Project Title	Beatrice Offshore Wind Farm
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Beatrice Offshore Wind Farm Decommissioning Programme [Consultation Draft]

Section 105 of the Energy Act 2004

Beatrice Offshore Wind Farm Section 36 Consent - Condition 3

For the approval of the Scottish Ministers

Rev	Date	Reason for Issue	Originator	Checker	Approver
05	01/08/2024	Consultation draft for review by Interested Parties	E. Maxwell	E. Noble	C. MacDonald

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1. Executive Summary

Beatrice Offshore Windfarm Ltd ('BOWL'), currently a joint venture between SSE Renewables, Red Rock Power, The Renewables Infrastructure Group and Equitix, was awarded Section 36 Consent under the Electricity Act 1989 by Scottish Ministers in March 2014 for the Beatrice Offshore Wind Farm (OWF). Marine Licences for the Beatrice OWF and the Beatrice Offshore Transmission Works (OfTW) were also awarded by Scottish Ministers in September 2014 under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. The Marine Licences have been subsequently varied to take account of changes to the project design.

On 15 October 2014, following consultation with the Scottish Ministers, the Secretary of State (SoS) issued a notice requiring BOWL 'to submit a Decommissioning Programme (DP), pursuant to section 105 (S105) of the Energy Act 2004 ('the Act'), prior to the commencement of construction of the Project'. (BOWL notes that since these notices were issued the responsibility for approval of decommissioning programmes has been fully devolved to the Scottish Ministers).

BOWL submitted a DP to the SoS in November 2015, pursuant to S105 of the Act, the Section 36 Consent Condition 3 and OfTW Marine Licence Condition 3.2.2.2, thereby fulfilling the requirement for a DP to be submitted prior to the commencement of construction. Following consultation with the SoS and relevant stakeholders, a final DP was submitted for approval to the Scottish Ministers November 2021. The sale of the OfTW assets to an Offshore Transmission Owner (OFTO) was agreed and completed in July 2021 and, as such, the final DP covered only the OWF assets. Responsibility for decommissioning the OfTW assets now rests with the OFTO.

On 14 July 2023, Marine Directorate - Licensing Operations Team (MD-LOT) on behalf of the Scottish Ministers, notified BOWL that the DP was rejected pursuant to Section 106 (S106) of the Act. The reasons for rejection of the DP are set out in Annex A to the S106 Notice and were primarily due to the decommissioning methodology proposed for inter array cables and cable protection which was to leave these elements in-situ.

As part of the same communication, notice was served under S105 of the Act, requiring BOWL resubmit a DP for the decommissioning of the Beatrice OWF to the Scottish Ministers. The S105 issued on 14 July 2023 requires that BOWL consult the bodies specified in Schedule 2 on the draft DP and make the consultation draft of the DP publicly available for a minimum period of 30 days. In advance of the consultation period, BOWL is required to provide a copy of the consultation draft of the DP and details of the proposed consultation process to MD-LOT.

All related onshore assets are consented under the Town and Country Planning (Scotland) Act 1997 and are therefore not considered in this DP.

This document constitutes a consultation draft DP intended to give regulatory authorities and key stakeholders an opportunity to comment on the proposals regarding the decommissioning of the Beatrice OWF. Comments received during the defined consultation period will be addressed in a subsequent version of the DP which will be submitted to the Scottish Ministers for approval.

The proposed measures set out in this DP, as summarised in Table 1-1 below, adhere to the existing Scottish, UK and international legislation, environmental requirements and guidance notes that are in force at the

time of writing, and have regard to decommissioning good practice. Additionally, BOWL has undertaken a detailed review of the S106 Notice Annex A and all reasons for rejection which have been considered in this revised DP.

In considering appropriate decommissioning provisions, BOWL has sought to adhere to the key principles set out in *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* (Scottish Government, July 2022) (the 'Scottish Government Guidance').

Table 1-1 - Proposed decommissioning measures

Project Component	Proposed Decommissioning Measures
Wind Turbines	Complete removal from site.
Wind Turbine Support Structures	Entire jacket structure removed. Pin pile foundations to be cut at 1m below the surface of the seabed so that the remaining parts do not pose a danger for shipping or fishing vessels, even if sediments should become relocated, and cut sections removed from site.
Inter-Array Cables	Complete removal from site *except* where there is a high risk to other assets (for example cable crossings if present) or to the marine environment, or health and safety concerns (in addition to extreme costs required for the removal). Where cable protection (loose rock) is to remain in-situ, the cable underneath will also remain in-situ.
Cable Protection	Loose rock to be left in-situ since recovery is likely to result significant impacts on the benthic environment and health and safety risks. Climatic impacts are also likely to be significant and options for processing and re-use of recovered materials are not currently available The proposed decommissioning measures for cable protection will be considered further in future updates of the DP and will be subject to further environmental assessment.

Methods outlined are presented based on current available technology. It is expected that by the time of decommissioning, technological changes may result in different approaches to decommissioning activities and that any relevant changes will be reflected in future revisions of the DP.

The DP details the methods associated with the future end of life decommissioning of the assets. It has been prepared based on known site characteristics and consent conditions. The DP is informed and supported by the Environmental Statement (ES) prepared for the OWF (April 2012) (and further information provided via the ES Addendum dated May 2013). In advance of decommissioning, the ES will be reviewed to assess the potential impacts that may arise and are not covered in the initial EIA process and subsequent reviews.

The Beatrice OWF has an anticipated operational period of 25 years following final commissioning, and in the absence of any extension of life, decommissioning would be required at the end of the operational period.

A cost estimate for the DP has been estimated by means of a ground-up decommissioning cost model based on the vessel, equipment and personnel requirements and the duration of the works. Financial security has been carefully considered to ensure that the liability will be met. The financial appendix has been provided to MD-LOT on a confidential basis separately for review.

This DP meets the requirements set out under Section 105(8) of the Energy Act 2004, and the S105 Notice.

2. Introduction

2.1 Background

Beatrice Offshore Windfarm Ltd ('BOWL'), currently[1] a joint venture between SSE Renewables (40%), Red Rock Power (25%), The Renewables Infrastructure Group (17.5%) and Equitix (17.5%), was awarded Section 36 Consent under the Electricity Act 1989 by Scottish Ministers in March 2014 for the Beatrice Offshore Wind Farm (OWF). Marine Licences for the OWF and the Offshore Transmission Works (OfTW) were also awarded by Scottish Ministers in September 2014 under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. The Marine Licences were varied in May 2018.

Construction of the OWF commenced in 2017 and it was fully commissioned in 2019. Production of electricity is currently forecast to cease in 2044.

BOWL (company number SC350248) has its registered office at 200 Dunkeld Road, Perth, PH1 3AQ.

2.2 Licence Conditions and Section 105 and 106 Notices

On 15 October 2014, following consultation with the Scottish Ministers, the Secretary of State (SoS) issued a notice requiring BOWL to submit a Decommissioning Programme (DP), pursuant to Section 105 (S105) of the Energy Act 2004 ('the Act'), prior to the commencement of construction of the Project.

BOWL submitted a DP to the SoS in November 2015, pursuant to S105 of the Act, the Section 36 Consent Condition 3 and OfTW Marine Licence Condition 3.2.2.2, thereby fulfilling the requirement for a DP to be submitted prior to the commencement of construction. Following consultation with the SoS and relevant stakeholders, a final DP was submitted for approval to the Scottish Ministers November 2021. The sale of the OfTW assets to an Offshore Transmission Owner (OFTO) was agreed and completed in July 2021 and, as such, the final DP covered only the OWF assets. Responsibility for decommissioning the OfTW assets now rests with the OFTO.

On 14 July 2023, MD-LOT on behalf of the Scottish Ministers notified BOWL that the DP was rejected pursuant to S106 of the Act. At the same time notice was served under S105(2) of the Act, requiring BOWL to resubmit a DP for the OWF. A copy of the S105 Notice is included at Appendix B.

This DP has been produced in accordance with the S105 Notice and the reasons for rejection set out in the S106 Notice. Table 2-1 summarises the S105 Notice, Section 36 condition and Energy Act 2004 requirements in relation to the DP.

This DP therefore applies to the OWF only. The OFTO will be required to submit for approval a DP in relation to the OfTW.

[1] At the time of consent application, BOWL was a joint venture between SSE Renewables (75%) and Repsol (25%)

Table 2-1 - Relevant S105 Notice requirements, Section 36 consent condition and Energy Act 2004 requirements

Condition Reference	Condition/Notice Text	Relevant Section of this DP
S36 Consent Condition 3	Where the Secretary of State has, following consultation with the Scottish Ministers, given notice requiring the Company to submit to the Secretary of State a Decommissioning Programme, pursuant to section 105(2) and (5) of the Energy Act 2004, then construction may not begin on the site of the Development until after the Company has submitted to the Secretary of State a Decommissioning Programme in compliance with that notice.	An earlier version of the DP was submitted in advance of the commencement of construction, as required by this condition
S105 Notice Paragraph 1	The Scottish Ministers, in exercise of their powers under section 105(2) of the Energy Act 2004 ("the Act"), hereby requires Beatrice Offshore Windfarm Limited ("BOWL") to submit to the Scottish Ministers a decommissioning programme for the Beatrice Offshore Windfarm, to be located at Smith Bank within the outer Moray Firth. The decommissioning programme relates to a renewable energy installation consisting of the electricity generating infrastructure, including but not limited to the wind turbines, associated support structures and inter-array cables under the responsibility of BOWL used for purposes connected with the production of energy from water or winds, as defined in section 104(3) of the Act.	The submission of this DP will satisfy the requirement
S105 Notice Paragraph 2	The decommissioning programme must include an estimate of expenditure likely to be incurred in carrying out decommissioning, in accordance with the template provided in Schedule 1 of this notice.	Section 8, Appendix D
S105 Notice Paragraph 3	The Scottish Ministers, pursuant to section 105(7) of the Act, hereby further requires Beatrice Offshore Windfarm Limited to consult the bodies specified in Schedule 2, as well as any other consultees identified by Beatrice Offshore Windfarm Limited and any further persons subsequently identified by the Scottish Ministers, on the draft decommissioning programme and make the consultation draft of the decommissioning programme publically available for a minimum period of 30 days	Section 7, Appendix E and Appendix F (to be populated upon receipt of responses and before submission of DP for approval by the Scottish Ministers)

Condition Reference	Condition/Notice Text	Relevant Section of this DP
S105 Notice Paragraph 4	In advance of the consultation period, Beatrice Offshore Windfarm Limited should provide a copy of the consultation draft of the decommissioning programme and details of the proposed consultation process to Marine Directorate - Licensing Operations Team (previously known as Marine Scotland – Licensing Operations Team) ("MD-LOT"). Following the consultation, a copy of the latest draft of the decommissioning programme should be provided to MD-LOT no later than 14 November 2023 for review.	The submission of this draft DP satisfies the requirement. An extension to the submission deadline to 30 September 2024 has been agreed with MD-LOT
S105 Notice Paragraph 5	The decommissioning programme should be submitted to MD-LOT within one month of the completion of the consultation. This latest draft of the decommissioning programme should include details of the consultation process, including the comments from each consultee (including 'nil returns'). Information should be provided on how any consultation responses have been reflected in the submitted draft of the decommissioning programme. You should ensure that each consultee named in Schedule 2 of this notice acknowledges receipt of the consultation document.	Section 7 outlines the consultation process. Appendix E will demonstrate how each consultation response has been reflected in the DP
Energy Act 2004 S105 (8)	A decommissioning programme—	
	(a) must set out measures to be taken for decommissioning the relevant object	Section 5 outlines measures to be taken for decommissioning
	(b) must contain an estimate of the expenditure likely to be incurred in carrying out those measures	Appendix D provides decommissioning costs
	(c) must make provision for the determination of the times at which, or the periods within which, those measures will have to be taken	Appendix C provides the indicative decommissioning schedule
	(d) if it proposes that the relevant object will be wholly or partly removed from a place in waters regulated under this Chapter, must include provision about restoring that place to the condition that it was in prior to the construction of the object; and must include provision about whatever continuing monitoring and maintenance of the object will be necessary	Section 12 details provision for restoration of the site

Condition Reference	Condition/Notice Text	Relevant Section of this DP
	(e) if it proposes that the relevant object will be left in position at a place in waters regulated under this Chapter or will not be wholly removed from a place in such waters, must include provision about whatever continuing monitoring and maintenance of the object will be necessary	Section 13 details post-decommissioning monitoring, maintenance and management of the site

2.3 Relevant Guidance

This DP has been prepared in accordance with the latest relevant guidance as follows:

- *Decommissioning of offshore renewable energy installations in Scottish Waters or in the Scottish art of the Renewable Energy Zone under the Energy Act 2004: Guidance notes for industry* (Scottish Government, July 2022) – the 'Scottish Government Guidance'
- 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, October 1989)
- *Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines* (BEIS, November 2018)
- *Guidelines for Environmental Risk Assessment and Management – Green Leaves III* (Defra, November 2011)

2.4 Updates and Amendments

This draft DP has been prepared to facilitate consultation with key stakeholders on the proposed approach to be taken by BOWL to the decommissioning of the OWF at the end of its operational life. Feedback and comments received during consultation will be incorporated into this document, which once updated will comprise the final DP which will be submitted to the Scottish Ministers for approval.

