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**Decommissioning Programme - 5 x 9.5MW and 2MW
Turbines & Associated Infrastructure
KINCARDINE OFFSHORE WINDFARM PROJECT**

(EXCLUDING CONFIDENTIAL FINANCIAL INFORMATION)

Prepared	Checked	Reviewed	Approved	ECOW Approved
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Organisation: KOWL	Organisation: KOWL	Organisation: KOWL	Organisation: KOWL	Organisation: KOWL
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Acronyms, Abbreviations and Definitions

AC	Aberdeenshire Council
ACC	Aberdeen City Council
DP	Decommissioning Programme
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HES	Historic Environment Scotland
KM	Kilometres
KOWL	Kincardine Offshore Wind Limited
MHWS	Mean High Water Spring
MS-LOT	Marine Scotland Licence and Operations Team
MW	Mega Watt
Nm	Nautical Miles
NS	Nature Scotland
ROC	Renewable Obligation Certificate
ROV	Remotely Operated Vehicle
S36	Section 36 Licence
WTG	Wind Turbine Generator

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1. INTRODUCTION

1.1. Purpose of the Document

This document provides the Decommissioning Plan (DP) for the 5 x 9.525MW and 1 x 2MW Turbines, associated Interarray Cables and Export Cables which form part of the Kincardine Offshore Wind farm Project.

1.2. Scope of the Document

This document outlines the decommissioning requirements for the Kincardine Offshore Windfarm Project in line with relevant licence conditions and guidelines. This includes the 'Decommissioning of Offshore Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under The Energy Act 2004 – Guidance notes for industry (in Scotland) July 2022'.

1.3. Project Overview

The Project is considered a commercial demonstrator site, which will utilise floating foundation technology and is the second floating wind turbine farm array in the UK. It has been included within the Survey, Deploy and Monitoring scheme for offshore renewable systems (similar to wave and tidal devices).

The Project is located south-east of Aberdeen approximately 8nm (15km) from the Scottish coastline, in a location that provides suitable water depth for a floating offshore wind demonstrator development (approximately 60-80m water depth).

The project is split into the following areas:

- The Development Area – the wind farm area including the Wind Turbine Generators (WTG) and inter-array cables.
- The Offshore Export Cable Corridor – the area within which the export cables are laid, from the perimeter of the Development Area to the onshore area at Mean High Water Spring (MHWS).
- The Onshore Area – the onshore area above Mean High Water Spring (MHWS) including the underground cables connecting to the onshore substation at Redmoss.

This DP focuses on the offshore elements only as per Section 36 Consent and Marine Licence granted.


Since consent was granted, there have been several necessary changes to the Project. Therefore, an application for a variation of the Section 36 consent granted by the Scottish Ministers under S36C of the Electricity Act 1989 was applied for in December 2017 (the 'Variation Application') followed by a subsequent variation in 2018.

1.4. Project Components

The maximum generation capacity of the windfarm is capped at 50MW. The main difference between the various stages of the applications have been the number and size of the turbines, and the substructure type.

As applied for in the Variation Application, the Project will now consist of the following offshore components:

- WTGs: 1 x 2MW and 5 x 9.525MW

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- Substructures: semi-submersible Windfloat™ design
- 33kv inter-array and two export cables

Onshore, the following construction activities have taken place (under permissions granted by Aberdeen City Council):

- Onshore substation
- Horizontal Directional Drilling landfall and onshore cable route

1.5. Construction Programme Overview

The construction of the Project occurred in 'Tranches' in-line with the indicative Programme outlined in the Document KOWL-REP-0004-001.

The Design Life of the Project is 25 years.

1.6. Approach to Amending and Updating this Decommissioning Plan


The nature of the construction process proposed for the Project means that updates to this document will be required as the Project progresses.

Where the need for an update or amendment is identified following approval from Marine Scotland Licensing Operations Team (MS-LOT) of the DP, either through a consultation response, or due to practicalities arising as the Project progresses, KOWL will communicate the suggested update/amendment to MS-LOT prior to editing the approved document. If the suggested change is accepted by MS-LOT, the Decommissioning Programme will be redrafted and submitted for re-approval.

