

**Moray Offshore Windfarm (West) Limited
Decommissioning Programme**



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MORAY OFFSHORE WINDFARM (WEST) LIMITED

Decommissioning Programme

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Prepared by:	ECoW Review:	Legal Review:	Approved by:	Approved by:
Moray West	RHDHV (Richard Stocks)	Shepherd and Wedderburn (Scott McCallum)	Catarina Rei (Senior Development Manager)	Adam Morrison (Project Director)

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Abbreviations and Acronyms

Term	Description
AC	Alternating Current
ATC	Air Traffic Control
BATNEEC	Best Available Technique not Entailing Excessive Cost
BEIS	Department for Business, Energy & Industrial Strategy
BOWL	Beatrice Offshore Windfarm Limited
BPEO	Best Practicable Environmental Option
CD	Chart Datum
CfD	Contract for Difference
CPS	Cable Protection System
CSV	Construction Support Vessel
DECC	Department of Energy and Climate Change
DP	Decommissioning Programme
EIA	Environmental Impact Assessment
HAL	Highlands and Islands Airport Limited
HVAC	High Voltage Alternating Current
IAC	Inter Array Cable
IMO	International Maritime Organisation
MHWS	Mean High Water Springs
MW	Megawatts
NCMPA	Nature Conservation Marine Protected Area
OEC	Offshore Export Cable
OfTI	Offshore Transmission Infrastructure
OFTO	Offshore Transmission Operator
OSP	Offshore Substation Platform
PMF	Priority Marine Feature
PSR	Primary Surveillance Radar
RIAA	Report to Inform an Appropriate Assessment
SAC	Special Area of Conservation
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
TJB	Transmission Joint Bays
TP	Transition Piece
WTG	Wind Turbine Generator
UNCLOS	United Nations Convention on the Law of the Sea

Executive Summary

On the 14th June 2019, Moray Offshore Windfarm (West) Ltd ('Moray West'), was granted consent under Section 36 of the Electricity Act 1989 to construct and operate the Moray West Offshore Wind Farm. Moray West also received two Marine Licences under the Marine and Coastal Access Act 2009 and Marine (Scotland) Act 2010 for the Moray West Offshore Wind Farm and the associated Offshore Transmission Infrastructure (OfTI).

The Moray West Offshore Wind Farm and the OfTI are collectively referred to as 'the Development'. The Development together with the Onshore Transmission Infrastructure (OnTI) comprises 'the Project'.

Moray West (Company Number 10515140) has its registered office at Octagon Point, 5 Cheapside, London, England, EC2V 6AA. Moray Offshore Windfarm (West) Limited is a wholly subsidiary of Moray West Holdings Limited which in turn is owned by Moray Offshore Renewable Power Limited, Delphis Holdings Limited, EDP Renewables Europe, S.L.U and UAB Ignitis Renewables.

Moray West received a notice under Section 105(2) of the Energy Act 2004 Decommissioning of Offshore Installations from Marine Scotland Licensing Operations Team (MS-LOT) on the 12th September 2019. This notice, together with Condition 3 of the Section 36 Consent and corresponding Marine Licence condition 3.2.1.3 (Offshore Wind Farm and OfTI) requires Moray West to submit, for approval by Scottish Ministers, a Decommissioning Programme (DP) setting out the measures to be taken in connection with the decommissioning of the offshore installations specified in Schedule 1 of the notice.

The onshore aspects of the Project (OnTI) and their associated decommissioning requirements fall under the Town and Country Planning (Scotland) Act 1997 and therefore are not considered within this DP.

This document constitutes an updated draft DP (from the version submitted with the Section 36 consent and Marine Licence applications) for the Development. Moray West has prepared this updated draft to give regulatory authorities and key stakeholders an opportunity to comment on proposals for how the infrastructure comprising the Moray West Offshore Windfarm and OfTI will be decommissioned.

Potential effects of the decommissioning proposals presented in this draft DP on the marine environment and other human activities have been informed by information presented in the Environmental Impact Assessment (EIA) Report (Volumes 1 to 4) submitted as part of the Section 36 Consent and associated Marine Licence(s) application. Any new or updated information made available post submission has also been taken into account. Moray West has prepared this draft DP in advance of the development design being finalised. Therefore, this draft DP presents design information available at the time of writing this document, and future revisions of the DP will provide refined description of items to be decommissioned.

In considering appropriate decommissioning provisions, Moray West have sought to adhere to the following key principles; safety for all at all times, consideration of the rights and needs of legitimate users

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of the sea, minimise environmental impact, adherence to 'polluter pays' principle, promote sustainable development, maximise the reuse of materials, commercial viability; and practical integrity.

The following key documents have also informed this draft DP:

- Decommissioning of offshore renewable energy installations under the Energy Act 2004: Guidance notes for industry (England and Wales), BEIS, March 2019;
- Decommissioning of Offshore Renewable Energy Installations in Scottish Waters or in the Scottish Part of the Renewable Energy Zone under the Energy Act 2004 Guidance notes for industry (in Scotland) – Scottish Government Consultation Draft (November 2019).
- OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development, 2008;
- Guidelines for Environmental Risk Assessment and Management – Green Leaves III, Defra, November 2011; and
- United Nations Convention on the Law of the Sea (UNCLOS), 1982.

1 Introduction

1.1 Introduction to Moray West

Moray Offshore Windfarm (West) Limited (known as ‘Moray West’) is promoting the development of the Moray West Offshore Wind Farm and associated Moray West Offshore Transmission Infrastructure (OfTI) (referred to as ‘the Development’).

Moray West (Company Number 10515140) has its registered office at Octagon Point, 5 Cheapside, London, England, EC2V 6AA. Moray Offshore Windfarm (West) Limited is a wholly subsidiary of Moray West Holdings Limited which in turn is owned by Moray Offshore Renewable Power Limited, Delphis Holdings Limited, EDP Renewables Europe, S.L.U and UAB Ignitis Renewables.

Moray West received consent (Section 36 and associated Marine Licences) to construct and operate the Moray West Offshore Wind Farm and associated Offshore Transmission Infrastructure on 14th June 2019. In order to proceed with the Development, Moray West is required to discharge various conditions that are attached to the Section 36 consent and Marine Licences. These conditions include the requirement to submit for approval a Decommissioning Programme (DP).

Under the Energy Act 2004, wind farms and associated OfTI must be decommissioned at the end of their lifetime. On 12th September 2019 Scottish Ministers issued a notice under Section 105(2) of the Energy Act 2004 requiring Moray West to prepare a Decommissioning Programme (DP) for the Development. Condition 3 of the Section 36 Consent and corresponding Marine Licence condition 3.2.1.3 (Offshore Wind Farm and OfTI) also specifies that there must be no commencement of the Development unless a DP has been submitted to, and approved in writing, by Scottish Ministers.

In accordance with the Section 105 notice, Moray West is submitting this draft DP to the Marine Scotland Licencing and Operations Team (MS-LOT) for consultation with key stakeholders. This will enable feedback and comments received from consultation to be taken into account prior to submission of the final DP to Scottish Ministers (via MS-LOT) for approval.

1.2 Limitations with this Draft DP

Due to timescales required for consultation on, and subsequent approval of the DP, Moray West has prepared this draft DP in advance of the Project reaching Financial Close and final design. Consequently, certain design parameters and specifications for key components of the Development have yet to be finalised.

In order to facilitate effective consultation with key stakeholders at this time, it has been necessary for Moray West to include some design information within the DP. However, this is currently restricted to information that has already been made available in the public domain e.g. included in the Moray West Consent Application documents and associated EIA Reports. It is therefore important to note that design information included in Section 3 of this Draft DP – Description of Items to be Decommissioned is likely to be refined as part of the finalisation of the DP.

Although the proposed approaches to decommissioning set out in Section 4 are linked to the components of the Development described in Section 3, these approaches are fairly generic, in that they are expected to be applicable across a range of parameters associated with each component. Based on this, changes to the proposed approaches to decommissioning are expected to be limited, except where feedback from consultation requires alternative approaches to be considered or proposed approaches to be modified.

Moray West will also not be in a position to finalise information included in Schedule 3 of the notice: Confidential Annex – Financial Information until the Project has reached Financial Close. Consequently, no confidential financial information has been included in this draft DP at this stage. This information will be included in the Final DP that will be prepared for submission to Scottish Ministers.

This approach, to not include the information for the confidential annex at this stage, means that Moray West is able to commence consultation on the technical aspects of the DP in advance of the Project reaching Financial Close and also provides the opportunity for feedback and comments from consultation to be addressed prior to the Project reaching final design, therefore facilitating greater robustness in the costs presented in the Confidential Annex.

1.3 Project Overview

The Moray West Site covers an area of approximately 225 km² on the Smith Bank in the Outer Moray Firth approximately 22 km from the Caithness coastline (Figure 2-1).

The Moray West Offshore Wind Farm will comprise up to 72 Wind Turbine Generators (WTGs), associated seabed foundations, inter-array cables (IAC) and any scour and cable protection. The OfTI comprises up to two Offshore Substation Platforms (OSPs) and OSP interconnector cables which will be located within the Moray West Site, and no more than two offshore export cable (OEC) circuits which will be located within the Offshore Export Cable Corridor and will be used to transmit the electricity generated by the offshore wind farm to shore.

The offshore export cable circuits are expected to make landfall on the Aberdeenshire Coast at a location known as Broad Craig, close to Sandend Bay, approximately 65 km south of the Moray West Site.

1.4 Relevant Guidance and Legislation

This draft DP has been prepared in accordance with the latest guidance and relevant legislation:

- Decommissioning of offshore renewable energy installations under the Energy Act 2004: Guidance notes for industry (England and Wales) Department for Business, Energy & Industrial Strategy (BEIS) (March 2019);
- Decommissioning of Offshore Renewable Energy Installations in Scottish Waters or in the Scottish Part of the Renewable Energy Zone under the Energy Act 2004 Guidance notes for industry (in Scotland) – Scottish Government Consultation Draft (November 2019);
- Energy Act 2004;

- United Nations Convention on the Law of the Sea (UNCLOS), 1982;
- OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development, 2008;
- Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, IMO, 19th October 1989;
- Guidance Notes for Industry: Decommissioning of Offshore Installations and Pipelines under the Petroleum Act 1998, DECC, March 2011; and
- Guidelines for Environmental Risk Assessment and Management – Green Leaves III, Defra, November 2011.

1.5 DP review Process

As noted above, this draft DP has been prepared to facilitate consultation with key stakeholders on the proposed approach to be taken by Moray West to the decommissioning of the Development at the end of its operational life. Feedback and comment received during consultation will be incorporated into this document, which once updated will comprise the Final DP which will be submitted to Scottish Ministers for approval prior to the commencement of construction offshore.

Although the DP will be finalised for approval, it will remain a live document throughout the operational life of the Development. Consequently, there will be a requirement for the DP to be reviewed and updated on a regular basis to take into account changing market regimes and regulatory requirements, increased knowledge and understanding of the marine environment including the availability of new information, advancements in technology and working practices, changes to nearby infrastructure and navigational routes and any changes in cost estimates or financial security arrangements (BEIS, 2019; Scottish Government, 2019).

As a minimum, the DP is expected to be reviewed and, where necessary, updated at the following points in time (BEIS, 2019; Scottish Government, 2019):

- Post construction report to be submitted to Scottish Ministers within one year of completion of construction. This report should include information on any issues raised during construction which may impact eventual decommissioning methods and costs;
- A comprehensive review 12-18 months before the first security provision is due to identify any changes in assumptions on costs and risks where these might affect size or timings of financial securities;
- Annual reviews to be carried out from payment of the first security to ensure the financial security provisions are on track. Any changes that could affect these financial security provisions are to be reported to Scottish Ministers; and
- Consultation on the EIA required to inform the final decommissioning proposals should be commenced at least 3 years prior to commencing decommissioning with a final

comprehensive review of the DP carried out at least two years prior to commencement of decommissioning.

1.6 Content and structure of the Draft DP

This document is divided into the sections summarised in Table 1-1 below and reflects the structure for the DP as set out in Annex C of both the BEIS guidance (BEIS, 2019) and the Scottish Government guidance (Scottish Government, 2019).

Table 1-1 Decommissioning Programme Structure		
Section Number	Section Title	Summary of Content
n/a	Executive Summary	Summary highlighting essential features of the DP.
1	Introduction	Brief introduction, indicating the DP is being submitted in accordance with the requirements of the Energy Act 2004. Confirmation of the companies that are party to the programme and their ownership status.
2	Background Information	Relevant background information including: <ul style="list-style-type: none"> Layout of the infrastructure to be decommissioned; Relative location of any adjacent facilities; Information on prevailing weather conditions, sea states, currents, seabed conditions etc.; Any fishing, shipping and other activity in the area; Names and locations of any Special Areas of Conservation (SACs) or Special Protection Areas (SPAs) including candidate or proposed sites, that may be affected by the DP; and Any other background information relevant to consideration of the draft DP.
3	Description of Items to be Decommissioned	A full description of all items associated with the Development to be decommissioned.
4	Description of Proposed Decommissioning Measures	An overview of the proposed approach to decommissioning the Development, including: an overview of the process; details of any items to be left in situ; and, waste management.
5	Environmental Impact Assessment	Details of the EIA that was prepared for the Development and its consideration of decommissioning activities. Outline mitigation measures to also be included.
6	Consultations with Interested Parties	The consultation process undertaken for this draft DP and future plans.

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Table 1-1 Decommissioning Programme Structure		
Section Number	Section Title	Summary of Content
7	Schedule	Details of the proposed decommissioning timescale, provided preferably in Gantt chart form. Final details of the schedule are only required towards the end of the life of the Development.
8	Project Management and Verification	Information on how Moray West will manage the implementation of the DP and provided verification to Scottish Ministers concerning progress and compliance.
9	Costs	<p>An overall cost estimate of the proposed decommissioning measures including:</p> <ul style="list-style-type: none"> Financial models including payments of debt financing / financing structure prior to construction commencing; 3 years of accounts for all operators involved in the Offshore Renewable Energy Infrastructure (OREI), including parent companies; Business plan for the Development; Full funding model, detailing when senior funders will be paid back; Cash flow for the life of the Project; and Robust overall cost estimates in line with Chapter 8 of the Scottish Government Guidance (November, 2019) in £ sterling, of the proposed decommissioning measures. This should explain the basis on which the estimate is made, including the breakdown of the major components. <p>Costs should be reviewed in line with decommissioning timescales and altered as required. This includes any changes to the VAT rate, exchange rate and inflation and includes for optimism bias.</p> <p>This information is to be provided in a Confidential Annex (Schedule 3 of the Section 105 notice). This is not included in this Draft DP for reasons provided in Section 1.2 above.</p>

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Table 1-1 Decommissioning Programme Structure		
Section Number	Section Title	Summary of Content
10	Financial Security	<p>Details of the financial security which the companies that are party to the programme propose to provide. This includes appropriate arrangements provided to assure Scottish Ministers that such funds will be available to the Scottish Government if needed. These arrangements should be underpinned by the Guiding Principles presented in Chapter 9 of the Scottish Government guidance (November, 2019).</p> <p>This information is also to be provided in the Confidential Annex (Schedule 3 of the Section 105 notice). This is not included in this Draft DP for reasons provided in Section 1.2 above.</p>
11	Site Remediation and Seabed Clearance	<p>Description of how Moray West intends to restore the site as far as reasonably practicable, to the condition that it was in prior to construction of the installation.</p> <p>Moray West's proposals for confirming that, following decommissioning, the site has been cleared. This includes information on site surveys and schedules.</p>
12	Post-decommissioning Monitoring, Maintenance and Management of the Site	<p>Details of the post decommissioning monitoring, maintenance and management activities that will be required, given that Moray West is not proposing to fully remove all infrastructure. This includes a commitment to report outcomes of these activities to Scottish Ministers.</p>
13	Supporting Studies	<p>Details of supporting studies that have been used to inform the DP.</p>
14	References	<p>A list of references used in the production of this DP.</p>

2 Background Information

2.1 Overview of Facilities to be Decommissioned

The Development will be located on the Smith Bank in the Outer Moray Firth, approximately 22 km from the Caithness coastline (Figure 2-1). The Moray West Site covers an area of approximately 225 km² and the Offshore Export Cable Corridor covers an area of approximately 185 km².

