-case scenario 0.117-0.237 grey seal (0.001%-0.002% of MU) could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port</p> <p>For turbine collision, as a worst-case, the assessment for the indicative 240MW scenario indicates that up to 1.1% of the grey seal MU (112 grey seal) could be</p>	<p>No</p>

		<p>at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>Therefore the combination of the effects from these two scenarios predicts up to 112 seal (1.1% of the MU).</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal, an AEOSI cannot be ruled out as a consequence of the effects on the grey seal population.</i></p>	
Lambay Island SAC (85km)			
Grey Seal	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p>Lambay Island SAC is located along the east coast of the Republic of Ireland, 85km from the MDZ and covers an area of 4.05km². The island is 127m high with steep cliffs to the north, east and south coasts, while the west shore is low-lying and gently slopes upwards (NPWS, 2012b).</p> <p>The Lambay Island SAC is primarily designated for the Annex I habitats of reefs and vegetated sea cliffs, and the Annex II species of both grey and harbour seal (NPWS, 2013b).</p> <p>Lambay Island supports the main breeding colony of grey seal along the east coast of Ireland, with a population of 196-252. There are additionally regionally significant numbers of harbour seal present at the site. Both species of seal occur year round at the site, along the intertidal coasts, coves and caves (NPWS, 2013b).</p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. However, there is the potential to affect grey and harbour seal from the Lambay Island SAC if they are foraging or moving through the MDZ.</p> <p>The Lambay Island SAC is not located in the South and West England and the Wales MU and it is highly unlikely that all grey seal in and around the MDZ would be from this SAC.</p>	Yes

		<p>Chapter 10 of the ES (section 10.6.5.2 – habitat loss effects; section 10.6.5.6 – collision risk effects) concluded minor adverse effects on fish receptors from operational phase.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
Grey Seal	<p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The supplementary HR Wallingford report (document no. MOR/HRW/DOC/0001) supports the zones of influence considered in the ES and it is concluded that the HRA screening remains appropriate. The Metocean and Physical Processes Numerical Modelling Supplementary Note (document no. MOR/RHDHV/DOC/0112) confirm the findings of the assessment presented in the ES.</p> <p>Irrespective of the effect of changes on the seabed features around the MDZ, the conservation objective will be maintained.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes
Grey Seal	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p>	Yes

		<p>The Lambay Island SAC is not located in the South and West England and the Wales MU and it is highly unlikely that all grey seal in and around the MDZ would be from this SAC.</p> <p>To take into account the movement of grey seal and that grey seal in the Lambay Island SAC are part of the wider population the assessments have been put into the context of the 10,250 grey seal SW England, Wales and Ireland region (SCOS 2018)</p> <p>As a worst-case scenario 0.117-0.237 grey seal (rounding up to 1 individual per year) could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port (<0.01% of MU).</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
<p>Grey Seal</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>Consideration is given against the wider population of the large South and West England, Wales and Ireland MU i.e. 10,250 grey seal. However, at the local level a population of 196-252 has been estimated (NPWS, 2013b)</p> <p>As a worst-case scenario 112 grey seal could be at increased collision risk from turbines deployed in the MDZ. This being based on the indicative 240MW scenario used by the predictive modelling at an avoidance rate of 98% (see MOR/RHDHV/DOC/0067).</p> <p>There is much uncertainty regarding actual 'growth rate' of the population although it is considered to be increasing on the whole. There is also uncertainty regarding how many grey seals are being caught as by-catch</p>	<p>No</p>

		<p>Although highly unlikely that all grey seals affected would be part of this site's population there is uncertainty regarding what proportion of grey seals from this site may utilise the waters around the MDZ.</p> <p>At a localised level, for the 240MW proposal, if it were assumed that the loss of 112 grey seals were directly related to the Lambay Island SAC population then an AEOSI would occur.</p> <p><i>Given the above, the achievement of the relevant conservation objective will be affected and an AEOSI is concluded</i></p>	
Grey Seal	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>As a worst-case scenario 0.117-0.237 grey seal could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port</p> <p>For turbine collision, as a worst-case, the assessment for the indicative 240MW scenario indicates that up to 112 grey seal MU could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>Therefore the combination of the effects from these two scenarios predicts up to 112 seal collisions per year.</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal, an AEOSI cannot be ruled out as a consequence of the effects on the grey seal population for both vessel and turbine collision.</i></p>	No
Grey Seal	<p>Presence of turbine mooring lines resulting in entanglement</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p>	Yes

		<p>To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling <i>et al.</i>, 2013; Isaacman and Daborn, 2011)</p> <p>Work by Benjamins <i>et al.</i> (2014) provides a qualitative assessment of relative entanglement risk across different marine megafauna groups, concluding that for the mooring scenarios which most represent those likely to be used at MDZ (i.e. catenary & chain or tension mooring, with or without accessory buoy), the risk to bottlenose dolphin is low.</p> <p>The tidal devices and moorings would receive regular checks (approximately 15 times annually for both planned and unplanned maintenance activities), this would ensure that there was no material such as discarded nets, ropes or other debris which could increase the risk of entanglement for marine mammals or interfere with the optimal operation of the tidal devices.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
Grey Seal	<p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes
Grey Seal	<p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p>	Yes

		<p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
Grey Seal	<p>Disturbance at seal haul out sites a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. maintenance).</p>	<p><i>Relevant conservation objective(s) to impact pathway:</i></p> <p><i>Breeding behaviour: The breeding sites should be maintained in a natural condition.</i></p> <p><i>Moulting behaviour: The moult haul-out sites should be maintained in a natural condition.</i></p> <p><i>Resting behaviour: The resting haul-out sites should be maintained in a natural condition</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes
Grey Seal	<p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	<p><i>Relevant conservation objective(s) to impact pathway:</i></p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p>	Yes

		<p><i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
Grey Seal	<p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes
Grey Seal	<p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes

<p>Grey Seal</p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through these impact pathways</i></p>	<p>Yes</p>
<p>Harbour Seal</p>	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p>Lambay Island SAC is located along the east coast of the Republic of Ireland, 85km from the MDZ and covers an area of 4.05km². The island is 127m high with steep cliffs to the north, east and south coasts, while the west shore is low-lying and gently slopes upwards (NPWS, 2012b).</p> <p>The Lambay Island SAC is primarily designated for the Annex I habitats of reefs and vegetated sea cliffs, and the Annex II species of both grey and harbour seal (NPWS, 2013b).</p> <p>Lambay Island supports the main breeding colony of grey seal along the east coast of Ireland, with a population of 196-252. There are additionally regionally significant numbers of harbour seal present at the site. Both species of seal occur year round at the site, along the intertidal coasts, coves and caves (NPWS, 2013b).</p>	<p>Yes</p>

		<p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. However, there is the potential to affect grey and harbour seal from the Lambay Island SAC if they are foraging or moving through the MDZ.</p> <p>The Lambay Island SAC is not located in the South and West England and the Wales MU and it is highly unlikely that all harbour seal in and around the MDZ would be from this SAC.</p> <p>Chapter 10 of the ES (section 10.6.5.2 – habitat loss effects; section 10.6.5.6 – collision risk effects) concluded minor adverse effects on fish receptors from operational phase.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway. There will no restriction of species range within the site.</i></p>	
<p>Harbour Seal</p>	<p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The supplementary HR Wallingford report (document no. MOR/HRW/DOC/0001) supports the zones of influence considered in the ES and it is concluded that the HRA screening remains appropriate. The Metocean and Physical Processes Numerical Modelling Supplementary Note (document no. MOR/RHDHV/DOC/0112) confirm the findings of the assessment presented in the ES and the ISHRA</p> <p>Irrespective of the effect of changes on the seabed features around the MDZ, the conservation objective will be maintained.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway. There will no restriction of species range within the site.</i></p>	<p>Yes</p>

<p>Harbour Seal</p>	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85 km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The Lambay Island SAC is not located in the South and West England and the Wales MU and it is highly unlikely that all harbour seal in and around the MDZ would be from this SAC.</p> <p>At a distance of 85km from the MDZ it is considered unlikely that any harbour seal present at the MDZ would be from this SAC. In addition, the construction/decommissioning activities would be short-term with temporary requirements for vessels.</p> <p><i>Hence, at a localised population level it is concluded that the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	<p>Yes</p>
<p>Harbour Seal</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85 km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The Lambay Island SAC is not located in the South and West England and the Wales MU and it is unlikely that all harbour seal in and around the MDZ would be from this SAC.</p> <p>To take into account the movement of harbour seal and that individuals from the Lambay Island SAC are part of the wider population the assessments have been put into the context of the 31,549 harbour seal in the wider OSPAR region</p>	<p>No</p>

		<p>There is currently limited understanding and empirical data relating interactions between marine mammals with tidal devices and there have been no recorded incidents at any operational tidal turbines.</p> <p>Predictive modelling was used. This stage of the assessment is based on the 240MW scenario and does not acknowledge '<i>phased development</i>' which is considered a key mitigation measure. An avoidance rate of 98% has been assumed (see ISHRA (MOR/RHDHV/DOC/0067) and Marine Mammals Additional collision risk modelling (MOR/RHDHV/DOC/0118))</p> <p>As a worst-case, the ERM and CRM assessments for the indicative 240MW scenario indicated values of 0.25-0.32 individuals, respectively, to be at risk of collision (0.5% of reference population) (see Morlais ES, Appendix 12.2). However, rounding up 0.32 to a single individual results in 2% of the reference population being affected.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>As the nearest designated site with harbour seal features to the MDZ, there is potential, although unlikely, that harbour seals affected could be linked to the Lambay Island SAC.</p> <p>At a localised level, there is uncertainty as to the potential effect that the loss of 1 harbour seal per year, from long-term operational activities, would have on the SAC population and therefore the conservation objective.</p> <p><i>Hence, for the 240MW proposal, an AEOSI from this impact pathway cannot be ruled out.</i></p>	
Harbour Seal	Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p>	No

		<p><i>Given the conclusions against just turbines (see above) for the 240MW proposal, an AEOSI cannot be ruled out as a consequence of the effects on the harbour seal population for both vessel and turbine collision.</i></p>	
Harbour Seal	<p>Presence of turbine mooring lines resulting in entanglement</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling <i>et al.</i>, 2013; Isaacman and Daborn, 2011)</p> <p>Work by Benjamins <i>et al.</i> (2014) provides a qualitative assessment of relative entanglement risk across different marine megafauna groups, concluding that for the mooring scenarios which most represent those likely to be used at MDZ (i.e. catenary & chain or tension mooring, with or without accessory buoy), the risk to bottlenose dolphin is low.</p> <p>The tidal devices and moorings would receive regular checks (approximately 15 times annually for both planned and unplanned maintenance activities), this would ensure that there was no material such as discarded nets, ropes or other debris which could increase the risk of entanglement for marine mammals or interfere with the optimal operation of the tidal devices.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	Yes
Harbour Seal	<p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling,</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p>	Yes

	turbine operation, ADDs etc.) resulting in noise related injury	<p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	
Harbour Seal	Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	Yes
Harbour Seal	Disturbance at seal haul out sites a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. maintenance).	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Breeding behaviour: The breeding sites should be maintained in a natural condition.</i></p> <p><i>Moulting behaviour: The moult haul-out sites should be maintained in a natural condition.</i></p> <p><i>Resting behaviour: The resting haul-out sites should be maintained in a natural condition</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	Yes

Harbour Seal	Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	Yes
Harbour Seal	Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	Yes
Harbour Seal	Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p>	Yes

	fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration	<p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	
Harbour Seal	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i></p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 85km from the Lambay Island SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on harbour seal or the integrity of the site through this impact pathway.</i></p>	Yes
Pembrokeshire Marine SAC (150km)			
Grey Seal	The relevant impact pathways are as detailed for Lleyn Peninsula and the Sarnau SAC (assessed above):	<p>Grey seals within the Sir Benfro Forol/Pembrokeshire Marine SAC are not part of a discrete population, but are centred (in terms of abundance) on the Pembrokeshire coast and are considered part of the SW England and Wales management unit (NRW, 2018b). This population itself is not isolated but extends from SW Scotland to SW England and SE Ireland (individuals have been photographically recaptured among these regions (e.g. Keily <i>et al.</i> 2000) and there are movements and exchanges with more distant populations</p>	Yes (to all impact pathways listed)

	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling,</p>	<p>(for example, satellite tracked individuals have been tracked to/from France, west coast of Scotland and Ireland (Cronin, 2011)(NRW, 2018b).</p> <p>The Sir Benfro Forol/Pembrokeshire Marine SAC is located within the SW England, Wales and Ireland region (SCOS 2018) which has an estimated popn of 10250</p> <p>The MDZ is located >150km from the Sir Benfro Forol/Pembrokeshire Marine SAC. Therefore, there is no direct or indirect effect within the SAC area. However, there is the potential to affect grey seal from the Sir Benfro Forol/Pembrokeshire Marine SAC if they are foraging or moving through the MDZ.</p> <p>There is acknowledged connectivity by individuals between this site and the Lleyn Peninsula and the Sarnau SAC (assessed above).</p> <p>The conservation objectives for this SAC are the same as Lleyn Peninsula and the Sarnau SAC and Cardigan Bay SAC:</p> <ol style="list-style-type: none"> 1. <i>The populations are maintained on a long-term basis as a viable component of its natural habitat.</i> 2. <i>The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.</i> 3. <i>The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing.</i> <p>Therefore, the relevant conservation objectives for Pembrokeshire Marine SAC are the same for each impact pathway as identified for Lleyn Peninsula and the Sarnau SAC and Cardigan Bay SAC, as are the assessment conclusions.</p> <p><i>Hence, with the exception of the impact pathways highlighted below, the assessment concluded that the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through these impact pathways.</i></p>	
--	---	--	--

	<p>turbine operation, ADDs etc.) resulting in noise related injury</p> <p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures</p>		
--	--	--	--

	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures		
Grey Seal	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> • <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against potential turbine collision only</p> <p>There is acknowledged connectivity by individuals between this site and the Lleyn Peninsula and the Sarnau SAC and Cardigan Bay SAC (assessed above).</p> <p>Due to the limited understanding and lack of empirical data relating interactions between marine mammals with tidal devices predictive modelling was used to inform the assessment. This is based on the 240MW scenario and does not acknowledge 'phased development' which is considered a key mitigation measure. An avoidance rate of 98% has been assumed (see ISHRA</p>	No

		<p>(MOR/RHDHV/DOC/0067) and Marine Mammals Additional collision risk modelling (MOR/RHDHV/DOC/0118))</p> <p>For HRAs covering developments in Welsh waters, consideration is typically given to all SACs in the large South and West England, Wales and Ireland region. . As such, to take into account the movement of grey seal and that grey seal in the Pen Llyn a'r Sarnau/Lleyn Peninsula and Sarnau SAC and Bae Ceredigion/Cardigan Bay SAC are part of the wider population the assessments have been put into the context of the SW England, Wales and Ireland region (SCOS 2018) which has an estimated popn of 10,250</p> <p>The ERM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for grey seal, without mitigation, could be up to 84.21 individuals per year (0.8% of the MU)</p> <p>The CRM assessment indicates that for an indicative deployment, based on 98% avoidance, the potential collision risk for grey seal, without mitigation, could be up to 112 individuals per year (1. 1% of the MU)</p> <p>As a worst-case, the assessment for the indicative 240MW scenario indicates that up to 1.1% of the grey seal MU (112 grey seal/annum) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>Grey seals present at this SAC are thought to be a part of the wider north Wales population (between 700 and 750 in winter and up to 1,100 in summer) and that the persistent breeding individuals form part of the larger Irish Sea population. The Pen Llyn a'r Sarnau/Lleyn Peninsula and Sarnau SAC had an estimated population of 365 grey seals (in 2002) and has the largest breeding colony in north Wales with a number of important pupping sites, including Bardsey Island (CCW, 2009a).</p> <p>Interpretation of the conservation objectives suggests 'population' size is maintained and not reduced. Across the UK grey seal populations have shown an increase in recent years. Recent estimate for pup production in Wales (2014) was 1,650 (SCOS, 2017). It is acknowledged that grey seal have connectivity with other SACs and, on account of their large range, SACs beyond Welsh waters.</p> <p>The estimated 112 grey seal would represent >5% of the estimated Welsh pup production in 2014. Consideration against the wider population of the wider population the assessments have been put into the context of the SW England,</p>	
--	--	---	--

