




F I V E 
ESTUARIES
OFFSHORE WIND FARM

FIVE ESTUARIES
OFFSHORE WIND FARM
VOLUME 9, REPORT 32: OFFSHORE IN-
PRINCIPLE MONITORING PLAN
(TRACKED)

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DEFINITION OF ACRONYMS

Term	Definition
AEoL	Adverse Effect on Integrity
AIS	Automatic Identification System
CSIP	Cable Specification and Installation Plan
DCO	Development Consent Order
dML	Deemed Marine Licence
EIA	Environmental Impact Assessment
ES	Environmental Statement
IPMP	In-Principles Monitoring Plan
MBES	Multi-Beam Echo Sounder
MHCLG	Ministry of Housing, Communities and Local Government
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MWSQ	Marine Water and Sediment Quality
MW	Megawatts
NSIP	Nationally Significant Infrastructure Project
OOMP	Offshore Operations and Maintenance Plan
SoS	Secretary of State
SSS	Side-Scan Sonar
UXO	Unexploded Ordnance
VE	Five Estuaries Offshore Wind Farm
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator



GLOSSARY OF TERMS

Term	Definition
Development Consent Order	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for the Department for Energy Security and Net Zero (DESNZ)
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact in question with the sensitivity of the receptor in question, in accordance with defined significance criteria.
Export Cable Corridor (ECC)	The area(s) where the export cables will be located. The ECC is the wider cable corridor within which the preferred cable route is located. The Onshore ECC is typically approximately 90m wide, however some areas require a wider corridor (such as where trenchless crossing may take place)
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial, resulting from the activities associated with the construction, operation and maintenance, or decommissioning of the project.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
Order Limits	The extent of development including all works, access routes, TCCs, visibility splays and discharge points.
Outline plan	An early version of a management plan produced to secure principles, which the final approved management plan will adhere to.



Term	Definition
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Proposed Development.
Sound Exposure Level	Measure that considers both the received level of the sound and duration of exposure.
Sound Pressure Level	Measure of the average unweighted level of sound, usually a continuous noise source.
The Applicant	The company Five Estuaries Offshore Wind Farm Ltd.



1 THE PROJECT

1.1 BACKGROUND

- 1.1.1 Five Estuaries Offshore Wind Farm Ltd (VE OWFL or the Applicant) has submitted a DCO application (the Application) to the Planning Inspectorate on behalf of the Secretary of State, for a Development Consent Order for the Five Estuaries Offshore Wind Farm (herein referred to as VE).
- 1.1.2 VE is the proposed extension to the operational Galloper Offshore Wind Farm located 37km off the coast of Suffolk and comprises both offshore and onshore infrastructure within the administrative area of Essex Country Council. VE will have an overall capacity of greater than 100 Megawatts (MW) and therefore constitutes a Nationally Significant Infrastructure Project (NSIP) under Section 15 (3) of the Planning Act 2008. Such projects require a Development Consent Order (DCO) to be granted by the relevant UK Secretary of State (SoS).
- 1.1.3 This Offshore In-Principle Monitoring Plan (IPMP) has been produced as part of the Application.

1.2 PURPOSE OF THE DOCUMENT

- 1.2.1 This Offshore In-Principle Monitoring Plan (IPMP) sets out the basis for delivering offshore monitoring measures for VE as expected to be required under the deemed Marine Licences (dMLs) – comprising Schedules 10 and 11 of the draft DCO (Document 3.1).
- 1.2.2 The IPMP is secured in multiple dML conditions in relation to pre-construction, construction and post-construction monitoring and requires that, for each phase, the Applicant *'submit a [phase] monitoring plan or plans for that stage in accordance with the outline offshore in principle monitoring plan for written approval by the MMO in consultation with the relevant statutory nature conservation body, which must include details of any proposed construction monitoring, including methodologies and timings, and a proposed format, content and timings for providing reports on the results.'*
- 1.2.3 The IPMP provides a framework for further discussions post consent with the Marine Management Organisation (MMO) and the relevant authorities to agree the exact detail (timings, methodologies etc.) of the monitoring that is required. Final detailed plans will be produced prior to the commencement of monitoring work and in line with the Conditions set out in the dMLs.
- 1.2.4 This plan puts forward outline proposals for monitoring for the following relevant topics assessed as part of the Environmental Statement (ES):
- > Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes;
 - > Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality
 - > Volume 6, Part 2, Chapter 4: Offshore Ornithology;
 - > Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology
 - > Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology;