Key components of the Development are summarised below¹.

- Up to 72 offshore WTGs with a maximum blade tip height of 265m and a maximum rotor diameter of 230 m;
- Foundations (monopiles with maximum diameter 10 m);
- Up to two Offshore Substation Platforms (OSPs) (34.3 m x 29.4 m x 15 m above LAT);
- Up to 275 km of subsea inter-array cables (33 - 66kV) linking individual WTGs with each other and linking strings of WTGs with the OSPs;
- Up to 15 km of subsea inter-connector cables (33 - 400 kV) linking OSPs;
- No more than two Offshore Export Cables (two 132 - 400 kV circuits), each cable measuring no more than 65 km in length, running from the OSPs to the landfall at Broad Craig;
- Scour and cable protection (if required); and
- Monitoring equipment, such as metocean buoys (if required).

2.2 Location of the Facilities in Relation to Adjacent Facilities

The Moray West Offshore Wind Farm occupies the western extent of the Moray Firth Round 3 Zone (Zone 1), with the Moray East offshore wind farm (in construction) occupying the eastern part of the Zone. The Moray Firth Zone lies to the south of the Beatrice Offshore Wind Farm, with the 12 NM limit of territorial waters comprising the boundary between these two areas. The location of the Moray West Offshore Wind Farm Site and Offshore Export Cable Corridor in relation to the Moray East and Beatrice Offshore Wind Farms and routes of their associated offshore export cables is illustrated in Figure 2-2.

Other facilities in the immediate vicinity of the Moray West Site include the Beatrice Demonstrator Turbines, which are no longer operational, and the existing oil and gas infrastructure associated with the Beatrice Oil Field including the Beatrice Alpha, Bravo and Charlie Platforms, the Jacky Platform and associated subsea infrastructure (wells and pipelines). All the aforementioned oil and gas infrastructure and the Beatrice Demonstrator Turbines are due to be decommissioned by 2027.

¹ Note that this information will be refined for the Final DP once final detailed design of the Development is available.

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Other adjacent facilities and infrastructure in the Moray Firth include the Caithness Moray Interconnector and a Marine Disposal Site at Buckie (2 km from the Moray West Export Cable Corridor). The location of these adjacent facilities is also illustrated on Figure 2-2.

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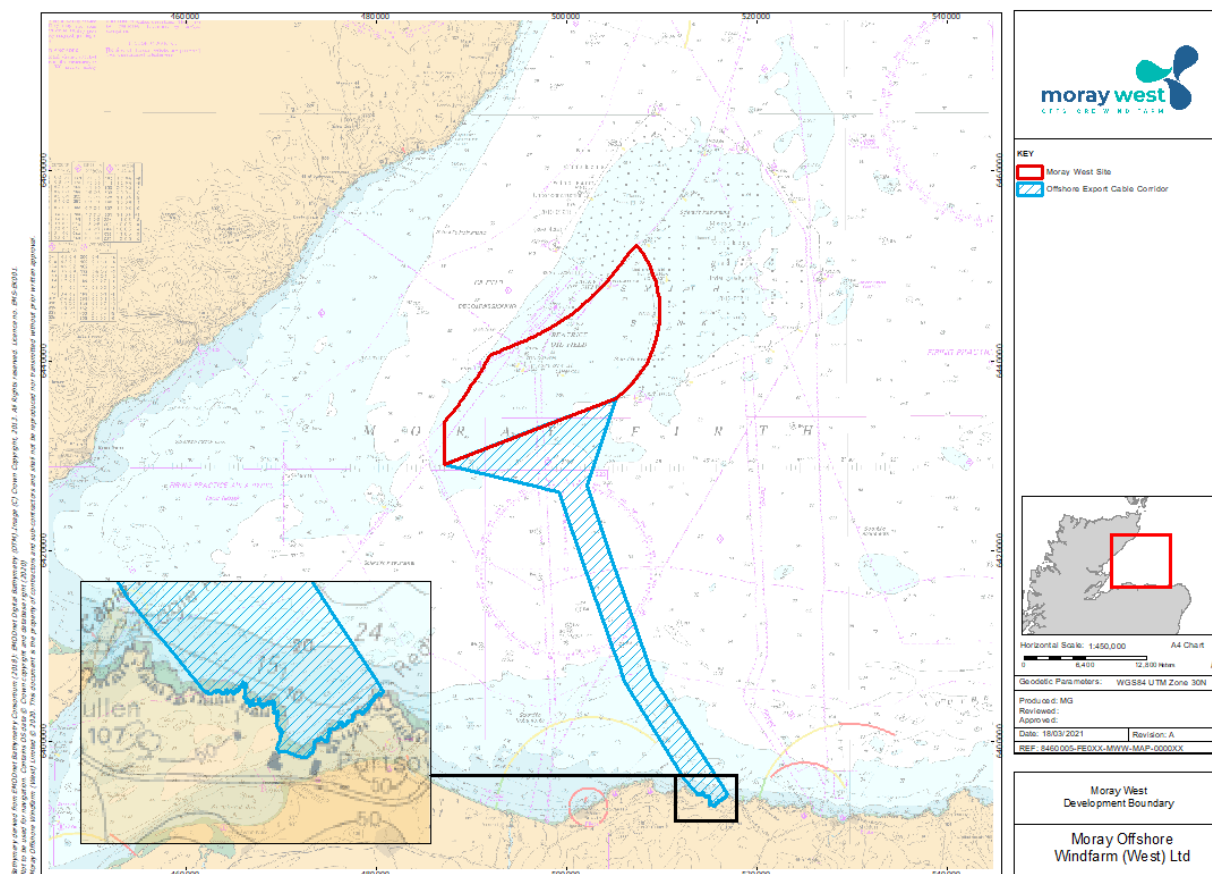


Figure 2-1 Location of Facilities

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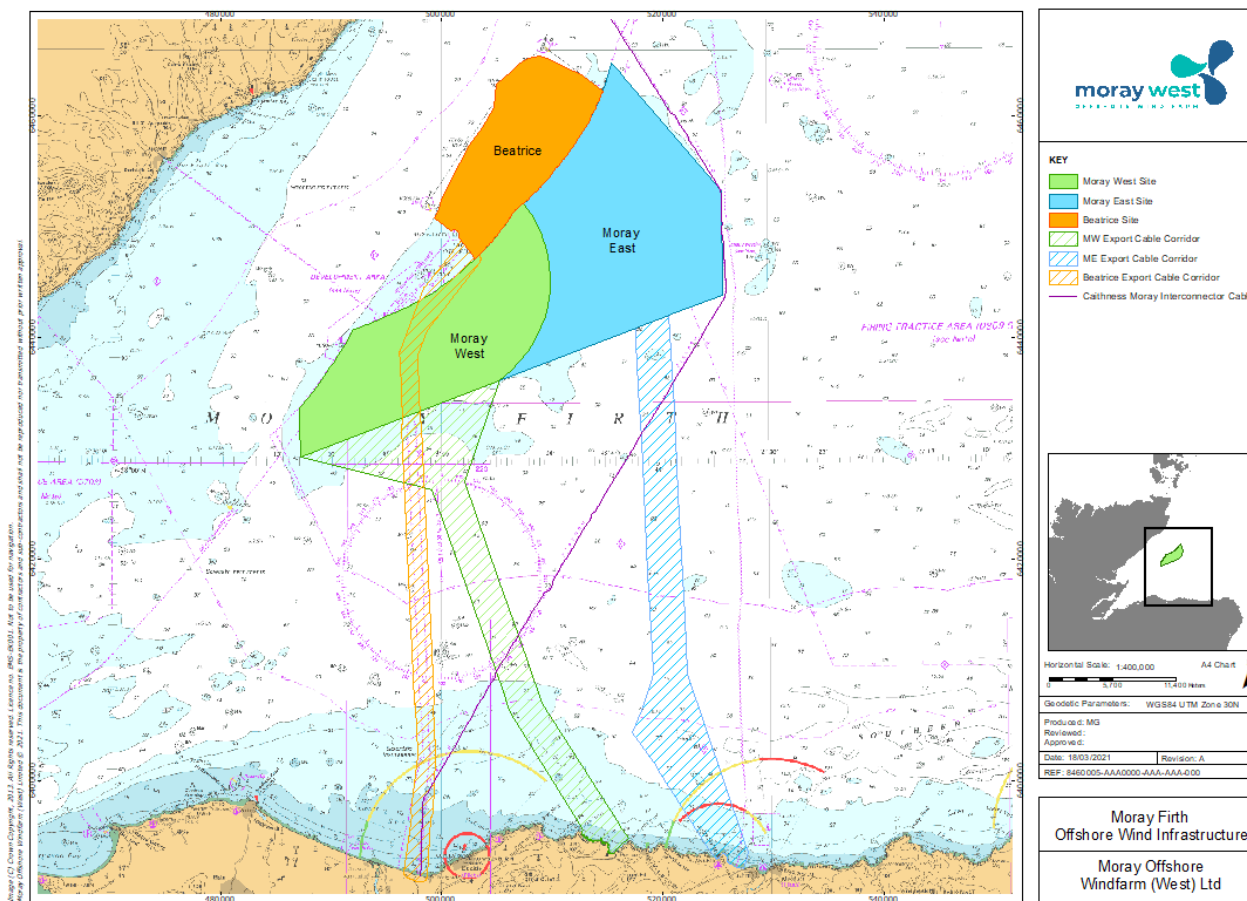


Figure 2-2 Location of Adjacent Facilities

2.3 Site Conditions Relevant to Decommissioning

A range of surveys and desk studies have been completed by Moray West to establish the physical, biological and human characteristics of the Development site. These studies, which informed the EIA for the Development and are reported as part of the EIA Report (Moray West, 2019) and Scoping Reports for the Development, form the basis of the information presented in this Section of the DP.

2.3.1 Physical Environment

2.3.1.1 Wind Climate

The prevailing wind direction is from the west (247.5 to 292.5°N), accounting for almost 20% of the record, and from the south (157.5 to 202.5°N) and south-east (112.5 to 157.5°N), together accounting for around 35% of the total record. Wind speeds are in the range 2 to 8m/s over 70% of the time and only infrequently (less than 1% of the time) exceed 16m/s. During extreme events (return period of 1 in 10-years or more), wind speeds can peak as high as 25 or 30m/s.

2.3.1.2 Bathymetry

The Moray West Site spans the crest and western flank of the Smith Bank and is characterised by water depths in the range 35 to 54 m below LAT. The shallowest depths are found in the north of the Moray West Site and the greatest depths are found in the south. From the Moray West Site the depth increases to 95 m along the Offshore Export Cable Corridor before decreasing again in inshore waters. These deeper areas are encountered where the Offshore Export Cable Corridor crosses the western margin of the Southern Trench, a long deep east to west orientated channel located in the southern part of the outer Moray Firth. The Southern Trench reaches depths of approximately 220 m off the Aberdeenshire coast to the east of the Offshore Export Cable Corridor.

2.3.1.3 Water Levels

The Moray West Site and Offshore Export Cable Corridor are subject to semi-diurnal tidal variations in water level. The mean spring range is approximately 3 m throughout the length of the Offshore Export Cable Corridor and within the Moray West Site.

It is possible that relative sea levels could rise in this region during the course of the 21st Century and by 2050 (i.e. approximately the end of the development's lifecycle) are likely to be around 0.22-0.35 m higher than 1990 levels (Lowe *et al.*, 2009).

2.3.1.4 Waves

The wave regime in the outer Moray Firth includes both swell waves generated elsewhere in the North Sea and locally generated wind waves. The wave regime in the outer Moray Firth is typically characterised by fetch limited wave conditions (from the west and south-west). The longer period swell waves tend to come from offshore sectors only.

The largest waves come from the more exposed offshore sectors (from north through south-east) although the southern end of the Offshore Export Cable Corridor is sheltered from south-easterly waves. Offshore wave heights during extreme events from these directional sectors may be 6 to 7 m during

relatively frequent (annual) events. However, waves coming from other directions within the outer Moray Firth are generally smaller during extreme events (4 to 5 m or up to 7 m, respectively) due to the relatively shorter distances available for wave growth.

2.3.1.5 Currents

Depth-averaged peak spring current speeds range between approximately 0.2 to 0.4 m/s in the Moray West Site and Offshore Export Cable Corridor. The faster speeds are found at the boundary between the Offshore Export Cable Corridor and the Moray West Site. In this area, peak flood current speeds are approximately 10% faster than adjacent peak ebb current speeds due to the influence of the Pentland Firth. Currents are relatively weaker elsewhere in the Offshore Export Cable Corridor.

Peak flood currents (directed approximately south or south-south-west into the Moray Firth) occur approximately 1.5 to 2 hours before high water at Wick; peak ebb currents (directed approximately north or north-north-east out of the Moray Firth) occur approximately 4 to 4.5 hours after high water at Wick.

2.3.1.6 Sediments

Seabed sediments across the Moray West Site generally consist of Holocene gravelly sand and sand with a minor proportion of fines (<5 to 10% silt and clay sized). A modal peak grain size between 150 to 215 µm (fine sand) was found in the majority of the grab samples collected from the Moray West Site. Other modal peak grain sizes were also variably observed, ranging from 24,000 µm (pebble gravel) to 350 µm (medium sand). The proportion of shell in sediment samples from and nearby to the Moray West Site are frequently in excess of 50% (Partrac, 2010; British Geological Survey (BGS), 1987).

Near to the Moray West Site, in intermediate water depths, the Moray West Offshore Export Cable Corridor transits areas of mixed sands and gravels, with a small proportion of fines (<5 to 10%) present. Seabed sediments become progressively finer in deeper water along the route, becoming relatively muddy (30 to 65% fines) in the deepest parts. The sediment character and distribution in these offshore sections is the result of the relatively benign tidal regime and the spatially variable effect of wave action at the seabed, depending upon the local water depth.

2.3.2 Biological Environments

2.3.2.1 Designated Sites

Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, also known as “The Habitats Directive”, provides for the conservation of natural habitats and of wild flora and fauna including in offshore areas. The EC Directive 2009/147/EC on the conservation of wild birds, also known as “The Birds Directive” applies to the conservation of all species of naturally occurring wild birds including in offshore areas. In the UK, sites designated as SACs and SPAs, under the Habitats Directive and Birds Directive respectively, form part of the Natura 2000 network. These sites aim to deliver the requirements of the Directives through the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the qualifying features.

Table 2-1 and Table 2-2 below detail the SACs and SPAs respectively that have qualifying features that were considered within the Report to Inform the Appropriate Assessment (RIAA) submitted in support of the application, as having the potential to interact with the Development.

