ICOL PEMP Monitoring Strategy

Benthic Ecology and Scour

Inch Cape Offshore Limited

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Document history

Author	Dr Laila Higgins	26/09/2019
	Victoria Rutherford	30/08/2024
Checked	Michelle Elliott	02/09/2024
Approved	Stuart McCallum	23/10/2024
Revised	Eliana Mercy	20/02/2025

Client Details	
Contact	Gavin Kelly
Client Name	Inch Cape Offshore Limited
Address	Fifth Floor Office Suite 40 Princes Street Edinburgh EH2 2BY UNITED KINGDOM

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Local Office:

Units 5 & 10, Stephenson House
Horsley Business Centre
Horsley
Northumberland
NE15 0NY
Tel: +44 (0) 1661 312 100

Reg No: SC177881

Registered Office:

The Natural Power Consultants Limited
The Green House
Forrest Estate, Dalry
Castle Douglas, Kirkcudbrightshire
DG7 3XS

VAT No: GB 243 6926 48

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Glossary

Defined Term	Meaning
Development	The Inch Cape Offshore Wind Farm (the Wind Farm) and Offshore Transmission Infrastructure (OfTI) being developed by ICOL.
Development Area	The area for the Wind Farm, within which all WTGs, IACs, interconnector cables, OSP and the initial part of the Offshore Export Cable and any other associated works must be sited. As stipulated in the Crown Estate agreement for lease.
2013 Environmental Statement (ES)	Refers to the document in which the Environmental Impact Assessment (EIA) was carried for the Inch Cape 2014 Consent.
2018 Environmental Impact Assessment (EIA) Report (EIAR)	Refers to the document produced in 2018 to accompany the application for Consent of the Development (granted in 2019) following a material change in design.
Inch Cape Offshore Transmission Infrastructure (OfTI)	Components of the Development comprising the offshore export cable and OSP which are permitted by the OfTI Marine Licence (MS-00010593).
Inch Cape Offshore Transmission Works (OfTW)	Offshore Transmission Works (i.e., construction methods) associated with Inch Cape Offshore Wind Farm.
Inch Cape Offshore Wind Farm (OWF)/the Wind Farm	A component of the Development, comprising wind turbines and their foundations and substructures, and IACs.
Inch Cape Onshore Transmission Works (OnTW)	Onshore transmission works associated with the Inch Cape Offshore Wind Farm comprising the construction, operation and decommissioning of an onshore substation, electricity cables and associated infrastructure required to export electricity from the Inch Cape Offshore Wind Farm to the National Electricity Transmission System.
Offshore Export Cables	The subsea, buried or protected electricity cables running from the offshore wind farm substation to the landfall and transmitting the electricity generated to the onshore cables for transmission onwards to the onshore substation and the electrical grid connection.
Offshore Export Cable Corridor	The area within which the Offshore Export Cables will be laid from the OSP and up to Mean High Water Springs.
(The) Consents	Collective term used to describe the Section 36 consents and Marine Licences issued to ICOL.

Acronyms and Abbreviations

Acronym	Term
BAP	Biodiversity Action Plan
CoP	Construction Programme
DDV	Drop down video
EC	European Commission
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ES	Environmental Statement
FMS	Fisheries Management Scotland
FTRAG	Forth and Tay Regional Advisory Group
ICOL	Inch Cape Offshore Limited
GS	Generating Station
HRA	Habitats Regulations Appraisal
JNCC	Joint Nature Conservation Committee
km	Kilometre
kV	kiloVolts
m	Metre
MD-LOT	Marine Directorate Licensing Operations Team
mm	Millimetre
m/s	Metres per second
MMO	Marine Management Organisation
MPA	Marine Protected Area
MS-LOT	Marine Scotland Licencing Operations Team (Now MD-LOT)
MW	Megawatt
NIS	Non Indigenous Species
O&M	Operation and maintenance
OfTI	Offshore Transmission Infrastructure
OfTW	Offshore Transmission Works
OSP	Offshore Substation Platform
OSPAR	The Convention for the Protection of the marine Environment of the North East Atlantic (the ‘OSPAR Convention')
PEMP	Project Environmental Monitoring Programme
PMF	Priority Marine Features
RAG	Regional Advisory Group
RSPB	Royal Society for the Protection of Birds
ScotMER	Sottish Marine Energy Research
SFF	Scottish Fishermen’s Federation
SNH	Scottish Natural Heritage (now NatureScot)
UK	United Kingdom

Acronym	Term
WDC	Whale and Dolphin Conservation
WTG	Wind turbine generator

1. Introduction

This document has been prepared by Natural Power Consultants (Natural Power) on behalf of Inch Cape Offshore Limited (ICOL), for submission for approval by Scottish Ministers. It outlines the rationale and specification of the proposed environmental monitoring for the Inch Cape Offshore Wind Farm (the Wind Farm) and Offshore Transmission Infrastructure (OfTI), hereafter referred to as the Development, for benthic communities and seabed scour and local sediment deposition (as per Section 36 and Marine Licences conditions).

This document has been produced to communicate and agree with stakeholders the proposed approach to the pre-construction environmental monitoring, and will form part of the Project Environmental Monitoring Programme (PEMP) as required by the Inch Cape Offshore Wind Farm Section 36 Consent conditions 24 and 25, Offshore Energy Generating Station (GS) Marine Licence (MS-00010140) conditions 3.2.2.21 and 3.2.2.22 and Offshore Transmission Infrastructure (OfTI) Marine Licence (MS-00010593) condition 3.2.2.18 and 3.2.2.19. These include conditions relating to the Regional Advisory Group (RAG) who will require to be consulted with for mitigation and monitoring.

Due to the Project Timelines, two separate PEMPs are being developed. The PEMP-OfTI and the PEMP-GS. This document is applicable to both.