		<p>Wales and Ireland region (SCOS 2018) i.e. a popn of 10,250 ; gives a maximum of 1.1% loss of seals each year within the region. There is much uncertainty regarding actual 'growth rate' of the population although it is considered to be increasing on the whole. There is also uncertainty regarding how many grey seals are being caught as by-catch. At a more localised level it is considered that an additional loss of 112 grey seals per year would be detectable in north wales.</p> <p>Given the above, there is considerable uncertainty over how this loss could affect the achievement of the relevant conservation objectives.</p> <p><i>Hence, for the 240MW proposal, an AEOSI from this impact pathway cannot be ruled out.</i></p>	
<p>Grey Seal</p>	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include:</i></p> <ul style="list-style-type: none"> • <i>Population size;</i> • <i>Structure;</i> • <i>Production; and</i> • <i>Condition of the species within the site.</i> <p><i>As part of this objective it should be noted that:</i></p> <ul style="list-style-type: none"> • <i>For bottlenose dolphin and grey seal: contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression.</i> • <i>For grey seal: Populations should not be reduced as a consequence of human activity.</i> <p><i>The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.</i></p> <p>This assesses against turbine collision and vessels</p>	<p>No</p>

		<p>As a worst-case scenario 0.117-0.237 grey seal (0.001%-0.0023% of the SW England, Wales and Ireland region) could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port</p> <p>For turbine collision, as a worst-case, the assessment for the indicative 240MW scenario indicates that up to 1.1% of the grey seal MU (112 grey seal) could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>Therefore the combination of the effects from these two scenarios predicts up to 112 seal (1.1% of the MU).</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal, an AEOSI cannot be ruled out as a consequence of the effects on the grey seal population from both turbines and potential vessel collision.</i></p>	
Saltee Islands SAC (>170km)			
Grey Seal	<p>The relevant impact pathways are as detailed for Lleyn Peninsula and the Sarnau SAC and Lambay Island SAC (assessed above):</p> <p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p> <p>Presence of vessels travelling to and from the site during construction/decommissioning</p>	<p>The MDZ is located >170km from the Saltee Islands SAC. Therefore, there is no direct or indirect effect within the SAC area. However, there is the potential to affect grey seal from the Sir Benfro Forol/Pembrokeshire Marine SAC if they are foraging or moving through the MDZ.</p> <p>As with Lambay Island SAC, The Saltee Islands SAC is located within the South and West England, Wales and Ireland region. It is highly unlikely that grey seal found within and around the MDZ would only be from the Saltee Islands SAC.</p> <p>The conservation objectives for this SAC are the same as Lambay Island SAC:</p> <ol style="list-style-type: none"> 1. <i>Access to suitable habitat: species range within the site should not be restricted by artificial barriers to site use.</i> 2. <i>Breeding behaviour: The breeding sites should be maintained in a natural condition.</i> 3. <i>Moulting behaviour: The moult haul-out sites should be maintained in a natural condition.</i> 4. <i>Resting behaviour: The resting haul-out sites should be maintained in a natural condition</i> 5. <i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i> 	Yes (against all impact pathways listed)

	<p>phase resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbine mooring lines resulting in entanglement</p> <p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p> <p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p> <p>Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.</p> <p>Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration</p>	<p>All conclusions of the assessments made against each relevant impact pathway for grey seal at Lambay Island SAC are valid for the grey seal feature at the more distant Saltee Islands SAC.</p> <p>Acknowledging the conclusions of the assessments made for grey seal as a feature of Lambay Island SAC, the achievement of the conservation objectives will not be affected by the proposal and there will be no adverse effect on the integrity of the site (Saltee Islands SAC) through the identified impact pathways, with the exception of those listed below.</p>	
--	--	---	--

	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>		
<p>Grey seal</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 170km from the Saltee Islands SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The Saltee Islands SAC is not located in the South and West England and the Wales MU and it is highly unlikely that all grey seal in and around the MDZ would be from this SAC.</p> <p>To take into account the movement of grey seal and that grey seal in the Saltee Islands SAC are part of the wider population the assessments have been put into the context of the 10,250 grey seal in the wider South and West England, Wales and Ireland region</p> <p>However, at a localised level, Great Saltee Island has a breeding colony of grey seal, estimated at 571-744 in 2005, and 246 in 2007 (estimated from a one-off moult count) (NPWS, 2011).</p> <p>Predictive modelling was used to inform the assessment. This is based on the 240MW scenario and does not acknowledge 'phased development' which is</p>	<p>No</p>

		<p>considered a key mitigation measure. An avoidance rate of 98% has been assumed (see ISHRA (MOR/RHDHV/DOC/0067) and Marine Mammals Additional collision risk modelling (MOR/RHDHV/DOC/0118))</p> <p>As a worst-case scenario 112 grey seal could be at increased collision risk from turbines deployed in the MDZ. This being based on the indicative 240MW scenario.</p> <p>Grey seals present at this SAC are thought to be a part of the wider region population (10,250). Although highly unlikely that all grey seals affected would be part of this site's population there is uncertainty regarding what proportion of grey seals from this site may utilise the waters around the MDZ.</p> <p>At a localised level, for the 240MW proposal, if it were assumed that the loss of 112 grey seals were directly related to the Saltee Islands SAC population then an AEOSI would occur.</p> <p><i>Given the above, the achievement of the relevant conservation objective will be affected and an AEOSI is concluded</i></p>	
	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Disturbance: human activities should occur at levels that do not adversely affect the grey seal and harbour seal population at the site.</i></p> <p>The MDZ is located 170km from the Saltee Islands SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>As a worst-case scenario 0.117-0.237 grey seal could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port</p> <p>For turbine collision, as a worst-case, the assessment for the indicative 240MW scenario indicates that up to 112 grey seal MU could be at risk, based on 98% avoidance without mitigation or the planned phased deployment.</p> <p>Therefore the combination of the effects from these two scenarios predicts up to 112 seal collisions per year.</p>	<p>No</p>

		<i>Given the conclusions against just turbines (see above) for the 240MW proposal, an AEOSI cannot be ruled out as a consequence of the effects on the grey seal population for both vessel and turbine collision.</i>	
The Maidens SAC (185km)			
Grey Seal	Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain and enhance, as appropriate, physical features used by grey seal within the site.</i></p> <p>The MDZ is located 185km from The Maidens SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>This conservation objective relates to the area within the site.</p> <p><i>Given that there is no credible mechanism for the proposal to have a significant direct or indirect impact at the location of the SAC there will be no adverse effect on the integrity of the site through this impact pathway</i></p>	Yes
Grey Seal	Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain and enhance, as appropriate, physical features used by grey seal within the site.</i></p> <p>The MDZ is located 185km from The Maidens SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>This conservation objective relates to the area within the site.</p> <p><i>Given that there is no credible mechanism for the proposal to have a significant direct or indirect impact at the location of the SAC, this conservation objective will be maintained. Hence, there will be no adverse effect on the integrity of the site through this impact pathway</i></p>	Yes
Grey Seal	Presence of vessels travelling to and from the site during	Relevant conservation objective(s) to impact pathway:	Yes

	<p>construction/decommissioning phase resulting in physical damage (or mortality) to species from collision</p>	<p><i>To maintain (or restore where appropriate) the grey seal to favourable condition</i></p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p>The MDZ is located 185km from The Maidens SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The Maidens SAC is located within the South and West England, Wales and Ireland region and it is highly unlikely that all grey seal in and around the MDZ would be from this SAC.</p> <p>To take into account the movement of grey seal and that grey seal in The Maidens SAC are part of the wider population, the assessments have been put into the context of the 10,250 grey seal in the wider region</p> <p>However, there is a permanent population of grey seal at this site with a population estimate of between 51 and 100 individuals (DAERA, 2017), with an estimated count of 70 adults recorded in a July 2000 survey. Recent surveys in 2009 confirmed use of the site for both pupping and breeding (DAERA, 2017).</p> <p>As a worst-case scenario 0.117-0.237 grey seal (rounding up to 1 individual per year) could be at increased collision risk with vessels in the MDZ and moving between the MDZ and Holyhead Port.</p> <p>In the context of the wider grey seal population of the OSPAR MU it is considered that the loss of 1 grey seal per year would not contravene the relevant conservation objectives for this site.</p> <p>Although at the local population level a loss of 1 grey seal would equate to ~2% of the SAC population, at a distance of 185 km from the MDZ it is considered highly unlikely that any grey seal present at the MDZ would be from this SAC.</p> <p><i>Hence, at a localised population level the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
Grey Seal	<p>Presence of turbines (operation phase) resulting in physical</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain (or restore where appropriate) the grey seal to favourable condition</i></p>	No

	<p>damage (or mortality) to species from collision</p>	<p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p>The MDZ is located 185km from The Maidens SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The Maidens SAC is located within the South and West England, Wales and Ireland region and it is highly unlikely that all grey seal in and around the MDZ would be from this SAC.</p> <p>To take into account the movement of grey seal and that grey seal in The Maidens SAC are part of the wider population, the assessments have been put into the context of the 10,250 grey seal in the wider region</p> <p>However, at a localised level the population of grey seal at this site is estimated between 51 and 100 individuals (DAERA, 2017),</p> <p>As a worst-case scenario 112 grey seal could be at increased collision risk from turbines deployed in the MDZ. This being based on the indicative 240MW scenario.</p> <p>The number of animals that can be 'removed' from a population varies, but is largely dependent on the growth rate of the population. Populations with low growth rates can sustain the removal of a smaller proportion of the population.</p> <p>Grey seals present at this SAC are thought to be a part of the wider region population (10,250). Although highly unlikely that all grey seals affected would be part of this site's population there is uncertainty regarding what proportion of grey seals from this site may utilise the waters around the MDZ.</p> <p>At a localised level, for the 240MW proposal, if it were assumed that the loss of 112 grey seals were directly related to The Maidens SAC population then an AEOSI would occur.</p> <p><i>Given all of the above, the achievement of the relevant conservation objectives will be affected and an AEOSI is concluded</i></p>	
<p>Grey Seal</p>		<p>Relevant conservation objective(s) to impact pathway:</p>	

	<p>Presence of vessels travelling to and from the site during construction/decommissioning phase and turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p><i>To maintain (or restore where appropriate) the grey seal to favourable condition</i></p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p>The MDZ is located 185km from The Maidens SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>The Maidens SAC is not located in the South and West England and the Wales MU and it is highly unlikely that all grey seal in and around the MDZ would be from this SAC.</p> <p><i>Given the conclusions against just turbines (see above) for the 240MW proposal, an AEOSI cannot be ruled out as a consequence of the effects on the grey seal population for both vessel and turbine collision.</i></p>	<p>No</p>
<p>Grey Seal</p>	<p>Presence of turbine mooring lines resulting in entanglement</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain (or restore where appropriate) the grey seal to favourable condition</i></p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p>The MDZ is located 185km from The Maidens SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices (Sparling <i>et al.</i>, 2013; Isaacman and Daborn, 2011)</p> <p>Work by Benjamins <i>et al.</i> (2014) provides a qualitative assessment of relative entanglement risk across different marine megafauna groups, concluding that for the mooring scenarios which most represent those likely to be used at MDZ (i.e. catenary & chain or tension mooring, with or without accessory buoy), the risk to bottlenose dolphin is low.</p> <p>The tidal devices and moorings would receive regular checks (approximately 15 times annually for both planned and unplanned maintenance activities), this would ensure that there was no material such as discarded nets, ropes or other</p>	<p>Yes</p>

		<p>debris which could increase the risk of entanglement for marine mammals or interfere with the optimal operation of the tidal devices.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
Grey Seal	<p>Activities carried out in the construction/operation/decommissioning phase (e.g. piling, drilling, turbine operation, ADDs etc.) resulting in noise related injury</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain (or restore where appropriate) the grey seal to favourable condition.</i></p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p>The MDZ is located 185km from the SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Given the above, the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes
Grey Seal	<p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain (or restore where appropriate) the grey seal to favourable condition.</i></p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p>The MDZ is located 185 km from the SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p>Acoustic deterrent devices (ADDs) <i>may</i> be used as part of the mitigation plan to deter marine mammals for coming too close to operational turbines and to reduce the potential collisions risk.</p> <p>Their use is assumed here even though this links to mitigation which is not usually encompassed within this section of the HRA</p>	Yes

		<i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i>	
Grey Seal	Noise/vibration disturbance and exclusion from areas as a result of vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain (or restore where appropriate) the grey seal to favourable condition.</i></p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p>The MDZ is located 185 km from the SAC. Therefore, there is no direct or indirect effect within the SAC area.</p> <p><i>Therefore the achievement of the conservation objectives will not be affected and there will be no adverse effect on the integrity of the site through this impact pathway.</i></p>	Yes
Grey Seal	Presence of structures or disturbance (noise or visual) resulting in a barrier to movement, migratory pathways and/or access to feeding grounds.	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p><i>To maintain and enhance, as appropriate, physical features used by grey seal within the site.</i></p> <p>The MDZ is located 185 km from this SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes
	Impacts from Electromagnetic Fields (EMF) and thermal emissions on benthic invertebrates	Relevant conservation objective(s) to impact pathway:	Yes

	and electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration	<p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p><i>To maintain and enhance, as appropriate, physical features used by grey seal within the site.</i></p> <p>The MDZ is located 185 km from this SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	
	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Release of contaminants associated with the dispersion of suspended sediments during installation/removal of structures</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/removal of structures</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To maintain (or restore where appropriate) the grey seal to favourable condition.</i></p> <p><i>To maintain (and if feasible enhance) population numbers and the distribution of grey seal.</i></p> <p><i>To maintain and enhance, as appropriate, physical features used by grey seal within the site.</i></p> <p>The MDZ is located 185km from this SAC. Therefore, there is no direct or indirect effect within the SAC area. Nor would there be any potential to affect the breeding, moulting or haul-out sites within the SAC.</p> <p><i>Given the above, the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on grey seal or the integrity of the site through this impact pathway.</i></p>	Yes
Afon Gwyrfaï a Llyn Cwellyn SAC (33km)			
Atlantic salmon	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The population of the feature in the SAC is stable or increasing over the long term.</i></p>	Yes

		<p>Consideration is given to the evidence provided in the Additional Information to Support Morlais Habitats Regulations Assessment (migratory fish) (MOR-MSP-DOC-003). It is considered that individual fish will display high capacity for avoidance of TECs. This conclusion is supported by monitoring data from existing tidal energy developments. No instances of fish colliding with turbine blades have been recorded in post-construction monitoring for the tidal array at Bluemull Sound (data informed by automated impact sensors and motion triggered video; Nova International, 2015).</p> <p>As previously noted, the SAC's population that may utilise the MDZ is likely to be low.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objective will not be affected and there will be no adverse effect on Atlantic salmon or the integrity of the site through this impact pathway.</i></p>	
Anglesey Terns SPA (0km)			
<p>Terns (Arctic, Common, Roseate, Sandwich)</p>	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Construction, operation or decommissioning activities resulting in changes to prey availability.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There should be sufficient habitat, of sufficient quality, to support the population in the long term:</i></p> <ul style="list-style-type: none"> • <i>The extent of supporting habitats used by terns is stable or increasing</i> • <i>Supporting habitats are of sufficient quality to support the requirements of terns</i> • <i>There are appropriate and sufficient food sources for terns within access of the SPA</i> <p><i>Factors affecting the population, or its habitat should be under appropriate control</i></p> <p>The MDZ is located within the SPA; however, the proposal will not result in any direct habitat loss for the terns. As terns are surface feeders, in the order of 1 m depth for Arctic tern, common tern and roseate tern, and 2 m foraging depth for Sandwich tern (Haney and Stone, 1988), there will be minimal overlap between structures and foraging depth. There are also extensive areas of foraging habitat throughout the SPA.</p>	<p>Yes</p>