Although this DP will be finalised for approval, it will remain a live document throughout the operational life of the OWF. Consequently, there will be a requirement for the DP to be reviewed and updated on a regular basis to consider 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.

The DP will be reviewed and, where necessary, updated 5 years after approval by the Scottish Ministers and every 5 years thereafter throughout the life of the OWF.

Consultee bodies listed in the Section 105 notices, and any additional consultees identified by MD-LOT or BOWL will be provided with the opportunity to comment on the DP as it is reviewed and updated. It is

anticipated that the final revision process will commence two years prior to the initiation of decommissioning.

In addition, the DP is expected to be reviewed and, where necessary, updated at the following specific points in time, as per the Scottish Government Guidance:

- 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
- 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

2.5 Structure of this Decommissioning Programme

This DP is divided into the sections summarised in Table 2-2 below and reflects the structure for the DP as set out in Annex C of the Scottish Government Guidance.

Table 2-2 – Decommissioning Programme structure

Section	Title	Summary of Content
1	Executive Summary	Summary highlighting essential features of the DP
2	Introduction	Summary of S36 Consent and Energy Act 2004 requirements for a Decommissioning Programme. Confirmation of the companies that are party to the programme and their ownership status
3	Background Information	Relevant background information including: • A description of the assets to be decommissioned and their location • The physical, biological and human environment in the development area • Names and locations of nature conservation designated sites that may be affected by the decommissioning activities
4	Description of Items to be Decommissioned	A full description of all items associated with the assets to be decommissioned
5	Description of Proposed Decommissioning Measures	An overview of the proposed approach to decommissioning the assets including: • The guiding principles and industry guidance followed in the preparation of the DP • The proposed decommissioning processes for each component • A summary of the items to be left in-situ • Proposed waste management solutions
6	Environmental Impact Assessment	Details of the EIA that was prepared for the OWF and its consideration of decommissioning activities A description of the proposed approach to EIA of the decommissioning activities
7	Consultation with Interest Parties	The consultation process undertaken for the draft DP and future revisions to the DP
8	Costs and Financial Security	Cost information will be provided in line with the Scottish Government Guidance and S105 notice, in a Confidential Appendix to this DP
9	Schedule	Details of the proposed decommissioning timescale, noting that final details of the schedule are only required towards the end of the life of the OWF

Section	Title	Summary of Content
10	Project Management and Verification	Information on how BOWL will manage the implementation of the DP and provide verification to the Scottish Ministers concerning progress and compliance
11	Seabed Clearance and Restoration of the Site	Description of how BOWL intends to restore the site as far as is reasonably practicable, to the condition that it was in prior to construction of the project Proposals for confirming that, following decommissioning, the site has been cleared. This includes information on site surveys
12	Post-Decommissioning Monitoring, Maintenance and Management of the Site	Details of the post decommissioning monitoring, maintenance and management activities that will be required
13	Supporting Studies	Details of supporting studies used to inform this DP
14	References	A list of references made in this DP
Appendices		Appendix A – List of Abbreviations and Definitions Appendix B – Section 105 and Section 106 Notices Appendix C – Decommissioning Schedule Appendix D – Decommissioning Costs and Financial Security Information (Confidential) Appendix E – Consultation Matrix Appendix F – Consultation Responses

3. Background Information

3.1 Project Description

The Beatrice OWF is located in the North Sea, in the outer Moray Firth approximately 13.5km from the Caithness coast (see Figure 3-1) and consists of the following key components:

- 84 WTGs comprising installed on four-legged steel jackets, each installed on pin-piled foundations
- A network of 140km of 33kV inter-array subsea to connect strings of WTGs to each other and to the Offshore Transmission Modules (OTMs). Inter-array cables were buried where possible and where burial was not possible cable protection was installed

The Beatrice OfTW consists of two OTMs and two subsea export cables, totalling 140km in length, to transmit electricity from the OTMs to the landfall at Portgordon for connection to the onshore export cables for transmission to the onshore substation and onwards to the National Grid network. A 1.2km interconnector cable connects the two OTMs. The OfTW have been transferred to an OFTO and is therefore not subject to this DP.

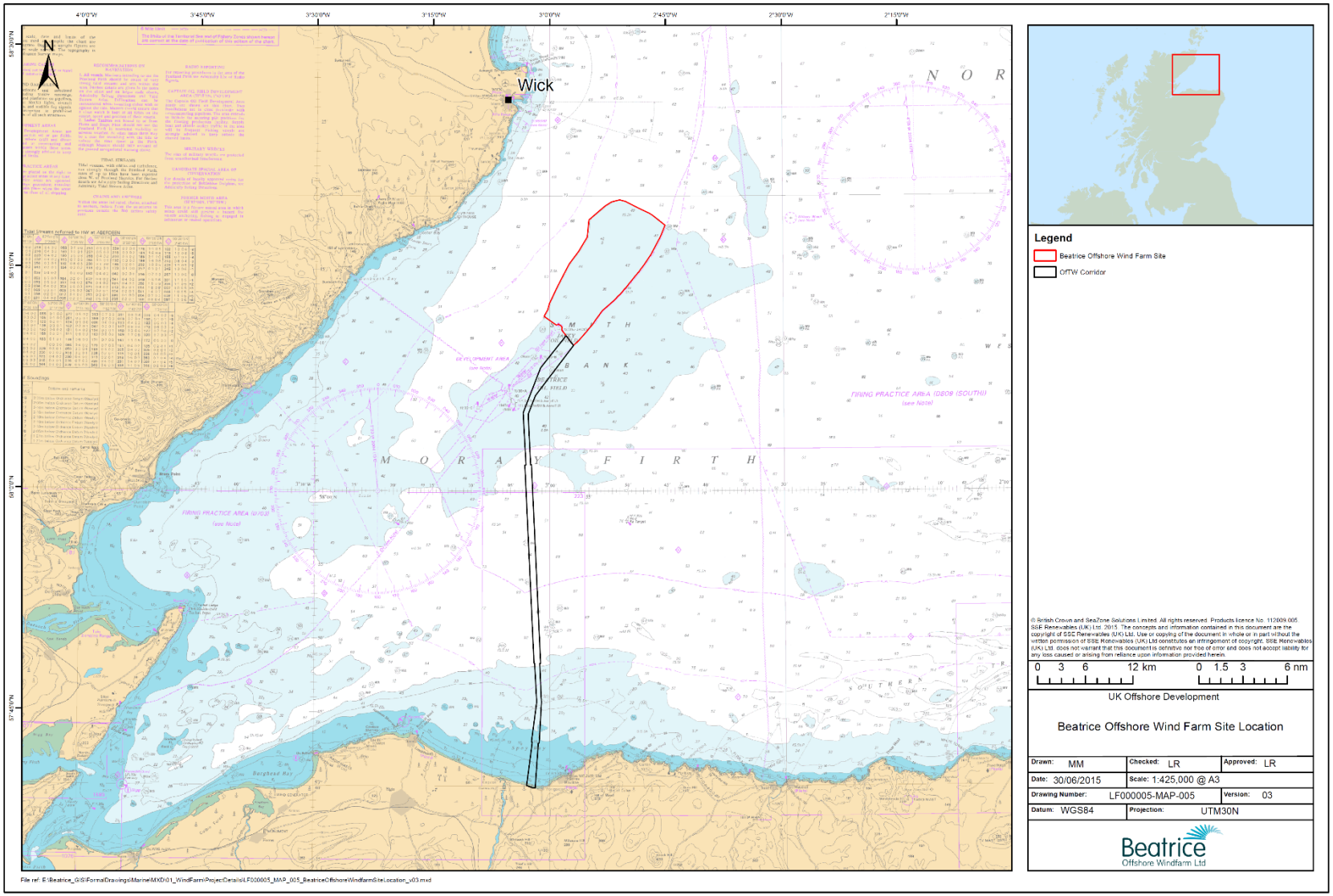

Figure 3-1 – Beatrice OWF Location

3.2 Site Characteristics

A range of surveys were completed by BOWL to establish the characteristics of the OWF Site. These studies informed the EIA for the development, reported as part of the ES and ES Addendum. The following sections provides a summary of information from those documents, updated where appropriate, to inform consideration of the decommissioning provisions and is reflective of environmental attributes identified in the Scottish Government Guidance. Refer to the ES and ES Addendum for full baseline descriptions, data sources and references.

3.2.1 Physical Characteristics

3.2.1.1 Topography and Bathymetry

The Wind Farm site is located on the Smith Bank, a submerged bathymetric high in the Outer Moray Firth. Water depths across the Wind Farm site range between 35 and 55 metres below chart datum.

3.2.1.2 Metocean Conditions

The OWF Site has the following metocean characteristics, as summarised in Table 3-1 below.

Table 3-1 – Metocean characteristics of the OWF Site

Parameter	Value
Estimated average mean wind speed	Approximately 10 m/s at 110 m above LAT
Water depth range	35 – 68 m Chart Datum (CD)
Mean surface temperature	11°C (summer) 6°C (winter)
Surface salinity range	34.5-35 ppt

Smith Bank is exposed to semi-diurnal tidal forcing. The mean neap tidal range is 1.4 m, the mean spring tidal range is 2.8 m, and the maximum (astronomical) tidal range is 4 m. The tidal current axis is aligned approximately north by northeast (ebb) by south by southwest (flood). Peak tidal current speeds over Smith Bank are generally 0.25 ms-1 during mean neap tides and 0.50 ms-1 during mean spring tides. Spatial gradients in tidal current speed result in a weak residual transport directed southwest or south, into the Moray Firth.

Non-tidal surges are known to occur in the Moray Firth, caused by the influence of strong winds and atmospheric pressure gradients associated with storms over the North Sea. Non-tidal surges can cause instantaneous water levels to be up to 1 m above or below the predicted value. Tidal surges also induce a surge current, which will be directed into the Moray Firth. The magnitude of this current will vary depending upon the scale and timing of the surge, but an extreme event may modify normal tidal currents by the order

of 1 ms^{-1}. In this area the magnitude of surge currents is predicted to decrease rapidly with distance into the Moray Firth and so the northeastern end of the Wind Farm site will experience the greatest effects.

Smith Bank is exposed to wave action on a regular basis. Winds blowing from directions from south by southeast, clockwise through to north, are only able to act upon the water surface over a relatively limited distance within the confines of the Moray Firth. Hence waves from these directions are typically more limited in height and period. Winds and hence waves (but of a limited height) most frequently occur from the southwest.

Much larger waves are observed to come from other directions that have much longer fetches into the North Sea. Over such long distances, distant storms can also drive long period swell waves into the Moray Firth that do not necessarily rely on further local wind input.

3.2.1.3 **Geology**

The main body of Smith Bank is relict and stable, comprising bedrock overlain by poorly sorted stiff clay till sediments, with a variably thick veneer of (occasionally shelly) marine sands and gravels. Sidescan sonar data indicate a predominance of granular surface sediments across the Development site, except in the shallowest parts near the crest of Smith Bank, where the underlying till is largely exposed with little sediment veneer.

Seabed sediments in the Outer Moray Firth area are broadly characterised as sandy or gravelly sandy material. The grain size of the sand fractions is generally finer than on Smith Bank.

3.2.2 **Biological Environment**

3.2.2.1 **Benthic**

The seabed at the OWF Site is dominated by sands and gravels. The most extensive benthic community occurs in medium sands with low gravel content. A range of biotopes exists across the Development Site, the SS.SCS.ICS.MoeVen (hereafter referred to as MoeVen) biotope, a Scottish Priority Marine Feature (PMF) was located within the Wind Farm site. As identified within the ES, this was a new record of this biotope in deeper waters (i.e., waters of up to 50 m).

3.2.2.2 **Fish and Shellfish Ecology**

The principal shellfish species caught within the area in which the OWF Site is located are king scallop, Nephrops, edible crab and squid. Haddock, herring, monkfish and whiting account for the majority of the fish landings. Spawning and nursery grounds have been defined for a number of species, including cod, herring, lemon sole, Nephrops, plaice, sandeel, sprat and whiting, within and in the vicinity of the Development. Elasmobranch and diadromous fish species potentially use areas within or in the vicinity of the Development.

3.2.2.3 Marine Mammals

A range of marine mammal species are present within the Moray Firth, with harbour porpoise, harbour seal, and grey seal being the most numerous and widespread recorded across the OWF Site during baseline surveys for the EIA. Minke whale were also recorded regularly within the OWF Site but in much lower abundance and only during the summer months. Distribution maps for bottlenose dolphin, a year-round resident, showed that individuals mainly occurred within the inner reaches of the Moray Firth and along the south coast, including near the Portgordon landfall location in Spey Bay. The most abundant species found within this southern area were bottlenose dolphin, harbour porpoise, and minke whale.