- > Volume 6, Part 2, Chapter 7: Marine Mammal Ecology;
- > Volume 6, Part 2, Chapter 8: Commercial Fisheries;
- > Volume 6, Part 2, Chapter 9: Shipping and Navigation; and
- > Volume 6, Part 2, Chapter 11: Offshore archaeology and Cultural Heritage.

1.2.5 This IPMP outlines topic specific monitoring proposals in line with the residual impacts assessed in the ES (topics listed above). This Offshore IPMP sets out the approach to monitoring in line with the assessments carried out at the date of writing and the Applicant recognises that this is a first iteration and through ongoing discussions with stakeholders monitoring methodologies will be refined in future iterations of this IPMP. In addition, it is noted that the pre-construction and post-construction monitoring plans will be based on hypothesis or questions that validate impact predictions where appropriate and/or monitor the effectiveness of mitigation.



2 GENERAL GUIDING PRINCIPLES FOR THE PROPOSED MONITORING

- 2.1.1 The ES and supporting documentation details the steps the Applicant has taken to avoid or reduce significant impacts either through the iterative process of project design (e.g., the location of project boundaries) or by mitigation measures which will be applied during the construction, operation or decommissioning phases of the Project.
- 2.1.2 The guiding principles for monitoring which apply to the monitoring outlined in this document are as follows:
- > All consent conditions, which would include those for monitoring, should be “necessary, relevant to planning and to the development to be permitted, enforceable, precise and reasonable in all other respects” as set out in Paragraph 56 of the National Planning Policy Framework and referred to as the ‘six tests’ (Ministry of Housing, Communities and Local Government (MHCLG) 2021).
 - > In line with good practice, monitoring must have a clear purpose in order to provide answers to specific questions where significant environmental impacts have been identified. As such, monitoring proposals should have an identified aim, end date and confirmed outputs, which provide, as far as possible, statistically robust data sets, as applicable to the hypothesis being tested.
 - > Monitoring should be targeted towards significant evidence gaps or uncertainties, which are relevant to the project and can be realistically delivered by project level monitoring, as well as those receptors considered to be the most sensitive to project specific impacts including those of conservation, ecological and/or economic importance. The presence of a significant impact should not, on its own, necessarily lead to a requirement for monitoring.
 - > Proposals for monitoring should be based, where relevant, on best practice and the latest environmental data associated with post-consent monitoring of offshore wind farms.
 - > The scope and design of all monitoring work should be finalised and agreed following review of the results of any preceding survey and/or monitoring work (i.e., an adaptive approach), including those surveys conducted in support of the environmental impact assessment (EIA). This includes the potential for future survey requirements to be adapted based on the results of the monitoring outlined in this document. Where it has been agreed that there are no significant impacts, monitoring need not be conditioned through the dMLs or detailed in this document.



2.1.3 This document specifically focusses on monitoring the wind farm arrays areas and export cable corridor (ECC) area. Monitoring associated with Habitats Regulations Assessment compensatory measures (with or without prejudice), which would be located remotely from the project, are detailed in a series of separate implementation and monitoring plans as detailed below:

- > Volume 5, Report 5.2: Outline Benthic Implementation and Monitoring Plan
- > Volume 5, Report 5.6: Lesser Black Backed Gull Implementation and Monitoring Plan
- > Volume 5, Report 5.7: Kittiwake Implementation and Monitoring Plan