		<p>Assessments carried out in the ES (Morlais ES, 2019) concluded that any impacts on fish from the development would be minor adverse.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on terns or the integrity of the site through these impact pathways.</i></p>	
<i>Terns (as listed above)</i>	<p>Presence of vessels (construction/decommissioning) and/or turbine structures (operation) resulting in temporary/permanent changes to seabed (including intertidal and coastal areas) from scour (including vessels, anchors, jack-up legs) or hydrodynamic changes</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There should be sufficient habitat, of sufficient quality, to support the population in the long term:</i></p> <ul style="list-style-type: none"> • <i>The extent of supporting habitats used by terns is stable or increasing</i> • <i>Supporting habitats are of sufficient quality to support the requirements of terns</i> • <i>There are appropriate and sufficient food sources for terns within access of the SPA</i> <p><i>Factors affecting the population, or its habitat should be under appropriate control</i></p> <p>The nearest tern nesting habitat to the MDZ is at Ynys Feurig and The Skerries both of which are >10km away. These areas would remain unaffected from any changes to coastal processes.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on terns or the integrity of the site through these impact pathways.</i></p>	Yes
<i>Terns (as listed above)</i>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term</i></p> <p><i>The distribution of the population should be being maintained, or where appropriate increasing</i></p>	Yes

		<p>Whilst tern species are plunge diving birds (Cramp, 1985), they are limited to shallow depths; in the order of 1 m for Arctic tern, common tern and roseate tern, and 2 m for Sandwich tern (Haney and Stone, 1988). Moving elements of tidal devices which will be operated at the project are not expected to occur less than approximately 5 m from the surface of the sea.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on terns or the integrity of the site through this impact pathway</i></p>	
<p><i>Terns (as listed above)</i></p>	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There should be sufficient habitat, of sufficient quality, to support the population in the long term:</i></p> <ul style="list-style-type: none"> • <i>The extent of supporting habitats used by terns is stable or increasing</i> • <i>Supporting habitats are of sufficient quality to support the requirements of terns</i> • <i>There are appropriate and sufficient food sources for terns within access of the SPA</i> <p><i>Factors affecting the population, or its habitat should be under appropriate control</i></p> <p>The nearest tern nesting/breeding site to the MDZ is at either Ynys Feurig or The Skerries, both of which are >10km away.</p> <p>A wide-ranging review of displacement and habituation of seabirds did not identify terns as being sensitive to disturbance or displacement in response to a range of marine activities (MMO, 2018). A review of offshore wind farm ornithology studies concluded that effects on common tern and Arctic tern (which often could not be separated during such studies) were generally weak or not detectable. Sandwich terns were described as a species displaying weak avoidance to offshore wind farms (Dierschke <i>et al.</i>, 2016).</p> <p>Terns are generally not thought to be active at night (Garthe and Hüppop, 2004), and there is no evidence that they are affected by the presence of artificial lighting at sea.</p>	<p>Yes</p>

		<p>It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the project, some disturbance to terns at sea may occur within the MDZ and ECC. Based on the recorded reactions of birds elsewhere at other developments where comparable marine activities have been undertaken, disturbance events will be spatially restricted to areas within close proximity to construction, operational or decommissioning activity (likely to be in the order of tens to hundreds of metres based on the apparent relative insensitivity of the qualifying species to this impact pathway), last only for as long as the activity itself, and be reversible once the activity has concluded. Rather than resulting in harm to the bird or loss from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The Anglesey Terns SPA consists of a large amount of foraging habitat (approximately 100,000 hectares (NRW, 2015b)), so it is considered that ample alternative foraging habitat for any disturbed birds is available.</p> <p>Based on the relatively low observed densities of birds during the baseline surveys individual disturbance events are likely to be infrequent, and when they do occur will involve very small numbers of birds. The low recorded densities of all tern species in the MDZ and 2 km buffer during the baseline surveys indicates that this area of sea is not an important area for these species, which is not unexpected when the findings of related studies are reviewed (Perrow <i>et al.</i>, 2011; Wilson <i>et al.</i>, 2014).</p> <p><i>Given all of the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on terns or the integrity of the site through this impact pathway</i></p>	
<p><i>Terns (as listed above)</i></p>	<p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There should be sufficient habitat, of sufficient quality, to support the population in the long term:</i></p> <ul style="list-style-type: none"> • <i>The extent of supporting habitats used by terns is stable or increasing</i> • <i>Supporting habitats are of sufficient quality to support the requirements of terns</i> • <i>There are appropriate and sufficient food sources for terns within access of the SPA</i> 	<p>Yes</p>

		<p><i>Factors affecting the population, or its habitat should be under appropriate control</i></p> <p>The nearest tern nesting/breeding site to the MDZ is at either Ynys Feurig or The Skerries, both of which are >10km away and therefore any effect from noise/visual disturbance can be excluded from consideration.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on terns or the integrity of the site through this impact pathway</i></p>	
<p><i>Terns (as listed above)</i></p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>There should be sufficient habitat, of sufficient quality, to support the population in the long term:</i></p> <ul style="list-style-type: none"> • <i>The extent of supporting habitats used by terns is stable or increasing</i> • <i>Supporting habitats are of sufficient quality to support the requirements of terns</i> • <i>There are appropriate and sufficient food sources for terns within access of the SPA</i> <p><i>Factors affecting the population, or its habitat should be under appropriate control</i></p> <p>Pollution incidents, which are considered unlikely to occur, would result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because of the overlap between the project and the SPA, it is possible that such an event could result in the temporary non-availability of a small area of subtidal habitat to the qualifying features of the SPA.</p> <p>The foraging capabilities of the qualifying species of this SPA (Thaxter <i>et al.</i>, 2012; Wilson <i>et al.</i>, 2014; Woodward <i>et al.</i>, 2019) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat within the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount</p>	<p>Yes</p>

		<p>of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p> <p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on terns or the integrity of the site through these impact pathways</i></p>	
Irish Sea Front SPA (35km)			
Manx Shearwater	<p>Development footprint leading to permanent loss/changes to seabed, foraging or nursery/spawning areas</p> <p>Construction, operation or decommissioning activities resulting in changes to prey availability.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Maintain the habitats and food resources of the qualifying features in favourable condition.</i></p> <p>The MDZ is located ~35km from the SPA. Therefore, there is no direct or indirect effect within the SPA. There are extensive areas of foraging habitat throughout the SPA and wider areas available for this feature.</p> <p>Assessments carried out in Section 10.6.5.2 ES (Morlais ES, 2019) concluded that any impacts on fish from the development would be minor adverse.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through these impact pathways.</i></p>	Yes (for all impact pathways listed)
Manx Shearwater	Presence of turbines (operation phase) resulting in physical	Relevant conservation objective(s) to impact pathway:	Yes

	<p>damage (or mortality) to species from collision</p>	<p><i>Avoid significant mortality, injury and disturbance of the qualifying features, so that the distribution of the species and ability to use the site are maintained in the long-term;</i></p> <p>Manx shearwater is known to possess substantial diving capabilities, meaning that there is a theoretical risk of collision with tidal devices. At an indicative 240 MW array, approximately 0-2 or 0-9 birds per season may collide with tidal devices, of which the vast majority will breed at either the Skomer, Skokholm and the Seas off Pembrokeshire SPA or the Aberdaron Coast and Bardsey Island SPA (SNH, 2018). This assumes an avoidance rate of at least 95%. Compared with the 12,000 birds estimated to occur at the Irish Sea Front SPA, this is <0.1% of the total, and is therefore considered an impact so small it will not result in an adverse effect on site integrity.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	
<p>Manx Shearwater</p>	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Avoid significant mortality, injury and disturbance of the qualifying features, so that the distribution of the species and ability to use the site are maintained in the long-term;</i></p> <p>In two literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012), Manx shearwater was given a score of one out of five for disturbance by vessels (where a score of one is the least sensitive). More recently, a wide-ranging review of displacement and habituation of seabirds did not identify Manx shearwater as being sensitive to disturbance or displacement in response to a range of marine activities (MMO, 2018). A review of offshore wind farm studies stated that in general, Manx shearwater displayed weak avoidance of offshore wind farms, though it has been recorded in developments in the Celtic Sea (Dierschke <i>et al.</i>, 2016). Due to the obvious visual differences between an offshore wind farm and a tidal energy development it is currently thought that displacement for this species will</p>	<p>Yes</p>

		<p>not occur during the operational phase of the proposed development. Manx shearwaters are active at night, though most nights away from the colony are spent roosting on the water rather than foraging (Dean, 2012; Dean <i>et al.</i>, 2012).</p> <p>The Irish Sea Front is located >30 km from the nearest extent of the MDZ, and it is unlikely that any activities will occur much closer to the Irish Sea Front SPA than this. Due to this spatial separation it is inconceivable that birds within the SPA boundary could be impacted by visual disturbance or airborne noise disturbance during any project phase.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	
<p>Manx Shearwater</p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Maintain the habitats and food resources of the qualifying features in favourable condition.</i></p> <p><i>Avoid significant mortality, injury and disturbance of the qualifying features, so that the distribution of the species and ability to use the site are maintained in the long-term;</i></p> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >30 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p> <p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p>	<p>Yes (for all impact pathways listed)</p>

		<p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through these impact pathways.</i></p>	
Aberdaron Coast and Bardsey Island SPA (45km)			
Manx Shearwater	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Breeding population of Manx shearwater (confined to Ynys Enlli) is stable or increasing. Current popn of 20,675 pairs and a conservation objective/performance indicator of 10,000 pairs (NRW, 2018)..</i></p> <p><i>Reproductive rates remain stable.</i></p> <p><i>Deaths from the lighthouse attractions, fencing and other infrastructure are minimal</i></p> <p>Dean (2012) reported that approximately 50% of all Manx shearwater diving activity occurs at depths of less than 5.3 m, though birds were recorded diving as deep as 55.5 m. Using the same raw data, Shoji <i>et al.</i>, (2016) reported that mean dive depth was 9.6 m, and mean dive duration was 13.49 seconds. Whilst this information suggests that the majority of Manx shearwater diving behaviour occurs in relatively shallow parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project.</p> <p>At an indicative 240 MW array, approximately 0-2 or 0-9 birds respectively per season may collide with tidal devices (assuming an avoidance rate of at least 95%). The theoretical method of apportioning (SNH, 2018) indicates that approximately 42% of the Manx shearwaters present in the MDZ and buffer zone are likely to originate from this SPA. On this basis, between 0-4 birds from this SPA may collide annually with tidal devices. On the basis that this represents 0.03% of the 13,860 birds that breed at this SPA. The predicted magnitude of this impact means that it is considered that the project will not result in an adverse effect on site integrity through this impact pathway.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	Yes

<p>Manx Shearwater</p>	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Breeding population of Manx shearwater (confined to Ynys Enlli) is stable or increasing. Current popn of 20,675 pairs and a conservation objective/performance indicator of 10,000 pairs (NRW, 2018)..</i></p> <p><i>Reproductive rates remain stable.</i></p> <p><i>Deaths from the lighthouse attractions, fencing and other infrastructure are minimal</i></p> <p><i>Nesting birds are not disturbed by restoration works on boundary walls or recreational activities; and</i></p> <p><i>All factors affecting the achievement of these conditions are under control.</i></p> <p>In two literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012), Manx shearwater was given a score of one out of five for disturbance by vessels (where a score of one is the least sensitive). More recently, a wide-ranging review of displacement and habituation of seabirds did not identify Manx shearwater as being sensitive to disturbance or displacement in response to a range of marine activities (MMO, 2018). A review of offshore wind farm studies stated that in general, Manx shearwater displayed weak avoidance of offshore wind farms, though it has been recorded in developments in the Celtic Sea (Dierschke <i>et al.</i>, 2016). Due to the obvious visual differences between an offshore wind farm and a tidal energy development it is currently thought that displacement for this species will not occur during the operational phase of the proposed development. Manx shearwaters are active at night, though most nights away from the colony are spent roosting on the water rather than foraging (Dean, 2012; Dean <i>et al.</i>, 2012).</p> <p>Fledging shearwaters, along with other members of the Procellariiformes order of seabirds are known to be vulnerable to grounding by attraction to artificial lighting (Deppe <i>et al.</i>, 2017; Laguna <i>et al.</i>, 2014; Rodríguez <i>et al.</i>, 2017, 2015, 2014). This grounding seems to occur at relatively close range to the colony (within 20 km), so is not considered to be an issue for the proposed</p>	<p>Yes</p>
-------------------------------	---	---	-------------------

		<p>development requiring further consideration given that this SPA is situated >40 km from the nearest part of the MDZ.</p> <p>Of the Manx shearwater in the MDZ and ECC, approximately 42% are predicted to originate from this SPA (SNH, 2018). It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the proposed development, some disturbance to Manx shearwaters at sea that are from this SPA may occasionally occur within the MDZ and ECC as a result of these activities but is not likely on a regular basis. Based on the available information, disturbance events will be spatially restricted to areas within close proximity to construction, operational or decommissioning activity (likely to be in the order of tens of metres or less due to the apparent insensitivity of this qualifying feature to this impact pathway), last only for as long as the activity itself, and be reversible once the activity has concluded. Rather than resulting in harm to the bird or loss from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The relatively low recorded densities of Manx shearwater in the MDZ and 2 km buffer during the baseline surveys indicates that the area of sea occupied by the MDZ and ECC are not an important foraging area for these species. The preferred foraging grounds of Manx shearwater for birds breeding in UK western waters have been shown to occur away from the MDZ and ECC (Dean, 2012; Dean <i>et al.</i>, 2012; Guilford <i>et al.</i>, 2008; Shoji <i>et al.</i>, 2016).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	
<p>Manx Shearwater</p>	<p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Breeding population of Manx shearwater (confined to Ynys Enlli) is stable or increasing. Current popn of 20,675 pairs and a conservation objective/performance indicator of 10,000 pairs (NRW, 2018)..</i></p> <p><i>Reproductive rates remain stable.</i></p> <p><i>Deaths from the lighthouse attractions, fencing and other infrastructure are minimal</i></p>	<p>Yes</p>

		<p><i>Nesting birds are not disturbed by restoration works on boundary walls or recreational activities; and</i></p> <p><i>All factors affecting the achievement of these conditions are under control.</i></p> <p>The Manx shearwater population of the Aberdaron Coast and Bardsey Island SPA consists of birds breeding at Bardsey Island. This is located approximately 45 km from the nearest boundary of the MDZ. There is no project-related activity planned at substantially closer distances to these colonies during any of the project phases. Whilst habituation to anthropogenic activities near a breeding colony is a key factor in understanding the likely response of the colony to that activity, flight initiation distances for birds at breeding colonies are generally in the order of hundreds of metres or less (Burger, 1998; Erwin, 1989; Livezey <i>et al.</i>, 2016; Rodgers Jr. and Schwikert, 2002; Rodgers Jr. and Smith, 1995).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	
<p>Manx Shearwater</p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Breeding population of Manx shearwater (confined to Ynys Enlli) is stable or increasing. Current popn of 20,675 pairs and a conservation objective/performance indicator of 10,000 pairs (NRW, 2018)..</i></p> <p><i>Reproductive rates remain stable.</i></p> <p><i>Deaths from the lighthouse attractions, fencing and other infrastructure are minimal</i></p> <p><i>Nesting birds are not disturbed by restoration works on boundary walls or recreational activities; and</i></p> <p><i>All factors affecting the achievement of these conditions are under control.</i></p> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of</p>	<p>Yes</p>

		<p>metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >40 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p> <p>The foraging capabilities of the qualifying species of this SPA (Oppel <i>et al.</i>, 2018; Woodward <i>et al.</i>, 2019) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat outside the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p> <p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through these impact pathways.</i></p>	
Howth Head Coast SPA (80km)			
Kittiwake	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;</i></p> <p>Like other gull species, kittiwake are surface feeding birds. The maximum depth at which kittiwakes are likely to feed is approximately 1 m (Cramp and Simmons, 1983). Moving elements of tidal devices which will be operated at the project are not expected to occur less than 5 m from the surface of the sea.</p>	Yes