3.2.2.4 Ornithology

The seabird breeding colonies around the Moray Firth are host to internationally important populations of several species. Thirteen species of seabird and four species of wildfowl were identified from survey data as potential sensitive receptors, namely: Fulmar, Sooty shearwater, Shag, Gannet, Arctic skua, Great skua, Kittiwake, Great black backed gull, Herring gull, Arctic tern, Guillemot, Razorbill, Puffin, Pink footed goose, Greylag goose, Barnacle goose and Whooper Swan.

3.2.3 Human Environment

3.2.3.1 Seascape, Landscape and Visual

The OWF is visible at distances of 13.5 km and more from a number of locations along the Caithness coast. The turbines are also visible by visual receptor groups at sea where they will be seen against a backdrop of Caithness's predominately rocky cliff coastlines.

3.2.3.2 Offshore Wind Farms

The Moray East (950 MW, operational) and Moray West (882 MW, under construction) Offshore Wind Farms are located to the southeast and south of the OWF respectively. The proposed Caledonia OWF (in the ScotWind NE4 option area) lies further to the east.

3.2.3.3 Marine Archaeology

The OWF Site itself is known to have been largely restricted in the past to glacial and marine conditions; therefore never becoming terrestrialised within the last 12,000 years. Relative sea level change in the area, combined with glacial isostatic uplift, has meant that the Outer Moray Firth has remained either under ice sheets or submerged by the North Sea since the last glacial period. This means that there have been no opportunities for terrestrial deposits of palaeo-environmental interest, such as peats, to develop.

There are no recorded wrecks or features identified within the OWF Site, but several recorded wreck locations were identified within the export cable corridor and the Outer Study Area (1 km buffer from the transmission corridor boundary), with a number of potential targets of cultural heritage interest identified from the geophysical data.

3.2.3.4 Oil and Gas Exploration Activities

At the time consent was awarded, there were two producing oil fields, named 'Beatrice' and 'Jacky', located to the southwest of the OWF Site. All platforms associated with this field have now ceased production and are expected to be decommissioned. No other oil and gas activities are located at or near the OWF Site.

3.2.3.5 Subsea Cable

The SHEFA-2 fibre-optic telecommunications cable runs from the Faroe Islands to Banff in Moray. It runs north to south, to the east of the OWF Site.

The route of the transmission cable proposed by Scottish Hydro Electric Transmission Limited (SHE-T) for a Caithness-Moray link will pass to the east of the Wind Farm site. This SHE-T cable makes landfall directly to the east of the BOWL cable having run parallel with BOWL for approximately 5 km prior to reaching the shore.

3.2.3.6 Ports and Harbours

There are a number of ports and harbours located within the Moray Firth and surrounding area. These include the important fishing ports of Wick off the north east coast and Buckie Harbour on the south coast and the sheltered deepwater commercial ports and harbours of Inverness and the Cromarty Firth located at the head of the Moray Firth.

There are also a number of smaller, former fishing harbours, that have been redeveloped as small marinas and these include Banff, Whitehills, Lossiemouth and Findhorn on the south coast of the Moray Firth and Helmsdale on the north coast. The area has direct links with the Caledonian Canal (Inverness).

3.2.3.7 Shipping and Navigation

Shipping in the vicinity of the OWF Site includes commercial shipping, fishing and recreational yachting.

The OWF Site is located in an area of low commercial ship density, with the nearest main ship route passing 5 nautical miles (NM) north by northeast of the Wind Farm site boundary - the route used by ships heading to and from the Pentland Firth.

3.2.3.8 Commercial Fisheries

Scallop dredging is recorded throughout the Moray Firth, including on the Smith Bank and in inshore areas along the Caithness and Moray coasts but there is limited activity recorded within the Wind Farm site. There is additionally whitefish and squid fishing activity in the vicinity of the Wind Farm site, although the majority of activity by vessels targeting these fisheries occurs outwith the Wind Farm site.

3.2.3.9 Aviation and Military Interests

The OWF Site is visible to the primary surveillance radar (PSR) at RAF Lossiemouth and the NATS (En Route) plc (NERL) PSR at Allanshill. The Wind Farm is located in the vicinity of and directly beneath helicopter main

route (HMR) X-RAY which routes between Aberdeen and Wick, and the helicopter approaches to helidecks on platforms in the Beatrice and Jacky oil fields.

Military Practice and Exercise Area (PEXA) charts, produced by the UK Hydrographic Office, identify the military activity zones within the Moray Firth area. PEXAs are used for various military practice activities by the Royal Navy, the Army, the Royal Air Force (RAF) and the Ministry of Defence (MoD). Firing Practice Areas D807 and D809 are the closest areas (1 NM east and 2.6 NM south of the Wind Farm site) and the proposed OfTW corridor passes through Firing Practice Area D807. Tain RAF Bombing Range is located approximately 19 NM southwest.

3.2.4 Nature Conservation Designations

The closest European designations to the OWF Site are located at a distance of 16.5 km and 37 km respectively and are the Caithness Cliffs Special Protection Area (SPA) and the Moray Firth Special Area of Conservation (SAC), which are designated for the conservation of breeding bird interests, and for sub tidal sandbanks and the bottlenose dolphin respectively.

Information on European designated sites considered in the Appropriate Assessment undertaken during the consenting of the OWF is provided in Table 3-2.

Table 3-2 – Nature Conservation Designations

Site	Type	Qualifying features requiring further assessment	Assessment outcome
East Caithness Cliffs	SPA	Great black backed gull Herring gull Atlantic puffin Common guillemot Razorbill Black-legged kittiwake Northern fulmar	No Adverse Effect on Site Integrity (AEOSI)
North Caithness Cliffs	SPA	Atlantic puffin Common guillemot Razorbill Black-legged kittiwake Northern fulmar	No AEOSI
Hoy	SPA	Atlantic puffin Arctic skua Great skua	No AEOSI
Dornoch Firth and Morrich More	SAC	Common seal	No AEOSI
Moray Firth	SAC	Bottlenose dolphin	No AEOSI

Site	Type	Qualifying features requiring further assessment	Assessment outcome
		Subtidal sandbanks	
Berriedale and Langwell Waters	SAC	Atlantic salmon	No AEOSI
River Moriston	SAC	Atlantic salmon Freshwater pearl mussel	No AEOSI
River Spey	SAC	Atlantic salmon Freshwater pearl mussel Sea lamprey	No AEOSI
River Oykel	SAC	Atlantic salmon Freshwater pearl mussel	No AEOSI
River Thurso	SAC	Atlantic salmon	No AEOSI
River Borgie	SAC	Atlantic salmon Freshwater pearl mussel	No AEOSI
River Dee	SAC	Atlantic salmon Freshwater pearl mussel	No AEOSI
River Naver	SAC	Atlantic salmon Freshwater pearl mussel	No AEOSI
River Evelix	SAC	Freshwater pearl mussel	No AEOSI

4. Description of Items to be Decommissioned

This section describes the key components of the OWF that will be decommissioned. Further details of the decommissioning process are set out in Section 5. Figure 4-1 shows the as-built layout of the OWF.

4.1 Wind Turbine Generators

Horizontal axis WTGs will be used which are made up of three main external components as follows.

- Rotor – comprised of the blades, hub, spinner and spinner bracket
- Nacelle - housing the electrical generator, the control electronics and gearbox, adjustable speed drive or continuously variable transmission
- Structural support - including the tower and rotor yaw mechanism which allows the WTG rotor to turn against the wind

The main components to be decommissioned are summarised in Table 4-1.

Table 4-1 – WTG components to be decommissioned

Component	Quantity and dimensions
Wind turbine tower sections	84 towers in up to 3 sections (85m height approx.)
Wind turbine nacelles	84 Siemens 7MW nacelles (20.6 x 9 x 9.1m)
Wind turbine blades	84 x 3 rotor blades (75m length)

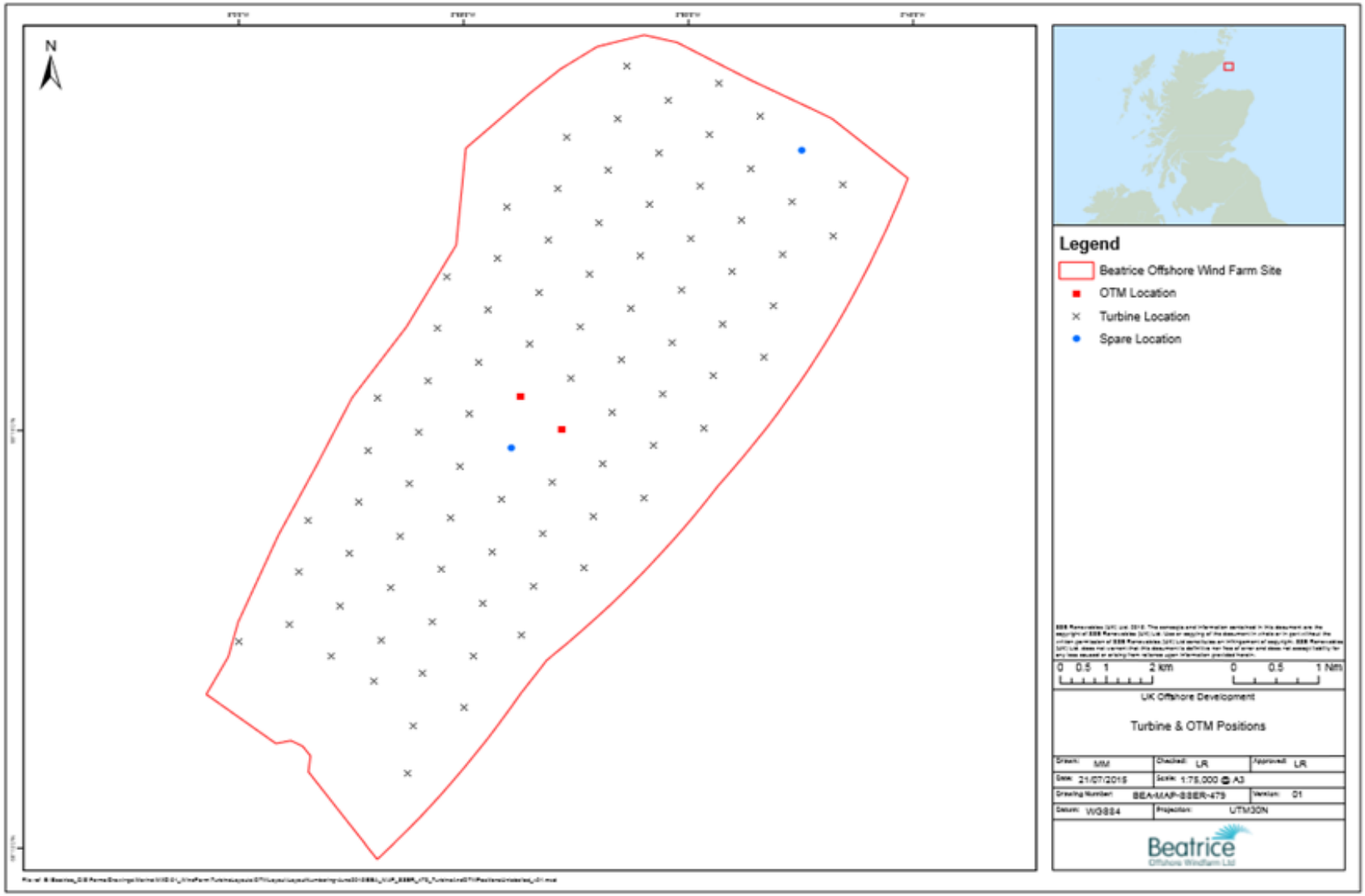

Figure 4-1 – Beatrice OWF layout

4.2 Wind Turbine Support Structures (Foundations and Substructures)

The wind turbine foundations are comprised of four steel pin piles per structure, which are attached by grouted connection to a jacket substructure.

The jacket substructures and pin piles vary in length depending on seabed conditions and water depth. The pin piles have a diameter of 2.2 m and have a length of 35 - 60 m.

The jacket substructure is of tubular steel lattice design with four legs. Transition pieces were mounted on the jacket substructures during fabrication and form the point of connection between the wind turbine tower and the support structure.

The main components to be decommissioned are summarised in Table 4-2.

Table 4-2 – WTG support structure components to be decommissioned

Component	Quantity	Tubular jacket structure
4-legged jacket structures	84	
Transition pieces	84	
Pin-piles	84 x 4 piles	

4.3 Inter-Array Cables

The inter-array cables are the cables which connect the WTGs to each other and to the OTMs, up to a defined interface with the assets under the ownership of the OFTO. The main components to be decommissioned are summarised in Table 4-3.

Table 4-3 – Array cable components to be decommissioned

Component	Description	Image
Inter-array cables	3-core 66kV protectioned submarine cable, total 140km • 28 no. Type 1 (cross-sectional area of 630mm²) • 63 no. Type 2 (cross-sectional area of 300mm²)	Example 3 core cable 

4.4 Cable Protection

Cable protection was installed in areas of harder ground conditions where the cable could not be buried to a depth necessary to achieve adequate protection of the cable.