Volume 5, Report 5.8: Guillemot and Razorbill Implementation and Monitoring Plan



3 VE RESIDUAL IMPACTS

- 3.1.1 The EIA predicts the residual impacts taking into account:
- > Linkages using the source > pathway > receptor model;
 - > Mitigation;
 - > Sensitivity to the effect;
 - > Magnitude of the effect; and
 - > Ecological/economic importance.
- 3.1.2 The significance of the residual effect should not in its own right necessarily lead to a requirement for monitoring. Monitoring should be targeted to significant evidence gaps or uncertainty, which are relevant to the project and can be realistically addressed.
- 3.1.3 For each receptor the residual effects and major areas of uncertainty as predicted within the DCO Order Limits are detailed. Only where moderate or major adverse effects are predicted for the topics listed in Section 1.2 or significant uncertainty remains in the assessment has monitoring been deemed necessary and required as part of the dML.



4 IN PRINCIPLE PROPOSAL FOR MONITORING

4.1.1 The following sections set out the in-principle proposals for monitoring in relation to those topics and/or receptor groups outlined in the Section 1.

4.1.2 Accepting that this IPMP represents the proposed approach to monitoring at the time of writing, it is recognised that the outcomes of future survey work could influence future monitoring requirements, methodologies, focus and effort for VE, as knowledge and understanding develops. For example, where appropriate, and in consultation with the MMO and its advisors, including the relevant Statutory Nature Conservation Body (SNCB) (e.g Natural England), these scopes may be refined to consider other relevant studies. An adaptive approach to monitoring is important to ensure that data collected can realistically and robustly contribute to the evidence base for offshore wind farm impacts. This IPMP will be the subject of ongoing consultation between The Applicant, the MMO and its advisers. This document sets out the monitoring commitments made in the ES and will be used as a basis for further discussions, in relation to monitoring, post consent.

4.2 ENGINEERING AND DESIGN RELATED MONITORING

4.2.1 In addition to the environmental survey and monitoring required under the dMLs, survey activities will also be undertaken for engineering and design purposes. Some of these will overlap with, or incorporate, dML monitoring and wherever possible the Applicant will look to combine surveys for monitoring purposes with those already being carried out for engineering purposes to optimise data collection and evidence.

4.2.2 Geophysical and geotechnical surveys will be carried out before construction works commence and the information from those surveys would allow the following to be identified:

- > Debris;
- > Boulders;
- > Archaeological features;
- > Unexploded Ordnance (UXO) presence;
- > Seabed features;
- > Sediment depth; and
- > The specific nature of the seabed.

4.2.3 The geotechnical and geophysical surveys may comprise survey methods including but not limited to, multibeam sonar, sidescan sonar, sub-bottom profiling, cone penetration tests and vibrocoring. Where required, seabed sediments may also be subject to grab sampling for physical and biological analyses. In addition, buoys may be deployed to survey local meteorological conditions.

4.2.4 Other relevant Plans required under the dML with commitments to monitoring (linked to the surveys listed above) are:

- > A Cable Specification and Installation Plan (CSIP) in accordance with the Outline CSIP (Volume 9, Report 12) submitted with this DCO application;



- > An offshore operations and maintenance plan (OOMP) in accordance with the Outline OOMP (Volume 9, Report 17) submitted with this DCO application; and
- > Marine written schemes of investigation (WSI) in accordance with the Outline Marine Written Schemes of Investigation (Volume 9, Report 19) submitted with this DCO application.



4.3 MARINE GEOLOGY, OCEANOGRAPHY AND PHYSICAL PROCESSES

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

- 4.3.1 The impacts on marine geology, oceanography and physical processes during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes) found that there will be effects of **negligible** to **minor adverse** on the physical processes environment.
- 4.3.2 VE intend to survey the areas where construction will be carried out using appropriate geophysical surveys including high resolution bathymetric, multibeam echosounder (MBES) and side-scan sonar (SSS) surveys of the area(s) within the Order limits for engineering purposes (as set out in Section 4.2).