		<p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Kittiwake or the integrity of the site through this impact pathway.</i></p>	
Kittiwake	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future;</i></p> <p>At 80km away from the nearest point of the MDZ, there is no potential for a direct or indirect effect to occur within the SPA boundary.</p> <p>In three literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012; Garthe and Hüppop, 2004), kittiwake was given a score of two out of five for disturbance by vessels (where a score of one is the least sensitive), with avoidance behaviour described as slight avoidance at short range. More recently, a wide-ranging review of displacement and habituation of seabirds did not identify kittiwake as being sensitive to disturbance or displacement in response to a wide range of marine activities (MMO, 2018).</p> <p>During a review of offshore wind farm studies, kittiwake was described as a species which is hardly affected by offshore wind farms or with attraction and avoidance approximately equal over all studies (Dierschke <i>et al.</i>, 2016). Single site studies showed attraction during construction only (indicating possible attraction to vessels) (Gill <i>et al.</i>, 2018), mixed avoidance at two sites in Dutch waters (including attraction into a vessel anchorage zone) (Leopold <i>et al.</i>, 2013), no evidence of any such effects (APEM, 2017) and possible, but not significant, attraction effects (Vanermen <i>et al.</i>, 2015).</p> <p>Kittiwake are thought to be fairly active during nocturnal conditions (Garthe and Hüppop, 2004), but there is no evidence that artificial lighting during the night causes issues for this species.</p> <p>It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the proposed development, some disturbance to breeding kittiwakes at sea that are from this SPA may occasionally occur within the MDZ as a result of these activities but is not likely on a regular basis. Based on the available information, disturbance</p>	Yes

		<p>events will not be particularly common, and be spatially restricted to areas within close proximity to construction, operational or decommissioning activity (likely to be in the order of tens or hundreds of metres due to the apparent insensitivity of this qualifying feature to this impact pathway), last only for as long as the activity itself, and be completely reversible once the activity has concluded. Rather than resulting in harm to the bird or loss from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The low recorded densities of kittiwake in the MDZ and 2 km buffer during the baseline surveys (Morlais ISHRA, 2019) indicates that this area of sea is not an important area for these species; and only 13% of birds in the MDZ and ECC are thought to originate from this colony. The low on-site kittiwake density reflects models of at-sea distribution for kittiwake throughout UK waters, which do not consider the MDZ, ECC and surrounding subtidal habitats to be part of the core foraging range for this species (Cleasby <i>et al.</i>, 2018; Wakefield <i>et al.</i>, 2017).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Kittiwake or the integrity of the site through this impact pathway.</i></p>	
Kittiwake	Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future;</i></p> <p>At 80km away from the nearest point of the MDZ, there is no potential for a direct or indirect effect to occur within the SPA boundary i.e. at kittiwake breeding sites.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Kittiwake or the integrity of the site through this impact pathway.</i></p>	Yes
Kittiwake	Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future;</i></p>	Yes

	<p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p><i>There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis</i></p> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >80 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p> <p>The foraging capabilities of the qualifying species of this SPA (Oppel <i>et al.</i>, 2018; Woodward <i>et al.</i>, 2019) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat outside the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p> <p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Kittiwake or the integrity of the site through these impact pathways</i></p>	
<p>Lambay Island SPA (80km)</p>			
<p>Kittiwake</p>		<p>The relevant conservation objectives are the same as Howth Head Coast SPA (see above) for each Impact Pathway.</p>	

	<p>The impact pathways are the same as detailed for Howth Head Coast SPA (see above):</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p>As the MDZ is approximately 80km from the Lambay Island SPA, there is no potential for direct or indirect effects at the site, including disturbance effects.</p> <p><i>Given that the conclusions align with those for Howth Head Coast SPA, the achievement of all conservation objectives will be maintained. Hence there will be no adverse effect on the integrity of the site through these impact pathways.</i></p>	<p>Yes (to all impact pathways)</p>
--	---	---	--

Ribble and Alt Estuaries SPA (120km)			
Lesser black-backed gull	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</i></p> <ul style="list-style-type: none"> • <i>the population of each of the qualifying features: and</i> • <i>the distribution of the qualifying features within the site</i> <p>Lesser black-backed gull is a surface feeding species. The maximum depth at which they are likely to feed is approximately 1 m or less (Cramp and Simmons, 1983; Schwemmer and Garthe, 2008). The moving elements of tidal energy converters which will be operated at the proposed development are not expected to occur less than 5 m from the surface of the sea.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Lesser black-backed gull or the integrity of the site through this impact pathway.</i></p>	Yes
Lesser black-backed gull	Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>Ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</i></p> <ul style="list-style-type: none"> • <i>the population of each of the qualifying features: and</i> • <i>the distribution of the qualifying features within the site</i> <p>In three literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012; Garthe and Hüppop, 2004), lesser black-backed gull was given a score of two out of five for disturbance by vessels (where a score of one is the least sensitive), with avoidance behaviour described as slight avoidance at short range. More recently, a wide-ranging review of displacement and habituation of seabirds did not identify lesser black-backed gull as being sensitive to disturbance or displacement in response to a wide range of marine activities (MMO, 2018).</p> <p>Whilst some evidence does exist of lesser black-backed gull displacement by offshore wind farms (Leopold <i>et al.</i>, 2013), it is suggested that the prohibition of</p>	Yes

		<p>fishing vessels within operational offshore wind farms may be responsible for this observation, as opposed to a genuine disturbance and displacement effect. More recent work at another site no change in numbers during any stage of an offshore wind farm's development (Gill <i>et al.</i>, 2018). A review into the findings of ornithological studies at offshore wind farms suggested that single site studies usually concluded weak attraction for lesser black-backed gull; this was attributed to the species being regularly recorded roosting on wind farm infrastructure (Dierschke <i>et al.</i>, 2016).</p> <p>Lesser black-backed gull are thought to be fairly active during nocturnal conditions (Garthe and Hüppop, 2004), but there is no evidence that artificial lighting during the night causes issues for this species. It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the proposed development, some disturbance to breeding lesser black-backed gull at sea that are from this SPA may occasionally occur within the MDZ and ECC as a result of these activities but is not likely on a regular basis. Based on the available information, disturbance events will not be particularly common, and be spatially restricted to areas within close proximity to construction, operational or decommissioning activity (likely to be in the order of tens or hundreds of metres due to the apparent relative insensitivity of this qualifying feature to this impact pathway), last only for as long as the activity itself, and be reversible once the activity has concluded. Rather than resulting in harm to the bird or loss from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The low recorded densities of lesser black-backed gull in the MDZ and 2 km buffer during the baseline surveys indicates that this area of sea is not an important area for these species; even less so for birds from this SPA with approximately 12% of lesser black-backed gulls recorded in the MDZ and ECC thought to originate from this SPA.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Lesser black-backed gull or the integrity of the site through this impact pathway.</i></p>	
Lesser black-backed gull	Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning),	Relevant conservation objective(s) to impact pathway:	Yes

	<p>construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p><i>Ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</i></p> <ul style="list-style-type: none"> • <i>the population of each of the qualifying features: and</i> • <i>the distribution of the qualifying features within the site</i> <p>Within this SPA, lesser black-backed gull breeding sites are located in excess of 100 km from the nearest boundary of the MDZ. There is no project-related activity planned at substantially closer distances to these colonies during any of the project phases. Whilst habituation to anthropogenic activities near a breeding colony is a key factor in understanding the likely response of the colony to that activity, flight initiation distances for birds at breeding colonies are generally in the order of hundreds of metres or less (Burger, 1998; Erwin, 1989; Livezey <i>et al.</i>, 2016; Rodgers Jr. and Schwikert, 2002; Rodgers Jr. and Smith, 1995).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Lesser black-backed gull or the integrity of the site through this impact pathway.</i></p>	
<p>Lesser black-backed gull</p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p><i>Ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</i></p> <ul style="list-style-type: none"> • <i>The extent and distribution of the habitats of the qualifying features;</i> • <i>The structure and function of the habitats of the qualifying features;</i> • <i>The supporting processes on which the habitats of the qualifying features rely;</i> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >120 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p>	<p>Yes</p>

		<p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p> <p>The foraging capabilities of the qualifying species of this SPA (Woodward <i>et al.</i>, 2019) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat outside the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Lesser black-backed gull or the integrity of the site through these impact pathways.</i></p>	
Ribble and Alt Estuaries Ramsar (120km)			
<p>Lesser black-backed gull</p>	<p>The impact pathways are the same as detailed for Ribble and Alt Estuaries SPA (see above):</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning</p>	<p>For this feature the high level conservation objectives are as given for the Ribble and Alt Estuaries SPA above. Hence, the relevant conservation objectives are the same as Ribble and Alt estuaries SPA (see above) for each Impact Pathway.</p> <p><i>Given that the conclusions align with those for Ribble and Alt estuaries SPA, the achievement of all conservation objectives will be maintained. Hence there will be no adverse effect on the integrity of the site through these impact pathways.</i></p>	<p>Yes (for all impact pathways listed)</p>

	<p>activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>		
Morecambe Bay and Duddon Estuary SPA (120km)			
<p>Lesser black-backed gull</p>	<p>The impact pathways are the same as detailed for Ribble and Alt Estuaries SPA (see above):</p> <p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Noise/visual disturbance to birds at sea resulting from vessel</p>	<p>For this feature the conservation objectives are as given for the Ribble and Alt estuaries SPA above. Hence, the relevant conservation objectives are the same as Ribble and Alt estuaries SPA (see above) for each Impact Pathway.</p> <p><i>Given that the conclusions align with those for Ribble and Alt estuaries SPA, the achievement of all conservation objectives will be maintained. Hence there will be no adverse effect on the integrity of the site through these impact pathways.</i></p>	<p>Yes (for all impact pathways listed)</p>

	<p>movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>		
Morecambe Bay Ramsar (120km)			
Lesser black-backed gull	<p>The impact pathways are the same as detailed for Ribble and Alt Estuaries SPA (see above):</p> <p>Presence of turbines (operation phase) resulting in physical</p>	<p>For this feature the high level conservation objectives are as given for the Ribble and Alt estuaries SPA above. Hence, the relevant conservation objectives are the same as Ribble and Alt estuaries SPA (see above) for each Impact Pathway.</p>	Yes (for all impact pathways listed)

	<p>damage (or mortality) to species from collision</p> <p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p><i>Given that the conclusions align with those for Ribble and Alt estuaries SPA, the achievement of all conservation objectives will be maintained. Hence there will be no adverse effect on the integrity of the site through these impact pathways.</i></p>	
Skomer, Skokholm and the Seas off Pembrokeshire SPA (160km)			
<p>Manx shearwater</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> • <i>The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term</i> 	<p>Yes</p>

		<p><i>The breeding population of Manx shearwater should be stable or increasing with no measured decrease in numbers (based on a population count of 150,968), based on annual study plots</i></p> <p>Dean (2012) reported that approximately 50% of all Manx shearwater diving activity occurs at depths of less than 5.3 m, though birds were recorded diving as deep as 55.5 m. Using the same raw data, Shoji <i>et al.</i>, (2016) reported that mean dive depth was 9.6 m, and mean dive duration was 13.49 seconds. Whilst this information suggests that the majority of Manx shearwater diving behaviour occurs in relatively shallow parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project.</p> <p>At an indicative 240 MW array, approximately 0-2 or 0-9 birds respectively per season may collide with tidal devices (assuming an avoidance rate of at least 95%). The theoretical method of apportioning (SNH, 2018) indicates that approximately 56% of the Manx shearwaters present in the MDZ and buffer zone are likely to originate from this SPA. On this basis, between 0-5 birds from this SPA may collide annually with tidal devices. On the basis that this represents 0.0008% of the 600,000+ birds that breed at this SPA. The predicted magnitude of this impact means that it is considered that the project will not result in an adverse effect on site integrity through this impact pathway.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	
<p>Manx shearwater</p>	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> <i>The distribution of the population should be being maintained, or where appropriate increasing</i> <p><i>The distribution of this species within the site should not be constrained by anthropogenic factors, including disturbance of nesting sites by the public and activities leading to possible loss of suitable nesting sites</i></p>	<p>Yes</p>

		<p>In two literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012), Manx shearwater was given a score of one out of five for disturbance by vessels (where a score of one is the least sensitive). More recently, a wide-ranging review of displacement and habituation of seabirds did not identify Manx shearwater as being sensitive to disturbance or displacement in response to a range of marine activities (MMO, 2018). A review of offshore wind farm studies stated that in general, Manx shearwater displayed weak avoidance of offshore wind farms, though it has been recorded in developments in the Celtic Sea (Dierschke <i>et al.</i>, 2016). Due to the obvious visual differences between an offshore wind farm and a tidal energy development it is currently thought that displacement for this species will not occur during the operational phase of the proposed development. Manx shearwaters are active at night, though most nights away from the colony are spent roosting on the water rather than foraging (Dean, 2012; Dean <i>et al.</i>, 2012).</p> <p>Fledging shearwaters, along with other members of the Procellariiformes order of seabirds are known to be vulnerable to grounding by attraction to artificial lighting (Deppe <i>et al.</i>, 2017; Laguna <i>et al.</i>, 2014; Rodríguez <i>et al.</i>, 2017, 2015, 2014). This grounding seems to occur at relatively close range to the colony (within 20 km), so is not considered to be an issue for the proposed development requiring further consideration given that this SPA is situated >160 km from the nearest part of the MDZ.</p> <p>Of the Manx shearwater in the MDZ and ECC, approximately 56% are predicted to originate from this SPA (SNH, 2018). It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the proposed development, some disturbance to Manx shearwaters at sea that are from this SPA may occasionally occur within the MDZ and ECC as a result of these activities but is not likely on a regular basis. Based on the available information, disturbance events will be spatially restricted to areas within close proximity to construction, operational or decommissioning activity (likely to be in the order of tens of metres or less due to the apparent insensitivity of this qualifying feature to this impact pathway), last only for as long as the activity itself, and be reversible once the activity has concluded. Rather than resulting in harm to the bird or loss from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The relatively low recorded densities of Manx shearwater in the MDZ and 2 km buffer during the baseline surveys indicates that the area</p>	
--	--	---	--

		<p>of sea occupied by the MDZ and ECC are not an important foraging area for these species. The preferred foraging grounds of Manx shearwater for birds breeding in UK western waters have been shown to occur away from the MDZ and ECC (Dean, 2012; Dean <i>et al.</i>, 2012; Guilford <i>et al.</i>, 2008; Shoji <i>et al.</i>, 2016).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	
Manx shearwater	Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> <i>The distribution of the population should be being maintained, or where appropriate increasing</i> <p><i>The distribution of this species within the site should not be constrained by anthropogenic factors, including disturbance of nesting sites by the public and activities leading to possible loss of suitable nesting sites</i></p> <p>The Manx shearwater population of the Skomer, Skokholm and the Seas off Pembrokeshire SPA consists of birds breeding on Skokholm, Skomer and Middleholm Islands (Perrins <i>et al.</i>, 2012). These are located approximately 160 km from the nearest boundary of the MDZ. There is no project-related activity planned at substantially closer distances to these colonies during any of the project phases. Whilst habituation to anthropogenic activities near a breeding colony is a key factor in understanding the likely response of the colony to that activity, flight initiation distances for birds at breeding colonies are generally in the order of hundreds of metres or less (Burger, 1998; Erwin, 1989; Livezey <i>et al.</i>, 2016; Rodgers Jr. and Schwikert, 2002; Rodgers Jr. and Smith, 1995).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through this impact pathway.</i></p>	Yes
Manx shearwater	Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> <i>There should be sufficient habitat, of sufficient quality, to support the population in the long term</i> 	Yes

	<p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<ul style="list-style-type: none"> • <i>Factors affecting the population or its habitat should be under appropriate control</i> <p><i>The breeding and foraging habitat of this species should be stable or increasing in terms of its area, and its quality should remain unaffected by anthropogenic factors</i></p> <p><i>Rafting birds should remain unaffected by boat use and other anthropogenic factors; appropriate codes of conduct must be followed by all visitors and craft surrounding the islands. Factors affecting the species within the site should</i></p> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >160 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p> <p>The foraging capabilities of the qualifying species of this SPA (Oppel <i>et al.</i>, 2018; Woodward <i>et al.</i>, 2019) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat outside the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p> <p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p>	
--	--	--	--