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Table 2-1 Designated SACs and Relevant Qualifying Features that have the Potential to Interact with the Development	
Site	Qualifying Features
Moray Firth SAC	Bottlenose dolphin Sandbanks which are slightly covered by sea water all the time
Dornoch Firth and Morrich More SAC	Harbour seal Sandbanks which are slightly covered by sea water all the time Reefs
Faray and Holm of Faray SAC	Grey seal
Sanday SAC	Harbour seal
Isle of May SAC	Grey seal
Monach Islands SAC	Grey seal
Berriedale and Langwell Waters SAC	Atlantic salmon
River Borgie SAC	Atlantic salmon Freshwater pearl mussel
River Dee SAC	Atlantic salmon Freshwater pearl mussel
River Naver SAC	Atlantic salmon Freshwater pearl mussel
River Thurso SAC	Atlantic salmon
River Oykel SAC	Atlantic salmon Freshwater pearl mussel
River Moriston SAC	Atlantic salmon Freshwater pearl mussel
River Spey SAC	Atlantic salmon Freshwater pearl mussel Sea lamprey
Culbin Bar SAC	Atlantic salt meadows Embryonic shifting dunes

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Table 2-2 Qualifying SPA Species with Foraging Ranges that Interact with Moray West Offshore Wind Farm from Relevant Breeding Colonies		
SPA	Distance to Moray West Site (km) / Offshore Export Cable Corridor from the Closest Points	Qualifying Feature (Mean Maximum Foraging Range)
Breeding		
Auskerry SPA	92.4 / 108.4	Storm petrel (91.7 ± 27.5 km)
Buchan Ness to Collieston Coast SPA	92.7 / 59.6	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km) Herring gull (61.1 ± 44.0 km) Kittiwake (60 ± 23 km)
Calf of Eday SPA	111.7 / 127.7	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km)
Cape Wrath SPA	110.3 / 112.9	Fulmar (400 ± 245.8 km) Puffin (105.4 ± 46 km) Guillemot (84 ± 50.1 km)
Copinsay SPA	74.3 / 90.3	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km) Kittiwake (60 ± 23 km)
East Caithness Cliffs SPA	19.9 / 23.1	Fulmar (400 ± 245.8 km) Cormorant (25 ± 10 km) Shag (35 km) Puffin (105.4 ± 46 km) Guillemot (84 ± 50.1 km) Razorbill (48.5 ± 35 km) Herring gull (61.1 ± 44.0 km) Great black-backed gull (20km) Kittiwake (60 ± 23 km)
Fair Isle SPA	157.8 / 173.2	Fulmar (400 ± 245.8 km) Gannet (229.4 ± 124.3 km)
Fetlar SPA	281.2 / 296.8	Fulmar (400 ± 245.8 km)
Flannan Isles SPA	254.6 / 255.4	Fulmar (400 ± 245.8 km)
Forth Islands SPA	202.9 / 163.8	Fulmar (400 ± 245.8 km) Gannet (229.4 ± 124.3 km)
Foula SPA	213.5 / 229.5	Fulmar (400 ± 245.8 km)
Fowlsheugh SPA	132 / 88.4	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km)

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Table 2-2 Qualifying SPA Species with Foraging Ranges that Interact with Moray West Offshore Wind Farm from Relevant Breeding Colonies		
SPA	Distance to Moray West Site (km) / Offshore Export Cable Corridor from the Closest Points	Qualifying Feature (Mean Maximum Foraging Range)
Handa SPA	118.9 / 120.5	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km)
Hermaness, Saxa Vord and Valla Field SPA	300.2 / 315.8	Fulmar (400 ± 245.8 km) Gannet (229.4 ± 124.3 km)
Hoy SPA	64.9 / 79.5	Fulmar (400 ± 245.8 km) Puffin (105.4 ± 46 km) Guillemot (84 ± 50.1 km) Arctic skua (62.5 ± 17.7 km) Kittiwake (60 ± 23 km)
Marwick Head SPA	101.9 / 116.8	Guillemot (84 ± 50.1 km)
North Caithness Cliffs SPA	41.6 / 57	Fulmar (400 ± 245.8 km) Puffin (105.4 ± 46 km) Guillemot (84 ± 50.1 km) Razorbill (48.5 ± 35 km) Kittiwake (60 ± 23 km)
North Rona and Sula Sgeir SPA	188.7 / 192.2	Fulmar (400 ± 245.8 km) Gannet (229.4 ± 124.3 km)
Noss SPA	235.8 / 251.1	Fulmar (400 ± 245.8 km) Gannet (229.4 ± 124.3 km)
Outer Firth of Forth and St Andrews Bay Complex SPA	165.2 / 124.7	Gannet (229.4 ± 124.3 km)
Pentland Firth SPA	38.2 / 54.1	Arctic skua (62.5 ± 17.7 km) Guillemot (84 ± 50.1 km)
Rousay SPA	104.2 / 119.8	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km)
Seas off Foula SPA	187.5 / 203.6	Fulmar (400 ± 245.8 km)
Shiant Isles SPA	182 / 182.1	Fulmar (400 ± 245.8 km)
Sule Skerry and Sule Stack SPA	126.6 / 133.3	Gannet (229.4 ± 124.3 km)
Sumburgh Head SPA	201.8 / 217.1	Fulmar (400 ± 245.8 km)

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Table 2-2 Qualifying SPA Species with Foraging Ranges that Interact with Moray West Offshore Wind Farm from Relevant Breeding Colonies		
SPA	Distance to Moray West Site (km) / Offshore Export Cable Corridor from the Closest Points	Qualifying Feature (Mean Maximum Foraging Range)
Troup, Pennan and Lion's Heads SPA	52.5 / 21	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km) Razorbill (48.5 ± 35 km) Herring gull (61.1 ± 44.0 km) Kittiwake (60 ± 23 km)
West Westray SPA	116.7 / 132.4	Fulmar (400 ± 245.8 km) Guillemot (84 ± 50.1 km)
Non-Breeding		
Moray Firth SPA	10.8 / 0.0	Scaup Eider Long-tailed duck Common scoter Velvet scoter Goldeneye Red-breasted merganser Red-throated diver Great northern diver Cormorant Shag Slavonian grebe

The Southern Trench was designated as a nature conservation Marine Protected Area (NCMPA) in December 2020 by Scottish Ministers. The area included in the NCMPA extends along Aberdeenshire coast between Buckie and Fraserburgh following the coastline round and extending out to approximately the 12 nm limit. Key interest features of the Southern Trench NCMPA, and basis for its designation include minke whale, benthic habitats including burrowed mud habitat and stratification fronts.

With the exception of parts of Cullen Bay and Sandend Bay, much of the south coast of the Moray Firth (Moray and Aberdeenshire coastline) is nationally designated with qualifying features of geology and habitats (saltmarsh, shingle, springs and lowland dry heath). Of relevance to the Development the EIA Report identified the Cullen to Stake Ness Coast SSSI which is designated for the underlying geology and coincides with part of the landfall area on the Moray Firth coast.

2.3.2.2 Benthic Ecology

Within the Moray West Site sediments tended to be homogeneous with much of the area characterised by sands or slightly gravelly sands. Similar sediments were recorded along the Offshore Export Cable Corridor. A range of biotopes were recorded comprising SS.SCS.ICS.MoeVen (Moerella spp. with venerid bivalves in infralittoral gravelly sand) and SS.SSa.CFiSa.EpusOborApri (*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand).

The deeper sections of the Offshore Export Cable Corridor comprised of more fine mud sediments with the biotopes SS.SMu.CFiMu.SpMmeg (Seapens and burrowing megafauna in circalittoral fine mud in areas of deeper muddy sediment) and SS.SMx.CMx.OphMx (*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment).

On the inshore areas of the Offshore Export Cable Corridor stony habitats were more widely recorded with a varied epibiota which ranged from sparsely populated pebbles/stones to more consolidated cobble with a richer hydroid/bryozoan turf.

A number of habitats/species of conservation interest were also noted during the survey including the biotope SS.SCS.ICS.MoeVen which is a Priority Marine Feature (PMF). Other PMFs recorded during the survey include the Arctic quahog (*Arctica islandica*) and flameshell beds (*Limaria hians*) although these were only recorded at single stations and in very low numbers. In addition, the deeper muddy habitats along the Offshore Export Cable Corridor were classified as SS.SMu.CFiMu.SpMmeg which is also a PMF.

2.3.2.3 Fish and Shellfish Ecology

A review of fish sensitivity maps (Coull *et al.*, 1998) indicates that the Moray West Site is within reported spawning grounds for cod (*Gadus morhua*), plaice (*Pleuronectes platessa*), lemon sole (*Microstomus kitt*), sprat (*Sprattus sprattus*) and Norway lobster (*Nephrops norvegicus*). Herring (*Clupea harengus*) spawn to the north of the Moray West Site, while whiting (*Merlangius merlangus*) spawn further to the east. Sandeel (*Ammodytes marinus* and *Ammodytes tobianus*) are mapped as spawning within the inner Moray Firth, including along the Offshore Export Cable Corridor. The Moray West Site is also close to a nursery area for herring, haddock (*Melanogrammus aeglefinus*), whiting, saithe (*Pollachius virens*), plaice (landfall coastal area only), lemon sole, sprat and Norway lobster.

Survey work completed within the Moray Firth as part of pre-construction monitoring surveys for the Moray East and Beatrice Offshore Wind Farm Ltd. (BOWL) projects has focused on sandeel and cod. Three species of sandeels (*Ammodytidae* spp.) were caught during surveys with abundance data indicating that the area around the Moray West Offshore Wind Farm Site do not support particularly important sandeel populations. The cod survey recorded individuals at a total of 35 of the 58 tows in relatively low numbers, with 23 spawning cod caught. The survey determined that significant cod spawning did not take place within the Moray Firth zone.

Key fish and shellfish species of commercial importance occurring within the Moray West Site and along the Offshore Export Cable Corridor include king scallop (*Pecten maximus*), squid (*Loligo forbesi*), crab, lobster and Nephrops. Haddock accounts for the majority of the whitefish landings.

According to Barne *et al.* (1996), within the Moray Firth there are several species that migrate between fresh and salt waters, including Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), European eel (*Anguilla Anguilla*), twaite shad (*Alosa fallax*) and allis shad (*Allosa alosa*). Within the Moray Firth there are 8 river systems designated as SACs that support spawning populations of Atlantic salmon (*Salmo salar*) as detailed in Table 2-1. Additionally, the River Spey SAC which is situated in close proximity to the landfall area also supports populations of sea lamprey. Non-designated river systems, including the River Deveron near to the landfall area, may also support migratory species that have the potential to interact with the Wind Farm site or the OfTI during key periods of migration.

2.3.2.4 Marine Mammals

To date, a total of 14 cetacean (whale, dolphin and porpoise) and two pinniped (seal) species have been recorded within the Moray Firth (Moray East ES, 2012, as adapted from Reid *et al.* 2003, Robinson *et al.* 2007, Thompson *et al.* 2010a), these are listed in Table 2-3 below. Of these, the most common species occurring within the Moray Firth include harbour and grey seals, harbour porpoise, minke whale and bottlenose dolphin.

All cetaceans are listed on Annex IV of the Habitats Directive and therefore are protected from physical injury (harm) and disturbance. Harbour porpoise, bottlenose dolphin, harbour seal and grey seal are also listed on Annex II of the Habitats Directive and, as such, are also protected through the designation of SACs. Harbour seals are a qualifying feature of the Dornoch Firth and Morrich More SAC. Bottlenose dolphin are a qualifying feature of the Moray Firth SAC and the primary reason for its designation. The current population estimate for the Moray Firth SAC is 195 animals. As discussed previously, minke whale is one of the main protected features of the Southern Trench NCMPS. Estimated densities for minke whales across the Moray Firth are generally low except for the Southern Trench NCMPS, where higher densities have been observed during the summer when minke whales move into the area for foraging. Harbour porpoise are the smallest and most abundant cetacean species in UK waters (Reid *et al.*, 2003) and are also the most abundant species in the Moray Firth. The abundance of the North Sea population of harbour porpoise is currently estimated at 345,373 porpoise (95% CI: 246,526 to 495,752) (Hammond *et al.*, 2017).

Marine mammal species recorded in the Moray Firth are listed in Table 2-3 below.

Table 2-3 Marine Mammal Species Recorded in the Moray Firth	
Name	Frequency of Occurrence
Harbour seal	Common, all year

Table 2-3 Marine Mammal Species Recorded in the Moray Firth	
Name	Frequency of Occurrence
Grey seal	Common, all year
Harbour porpoise	Common, all year
Bottlenose dolphin	Common, all year
Common dolphin	Common, seasonal
White-beaked dolphin	Common, seasonal
Minke whale	Common, seasonal
Risso's dolphin	Occasional
White-sided dolphin	Occasional
Killer whale	Occasional
Pilot whale	Rare
Humpback whale	Rare
Fin whale	Rare
Sperm whale	Rare
Northern bottlenose whale	Rare
Beluga whale	Rare

2.3.2.5 Ornithology

A total of 35,372 seabirds were recorded during aerial surveys undertaken across the Moray West Site plus a 4 km buffer between April 2016 and March 2017. Results comprise a total of 21 species with guillemot, kittiwake and razorbill the three most frequently encountered species. These three species accounted for over 86% of all bird records. Only 5.6% of records could not be assigned to species level. Key species assessed as part of the ornithological assessment undertaken for the EIA are detailed in Table 2-4.

Table 2-4 Key Species Assessed as part of the Ornithological Assessment Undertaken for the EIA	
Key Bird Species Considered in the EIA Report	
Fulmar	Arctic skua
Gannet	Puffin

Table 2-4 Key Species Assessed as part of the Ornithological Assessment Undertaken for the EIA	
Key Bird Species Considered in the EIA Report	
Razorbill	Herring gull
Guillemot	Great black backed gull
Kittiwake	Scaup*
Eider*	Goldeneye*
Long-tailed duck*	Red-breasted merganser*
Common scoter*	Red-throated diver*
Velvet scoter*	Great northern diver*

(*) denotes species relevant to the offshore export cable corridor only.

2.3.3 Human Environment

2.3.3.1 Shipping and Navigation

The current shipping and navigation baseline was informed by 53 days of marine traffic data collection completed over two surveys: one summer survey and one winter survey. The study area comprised of the Moray West Site plus a 10 nm buffer and the Offshore Export Cable Corridor plus a 5 nm buffer.

During the summer survey, an average of approximately ten unique vessels per day were recorded within 10 nm of the Moray West Site, four of which intersected the site itself. Traffic levels dropped during winter (noting that non-AIS vessels will be underrepresented during winter), with an average of four unique vessels per day recorded within 10 nm of the Moray West Site, two per day of which intersected the site itself.

The most commonly recorded traffic recorded during both seasonal periods was from fishing vessels, and oil and gas support vessels associated with the Beatrice Oil Field operations. Other vessels included cargo / commercial vessels and recreational (cruise liners).