It is anticipated that this DP will be reviewed at least at the following times:

- Where a significant change to the Project occurs (e.g. early removal of a WTG);
- At least one year before the start of the financial security provision period (end of operational year 10 – (2028));
- Thereafter annually with confirmation sent to MS-LOT to advise that the review has been carried out and
- 3 years before decommissioning commence discussions with MS-LOT and Nature Scotland (NS)
- Comprehensive review of the decommissioning plan two years before the commencement of decommissioning

Notwithstanding the above anticipated changes and in line with the Decommissioning guidance referenced in Section 1.2.

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2. Consent Conditions

The following consent conditions are taken from the S36 Consent which forms the requirements for this Decommissioning Programme. The submission of this DP is in line with these conditions.


Table 2-1 Licence conditions linked to the Decommissioning Programme

Licence	Condition Number	Name	Details
S36	3	Decommissioning	Where the Company has been given notice requiring them to submit to the appropriate authority, as defined in the Energy Act 2004, a Decommissioning Programme ("DP"), 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 appropriate authority a DP in compliance with that notice.
S36	31	Limitation on duration of the Deployment for the 2MW WTG	<p>The Company must remove the 2MW WTG, no later than three years from the date of this consent, or in substitution such other period as the Scottish Ministers may hereafter agree and confirm in writing.</p> <p>If the Company wish to re-deploy the 2MW WTG following the initial 3 year period, the Company must provide a written request to Scottish Ministers no later than six months before that date or at such as time as agreed with Scottish Ministers. Such approval may only be granted following consultation by the Scottish Ministers with SNH, ACC, AC, HES and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers.</p> <p><i>A request was made by the Company on the 22nd of August 2019 and the redeployment of the 2MW turbine was approved on the 17th of March 2021.</i></p>

2.1. Links to Other Consent Plans

The following consent condition is taken from the Marine Licence with which this DP has linkages to.

Table 2-2 Licence conditions linked to the Decommissioning Plan.

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Licence	Condition Number	Name	Details
Marine Licence	3.2.4.8	Decommissioning	This Licence does not permit the Decommissioning of the Works, for which a separate marine Licence is required.

3. DECOMMISSIONING BACKGROUND INFORMATION

3.1. Review of Decommissioning Guidelines

The decommissioning assessment is based on the following guidance:

- a. IMO 'Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone'¹.
- b. Decommissioning of Offshore Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under The Energy Act 2004 – Guidance notes for industry (in Scotland) July 2022
- c. Government (UK) guidance notes for decommissioning offshore oil and gas installations² in compliance with OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic Decision 98/3;
- d. OSPAR guidance documents on offshore wind farms³;
- e. The concept of Best Practicable Environmental Option (BPEO), this is the option which provides the most benefit or least damage to the environment, at an acceptable cost, in both the long and short term^{4 5}.

The guidance generally recommends the complete removal of all installations and structures from a development area. The removal of offshore installations should include the removal and subsequent full recycling process considering the Waste Hierarchy Framework of with reuse, recycling, incineration with energy recovery or disposal at a licensed site.

4. COMPONENTS TO BE DECOMMISSIONED AND PROCESS

The Project consists of the following components:

5 x 9.525MW Turbines

¹ Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, IMO, 19 October 1989,

http://www.imo.org/Newsroom/contents.asp?doc_id=628&topic_id=227

² Guidance Notes for Industry: Decommissioning of Offshore Installations and Pipelines under the Petroleum Act

1998 <https://www.og.decc.gov.uk/regulation/guidance/decommission.htm>

³ Guidance on Environmental Considerations for Offshore Wind Farm Development (Ref 2008-3), OSPAR, March 2008

⁴ Guidelines for Environmental Risk Assessment and Management, Defra, September 2002, <http://www.defra.gov.uk/environment/quality/risk/eramguide/08.htm>

⁵ The concept of BPEO is similar to that of BATNEEC - Best Available Technique not Entailing Excessive Cost

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in that both criteria involve balancing the reduction in environmental risk with the practicability and cost of reducing the risk

- Two export cables (HDD drilled at the shore end and connected to either the turbine in location 1 or location 4);
- 15 mooring lines and anchors (five turbines with three anchors);
- Five large windfloat substructures;
- Five Vestas 9.525MW Turbines
- Four inter-array cables.