Cable protection consists of crushed rock berms on the free-span sections of cable. The rock berms are typically 6m wide and 1m high. The rock is up to 200 mm diameter. Crushed rock is the industry standard solution for protecting long sections of cable and installation has cost, practicality, safety and programme benefits over other forms of cable protection. A total of 43,915m³ of loose rock was laid, protecting approximately 14km (10%) of the inter-array cables. No other forms of cable protection were used.

5. Description of Proposed Decommissioning Measures

5.1 Introduction

Decisions will need to be taken as to the next steps for the OWF once it approaches the end of its operational life.

Further information on options for end-of-life asset management, the guiding principles considered when developing approaches for decommissioning and the proposed decommissioning measures are provided in this section.

The proposed decommissioning approach for each component is based on current technology, methodologies and good practice. The final details of the DP will be reviewed and confirmed prior to decommissioning of the OWF to consider any changes in legislation, guidance, technology, decommissioning methods and good practice.

5.2 End of Life Asset Management

Decommissioning of the OWF is expected to occur at the end of its operational life (which, in accordance with the Section 36 Consents and Marine Licences is 25 years from the date of commissioning). However, there is potential for these timescales to vary depending on whether BOWL seeks to repower the OWF or explore other options for extending the operational life, subject to securing the necessary consents.

All decisions for end-of-life asset management will be informed by environmental surveys and assessment carried out towards the end of the operational life of the OWF. These surveys will 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. For the purpose of this DP, full decommissioning at the end of the lifetime of the OWF is assumed.

An overview of the options for end-of-life asset management and repowering for the OWF are presented below.

5.2.1 Decommissioning and Construction of a New Wind Farm

In the case that wind power is still economically attractive at the time of decommissioning, but the technical integrity of the OWF is in decline, BOWL may consider decommissioning and construction of a new wind farm. This would facilitate the installation of modern technology which may be preferable to increasing the operations and maintenance (O&M) effort required to extending the operational life of the existing wind farm. Under such a scenario, and subject to all necessary consents being granted, the existing wind farm would be decommissioned, and a new wind farm constructed.

5.2.2 Re-powering

Where the technical integrity of the WTGs is declining but the electrical infrastructure and possibly the foundations remain sound, BOWL may consider installation of new WTGs on existing foundations. The

lifetime of the electrical infrastructure could be up to 50 years and from reference to the oil and gas industry it is anticipated that the lifetime of foundations can be extended outside the original 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 WTGs to the existing foundation and electrical systems.

5.2.3 Life Extension

This scenario assumes that most of the WTGs will continue to perform sufficiently beyond 25 years. Under this scenario, the operational life of the OWF would be extended subject to obtaining the relevant consents and would be decommissioned gradually as the technical integrity of the WTGs gradually declines. 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.

5.2.4 Removal

This scenario assumes it is not preferable to invest in new technology and that WTGs and/or their foundations will not continue to perform sufficiently beyond the 25-year lifetime. In this scenario the OWF (and associated OfTW) are removed with no intention of redeveloping the site.

WTG foundations will be cut 1m below the natural level of the seabed, and the approach to decommissioning cable protection will be considered in the final DP, where the approach taken will be in line with the position set out in the Scottish Government Guidance (i.e. with the presumption of full removal unless this creates unacceptable risks to personnel or to the marine environment, be technically unfeasible or involve extreme cost.

The asset owners will liaise with other (including future) offshore wind developers and/or offshore transmission owners (OFTOs) in the vicinity of the OWF to evaluate any potential opportunities for synergy or economies of scale through decommissioning assets at the same time.

5.3 Guiding Principles

The principal aim of the provisions of sections 105 to 114 of the Energy Act 2004 is to restore the marine environment so that it can be used for other purposes including safe navigation. 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 IMO in 1989.

BOWL has also considered the UK's commitments under the United Nations Convention for the Law of the Sea (UNCLOS) and the work of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).

This means that **BOWL's starting assumption for decommissioning is the complete removal of the entire offshore wind farm**, with the offshore components being transported to shore for re-use, recycling or energy recovery leaving a clear seabed which does not pose a risk or restriction to other users of the sea in line with IMO guidance. This approach aligns with the presumption for full removal set out in section 7.5 of the Scottish Government Guidance.

The Scottish Ministers will consider exceptions from full removal in line with those standards, only on presentation of compelling evidence that removal would create unacceptable risks to personnel or to the marine environment, be technically unfeasible or involve extreme costs. The Scottish Government Guidance further recommends considering the application of the Comparative Assessment Framework developed for the oil and gas industry and detailed within the *Decommissioning of Offshore Oil and Gas Installation and Pipelines Guidance Notes* (BEIS, 2018) when developing decommissioning proposals.

The approach taken by BOWL to decommissioning the Projects will be informed by the guiding principles set out in Table 5-1 below. These are in accordance with the Scottish Government Guidance and are underpinned by the following:

- Health and safety considerations.
- Environmental impacts
- Safety of surface and subsurface navigation.
- Other uses of the sea

Table 5-1 - Comparative Assessment criteria and BOWL objectives

Assessment Criteria	Key Considerations	BOWL Objectives
Safety	No harm to people	BOWL is committed to adhering to the highest standards for safety during the life of the OWF, including the decommissioning phase.
	Consider the rights and needs of legitimate users of the sea	Minimising any real or perceived safety risk to other stakeholders active in the vicinity of the Projects during or after decommissioning.
Environmental	Minimise environmental impact	The option which provides the most benefit or least damage to the environment as a whole in both the long and short term (BPEO).
	Maximise re-use of materials	BOWL will seek to maximise re-use and recycling according to the waste hierarchy.
Technical	Ensure practical integrity	Methods necessary to achieve the objectives should be practicable, meaning feasible and realistic in the working environment.
Societal	Promote sustainable development	Ensure that future generations do not suffer from a diminished environment or have a compromised ability to use available marine resources.
	Adhere to the Polluter Pays Principle	Recognising the responsibility to sustain the costs associated with the impact on the environment.
Economic	Ensure commercial viability	The BATNEEC (Best Available Technique Not Entailing Excessive Costs) solution will be sought to ensure the commercial viability of the OWF.

5.4 Proposed Decommissioning Process

The approach to decommissioning of the Projects described below builds on the guiding principles set out in Table 5.1 and reflects the UK and Scotland's commitment to seek decommissioning provisions in accordance with national and international legislation and standards.

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 their detailed design. 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 OWF.

In developing this DP, BOWL has sought solutions for each component that follow the guiding principles described in Table 5-1 and discussed in Section 5.3. The proposed approach to decommissioning the various components of the OWF is presented is Table 5-3 below. Each of these approaches are discussed in more detail in the following subsections.

Table 5-2 – Summary of proposals for decommissioning of the Beatrice OWF

Project Component	Proposed Decommissioning Method
Wind Turbines	Complete removal from site
Wind Turbine Support Structures	Complete removal from site
Inter-Array Cables	Complete removal from site *except* where there is a high risk to marine environment. It is anticipated that cable protection (loose rock) and the cable underneath will be left in situ, subject to further environmental assessment
Cable Protection	Loose rock to be left in-situ since recovery is likely to result significant impacts on the benthic environment and health and safety risks. Climatic impacts are also likely to be significant and options for processing and re-use of recovered materials are not currently available The proposed decommissioning measures for cable protection will be considered further in future updates of the DP and will be subject to further environmental assessment

5.4.1 Wind Turbine Generators

WTG decommissioning is carried out step by step with the aid of a crane in reverse order to the installation. The dismantled parts are unloaded on the decommissioning vessel or another suitable vessel. Once the WTGs are disconnected from the electrical distribution and SCADA systems the following approach will be taken:

- De-energise WTGs and isolate from the grid
- Mobilise heavy lift vessel and support vessels
- Removal of three WTG blades (three lifts)
- Removal of the nacelle and hub (single lift)
- Successive dismantling of the tower sections (up to three lifts)
- Transportation by vessels to onshore decommissioning port
- Once onshore the WTGs will be broken down for recycling and/ or disposal:
    - All steel components will be sold and recycled
    - Blades are made of fibreglass and therefore will be transported to a suitable waste facility

Onshore, all components of the wind turbines are dismantled to manageable quantities to be reused or recycled. All remaining hazardous substances will be removed from the WTGs and supplied to a proven recovery facility according to the regulations in force at the time of the dismantling. All steel components are anticipated to be recycled as scrap. The rotor blades made of fibre composites and will be recycled (where facilities exist) or disposed of according to the regulation valid at the time of dismantling.

Table 5.3 below provides an assessment of the WTG decommissioning process against the guiding principles set out in Table 5-1.

Table 5-3 – Assessment of proposed WTG decommissioning process against Guiding Principles

Guiding principle	Complete removal of the WTGs
No harm to people	Safest option involving standard procedures
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	Very low risk to the environment. Risk of oil leak is low due to the nacelle being a fully contained unit and being removed in a single lift. The remaining WTG components will be dismantled onshore therefore minimising potential for pollution incidents
Maximise re-use of materials	All WTG components will be recycled with exception of the blades which will be disposed of in line with relevant regulations
Ensure practical integrity	Removal methods are tried and tested
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	Consistent, assuming suitable recycling option is found for steel components and a suitable disposal method is adopted for blades
Ensure commercial viability	Extensive cost of removal. Costs associated with removal may be partially offset by recycling of scrap metal

5.4.2 Wind Turbine Support Structures (Foundations and Substructures)

The decommissioning of the WTG foundations and substructures is anticipated to be carried out by a jack-up vessel or HLV.

Prior to removing the jacket foundations, the array cable will be cut after the J-tube exit. The cable within the J-tube and any cable protection at the J-tube exit will be removed with the jacket.

The foundation pin piles will be cut at least 1 metre below the seabed. The seabed around the pile will be excavated by dredging to allow access for a diamond wire cutting tool which is clamped on to the pile. Once cut the pile is recovered to the decommissioning vessel and the remaining pin pile will be covered and left *in situ*. The cut structure (entire jacket and short section of pile) will then be lifted to a the HLV or barge deck and sea fastened ready for transportation to shore. Following removal of the foundation the seabed will be inspected and any debris will be removed leaving a clear seabed surface.

Currently there is not a technical solution to remove entire pin piles from the seabed however should a suitable method be established during the operational life of the wind farm BOWL will reconsider the decommissioning options for the piles. This will be undertaken as part of the ongoing DP reviews proposed at 5-year intervals.

Once the foundations have been returned to shore, they will be dismantled ready for recycling. The foundations contain no environmentally hazardous materials and can be recycled as steel scrap. Sections of cable will be removed and recycled appropriately.

Table 5-4 below presents an assessment of the WTG foundation decommissioning process against the guiding principles set out in Table 5-1.

Table 5-4 – Assessment of proposed foundation decommissioning process against Guiding Principles

Guiding principle	Complete removal of the jacket structure and pin piles	Removal of the jacket. Pin piles cut 1m below seabed and left in-situ
No harm to people	Significant excavation of the seabed down to penetration depth (max. 45m) required to remove seabed material prior to pin pile removal. Excavation of any surface sediment would be required to expose the pin pile at the rock layer requiring significant offshore activity. Breaking the grouted connection within the rock layer would require significant time resource and would therefore increase offshore activity. Currently complete excavation and removal of the pin piles is not technically feasible.	Significantly less activity required over a shorter campaign. Depending on the cutting method adopted it may be possible to avoid the use of divers, minimising risk to personnel. Provided the pin pile is cut below the seabed surface there will be no enduring health and safety risk to other sea users. Post decommissioning site monitoring will identify any unlikely exposure with the result that safety risk is insignificant.
Consider the rights and needs of legitimate users of the sea	Full removal would require longer campaigns and may result in significant excavation leaving significant scour holes. Currently complete excavation and removal of the pin piles is not technically feasible.	Negligible risk provided the pin pile is cut at a suitable depth below the seabed surface to ensure the risk of future exposure is minimised. The removal campaign would be significantly shorter causing less disturbance to other sea users.
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.
Maximise re-use of materials	Maximum number of piled foundations potentially available for re-use.	Less foundation material available for re-use relative to complete removal. However, the entirety of the recovered material will be recycled to scrap metal.
Ensure practical integrity	As noted above, not technically viable. Significant risk associated with HLV, considerable excavation needed with	Tried and tested procedures and equipment, and reduced risk due to minimising of offshore activity.

Guiding principle	Complete removal of the jacket structure and pin piles	Removal of the jacket. Pin piles cut 1m below seabed and left in-situ
	associated storage or disposal of large volume of waste. Removal of the pin piles may not be possible in harder substrates.	
Promote sustainable development	In the long-term complete removal affords maximum flexibility over use of seabed.	Providing the buried pin piles do not become exposed, future activities will not be affected. The seabed will recover entirely following reinstatement.
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.
Ensure commercial viability	Costs are considered extreme - excavation and lifting involves major equipment requirements over longer periods of time. Campaign costs significantly higher due to level of risk. As noted above there is currently not a suitable technical and cost-effective method of removing pin piles.	Less expensive alternative to complete removal, involving minimal or no excavation and minimising environmental impacts.