2.3.3.2 Commercial Fisheries

The principal commercial fisheries fleets operating in areas relevant to the Development have been identified as follows:

- Creel fleet (crabs and lobster) – mainly nearshore areas along the Offshore Export Cable Corridor and in the vicinity of the Landfall Area;
- Mackerel jigging – similar locations to the creel fleet, again focused more on nearshore / coastal areas;
- Demersal trawl fleet (Nephrops, squid and whitefish):
 - Nephrops – the main fishing grounds lie south of the Moray West Site therefore most activity is along the Offshore Export Cable Route;

- Squid – mainly along the Offshore Export Cable Route but also some activity in the Moray West Site; and
- Whitefish (haddock) – mainly in the Moray West Site but low intensity.
- Scallop dredging fleet (king scallops) – mainly in the Moray West Site; and
- Scottish seine fleet (haddock) – throughout study area at low intensity.

2.3.3.3 Military and Civil Aviation

The Moray West Wind Farm will be visible from the military Air Traffic Control (ATC) Primary Surveillance Radar (PSR) at RAF Lossiemouth and the civilian NATS (En Route) plc (NERL) PSR at Allanshill. Highlands and Islands Airport Ltd. (HIAL) also operate an airport at Wick to the north-east of the Moray West Site and a PSR at Inverness to the west of the Moray West Site. The Moray West Site is also located in the vicinity of and directly beneath helicopter main route (HMR) XRAY which routes between Aberdeen and Wick, and the helicopter approaches to helidecks on platforms in the Beatrice and Jacky Oil Fields.

2.3.3.4 Seascape, Landscape and Visual Receptors

The Moray Firth coastline is generally rural in character with a predominantly agricultural land use and a strong association with the sea. There are numerous settlements along the coastline and these are connected by roads, rail and other routes that generally run close to, or on, the coast. The Moray West Site lies approximately 22 km from the Caithness Coast with the closest point located near Lybster. Once constructed the Wind Farm will be visible from a number of locations along the Caithness, Sutherland, Ross and Cromarty, Moray and Aberdeenshire coastlines.

2.3.3.5 Archaeology and Cultural Heritage

The archaeological study area comprised the Moray West Site, the Offshore Export Cable Corridor and a 2 km buffer around both areas. Geologically, the surrounding landscape would have been subjected to glacial and interglacial cycles and at various times the area would have been covered by ice sheets, inundated by water from melting ice sheets and associated rising sea levels, and at certain points would have been dry land and therefore, may have been suitable for human settlement. There were no designated prehistoric archaeological sites located within the archaeological study area.

Within the study area, a total of 39 geophysical anomalies were identified from a review of geophysical data collected in 2010. Of these, 29 anomalies within the Moray West Site were identified as having possible archaeological potential, including a record from a recorded wreck. A further six wrecks and five obstructions were identified along the Offshore Export Cable Corridor from a review of UKHO datasets.

2.3.3.6 Other Human Activities

Offshore Wind Farms

Beatrice Wind Farm Demonstrator Project

The Beatrice Wind Farm Demonstrator Project is one of two operational offshore wind farms in Scottish waters and is located adjacent to the Beatrice oil field, immediately to the west of the Moray West site. This small wind farm comprises of two 5 MW wind turbines. All electricity generated by these two turbines

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is fed to a nearby oil platform. It is understood that these turbines will be decommissioned at the same time as the Beatrice Oil Field infrastructure, with decommissioning work expected to begin in 2024 and to be completed by 2029.

Beatrice Offshore Wind Farm

Beatrice Offshore Wind Farm is comprised of 84 wind turbines, two offshore transformer modules (or OSPs) and associated cable infrastructure. The BOWL lease area lies adjacent to the extreme north-east corner boundary of the Moray West Site approximately 13.5 km from the Caithness Coast in the Outer Moray Firth. BOWL's export cable extends approximately 65 km from the BOWL wind farm, through the Development, and makes landfall at Portgordon.

The Beatrice Offshore Wind Farm received consent in 2014 and construction commenced in April 2017. The Beatrice Offshore Wind Farm has been fully operational since June 2019.

Moray East Offshore Wind Farm

Moray Offshore Renewables Limited (MORL) (now Moray East) was granted consent in 2014 for three projects (Telford, Stevenson and MacColl Offshore Wind Farms) in the Moray Firth Round 3 Zone. These projects are now being taken forward to development as the 'Moray East' project which comprises 100 offshore wind turbine generators and has a total generating capacity of 950 MW. Construction of Moray East commenced in May 2019, with final commissioning expected in 2022 in line with Contracts for Difference (CfD) milestones.

Oil and Gas

The Development is located within an area surrounded by oil and gas activity and is in close proximity to, but not overlapping two producing oil fields. The "Beatrice" oil field is located in Block 11/30a immediately to the north of the Moray West Site, and was in production from 1981-2015, whilst the "Jacky" oil field located immediately adjacent to "Beatrice" in Block 12/21c and commenced production in 2009. The Beatrice platforms lie between 200 – 1,200 m from the Moray West Site boundary, whilst the Jacky platform lies approximately 2.5 km away. Both the Jacky and Beatrice oil fields are no longer producing and are scheduled for decommissioning in 2023 and 2024-2025, respectively.

Oil and gas extracted from the Beatrice Oil Field was exported to shore via an installed pipeline. This pipeline crosses the north-west corner of the Moray West Site and runs to shore at Nigg in the Cromarty Firth.

Marine Dredging and Disposal

Dredging and disposal activity within the Moray Firth is sporadic and associated with port and harbour maintenance and development and coastal marine disposal sites.

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The closest 'open' marine disposal site to the Development is "Buckie" which lies 2 km from the Offshore Export Cable Corridor, and 24.5 km from the Moray West Offshore Windfarm Site.

Subsea Cables and Pipelines

There is one existing subsea telecommunications cable in proximity to the Development. The SHEFA-2 fibre-optic telecommunications cable, owned by Faroese Telecom, links the Faroe Islands to mainland Scotland via the Northern Isles (Faroese Telecom, 2017). It runs south from the Orkney Islands to the Scottish mainland at Inverboyndie and is buried under the seabed surface as it transits the Moray Firth and makes landfall 5 NM (10 km) east of the Moray West landfall area.

The Caithness – Moray Link electrical interconnector cable, owned by SHE-T, is a subsea High Voltage Direct Current (HVDC) reinforcement of the transmission network between Caithness and Moray (SHE-T, 2015). Installation of the Caithness Moray Interconnector Cable was completed at the end of 2018. Commissioning and energisation were completed in January 2019. The Caithness Moray Interconnector Cable passes through the Moray West Offshore Export Cable Corridor. The Moray West IAC are expected to cross both 16" diameter main oil export pipelines PL16 and PL1838 to the Nigg Oil Terminal which runs between Beatrice 'Alpha Production' (AP) Platform to landfall at Shandwick Bay. This includes the replacement section of subsea pipeline (PL1838) which is laid alongside (20- 50m distance) the original line (PL16).

3 Description of Items to be Decommissioned

3.1 Introduction

This section describes the key components of the Moray West offshore wind farm and OfTI that will be decommissioned at the end of the operational period of the Development as defined in the Section 105 notice and in accordance with Condition 3 of the Section 36 Consent and Condition 3.2.1.3 of the associated Marine Licences. Further detail on the methods that will be used to decommission the various components of the Development is provided in Section 4.

It should be noted that, following commissioning of the offshore wind farm, ownership of the associated OfTI assets (OSPs, OSP interconnector cable and offshore export cables) will be transferred to the Offshore Transmission Operator (OFTO). Responsibility for the decommissioning of these assets will therefore also be transferred to the OFTO.

3.2 Components of the Development to be Decommissioned

In accordance with the BEIS Guidance on Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004 (BEIS, 2019) and the Scottish Government's Consultation Draft Guidance on Decommissioning of Offshore Renewable Energy Installation in Scottish Waters (Scottish Government, 2019), Moray West has identified the following components of the Development for decommissioning:

- WTGs and OSPs;
- WTGs and OSPs foundations;
- Subsea inter-array, OSP interconnector and export cables; and
- Cable and Scour Protection.

3.2.1 Wind Turbine Generators (WTGs)

The Development will comprise up to 72 horizontal axis WTGs. These will be made up of three main external components:

- Rotor – comprised of the blades, hub, spinner and spinner bracket;
- Nacelle – housing the electrical generator, the transformer and the control electronics; and
- Structural support – includes the tower and rotor yaw mechanism.

The main components of the WTGs to be decommissioned are summarised in Table 3-1. Further information on the specific components (e.g. key dimensions) will be provided as part of the Development Specification and Layout Plan (DSLPL) (document produced to meet the requirement under the Section 36 Consents condition 12 and Offshore Wind Farm Marine Licence condition 3.2.2.9).

Table 3-1: Summary of WTG Components to be Decommissioned

Component	Number	Key Dimensions / Weights ²
Tower Sections	Up to 72 towers, each in 4 sections	Complete towers will consist of 4 sections with bolted flange connections. The maximum hub height will be up to 150 m. Weight: Approximately 1,175 tonnes (outer shells and flanges only - not internals).
Nacelle	Up to 72 nacelles	22 m x 11 m x 12 m (including hub). Weight: Approximately 650 tonnes.
Blades	Up to 72 x 3 rotor blades	Width: 6.5 m (tapered) ³

3.2.2 WTG Support Structures (Foundations)

The WTGs will be supported by foundations which hold the equipment in place on the seabed. It is anticipated that there will be an access platform between the foundations and the WTG to allow personnel access into the WTG tower.

Each WTG support structure comprises a piled monopile foundation.

The monopile foundation will consist of a single tubular steel column comprising a number of sections of rolled steel plate welded together. The monopile will be embedded into the seabed and extend to approximately sea surface level. A tubular steel transition piece (TP) is fitted over the monopile and secured mechanically (e.g. bolts), by a grouted interface or by a combination of both methods. The TP may include integrated ancillary components, such as boat landing, working platform, sacrificial anodes etc., as well as providing the connection to the wind turbine tower. The TP is usually painted yellow and marked according to relevant regulatory guidance and may be installed separately following the monopile installation. A fully integrated pile and TP structure may also be considered.

The main components of the monopile foundations to be decommissioned are summarised in Table 3-2 below.

² Dimensions and weights of the WTG components to be decommissioned are approximate and subject to be refined.

³ Blade width parameter (6.5 m) in line with the Moray West Section 36 Consent Variation Application submitted to MS-LOT on 30th March 2021.

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Table 3-2: Summary of Foundation Components to be Decommissioned			
Foundation Type	Component	Number	Key Dimensions / Weights ⁴
Piled monopile foundations	Monopile foundation structure	Up to 72	Diameter: up to 10 m Total length: Up to 105 m with 36 m embedment (below seabed) Weight: Approximately 2,160 tonnes per monopile
	Transition piece	Up to 72	Diameter: up to 8 m Length: Currently anticipated to be 18.6 m Weight: Approximately 377 tonnes per TP
	Scour protection	Requirement for this to be determined. See Section 3.2.7	

⁴ Dimensions and weights of the foundations components to be decommissioned are approximate and subject to be refined.

3.2.3 Offshore Substation Platforms (OSPs) and Support Structures

Up to two high voltage alternating current (HVAC) OSPs will be installed within the Moray West Site to collect the electricity generated by the WTGs and convert it from 66 kV to 220 kV for transmission to shore via the two offshore export cables.

Each OSP will comprise two main elements: the topside and the support structure. The topside contains all the primary electrical equipment e.g. transformers and switchgear required to increase the voltage of the electricity and ancillary components such as communications and control equipment and emergency refuge facilities. The OSP topsides will be installed on monopile support structures.

The main components to be decommissioned are summarised in Table 3-3 below.

Table 3-3: Summary of OSP Topside Components and Support Structures to be Decommissioned			
Component		Number	Key Dimensions / Weights ⁵
OSP topside		2 HVAC OSP topside facilities	OSP topside dimensions: up to 34.3 m (length) x 29.4 m (width) x 15 m (height). OSP topside weight: Approximately 1,300 tonnes.
Monopile	Monopile foundation structure	2	Diameter: Up to 10 m Total length: Up to 103 m with 36 m embedment (below seabed) Weight: Approximately 2,160 tonnes per monopile
	Transition piece	2	Diameter: approximately 8 m Length: approximately 26 m Weight: Approximately 400 tonnes per TP
	Scour protection	Requirement for this to be determined. See Section 3.2.7	

3.2.4 Inter Array Cables

A network of no more than 275 km of inter-array cabling will connect each of the WTGs to each other and to the OSPs. For the Development, the layout consists of single chains or strings of cabling linking the WTGs together, with the final cable connecting the WTGs back to the OSP.

⁵ Dimensions and weights of the OSP topside components to be decommissioned are approximate and subject to be refined.

The inter array cables will consist of an aluminium conductor core surrounded by a layer of insulating material as well as material to armour the cable for protection from external damage, and material to keep the cable watertight.

The inter array cables will be connected to the WTGs via a J-tube or opening (aperture) in the monopile foundation. A cable protection system will be adopted at the base of the WTG foundations to mechanically protect the cable between the J-tube bellmouth/aperture exit until the point where the cable is adequately buried and, or, protected by rock placement. Further away from the foundations, if there are any locations where a sufficient level of protection cannot be achieved by trenching and burial during installation, alternative protection methods such as rock placement or concrete mattresses will be used. Further information on cable burial and protection is provided in the Wind Farm Cable Plan, produced as required by Condition 19 of the Section 36 Consent and Condition 3.2.2.16 of the Offshore Wind Farm Marine Licence.

The main components to be decommissioned are summarised in Table 3- below.

Table 3-4: Summary of Inter Array Cable Components to be Decommissioned		
Component	Number	Key Dimensions / Weights ⁶
Inter array cables	14 strings with total length no more than 275 km	3-core 66 kV armoured submarine cables Section: 300 sqmm Diameter: 124 mm Weight: Approximately 21 kg/m of weight in air, 10 kg/m weight in water
		3-core 66 kV armoured submarine cables Section: 800 sqmm Diameter: 151 mm Weight: Approximately 30 kg/m of weight in air, 15 kg/m weight in water

3.2.5 OSP Interconnector Cable

The two OSPs will be connected via an OSP interconnector cable, totalling 15 km in length. As with the inter-array cables, the OSP interconnector cables will be connected to the OSP foundations via a J-tube and will include a cable protection system to protect the sections of cables between the exit from the j-tube and point where they are adequately buried or protected by rock placement.

The main components to be decommissioned are summarised in Table 3-5 below.

⁶ Dimensions and weights of the IAC components to be decommissioned are preliminary and subject to be refined.

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Table 3-5: Summary of OSP Interconnector Components to be Decommissioned		
Component	Number	Key Dimensions / Weights ⁷
OSP interconnector cable	1 cable with total length no more than 15 km	3-core 66 kV armoured submarine cables Section: 800 sqmm Diameter: 151 mm Weight: Approximately 30 kg/m of weight in air, 15 kg/m weight in water

⁷ Dimensions and weights of the OSP Interconnector components to be decommissioned are preliminary and subject to be refined.

3.2.6 Offshore Export Cables

Two HVAC offshore export cables (each cable measuring no more than 65 km in length) will connect the OSPs to shore at the landfall at Broad Craig on the Aberdeenshire coastline where they will connect with the onshore transmission works.

Where the required level of protection cannot be achieved by trenching and burial during installation, alternative protection methods such as rock placement or concrete mattresses will be used. Further information on cable burial and protection is provided in the OfTI Cable Plan, produced as required by the OfTI Marine Licence condition 3.2.2.15.

On approach to the OSPs, each of the OECs will feature a cable protection system (CPS). The length of the CPS will be determined during detailed engineering but is currently expected to be circa 35m long.