		<p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Manx shearwater or the integrity of the site through these impact pathways.</i></p>	
<p>Storm Petrel</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p> <p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise</p> <p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p>Relevant conservation objective(s) to impact pathways:</p> <ul style="list-style-type: none"> <i>The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term. Current popn of 1,925 pairs in 2016. The conservation objective for storm petrel is 3,500 AOS but was calculated from a different method and therefore is incomparable with the recent surveys.</i> <i>The distribution of the population should be being maintained, or where appropriate increasing.</i> <i>There should be sufficient habitat, of sufficient quality, to support the population in the long term.</i> <i>Factors affecting the population or its habitat should be under appropriate control.</i> <p>The average diving depth of European Storm petrel is thought to be very shallow (~1m) (see Griffiths, 1981; Flood <i>et al.</i>, 2009 Albores-Barajas <i>et al.</i>, 2011). Therefore exposure to turbines would be minimal. The storm petrel flies within 10m of the water, taking prey from the surface or very close to the surface rather than diving from height.</p> <p>The breeding colony is greater than 100km from the proposal and would not be subject to noise/visual disturbance from the activities. Although individuals may be present in the MDZ they would only be present in very low numbers and any noise/visual disturbance from the construction/operation/decommissioning activities would not have an effect on the population from this site.</p> <p>The foraging capabilities of storm petrel (mean max 336km) (Woodward <i>et al.</i>, 2019) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat outside the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based</p>	<p>Yes</p>

		<p>on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >160 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on storm petrel or the integrity of the site through these impact pathways.</i></p>	
<p>Grassholm SPA (170km)</p>			
<p>Gannet</p>	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> • <i>The population will not fall below 30,000 pairs in three consecutive years;</i> • <i>It will not drop by more than 25% of the previous year's figures in any one year; and</i> • <i>There will be no decline in this population significantly greater than any decline in the North Atlantic population as a whole.</i> <p>Gannets have an average diving depth and time of 8 m (+/- 7.8 m) and 7.3 seconds respectively, and a maximum reported dive depth of 34 m (Robbins, 2017). Whilst the majority of gannet diving behaviour occurs in the shallower parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project. Whilst this information suggests that the majority of gannet diving behaviour occurs in relatively shallow parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project, which may occur at depths as shallow as 5 m.</p>	<p>Yes</p>

		<p>At an indicative 240 MW array respectively, approximately 0-1 gannets per season may collide with tidal devices (assuming an avoidance rate of at least 95%). The theoretical method of apportioning (SNH, 2018) indicates that approximately 54% of the Gannets present in the MDZ and buffer zone are likely to originate from this SPA.</p> <p>The most recent count of gannets is 36,011 pairs, which equates to 72,022 birds</p> <p>On the basis that the value of 1 represents <0.002% of the birds that breed at this SPA, the predicted magnitude of this impact means that it is considered that the project will not result in an adverse effect on site integrity through this impact pathway.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	
<p>Gannet</p>	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> • <i>The population will not fall below 30,000 pairs in three consecutive years;</i> • <i>It will not drop by more than 25% of the previous year's figures in any one year; and</i> • <i>There will be no decline in this population significantly greater than any decline in the North Atlantic population as a whole.</i> <p>In three literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012; Garthe and Hüppop, 2004), gannet was given a score of two out of five for disturbance by vessels (where a score of one is the least sensitive), and assigned the descriptor slight avoidance at short range. More recently, a wide-ranging review of displacement and habituation of seabirds in response to marine activities did not identify gannet as being sensitive to disturbance or displacement, with exception of displacement effects noted at offshore wind farms (MMO, 2018). This has been observed in several single site studies (Dierschke <i>et al.</i>, 2016; Gill <i>et al.</i>, 2018; Leopold <i>et al.</i>, 2013; Vanermen <i>et al.</i>, 2015). Rather than displacement occurring as a result of vessel activity (which generally attracts gannets (Leopold <i>et al.</i>, 2013)), the presence of the wind farm itself is what seems to cause the effect. Due to the</p>	<p>Yes</p>

		<p>obvious visual differences between an offshore wind farm and a tidal energy development it is currently thought that displacement for this species will not occur during the operational phase of the proposed development.</p> <p>With respect to artificial light, gannet are not known to be particularly sensitive to the presence of artificial light at sea, particularly as nocturnal activity for this species is around 8% of activity levels during daytime (Furness <i>et al.</i>, 2018).</p> <p>It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the proposed development, some disturbance to gannets at sea that are from this SPA may occasionally occur within the MDZ as a result of these activities but is not likely on a regular basis. Based on the available information, disturbance events will be spatially restricted to areas within close proximity to construction, operation or decommissioning activity (likely to be in the order of tens to hundreds of metres due to the apparent relative insensitivity of this qualifying feature to this impact pathway), last only for as long as the activity itself, and be reversible once the activity has concluded. Rather than resulting in harm to the bird or loss from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The relatively low recorded densities of gannet in the MDZ and 2 km buffer during the baseline surveys indicates that the area of sea occupied by the MDZ is not an important foraging area for these species and that subtidal habitats favoured for foraging by gannets from this SPA lie elsewhere. This position is supported by two recent tracking studies concerning this species (Cox <i>et al.</i>, 2016; Wakefield <i>et al.</i>, 2013).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	
<p>Gannet</p>	<p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> • <i>The population will not fall below 30,000 pairs in three consecutive years;</i> • <i>It will not drop by more than 25% of the previous year's figures in any one year; and</i> • <i>There will be no decline in this population significantly greater than any decline in the North Atlantic population as a whole.</i> 	<p>Yes</p>

		<p>Within this SPA, breeding gannet sites are located in excess of 170 km from the MDZ. There is no project-related activity planned at substantially closer distances to these colonies during any of the project phases. Whilst habituation to anthropogenic activities near a breeding colony is a key factor in understanding the likely response of the colony to that activity, flight initiation distances for birds at breeding colonies are generally in the order of hundreds of metres (Burger, 1998; Erwin, 1989; Livezey <i>et al.</i>, 2016; Rodgers Jr. and Schwikert, 2002; Rodgers Jr. and Smith, 1995).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	
<p>Gannet</p>	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> • <i>The population will not fall below 30,000 pairs in three consecutive years;</i> • <i>It will not drop by more than 25% of the previous year's figures in any one year; and</i> • <i>There will be no decline in this population significantly greater than any decline in the North Atlantic population as a whole.</i> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >170 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p> <p>The foraging capabilities of the qualifying species of this SPA (Woodward <i>et al.</i>, 2019) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat outside the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p>	<p>Yes</p>

		<p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through these impact pathways.</i></p>	
Saltee Islands SPA (170km)			
Gannet	<p>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> <i>To maintain the favourable conservation condition of gannet</i> <p>Gannets have an average diving depth and time of 8 m (+/- 7.8 m) and 7.3 seconds respectively, and a maximum reported dive depth of 34 m (Robbins, 2017). Whilst the majority of gannet diving behaviour occurs in the shallower parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project. Whilst this information suggests that the majority of gannet diving behaviour occurs in relatively shallow parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project, which may occur at depths as shallow as 5 m.</p> <p>At an indicative 240 MW array respectively, approximately 0-1 gannets per season may collide with tidal devices (assuming an avoidance rate of at least 95%).</p> <p>On the basis that the value of 1 represents <0.01% of the 3,000 birds that breed at this SPA, the predicted magnitude of this impact means that it is considered that the project will not result in an adverse effect on site integrity through this impact pathway.</p>	Yes

		<p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	
Gannet	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> <i>To maintain the favourable conservation condition of gannet</i> <p>In three literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012; Garthe and Hüppop, 2004), gannet was given a score of two out of five for disturbance by vessels (where a score of one is the least sensitive), and assigned the descriptor slight avoidance at short range. More recently, a wide-ranging review of displacement and habituation of seabirds in response to marine activities did not identify gannet as being sensitive to disturbance or displacement, with exception of displacement effects noted at offshore wind farms (MMO, 2018). This has been observed in several single site studies (Dierschke <i>et al.</i>, 2016; Gill <i>et al.</i>, 2018; Leopold <i>et al.</i>, 2013; Vanermen <i>et al.</i>, 2015). Rather than displacement occurring as a result of vessel activity (which generally attracts gannets (Leopold <i>et al.</i>, 2013)), the presence of the wind farm itself is what seems to cause the effect. Due to the obvious visual differences between an offshore wind farm and a tidal energy development it is currently thought that displacement for this species will not occur during the operational phase of the proposed development.</p> <p>With respect to artificial light, gannet are not known to be particularly sensitive to the presence of artificial light at sea, particularly as nocturnal activity for this species is around 8% of activity levels during daytime (Furness <i>et al.</i>, 2018).</p> <p>It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the proposed development, some disturbance to gannets at sea that are from this SPA may occasionally occur within the MDZ as a result of these activities but is not likely on a regular basis. Based on the available information, disturbance events will be spatially restricted to areas within close proximity to construction, operation or decommissioning activity (likely to be in the order of tens to hundreds of metres due to the apparent relative insensitivity of this qualifying feature to this impact pathway), last only for as long as the activity itself, and be reversible once the activity has concluded. Rather than resulting in harm to the bird or loss</p>	Yes

		<p>from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The relatively low recorded densities of gannet in the MDZ and 2 km buffer during the baseline surveys indicates that the area of sea occupied by the MDZ is not an important foraging area for these species and that subtidal habitats favoured for foraging by gannets from this SPA lie elsewhere. This position is supported by two recent tracking studies concerning this species (Cox <i>et al.</i>, 2016; Wakefield <i>et al.</i>, 2013).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	
Gannet	<p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> • <i>To maintain the favourable conservation condition of gannet</i> <p>The breeding colony is greater than 100km from the proposal and would not be subject to noise/visual disturbance from the activities. Although individuals may be present in the MDZ they would only be present in very low numbers and any noise/visual disturbance from the construction/operation/decommissioning activities would not have an effect on the population from this site.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	Yes
Gannet	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p> <p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <ul style="list-style-type: none"> • <i>To maintain the favourable conservation condition of gannet</i> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located >170 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p>	Yes

		<i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i>	
Ailsa Craig SPA (~210km)			
Gannet	Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To ensure for the qualifying species that the following are maintained in the long term:</i></p> <ul style="list-style-type: none"> • <i>Population of the species as a viable component of the site</i> • <i>Distribution of the species within site</i> <p>Gannets have an average diving depth and time of 8 m (+/- 7.8 m) and 7.3 seconds respectively, and a maximum reported dive depth of 34 m (Robbins, 2017). Whilst the majority of gannet diving behaviour occurs in the shallower parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project. Whilst this information suggests that the majority of gannet diving behaviour occurs in relatively shallow parts of the water column, there is potential for this species to interact with the moving parts of tidal energy convertors during the operational phase of the project, which may occur at depths as shallow as 5 m.</p> <p>At an indicative 240 MW array respectively, approximately 0-1 gannets per season may collide with tidal devices (assuming an avoidance rate of at least 95%). The theoretical method of apportioning (SNH, 2018) indicates that approximately 34% of the Gannets present in the MDZ and buffer zone are likely to originate from this SPA.</p> <p>On the basis that the value of 1 represents <0.01% of the birds that breed at this SPA, the predicted magnitude of this impact means that it is considered that the project will not result in an adverse effect on site integrity through this impact pathway.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	Yes

<p>Gannet</p>	<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To ensure for the qualifying species that the following are maintained in the long term:</i></p> <ul style="list-style-type: none"> • <i>No significant disturbance of the species</i> <p>In three literature reviews examining the likely sensitivity of seabirds to tidal and wave energy development (Furness <i>et al.</i>, 2012) and offshore wind development (Furness and Wade, 2012; Garthe and Hüppop, 2004), gannet was given a score of two out of five for disturbance by vessels (where a score of one is the least sensitive), and assigned the descriptor slight avoidance at short range. More recently, a wide-ranging review of displacement and habituation of seabirds in response to marine activities did not identify gannet as being sensitive to disturbance or displacement, with exception of displacement effects noted at offshore wind farms (MMO, 2018). This has been observed in several single site studies (Dierschke <i>et al.</i>, 2016; Gill <i>et al.</i>, 2018; Leopold <i>et al.</i>, 2013; Vanermen <i>et al.</i>, 2015). Rather than displacement occurring as a result of vessel activity (which generally attracts gannets (Leopold <i>et al.</i>, 2013)), the presence of the wind farm itself is what seems to cause the effect. Due to the obvious visual differences between an offshore wind farm and a tidal energy development it is currently thought that displacement for this species will not occur during the operational phase of the proposed development.</p> <p>With respect to artificial light, gannet are not known to be particularly sensitive to the presence of artificial light at sea, particularly as nocturnal activity for this species is around 8% of activity levels during daytime (Furness <i>et al.</i>, 2018).</p> <p>It is considered that due to airborne noise and visual disturbance during the construction, operational and decommissioning phases of the proposed development, some disturbance to gannets at sea that are from this SPA may occasionally occur within the MDZ as a result of these activities but is not likely on a regular basis. Based on the available information, disturbance events will be spatially restricted to areas within close proximity to construction, operation or decommissioning activity (likely to be in the order of tens to hundreds of metres due to the apparent relative insensitivity of this qualifying feature to this impact pathway), last only for as long as the activity itself, and be reversible once the activity has concluded. Rather than resulting in harm to the bird or loss</p>	<p>Yes</p>

		<p>from the population, disturbance by airborne noise and visual disturbance will generally result in affected birds temporarily redistributing at sea and moving to an area where they are undisturbed. The relatively low recorded densities of gannet in the MDZ and 2 km buffer during the baseline surveys indicates that the area of sea occupied by the MDZ is not an important foraging area for these species and that subtidal habitats favoured for foraging by gannets from this SPA lie elsewhere. This position is supported by two recent tracking studies concerning this species (Cox <i>et al.</i>, 2016; Wakefield <i>et al.</i>, 2013).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	
Gannet	<p>Noise/visual disturbance at breeding sites resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To ensure for the qualifying species that the following are maintained in the long term:</i></p> <ul style="list-style-type: none"> • <i>No significant disturbance of the species</i> <p>Within this SPA, breeding gannet sites are located in excess of 210 km from the MDZ. There is no project-related activity planned at substantially closer distances to these colonies during any of the project phases. Whilst habituation to anthropogenic activities near a breeding colony is a key factor in understanding the likely response of the colony to that activity, flight initiation distances for birds at breeding colonies are generally in the order of hundreds of metres (Burger, 1998; Erwin, 1989; Livezey <i>et al.</i>, 2016; Rodgers Jr. and Schwikert, 2002; Rodgers Jr. and Smith, 1995).</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through this impact pathway.</i></p>	Yes
Gannet	<p>Spillage of fluids, fuels and/or construction materials during installation or removal of structures or during survey/maintenance leading to changes in water quality.</p>	<p>Relevant conservation objective(s) to impact pathway:</p> <p><i>To ensure for the qualifying species that the following are maintained in the long term:</i></p>	Yes

	<p>Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation/operation/removal of structures leading to changes in water quality.</p>	<ul style="list-style-type: none"> • <i>Distribution and extent of habitats supporting the species</i> • <i>Structure, function and supporting processes of habitats supporting the species</i> <p>Any pollution incidents, which are considered to be unlikely to occur, will result in the contamination of a small area (likely no more than several hundreds of metres) of subtidal habitat with a small amount of pollution. Measures will be in place to rapidly collect or disperse any such contamination, meaning that its presence will be temporary and reversible. Because this SPA is located ~210 km from the MDZ and ECC, it is inconceivable that this impact pathway could affect habitats within this SPA.</p> <p>The foraging capabilities of the qualifying species of this SPA (Oppel <i>et al.</i>, 2018; Thaxter <i>et al.</i>, 2012) are such that whilst temporary habitat loss of a small area of subtidal foraging habitat outside the SPA boundary could occur, the temporary non-availability of a section of subtidal habitat of this size would represent a very small percentage of the total available to the qualifying species of this SPA. Combined with the large amount of alternative habitat available locally, and the fact that the project does not appear to represent prime foraging habitat based on reported species densities, such an event would therefore not be expected to substantially impact the species concerned.</p> <p>The maximum envisaged effect associated with sediment plumes arising as a result of construction, operation and decommissioning of the project are very minor increases in suspended sediment concentration; less than 1 mg/l a short distance from the release point, over a distance of several hundred metres. The effects will be temporary and reversible, with a return to very low background concentrations occurring rapidly upon cessation of activities. Other than at the immediate release point, such a change would be immeasurable.</p> <p><i>Given the above, it is concluded that the achievement of the relevant conservation objectives will not be affected and there will be no adverse effect on Gannet or the integrity of the site through these impact pathways.</i></p>	
--	--	---	--