5.4.3 Inter-Array Cables

5.4.3.1 General Approach

The proposed baseline approach to the decommissioning of the buried cable is full removal. This approach acknowledges the preferences stated in the Scottish Government Guidance. However, the final methods that will be used to remove the cables will depend on the outcome of surveys and studies carried out to inform any pre-decommissioning EIA, and conclusions from the assessment of likely significant effects on benthic habitats and species along the inter array cable routes, as well as other users of the seabed.

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. This will only be the case where removal would create unacceptable risks to personnel or to the marine environment, be technically unfeasible or involve extreme costs.

Cable removal will be completed by reversing the installation process using a similar vessel and equipment spread to that of the installation campaign. The approximate sequence of operations for decommissioning cables is as follows:

- De-burial of the cable routes using a mass flow excavation (MFE) tool. The MFE equipment will use high flow hydraulic pumps to focus water on the seabed to agitate the soil sending seabed material into suspension in the water column and depositing it in a spoil berm adjacent to the focus point of the tool. See below note on MFE in regard to environmental impacts.
- A Remotely Operated Vehicle (ROV) will be used to cut cable at the bell mouth of the OSP or WTG foundation using shears at the bottom of the jackets
- The ROV will then attach a recovery clamp to the end of the cable and connect to the cable lay vessel winch wire
- The vessel will then transit towards shore while recovering the cable to the cable carousel on the vessel
- Once the carousel capacity is reached the cable will be cut and the cable end will be placed on temporary wet store rigging
- The vessel will transit to shore and offload the recovered cable
- The process will be repeated until the entire cable is recovered

At the decommissioning port, cables would likely be cut into manageable lengths ready for recycling of the suitable components and subsequent disposal.

Any cable protection system used at the J-tube exit would be removed from site at this time and recycled. If the foundation is removed ahead of the array or export cable removal, the end of the cable on the seabed will be appropriately protected to prevent risks to other sea users. This will most likely be achieved by burying the cable to the burial depths stated in the relevant Cable Plan or through the use of guard vessels.

It should be noted that MFE is significantly different to the method of jetting used to install the cable. The installation of the cable is undertaken using the method of laying the cable on the seabed followed by a post-burial campaign using a jetting tool. The jetting tool is dragged over the centre point of the cable and using water jets either side of the cable, fluidises the seabed sediment over a relatively small area around the cable (3 m to 5 m wide), the cable sinks to the desired burial depth and the fluidised sediment then settles on top of the buried cable.

MFE uses the same principles, however the jets of water are significantly more powerful and instead of fluidising the immediate area of the cable, MFE cuts a wide trench with very shallow angled side walls and positions the spoil from the excavation adjacent to the trench. The trench will be approximately 15 to 20 m in width. The method of cutting a wide trench is required to ensure that the trench remains open for the period between the de-burial and cable retrieval campaigns. As a result of this, the area of impact is larger for decommissioning than construction and it is anticipated that the impacts will also be more significant. As noted in the introduction to this section, pre-decommissioning surveys will be undertaken to establish the ecology baseline and EIA will likely be required to understand the significance of any potential impacts that may be caused by MFE. In the case that potential impacts are significant it may be deemed more appropriate to leave certain sections of cable in-situ.

5.4.3.2 **Exceptions**

Complete removal may not be the best environmental or safe option and it may therefore be necessary to leave sections of cable in situ where:

- Environmental impact assessment indicates that the impacts associated with removal (MFE) are significant and outweigh the benefits of leaving the cable in-situ
- The cable is covered by loose rock protection berms (see section 5.4.4 below)

BOWL will obtain studies and evidence to support the cable decommissioning methods closer to the time of decommissioning. Where these studies (including EIA) indicate that valuable benthic features (such as PMFs, Scottish Biodiversity List species or Annex I habitats) have colonised parts of the cable routes, or otherwise where EIA indicates cable removal would result in a significant and unacceptable environmental impact, consultation with MD-LOT and NatureScot would be initiated to determine the most appropriate decommissioning option which may include leaving 'high risk' sections in-situ.

Where sections of cable are to be left in-situ, the cables will be cut and capped, and the cable ends weighted to ensure that they are securely buried below the seabed reducing the risk of exposure. Additionally, where cables are decommissioned in-situ ongoing monitoring would be undertaken in order to ascertain if there is any risk of exposure in the future. The cable will not contain fluids and therefore there is no enduring pollution risk associated with cables remaining in-situ.

Cable protection is dealt with separately in section 5.4.4. However it should be noted that where it is considered more appropriate to leave rock protection *in-situ*, the cable section underneath the rock protection is also proposed to be left *in-situ*. Any such decision will be supported by further assessment closer to the time of decommissioning.

5.4.3.3 Assessment of Decommissioning Impacts and Guiding Principles

The following section provides a high-level assessment of the potential impacts of the decommissioning of the inter-array cables. Table 5-5 compares the environmental impacts of removal against the impacts of leaving the cables in-situ (where an exception applies). Table 5-6 provides an assessment of the cable decommissioning options against the guiding principles outlined in Table 5-1 above.

Table 5-5 - Decommissioning environmental impacts - inter-array cables

Receptor	Identified Impacts	
	Removal	**Leave In-Situ**
Water Quality and Sediments	Sediment disturbance in immediate area and turbidity increase. The area of influence is expected to be significantly larger than for construction (approx. 15 – 20m trench width).	None
	Hydrocarbon pollution due to fuel and oil spills from during decommissioning.	
Benthic Ecology	Displacement, damage, and/or crushing of benthic communities in immediate area due to ground disturbing activities and removal of protective structures with an variable recovery times depending on species resilience.	None
Fish and Shellfish Ecology	Local turbidity from sediment disruption may persist up to a few days and reduce visibility which impacts the feeding ability of fish that detect prey visually.	None
	Displacement, disturbance or injury to burrowing fish such as sandeel in immediate area.	
	Removal of artificial reef may reduce fish density in local area.	
	Disturbance, damage, and removal of shellfish species due to hard surface removal.	
Marine Mammals	Vessel collisions with marine mammals may lead to injury or death.	None
	Disturbance of essential functions due to noise pollution.	
	Reduced health due to water quality.	
Ornithology	Temporary changes to intertidal and subtidal habitats possibly affecting food sources in immediate/local area.	None
Shipping and Navigation	Temporary disruption of path around the project area.	Damage or movement of exposed cable due to anchor drag.
Commercial Fishing	Temporary disruption of fishing vessels in immediate area.	Damage to fishing equipment from snagging on exposed cable.

Table 5-6 – Assessment of inter-array cable decommissioning proposals against the guiding principles

Guiding principle	Complete removal of cable	Leave in-situ (where an exception applies)
No harm to people	Risk to personnel due to the requirement for extensive offshore operations, however risk is not considered excessive.	No works required (after cutting and reburial of cable ends) minimising risks to personnel.
Consider the rights and needs of legitimate users of the sea	Removal affords maximum flexibility over use of seabed, with no ongoing risks to other users of the sea.	Negligible risk presented providing adequate consultation and notification, burial is to a sufficient depth and site is monitored post decommissioning to identify any (unlikely) cable exposure. Cable left in-situ at crossings protects other legitimate users and their assets.
Minimise environmental impact	Given the considerable length of cable and the need for MFE techniques, removal would cause substantial disruption to the seabed and benthic habitats. Impacts are likely to be comparable to, or exceed, those reported in the original ES. As no infrastructure will be left in-situ, there will be no lasting impact on the environment.	Minimal disturbance after the temporally and spatially limited cable cutting and cable end re-burial operation. Inert materials (containing no fluid contaminants) resulting in no lasting environmental impact from cable left in-situ.
Maximise re-use of materials	Maximum material, e.g., aluminium, copper, lead, plastics, potentially available for re-use.	Cable material not available for re-use, although in the case of crossings, total volume of material not significant.
Ensure practical integrity	Removal is feasible but would require disturbance of seabed along full length of cable route during exposure and recovery.	Standard procedures and equipment. Reduced risk due to minimising offshore activity.
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.	Providing remaining cable lengths do not become exposed, most future activities will not be affected.
Adhere to the Polluter Pays Principle	Consistent, assuming suitable disposal (recycling) option is found for cable components.	Consistent as far as practicable. Cables left in-situ will remain below seabed level where they will pose minimal risk to the environment or other users of the sea. Decision to leave in situ will be balanced with risks to other assets and to benthic and other ecological receptors.
Ensure commercial viability	High cost of removal where cable is buried by rock protection. Costs associated with removal may be partially offset by recycling of scrap cable where appropriate.	Minimal costs – simultaneously minimises environmental disturbance and impacts to other renewable energy assets.

Table 5-6 demonstrates that both inter-array cable decommissioning options accord with the guiding principles. However where an exception applies and the cables are left in-situ, this would be a better environmental option in terms of reducing disturbance to the seabed and any established benthic communities – and would minimise health and safety risks associated with offshore operations which are key considerations in determining whether an exemption from the presumption for full removal should be accepted. Any residual risks to other users of the sea could be managed (including through monitoring where required) and therefore both options would promote sustainable development.

5.4.4 Cable Protection

5.4.4.1 General Approach

Determination of the decommissioning procedure for cable protection will be presented in the final DP. For the purposes of this DP and in recognition of Scottish Government Guidance and IMO Standards – **any loose rock protection covering cables will be left in situ** 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. Where this is the case, sections of cable underneath the protection would also therefore remain in-situ for the same reasons. IMO Standards recognise that assets may be left in-situ if:

- It can be left without causing unjustifiable interference with other uses of the sea
- Entire removal is not technically feasible or would involve extreme cost, or an unacceptable risk to personnel or the marine environment

The Scottish Government Guidance does not make specific reference to suitable decommissioning measures for loose rock cable protection beyond the recommendation to undertake a comparative assessment of the available options. However, equivalent guidance for the oil and gas industry recognises that removal of rock-protected pipelines is 'unlikely to be practicable and it is generally assumed that the rock dump and the pipeline will remain in place'.

Future iterations of the DP will review the type of cable protection installed and the available technology at the time and will update the proposed decommissioning procedures accordingly, considering the principles outlined in section 5.3. Any options would be subject to an updated comparative assessment. An EIA would likely be required to support this assessment to ensure the relative risks to the benthic environment and to future users of the seabed are appropriately considered. No types of cable protection, other than loose rock berms, was installed.

5.4.4.2 Supporting Assessment

In support of the preparation of this DP, BOWL engaged external consultants to undertake a technical review of the potential decommissioning options for the cable protection. The following subsections summarise the conclusions of the review which has informed the proposed decommissioning solution for cable protection.

Technical

There are currently several methods available for subsea rock removal. However, at present there is no widely accepted method or framework for decommissioning OWFs, and experience in the UK is limited to smaller projects located relatively close to shore. Therefore, use and impact of these removal methods on large-scale OWFs with significant quantities of rock protection is relatively unknown.

In their assessment of currently available options for the removal of cable protection, Natural England (2022) concluded that 'given the nature of the loose rock, it is very difficult and time consuming to remove extensive sections of rock dump'. All practical removal methods assessed in the research had risks (health, safety or environmental) or limitations such as speed of removal and storage capacity for recovered material, which preclude their use in the recovery of the quantity of rock protection required for the Project. All were assessed as having a significant impact on the benthic environment with potential long-term damage to marine habitats.

This study placed rock protection (loose rock protection) as the lowest ranked cable protection system (compared to five other systems) in terms of ability to be decommissioned, ranking rock protection as 'very poor' for removal track record and current ease of removal and 'poor' for number of removal options. According to the study, of the 52 oil and gas decommissioning plans reviewed, all left the rock protection (commonly used for pipeline protection) in situ.

Of the methods assessed, grab dredging is currently the most likely method to be suitable for rock protection removal. This would involve a grab tool, lowered to the seabed using crane mounted on a construction support vessel (CSV) and lifted back to the surface. However, as removal is not common practice across the oil and gas sector, technical feasibility at the scale and depth required for OWFs is unproven to date. Removal of the rock protection by grab dredging will require working in deeper water than most routine dredging activities and will have added technical complexity because of the water depth and metocean conditions further offshore. The removal of rock protection would also need to be more selective than other dredging operations that collect material indiscriminately, whereas the aim for the removal operation would be to remove only the rock protection and avoid dredging up the underlying or adjacent sediment.

The rock protection removal process would be significantly more challenging and time consuming than installation, as during installation the rock is dropped on the cable from above, directly from the vessel, with sufficient coverage being achieving in a much faster time, compared to the removal operation. A grab dredger is unlikely to have the practical accuracy to ensure every rock is collected from the seabed, made more challenging due to the depth and volume of rock involved.

Removal methods may improve over the years as the offshore wind decommissioning sector develops, however, this will require the technical feasibility of the removal methods to be demonstrated at scale and depth to understand the challenges around deepwater removal, for example. how much of the rock can be removed practically within suitable weather windows and the ability of available technology to collect the rock to the level of accuracy that would be required for 'clearance' of the seabed. Once removed, the rock protection will also need to be transported back to shore. Given the large quantities of rock involved this would involve several trips by one or more barges. This adds associated cost, risk and carbon impacts from additional vessel use.