1.1. Developing the Benthic Ecology and Scour Strategy

The proposed approach to these monitoring strategies will take into consideration the following:

- The baseline conditions of the Development Area and Offshore Export Cable Corridor (i.e., the results of the Environmental Impact Assessment (EIA) baseline characterisation);
- The predictions of the impact assessment for benthic receptors, and degree of certainty in these predictions, made within the original Environmental Statement (ES) (ICOL, 2013) and revised Environmental Impact Assessment Report (EIAR) (ICOL, 2018);
- The mitigation and monitoring commitments outlined in the ES (ICOL, 2013);
- The outcomes/recommendations of published reports on monitoring at other offshore wind farm sites in the UK (and overseas) and existing data on the sensitivity and recoverability of receptors as relevant; and
- The outcomes of the independent review of post-consent environmental monitoring data undertaken on behalf of the Marine Management Organisation (MMO) (MMO, 2014a) and the MMO's subsequent recommendations (MMO, 2014b) which state that for Benthic ecology:
  - "*Where baseline surveys do not reveal the presence of species/habitat of conservation interest (e.g., Annex I habitat such as Sabellaria reef, Priority Marine Features (PMFs), Marine Protected Areas (MPAs), Biodiversity Action Plan (BAP) and OSPAR habitats; see JNCC, 2014), and where modifications to the seabed through scour is not predicted then further PCM [post-consent monitoring] should not typically be required*" (MMO, 2014b).
  - "*Where benthic ecological monitoring is required, scientifically robust strategies using cost-effective monitoring methods should be adopted (e.g., depending on issues to be investigated, drop-down video (DDV), or particle size analysis may be appropriate as a surrogate for macrofaunal taxonomic analyses*" (MMO, 2014b).
  - In general monitoring should "*ensure compliance with measures identified in assessments to mitigate significant impacts, detect any unforeseen impacts and validate predictions made in an EIA or HRA*". For impacts where there is a significant impact, mitigation should be used "*to protect the environment*" (MMO, 2014a);
  - Monitoring should be used "*where there is uncertainty in the significance of an impact which could lead to a potentially significant impact on a sensitive receptor*", and that "*surveys should be designed so that data*

collected can reduce uncertainty in impact significance statements". It also states that "*monitoring should not be required for impacts where there is already high certainty*" (MMO, 2014a); and

  - The MMO (2014a) concludes "*offshore wind farms have not had significant impacts on benthic habitats and associated faunal communities*".

- The outcomes of the independent review of post-consent environmental monitoring data undertaken by the MMO (MMO, 2014a) and the MMO's subsequent recommendations (MMO, 2014b), specific to scour and deposition of sediment makes the following statements:
  - "*The rationale for scour monitoring is not specifically linked to a sensitive environmental receptor and therefore does not inform the environmental receptor impacts. Instead, the scour monitoring rationale is typically linked to structural/engineering integrity*" (MMO, 2014a).
  - The MMO (2014a) review also states that multibeam bathymetry is not specifically required for data collection, however it represents "*the most useful and accurate 'best-practice' survey method for quantifying scour*".
  - "*Similar geological, sedimentary and metocean conditions respond similarly to one another following wind farm construction*", and when predicting scour, "*methods currently used to assess coastal and seabed changes are sufficient to detect changes and potential impacts attributed to physical processes*" (MMO, 2014a).
  - Scour monitoring "*may form part of ecological monitoring in the future*", and scour monitoring for environmental reasons is only recommended "*where there is a potential impact on sensitive receptors*" (MMO, 2014a).

2. The Development

In 2014, ICOL, the developer, was awarded Section 36 and Marine Licences for the construction and operation of an offshore wind farm and associated transmission works.

In 2018, ICOL submitted a new application with a revised design that would allow the development of a project that could utilise progressions in wind turbine generator (WTG) technology, since the 2014 consent. The revised design was aimed at reducing the environmental impacts and increasing the cost competitiveness of the project, primarily by reducing the overall number of WTGs and increasing the height of the WTGs being installed. Section 36 and Marine Licence Consents for the revised design were granted by Scottish Ministers in 2019.

Offshore construction is currently expected to commence April 2025 and is anticipated to take approximately two and a half years, running to August 2027. Details of the full programme for the construction works are provided in the Construction Programme (CoP) (IC02-INT-EC-OFC-004-INC-PRG-001).

The Inch Cape Offshore Wind Farm will be located approximately 15 to 22 km (eight to 12 nautical miles) off the Angus coastline, to the east of the Firth of Tay. The Development Area is approximately 150 km^2 and will contain 72 (Wind Turbine Generators) WTGs, one Offshore Substation Platform (OSP), 66 kilovolts (kV) inter-array cabling and the initial section of the Export Cables between the Development Area boundary and OSP.

The Offshore Export Cables will be installed within the Offshore Export Cable Corridor (ECC) , and will consist of two 220 kV export cables approximately 85 km long, between the landfall point at Cockenzie in East Lothian and the OSP within the Development Area. The ECC is approximately 1.4 km wide across at the widest point, reducing to approximately 250 m when approaching the landfall.

The location and extent of the Development Area and Offshore Export Cable Corridor is shown in Figure 2.1.