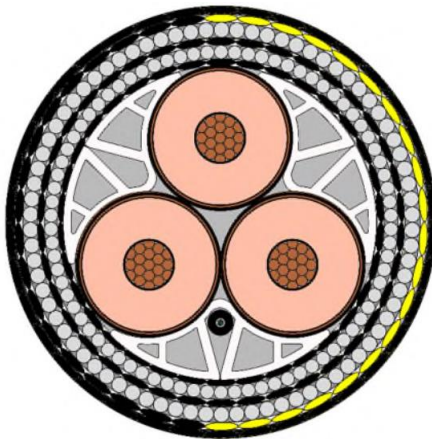
1 x 2 MW Turbine

- One small windfloat substructure
- Vestas 2MW WTG
- One Inter-array cable
- Four mooring lines and anchors

4.1. Export and Inter-array Cables & Associated Deposits

The total length of the export cables is made up of two lengths of approximately 17 km, including approximately 400m of dynamic sections at the offshore ends, connecting to the turbines KIN-01 (Southern cable) and location KIN-04 (Northern cable). The total length of the inter-array cables is approximately 9km.

Both the export cables and the inter-array cables are the same internal design, both are AC and have a cross-section as illustrated below. The cable is a 19/33(36) rated voltage with a 500mm² core area. The outside diameter is 170mm and it has a weight of 57kg/m in air with an estimated weight in seawater of 35kg/m. This is compliant with the type of cable assessed in the Original ES, ES Addendum and Variation ES where applicable.




Description	Details
Conductor	Stranded, round and compacted copper, longitudinally water blocked
Conductor screen	Extruded bonded semi conductive compound
Insulation	EPR
Insulation screen	Extruded bonded semi conductive compound
Screen bedding	Semi conductive screen bedding
Metal screen	Individual Copper Braid screen on each phase
Sheath bedding	Sheath bedding tapes
Power core sheath	Polyethylene sheath
Fillers	Extruded shaped fillers
Binder tape	Synthetic tape for bounding the assembled cores.
1 st Armour bedding	Polypropylene Yarns bedding
1 st Armouring	One layer of galvanized steel wires, filled with Bitumen.
2 nd Armour bedding	Polyester tape + Polypropylene Yarns bedding
2 nd Armouring	One layer of galvanized steel wires, filled with Bitumen.
Serving	Polyester tape + Polypropylene Yarns + Polyethylene sheath
OF cable	1 x Optical Fiber Cable with 20SM+4MM fibers, 4SM + 2MM as contingency

Figure 4-1 Cross section of the 33kv export and inter-array cables.

The static export cables have an outer layer of polypropylene yarn, where-as the dynamic sections have an additional extruded polyethylene sheath on top of the yarn.

The inter-array cables have not been buried during installation. The method of removal of the inter-array cables will be one of the following methods:

- Use a powered reel capable of recovering the cable onto the reel

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- Use a powered reel and a tensioner to recover the cable onto a storage reel
- Pull the cable on board using a 'hand over hand' method, cutting the cable into lengths using a guillotine type cutter
- All the buoys attached to the cables will be removed during the recovery of the inter-array cables

The two export cables have been buried. The southern cable also has some rock placement at locations where the minimum burial depth was not achieved. The cables are located between the exit of the directionally drilled conduits and KIN-01 for the southern cable and KIN-04 for the northern cable. The method for recovery will be to disconnect the cable from the turbines and recover using one of the following methods:

- Use a powered reel capable of recovering the cable onto the reel
- Use a powered reel and a tensioner to recover the cable onto a storage reel
- Pull the cable on board using a 'hand over hand' method, cutting the cable into lengths using a guillotine type cutter
- All the buoys attached to the cables will be removed during the recovery of the inter-array cables

The cables will be cut at the exit point from the directionally drilled conduits. It may be possible to release the cables at the connection point onshore and pull the cable out of the directionally drilled conduits. However, the current plan is to cut the cable at the exit point from the conduits subsea.