Where the rock protection is left in situ, there would be minimal offshore activity required except for cutting and capping the cable sections. Ongoing monitoring would also be required to ensure that the infrastructure left in situ does not become exposed (cables) or pose a risk to other maritime users (cables and cable protection).

Table 5-7 provides a summary comparison of the cable protection decommissioning options from a technical perspective.

Table 5-7 – Comparison of options for cable protection decommissioning – technical aspects

Aspect	Complete removal	Leave in-situ	Comparison to construction
Offshore activities	All rock material will require removal and transport to shore by barge. Current rock removal techniques have technical limitations around speed of removal and storage capacity and are untested for large volumes of rock material at the water depth of offshore wind farms. Removal of all rock protection, and only rock protection (avoiding dredging of surrounding sediment) is likely to be difficult and time consuming.	Minimal offshore activity required. Ongoing monitoring required to ensure that the cable left in situ does not become exposed or pose a risk to maritime users.	Rock protection placement is a routine construction activity, with established equipment and procedures. Operations generally take place over a few days for a commercial offshore wind farm.
Onshore activities - cleaning and processing	If being reused or recycled, the rock material may require cleaning and processing to remove marine growth with an associated cost and carbon impact. It would also generate additional waste streams such as sand and marine growth which would need to be dealt with. It is unknown if specialist decommissioning services currently available would be able to handle the rock material. There will also be challenges to comply with current waste management regulations, such as volume or time limitations.	No onshore handling required.	No cleaning and processing required
Onshore activities - storage	Storage of the rock material would be required, which would be challenging due to the volumes involved as this would create risks and disruption at port. Offshore storage could potentially be considered to avoid disruption if rock material is being reused in a marine application.	No onshore storage required.	Rock protection is likely to be transported directly from the source (e.g. quarry) to the vessel to be placed on the seabed. As timings can be understood in advance, there is less likely to be the requirement to store large volumes of rock.

Aspect	Complete removal	Leave in-situ	Comparison to construction
Onshore activities - transport	Transport to where the rock is being stored, processed, reused or disposed of will likely be required. This would likely be by HGV with an associated cost and carbon impact. Cost and carbon impacts depend on the transportation distance, which will be dependent on the end use of the material and is unknown at this stage.	No onshore transport required.	As above, assume the rock protection will be transported from directly from the source to quayside using HGVs. Cost and carbon impacts depend on the transportation distance which can be managed as part of the construction process.

Health and Safety

Removal of the rock protection by grab dredging will require long periods offshore, working in deeper water than most routine dredging activities, for example navigational dredging at harbours. Removing the rock protection would likely result in a greater risk to personnel due to offshore operations required to remove the rock material, including use of multiple vessels, moving the rock from the grab dredger to the transportation barge, heavy lifting and storage of large volumes of rock onboard the vessels. These operations are more complex than installation of the rock protection, which is dropped directly from the vessel on to the seabed, resulting in limited handling of the rock offshore. The risk of the removal activities would need to be mitigated to an acceptable level with appropriate control measures in place.

Available weather windows and increased likelihood of storm events would be another key risk around removal of rock protection, particularly as the removal process is likely to be slow and laborious, and considering the volumes of rock material that would be involved. The number of days estimated for recovery of the rock protection for the Project is 68 days at a removal rate of 40m³ of rock per hour, requiring 12 return journeys to offload the rock. The actual removal duration would likely be greater depending on the degree of 'full removal' that needed to be achieved. There would likely be inefficiencies in accuracy of collection by the grab dredger, particularly for scattered or sparse areas of rock deposit and as the removal progresses and the volume of rock being targeted is smaller.

Leaving the rock protection in situ would remove the need for offshore removal operations. Ongoing monitoring would be required – however surveying this is considered a low-risk activity in comparison to the removal operations.

Once onshore, there would be additional risks to personnel around rock material handling, including cleaning, processing and transporting the rock protection from storage locations to HGVs. Handling of large volumes of rock presents significant hazards and risk of injury, therefore robust safety measures would need to be in place. The storage of the rock material also presents a risk and sufficient security measures will need to be in place ensuring that unauthorised personnel are not able to access the rock material as this could result in injury and damage. Leaving the rock protection in situ would remove the need for onshore handling operations.

Whilst quantitative risk assessment techniques are used regularly in the oil and gas industry, they are not frequently applied in offshore wind and no published data on the analysis of specific offshore wind activities could be found for comparison. However, G+ the Global Offshore Wind Health and Safety Organisation do report on offshore wind industry health and safety statistics that may be used to provide comparison of the rock protection removal activities, against the construction activities.

The 2023 G+ incident data shows that the top five most incident prone work processes include lifting operations, vessel operations, manual handling, operating plant and machinery, and routine maintenance. Four out of five of these processes (excluding routine maintenance) would be employed during removal operations, for a period of time over and above the construction operations (likely more than 20 times the construction vessel days). Additionally, the data shows that dropped object incidents increased in 2023 to 2.70 in 1 million hours worked, the risk of dropped objects is higher during removal operations due to the lifting of rock, transfer to the hopper barge, transfer to the quayside and further handling and transport once onshore.

Table 5-8 provides a summary comparison of the cable protection decommissioning options from a health and safety perspective.

Table 5-8 – Comparison of options for cable protection decommissioning – health and safety aspects

Aspect	Complete removal	Leave in-situ	Comparison to construction
Offshore operations	Increased risk to personnel due to offshore operations required to remove the rock protection, including use of multiple vessels, moving the rock from the grab dredger to the transportation barge, heavy lifting and storage of large volumes of rock onboard the vessels. Requirement to transfer rock from grab dredger to barge will likely restrict operational weather windows resulting in extended offshore operational time. The operational time would be significantly longer than the installation time, increasing the risk to personnel.	Minimal offshore activity required. Ongoing monitoring, however, this would be considered low risk in comparison to removal.	Installation activities drop the rock on the seabed, requiring limited handling of the rock offshore. Construction operations are less complex and significantly shorter than removal operations, with a lower level of risk.
Onshore operations	Increased risk to personnel and public due to storage, handling and transport of large volumes of rock.	No onshore handling required.	Installation operations would require transfer of the rock from HGV to the rock installation vessel. However, there is no need for storage and cleaning, reducing the overall handling risk.

Aspect	Complete removal	Leave in-situ	Comparison to construction
Marine users	Full removal of the cables and rock protection would result in a clear seabed which can be used for other purposes including trawling or new offshore development.	Leaving the cables and rock protection in situ may create a hazard for other marine users and impact on future developments.	-

Environmental

Based on previous studies and desktop review, key environmental impacts to consider in decommissioning include:

- Disturbance to the seabed and associated disruption to benthic species and habitats, including Priority Marine Features (PMFs)
- Ornithology, marine mammal and fish – temporary disturbance and displacement due to decommissioning activities
- Loss of foraging habitat and reduced prey availability for marine mammals and birds
- Increased risk of collision with vessels
- Risk to threatened or endangered species
- Potential water quality incidents in terms of disturbance of contaminated sediment, trapped toxins and chemical or fuel spills associated with vessels or other decommissioning equipment
- Changes to physical processes, including sediment mobilisation, smothering and increased turbidity

There is approximately 14km of rock protection to be decommissioned. Dependent on establishment of benthic communities upon the rocks, removal could result in substantial levels of habitat and species loss through destruction and disturbance, as well as disturbance to surrounding benthic habitats including component biotopes of Scottish PMFs. The extent to which benthic communities establish in the rock protection will not be known until nearer to the time of decommissioning

It is possible that priority habitats and species will be present on the extant rock protection, and that removal would significantly impact these PMFs. Further data will be required via drop-down video and/or ROV/photography to confirm the biotope characteristics of the rock protection and whether the rock protection is providing functional habitats to local fish and crustacean populations.

There is also likely to be significant levels of sediment disturbance. Sediment disturbance and suspended sediments have the potential to smother habitats and impact fish survival through physiological stress and decreased feeding rates.

With the windfarm area and wider Moray Firth being important habitat for marine mammals, removal of the rock protection has the potential to cause temporary disturbance. Rock protection removal would likely

result in increased noise levels, over a period of approximately 68 days. The harbour porpoise is particularly responsive to noise and has a high dependency on echolocation for orientation and foraging. High levels of underwater noise can damage hearing apparatus, which results in echolocation disturbance leading to navigation errors, food tracking problem and even the death of the individuals. At noise levels where physiological injury is no longer a concern, noise can continue to interfere with the animals' ability to orientate, communicate and forage, likely causing avoidance behaviour. It is not anticipated that rock removal would contribute to significant noise impacts but a precautionary approach is required.

There is potential for rock protection removal to impact protected species identified in the area, notably the bivalve *Arctica islandica* (a Scottish PMF and OSPAR listed threatened and/or declining species). Further monitoring surveys would assist in understanding the significance of potential impacts to this species.

Removal of the rock protection has the potential to facilitate the spread of invasive species. Survey data identified three non-native species (the polychaete *Goniadella gracilis*, the amphipod *Monocorophium sextonae* and the Japanese skeleton shrimp *Caprella mutica*). There could be a risk of introducing these species to new areas, especially if the rock material is being stored or reused in a marine setting.

When the rock protection was originally introduced at the site, the most significant impact was deemed to be loss of seabed habitat (of most significance for the MoeVen biotope). However, within the ES, it was also concluded that new hard substrates introduced in the form of rock cable protection would allow the development of communities that will be different to those on the existing sediments, with a higher biomass per unit area of seabed. This was considered to be a permanent positive effect of minor significance. Therefore, dependant on the communities that develop on the rock protection after installation, the impacts of removal may be more severe due to the rock protection supporting more biomass, higher biodiversity and potential protected species than the seabed originally lost. As mentioned above, further data gathered closer to the time of decommissioning would be required to confirm this.

In addition to the carbon impacts from removal operations, removal of the rock protection would also cause disturbance to the seabed sediment which may disrupt the ability of the sediment to store 'blue carbon'. Blue carbon is the term for carbon sequestered and stored by marine and coastal environments and can be threatened by physical disturbances. Blue carbon environments can contribute to climate change mitigation through expansion and restoration. This is an area of ongoing research.

Table 5-9 provides a summary comparison of the cable protection decommissioning options from an environmental perspective, noting that the final decommissioning option(s) would be subject to an EIA or environmental appraisal at the appropriate time.

Table 5-9 – Comparison of options for cable protection decommissioning – environmental aspects

Receptor	Complete removal	Leave in-situ
Benthic Ecology	Sediment disturbance, potential smothering. Species and habitat loss. Risk of spread of Invasive nonnative species.	Preservation of any epibenthic communities colonising the rock protection – maintaining the higher marine biodiversity predicted in ES.
Fish and Shellfish Ecology	Increased sediment disturbance.	Increased habitat due to potential enhanced benthic communities.
Marine Mammals	Increased vessel presence (and increased operational duration of decommissioning), increased collision risk.	Reduced offshore works required therefore minimal disturbance.
Ornithology	Increase vessel presence, increased collision risk	Reduced offshore works required therefore minimal disturbance.
Water Quality	Potential disturbance of contaminated sediment.	Reduced impact when considering safe capping of cables and potential for contamination.
Carbon/climate change	Carbon emissions associated with removal. Impacts to blue carbon (carbon stored in sediments) associated with sediment disturbance.	Reduced vessel time as removal activity required.
Physical processes	Alterations to physical processes, including sediment mobilisation and increased turbidity.	Permanent change to sediment type in the form of rock protection.

Life Cycle Assessment

Complete removal of the rock protection would require the storage, processing and re-use or recycling of the recovered material. There are a number of post-removal options and these have been subject to an initial life cycle assessment (LCA) to identify the downstream impacts in terms of cost and sustainability.

The most desirable option against the waste hierarchy is reusing the rock protection directly offshore for another offshore wind development. However, this relies on the timing of decommissioning and a new development aligning, which may not be the case. The next best option is re-using the rock protection for another offshore infrastructure project, such as coastal erosion works. Re-using and recycling the rock protection onshore are next. These come with additional transport, storage and processing challenges, particularly for recycling which requires energy intensive processes to crush the rock into aggregate. Finally, the least desirable option is sending the rock protection to landfill. This is unlikely to be seen as acceptable considering the volumes of rock material involved and government zero waste targets.

The results from the LCA have demonstrated the additional cost and carbon impact of five scenarios assessed, as opposed to leaving the rock in situ. Across the scenarios, the total carbon emissions range from 3,400 – 13,300 tCO2e. It was found that vessel use for removal and transportation of the rock protection over significant distances accounted for a large proportion of the carbon, adding approximately 6,600 tCO2e. The impact of onshore transportation by HGV is highly dependent on distance, but can also add significant carbon, requiring thousands of truck loads. The carbon associated with cleaning and processing the rock protection was challenging to quantify in this analysis due to lack of available of carbon factors. However, it is likely that

carbon emissions would be significant due to the energy intensive processing required. The actual carbon impact would depend on the options (and supporting supply chain) available at the time of decommissioning.