IN PRINCIPLE MONITORING PROPOSED

- 4.3.3 Geophysical and geotechnical survey data will be collected pre-construction to inform detailed engineering design and will inform pre-construction identification and mapping of features of importance in relation to archaeology and benthic ecology.
- 4.3.4 Post construction survey proposals will be informed by the final engineering design of the project and also by potential for significant scour around rock/cable protection and foundations; any need to for cable burial depth monitoring; and potential for impact on features of ecological (primarily benthic) and archaeological sensitivity.

PRE-CONSTRUCTION MONITORING / PROGRAMME

4.3.5 A survey of the final array areas and a refined cable corridor survey will be carried out to provide full sea floor coverage swath-bathymetric and side-scan data for the area(s) within the DCO Order Limits in which it is proposed to carry out construction works. Scope of pre-construction surveys will be informed by relevant guidance for benthic monitoring (as discussed in Section 4.6) and the requirements of the agreed Archaeological Written Schemes of Investigation (as discussed in Section 4.11) as well as Marine Guidance Note 654 and the associated need for surveys to provide data to IHO S44ed5 Order 1a standard.

4.3.54.3.6 The specification, timing and programme of any surveys shall be submitted to the MMO for written approval at least six months prior to the commencement of any survey works, unless otherwise agreed.

POST-CONSTRUCTION MONITORING / PROGRAMME

4.3.7 ~~The final extent and scope of post construction surveys will be dependent on the final engineering design for the project and findings of the pre-construction surveys. Scope of post construction surveys and programmes and methodologies for the purposes of monitoring shall be submitted in accordance with the relevant dML conditions.~~



4.3.6—A single survey within the agreed array and cable corridor survey areas using full sea floor coverage swath-bathymetric surveys undertaken to International Hydrographic Organization (IHO) Order 1A standard and side scan sonar surveys around appropriate sub-samples of adjacent infrastructure to assess any changes in seabed topography. For this purpose, the survey contractor will, prior to the first such survey, submit a desk-based assessment (which takes account of all factors which influence scour) to identify the sample of adjacent turbines with greatest potential for scour. The survey will be used to substantiate the desk-based assessment: further surveys may be required if there are significant differences between the modelled scour and recorded scour. The number of turbine locations subject to monitoring will be confirmed following the completion of detailed design studies and in consultation with the MMO and relevant SNCBs.



4.4 MARINE WATER AND SEDIMENT QUALITY

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

- 4.4.1 The impacts on marine water and sediment quality during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality) found that there is no residual impact.

IN PRINCIPLE MONITORING PROPOSED

- 4.4.2 No monitoring or independent surveys are proposed in relation to Marine Water and Sediment quality on the basis of no residual impact being assessed within the ES.



4.5 OFFSHORE ORNITHOLOGY

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

- 4.5.1 The impacts on offshore ornithology during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 4: Offshore Ornithology) found that there will be impacts of no greater than **minor** adverse significance on offshore ornithology.
- 4.5.2 The Report to Inform Appropriate Assessment (RIAA) (Volume 5, Report 4) that has been submitted with this DCO application sets out that there is potential for Adverse Effect on Integrity (AEoI) for Lesser Black Backed Gulls (LBBG) from the Alde Ore Estuary SPA. Details of the proposed compensation measures and associated monitoring for these measures are set out in Volume 5, Report 5.3: LBBG Compensation: Evidence, Site Selection and Roadmap and Volume 5, Report 5.6: LBBG Implementation and Monitoring (IMP) Plans and are not covered in the IPMP.

IN PRINCIPLE MONITORING PROPOSED

- 4.5.3 It is proposed that ornithological monitoring is focused on the compensatory measures that are implemented for the project (and as set out the relevant IMP) as significant effects from Five Estuaries (alone or cumulatively with other projects) in line with EIA regulations are not predicted. In addition, previously standard, pre and post-construction aerial surveys have not conclusively confirmed the ES impact predications, or significantly furthered the evidence base on the impacts of offshore wind farms on birds. It should also be noted that various factors of precaution are factored into impact assessments to account for this uncertainty. With this in mind, and noting the principles set out in Section 2, further monitoring is not proposed.