4.2 Assessment of the project taking into account additional mitigating measures, conditions or restrictions

SPA, SAC or Ramsar feature (from Table 4.1 – ‘NO’ rows only)	Description of adverse effect(s)	Can adverse effect(s) be mitigated? *	Description of mitigation measures, and how they would be applied (e.g. contractual obligations, consent conditions)	Can adverse effect on site integrity be ruled out?
North Anglesey Marine SAC				
Harbour porpoise	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>Under the full proposal (240MW consisting of a range of devices in varying numbers) it is concluded that the loss of up to 519 harbour porpoise from the MU would lead to an AEOSI. Hence, suitable and realistic mitigation measures are required to provide confidence that any collisions, should they occur, would not result in AEOSI.</p> <p>With considerable uncertainty surrounding current population estimates and trends (e.g. SCANS III), turbine avoidance, Collision models etc. and therefore the evidence to support a robust assessment, the reliance on a purely quantitative assessment is not wholly justified at this point.</p> <p>However, the application of a suitable and realistic approach to phasing, monitoring and management, as provided through an Adaptive Management Plan (within an outline Environmental Mitigation and Monitoring Plan (oEMMP)) (MOR/RHDHV/DOC/0072 (10)) provides realistic mechanisms to prevent an AEOSI. The oEMMP will be developed into a detailed EMMP as a condition of consent.</p> <p>The plan (oEMMP v.10) identifies specific approaches and details conditions appropriate to maintaining the conservation objectives, in this case population viability, in relation to ecological features including harbour porpoise, bottlenose dolphin, grey seal and harbour seal.</p> <p>The oEMMP (v.10), allows deployment and operation to occur at a scale that is acceptable with sufficient confidence that</p>	Yes

		<p>operational activities will not lead to an AEOSI on Annex II and Annex IV species. Trigger levels for each marine mammal species, as detailed within the oEMMP (v.10), will lead to a mitigation cascade that will maintain the continued viability of the population, thus ensuring that AEOSI does not occur.</p> <p>The applicant has committed to not operating devices until such a time that it is possible to be confident that any marine mammal collisions can be detected and adequate and timely (real time) measures be implemented to ensure that impacts will not lead to an AEOSI. This includes all phases of deployment including phase 1.</p> <p>From oEMMP (MOR/RHDHV/DOC/0072 (10)): <i>Device deployments in all Phases including Phase 1 will only be allowed at scales at which Regulators agree that the best available scientific understanding does not predict adverse impacts upon marine mammals or upon non SPA populations of diving seabirds from local colonies.</i></p> <p>The plan encompasses a survey, deploy and monitor (including real-time monitoring) approach with regular reviews of the data. Although the oEMMP is not a finalised document, commitment from the applicant to provide a detailed EMMP post consent that accords with the requirements of the oEMMP, as provided pre-consent., will be incorporated as a licence condition.</p> <p>The oEMMP v.10 (MOR/RHDHV/DOC/0072) should be referred to when considering the potential for adverse effects on marine mammals from collision impacts. The measures provided in the oEMMP are key to concluding that an adverse effect on site integrity can be ruled out.</p> <p>The inclusion of phasing is considered to be a core element of the EMMP to support the requirements of the HRA as even with the assumption that an immediate 'stop' clause is conditioned, should marine mammal collisions reach an agreed threshold, there needs to be enough confidence that the monitoring (and associated management measures) used would be adequate to identify, implement and cascade measures quickly enough that an AEOSI would be prevented.</p>	
--	--	--	--

			<p>Within the NRW closing statement provided to PINS during the Morlais public inquiry under the TWA order on 11 February 2021 (Inquiry Doc 148 – Morlais Closing NRW), in relation to the potential impacts on the marine mammal features of Welsh SACs (by way of possible collision impacts), NRW stated that they were ‘able to advise the decision maker that there would be no such adverse effect.’ This being based upon the measures given in the oEMMP.</p> <p>Given the above and specifically the implementation of ‘back-stop’ mitigation in the form of an immediate ‘stop’ clause (cessation of turbine operation), provides confidence that AEOSI would not occur at any stage in the proposal. Hence, an AEOSI is ruled out.</p>	
	<p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/ decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	Yes	<p>The oEMMP v.10 (MOR/RHDHV/DOC/0072) (see detail above) makes specific commitments to monitoring and mitigation of underwater noise. Paragraph 27 of the oEMMP v.10 states:</p> <p><i>Prior to deployment, the array layout will take into account the potential for any barrier effects as a result of underwater noise from operational tidal turbines and the use of any ADDs, as well as the potential of any physical barrier effects. This will also be developed as part of the EMMP. Underwater noise from operational turbines and the activation of ADDs will be modelled, monitored and managed, this will include:</i></p> <ul style="list-style-type: none"> (i) <i>underwater noise modelling prior to deployment to ensure predicted noise levels would not result in significant disturbance or an adverse effect on site integrity in relation to the conservation objectives of the North Anglesey Marine/Gogledd Môn Forol SAC designated for harbour porpoise;</i> (ii) <i>underwater noise monitoring and measurements to ensure noise levels to not exceed predicted levels; and</i> 	Yes

			<p>(iii) <i>mitigation methods if there is the potential that underwater noise could result in significant disturbance.</i></p> <p>Within the NRW closing statement provided to PINS during the Morlais public inquiry under the TWA order on 11 February 2021 (Inquiry Doc 148 – Morlais Closing NRW), in relation to the potential impacts on the marine mammal features of Welsh SACs (by way of underwater noise disturbance and/or barrier effects), NRW stated that they were ‘able to advise the decision maker that there would be no such adverse effect.’ This being based upon the commitments given in the oEMMP (v.10).</p>	
West Wales Marine SAC				
Harbour porpoise	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for North Anglesey Marine SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal. Hence, an AEOSI is ruled out.</p>	Yes
	<p>Noise/vibration disturbance and exclusion from areas as a result of vessel movements construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p> <p>Noise/vibration disturbance and exclusion from areas as a result of Acoustic Deterrent Devices (ADDs).</p>	Yes	<p>A conclusion of no AEOSI was made in relation to the potential disturbance (and barrier) effects on the qualifying feature (harbour porpoise) of the North Anglesey Marine SAC which overlaps with the MDZ.</p> <p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for North Anglesey Marine SAC, confidence is provided that AEOSI would not occur at any stage in the proposal. Hence, an AEOSI is ruled out on the more distant West Wales Marine SAC.</p>	Yes
Rockabill to Dalkey Island SAC				
Harbour porpoise		Yes		Yes

	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>		<p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for North Anglesey Marine SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal. Hence, an AEOSI is ruled out.</p>	
North Channel SAC				
Harbour porpoise	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for North Anglesey Marine SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal. Hence, an AEOSI is ruled out.</p>	Yes
Bristol Channel Approaches SAC				
Harbour porpoise	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for North Anglesey Marine SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal. Hence, an AEOSI is ruled out.</p>	Yes
Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC				
Bottlenose Dolphin	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>At the 240MW scale, it has been predicted that there would be a loss of up to 25 bottlenose dolphins each year, with all collisions assumed as mortality. This would lead to an AEOSI without the application of suitable mitigation and management measures.</p> <p>With considerable uncertainty surrounding current population estimates and trends (e.g. SCANS III), turbine avoidance, collision models etc. and therefore the evidence to support a</p>	Yes

		<p>robust assessment, the reliance on a purely quantitative assessment is not wholly justified at this point.</p> <p>However, the application of a suitable and realistic approach to phasing, monitoring and management, as provided through an Adaptive Management Plan (within an outline Environmental Mitigation and Monitoring Plan (oEMMP)) (MOR/RHDHV/DOC/0072 (10)) provides realistic mechanisms to prevent an AEOSI. The oEMMP will be developed into a detailed EMMP as a condition of consent.</p> <p>The plan (oEMMP v.10) identifies specific approaches and details conditions appropriate to maintaining the conservation objectives, in this case population viability, in relation to ecological features including harbour porpoise, bottlenose dolphin, grey seal and harbour seal.</p> <p>The oEMMP (v.10), allows deployment and operation to occur at a scale that is acceptable with sufficient confidence that operational activities will not lead to an AEOSI on Annex II and Annex IV species. Trigger levels for each marine mammal species, as detailed within the oEMMP (v.10), will lead to a mitigation cascade that will maintain the continued viability of the population, thus ensuring that AEOSI does not occur.</p> <p>The applicant has committed to not operating devices until such a time that it is possible to be confident that any marine mammal collisions can be detected and adequate and timely (real time) measures be implemented to ensure that impacts will not lead to an AEOSI. This includes all phases of deployment including phase 1.</p> <p>From oEMMP (MOR/RHDHV/DOC/0072 (10)): <i>Device deployments in all Phases including Phase 1 will only be allowed at scales at which Regulators agree that the best available scientific understanding does not predict adverse impacts upon marine mammals or upon non SPA populations of diving seabirds from local colonies.</i></p> <p>The plan encompasses a survey, deploy and monitor (including real-time monitoring) approach with regular reviews of the data. Although the oEMMP is not a finalised document,</p>	
--	--	---	--

			<p>commitment from the applicant to provide a detailed EMMP post consent that accords with the requirements of the oEMMP, as provided pre-consent., will be incorporated as a licence condition.</p> <p>The Outline EMMP v.10 (MOR/RHDHV/DOC/0072) should be referred to when considering the potential for adverse effects on marine mammals from collision impacts. The measures provided in the Outline EMMP are key to concluding that an adverse effect on site integrity can be ruled out.</p> <p>The inclusion of phasing is considered to be a core element of the EMMP to support the requirements of the HRA as even with the assumption that an immediate 'stop' clause is conditioned, should marine mammal collisions reach an agreed threshold, there needs to be enough confidence that the monitoring (and associated management measures) used would be adequate to identify, implement and cascade measures quickly enough that an AEOSI would be prevented.</p> <p>Within the NRW closing statement provided to PINS during the Morlais public inquiry under the TWA order on 11 February 2021 (Inquiry Doc 148 – Morlais Closing NRW), in relation to the potential impacts on the marine mammal features of Welsh SACs (by way of possible collision impacts), NRW stated that they were <i>'able to advise the decision maker that there would be no such adverse effect.'</i> This being based upon the measures given in the oEMMP (v.10).</p> <p>Given all of the above and specifically the implementation of 'back-stop' mitigation in the form of an immediate 'stop' clause (cessation of turbine operation), provides confidence that AEOSI would not occur at any stage in the proposal. Hence, an AEOSI is ruled out.</p>	
Grey Seal	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>At the 240MW scale, it has been predicted that there would be a loss of up to 112 grey seal each year, with all collisions assumed as mortality. This would lead to an AEOSI without the application of suitable mitigation and management measures.</p>	Yes

			Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for the <i>bottlenose dolphin</i> qualifying feature of this SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal as a result of collision impacts on grey seal. Hence, an AEOSI is ruled out.	
Cardigan Bay SAC				
Bottlenose dolphin	Presence of turbines resulting in physical damage (or mortality) to species from collision Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision	Yes	Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for the <i>bottlenose dolphin</i> qualifying feature of <i>Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC</i> , confidence is provided that an AEOSI would not occur at any stage in the proposal as a result of collision impacts on bottlenose dolphin. Hence, an AEOSI is ruled out.	Yes
Grey seal	Presence of turbines resulting in physical damage (or mortality) to species from collision Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision	Yes	Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for the <i>bottlenose dolphin</i> qualifying feature of <i>Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC</i> , confidence is provided that an AEOSI would not occur at any stage in the proposal as a result of collision impacts on grey seal. Hence, an AEOSI is ruled out.	Yes
Lambay Island SAC				
Grey seal	Presence of turbines resulting in physical damage (or mortality) to species from collision Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision	Yes	Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for the <i>bottlenose dolphin</i> qualifying feature of <i>Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC</i> , confidence is provided that an AEOSI would not occur at any stage in the proposal as a result of collision impacts on grey seal. Hence, an AEOSI is ruled out.	Yes
Harbour Seal	Presence of turbines resulting in physical damage (or mortality) to species from collision	Yes	At the 240MW scale, worst case scenario predictions suggested 0.25 harbour seal collisions per year (0.5% of MU). However, it is considered that this should be rounded up to 1	Yes

	<p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	<p>harbour seal (2% of MU). This could lead to an AEOSI without the application of suitable mitigation and management measures.</p> <p>With considerable uncertainty surrounding current population estimates and trends (e.g. SCANS III), turbine avoidance, collision models etc. and therefore the evidence to support a robust assessment, the reliance on a purely quantitative assessment is not wholly justified at this point.</p> <p>However, the application of a suitable and realistic approach to phasing, monitoring and management, as provided through an Adaptive Management Plan (within an outline Environmental Mitigation and Monitoring Plan (oEMMP)) (MOR/RHDHV/DOC/0072 (10)) provides realistic mechanisms to prevent an AEOSI. The oEMMP will be developed into a detailed EMMP as a condition of consent.</p> <p>The plan (oEMMP v.10) identifies specific approaches and details conditions appropriate to maintaining the conservation objectives, in this case population viability, in relation to ecological features including harbour porpoise, bottlenose dolphin, grey seal and harbour seal.</p> <p>The oEMMP (v.10), allows deployment and operation to occur at a scale that is acceptable with sufficient confidence that operational activities will not lead to an AEOSI on Annex II and Annex IV species. Trigger levels for each marine mammal species, as detailed within the oEMMP (v.10), will lead to a mitigation cascade that will maintain the continued viability of the population, thus ensuring that AEOSI does not occur.</p> <p>The applicant has committed to not operating devices until such a time that it is possible to be confident that any marine mammal collisions can be detected and adequate and timely (real time) measures be implemented to ensure that impacts will not lead to an AEOSI. This includes all phases of deployment including phase 1.</p> <p><i>Device deployments in all Phases including Phase 1 will only be allowed at scales at which Regulators agree that the best available scientific understanding does not predict adverse</i></p>	
--	---	---	--

		<p><i>impacts upon marine mammals or upon non SPA populations of diving seabirds from local colonies. From oEMMP (MOR/RHDHV/DOC/0072 (10)).</i></p> <p>The plan encompasses a survey, deploy and monitor (including real-time monitoring) approach with regular reviews of the data. Although the oEMMP is not a finalised document, commitment from the applicant to provide a detailed EMMP post consent that accords with the requirements of the oEMMP, as provided pre-consent., will be incorporated as a licence condition.</p> <p>The Outline EMMP v.10 (MOR/RHDHV/DOC/0072) should be referred to when considering the potential for adverse effects on marine mammals from collision impacts. The measures provided in the Outline EMMP are key to concluding that an adverse effect on site integrity can be ruled out.</p> <p>The inclusion of phasing is considered to be a core element of the EMMP to support the requirements of the HRA as even with the assumption that an immediate ‘stop’ clause is conditioned, should marine mammal collisions reach an agreed threshold, there needs to be enough confidence that the monitoring (and associated management measures) used would be adequate to identify, implement and cascade measures quickly enough that an AEOSI would be prevented.</p> <p>Within the NRW closing statement provided to PINS during the Morlais public inquiry under the TWA order on 11 February 2021 (Inquiry Doc 148 – Morlais Closing NRW), in relation to the potential impacts on the marine mammal features of Welsh SACs (by way of possible collision impacts), NRW stated that they were <i>‘able to advise the decision maker that there would be no such adverse effect.’</i> This being based upon the measures given in the oEMMP (v.10).</p> <p>Given all of the above and specifically the implementation of ‘back-stop’ mitigation in the form of an immediate ‘stop’ clause (cessation of turbine operation), provides confidence that AEOSI would not occur at any stage in the</p>	
--	--	---	--

			proposal as a result of collision impacts on harbour seal. Hence, an AEOSI is ruled out.	
Pembrokeshire Marine SAC				
Grey Seal	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for the bottlenose dolphin qualifying feature of Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal as a result of collision impacts on grey seal. Hence, an AEOSI is ruled out.</p>	Yes
Saltee Islands SAC				
Grey Seal	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for the bottlenose dolphin qualifying feature of Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal as a result of collision impacts on grey seal. Hence, an AEOSI is ruled out.</p>	Yes
The Maidens SAC				
Grey Seal	<p>Presence of turbines resulting in physical damage (or mortality) to species from collision</p> <p>Presence of turbines and vessels resulting in physical damage (or mortality) to species from collision</p>	Yes	<p>Given the information and commitments acknowledged within the oEMMP (v.10), as detailed above for the bottlenose dolphin qualifying feature of Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC, confidence is provided that an AEOSI would not occur at any stage in the proposal as a result of collision impacts on grey seal. Hence, an AEOSI is ruled out.</p>	Yes