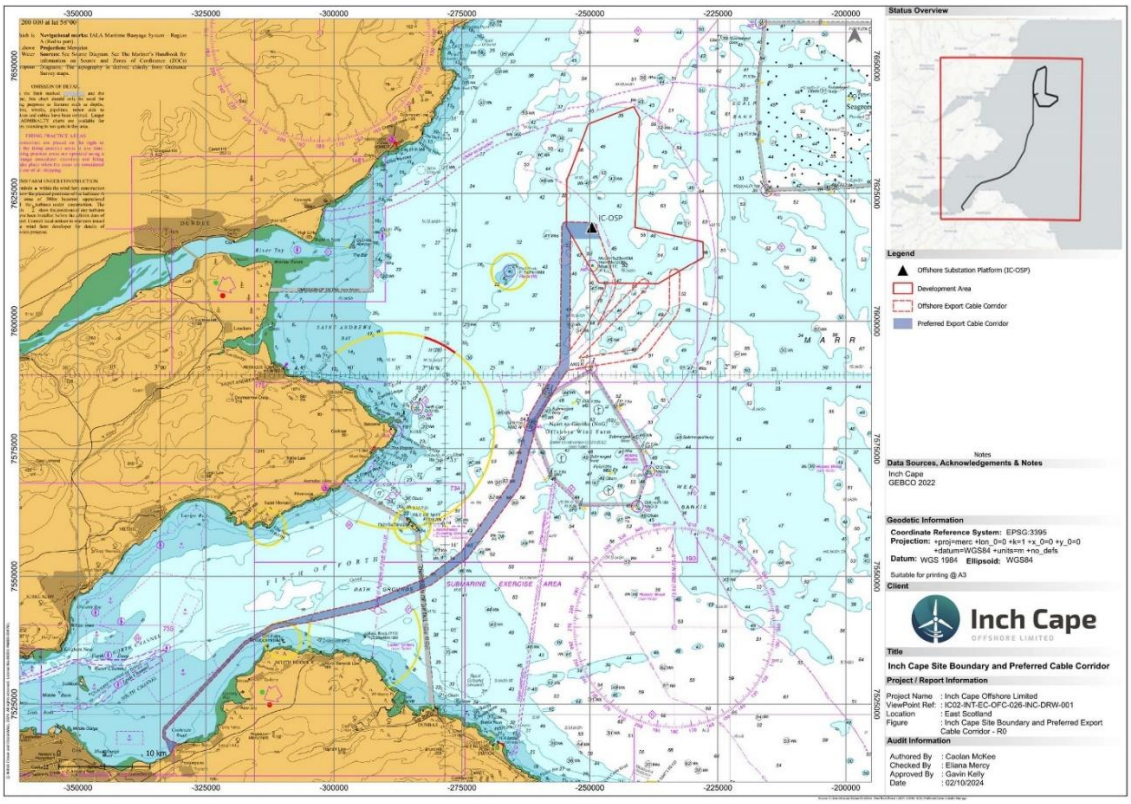

Figure 2.1: Project Location

3. Baseline Summaries

3.1. Benthic Ecology

Designated Sites

There are no designated sites with benthic ecology interest features identified within the Development Area or Offshore Export Cable Corridor and it was concluded within the ES (ICOL, 2013) that there was no potential for likely significant effects with nearby Special Areas of Conservation (SAC) with benthic ecology interest features.

Sediment Regime

Analysis of medium-term data sets undertaken for the 2013 EIA suggested that the sediment regime and associated biological habitats within the Development Area and Offshore Export Cable Corridor appeared to be relatively stable, with a probable improvement in seabed contamination levels since the Bell Rock disposal ground is no longer in use.

The Development Area

Site-specific surveys were undertaken in 2012. Surveys covered the Development Area and an area within a single tidal excursion from the Development Area, with discrete reference stations outside the tidal excursion. Surveying consisted of DDV, benthic grabs (including sub-sampling for contaminant analysis, particle size analysis and total organic carbon analysis) and epibenthic trawls. These results alongside interpretation and integration of geophysical results, enabled habitats (biotopes) to be mapped in order to characterise the environment.

Overall, the Development Area consisted of circalittoral sands and gravelly sands with areas of muddy mixed sediment, classified as follows:

- *Mysella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment (SS.SMxCMxMysThyMx) (classification for the majority of the Development Area).
- Venerid bivalves in circalittoral coarse sand or gravel (SS.SCS.CCS.MedLumVen); and
- Offshore circalittoral coarse sediment (SS.SCS.OCS).

Offshore Export Cable Corridor

Sub-tidal surveys undertaken along the Offshore Export Cable Corridor in 2010 and 2012 comprised benthic grab and DDV as well as geophysical interpretation enabled biotope mapping in order to characterise the seabed. The Offshore Export Cable Corridor was found to mainly comprise slightly gravelly muddy sand, with slightly gravelly sand and slightly gravelly sandy mud making up the majority of the remaining sediment. Sediments were generally coarser towards the offshore limit of the Offshore Export Cable Corridor (EMU, 2010; EMU 2013).

The following habitats were identified within the Offshore Export Cable Corridor:

- Seapens and burrowing megafauna in circalittoral fine mud (SS.SMu.CFiMu.SpnMeg) (dominant mud/sand biotope);
- Muddy sand habitats, including
  - Circalittoral mixed sediment (SS.SMx.CMx);
  - Circalittoral muddy sand (SS.SSa.CMuSa);
  - *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment (SS.SMx.CMx.FluHyd);
  - *Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment (SS.SMx.CMx.OphMx);
- Circalittoral coarse sediment (SS.SCS.CCS); and
- Subtidal rock habitats, including:
  - Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock (CR.MCR.EcCr.FaAlCr);

  - Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock (CR.MCR.EcCr.FaAlCr.Bri);
  - *Alcyonium digitatum*, *Pomatoceros triqueter*, algal and bryozoan crusts on wave-exposed circalittoral rock (CR.MCR.EcCr.FaAlCr.ADig);
  - Faunal and algal crusts with *Pomatoceros triqueter* and sparse *Alcyonium digitatum* on exposed to moderately wave-exposed circalittoral rock (CR.MCR.EcCr.FaAlCr.Pom);
- Intertidal habitats at the Cockenzie landfall:
  - Talitrids on the upper shore and strand-line (LS.LSa.St.Tal);
  - *Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock (LR.MLR.BF.PelB);
  - *Chthamalus* spp. on exposed upper eulittoral rock (LR.HLR.MusB.Cht.Cht);
  - *Fucus spiralis* on exposed to moderately exposed upper eulittoral rock (LR.MLR.BF.FspiB);
  - Barren littoral shingle (LS.LCS.Sh.BarS)
  - Barnacles and *Littorina* spp. on unstable eulittoral mixed substrata (LR.FLR.Eph.BLitX);
  - *Fucus spiralis* on full salinity upper eulittoral mixed substrata (LR.LLR.F.Fspi.X);
  - *Lanice conchilega* in littoral sand (LS.LSa.MuSa.Lan); and
  - *Laminaria digitata* on moderately exposed sublittoral fringe bedrock (IR.MIR.KR.Ldig.Ldig).