Close to the point of landfall the export cables will be installed within two HDD ducts routed under the nearshore area to onshore transition joint bays (TJBs) at Broad Craig. Each of the two offshore export cables will be joined individually to the onshore cables within the TJBs.

The main components of the export cables to be decommissioned are summarised in Table 3-6 below.

Table 3-6: Summary of Offshore Export Cable Components to be Decommissioned		
Component	Number	Key Dimensions / Weights ⁸
Export cables	Up to two offshore export cables, each cable measuring no more than 65 km in length	Single armoured submarine 3-core 220 kV cable per circuit (three circuits), consisting of aluminium conductors with an overall cross-sectional area of 2000 mm ² with an HDD section of copper conductors of 1600 mm ² Diameter: 267 mm Weight: 100 kg/m of weight in air, 55 kg/m weight in water

3.2.7 Cable and Scour Protection

Cable protection will be installed where a sufficient level of protection cannot be achieved by burial. Should cable protection need to be installed, details of the decommissioning procedure will be presented in the Final DP.

It is likely that the WTG & OSP monopiles will include scour protection in the form of scour mats, rock or similar on the seabed around the monopiles to mitigate scour effects. The scour protection volume will

⁸ Dimensions and weights of the OEC components to be decommissioned are preliminary and subject to be refined.

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be approximately 1,325 m³. Further information on the scour protection design will be provided within the Moray West DSLP.

4 Description of Proposed Decommissioning Measures

4.1 Introduction

Once the Moray West Development reaches the end of its operational life decisions will need to be made as to the next steps for the Development. The approach that will be taken by Moray West to the decommissioning of the Development is described in Section 4.4. Further information on options for end of life asset management and repowering, and guiding principles to be considered when developing approaches for decommissioning are provided below.

4.2 End of Life Asset Management and Repowering

In general, decommissioning is expected to occur at the end of the operational life of the Moray West Development (which, in accordance with the Section 36 Consent and Marine Licences is 25 years from commissioning). However, there is potential for these timescales to vary depending on whether Moray West seeks to repower the wind farm or explore other options for extending the operational life of the Development.

All decisions for end of life asset management and repowering will be informed by environmental surveys and assessment carried out towards the end of the operational life of the Development. These surveys should be used to provide an assessment of the condition of the infrastructure, the state of the environment and any safety considerations to inform decisions on the best practicable environmental option (BPEO) with regard to proposals for end of life asset management and repowering (BEIS, 2019).

An overview of the options for end of life asset management and repowering to be considered by Moray West are summarised below.

4.2.1 Decommissioning and Construction of a New Wind Farm

For this scenario the assumption has been made that wind energy is still economically attractive at the point of decommissioning and the technical integrity of the Moray West Offshore Wind Farm is declining. If this were the case, installing new and better technology may be preferable than increasing the O&M effort for any additional years of running time on the existing wind farm. Under such a scenario, and subject to all necessary consents being granted, the existing wind farm would be decommissioned (following the process set out under Section 4.4 below) and a new wind farm constructed (with all appropriate consents having been obtained beforehand).

4.2.2 Re-powering

In this scenario it is assumed that wind energy is still economically attractive at the point of decommissioning, the technical integrity of the wind turbines is declining but the electrical infrastructure and possibly the foundations remain sound. The lifetime of the electrical infrastructure could be up to 50 years. Experience from the oil and gas industry indicates that the lifetime of foundations can be extended outside the design specifications. By closely monitoring the structural integrity of the asset, it could be possible, subject to all necessary consents being granted, to re-use electrical infrastructure and

foundations in a re-powering of the wind farm by fitting new wind turbines to the existing foundation and electrical systems.

4.2.3 Step-down

This scenario assumes it is not preferable to invest in new technology but that most wind turbines will continue to perform sufficiently beyond 25 years (duration of Section 36 Consent and Marine Licences). Under this scenario, the Moray West Offshore Wind Farm would be decommissioned through a controlled step-down. In this case wind turbines would be gradually shut down as their technical integrity declined. A decommissioning campaign would most likely be undertaken when the entire wind farm is shut down, but this could be undertaken in a phased manner if this was found to be more cost effective or if the prevailing regulatory regime required this approach. Any such step-down process would be set out for approval in the final DP.

4.2.4 Removal

This scenario assumes it is not preferable to invest in new technology but that most wind turbines and/or their support structures and foundations will **not** continue to perform sufficiently beyond the lifetime of the consent and marine licences (25 years). In this scenario the offshore wind farm and associated components (WTGs, OSP topsides, cables) are removed with no intention of redeveloping the site.

WTG and OSP foundations will be cut below the natural level of the seabed, and the approach to decommissioning scour and cable protection will be considered in the final DP.

4.3 Guiding Principles Underpinning the Approach to Decommissioning

The principal aim of provisions included under the Energy Act 2004 (sections 105 to 114) is to restore the marine environment so that it can be used for other purposes, including safe navigation. Therefore, for all options presented above, there remains a requirement for the Moray West Development to be fully decommissioned at some point in time.

When decommissioning does occur, this is to be achieved by removing and returning offshore installations back to land for reuse, recycling, incineration with energy recovery or disposal at a licensed site (BEIS, 2019). In all cases, the base case is complete removal of all offshore infrastructure, ensuring standards set for removal do not fall below those set by the International Maritime Organisation (IMO) in 1989⁹ (BEIS, 2019).

Where there is a requirement to consider alternative solutions involving partial removal / leaving some infrastructure in situ, these alternatives will only be considered under the following circumstances:

- Entire removal would involve an unacceptable risk to personnel;
- Entire removal would involve an unacceptable risk to the marine environment;

⁹ IMO Guidelines and standards for the removal of offshore installations and structures on the continental shelf and in the exclusive economic zone

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- Entire removal would be technically unfeasible;
- Entire removal would involve extreme cost. It is considered that design decisions should, as far as possible, result in installations which are affordable to remove, but it is recognised that some elements, such as deep foundations, may nonetheless be costly to remove;
- The installation or structure will serve a new use, whether for renewable energy generation or for another purpose, such as enhancement of a living resource (provided it is not detrimental to other aims – e.g. conservation). This does not include leaving in place for colonisation and artificial reef purposes. However, in this situation, measures will be expected to be put in place should the installation/structure finally become disused; and
- The installation of structure weighs more than 4000 tonnes in air (excluding any deck and superstructure) or is standing in more than 100 m of water and could be left wholly or partially in place without causing unjustifiable interference with other uses of the sea.

Where complete removal may not be the most appropriate option, the BEIS guidance (BEIS, 2019) recommends applying the ‘Comparative Assessment Framework’ developed for the oil and gas industry and detailed within the Decommissioning of Offshore Oil and Gas Installations and Pipelines Guidance Notes (BEIS, 2018) to determine the best approach for decommissioning infrastructure.

The approach taken by Moray West to decommissioning the Development will be informed by the guiding principles set out in Table 4-1 below. These are in accordance with the BEIS guidance (BEIS, 2019) and the Scottish Government’s consultation draft guidance (Scottish Government, 2019) and are underpinned by the following:

- Health and safety will be the primary consideration;
- BPEO. The final approach will comprise the most benefit or least damage to the environment as a whole at an acceptable cost. This involves balancing the reduction in environmental risk with practicality and cost of reducing the risk; and
- Consideration of other users of the sea – safety of surface and subsurface navigation.

Table 4-1: Guiding Principles in Considering the Proposed Decommissioning Programme for the Development	
Guiding Principle	Moray West Commitments and Objectives
No harm to people	Moray West is committed to adhering to the highest standards for health and safety throughout the lifecycle of the development. Moray West seek to promote safe practices and minimise risk in the development and implementation of decommissioning solutions.
Consider the rights and needs of legitimate users of the sea	Moray West respects the rights and needs of other users of the sea. Decommissioning activities will seek to minimise the impact on stakeholders and emphasis will be placed on clear, open communication.
Minimise environmental impact	The BPEO, at the time of considering the precise decommissioning procedure, will be chosen in order to minimise impact on the environment at an acceptable cost.

Table 4-1: Guiding Principles in Considering the Proposed Decommissioning Programme for the Development	
Guiding Principle	Moray West Commitments and Objectives
Promote sustainable development	In decommissioning, Moray West will seek to ensure that, future generations do not suffer from a diminished environment or from a compromised ability to make use of marine resources.
Adhere to the Polluter Pays Principle	Moray West's decommissioning and waste management provisions acknowledge our responsibility to incur the costs associated with our impact on the environment.
Maximise re-use of materials	Moray West is committed to maximising the re-use of waste materials and pays full regard to the 'waste hierarchy'.
Ensure commercial viability	In order that commercial viability is maintained, the BATNEEC (Best Available Technique not Entailing Excessive Cost) decommissioning solutions will be sought.
Ensure practical integrity	Solutions that are necessary to achieve one or more of the above objectives must be practicable.

4.4 Proposed Decommissioning Process

The approach to decommissioning of the Development described below builds on these guiding principles and reflects the UK and Scotland's commitment to seek decommissioning provisions in accordance with national and international legislation as discussed in Section 1. The approach to decommissioning has also been informed by conclusions of effect significance presented in the EIA Report prepared in support of the application for Moray West's Section 36 Consent and Marine Licences (July 2018). These conclusions are summarised in Section 5.

As discussed in Section 1, Section 1.5 and Section 4.2 above, there will be a requirement to carry out a number of pre-decommissioning studies and surveys in order to determine the most appropriate methods for decommissioning and finalise detailed design (of decommissioning methods). Results from these pre-decommissioning studies and surveys will be presented in an EIA Report which will be submitted with any application(s) for Marine Licence(s) that will be required for decommissioning of the Development.

In considering the proposed DP for the Development, Moray West will seek solutions for each element of the Development that seek to follow the Guiding principles described in Table 4-1 and discussed in Section 4.3.

The proposed approach to decommissioning various components of the Development is presented in Table 4-2 below.

Table 4-2: Summary of the Proposals for Decommissioning the Development	
Development Component	Proposed Decommissioning Measures
Wind turbines	Complete removal from site.
OSP topsides	Complete removal from site.
Turbine and OSP foundations	Pile foundations to be cut at such a depth below the surface of the seabed that the remaining parts do not pose a danger for shipping or fishing vessels, even if sediments should become relocated. Cut sections to be removed from site.
Inter array cables	Removal from site. Final proposals for removal will be subject to review and final approval based on findings from pre-decommissioning surveys and assessments.
Interconnector cable	Removal from site. Final proposals for removal will be subject to review and final approval based on findings from pre-decommissioning surveys and assessments.
Offshore export cables	Removal from site. Final proposals for removal will be subject to review and final approval based on findings from pre-decommissioning surveys and assessments.
Cable / scour protection	Decommissioning measures will be dependent on the type, quantity and extent of cable and scour protection used. Where durable crushed rock is used it is likely that this will be left in-situ. The proposed decommissioning measures of cable and scour protection will be considered in future updates of the DP once the type and quantity of any installed protection is known.

Each of these approaches are discussed in more detail in the following sections.

4.4.1 Wind Turbine Generators (WTGs)

The WTGs (all components) will be fully removed from site and the process is likely to be a reversal of the installation process.

The general methodology for carrying out WTG decommissioning will be:

- De-energise WTGs and isolate from the grid;
- Mobilise suitable heavy lift vessels to site;
- Remove WTG blades;
- Removal of all tower/nacelle internal cables as well as related control and communication cables;
- Remove nacelle and generator;
- Dismantle and remove WTG tower; and

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- Transportation of all components to an onshore facility for processing.

Once onshore, components are likely to be processed as follows:

- All hazardous substances and fluids will be removed from the WTGs (such as oil reservoirs and any hazardous materials and components). These will be disposed of in accordance with relevant regulations at the time of disposal. All components with hazardous fluids will be treated with care to minimise the risk of spillage;
- All steel components will be sold for scrap to be recycled. This forms the bulk of the WTG structures; and
- The WTG blades (made predominantly of fibreglass) will be disposed of in accordance with the relevant regulations in force at the time of decommissioning.

The port/harbour to which the infrastructure would be removed would be chosen depending on available facilities and the location of the appropriate onshore facility to which the materials were being taken.

Table 4-3 below provides an assessment of the WTG decommissioning process against the guiding principles outlined in Table 4-1 above.

Table 4-3: Assessment of proposed WTG decommissioning process against Guiding Principles	
Guiding Principle	Comments
No harm to people	Safest option, involving standard procedures and minimal work offshore.
Consider the rights and needs of legitimate users of the sea	Complete removal of the WTGs is considered the best long term solution. Appropriate notification and consultation prior to temporary works to minimise disruption.
Minimise environmental impact	Risk of spillage minimal as a result of all potential pollutants being fully contained within the nacelle and nacelle being removed in a single lift. All subsequent dismantling takes place onshore thereby minimising potential for pollution incidents.
Promote sustainable development	WTGs and support structures completely removed from site ensures no ongoing environmental impacts and no restriction on future use of marine resources.
Adhere to the Polluter Pays Principle	Entirely consistent with this principle – full removal and disposal.
Maximise re-use of materials	All dismantling of individual major components (i.e. nacelle) to take place onshore. Maximum potential for re-use or recycling.
Ensure commercial viability	Most commercially viable solution – minimal works offshore and maximum potential for re-sale/re-use value from WTG components with minimum residual risk.
Ensure practical integrity	Known/tried and tested procedures and reduced risks due to minimising of offshore activity.

4.4.2 Support Structures

In order to achieve sufficient structural integrity, the monopile will be embedded into the seabed to a depth of around 40-60 m. Complete removal of the piles below the seabed is therefore considered neither practical nor environmentally desirable. There are currently no proven methods available for the removal of such piles which are technically or economically feasible and would not cause significant damage to the seabed or potentially significant disturbance to biological receptors. Accordingly, the proposed approach to the decommissioning of the monopile foundations is to cut the piles at a depth below the natural level of the seabed to ensure the remains do not extend above the seabed level, are unlikely to become uncovered and do not pose a danger for other sea users following decommissioning. Cut sections will be removed from site. The appropriate cutting depth for monopile removal will depend on the seabed conditions, presence of scour protection and site characteristics at the time of decommissioning; therefore, the cut level will be determined prior decommissioning.

4.4.2.1 Transition Pieces

Prior to cutting of the monopiles it will be necessary to first remove the TPs. The process is anticipated to be the reverse of the installation process and will follow removal of the WTGs and disconnection of the inter array cables. The TP will either be removed by unbolting the monopile/TP connection or by being cut at a suitable location. The exact methodology will be determined following a risk assessment of the options during decommissioning engineering. Following the separation from the monopile, the TP will be recovered by the decommissioning vessel and taken ashore for re-use or scrap recycling.

4.4.2.2 Monopiles

Following removal of the TPs, decommissioning of the monopiles is anticipated to proceed as follows:

- The decommissioning vessel is mobilised to the site;
- Remotely Operated Vehicle (ROVs) are deployed to inspect each monopile footing;
- Scour protection that has been placed around the monopile which would obstruct the cutting process will be removed;
- Remove any secondary steel appurtenances detrimental to the main lift operations;
- Depending upon the cutting techniques to be employed, material within and/or around the monopiles will be excavated to below the cutting depth (excavated material will be placed on the seabed adjacent to the piles);
- Support the main monopile structure in preparation for the cutting operation;
- The cutting sequence will depend on the structural integrity of the foundation for the lifting operation, but will either be:
 - In one step with the monopiles being cut below the natural level of the seabed with the cut section lifted as a whole structure to a decommissioning vessel for recovery to shore; or

- In two steps with the monopile first being cut at a point above the seabed, to allow the main cut section to be lifted and recovered to shore. Then remaining section of monopile (at the seabed) will then be cut below the natural level of the seabed and recovered.
- The seabed is inspected for debris and any found is subsequently removed;
- The decommissioning vessel would continue to the next location or transit back to shore either by lifting the foundations on to the deck of the vessel, jack-up, barge or by buoyant tow; and
- The monopile sections will be offloaded onshore and then be cut up and the steel could be recycled.