4.3 Concluding the appropriate assessment of the project alone

(a) If the right hand column of Table 4.1 and Table 4.2 (if applicable) is 'YES' for all features	<i>It has been ascertained that the proposal, when considered alone, will not adversely affect the integrity of any SPA, SAC or Ramsar sites.</i>
(b) If there are any 'NO's in the right hand column of Table 4.1 that have not been resolved to 'YES' through mitigation measures identified in Table 4.2	n/a
(c) Are there any residual effects of the project (net of any mitigation measures identified) which, though insignificant on their own, could be significant if considered in combination with the effects of other plans or projects?	YES

5 In combination assessment

5.1 Identifying possible in combination effects

Residual effect (from AA in section 4) and/or BLUE impact pathway from Table 3.2	SPA, SAC or Ramsar site feature(s) concerned	Other plans/projects with effects that might interact with the effects of the project to render its effects significant (if any)	Nature of the in-combination effect (if any)	Is there likely to be any significant in-combination effect, in view of the site's conservation objectives?
The nature of this proposal means that a number of key construction and operation	North Anglesey Marine SAC, West Wales Marine SAC,	<i>Although a number of projects were considered relevant to the in-combination assessment; at the</i>	The potential for disturbance/ displacement effects were assessed against a worst case which included the	NO

<p>activities are not delineated over a timescale. Thus, activities associated with each of these phases will occur simultaneously i.e. construction/installation of turbines will take place while turbines are operational. Accordingly, the ISHRA has adopted a worst case scenario (Morlais, 2019) and assumed that where there is potential for concurrent activities then this is assessed.</p> <p>Residual potential impact pathways include:</p> <p>Underwater noise/vibration and visual impacts leading to disturbance and/or displacement</p>	<p>Rockabill to Dalkey Island SAC, North Channel SAC, Bristol Channel Approaches SAC</p> <p>Harbour Porpoise</p>	<p>time of writing the ISHRA (2019) (MOR/RHDHV/DOC/0067), information was not available for some of these projects.</p> <p><i>On 27 January 2021 the marine licence application for Wylfa Newydd Nuclear Power Plant was withdrawn and is therefore no longer a consideration for in-combination effects with the Morlais proposal. It should be noted that the applicant's assessments (e.g. MOR/RHDHV/DOC/0067) (02) all include consideration of Wylfa Newydd as this project was considered likely to proceed at the time of application.</i></p> <p><i>The following projects (construction and/or operation phases) were considered relevant to this impact pathway:</i></p> <ul style="list-style-type: none"> • Holyhead Deep Phase I; • Holyhead Deep Tidal Array – 80MW; • Holyhead Port Expansion; • Holyhead Waterfront Regeneration; • Amlwch LNG; • North Hoyle Offshore Wind Farm; • Rhyl Flats Offshore Windfarm; • Gwynt y Môr Offshore Wind Farm; • Barrow Offshore Wind Farm Operation & Maintenance Activities; 	<p>following activities occurring concurrently for the Morlais proposal:</p> <p><i>Underwater noise and disturbance from installation of tidal devices and hubs (two drilling rigs), two cable laying activities, two cable protection activities and up to 16 vessels, plus operational turbine noise for full deployment (240MW)</i></p> <p>Regarding in-combination effects, the ISHRA has acknowledged the construction and/or operation underwater noise and disturbance effects from the relevant projects where information is available.</p> <p>According to the ISHRA (MOR/RHDHV/DOC/0067) (02) (and revaluating based on Wylfa Newydd withdrawing application) as a worst-case scenario, up to 279 harbour porpoise could potentially be disturbed as a result of in-combination effects (0.5% of the MU). At any one time the maximum area of potential displacement of harbour porpoise as a result disturbance from the in-combination effects of underwater noise could be up to 11.8% of the North Anglesey Marine SAC area. Assuming a worst-case scenario, that this would be throughout the summer period (183 days), the maximum seasonal average could be up to 11.8%.</p> <p>Since the ISHRA, specific underwater noise modelling (MOR/RHDHV/DOC/0116) has concluded that the potential disturbance as a result of UW noise would be less</p>
---	--	---	--

		<ul style="list-style-type: none"> • West of Duddon Sands Offshore Wind Farm Operation & Maintenance Activities; • Ormonde Offshore Wind Farm • Walney Extension Offshore Wind Farm; • Burbo Bank Extension Offshore Wind Farm; • Codling Wind Park; • Codling Wind Park Extension; • Alexandra Basin Redevelopment Project; • Isle of Man Ferry Terminal; • Milford Haven, Maintenance Dredge Pembrokeshire; • Afon Dysynni outfall gravel removal and relocation; • Belfast Harbour D3 terminal cruise ship facility; • Disposal of dredge material from the D3 approach channel; • Marine Energy Wales marine testing Area; • Enlli Tidal Energy Scheme, Bardsey Island 	<p>than those assessed in the HRA (MOR/RHDHV/DOC/0117).</p> <p>It is highly unlikely that all these activities and potential disturbance would occur on every day throughout the summer season, it would therefore be more realistic to assume that a number of days could be lost due to poor weather, technical issues or other delays, therefore the seasonal average is more likely to be 10% or less.</p> <p>Any displacement of harbour porpoise would not exceed 20% of the seasonal component of the SAC area in any given day or on average exceed 10% of the seasonal component of the SAC area over the duration of that season.</p> <p>Marine Mammal Mitigation Protocols (MMMPs) will be prepared to reduce the risk of any permanent auditory injury (PTS) to marine mammals as a result of underwater noise during construction. The MMMP(s) will be developed in the pre-construction period and based upon best available information, methodologies, industry best practice, latest scientific understanding, current guidance and detailed project design. Piling works are proposed as part of the activities for Holyhead Port Expansion (HPE). Approx. 12km from the MDZ, the potential underwater noise effects from HPE were assessed in the HPE ES addendum (Table 4-20) and it was concluded that no significant adverse effect would occur at the population level on harbour porpoise, bottlenose dolphin or grey seal, either from the proposal</p>	
--	--	--	---	--

			<p>alone or in-combination with the Morlais development.</p> <p>It is accepted that the commitments within the oEMMP (v.10) along with a condition to deliver these commitments within a detailed EMMP post consent , provides confidence that no AEOSI would occur on harbour porpoise as a qualifying feature of designated sites, including the overlapping North Anglesey Marine SAC.</p> <p>Given the above and the information and commitments acknowledged within the oEMMP (v.10) it is concluded that there would be no AEOSI as a result of in-combination effects.</p>	
<p>Collision risk from vessel movements and turbine operation leading to mortality</p>	<p>North Anglesey Marine SAC, West Wales Marine SAC, Rockabill to Dalkey Island SAC, North Channel SAC, Bristol Channel Approaches SAC</p> <p><i>Harbour Porpoise</i></p>	<p><i>The following projects (construction and/or operation phases) were considered relevant to this impact pathway:</i></p> <ul style="list-style-type: none"> • Holyhead Deep Phase I; • Holyhead Deep Tidal Array – 80MW; • Holyhead Port Expansion; • Holyhead Waterfront Regeneration; • Amlwch LNG; • North Hoyle Offshore Wind Farm; • Rhyl Flats Offshore Windfarm; • Gwynt y Môr Offshore Wind Farm; 	<p>It is accepted that the commitments within the oEMMP (v.10) along with a condition to deliver these commitments within a detailed EMMP post consent , provides confidence that no AEOSI would occur on harbour porpoise as a qualifying feature of designated sites including the overlapping North Anglesey Marine SAC.</p> <p>The HPE ES addendum (Table 4-20) concluded that no significant adverse effect would occur at the population level on harbour porpoise, bottlenose dolphin or grey seal, either from the proposal alone or in-combination with the Morlais development, as result of collision.</p> <p>The planning application has not yet been submitted for Holyhead Deep Tidal</p>	<p>NO</p>

		<ul style="list-style-type: none"> • Barrow Offshore Wind Farm Operation & Maintenance Activities; • West of Duddon Sands Offshore Wind Farm Operation & Maintenance Activities; • Ormonde Offshore Wind Farm • Walney Extension Offshore Wind Farm; • Burbo Bank Extension Offshore Wind Farm; • Codling Wind Park; • Codling Wind Park Extension; • Alexandra Basin Redevelopment Project; • Isle of Man Ferry Terminal; • Milford Haven, Maintenance Dredge Pembrokeshire; • Afon Dysynni outfall gravel removal and relocation; • Belfast Harbour D3 terminal cruise ship facility; • Disposal of dredge material from the D3 approach channel; • Marine Energy Wales marine testing Area; • Enlli Tidal Energy Scheme, Bardsey Island 	<p>Array (80MW) and it is unlikely that the Minesto project would be operational prior to deployment of the first phase of Morlais. No assessments are currently available for Holyhead Deep Tidal Array (80MW) however, the commitments within the oEMMP for Morlais provide enough confidence that AEOSI would not occur, either from the project alone or in-combination with Holyhead Deep Tidal Array (80MW).</p> <p>The ISHRA (MOR/RHDHV/DOC/0067) (02) concluded that it is unlikely that the potential collision risk would result in any significant population effects.</p> <p>Given the above and the information and commitments acknowledged within the oEMMP (v.10) it is concluded that there would be no AEOSI as a result of in-combination effects.</p>	
Development footprint (habitat loss) leading to changes in prey availability/foraging areas	North Anglesey Marine SAC, West Wales Marine SAC, Rockabill to Dalkey Island SAC, North Channel SAC,	<p><i>The following projects (construction and/or operation phases) were considered relevant to this impact pathway:</i></p> <ul style="list-style-type: none"> • Holyhead Deep Tidal Array – 	As a worst case, the Morlais proposal (240MW of varying devices and layout (Chapter 4, ES) would result in the loss of 2.18km ² . Considering the cumulative habitat loss from other developments	NO

	<p>Bristol Channel Approaches SAC</p> <p><i>Harbour Porpoise</i></p>	<ul style="list-style-type: none"> • 80MW; • Holyhead Port Expansion; • Holyhead Waterfront Regeneration; • Milford Haven, Maintenance Dredge Pembrokeshire; • Afon Dysynni outfall gravel removal and relocation; • Enlli Tidal Energy Scheme, Bardsey Island 	<p>would result in a total loss of 11.3km² (see ISHRA).</p> <p>Up to 9 harbour porpoise could potentially be displaced as a result of in-combination effects for any changes in prey availability as a result of habitat loss (<0.01% of the MU). At any one time the maximum area of potential displacement of harbour porpoise could be up to 0.4% of the Gogledd Môn Forol/North Anglesey Marine SAC area.</p> <p>Chapter 10 of the Morlais ES (section 10.6.5.2 – habitat loss effects; section 10.6.5.6 – collision risk effects) concluded minor adverse effects on fish receptors (i.e. prey) from the operational phase.</p> <p>The planning application has not yet been submitted for Holyhead Deep Tidal Array (80MW) and it is unlikely that the Minesto project would be operational prior to deployment of the first phase of Morlais. No assessments are currently available for Holyhead Deep Tidal Array (80MW)</p> <p>The shadow HRA for HPE concluded that there would be no AEOSI as a result of habitat loss and potential changes to prey availability, from the project alone or in-combination with other proposals.</p> <p>Given the above it is concluded that there would be no AEOSI as a result of in-combination effects.</p>	
				NO

<p>The nature of this proposal means that a number of key construction and operation activities are not delineated in time. Thus, activities associated with each of these phases will occur simultaneously i.e. construction/installation of turbines will take place while turbines are operational. Accordingly, the ISHRA has adopted a worst case scenario (Morlais, 2019) and assumed that where there is potential for concurrent activities then this is assessed.</p> <p>Residual potential impact pathways include:</p> <p>Underwater noise/vibration and visual impacts leading to disturbance and/or displacement</p>	<p>Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC; Cardigan Bay SAC</p> <ul style="list-style-type: none"> • Bottlenose Dolphin • Grey seal <p>Lambay Island SAC;</p> <ul style="list-style-type: none"> • Grey seal • Harbour seal <p>Pembrokeshire Marine SAC; Saltee Islands SAC; The Maidens SAC</p> <ul style="list-style-type: none"> • Grey seal 	<p>Although a number of projects were considered relevant to the in-combination assessment; at the time of writing the ISHRA (2019), information was not available for some of these projects.</p> <p><i>The following projects (construction and/or operation phases) were considered relevant to this impact pathway (those in bold are only relevant to seal features, these being outside the bottlenose dolphin MU):</i></p> <ul style="list-style-type: none"> • Holyhead Deep Phase I; • Holyhead Deep Tidal Array – 80MW; • Holyhead Port Expansion; • Holyhead Waterfront Regeneration; • Amlwch LNG; • North Hoyle Offshore Wind Farm; • Rhyl Flats Offshore Windfarm; • Gwynt y Môr Offshore Wind Farm; • Barrow Offshore Wind Farm Operation & Maintenance Activities; • West of Duddon Sands Offshore Wind Farm Operation & Maintenance Activities; • Ormonde Offshore Wind Farm • Walney Extension Offshore Wind Farm; • Burbo Bank Extension Offshore Wind Farm; 	<p>The potential for disturbance/ displacement effects were assessed against a worst case which included the following activities occurring concurrently for the Morlais proposal:</p> <p><i>Underwater noise and disturbance from installation of tidal devices and hubs (two drilling rigs), two cable laying activities, two cable protection activities and up to 16 vessels, plus operational turbine noise for full deployment (240MW)</i></p> <p>Regarding in-combination effects, the ISHRA (MOR/RHDHV/DOC/0067) (02)) has acknowledged the construction and/or operation underwater noise and disturbance effects from the relevant projects where information was available.</p> <p>As a worst-case scenario, up to 2 bottlenose dolphin and up to 65 grey seal could potentially be disturbed as a result of in-combination effects (MOR/RHDHV/DOC/0067) (02) (revaluating based on Wylfa Newydd withdrawing application).</p> <p>Up to 0.2 harbour seal (rounding up to 1) or <0.01% of OSPAR MU could potentially be disturbed as a result of in-combination effects.</p> <p>Marine Mammal Mitigation Protocols (MMMPs) will be prepared to reduce the risk of any permanent auditory injury (PTS) to marine mammals as a result of underwater noise during construction. The MMMP(s) will be developed in the pre-construction period and based upon</p>
--	---	--	---

		<ul style="list-style-type: none"> • Codling Wind Park; • Codling Wind Park Extension; • Alexandra Basin Redevelopment Project; • Isle of Man Ferry Terminal; • Milford Haven, Maintenance Dredge Pembrokeshire; • Afon Dysynni outfall gravel removal and relocation; • Belfast Harbour D3 terminal cruise ship facility; • Disposal of dredge material from the D3 approach channel; • Marine Energy Wales marine testing Area; • Argyll Tidal Demonstration; • Sound of Islay Demonstration • Site • West of Islay Tidal Energy Park • Enlli Tidal Energy Scheme, Bardsey Island 	<p>best available information, methodologies, industry best practice, latest scientific understanding, current guidance and detailed project design.</p> <p>It is accepted that the commitments within the oEMMP (v.10) along with a condition to deliver these commitments within a detailed EMMP post consent , provides confidence that no AEOSI would occur on bottlenose dolphin, grey seal and harbour seal as qualifying features of designated sites.</p> <p>Piling works are proposed as part of the activities for Holyhead Port Expansion (HPE). Approx. 12km from the MDZ, the potential underwater noise effects from HPE were assessed in the HPE ES addendum (Table 4-20) and it was concluded that no significant adverse effect would occur at the population level on harbour porpoise, bottlenose dolphin or grey seal, either from the proposal alone or in-combination with the Morlais development.</p> <p>Given the above and the information and commitments acknowledged within the oEMMP (v.10) it is concluded that there would be no AEOSI as a result of in-combination effects</p>	
Collision risk from vessel movements and turbine operation leading to mortality	Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC Cardigan Bay SAC	<i>Although a number of projects were considered relevant to the in-combination assessment; at the time of writing the ISHRA (2019), information was not available for some of these projects.</i>	<p>It is accepted that the commitments within the oEMMP (v.10) along with a condition to deliver these commitments within a detailed EMMP post consent , provides confidence that no AEOSI</p>	NO