In terms of commercial readiness, each scenario assessed in the LCA comes with challenges and no pathway is currently commercially ready to accept the volumes of rock material associated with Beatrice OWF. Challenges include navigation of waste management regulations, storage and transport of large quantities of rock protection, and cleaning/processing the rock for end use. When considering that the rock protection volume for Beatrice is lower than many other OWFs being developed around the UK, it is clear that an industry-wide supply chain and regulatory framework to support a standard process for re-purposing rock material will need to be developed, in the case that the rock protection cannot be left in situ.

Conclusion

Removal of rock protection is a relatively untested decommissioning activity within the offshore wind sector (and oil and gas sector), and therefore careful consideration of the impacts and potential end use of the rock is required to determine the most appropriate decommissioning option.

There are several technical and safety challenges around removal of rock protection, including physically collecting the rock protection (particularly removing all and only the rock protection), moving it between vessels, and speed of removal from the seabed. As rock protection removal is not common practice across the oil and gas sector, technical feasibility at the scale and depth required for OWFs is currently unproven. Removal of rock protection would require dredging at greater depths and for longer time periods than most routine dredging activities resulting in added technical complexity and risk. Onshore, storage and transport of the large quantities of rock material associated with OWFs will also need to be resolved if the rock protection is to be fully removed. This will require collaboration and consensus across the offshore wind industry to determine feasible technical options for rock protection removal, alongside development of a system for transport, processing, storage and disposal or re-purposing of the rock material and any additional waste streams (such as sand and marine growth). This will likely require specialist contractors who are able to manage the rock from quayside to end use.

One of the biggest considerations around removal of rock protection is the environmental impact on marine habitat that has developed over the lifetime of the wind farm. There is potential for the rock protection to support higher levels of biodiversity than surrounding areas. In general, the environmental impacts of full rock protection removal could be more significant due to increased benthic disturbance, noise impacts, spread of invasive species and impacts to protected/notable species. Removal of the rock protection could also have impacts on blue carbons sequestration due to disturbance of old seabed sediment. While clearing the seabed can reduce the impact and hazards relating to other uses including trawling or new offshore developments, this benefit is outweighed by the technical challenges and health, safety and environmental (including carbon and climate) impacts associated with removal and onward re-use, recycling or disposal of the recovered material for which there is currently no established supply chain.

The health and safety risks, environmental impacts (both of which are considered to be higher than during the construction phase) and costs associated with rock protection removal are considered to be high when balanced against the benign nature of the material and the unproven nature of both the methodologies for

recovery and options for post-recovery treatment, use or disposal. Some costs are currently unknown and may be significant. Since the comparative assessment has concluded that leaving rock protection in situ would not present significant risks to other users of the sea and would not preclude future uses of the seabed, the risks to personnel and the environment (including in terms of carbon emissions) associated with removal of the cable protection are considered to be unacceptable.

Therefore this DP proposes in situ decommissioning of all cable protection. It should however be noted that as technology and the environmental baseline of the site develops during the operational period, this position will be subject to review (see section 2.4) and any final decommissioning decisions will be based on an EIA which will thoroughly consider the environmental impacts (including impacts on other users) of the decommissioning options presented.

Table 5-10 provides an assessment of the cable protection decommissioning proposals against the guiding principles outlined in Table 5-1 above.

Table 5-10 – Assessment of cable protection decommissioning proposals against the guiding principles

Guiding principle	Removal	Leave in-situ
No harm to people	Risk to personnel would be greater (than leaving in situ) due to requirement for offshore operations. Repeated lifting and handling of high volumes of rock to a vessel/barge is considered a high-risk activity.	No works required minimising risks to personnel.
Consider the rights and needs of legitimate users of the sea	Removal affords maximum flexibility over use of seabed, with no ongoing risks.	Minimal residual risks remain to specific users but can be mitigated by adequate consultation and notification to other users of the sea.
Minimise environmental impact	Removal could cause substantial disruption to or destruction of benthic habitats that are likely to have formed on and near the rock berms following installation. Impacts associated with removal may exceed those reported in the original ES.	Minimal impact as leaving in-situ avoids further disturbance to the benthic environment (and protects habitats that are likely to have formed on and near the rock berms following installation) and avoids the need for an offshore campaign and significant use of transportation vehicles.
Maximise re-use of materials	Material available for re-use or recovery.	Material not available for re-use.
Ensure practical integrity	Removal has been assessed as technically *possible* but unproven in the conditions encountered at the site. Removal of this volume of material is unproven.	No offshore activity required.
Promote sustainable development	Significant disturbance of the seabed in the short term, although removal would allow greater flexibility over use of seabed in the longer term.	Does not preclude the reuse of the seabed for most purposes.
Adhere to the Polluter Pays Principle	Consistent, assuming suitable re-use or recycling option is found for recovered rock in accordance with relevant waste legislation.	Consistent as far as practicable. Rock berms will present a minimal risk to the environment or other users of the sea and may result in biodiversity gain due to the introduction of the rock substrate.
Ensure commercial viability	Costs are likely to be high due to the volume of rock requiring recovery and the requirement for lengthy offshore operations. Potentially significant onshore storage, processing and transportation costs (currently unknown due to lack of commercial scale examples and established supply chain), and carbon emissions.	Minimal costs – simultaneously minimises environmental disturbance/impacts.

5.4.5 Items to Remain In-Situ

To summarise the preceding subsections it is proposed that the following items will remain in-situ following decommissioning:

- Cable protection consisting of loose rock (subject to further comparative and technical assessment closer to the date of decommissioning)
- Lengths of cable protected by loose rock cable protection
- WTG foundation pin piles (cut below seabed)

The following items *may* remain in-situ following decommissioning, where subsequent assessment demonstrates compelling evidence that full removal would present an unacceptable risk to personnel or to the marine environment, be technically unfeasible or involve extreme cost:

- Lengths of cable at cable and pipeline crossings, if present (noting the potential to remove these lengths when the crossed infrastructure is removed)
- Lengths of cable where environmental assessment indicates it is not appropriate to fully remove the cable (noting BOWL's assumption that cable removal will be maximised and only remain in-situ where there is a compelling environmental or operational justification to do so)

5.5 Proposed Waste Management Solutions

BOWL 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 5-9 below.

Table 5-11 – Proposed disposal route for components to be removed

Waste material	Pre-treatment	Re-use/recycle/disposal
WTG support structures	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
WTG tower and nacelle	Break down into transportable size	Recycle
Glass-fibre Reinforced Epoxy (GRE) from wind turbine blades	Break down into transportable size	Recycle where facilities exist or disposal if no alternative
Inter array cables	Cut into transportable lengths. Split and separate into components	Aluminium/copper/lead/steel and insulation plastics – recycle Other components – recycle where facilities exist, otherwise energy recovery

5.6 Potential for Phasing and Integration

It is possible that there may be synergies and interactions between the decommissioning of the OWF and that of other nearby developments.

BOWL will promote formal industry collaboration on this issue and, as a minimum, will approach the developers of the Moray East and Moray West OWFs to consider potential opportunities as part of the ongoing DP review process. However, BOWL's starting assumption is that decommissioning will be undertaken in isolation such 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.

5.7 Lighting and Marking

In accordance with the OWF Marine Licences, the OWF will be marked and lit, as agreed with relevant stakeholders until the point of removal of the structures. BOWL will comply with any lighting and marking requirements specified in the consents granted for decommissioning.

6. Environmental Impact Assessment

In support of the consent applications BOWL undertook an EIA for the OWF (and OTA) as reported in the ES dated April 2012, with further information provided via the ES Addendum dated May 2013.

As required by the EIA Directive, a lifecycle approach was taken in assessing the impacts of the OWF and in seeking to mitigate and minimise the effect of the works. In all instances a 'worst case', Rochdale Envelope approach was taken to the assessment and the impact assessment included the process of decommissioning so far as it could be predicted at the time.

In consultation with MD-LOT, the information relating to decommissioning in the ES and ES Addendum will be reviewed when the final details of the DP are confirmed prior to decommissioning activities taking place.

The following key criteria will inform the decision as to the need for a new or updated EIA:

- The understanding of the baseline environment at the time just prior to decommissioning, informed by the findings of the environmental monitoring of the project and engineering/asset surveys such as cable burial monitoring and any Annex 1 habitat monitoring undertaken prior to decommissioning
- A review of other marine uses (fishing, navigation, etc.) with potential to be affected by decommissioning
- Amenities, the activities of communities and on future uses of the environment
- Historic environment interests
- Seascape and landscape interests

If required, the decommissioning EIA will supplement existing information 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 conclusions of the EIA will be used to inform the final decommissioning options that will be detailed in the final DP.

7. Consultation with Interested Parties

7.1 Introduction

BOWL recognises effective and open communication and consultation as essential elements to the successful operation of the Project. These principles were adopted throughout the development of the Project and will be applied during the life of the Project including the decommissioning phase.

7.2 Consultation on Draft Decommissioning Programme

7.2.1 Consultation Process

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 decommissioning programme. Schedule 2 to the S105 Notices issued to BOWL by the Scottish Ministers sets out those organisations who were required to receive a copy of draft DP for comment, as listed in Table 7-1.

Table 7-1 - Consultees listed in Section 105 Notices

Consultees listed in the Section 105 Notices	
Buckie Harbour Master	Royal Yachting Association
Cromarty Firth Port Authority	RSPB
Historic Environment Scotland	Scottish Environmental Protection Agency
Maritime and Coastguard Agency	Scottish Fishermen's Federation
Ministry of Defence	TC Beatrice OFTO Ltd
Moray Council	The Highland Council
Moray Firth Partnership	UK Chamber of Shipping
NatureScot	Wick Harbour
Northern Lighthouse Board	

Following review by MD-LOT, this draft DP will be issued to all consultees listed above for a 30-day consultation period in line with the Scottish Government Guidance. The draft DP will also be made available on the BOWL website. Responses received during the consultation period will be reported in this DP (Appendix E) and updates will be made where necessary. The full consultation responses will be attached to this DP at Appendix F.

The Financial Security Information (Appendix D) associated with the DP will be subject to a separate consultation and approval process and will not be circulated as part of the Section 105 consultation. The approved Financial Security Information will form a confidential appendix to this document (Appendix D).

7.2.2 Consultation Responses

Table 7-2 below will provide a summary of the consultees who provided comment and those who did not provide comments on the DP.

Table 7-2 – Consultees listed in the Section 105 Notices and summary of those providing comments on the draft DP [to be populated post-consultation]

Consultee	Comment received?
Buckie Harbour Master	
Cromarty Firth Port Authority	
Historic Environment Scotland	
Maritime and Coastguard Agency	
Ministry of Defence	
Moray Council	
Moray Firth Partnership	
NatureScot	
Northern Lighthouse Board	
Royal Yachting Association	
RSPB	
Scottish Environmental Protection Agency	
Scottish Fishermen's Federation	
TC Beatrice OFTO Ltd	
The Highland Council	
UK Chamber of Shipping	
Wick Harbour	

7.3 Ongoing Consultation and Notifications

As per Section 2.4, throughout the lifespan of the Project, the DP will be reviewed and updated at least every 5 years as new information relevant to the decommissioning strategy becomes available. Consultees listed in the S105 Notices, and any additional consultees identified by MD-LOT or BOWL, will be provided with the opportunity to comment on the final DP prior to it being finalised. It is anticipated that the final revision process will commence two years prior to the initiation of decommissioning (see Section 10).

At the time of decommissioning, BOWL will issue 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.

8. Costs and Financial Security

The decommissioning cost information required by Scottish Ministers is provided in confidence as Appendix D to this DP.

9. 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 proposed that decommissioning would commence approximately 25 years after final commissioning of the wind farm, coinciding with the end of its design life (subject to any life-extension or re-powering options being pursued and consented).

The DP will be reviewed periodically throughout the operational phase in accordance with the Scottish Government guidance. A final review of the DP will commence at year 23, two years prior to the scheduled start of the decommissioning operations.

Offshore decommissioning and any necessary onshore dismantling of the decommissioned infrastructure would run in parallel. The total duration of the decommissioning campaign is estimated at approximately 2 years.

10. Project Management and Verification

BOWL intends to undertake internal reviews of the DP throughout the lifetime of the project and formally update the plan a minimum of every 5 years. The review schedule will be agreed with MD-LOT taking account of the review points suggested in paragraphs 5.21 and 5.23 of the Scottish Government Guidance. Once the wind farm is nearing the end of its operational period, and in any event, no later than two years prior to the commencement of decommissioning operations, BOWL 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.

It should be noted that the transmission assets have been transferred to an OFTO and therefore responsibility for decommissioning these assets rests with them.