The cutting methods are yet to be confirmed but external cutting tools such as a diamond wire cutter or an internal cutting tool such as a high pressure water jetting tool could be used.

This approach to decommissioning is in line with the IMO standards, BEIS Guidelines (BEIS, 2019) and Scottish Government's consultation draft guidance (Scottish Government, 2019) as complete removal of the monopiles would likely involve an unacceptable risk to the marine environment and is likely to involve extreme high cost. If an obstruction exists above the seabed or an obstruction which is attributable to the wind farm appears following decommissioning, this obstruction will be marked by the owner so as not to present a hazard to other sea users. The marking will remain in place until such time as the obstruction is made safe. The monitoring of this obstruction will be built into the decommissioning monitoring and maintenance programme. Table 4-3 below provides an assessment of the monopiles decommissioning process against the guiding principles outlined in Table 4-1 above.

Table 4-4: Assessment of Proposed Monopile Foundation Decommissioning Process against Guiding Principles		
Guiding Principle	Assessment	
	Complete Removal of Piled Foundations	Cutting of Piled Foundations at or below Seabed Level
No harm to people	Significant excavation required to remove seabed material prior to pile recovery. Excavation of any overburden would need to be undertaken in the first instance to expose the monopile at the rock layer requiring significant offshore activity. It may not be possible to remove the grouted piles within the rock layer although technology at the time of decommissioning will be considered. Breaking the grouted connection within the rock layer would require significant	Fewer activities to be undertaken over a shorter time period offshore, minimising risk to personnel. Post decommissioning site monitoring will identify any unlikely exposure with the result that safety risk is insignificant.

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	time resource and would therefore increase offshore activity. There may be a requirement for diver support associated with subsea cutting, excavation and lifting operations. Any diving operations would result in significant risk to dive teams.	
Consider the rights and needs of legitimate users of the sea	Disadvantages to other users of the marine environment include disruption over a longer time period whilst the works are undertaken, and remaining scour holes associated with excavation.	Negligible risk presented providing adequate consultation and notification, cutting is to a sufficient depth, site is monitored post decommissioning and any unlikely exposure identified.
Minimise environmental impact	Excavation pits over a wide area causing potentially significant impact to marine environment. Associated dumping of excessive volume of excavated waste material may be required. Disturbance would take place over long time period.	Considerably reduced works footprint relative to complete removal. Works would take place over reduced time period and involve less equipment. Seabed recovery time shorter than complete removal scenario.
Promote sustainable development	In the long term complete removal affords maximum flexibility over use of seabed, though considerable impacts are likely over the whole site in short to medium term.	Providing remaining structures do not become exposed most future activities will not be affected. Seabed recovery is considered highly likely.
Adhere to the Polluter Pays Principle	Consistent in principle, assuming a suitable disposal solution can be found for the excavated waste material and that the seabed can be restored.	Consistent as far as is reasonably practicable, all remains of piled foundations to be below seabed level.
Maximise re-use of materials	Maximum amount of piled foundations potentially available for re-use.	Less foundation material available for re-use relative to complete removal.
Ensure commercial viability	Not considered commercially viable - excavation and extreme lifting involves major equipment requirements over longer periods of time.	Less expensive alternative to complete removal, involving minimal excavation and minimising environmental impacts.
Ensure practical integrity	Not a practical solution: Significant risk associated with heavy lift, considerable excavation needed with associated storage or disposal of large volume of waste.	Standard procedures and equipment, and reduced risk due to minimising of offshore activity.

4.4.3 Offshore Substation Platforms (OSPs)

The decommissioning of the OSPs will follow a similar method as described for the wind turbines and turbine foundations.

The complete OSP topside structure will be removed in a single lift, taken by a suitable vessel to an onshore facility where the equipment and structure will be dismantled and the constituent parts processed for re-use, recycling and/ or disposal.

Following the separation of the monopile & topside, the monopile will be cut, lifted and recovered to land for re-use or recycling as scrap.

Decommissioning of monopiles will involve cutting off the foundation at or just below seabed level. The material cut off from the piles will be recovered to land for recycling as scrap.

4.4.4 Inter-Array, OSP Interconnector and Offshore Export Cables

The proposed approach to the decommissioning of the buried inter-array, OSP interconnector and offshore export cables is to remove all cables. This approach acknowledges the preferences stated in the most recent guidance (BEIS, 2019; Scottish Government, 2019). However, the final methods that will be used to remove the cables will depend on the outcome from surveys and studies carried out to inform any pre-decommissioning EIA, and conclusions from the assessment of potential effects on benthic habitats and species that have colonised along the cable routes, in particular within the Southern Trench MPA.

Where, based on the outcome from the pre-decommissioning surveys, studies and EIA, it emerges that there is potential for significant adverse effects on any benthic habitats and species, it may be necessary to consider an alternative approach to decommissioning where it may be more appropriate to leave some sections of cable in-situ. If it is deemed necessary to leave sections of cable in situ, Moray West would obtain, if required, studies and evidence that could reasonably be expected in accordance with Good Industry Practice from third parties (e.g. engineering and environmental consultants, contractors) to support Moray West's decommissioning approach at the time. Where sections of cable are to be left in-situ, the cables will be cut and ends sealed to ensure that they are securely buried below the seabed. Loose ends of cable that remain from where the main cables are cut at the wind turbines and OSPs will be recovered to shore for subsequent recycling.

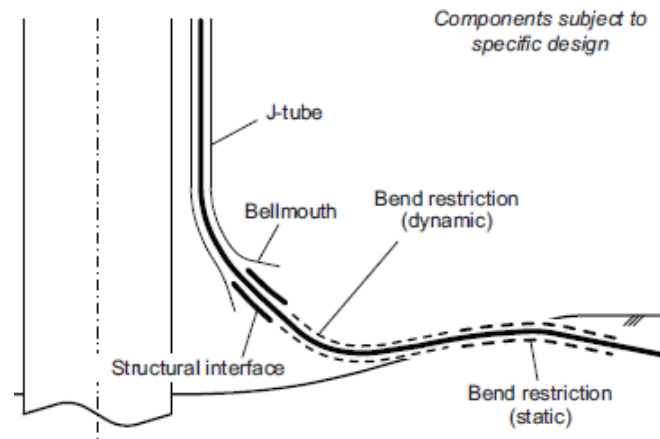
Table 4-5 below provides an assessment of the buried subsea cables decommissioning options against the guiding principles outlined in Table 4-1 above.

Table 4-5: Assessment of Buried Subsea Cable Decommissioning Options Against Guiding Principles		
Guiding Principle	Complete Removal of Cables	Cutting of Cables and Burial at a Depth That Does Not Pose a Danger to Other Sea Users
No harm to people	Risk to personnel would be greater due to increased offshore operations, however, risk is not considered excessive.	Low risk from leaving buried cables in situ. Post decommissioning site monitoring will identify any cable exposure and required mitigation to ensure that safety risk is insignificant. (see Section 14).

Table 4-5: Assessment of Buried Subsea Cable Decommissioning Options Against Guiding Principles		
Guiding Principle	Complete Removal of Cables	Cutting of Cables and Burial at a Depth That Does Not Pose a Danger to Other Sea Users
Consider the rights and needs of legitimate users of the sea	Removal affords maximum flexibility over use of seabed.	Low risk from leaving buried cables in-situ. Post decommissioning site monitoring will identify any cable exposure and required mitigation to ensure that safety risk is insignificant.
Minimise environmental impact	Given the considerable length of cable and the need for jetting techniques, removal would cause disruption to the seabed and benthic habitats.	Benign - no environmental impact associated with leaving buried cables in situ.
Promote sustainable development	Disturbance of the seabed in the short-medium term, although complete removal would allow flexibility over use of seabed in the longer term.	Some future activities, e.g. extraction, may be limited but only in a limited corridor.
Adhere to the Polluter Pays Principle	Consistent, assuming suitable disposal option is found for surplus cable components.	Benign, no pollution risk from leaving cables in-situ.
Maximise re-use of materials	Maximum material, e.g. copper, potentially available for re-use.	No re-use possible if left in situ.
Ensure commercial viability	Extensive cost of removal.	Limited cost involved with re- burial of cable ends.
Ensure practical integrity	Removal is possible but would require disturbance of seabed along full length of cable route during exposure and recovery.	Considered a standard technical solution. It is anticipated that buried cable would remain buried given the limited seabed motility in the vicinity of the Development.

4.4.4.1 Cable Connections to the WTG and OSP Foundations

As the cable protection system typically maintains a fixed structural interface to the foundation J-tubes or apertures, as is the case, it is not planned to remove the cable sections or cable protection system from the foundations prior to recovery of the structure.



The decommissioning of the cable connections is likely to form part of the piled foundation removal process and could proceed as follows:

Stage 1:

- A jack-up barge or heavy lift vessel is mobilised to the site;
- ROV to inspect each of the cable connections into the J-tube bellmouths;
- Mobilise cable handling equipment
- Identify suitable cut point near OSP subsea
- Rig cable for cutting and then lowering from topside
- Cut cable subsea (cable is now supported on hang-off only)
- Cut cables on topside (cable weight is taken by rigging)
- Lower cable from topside / pull out cable from bellmouth (approx. 100m of cable)
- Cut cable and CPS into sections for recovery to deck of a construction support vessel (CSV) (100m J-tube section)

Stage 2:

- Mobilise a vessel with a remedial protection equipment spread;
- Identify the exposed cable / cable protection system end sections post foundation removal;

- Complete burial of cable ends to required minimum of depth of lowering or equivalent depth of cover as defined in the Moray West Offshore Wind Farm Cable Plan and the Moray West OfTI Cable Plan¹⁰ ensuring no further hazard is presented to fishing or other human activities.

4.4.4.2 Landfall below MHWS

As described in Section 4.4.4 above, the proposed approach is that all cables will be removed as part of the decommissioning. This includes all sections of export cable that are located within the HDD ducts, in so far as engineering and environmental studies and surveys carried out pre-decommissioning confirm that it is technically feasible, safe and environmentally desirable to remove the cables. However, where there is potential for cable removal to affect the integrity of the HDD ducts, which are to remain in-situ as discussed below, it may be necessary for the cables to also be left in-situ, with cable ends cut well within the main duct to ensure that they remain buried well beneath the seabed / ground and therefore are not at risk of becoming exposed in the future.

Given the length and depth of burial beneath the coast of the HDD ducts, it is proposed that these are left in-situ, as described in Table 4-5. This is on the basis that removal of the ducts is likely to require significant excavation of the seabed (in the nearshore area) and ground onshore. Leaving the HDD ducts in situ long term is not considered to have any environmental or pollution impacts; nor is it considered to pose safety risks to mariners, navigation and commercial fisheries, or public land users at the landfall. As part of the HDD design and specification, studies have been undertaken to determine a suitable depth for the HDD ducts below the seabed and demonstrate that these are unlikely to become exposed. Further details will be provided in the Moray West OfTI Cable Plan.

4.4.5 Cable and Scour Protection

Should cable protection need to be installed and where scour protection around foundations is required a determination of the decommissioning procedure will be presented in the Final DP. For the purposes of this Draft DP and in recognition of the BEIS and Scottish Government Draft Consultation Guidance (BEIS, 2019; Scottish Government, 2019), it is expected that any protection installed around foundations or covering cables will be left in situ to preserve the marine habitat that will have established over the life of the Development, on the assumption that to do so would not have a detrimental impact on the environment, conservation aims, the safety of navigation and other uses of the sea.

When preparing the Final DP, all proposals for decommissioning cable and scour protection will be developed in accordance with the Guiding Principles included in Table 4-1 and all options would be subject to a comparative assessment as undertaken for the other wind farm components.

As part of this assessment, it will be necessary to justify decommissioning in situ by considering the extent to which any cable and scour protection has been colonised by marine life and the nature and biodiversity

¹⁰ Moray West Offshore Wind Farm Cable Plan and OfTI Cable Plan will be submitted to the Licensing Authority for its written approval in 2022.

value of the habitats and species present to determine whether leaving in-situ is the most appropriate approach. In developing final methods for decommissioning scour protection it will also be necessary to consider the type of protection measures that are in place and available technology at the time.

4.5 Proposed Waste Management Solutions

Moray West is committed to maximising the re-use of waste materials and will give full regard to the 'waste hierarchy' which suggests that re-use should be considered first, followed by recycling, incineration with energy recovery and, lastly, disposal. In any event, waste management will be carried out in accordance with all relevant legislation and with any necessary disposal taking place at licensed facilities.

The proposed approach to the disposal of the main components of the Development is set out in Table 4-7 below.

Table 4-7: Proposed Disposal Route for Main Wind Farm Components		
Waste Material	Pre-Treatment	Re-use/ Recycle/ Disposal
WTG and OSP support structures (piled foundations)	Establish remaining design life.	Re-use by repowering with new/superior WTGs or other renewable generation technology or dismantle and recycle the recovered material as much as possible.
Steel from WTG tower and nacelle removed to shore	Break down into transportable size.	Recycle.
Copper from power cables and transformers	Strip copper from power cables and transformers.	Recycle.
Glass-fibre Reinforced Epoxy (GRE) from wind turbine blades	Break down into transportable size.	Recycle where facilities exist or disposal if no alternative.
Steel from OSP topsides	Break down into transportable size.	Recycle.
Used lubricants from WTG	Filter.	Recycle.
Non-recyclable materials and fluids	None.	Incineration with energy recovery or disposal via landfill.

These approaches are likely to be subject to evolution of technology, change in regulations and demand for materials over the lifetime of the Development and therefore will be subject to review as part of the preparation of a Waste Management Plan (WMP) which will be included in the final DP. The final DP will be prepared prior to the commencement of decommissioning.

4.6 Lighting and Marking

In accordance with the requirements of Moray West's Section 36 Consent and Marine Licences, the appropriate marks and lights shall be exhibited during the decommissioning of the Development.

In relation to aviation safety, the shape, colour and character of the lighting will be compliant with the Air Navigation Order 2016 (or the current legislation at the time or as otherwise directed by the Civil Aviation Authority (CAA)).

In relation to navigational safety, lights and markings will be discussed with the Northern Lighthouse Board (NLB), in consultation with the Maritime and Coastguard Agency (MCA). In particular, the NLB will be consulted prior to decommissioning to specify any obstruction marking that may be required during the removal operations. In the event that any obstruction is left on site that may be considered to present a hazard to navigation the necessary marking specified by NLB will be displayed.

4.7 Potential for Phasing and Integration

It is possible that there may be synergies and interactions between decommissioning activities at the Moray West Site. Moray West will promote formal industry collaboration on this issue and, as a minimum, will approach the developers of the Beatrice Offshore Wind Farm and Moray East Offshore Wind Farm to consider potential opportunities as part of the ongoing DP review process. However, Moray West's starting assumption is that decommissioning will be undertaken in isolation at the Moray West Site in order that the provisions can be fully costed, and sufficient financial security provided.