Habitats and Species of Conservation Importance

The Icelandic cyprine (or ocean quahog, *Arctica islandica*) which is a PMF and listed on the OSPAR list of threatened or declining species (Annex V), was recorded at moderate abundances across the Development Area (0-5000 individuals per 100 m^2). All individuals recorded were juveniles but were greater than one millimetre (mm) in diameter.

Seapens and burrowing megafauna in circalittoral fine mud (SS.SMu.CFiMu.SpnMeg), also a PMF, was identified within the Offshore Export Cable Corridor, and were generally not recorded at the most offshore extremities of the Offshore Export Cable Corridor.

Stony habitat, recorded as present in the Offshore Export Cable Corridor, has the potential to be listed under the EC Directive 92/43/EEC (Habitats Directive) as part of the feature: Annex I reef. Rocky habitats associated with the Isle of May were investigated via seabed video transects to acquire information on potentially sensitive receptors, including potential Annex I reefs. Selected patches of cobbles identified within the Offshore Export Cable Corridor were assessed to have low resemblance to Annex I reef, based on several key parameters of 'reefiness', including composition and diameter of the cobbles, elevation, extent and biotic composition (ICOL, 2013).

No evidence of any Annex I biogenic reef features were observed during the benthic surveys carried out across the Development Area and Offshore Export Cable Corridor, though a number of individuals from reef forming polychaete species were recorded, specifically *Sabellaria spinulosa* and *Serpula vermicularis.* These species are ubiquitous in sediments around the UK, however they only form reef structures in very specific environmental conditions which do not exist in the vicinity of the Development.

The Development (the Offshore Export Cable Corridor in particular) also experiences regular background levels of seabed disturbance, therefore Annex I reef habitats are considered unlikely to develop in this area.

3.2. Scour and sedimentation

Metocean, Wave Climate and Tides

Metocean and tidal characteristics of the Development Area are provided below.

Table 3.1: Metocean Conditions in the Development Area

Parameter	Dimensions
Water Depth Range	35.5 – 63.5 m Chart Datum (CD)
Tidal Currents	Peak springs 0.6 - 0.7 m/s Peak neap 0.3 - 0.4 m/s
Mean spring tidal Range	4.6 m

Waves within the Development Area are most frequently from a north-easterly direction (22.5 degrees) with significant wave heights up to 6.2 m recorded by in situ instrumentation. Waves also arrive from both the south-eastern and south-western quadrants, but these form only a minor component of the wave direction spectrum. Information on baseline conditions along the Offshore Export Cable Corridor were contained within a separate Regional Coastal Processes Baseline Description.

Within the Firth of Forth (near Rosyth) spring currents are 0.7 – 1.1 m/s on the ebb and 0.4 – 0.7 m/s on the flood. Whereas I the outer Firth of Forth currents are relatively low, with spring tides only reaching around 0.52 m/s (Ramsay and Brampton, 2000).

Water depths range from 0m at landfall to approximately 57.6 m approximately ¾ along the route).

Sediment Regime and Bathymetry

The seabed around the Development Area has undulating bathymetry and is characterised by two main sandbank areas, one in the northwest and a shallower bank in the centre of the Development Area. These sandbank areas have a relief of approximately 12 m – 17 m above the surrounding seabed. Deeper areas of water are present in pockets around the Development Area, notably the south and the east.

The tidal current regime is not sufficiently powerful to generate significant sediment transport on either the spring or neap tidal phases. Fine and medium sand are transported by the tidal currents but only during spring tides and only during higher current speeds in the tidal cycle.

The main sediment type along the Offshore Export Cable Corridor is muddy sand, although there is some variability depending on location.

Designated Nature Conservation Sites with Geological Features

The Firth of Forth Banks Complex Marine Protected Area (MPA) is within 10 km of the Development and is designated for offshore subtidal sands and gravels, shelf banks and mounds and moraines representative of the Wee Bankie Key Geodiversity Area. During initial discussions, Marine Scotland confirmed that as there was no spatial overlap between the Firth of Forth Banks Complex MPA and the Development, no additional assessment of this MPA was required in the 2018 EIAR.

4. Impact Assessment Summary

4.1. Benthic Ecology

The conclusions for the Benthic Ecology assessment in the 2013 ES are provided in full in Appendix A (Table A.1 – A.4).

The majority of the potential impacts in the Development Area were considered to be negligible/minor, minor or minor/moderate and not significant. Deposition of resuspended sediments leading to smothering and introduction of non-indigenous species (NIS) were considered to both have a moderate non-significant effect on habitats.

Along the Offshore Export Cable Corridor, the majority of the potential impacts were predicted to be negligible/minor, minor or minor/moderate and not significant. Introduction of non-indigenous species (NIS) was assessed as a having a moderate non-significant effect on habitats.

For the revised design, an update to the 2013 assessment was not required as all parameters were within those assessed during 2013, and the conclusions from the 2013 Benthic Ecology chapter were considered still valid.

4.2. Scour and Sedimentation

The conclusions for the Metocean and Coastal Processes assessment in the 2013 ES are provided in full in Appendix A (Table A.5 – A.8).

The significance of the effects did not exceed minor/moderate (and not significant) for any of the impacts assessed.

For the revised design, an update to the 2013 assessment was not required as all parameters were within those originally assessed during 2013, and the conclusions from the 2013 Metocean and Coastal Processes chapter were considered to remain valid.