4.6 BENTHIC AND INTERTIDAL ECOLOGY

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

- 4.6.1 The impacts on benthic and intertidal ecology during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology) found that there will be impacts of **negligible** to **minor adverse** significance on benthic ecology.
- 4.6.2 The offshore ECC passes through 1.26 km² of the Margate & Long Sands Special Area of Conservation (M&LS SAC), overlapping with the tip of the most northerly of the 9 sandbanks identified within the SAC (Long Sands Head). The RIAA (Volume 5, Report 4) concludes that no AEoI is expected upon the M&LS SAC, however cognisant of previous decisions reached by the SoS on recent offshore wind farm Development Consent Order determinations, the Applicant has developed potential 'without prejudice' compensation measures for this SAC in the event VE is required to provide compensation for this SAC by the SoS. VE has prepared an outline Benthic Implementation and Monitoring Plan (Volume 5, Report 5.5.2) that details the outline proposals for monitoring of compensatory measures and this would be developed into a final plan upon decision.
- 4.6.3 As detailed on Section 4.3, the pre-construction geophysical survey will also provide data that will be used to help identify important benthic habitats (such as potential locations of *Sabellaria spinulosa* reef). In areas where *Sabellaria spinulosa* is identified from the review of geophysical data, drop down video and/ or stills will be deployed to confirm presence and extent, and determine any need for drop down camera or sampling to enable the full extent of features to be mapped and quality characteristics defined. However, it should be noted that *Sabellaria spinulosa* habitat was not recorded in reef form during site specific surveys.
- 4.6.4 The requirement for post-construction benthic survey will be informed by the results of pre-construction surveys and the final engineering design of the project.

IN PRINCIPLE MONITORING PROPOSED

- 4.6.5.4.6.4 Monitoring proposed will determine if there are any biogenic or geogenic reef features identified within construction areas for VE following geophysical pre-construction surveys, as described above.
- 4.6.6.4.6.5 In addition, pre-construction monitoring in the Margate and Long Sands SAC will be carried out in line with the methods and principles detailed in Larsen *et al.*, (2019) - Sandwaves and megaripples at Race Bank (UK) Offshore Wind Farm. However, it should be noted that this study is focussed on the entire Race Bank Wind Farm. The ECC crosses only a small portion of the SAC (for circa 1.2 km with up to 900 m length of cable protection) and potential for significant effects is avoided via the mitigation set out in 9.13 Margate and Long Sands SAC – Benthic mitigation plan. If cable protection is installed in the SAC then post-construction monitoring in line with the principles of Larsen, *et al.*, will also be carried out.
- 4.6.7.4.6.6 The scope for pre-construction monitoring surveys, including programmes and methodologies shall be submitted in accordance with the relevant dML to the MMO for written approval at least six months prior to the commencement.



POST-CONSTRUCTION MONITORING / PROGRAMME

- ~~4.6.8~~4.6.7 If no biogenic or geogenic reef feature is identified during the pre-construction survey of the proposed works area no benthic post-construction monitoring will be required.
- ~~4.6.9~~4.6.8 If biogenic or geogenic reef feature is identified during the pre-construction survey, a post-construction survey, specifically targeting that feature will be undertaken to determine any change in the location, extent and composition of such feature using the same method as outline in for the pre-construction monitoring.
- ~~4.6.10~~4.6.9 If cable protection is installed in the Margate and Long Sands SAC, post construction monitoring will be carried out in line with methods agreed in pre-construction monitoring in the first year following installation of cable protection. The results of this survey will be used to inform the timing of subsequent surveys, if required, in consultation with the MMO and NE.
- ~~4.6.11~~4.6.10 If required, the scope of post-construction monitoring surveys, including programmes and methodologies shall be submitted in accordance with the relevant dML conditions.
- ~~4.6.12~~4.6.11 If significant impacts are observed, the potential requirement for further surveys will be agreed following review of the post-construction survey.