The status and requirements of surrounding projects will be carefully considered in the planning and execution of the decommissioning process. Any sharing of decommissioning activities would influence the phasing of the works.

5 Environmental Impact Assessment

5.1 Introduction

In support of the Section 36 Consent and Marine Licence applications Moray West undertook an EIA, the conclusions of which are presented in the Moray West EIA Report (July, 2018).

In complying with the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) a lifecycle approach was taken to the assessment of potential effects of the Development. This included an assessment of all potential effects during construction, operation and maintenance and decommissioning.

Each impact was assessed against agreed 'worst case scenarios' design parameters. Details of these worst case scenario design parameters are presented in the respective chapters of the EIA Report. With respect to decommissioning, these worst case scenarios were representative of the proposed approach to decommissioning the various components of the Development described previously in Section 4.

A summary of the conclusions of effect significance as presented in the EIA Report is provided in Table 5-1 below.

It should be noted that these conclusions assume that there will be no requirement to remove the piled foundations (these will be cut at a point below the seabed to reduce the potential for exposure in the future). Should it be determined that removal of the piled foundations is required, this will be subject to a more detailed assessment as part of the review of the EIA that will be undertaken pre-decommissioning.

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Physical processes and water quality					
Increases in SSC and deposition of disturbed sediment to the seabed within the Moray West Site and Offshore Export Cable Corridor	Pathway not receptor	N/A (marine processes receptors insensitive to change)	N/A	N/A (marine processes receptors insensitive to change)	N/A as no overlap in decommissioning activities with other Moray Firth projects.
Impacts to designated marine and coastal geomorphological features (due to decommissioning activities)	Designated marine and coastal geomorphological features	Minor adverse	N/A	N/A	N/A as no overlap in decommissioning activities with other Moray Firth projects.
Impacts to Smith Bank (due to decommissioning activities)	Smith Bank	Negligible	N/A	N/A	N/A as no overlap in decommissioning activities with other Moray Firth projects.
Changes to water quality from chemical releases	Water quality	Minor adverse	N/A	N/A	
Changes to water quality from contaminated sediments	Water quality	Minor adverse	N/A	N/A	
Benthic and intertidal ecology					

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Temporary Habitat Loss / Habitat Disturbance	Benthic and intertidal habitats and species	Minor adverse	N/A	N/A	N/A as no overlap in decommissioning activities with other Moray Firth projects.
Loss of Habitat from Removal of Introduced Hard Substrate	Benthic and intertidal habitats and species	Minor adverse	N/A	N/A	
Increased Suspended Sediments/Sediment Deposition	Benthic and intertidal habitats and species	Negligible – Minor adverse	N/A	N/A	
Noise and Vibration	Benthic and intertidal habitats and species	Negligible – Minor adverse	N/A	N/A	
Accidental and Controlled Discharges	Benthic and intertidal habitats and species	Negligible – Minor adverse	N/A	N/A	
Risk of Introduction of MINNS	Benthic and intertidal habitats and species	Minor adverse	N/A	N/A	
Fish and shellfish ecology					
	Demersal / spawning adults	Minor adverse	N/A	N/A	N/A as no overlap in decommissioning activities

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Temporary habitat loss/ habitat disturbance	(sandeel, herring, cod)				with other Moray Firth projects.
	Brown crab, European lobster, scallop, <i>Nephrops</i>	Minor Adverse	N/A	N/A	
	All other fish and shellfish	Negligible to minor	N/A	N/A	
Increased SSC / sediment deposition	Scallops	Minor Adverse	N/A	N/A	N/A as no overlap in decommissioning activities with other Moray Firth projects.
	Spawning grounds	Minor Adverse	N/A	N/A	
	Fish	Negligible to minor	N/A	N/A	
	Shellfish	Negligible to minor	N/A	N/A	
Noise and vibration	Sea lamprey	Negligible	N/A	N/A	
	Herring, sprat, cod, whiting, salmonids	Negligible to minor	N/A	N/A	
	All other fish and shellfish	Negligible	N/A	N/A	
Removal of structures and hard substrates	Shellfish	Minor Adverse	N/A	N/A	
	Fish	Negligible or minor	N/A	N/A	

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Accidental release of hydrocarbons and chemicals	All fish and shellfish species	Minor Adverse	N/A	N/A	
Marine mammals					
Underwater noise	All species	Minor Adverse	N/A	N/A	N/A as no temporal overlap in decommissioning activities with other Moray Firth projects
Vessel collision risk	All species	Minor Adverse	N/A	N/A	
Reduction in prey availability	All species	Minor Adverse	N/A	N/A	
Reduction in foraging ability	All species	Minor Adverse	N/A	N/A	
Ornithology					
Disturbance / displacement	Eider	Negligible	None	N/A	Scoped out of cumulative assessment
Disturbance / displacement	Long-tailed duck	Negligible	None	N/A	Scoped out of cumulative assessment
	Common scoter	Negligible	None	N/A	Scoped out of cumulative assessment
	Velvet scoter	Negligible	None	N/A	Scoped out of cumulative assessment
	Goldeneye	Negligible	None	N/A	Scoped out of cumulative assessment

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Red-breasted merganser	Negligible	None	N/A	Scoped out of cumulative assessment
	Red-throated diver	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Great northern diver	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Shag	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Slavonian grebe	Negligible	None	N/A	Scoped out of cumulative assessment
	Guillemot	Moderate adverse	None	N/A	Scoped out of cumulative assessment
	Razorbill	Moderate adverse	None	N/A	Scoped out of cumulative assessment
	Puffin	Minor adverse	None	N/A	Scoped out of cumulative assessment
Disturbance / displacement	Scaup	Negligible	None	N/A	Scoped out of cumulative assessment
Indirect effects (prey and habitat loss)	Eider	Negligible	None	N/A	Scoped out of cumulative assessment

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Long-tailed duck	Negligible	None	N/A	Scoped out of cumulative assessment
	Common scoter	Negligible	None	N/A	Scoped out of cumulative assessment
	Velvet scoter	Negligible	None	N/A	Scoped out of cumulative assessment
	Goldeneye	Negligible	None	N/A	Scoped out of cumulative assessment
	Red-breasted merganser	Negligible	None	N/A	Scoped out of cumulative assessment
	Red-throated diver	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Great northern diver	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Fulmar	Negligible	None	N/A	Scoped out of cumulative assessment
	Gannet	Negligible	None	N/A	Scoped out of cumulative assessment
	Shag	Negligible	None	N/A	Scoped out of cumulative assessment

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Indirect effects (prey and habitat loss)	Slavonian grebe	Negligible	None	N/A	Scoped out of cumulative assessment
	Guillemot	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Razorbill	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Puffin	Minor adverse	None	N/A	Scoped out of cumulative assessment
	Kittiwake	Negligible	None	N/A	Scoped out of cumulative assessment
	Herring gull	Negligible	None	N/A	Scoped out of cumulative assessment
	Great black-backed gull	Negligible	None	N/A	Scoped out of cumulative assessment
	Scaup	Negligible	None	N/A	Scoped out of cumulative assessment
Pollution effects	Eider	Negligible	None	N/A	Scoped out of cumulative assessment
	Long-tailed duck	Negligible	None	N/A	Scoped out of cumulative assessment

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Common scoter	Negligible	None	N/A	Scoped out of cumulative assessment
	Velvet scoter	Negligible	None	N/A	Scoped out of cumulative assessment
Pollution effects	Goldeneye	Negligible	None	N/A	Scoped out of cumulative assessment
	Red-breasted merganser	Negligible	None	N/A	Scoped out of cumulative assessment
	Red-throated diver	Negligible	None	N/A	Scoped out of cumulative assessment
	Great northern diver	Negligible	None	N/A	Scoped out of cumulative assessment
	Fulmar	Negligible	None	N/A	Scoped out of cumulative assessment
	Gannet	Negligible	None	N/A	Scoped out of cumulative assessment
	Shag	Negligible	None	N/A	Scoped out of cumulative assessment
	Slavonian grebe	Negligible	None	N/A	Scoped out of cumulative assessment

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Guillemot	Negligible	None	N/A	Scoped out of cumulative assessment
	Razorbill	Negligible	None	N/A	Scoped out of cumulative assessment
	Puffin	Negligible	None	N/A	Scoped out of cumulative assessment
	Kittiwake	Negligible	None	N/A	Scoped out of cumulative assessment
Pollution effects	Herring gull	Negligible	None	N/A	Scoped out of cumulative assessment
	Great black-backed gull	Negligible	None	N/A	Scoped out of cumulative assessment
Commercial fisheries					
Adverse effects on commercially exploited Fish and Shellfish Populations	All fleets	Minor Adverse	N/A	N/A	Minor
Temporary loss or restricted access to traditional fishing grounds	Creel fleet	Minor Adverse	N/A	N/A	Minor
	Mackerel jigging fleet	Minor Adverse	N/A	N/A	Minor

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Demersal trawl fleet in general	Minor Adverse	N/A	N/A	Minor
	Local Nephrops fleet	Minor Adverse	N/A	N/A	Minor
	Local squid fleet	Minor Adverse	N/A	N/A	Minor
	Local whitefish fleet	Minor Adverse	N/A	N/A	Minor
	Local scallop fleet	Minor Adverse	N/A	N/A	Minor
	Nomadic scallop fleet	Minor Adverse	N/A	N/A	Minor
	Scottish seine fleet	Negligible	N/A	N/A	Scoped out of cumulative assessment
Safety issues for fishing vessels	All fleets	Within acceptable limits	N/A	N/A	Scoped out of cumulative assessment
Increased steaming times to fishing grounds	Creel fleet	Negligible	N/A	N/A	Negligible
	Mackerel jigging fleet	Negligible	N/A	N/A	Negligible
	Demersal trawl fleet (including local fleets)	Negligible	N/A	N/A	Minor

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Scallop dredging fleet (local and nomadic)	Negligible	N/A	N/A	Minor
	Scottish seine fleet	Negligible	N/A	N/A	Scoped out of cumulative assessment
Interference with fishing activities	Creel fleet	Minor Adverse	N/A	N/A	Minor
	Mackerel jigging fleet	Negligible	N/A	N/A	Negligible
	Demersal trawl fleet (including local fleets)	Negligible	N/A	N/A	Negligible
	Scallop dredging fleet (local and nomadic)	Negligible	N/A	N/A	Negligible
	Scottish seine fleet	Negligible	N/A	N/A	Negligible
Displacement of fishing activity into other areas	Creel fleet	Minor Adverse	N/A	N/A	Minor
	Mackerel jigging fleet	Minor Adverse	N/A	N/A	Minor
	Demersal trawl fleet in general	Minor Adverse	N/A	N/A	Minor

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Local Nephrops fleet	Minor Adverse	N/A	N/A	Minor
	Local squid fleet	Minor Adverse	N/A	N/A	Minor
	Local whitefish fleet	Minor Adverse	N/A	N/A	Minor
	Local scallop fleet	Minor Adverse	N/A	N/A	Minor
	Nomadic scallop fleet	Minor Adverse	N/A	N/A	Minor
	Scottish seine fleet	Negligible	N/A	N/A	Scoped out of cumulative assessment
Obstacles on the seabed post construction	All fleets	Within acceptable limits	N/A	N/A	Scoped out of cumulative assessment
Shipping and navigation					
Vessel displacement	Commercial fishing vessels	Broadly Acceptable	N/A	N/A	Scoped out of cumulative assessment.
Allision (vessel to structure) risk	All vessels	Broadly Acceptable	N/A	N/A	Scoped out of cumulative assessment.
Anchor interaction and snagging	All vessels	Broadly Acceptable	N/A	N/A	Scoped out of cumulative assessment.
Military and civil aviation					

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Radar interference from operating turbines	NERL Allanshill PSR	Not significant	N/A	Not significant	Aviation receptors considered on a case by case basis and measures applied to mitigate against any potential effects. If an effect is not significant at the Project level then it is considered sufficiently managed so as not to result in an additive cumulative effect.
	RAF Lossiemouth PSR	Not significant	N/A	Not significant	
Interference with aircraft approach procedures	Wick Airport	Not significant, subject to continuation of mitigation applied during operation.	N/A	Not significant	
Helicopter Main Route X-RAY	Helicopter operators	Not significant	N/A	Not significant	
Interference with helicopter approach procedures	Helicopter operators	Not significant	N/A	Not significant	
Minimum safe altitude	Aircraft operators	Not significant, subject to continuation of mitigation applied during operation.	N/A	Not significant	
SLVIA					
Daytime visual effects on representative viewpoints	Viewpoint 1: Duncansby Head	Not significant	N/A	N/A	Scoped out of cumulative assessment

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Viewpoint 2: Keiss (A99)	Not significant	N/A	N/A	Scoped out of cumulative assessment
	Viewpoint 3: Wick (path south of South View)	Significant	N/A	N/A	Scoped out of cumulative assessment
	Viewpoint 4: Sarclet (Sarclet Haven Info Board)	Significant	N/A	N/A	Significant
	Viewpoint 5: Whaligoe Steps	Significant	N/A	N/A	Significant
	Viewpoint 6: Minor Road (south east of Osclay)	Significant	N/A	N/A	Significant (subject to positive determination of project applications currently under consideration by the relevant licensing authority)
	Viewpoint 7: Lybster (end of Main Street)	Significant	N/A	N/A	Significant
	Viewpoint 8: Latheron (A9)	Significant	N/A	N/A	Significant

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Daytime visual effects on representative viewpoints	Viewpoint 9a: Dunbeath (nr Heritage Centre)	Significant	N/A	N/A	Significant
	Viewpoint 9b: Dunbeath (by harbour)	Significant	N/A	N/A	Significant
	Viewpoint 10: Morven	Not significant	N/A	N/A	Significant (subject to positive determination of project applications currently under consideration by the relevant licensing authority)
	Viewpoint 11: Berriedale (A9)	Significant	N/A	N/A	Significant
	Viewpoint 12: Navidale	Significant	N/A	N/A	Significant
	Viewpoint 13a: Brora (picnic area off Salt Street)	Not significant	N/A	N/A	Not significant
	Viewpoint 13b: Dornoch (beach parking)	Not significant	N/A	N/A	Not significant

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Viewpoint 14: Tarbat Ness Lighthouse	Not significant	N/A	N/A	Not significant
Daytime visual effects on representative viewpoints	Viewpoint 15: Burghead Visitor Centre	Not significant	N/A	N/A	Not significant
	Viewpoint 16: Lossiemouth Harbour – day and night time	Not significant	N/A	N/A	Not significant
	Viewpoint 17: Buckie (Cliff Terrace)	Not significant	N/A	N/A	Not significant
	Viewpoint 18: Bin Hill	Not significant	N/A	N/A	Not significant
	Viewpoint 19 Portnockie (Bow Fiddle Rock Info Point):	Not significant	N/A	N/A	Significant
	Viewpoint 20: Cullen (viaduct)	Not significant	N/A	N/A	Significant