5. Monitoring Commitments and Relevant Conditions

5.1. Monitoring commitments in the ES

The 2013 assessment for benthic ecology (ICOL, 2013), which included embedded mitigation, concluded that impacts to this receptor group were not significant therefore no additional mitigation was required. No additional benthic monitoring or mitigation was proposed for the Development. In the same report, the assessment for Metocean and Coastal Processes concluded that impacts to this receptor group were not significant therefore no additional mitigation was required

For the revised design an update to the 2013 assessment was not required and so the conclusions from the 2013 Benthic Ecology chapter were considered to remain valid.

5.2. Section 36 Consent and Marine Licence conditions

The Section 36 Consent, Generating Station (GS) Marine Licence, and OfTI Marine Licence for the revised design were granted by Scottish Ministers on 17th June 2019. The Section 36 Consent was subsequently varied on 16th July 2020, 22nd July 2021, and 14th June 2023, the GS Marine Licence was varied on 14th June 2023 (Licence No. MS-00010140); and the OfTI Marine Licence varied on 23rd August and amended on 9th November 2023 (Licence No. MS-00010593).

The S36 Condition 24, GS Marine Licence condition 3.2.2.21, and OfTI Marine Licence Condition 3.2.2.18 provide the requirement for the PEMP, as described below:

- The Company/ Licensee must, no later than six months prior to the Commencement of the Development/ Works, submit a Project Environmental Monitoring Programme ("PEMP"), in writing, to the Scottish Ministers/ *Licensing Authority* for their written approval. Such approval may only be granted following consultation by the Scottish Ministers/ *Licensing Authority* with SNH, RSPB Scotland, WDC, SFF, FMS and any other environmental advisors or organisations as required at the discretion of the Scottish Ministers/ *Licensing Authority*. The PEMP must be in accordance with the Application as it relates to environmental monitoring.
- The PEMP must set out measures by which the Company must monitor the environmental impacts of the Development. Monitoring is required throughout the lifespan of the Development where this is deemed necessary by the Scottish Ministers/ *Licensing Authority*. Lifespan in this context includes pre-construction, construction, operational and decommissioning phases.
- The Scottish Ministers/ *Licensing Authority* must approve all initial methodologies for the above monitoring, in writing and, where appropriate, in consultation with the FTRAG.
- Monitoring must be done in such a way so as to ensure that the data which is collected allows useful and valid comparisons between different phases of the Development. Monitoring may also serve the purpose of verifying key predictions in the Application. In the event that further potential adverse environmental effects are identified, for which no predictions were made in the Application, the Scottish Ministers/ *Licensing Authority* may require the Company to undertake additional monitoring.
- The PEMP must cover, but not be limited to, the following matters:
    a. Pre-construction, construction (if considered appropriate by the Scottish Ministers/ *Licensing Authority*) and post-construction monitoring or data collection as relevant in terms of the Application, and any subsequent monitoring or data collection for:

    1. Birds; [Generating Station only]
    2. Marine Mammals;
    3. Commercial Fisheries;

4. Marine fish;
5. Diadromous fish;
6. Benthic communities; and
7. Seabed scour and local sediment deposition.

b. The participation by the Company to contribute to data collection or monitoring of wider strategic relevance, identified and agreed by the Scottish Ministers/ *Licensing Authority*.

- Due consideration must be given to the Scottish Marine Energy Research ("ScotMER") programme, or any successor programme formed to facilitate these research interests.
- Any pre-consent monitoring or data collection carried out by the Company to address any of the above issues may be used in part to discharge this condition subject to the written approval of the Scottish Ministers/ Licensing Authority.
- The PEMP is a live document which will be regularly reviewed by the Scottish Ministers/ Licensing Authority, at timescales to be determined by them to identify the appropriateness of on-going monitoring. Following such reviews, the Scottish Ministers/ Licensing Authority may, in consultation with the FTRAG require the Company to amend the PEMP and submit such an amended PEMP, in writing, to the Scottish Ministers/ *Licensing Authority*, for their written approval. Such approval may only be granted following consultation with the FTRAG and any other environmental, or such other advisors as may be required at the discretion of the Scottish Ministers/ *Licensing Authority*.
- The Company must submit written reports and associated raw and processed data of such monitoring or data collection to the Scottish Ministers/ *Licensing Authority* at timescales to be determined by them. Consideration should be given to data storage, analysis and reporting and be to Marine Environmental Data and Information Network standards.
- Subject to any legal restrictions regarding the treatment of the information, the results are to be made publicly available by the Scottish Ministers/ Licensing Authority, or by such other party appointed at their discretion.
- The Scottish Ministers/ *Licensing Authority* may agree, in writing, that monitoring may be reduced or ceased before the end of the lifespan of the Development.

The S36 Condition 25, GS Marine Licence condition 3.2.2.22, and OfTI Marine Licence Condition 3.2.2.19, also set up the requirements for ICOL participation at the Forth and Tay Regional Advisory Group, the FTRAG, as described below:

- The Company must participate in the Forth and Tay Regional Advisory Group ("FTRAG") or any successor group, established by the Scottish Ministers/ *Licensing Authority* for the purpose of advising the Scottish Ministers/ *Licensing Authority* on research, monitoring and mitigation programmes for, but not limited to, ornithology, marine mammals, diadromous and commercial fish. The extent and nature of the Company's participation in the Regional Advisory Group is to be agreed by the Scottish Ministers/ *Licensing Authority*.

6. Proposed Approach to Monitoring

6.1. Benthic Ecology

Benthic ecology data have been collected to inform the ES (ICOL, 2013) supporting ICOL consent application. These data included inputs from literature review and site-specific survey involving grab and seabed video surveillance. The ES concluded no significant impacts to benthic ecology receptors are anticipated as a result of the Development, and no additional mitigation measures or monitoring were proposed.