4.7 FISH AND SHELLFISH ECOLOGY

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

4.7.1 The impacts on fish and shellfish ecology during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology) found that there will be impacts of **negligible** to **minor adverse** significance with no residual impact on fish and shellfish ecology assessed.

IN PRINCIPLE MONITORING PROPOSED

4.7.2 No monitoring or independent surveys are proposed in relation to fish and shellfish ecology on the basis of no residual impact being assessed within the ES. However noise monitoring is proposed to validate, within reason, the assumptions made within Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology and Volume 6, Part 2, Chapter 7: Marine Mammal Ecology. The monitoring is to reduce the uncertainty for injury / disturbance to marine ecological receptors.

CONSTRUCTION MONITORING / PROGRAMME

4.7.3 Where piled foundations are to be employed during construction, underwater noise monitoring of the first four piles of each type of foundation will be undertaken to inform comparison against predictions for received levels and source levels that were made within the ES assessments to validate the conclusions made. This monitoring requirement is secured in Schedule 10 of the DCO (Generation Assets dML).

4.7.34.7.4 The monitoring locations will be selected from the first 12 foundations to be installed in order to provide for sites with differing seabed conditions (particularly water depths), whilst ensuring data are collected for the earliest pile installations for verification of predicted (modelled) noise levels. The Applicant proposes to target two foundation sites of ≤ 40 m water depth and two sites of ≥ 40 m depth from the initial 12 foundation locations.

4.7.44.7.5 Survey programmes and methodologies for the purposes of monitoring shall be submitted to the MMO at least six months prior to the commencement of any survey work, in accordance with the relevant dML conditions.



4.8 MARINE MAMMALS

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

4.8.1 The impacts on marine mammals during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 7: Marine Mammal Ecology) found that all impacts are of **negligible** to **minor adverse** significance on marine mammals.

IN PRINCIPLE MONITORING PROPOSED

4.8.2 No monitoring or independent surveys are proposed in relation to marine mammals on the basis of no residual impact being assessed within the ES.– In addition, previously standard, pre and post-construction aerial surveys have not conclusively confirmed the ES impact predictions or significantly furthered the evidence base on the impacts of offshore wind farms on marine mammals. It should also be noted that various factors of precaution are factored into impact assessments to account for this uncertainty. With this in mind, and noting the principles set out in Section 2, further monitoring is not proposed.

4.8.3 However noise monitoring is proposed to validate, within reason, the assumptions made within Volume 6, Part 2, Chapter 7: Marine Mammal Ecology and Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology. The monitoring is to reduce the uncertainty for injury / disturbance to marine ecological receptors.

4.8.4 An outline MMMP (Volume 9, Report 14.1) for piling has been submitted with this DCO application. A Final MMMP for piling will be submitted six months prior to the construction commencement.

4.8.44.8.5 VE will consider the advice of the SNCBs regarding additional monitoring that may be required for marine mammals.

CONSTRUCTION MONITORING / PROGRAMME

4.8.54.8.6 In line with guidance set out in Good Practice Guide No.133: Underwater Noise Measurement (National Physical Laboratory, 2014) noise monitoring carried out will use hydrophones with full specifications and monitoring proposal detailing methodologies will be provided within further iterations of the Offshore IPMP. Such data collected will be recorded in a format that will allow analysis, conclusions and discussions using weighted metrics, such as sound exposure level and peak to peak pressure level.

4.8.64.8.7 Where piled foundations are to be employed during construction, underwater noise monitoring of the first four piles of each type of foundation will be undertaken to inform comparison against predictions for received levels and source levels that were made within the ES assessments to validate the conclusions made.

4.8.74.8.8 In addition to the above, requirements of the UK Marine Noise Registry will be adhered to where possible informed by survey works carried out for engineering surveys set out in Section 4.2.

4.8.84.8.9 Survey programmes and methodologies for the purposes of monitoring shall be submitted in accordance with the relevant dML conditions.