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Viewpoint 21: Findlater Castle	Not significant	N/A	N/A	Significant
	Viewpoint 22: Sandend	Significant (during Construction / Decommissioning only)	N/A	N/A	Not significant
	Viewpoint 23: Portsoy	Not significant	N/A	N/A	Not significant
Visual effects on people in settlements	Wick	Significant	N/A	N/A	Not significant
	Thrumster	Not significant	N/A	N/A	Not significant
	Lybster	Significant	N/A	N/A	Significant
	Latheronwheel	Significant	N/A	N/A	Significant
	Dunbeath	Significant	N/A	N/A	Significant
	Helmsdale	Significant	N/A	N/A	Significant
	Brora	Not significant	N/A	N/A	Not significant
	Sandend	Significant (during Construction / Decommissioning only)	N/A	N/A	Not significant

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Visual effects on people using routes	A9 (Brora to Spittal)	Significant	N/A	N/A	Significant
	A99 (Latheron to Wick)	Significant	N/A	N/A	Significant
	Far North Line (Brora to Helmsdale)	Significant	N/A	N/A	Significant
Night time visual effects on representative viewpoints	Viewpoint 3: Wick (path south of South View)	Not significant	N/A	N/A	Not assessed cumulatively
	Viewpoint 9a: Dunbeath (nr Heritage Centre)	Significant	N/A	N/A	Not assessed cumulatively
Night time visual effects on representative viewpoints	Viewpoint 12: Navidale	Significant	N/A	N/A	Not assessed cumulatively
	Viewpoint 16: Lossiemouth Harbour	Not significant	N/A	N/A	Not assessed cumulatively
Impact on Landscape character types	Sweeping Moorland - 25	Not significant	N/A	N/A	Not significant

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Small Farms and Crofts -23	Significant	N/A	N/A	Significant
	Moorland Slopes and Hills - 18	Significant	N/A	N/A	Significant
	Coastal Shelf -6	Not significant	N/A	N/A	Significant (subject to positive determination of project applications currently under consideration by the relevant licensing authority)
	Coastal High Cliffs and Sheltered Bays - 11	Significant	N/A	N/A	Significant
	Long Beaches Dunes and Links - 16	Not significant	N/A	N/A	Not significant
Regional coastal characters areas	Sarclet Head - G	Significant	N/A	N/A	Significant
Regional coastal characters areas	Lybster Bay - H	Significant	N/A	N/A	Significant
	Dunbeath Bay - I	Significant	N/A	N/A	Significant

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
	Helmsdale to Berriedale Coastal Shelf - J	Significant	N/A	N/A	Significant
	Brora to Helmsdale Deposition Coast - K	Not significant	N/A	N/A	Not significant
Landscape planning designations	Dunbeath Castle GDL (Gardens and Designed Landscapes)	Significant	N/A	N/A	Significant
	Dunrobin Castle GDL	Not significant	N/A	N/A	Not significant
	Flow Country and Berriedale Coast SLA (Special Landscape Area)	Significant	N/A	N/A	Significant
	Loch Fleet, Loch Brora and Glen Loth SLA	Not significant	N/A	N/A	Significant (subject to positive determination of project applications currently under consideration by the relevant licensing authority)

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Socio-economics, recreation and tourism					
Direct and indirect construction employment	Construction employment	<p>Local study area: minor beneficial significance for the low assessment scenario; Major beneficial significance for the high assessment scenario.</p> <p>Scotland: minor beneficial significance for low assessment scenario Moderate beneficial significance for high assessment scenario.</p>	N/A	N/A	Major beneficial significance
Direct and indirect construction Gross Value Added (GVA)	GVA	<p>Local study area: minor beneficial significance for the</p>	N/A	N/A	Major beneficial significance

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
		low assessment scenario; Major beneficial significance for the high assessment scenario. Scotland: minor beneficial significance for low assessment scenario Moderate beneficial significance for high assessment scenario.			
Change in demand for housing and local services associated with influx of labour in the local study area	Housing and local services in local study area	Negligible	N/A	N/A	Minor adverse significance
Access to, and enjoyment of, watersports activity in the local study area	Watersports activity in local study area	Negligible	N/A	N/A	Scoped out of cumulative assessment on basis

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
					construction related effects only
	Moray Firth Surfers (Sandend)	Minor adverse significance	N/A	N/A	Scoped out of cumulative assessment on basis construction related effects only
Change in economic activity onshore supported by local watersports activity: local study area	Economic activity supported by local watersports activity in Local Study Area	Minor adverse significance	N/A	N/A	Scoped out of cumulative assessment on basis construction related effects only
Archaeology and cultural heritage					
Contamination, damage to, or loss of, marine archaeology assets resulting from direct physical impacts	Seabed prehistory and seabed features including maritime and aviation sites and intertidal heritage assets	Minor Adverse or Positive (based on opportunities to identify and record new assets)	N/A	N/A	Negligible to Minor Adverse
Other human activities					
Disturbance of existing offshore wind farm activities	Offshore wind farm operators	Minor adverse	N/A	N/A	No cumulative effect

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Table 5-1: Summary of decommissioning impacts as presented in the EIA Report (Moray West, 2018)

Potential Impact	Receptors	Significance of Effect	Additional Mitigation Measures	Residual Effect	Cumulative Effect
Disturbance of existing subsea cables	Subsea cable operators	Minor adverse	Cable crossing and proximity agreements	Minor adverse	No cumulative effect
Disturbance of oil exploration and decommissioning activities	Oil block licence holders Oil infrastructure operators	Minor adverse	N/A	N/A	Oil and gas exploration: negligible or minor Decommissioning activities: No cumulative effect
Disturbance of marine disposal activities	Buckie marine disposal site	Negligible or minor adverse	N/A	N/A	No cumulative effect
Risks associated with UXO	Offshore workers	Negligible	N/A	N/A	Scoped out of cumulative assessment

5.2 Next Steps

Moray West will commence consultation in relation to the environmental impact of decommissioning three years in advance of the start of decommissioning. At that point the assessment presented in the Application documents will be reviewed taking account of the final decommissioning strategy under consideration. Subject to the results of this consultation, and provided that there have not been substantial changes to the baseline environment beyond those predicted in the Application documents, to the legislative process or to the methods proposed for decommissioning, it is not currently anticipated that an EIA will be required for decommissioning. The requirement for an EIA will be revisited at that time.

The need for a new EIA will be considered against the relevant Environmental Impact Assessment Regulations in place at the time of decommissioning. If required, the decommissioning EIA will fill any information gaps in relation to these issues and would also describe the measures envisaged to avoid, reduce and, if possible, remedy any likely significant adverse impacts arising from the decommissioning process. The outcomes of the EIA will be used to consider the final decommissioning options that will be detailed in the DP.

6 Consultations with Interested Parties

Section 105(7) of the Energy Act 2004 provides that a notice given under Section 105 may require the recipient of the notice to carry out consultation specified in the notice before submitting a DP.

The Section 105 notice issued to Moray West by Scottish Ministers on 12th September 2019 sets out those bodies to be consulted on this DP. The Section 105 notice identified a number of consultees who should receive a copy of this draft DP for comment. Key stakeholders identified in Schedule 2 of the Section 105 notice are as follows:

- NatureScot (previously Scottish Natural Heritage (SNH))
- Scottish Environment Protection Agency (SEPA)
- Aberdeenshire Council, Moray Council and The Highland Council
- Maritime and Coastguard Agency (MCA)
- Northern Lighthouse Board (NLB)
- Scottish Fishermen's Federation (SFF)
- Scottish White Fish Producers Association Limited
- North & East Coast Inshore Fisheries Groups
- Relevant Harbour Authority
- Royal Yacht Association (RYA) Scotland
- Chamber of Shipping

Note - These are standard consultees, MS-LOT will refer to marine licence consultees for other relevant and appropriate stakeholders that should be consulted and will advise Moray West.

Throughout the development's lifespan the DP may be revised periodically as new information relevant to the decommissioning strategy becomes available. Consultee bodies listed in the Section 105 notice, and any other relevant consultees identified by MS-LOT, will be provided with the opportunity to comment on the final decommissioning strategy prior to it being finalised. It is anticipated that the final revision process will commence two years prior to the initiation of decommissioning.

At the time of decommissioning, Moray West will issue timely and efficient Notices to Mariners (NtMs) and other navigational warnings of the position and nature of the decommissioning activities taking place. Efforts will be made to ensure that this information reaches mariners in the shipping and fishing industry as well as recreational mariners. The UK Hydrographic Office (UKHO) will be notified as appropriate on the progress and completion of the works.

7 Schedule

A full decommissioning schedule will be provided closer to the point of decommissioning setting out the detailed programme of the proposed decommissioning works for consultation with the relevant authorities.

At this stage it is anticipated that decommissioning would commence in the year 25 after final commissioning of the Development, in line with Section 36 Consent and Marine Licence conditions (but noting the options set out in Section 4.3). The DP will be reviewed periodically throughout the operational phase of the Wind Farm in accordance with the BEIS Guidance (BEIS, 2019) and Scottish Government's draft Consultation Guidance (Scottish Government, 2019), or the relevant guidance at the time. A final review of the DP is expected to commence two years prior to the anticipated start date of the decommissioning operations.

It is anticipated that the full decommissioning of the Development will take approximately, but no less than, 12 months to complete. Offshore decommissioning and onshore dismantling of the decommissioned infrastructure would run in parallel.

8 Project Management and Verification

8.1 DP Review Process

Internal reviews of the DP will be undertaken throughout the lifetime of the Development. As discussed in Section 1, the review schedule will be agreed with MS-LOT taking account of the review points suggested in both the BEIS Guidance (BEIS, 2019) and the Scottish Government's draft Consultation Guidance (Scottish Government, 2019). A summary of these review points is provided below:

- Post construction report to be submitted to Scottish Ministers within one year of completion of construction. This report should include information on any issues raised during construction which may impact eventual decommissioning methods and costs;
- A comprehensive review 12-18 months before the first security provision is due to identify any changes in assumptions on costs and risks where these might affect size or timings of financial securities;
- Annual reviews to be carried out from payment of the first security to ensure the financial security provision is on track. Any changes that could affect these financial security provisions are to be reported to Scottish Ministers; and
- Consultation on the EIA required to inform the final decommissioning proposals should be commenced at least 3 years prior to commencing decommissioning with a final comprehensive review of the DP carried out at least two years prior to commencement of decommissioning.

8.2 Project Management and Verification

Once the Development is nearing the end of its operational period, Moray West will initiate a final review of the DP and finalise the detail of the decommissioning provisions. This will include project management arrangements, the schedule, costs and the verification processes to ensure decommissioning is completed. Following completion of decommissioning, a post-decommissioning report will be prepared and submitted to the Scottish Ministers, detailing how the programme was carried out. In accordance with the BEIS Guidance (BEIS, 2019) and Scottish Government draft Consultation Guidance (Scottish Government, 2019) the report will include:

- Confirmation that decommissioning has been carried out in accordance with the approved DP or an explanation of any major variances from the programme with supporting evidence (e.g. photographic evidence of infrastructure out of the water and / or survey footage of the seabed);
- Independent verification that decommissioning took place in accordance with the approved decommissioning programme and a statement detailing any deviations from the approved DP with justification;
- A compliance statement setting out how relevant regulations (environment, health and safety) have been complied with together with any instances of non-compliance;

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- A cost breakdown to enable Scottish Ministers to understand the actual cost of decommissioning compared to the predicted cost and an explanation of any major variances from forecast costs;
- The results of any multibeam, side-scan sonar surveys or other survey work undertaken to confirm that the seabed has been cleared as detailed in the final decommissioning programme; and
- Where infrastructure is left in situ, evidence that it has been cut off, buried, or otherwise made safe and treated in accordance with the decommissioning programme.
- Reference to any future monitoring and maintenance set out in the decommissioning programme.

9 Costs

The decommissioning cost information required by the Scottish Ministers will be provided in confidence when the DP is updated prior to construction commencing.

10 Financial Security

The financial security information required by the Scottish Ministers will be provided in confidence when the DP is updated prior to construction commencing.

11 Site Remediation and Seabed Clearance

In line with the details discussed in previous sections, Moray West is committed to covering the costs required to decommission the Development and restoring the Development area, as far as is reasonably practicable, to the condition that it was in prior to construction of the Development. Further details on how the site will be restored will be provided in the updated DP towards the end of the Development's life.

Consistent with the decommissioning provisions detailed above, the key restoration work will relate to ensuring that piled foundations are cut below the natural level of the seabed (WTGs and OSPs) and are made safe and adequately covered.

Where necessary, upon completion of the decommissioning works, a survey will be undertaken to ensure that all debris related to the decommissioning works has been removed. The survey will enable identification and recovery of any debris located on the seabed which may have arisen from activities related to the decommissioning process and which may pose a risk to navigation.

In accordance with the BEIS Guidance (BEIS, 2019) and the Scottish Government's draft Guidance for Consultation (Scottish Government, 2019) these surveys are to be carried out by an independent Third Party to ensure that the process of collecting and presenting evidence that the site is cleared is independent of Moray West.

The required survey area would be determined during the decommissioning phase of the Development, taking into account good practice at the time and the views of stakeholders. It is anticipated that the survey area would focus around the WTG and OSP locations and the inter array, OSP interconnector and export cable routes. Moray West is aware of the current 500 m survey radius around any oil and gas installation as set out in best practice guidance for post-decommissioning surveys. However, due to the smaller footprint of the Moray West Offshore Wind Farm installations Moray West proposes a smaller radius could be used, for example, 100 m (based on the area within which decommissioning of each structure would occur and within which the main vessel would operate).

Analysis of any survey data gathered will also ensure that items for removal and disposal relate only to the Development. Consultation with relevant stakeholders will be conducted by Scottish Ministers in the event that other anomalies of archaeological interest are identified during seabed clearance.

12 Post-Decommissioning Method, Maintenance and Management of the Site

Given that Moray West is not proposing to fully remove all of the Development infrastructure, some post-decommissioning activities will be required to identify and mitigate any unexpected risks to navigation or other users of the sea. This could be, for example, as a result of piled foundations becoming exposed through natural sediment movement. The requirement for monitoring and the extent and approach taken will be determined based on the scale of the remaining infrastructure, the risk of exposure and the risk to marine users.

It is anticipated that a post-decommissioning monitoring survey of the seabed will be carried out approximately 2 years following the completion of the decommissioning works, subject to requirements at the time.

Surveys are expected to comprise of geophysical survey techniques (such as swath bathymetry, sidescan sonar and cable tracker). The results of these surveys will be issued to MS-LOT for review and comment. The results of the post-decommissioning monitoring survey will be assessed in relation to previous surveys, particularly the seabed clearance survey, to identify any changes to bathymetry or the seabed over time. Comparison with previous surveys will allow assessment of the extent of any sediment movement, the risk of exposure of piled foundations, and the need for further monitoring.

If an obstruction appears above the seabed following decommissioning which is attributable to the Development, it will be marked so as not to present a hazard to other sea users. The navigational marking will remain in place until such time as the obstruction is removed or no longer considered a hazard. The monitoring of the obstruction will be built into any monitoring and maintenance programme.

Details of the post-decommissioning monitoring, maintenance and management will be discussed with stakeholders closer to the point of decommissioning and will consider relevant guidelines and industry standard good practice at the time.

13 Supporting Studies

To date, a number of site investigation and environmental studies have been undertaken to inform project design and which informed the EIA for the Moray West Offshore Wind Farm and the OfTI. The EIA Report (submitted as part of the Application) includes a description of the potential effects of decommissioning on the receiving environment and also includes a list of desk based and site-specific studies undertaken. The EIA Report and the Addendum can be accessed online, on the Moray West website at: <http://morayoffshore.com/moray-west/document-library/>.

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