In addition to the pre-consent surveys, ICOL will review and interpret further geophysical survey data in relation to potential Annex I reef features along the Export Cable Corridor. The survey comprises a combination of multibeam echosounder and high-resolution side scan sonar. In the event that acoustic signatures synonymous with potential reef presence are identified from the geophysical data, it is proposed that these features/signature would be avoided or “micro-sited” where feasible, to mitigate disturbance of potential Annex I features.

Based on the available evidence, and the current recommendations in relation to environmental monitoring at offshore wind developments (See Section 1.1), no further monitoring for benthic ecology is proposed for the Development.

6.1.1. Alignment with Project Requirements

The proposed benthic monitoring strategy aligns with all licence requirements (See Section 5). In addition, the proposed benthic monitoring strategy is considered appropriate as it aligns with the conclusions of the 2013 ES and also with recommendations in relevant guidance documents, as set out below:

- No significant impacts on benthic ecology from the Development were identified in the ES (ICOL, 2013) (these conclusions were considered to remain valid, and no update was required for the Revised Design (2018). Furthermore, it is noted the MMO (2014a) concluded that there had been no record of any offshore wind farms having significant impacts on benthic habitats and associated faunal communities;
- It offers a scientifically robust strategy based on relevant guidance documents for identifying and evaluating reef habitats (e.g., Limpenny *et al*., 2010), and an effective method of utilising geophysical survey data that has already been collected in the first instance;
- Geophysical data currently being collected to inform engineering design will be reviewed and interpreted to confirm the baseline conditions in relation to potential Annex I reef features, and inform cable micro-routing, as applicable.;
- It is in line with MMOs monitoring recommendations for post construction monitoring (MMO, 2014b) that surveys are only undertaken for key habitats and species using robust cost-effective monitoring methods, with a strategy that mitigates for potential additional impacts;
- Given the high level of natural background seabed disturbance in the vicinity of the Development, any generic monitoring programme of benthic habitats would be ineffective at detecting any variations in communities present that could be attributable to the Development rather than the ongoing disturbance or changes in benthic composition from natural processes or other anthropogenic activities. On this basis it would be extremely difficult for any monitoring to validate monitoring hypotheses whereby changes in benthic ecology can be attributed solely to the Development; and
- ICOL is conscious of the requirement to give due consideration to the ScotMER programme and FTRAG as laid out in the Consents. ICOL has made a commitment to participate in the FTRAG meetings with updates from these meetings incorporated in the PEMP where relevant. ICOL considers that this strategy is consistent with the requirements of the Consents and is also consistent with the commitments for monitoring/mitigation outlined in the ES (ICOL, 2013).

6.2. Scour and Sedimentation

Local scouring is strongly influenced by wave and tidal activity, as well as the way these hydrological processes interact with the structure and the surrounding soil conditions. Monitoring seabed scour around foundations is crucial from an engineering standpoint to ensure that the seabed sediments essential for maintaining the structural integrity of the foundation are not eroded beyond the intended design limits.

The approach to any post-construction scour monitoring will be led by engineering and asset integrity requirements, which will determine the scope of work, methods and required frequency. Scour survey campaigns at the OSP and WTG foundations may be required. Details of any proposed scour monitoring will be developed following completion of the works on a risk-based approach, taking into account the risk of scour developing across the Development. The scour monitoring strategy will be adapted as required based upon evidence collected over the lifetime of the development.

Periodic surveys to verify cable burial conditions at specific sections will be carried out in line with the Cable Plan for the Export Cable (IC02-INT-EC-OFC-012-INC-PLA-002) and Inter-Array Cable (IC02-INT-EC-OFC-012-INC-PLA-001). The frequency and scope of this initial survey and any subsequent monitoring will be determined via a risk-based assessment which will provide a proportional indication of the risk of future cable exposure.

6.2.1. Alignment with Project Requirements

The proposed scour and sedimentation monitoring strategy aligns with all licence requirements (Section 5).

- No significant impacts on metocean and coastal processes from the Development were identified in the ES (ICOL, 2013) (these conclusions were considered to remain valid, and no update was required for the Revised Design (2018);
- It is in line with the MMOs monitoring recommendations (MMO, 2014a; MMO, 2014b) that scour monitoring is linked to structural/engineering integrity, and that additional monitoring is not required where species and habitats of conservation importance are not predicted to be affected.

7. Conclusions

A requirement for a benthic ecology and a scour and sedimentation monitoring strategy forms part of the conditions attached to the Section 36 consent and the Marine Licences for the Development. A review has been undertaken of the requirement for benthic ecology and scour and sedimentation monitoring surveys, based on consideration of the predictions made within the ES (ICOL, 2013) and the level of certainty in these assessments. These findings have been considered in the context of published reports from other offshore wind farms in the UK (and overseas) to determine if significant impacts or areas of uncertainty exist, against which benthic or scour and sedimentation monitoring could be targeted.

The conclusions of this review are that there is a high level of certainty in the impact assessments presented within the ES, where no significant impacts were predicted. This is due to the typically well understood nature of many of the impacts and the certainty of the predicted extents of the impacts. As such the monitoring strategies outlined in this document are appropriate both spatially (within the Development Area and Offshore Export Cable Corridor) and temporally (pre- and post-construction).

It is noted that this document will be updated with any outputs coming from the FTRAG, and due consideration will be given to the ScotMER programme (or any other successor programme formed to facilitate research on benthic ecology, seabed scour and local sediment deposition).