4.9 COMMERCIAL FISHERIES

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

4.9.1 The impacts on commercial fisheries during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 12: Commercial Fisheries) found that all impacts are of **negligible to moderate adverse** significance on commercial fisheries. The impacts identified with moderate adverse impacts on the UK potting fleet during construction, operation and decommissioning phases of VE is reduced to **minor adverse** significance following mitigation within the Fisheries Liaison and Co-existence Plan (FLCP).

IN PRINCIPLE MONITORING PROPOSED

4.9.2 No monitoring in relation to commercial fisheries is considered necessary, other than the standard arrangements for fisheries liaison, which will be agreed in the Fisheries Liaison and Co-existence Plan (FLCP) prior to the start of construction. The FLCP will be produced in accordance with the Outline FLCP (Volume 9, Report 16) submitted with the DCO application.



4.10 SHIPPING AND NAVIGATION

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

4.10.1 The impacts on shipping and navigation during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 9: Shipping and Navigation) found that all impacts range from **broadly acceptable** to **tolerable** with mitigation applied, project alone and cumulatively.

IN PRINCIPLE MONITORING PROPOSED

~~4.10.2 Monitoring of AIS data during construction and for three years post construction will be carried out in line with MGN654. The main purpose of vessel traffic monitoring is to help confirm the Navigation Risk Assessment (NRA) is accurate and to pick up any important deviations from the predications of the NRA and ensure the mitigations implemented are effective.~~

4.10.2 Construction monitoring shall include vessel traffic monitoring by Automatic Identification System (AIS), including the provision of reports on the results of that monitoring periodically as requested by the Maritime and Coastguard Agency (MCA).

4.10.3 Post-construction monitoring will also include monitoring via AIS, totaling a maximum of 28 days (not consecutively), taking account of seasonal variations in traffic patterns over one year, following the commencement of commercial operation. A report will be submitted to the MMO and the MCA following the end of the monitoring.



4.11 OFFSHORE ARCHAEOLOGY

CONCLUSIONS OF THE ENVIRONMENTAL STATEMENT

4.11.1 The impacts on offshore archaeology and cultural heritage during the construction, operation and decommissioning phases of VE (assessed in Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage) found that there will be impacts of **negligible** to **minor adverse** residual significance on offshore archaeology and cultural heritage receptors and are considered to be **negligible** on the basis of best practice including further interpretation / assessment of geophysical and geotechnical data post consent.

IN PRINCIPLE MONITORING PROPOSED

4.11.2 Monitoring proposed for offshore archaeology and cultural heritage will be delivered in line with the agreed Marine WSI in accordance with the Outline Marine WSI (Volume 9, Report 19) produced with this DCO application and / or further activity specific method statements to be agreed with the MMO in consultation with Historic England.

4.11.3 Any offshore geophysical surveys (including UXO surveys), geotechnical surveys or UXO ROV or diver investigations will be undertaken in line with agreed WSI, with survey specific archaeological method statements produced for review by Historic England as appropriate.

PRE-CONSTRUCTION MONITORING / PROGRAMME

4.11.4 Pre-construction surveys will be undertaken in line with the WSI and associated method statements with the intention that features of potential archaeological importance are avoided by construction work by identification and implementation archaeological exclusion zones.

4.11.5 Areas with geoarchaeological potential will be targeted during the geotechnical sampling campaigns and the results of the geoarchaeological assessment will be presented in staged geoarchaeological reports as appropriate.

POST- CONSTRUCTION MONITORING / PROGRAMME

4.11.6 A post-construction monitoring plan will be produced as per the requirements within the Outline Marine WSI (Volume 9, Report 19) set out. The post-construction monitoring plan will identify any areas or sites of high archaeological significance recommended for further investigation and outline how post-construction monitoring campaigns will collect, assess and report on changes to marine heritage receptors that may have occurred during the construction phase.

4.11.7 Any offshore geophysical surveys (including UXO surveys) undertaken during the life of VE will be subject to archaeological review, as appropriate.

4.11.8 Specific requirements relating to monitoring during post-construction (including a conservation programme for finds) are detailed in the WSI.



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