	<ul style="list-style-type: none"> • <i>Bottlenose Dolphin</i> • <i>Grey seal</i> <p>Lambay Island SAC;</p> <ul style="list-style-type: none"> • <i>Grey seal</i> • <i>Harbour seal</i> <p>Pembrokeshire Marine SAC; Saltee Islands SAC; The Maidens SAC</p> <ul style="list-style-type: none"> • <i>Grey seal</i> 	<p><i>The following projects (construction and/or operation phases) were considered relevant to this impact pathway (those in bold are only relevant to seal features, these being outside the bottlenose dolphin MU):</i></p> <ul style="list-style-type: none"> • Holyhead Deep Phase I; • Holyhead Deep Tidal Array – 80MW; • Holyhead Port Expansion; • Holyhead Waterfront Regeneration; • Amlwch LNG; • Rhyl Flats Offshore Windfarm; • Gwynt y Môr Offshore Wind Farm; • Barrow Offshore Wind Farm Operation & Maintenance Activities; • West of Duddon Sands Offshore Wind Farm Operation & Maintenance Activities; • Ormonde Offshore Wind Farm • Walney Extension Offshore Wind Farm; • Burbo Bank Extension Offshore Wind Farm; • Codling Wind Park; • Codling Wind Park Extension; • Isle of Man Ferry Terminal; • Milford Haven, Maintenance Dredge Pembrokeshire; • Afon Dysynni outfall gravel removal and relocation; 	<p>would occur on bottlenose dolphin, grey seal and harbour seal as qualifying features of designated sites.</p> <p>The HPE ES addendum (Table 4-20) concluded that no significant adverse effect would occur at the population level on harbour porpoise, bottlenose dolphin or grey seal, either from the proposal alone or in-combination with the Morlais development, as result of collision.</p> <p>The planning application has not yet been submitted for Holyhead Deep Tidal Array (80MW) and it is unlikely that the Minesto project would be operational prior to deployment of the first phase of Morlais. No assessments are currently available for Holyhead Deep Tidal Array (80MW) however, the commitments within the oEMMP for Morlais provide enough confidence that AEOSI would not occur, either from the project alone or in-combination with Holyhead Deep Tidal Array (80MW).</p> <p>The ISHRA (MOR/RHDHV/DOC/0067) (02) concluded that it is unlikely that the potential collision risk would result in any significant population effects on marine mammals, either alone or in-combination with other developments.</p> <p>Given the above and the information and commitments acknowledged within the oEMMP (v.10) it is concluded that there would be no AEOSI as a result of in-combination effects</p>	
--	---	---	--	--

		<ul style="list-style-type: none"> • Belfast Harbour D3 terminal cruise ship facility • Marine Energy Wales marine testing Area; • Argyll Tidal Demonstration; • Sound of Islay Demonstration Site • West of Islay Tidal Energy Park • Enlli Tidal Energy Scheme, Bardsey Island 		
Development footprint (habitat loss) leading to changes in prey availability/foraging areas	<p>Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC Cardigan Bay SAC</p> <ul style="list-style-type: none"> • <i>Bottlenose Dolphin</i> • <i>Grey seal</i> <p>Lambay Island SAC;</p> <ul style="list-style-type: none"> • <i>Grey seal</i> • <i>Harbour seal</i> <p>Pembrokeshire Marine SAC; Saltee Islands SAC; The Maidens SAC</p>	<p><i>The following projects (construction and/or operation phases) were considered relevant to this impact pathway:</i></p> <ul style="list-style-type: none"> • Holyhead Deep Tidal Array – 80MW; • Holyhead Port Expansion; • Holyhead Waterfront Regeneration; • Milford Haven, Maintenance Dredge Pembrokeshire; • Afon Dysynni outfall gravel removal and relocation; • Enlli Tidal Energy Scheme, Bardsey Island 	<p>As a worst case, the Morlais proposal (240MW of varying devices and layout (Chapter 4, ES) would result in the loss of 2.18km². Considering the cumulative habitat loss from other developments would result in a total loss of 11.3km².</p> <p>Up to 0.4 bottlenose dolphin (0.14% of the MU), up to 2 grey seal (0.002% of the OSPAR MU), up to 0.007 harbour seal (rounding up to 1 this would equate to <0.005 % of OSPAR MU) could potentially be displaced as a result of in-combination effects for any changes in prey availability as a result of habitat loss</p> <p>Chapter 10 of the ES (section 10.6.5.2 – habitat loss effects; section 10.6.5.6 – collision risk effects) concluded minor adverse effects on fish receptors from operational phase.</p> <p>The planning application has not yet been submitted for Holyhead Deep Tidal</p>	NO

	<ul style="list-style-type: none"> • <i>Grey seal</i> 		<p>Array (80MW) and it is unlikely that the Minesto project would be operational prior to deployment of the first phase of Morlais. No assessments are currently available for Holyhead Deep Tidal Array (80MW)</p> <p>The shadow HRA for HPE concluded that there would be no AEOSI as a result of habitat loss and potential changes to prey availability, from the project alone or in-combination with other proposals.</p> <p>Given the above it is concluded that there would be no AEOSI as a result of in-combination effects.</p>	
<p>The nature of this proposal means that a number of key construction and operation activities are not delineated in time. Thus, activities associated with each of these phases will occur simultaneously i.e. construction/installation of turbines will take place while turbines are operational. Accordingly, the ISHRA has adopted a worst case scenario (Morlais, 2019) and assumed that where there is potential for concurrent activities then this is assessed.</p> <p>No seabird features were taken through to Table 4.2, therefore there are no residual effects which need to be considered in relation to these features.</p>	<p>Ireland's Eye SPA</p> <ul style="list-style-type: none"> • <i>Kittiwake</i> • <i>Razorbill</i> <p>Lambay Island SPA</p> <ul style="list-style-type: none"> • <i>Fulmar</i> • <i>Lesser black-backed gull</i> • <i>Razorbill</i> • <i>Puffin</i> <p>Copeland Islands SPA</p> <ul style="list-style-type: none"> • <i>Manx shearwater</i> <p>Saltee Islands SPA</p>	<p><i>The following projects (construction and/or operation phases) were considered relevant to this impact pathway:</i></p> <ul style="list-style-type: none"> • Holyhead Deep Phase I • Holyhead Deep Tidal Array • Argyll Tidal Demonstration • Marine Energy Wales Marine Testing Area • West of Islay Tidal Energy Park <p>Other projects also considered but with insufficient information at the time of application are:</p> <ul style="list-style-type: none"> • Enlli Tidal Energy Scheme, Bardsey Island • Sound of Islay Tidal Demonstration Site 	<p>For all seabird features taken through AA it was concluded that there would be no AEOSI from the project alone (see Table 4.1).</p> <p>Consideration is given to those seabird features identified in section 3.2 which although not considered likely to lead to LSE from the project alone, had potential for LSE in-combination. However, where the same qualifying feature at another designated site had been considered within Table 4.1 (i.e. Kittiwake, Manx Shearwater, Lesser-black backed gull), it was concluded that the justifications made for no AEOSI were relevant when applied here against the same features. Accordingly, Kittiwake, Manx Shearwater and Lesser black-backed gull are not considered further for in-combination effects.</p>	<p>NO</p>

<p>In Section 3.2 impact pathways were identified on seabird features which, although not considered likely to lead to LSE from the project alone, had potential for LSE in-combination.</p> <p>Two impact pathways are identified which have the potential for an adverse effect from in-combination effects with other projects:</p> <p><i>Presence of turbines (operation phase) resulting in physical damage (or mortality) to species from collision</i></p>	<ul style="list-style-type: none"> • <i>Fulmar</i> 	<ul style="list-style-type: none"> • Fair Head Tidal Energy Park (project on hold) 	<p>Surface feeding species such as Fulmar would be unlikely to encounter the moving elements of turbines and are not considered further in relation to this impact pathway.</p> <p>Razorbill present within the MDZ from the Lambay Island SPA (~88km) would be approaching the limits of accepted mean max foraging range (Woodward <i>et al.</i>, 2019). At such a distance from either Lambay Island SPA and Ireland's Eye SPA it is considered that the MDZ would not represent an important foraging area for individuals. It is concluded that there is limited potential for the proposal to adversely affect the conservation objectives for razorbill from these sites either alone or in-combination with other projects.</p> <p>Theoretical method apportioning (SNH, 2018) indicates that approximately 2% of puffins present in the MDZ and ECC are likely to originate from Lambay Island SPA (Morlais ISHRA, 2019). During the non-breeding season densities of puffin within the MDZ were very low (<0.01/km²) (Morlais ISHRA, 2019). Due to the low level of occurrence of puffins, it is concluded that there is limited potential for the proposal to adversely affect the conservation objectives for puffin from Lambay island SPA either alone or in-combination with other projects.</p> <p>Given the above it is concluded that there would be no AEOSI as a result of in-combination effects.</p>	
--	---	---	---	--

<p>Noise/visual disturbance to birds at sea resulting from vessel movements (construction/decommissioning), construction/ decommissioning activities (e.g. piling, drilling), operation (e.g. turbine noise).</p>	<p>Ireland's Eye SPA</p> <ul style="list-style-type: none"> • Kittiwake • Razorbill <p>Lambay Island SPA</p> <ul style="list-style-type: none"> • Fulmar • Lesser black-backed gull • Razorbill • Puffin <p>Copeland Islands SPA</p> <ul style="list-style-type: none"> • Manx shearwater <p>Saltee Islands SPA</p> <ul style="list-style-type: none"> • Fulmar 	<p>The following projects (construction and/or operation phases) were considered relevant to this impact pathway:</p> <ul style="list-style-type: none"> • Holyhead Deep Phase I • Argyll Tidal Demonstration • Alexandra Basin Redevelopment Project • Greater Dublin Drainage • Kinsale Head / Ballycotton gas fields and Seven Heads gas field • Greenlink interconnector • Reclamation adjacent to Terminal 4 of the Port of Holyhead. • West of Islay Tidal Energy Park • Marine Energy Wales Marine Testing Area <p>Other projects also considered but with insufficient information at the time of application are:</p> <ul style="list-style-type: none"> • Anglesey Eco Park Power Station; • Holyhead Waterfront Redevelopment; • Holy Island Resort; • Enlli Tidal Energy Scheme, Bardsey Island • Sound of Islay Tidal Demonstration Site • Sirius SBC Renewables • Amlwch LNG 	<p>For all seabird features taken through AA it was concluded that there would be no AEOSI from the project alone (see Table 4.1) and therefore not unnecessary to consider mitigation. Hence, there are no residual effects.</p> <p>Consideration is given to those seabird features identified in section 3.2 which although not considered likely to lead to LSE from the project alone, had potential for LSE in-combination. However, where the same qualifying feature at another designated site had been considered within Table 4.1 (i.e. Kittiwake, Manx Shearwater, Lesser-black backed gull), it was concluded that the justifications made for no AEOSI were relevant when applied here against the same features. Accordingly, Kittiwake, Manx Shearwater and Lesser black-backed gull are not considered further for in-combination effects.</p> <p>Razorbill present within the MDZ from the Lambay Island SPA (~88km) would be approaching the limits of accepted mean max foraging range (Woodward <i>et al.</i>, 2012). At such a distance from either Lambay Island SPA and Ireland's Eye SPA it is considered that the MDZ would not represent an important foraging area for individuals.</p> <p>It is concluded that there is limited potential for the proposal to adversely affect the conservation objectives for razorbill from these sites either alone or in-combination with other projects.</p>	<p>NO</p>
---	---	--	--	-----------

		<ul style="list-style-type: none"> • Milford Haven Maintenance Dredge • Proposed New Cruise Berth Dun Laoghaire • Codling Wind Park II • Gas Storage Project Islandmagee • Fair Head Tidal Energy Park (project on hold) 	<p>During the non-breeding season densities of puffin within the MDZ were very low (<0.01/km²) (Morlais ISHRA, 2019). Due to the low level of occurrence of puffins, it is concluded that there is limited potential for the proposal to adversely affect the conservation objectives for puffin from Lambay island SPA either alone or in-combination with other projects.</p> <p>Theoretical method apportioning (SNH, 2018) based on Thaxter <i>et al</i> (2012) indicated that <1% of Fulmars present in the MDZ and ECC are likely to originate from the Lambay Island SPA (Morlais ISHRA, 2019). Since this time the mean max foraging range has been increased for Fulmar (542 km). However, the very low incidence of Fulmar from Lambay Island and Saltee Islands SPAs expected to occur in the MDZ leads to a conclusion that there is limited potential for the proposal to adversely affect the conservation objectives for Fulmar from these sites either alone or in-combination with other projects.</p> <p>Given the above it is concluded that there would be no AEOSI as a result of in-combination effects.</p>	
<p>(a) If the right hand column is 'NO' for all rows</p>		<p>The project, when considered in combination with other plans and projects, is either not likely to have a significant effect on, or will not adversely affect the integrity of any SAC, SPA or Ramsar site</p>		

6. Conclusion

<p>HRA is not required because the whole of the project is directly connected with or necessary to the management of one or more SPA, SAC or Ramsar sites, for the purposes of conserving the habitats or species for which the site(s) is/are designated, <u>and</u> the project is not likely to have a significant effect on any other SPA, SAC or Ramsar sites. (As documented in section 2.1 and 2.2 of this form)</p>	
<p>HRA is not required because there is no conceivable impact pathway to any SPA, SAC or Ramsar site (As documented in section 2.3 of this form)</p>	
<p>This project is a renewal of a current permission which complies with NRW agreed criteria for ruling out significant effects of a renewal without conducting a project-specific LSE test. Therefore it is considered not likely to have a significant effect on any SPA, SAC or Ramsar sites, either alone or in-combination with other plans and projects. (As documented in section 3.1 of this form)</p>	
<p>The project has been screened for likelihood of significant effects and, taking account of the advice received from protected sites advisors, is considered not likely to have a significant effect on any SPA, SAC or Ramsar site (As documented in section 3.2 of this form, or section 5 if applicable)</p>	
<p>In light of the conclusions of an appropriate assessment, and taking account of the advice received from protected sites advisors, it has been established that the project will not adversely affect the integrity of any SPA, SAC or Ramsar site, taking into account any conditions or restrictions as applicable, either alone or in-combination with other plans and projects. (As documented in section 4 of this form, and section 5 if applicable)</p>	X
<p>In light of the conclusions of the appropriate assessment, it has <u>not</u> been ascertained that the project will not adversely affect the integrity of any SPA, SAC or Ramsar site, as documented in section 4 of this form, and section 5 is applicable.</p> <p>Approval for the project <u>cannot</u> be given unless either:</p> <ul style="list-style-type: none"> • the project specification, and/or the terms under which it might be approved, are modified so as to remove the risk of adverse effects, and a revised HRA report is prepared, or 	

- | | |
|---|--|
| <ul style="list-style-type: none">the project satisfies the requirements of Article 6(4) of the Habitats Directive, an Article 6(4) Statement of Case is prepared (OGN 200 Form 3) and submitted for consideration by the appropriate authority, normally Welsh Ministers | |
|---|--|

Name: [Maria Alvarez](#)

Position: [NRW PS - Marine Licensing Officer](#)

Date: [22 October 2025](#)

7. Consultation with protected sites advisor(s) and how sections 2, 3, 4 and 5 of this HRA report (as applicable) take into account that advice.

Relevant section of the HRA report	Date(s) of correspondence* and any meeting(s) with protected sites advisor(s)	Description of how the comments from protected sites advisors have been taken into account
	3/12/2025	NRW A agree with the conclusions.

Appropriate nature conservation body (ANCB) response to an internal HRA consultation

This form should be completed by the team or individual providing the ANCB advice to the competent authority team

TO: Maria Alvarez, Marine Licensing Team
FROM: Katie Reynolds, Marine Area Advice and Management Team.
SUBJECT: Habitats Regulations Assessment of ORML1938v1 Morlais Demonstration Zone

Thank you for consulting Marine Area Advice and Management Team on the above. Our comments are as follows:

We agree with the conclusion of the above mentioned HRA, with respect to the marine features of the sites listed in section 3.2.1 of the HRA, as we conclude that the assessment remains unchanged (valid) as a result of this variation.

We agree that the project has been taken to appropriate assessment and that the project will not adversely affect the integrity of any SPA, SAC or Ramsar site, taking into account any conditions or restrictions as applicable, either alone or in-combination with other plans and projects.

Signed: *KReynolds*

Date: 03/12/2025