8. References

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A. Summary Tables

A.1. Conclusions from 2013 ES Benthic Ecology

Table 8.1: Summary of Effects – Development Area

Effect	Receptor	Residual Effect
Construction (and Decommissioning)		
Direct temporary disturbance to seabed habitats caused by construction based activities	SS.SMx.CMx.MysThyMx	Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS, *Arctica islandica*	Minor/Moderate
Indirect impacts of temporary increases in suspended sediment concentration (SSC) from construction based activities	SS.SMx.CMx.MysThyMx	Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS, *Arctica islandica*	Minor/Moderate
Deposition of resuspended sediments leading to smothering	SS.SMx.CMx.MysThyMx,	Minor/Moderate
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS, *Arctica islandica*	Moderate
Release of polycyclic aromatic hydrocarbon, polychlorinated biphenyl, organotins bound in sediments	SS.SMx.CMx.MysThyMx	Negligible/Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS	Minor
Release of metals bound in sediments	SS.SMx.CMx.MysThyMx	Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS	Minor/Moderate
Secondary impacts of decreased primary production due to increased SSC of the water column	SS.SMx.CMx.MysThyMx	Negligible/Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS	Minor
Potential release of pollutants from construction plant	SS.SMx.CMx.MysThyMx	Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS	Minor/Moderate
Introduction of non indigenous species (NIS)	SS.SMx.CMx.MysThyMx	Minor/Moderate
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS	Moderate
Operation and Maintenance		
Loss of original habitat	SS.SMx.CMx.MysThyMx	Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS, *Arctica islandica*	Minor/Moderate
Changes in hydrodynamic regime and sediment transport	SS.SMx.CMx.MysThyMx	Negligible/Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS, *Arctica islandica*	Minor
Scour and Associated Sediment Transportation Leading to Changes in Habitats	SS.SMx.CMx.MysThyMx	Minor
	SS.SCS.CCS.MedLumVen, SS.SCS.OCS, *Arctica islandica*	Minor/Moderate
	SS.SMx.CMx.MysThyMx	Negligible/Minor

Effect	Receptor	Residual Effect
Colonisation of introduced substrata leading to a change in the benthic ecology and/or biodiversity	SS.SCS.OCS and SS.SCS.CCS.MedLumVen	Minor
Introduced Substrata facilitating the Spread of NIS	SS.SMx.CMx.MysThyMx	Minor/Moderate
	SS.SCS.OCS and SS.SCS.CCS.MedLumVen	Moderate
Potential release of pollutants from operation plant	SS.SMx.CMx.MysThyMx	Minor
	SS.SCS.OCS and SS.SCS.CCS.MedLumVen	Minor/Moderate
Responses to electromagnetic field (EMF) and thermal emissions	SS.SMx.CMx.MysThyMx	Negligible/Minor
	SS.SCS.OCS and SS.SCS.CCS.MedLumVen	Minor
Temporary habitat disturbance from Operation and Maintenance (O&M) activities	SS.SMx.CMx.MysThyMx	Negligible/Minor
	SS.SCS.OCS and SS.SCS.CCS.MedLumVen	Minor

Source: 2013 ES, Chapter 12 – Benthic Ecology

Table A.2: Summary of Effects – Offshore Export Cable Corridor

Effect	Receptor	Residual Effect
Construction (and Decommissioning)		
Direct Temporary Disturbance of seabed habitats caused by Construction Activities	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor/Moderate
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Minor
Indirect impacts of temporary increases in SSC from construction based activities	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Negligible/Minor
Deposition of resuspended sediments leading to smothering	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor

	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Negligible/Minor
Release of contaminants bound in sediments	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Negligible/Minor
Secondary impacts of decreased primary production due to increased SSC of the water column	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Negligible/Minor
Potential release of pollutants from construction plant	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor/Moderate
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Minor
Introduction of NIS	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Moderate
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Minor/Moderate
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Minor/Moderate
Operation and Maintenance		
Loss of original habitat	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Negligible/Minor

Colonisation of cable protection leading to a change in benthic ecology and/or biodiversity	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor
Provision of New Substrata Facilitating the Spread of NIS	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS	Moderate
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Minor/Moderate
Responses to EMF and thermal emissions	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Negligible/Minor
Potential release of pollutants from operation plant	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor/Moderate
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Minor
Temporary habitat disturbance due to O&M Activities	SS.SMu.CFiMu.SpnMeg, SS.SCS.CCS, Stony Reef	Minor
	SS.SMx.CMx, SS.SSa.CMuSa, SS.SMx.CMx.MysThyMx SS.SMx.CMx.FluHyd	Negligible/Minor
	LR.MLR.BF.PelB, LR.HLR.MusB.Cht.Cht, LR.MLR.BF.FspiB, IR.MIR.KR.Ldig.Ldig, LR.LLR.F.FSpi.FS	Negligible/Minor

Source: 2013 ES, Chapter 12 – Benthic Ecology

Table 8.3: Summary of Effects – The Development

Effect	Receptor	Residual Effect
Construction (and Decommissioning)		
Direct temporary disturbance of seabed habitats caused by construction based activities	Benthic and epibenthic populations	Minor/Moderate
Indirect impacts of temporary increases in SSC from construction based activities and associated deposition	Benthic and epibenthic populations	Minor/Moderate

Effect	Receptor	Residual Effect
Release of contaminants found in sediments	Benthic and epibenthic populations	Minor/Moderate
Secondary impacts of decreased primary production due to increased SSC of the water column	Benthic and epibenthic populations	Minor
Potential release of pollutants from construction plant	Benthic and epibenthic populations	Minor/Moderate
Introduction of NIS	Benthic and epibenthic populations	Moderate
Operation and Maintenance		
Loss of original habitat	Benthic and epibenthic populations	Minor
Changes in hydrodynamic regime and sediment transport leading to changes in habitats such as scour	Benthic and epibenthic populations	N/A
Colonisation of introduced substrata leading to a change in the benthic ecology and/or a biodiversity	Benthic and epibenthic populations	Minor
Provision of new substrata facilitating the Spread of NIS	Benthic and epibenthic populations	Moderate
Potential release of pollutants from operation plant	Benthic and epibenthic populations	Minor/Moderate
Responses to EMF and thermal emissions	Benthic and epibenthic populations	Minor
Temporary Disturbance from O&M activities	Benthic and epibenthic populations	Minor