Following completion of the decommissioning works a post decommissioning report will be submitted to the appropriate regulatory authorities. In accordance with the Scottish Government Guidance, the decommissioning report will include:

- Evidence that all infrastructure that was due to be removed, according to the DP, has been removed
- Where infrastructure is left in-situ, evidence that it has been cut-off, buried or otherwise treated in accordance with the DP
- References to any future monitoring, maintenance and mitigation as set out in the DP
- References to compliance with permitting obligations
- A comparative analysis of predicted and actual costs

11. Seabed Clearance and Restoration of the Site

BOWL is committed to restoring the seabed areas occupied by the wind farm, as far as is reasonably practicable, to the condition that it was in prior to installation of the assets. Consistent with the decommissioning provisions detailed in section 5, the key restoration work will relate to ensuring that:

- Jacket pin-piles that are left in-situ are adequately buried, or otherwise protected
- Any sections of cable (including cut ends) that are left in-situ are adequately buried, or otherwise protected
- Any rock protection left in-situ is re-profiled following cable removal works, should this be required for continued safety of other sea users
- Open trenches resulting from MFE are reinstated and the seabed returned to its original profile, where practicable

It is anticipated that upon completion of the decommissioning works, a survey will be undertaken to ensure that all debris 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 or other users of the sea. The process of collecting and presenting evidence that the site is cleared is required to be independent of BOWL. BOWL proposes that an independent survey company complete the surveys and that the results of these surveys will be issued to MD-LOT for review and comment and circulated to stakeholders as agreed in advance with the Scottish Ministers.

The required survey area/corridor would be determined during the decommissioning phase of the project, taking into account good practice at the time and the views of stakeholders.

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

Further details on how the site will be restored will be provided in the updated DP towards the end of the life of the wind farm.

12. Post-Decommissioning Monitoring, Maintenance and Management of the Site

Given that BOWL's proposal is for full removal of the assets, with exceptions, some post-decommissioning activities may be required, to identify and mitigate any unexpected risks to navigation or other users of the sea arising from objects left on the seabed.

The requirement for monitoring and the extent and approach taken will be determined based on the scale of the remaining materials the risk of exposure and the risk to marine users and will be agreed upon with MD-LOT in subsequent revisions of the DP.

It should be reiterated that BOWL propose to fully remove all cables unless there is an overriding environmental justification for leaving sections in-situ. It is expected that any cable left in-situ will be limited to short sections where the cable is protected by rock. Requirements for monitoring of any cable protection left in-situ will be determined once longer-term data on its stability and mobility is available.

Post-decommissioning monitoring surveys of the seabed will be carried out following the completion of the decommissioning works. Surveys are expected to comprise geophysical survey (such as swathe bathymetry, sidescan sonar and magnetometer). Surveys will be undertaken in line with the final DP, survey scopes consulted on with MD-LOT and relevant stakeholders, and MGN 654 (MCA, 2021) (or equivalent guidance in place at the time). Compliance will be verified by means of independent third-party survey upon completion of the works.

Post-decommissioning hydrographic surveys will be undertaken in accordance with the requirements set out in the MGN 654 or relevant guidance in place at the time.

If an obstruction appears above the seabed following decommissioning which is attributable to the Project, it will be marked so as not to present a hazard to other sea users and remediated as required. Any remediation method will be agreed with MD-LOT. The navigational marking will remain in place until such time as the obstruction is removed or no longer considered a hazard due to suitable remediation. 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 close to the point of decommissioning and will consider relevant guidelines and industry standard good practice at the time and where possible this will take the form of non-intrusive survey techniques.

13. Supporting Studies

The Beatrice Offshore Wind Farm Environmental Statement and Environmental Statement Addendum can be accessed online, on the Marine Directorate website.

14. References

Note: Data sources and references for section 3.2 can be found in the ES and ES Addendum, as referenced below.

Department for Business, Energy and Industrial Strategy (BEIS). 2018. *Decommissioning of Offshore Oil and Gas Installations and Pipelines Guidance Note*

Department for Business, Energy and Industrial Strategy (BEIS). 2019. *Decommissioning of Offshore Renewable Energy Installations Under the Energy Act 2004: Guidance Notes for Industry (England and Wales)*

International Maritime Organisation (IMO). 1989. *Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone*

Maritime and Coastguard Agency (MCA). 2021. *MGN 654 – Safety of navigation: OREIs – Guidance on UK navigational practice, safety and emergency response*

OSPAR Convention for the Protection of the Marine Environment of the North East Atlantic. 1988

Scottish Government. 2022. *Decommissioning of Offshore Renewable Energy Installations in Scottish Waters or in the Scottish Part of Renewable Energy Zone under the Energy Act 2004: Guidance Notes for Industry (in Scotland)* [the 'Scottish Government Guidance']

United Nations Convention for the Law of the Sea (UNCLOS). 1982

OGUK. 2015. *Guidelines for Comparative Assessment in Decommissioning Programmes*

Natural England. 2022. *Scour and Cable Protection Decommissioning Study (Report NECR403)*

Beatrice Offshore Wind Farm Environmental Statement, April 2012

Beatrice Offshore Wind Farm Environmental Statement Addendum, May 2013

Appendix A – List of Abbreviations and Definitions

Term	Description
the Act	Energy Act 2004
BEIS	Department for Business, Energy and Industrial Strategy
BOWL	Beatrice Offshore Windfarm Ltd
Cable protection	Items installed over or around the cable to provide addition protection where burial is not possible or does not prove sufficient protection. Includes loose rock berms, grout bags, rock nets, concrete mattresses and cast-iron shells
Defra	Department of Environment, Food and Rural Affairs
DESNZ	Department of Energy Security and Net Zero
DP	Decommissioning Programme
EIA	Environmental Impact Assessment
ES	Environmental Statement
HLV	Heavy Lift Vessel
HVAC	High Voltage Alternating Current
IMO	International Maritime Organisation
Licensing Authority	Marine Directorate acting on behalf of the Scottish Ministers
Licensee	Beatrice Offshore Windfarm Ltd
Marine Licence	A licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 and/or the Marine and Coastal Access Act 2009
MFE	Mass Flow Excavation
MD-LOT	Marine Directorate Licensing and Operations Team
NCMPA	Nature Conservation Marine Protected Area
OfTW	Offshore Transmission Works
OFTO	Offshore Transmission Owner
OTM	Offshore Transmission Module
OWF	Offshore Wind Farm
OWF Site	Beatrice Offshore Wind Farm and surrounding water to the consented boundary
ROV	Remotely Operated Vehicle
S105	Section 105 of the Energy Act 2004
S106	Section 106 of the Energy Act 2004

Term	Description
S36 Consent	Consent under section 36 of the Electricity Act 1989 granted by the Scottish Ministers on 19 March 2014 in respect of the Beatrice OWF
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
Site	The area within which the Beatrice OWF is located, as defined in Annex 1 to the S36 Consent
WTG	Wind Turbine Generator

Appendix B – S105 Notices

See following pages.

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DECOMMISSIONING NOTICE UNDER SECTION 105 OF THE ENERGY ACT 2004

14 July 2023

To:

[redacted]
Beatrice Offshore Windfarm Limited
Inveralmond House
200 Dunkeld Road
Perth
PH1 3AQ

Beatrice Offshore Windfarm (generating infrastructure)

The Scottish Ministers, in exercise of their powers under section 105(2) of the Energy Act 2004 ("the Act"), hereby requires Beatrice Offshore Windfarm Limited ("BOWL") to submit to the Scottish Ministers a decommissioning programme for the Beatrice Offshore Windfarm, to be located at Smith Bank within the outer Moray Firth. The decommissioning programme relates to a renewable energy installation consisting of the electricity generating infrastructure, including but not limited to the wind turbines, associated support structures and inter-array cables under the responsibility of BOWL used for purposes connected with the production of energy from water or winds, as defined in sections 105(10) and 104(3) of the Act.

The decommissioning programme must include an estimate of expenditure likely to be incurred in carrying out decommissioning, in accordance with the template provided in Schedule 1 of this notice.

The Scottish Ministers, pursuant to section 105(7) of the Act, hereby further requires Beatrice Offshore Windfarm Limited to consult the bodies specified in Schedule 2, as well as any other consultees identified by Beatrice Offshore Windfarm Limited and any further persons subsequently identified by the Scottish Ministers, on the draft decommissioning programme and make the consultation draft of the decommissioning programme publically available for a minimum period of 30 days.

In advance of the consultation period, Beatrice Offshore Windfarm Limited should provide a copy of the consultation draft of the decommissioning programme and details of the proposed consultation process to Marine Directorate -Licensing Operations Team (previously known as Marine Scotland – Licensing Operations Team) ("MD-LOT"). Following the consultation, a copy of the latest draft of the decommissioning programme should be provided to MD-LOT no later than **14 November 2023** for review.

The decommissioning programme should be submitted to MD-LOT within one month of the completion of the consultation. This latest draft of the decommissioning programme should include details of the consultation process, including the comments from each consultee (including 'nil returns'). Information should be provided on how any consultation responses have been reflected in the submitted draft of the decommissioning programme. You should ensure that each consultee named in Schedule 2 of this notice acknowledges receipt of the consultation document.

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Schedule 1

DECOMMISSIONING PROGRAMME FINANCIAL APPENDIX TEMPLATE

Financial Information Requirements

Developers/operators should utilise the templates below when submitting decommissioning programmes to estimate the decommissioning expenditure to be incurred. Developers/operators should ensure that robust decommissioning costs are provided, including costs of disposal. Details of how the costs were developed should be provided alongside separate third party verification. If decommissioning is assumed to be taking place over multiple years, the 'Year' columns in the table below must be expanded and costs should be set out in the template for each individual year.

Work Package	Year 20XX £'000	Year 20XX £'000	Description of the work to be undertaken including for example vessel day rates, number of turbines etc.
Preparation of Assets			
Removal of generators			
Removal of foundations			
Removal of all cables			
Seabed clearance, site survey and restoration			
Recycling and Waste Management[2]			
Monitoring			
VAT*			
Exchange rate fluctuation**			
Inflation***			
Optimism Bias****			
Contingency*****			

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Total Security Per year			[redacted]
Total Overall Security Fund			

Costs should be reviewed in line with decommissioning review timelines and altered as required. This includes any changes to the VAT rate, exchange rate and inflations.
Developers/owners should not offset scrappage value from their cost assumptions.

***VAT**

Unlike the developers/owners, the Scottish Government has no exemption from VAT should it fall to the Scottish Ministers to decommission. Therefore, to understand the full costs relating to a scenario where the Scottish Ministers have to fund decommissioning, VAT will have to be factored into the financial securities.

The VAT regime only applies within territorial waters (i.e. up to 12 nautical miles from the shore baseline). Projects primarily located outside of territorial waters will therefore need to include how the VAT has been calculated for a limited proportion of the decommissioning costs (for example removal of cables within territorial water, and any on-land recycling or disposal costs).

Costs	£'000	Description of costs
Costs within territorial waters		
VAT (20%) Costs		[redacted]
Costs out with territorial waters		

****Exchange Rate Fluctuations**

For any decommissioning works to be undertaken using non-sterling currency, exchange rate hedging should be applied. Guidance is included within the HM Treasury's *Managing Public Money*.

Steps taken to manage exchange rate fluctuations	

*****Inflation Calculator**

Developers should ensure that inflation over the lifetime of the project is included. The rate at which inflation should be assessed is in the Office of Budget

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Responsibility's ("OBR") forecast for inflation as measured by the Consumer Price Index ("CPI").

Inflation should be forecast until the proposed date for decommissioning. If the current OBR forecast does not go up to the end of the subsidy period then an average inflation figure should be assumed for the years not yet covered by OBR forecasts.

Inflation should be applied to the total cost of decommissioning (excluding Optimism Bias and Contingency).

Year	20XX	20X1	20X2	20X3	20X4	20X5	20X6	20X7	Total
Inflation Rate (%)									
Inflation uplift per Annum (%)									
Total Costs to apply to inflation (£'000)									
Inflation cost (£'000)									

******Optimism Bias**

HM Treasury *Green Book* guidance should be utilised in the calculation of optimism bias. Optimism bias should be applied to the full cost of security, including exchange rate and inflation rate costs. Varying optimism bias rates can be applied to the different elements of decommissioning, based on the extent to which contributory factors are mitigated.

Work package	**Work package cost (£'000)**	**Optimism bias rate applied (%)**	**Optimism bias cost (£'000)**	**Reason for rate used including mitigating factors**

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*******Contingency**

Contingency percentage applied should reflect the sum of measured risk. The assumptions made in determining the contingency percentage should be included in the reasons for the contingency rate applied.

Contingency Applied	Reason for rate used

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Schedule 2

DECOMMISSIONING PROGRAMME - CONSULTEES

Buckie Harbour Master

Cromarty Firth Port Authority

Historic Environment Scotland

Maritime Coastguard Agency

MOD

Moray Council

Moray Firth Partnership

NatureScot

Northern Lighthouse Board

Royal Yachting Association

RSPB

Scottish Environment Protection Agency

Scottish Fishermen's Federation

TC Beatrice OFTO Limited

The Highland Council

The UK Chamber of Shipping

Wick Harbour

Appendix C – Decommissioning Schedule

[To be provided in future versions of the DP]

Appendix D – Decommissioning Costs and Financial Security Information

[To be submitted under separate cover as confidential appendix]

Appendix E – Consultation Matrix

[To be populated following consultation]

Reference	**Consultee**	**Consultee Comment**	**BOWL Response**	**Amendment(s) to DP** (if required)

Appendix F – Consultee Responses

See following pages.