Source: 2013 ES, Chapter 12 – Benthic Ecology

Table 8.4: Summary of Effects – The Development with Other Projects

Effect	Receptor	Residual Effect
Construction (and Operation)		
Direct temporary disturbance of seabed habitats caused by construction based activities	Benthic and epibenthic populations	Minor/Moderate
Indirect impacts of temporary increases in SSC from construction based activities and associated deposition	Benthic and epibenthic populations	Minor/Moderate
Release of contaminants found in sediments	Benthic and epibenthic populations	N/A
Secondary impacts of decreased primary production	Benthic and epibenthic populations	Minor

Effect	Receptor	Residual Effect
due to increased SSC of the water column		
Potential release of pollutants from construction plant	Benthic and epibenthic populations	Minor/Moderate
Introduction of NIS	Benthic and epibenthic populations	Moderate
Operation and Maintenance		
Loss of original habitat	Benthic and epibenthic populations	Minor
Changes in hydrodynamic regime and sediment transport	Benthic and epibenthic populations	Minor/Moderate
Scour and associated sediment transportation leading to changes in seabed habitats	Benthic and epibenthic populations	Minor/Moderate
Colonisation of introduced substrata leading to a change in the benthic ecology and/or a biodiversity	Benthic and epibenthic populations	Minor
Provision of new substrata facilitating the Spread of NIS	Benthic and epibenthic populations	Moderate
Potential release of pollutants from operation plant	Benthic and epibenthic populations	Minor/Moderate
Responses to EMF and thermal emissions	Benthic and epibenthic populations	Minor
Temporary Disturbance from O&M activities	Benthic and epibenthic populations	Minor

Source: 2013 ES, Chapter 12 – Benthic Ecology

A.2. Conclusions from 2013 ES Metocean and Coastal Processes

Table 8.5: Summary of Effects – Development Area

Effect	Receptor	Residual Effect Effect
Construction		
Modification to the seabed through deposition of dredged material for GBSs	Seabed features	NF – Minor/Moderate FF – Negligible/Minor
Modification to the seabed through scour pit formation around jacket foundations	Seabed features	NF – Negligible/Minor FF – Negligible/Minor
Modification to the seabed through deposition of scoured material for jacket foundations	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through deposition of material disturbed during cable burial	Seabed features	NF – Minor FF – Negligible/Minor

Effect	Receptor	Residual Effect Effect
Modification to the seabed through disturbance by installation vessels	Seabed features	NF – Negligible/Minor FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Operation and Maintenance		
Modification to the seabed due to changes in the metocean and sediment regimes	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through deposition of material disturbed during cable re-burial	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Decommissioning		
Modification to the seabed through removal of infrastructure	Seabed features	NF – Minor/Moderate FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible

Source: 2013 ES, Chapter 10 – Metocean and Coastal Processes

Table 8.6: Summary of Effects – Offshore Export Cable Corridor

Effect	Receptor	Residual effects Effect
Construction		
Modification to the seabed through deposition of material disturbed during cable burial	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the Hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Operation and Maintenance		
Modification to the seabed due to changes in the metocean and sediment regimes	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through deposition of material disturbed during cable re-burial	Seabed features	NF – Minor FF – Negligible/Minor

Effect	Receptor	Residual effects Effect
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the Hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Decommissioning		
Modification to the seabed through removal of infrastructure	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological)	NF – N/A FF – Minor/Moderate
Modification to the Hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible

Source: 2013 ES, Chapter 10 – Metocean and Coastal Processes

Table 8.7: Summary of Effects – The Development

Effect	Receptor	Residual effects Effect
Construction		
Modification to the seabed through deposition of dredged material for GBS	Seabed features	NF – Minor/Moderate FF – Negligible/Minor
Modification to the seabed through scour pit formation around jacket foundations	Seabed features	NF – Negligible/Minor FF – Negligible/Minor
Modification to the seabed through deposition of scoured material for jacket foundations	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through deposition of material disturbed during cable burial	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through disturbance by installation vessels	Seabed features	NF – Negligible/Minor FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Operation and Maintenance		
Modification to the seabed due to changes in the metocean and sediment regimes	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through deposition of material disturbed during cable re-burial	Seabed features	NF – Minor FF – Negligible/Minor

Effect	Receptor	Residual effects Effect
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the Hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Decommissioning		
Modification to the seabed through removal of infrastructure	Seabed features	NF – Minor/Moderate FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the Hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible

Source: 2013 ES, Chapter 10 – Metocean and Coastal Processes

Table 8.8: Summary of Effects – The Development with Other Projects

Effect	Receptors	Residual Effect
Construction		
Modification to the seabed through deposition of dredged material for GBSs	Seabed features	NF – Minor/Moderate FF – Negligible/Minor
Modification to the seabed through scour pit formation around jacket foundations	Seabed features	NF – Negligible/Minor FF – Negligible/Minor
Modification to the seabed through deposition of scoured material for jacket foundations	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through deposition of material disturbed during cable burial	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through disturbance by installation vessels	Seabed features	NF – Negligible/Minor FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor
Modification to the Hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Operation and Maintenance		
Modification to the seabed due to changes in the metocean and sediment regimes	Seabed features	NF – Minor FF – Negligible/Minor
Modification to the seabed through deposition of material disturbed during cable re-burial	Seabed features	NF – Minor FF – Negligible/Minor

Effect	Receptors	Residual Effect
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the Hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible
Decommissioning		
Modification to the seabed through removal of infrastructure	Seabed features	NF – Minor/Moderate FF – Negligible/Minor
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (geological) – both low and high tolerance	NF – N/A FF – Minor/Moderate
Modification to the hydrodynamic regime, sediment regime and seabed	Designated sites (non-geological)	NF – N/A FF – Negligible

Source: 2013 ES, Chapter 10 – Metocean and Coastal Processes

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