4.2. Moorings/Anchors

There are three mooring lines and anchors for the substructures for the 9.525MW turbines and four mooring lines for the 2MW turbine. This results in a total of 19 mooring lines and anchors for the Project.

The mooring line lengths range up to approximately 500m (dependent on water depth at each turbine location) and will be offshore grade stud-less mooring chains. The dimensions of the chain are between 3" and 6.5" dependent on section of mooring system.


The anchors are drag embedment anchors (approximate weight 12 tonnes). All anchors will now be buried as part of the installation process, rather than previously noted as worst case as being partially buried.

4.3. MHI Vestas V164 and V80 Turbines

The 9.525MW Turbines are MHI Vestas V164 and the 2MW Turbine is a Vestas V80.

4.4. MHI Vestas V164 and V80 Substructures

The MHI Vestas V164 and V80 turbines are installed on three sided semi-submersible foundations with three buoyancy modules each. The substructures are approximately an overall width of 70m (~35m for 2MW) and a draft of approximately 18m. The substructures are made of steel and will be partly filled ballast water to maintain stability.

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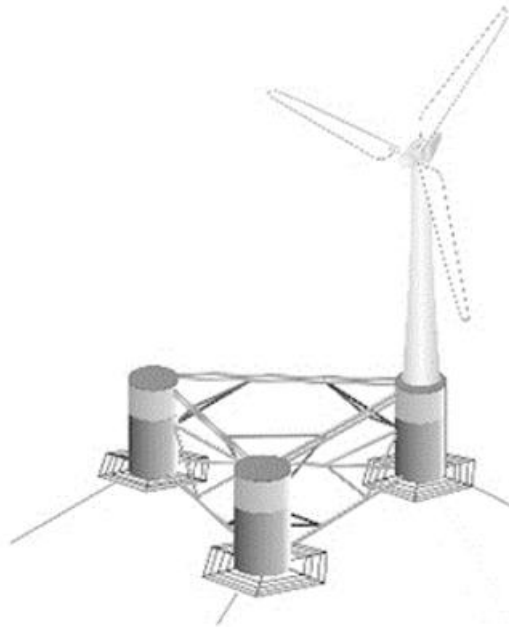


Figure 4-2 Schematic of the configuration of turbine, substructure and mooring lines

5. DECOMMISSIONING PROCESS

5.1. Decommission the WTGs

The final stage of the decommissioning is planned over a six-month campaign offshore in 2043. All items are planned to be removed from the Development Area, including the inter-array cables, export cables, moorings and anchors.

KOWL's decommissioning methodology will likely be based on the reverse of installation method and is significantly less complicated than fixed offshore wind installations. The current base case follows the process described in Table 5-1 below. In summary, the decommissioning process will start with the disconnection of the turbines from their cables and mooring ready for tow to a suitable port or sheltered location for removal of the wind turbine and tower. The sub-structure may then optionally be towed to a suitable port for removal of smaller items and preparation for decommissioning.

In parallel the mooring lines and anchors will be recovered onto an Anchor Handling Vessel and returned to shore. The inter-array cables will be recovered onto a Construction Vessel, including all buoyancy modules and ancillary items. The export cables will be recovered.

All elements of the material returned to shore will be processed as per the relevant regulations at the time of decommissioning, but where possible all items will be recycled or reused.


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Table 5-1 Anticipated decommissioning process to be undertaken by KOWL.

Process	Operation	Vessel types to be used
1	Remove all floating units from site and return to port.	Towing and anchor handling vessel(s)
2	Recover all mooring lines and anchors to port.	Anchor handling vessel
3	Recover all inter-array cables to ship and any additional marine deposits laid on the seabed (including concrete mats).	Cable laying vessel / supply vessel with ROV
4	Cut, disconnect and retrieve dynamic cable ends of export cables.	Cable laying vessel / supply vessel with ROV
5	Export Cables removal.	Cable laying vessel / Anchor Handler / Large Supply Ship with ROV.

All decommissioned elements will be delivered to a certified waste handling facility for recycling, in the event of no possible repowering or re-use being identified. If re-use or recycling is not possible, incineration with energy recovery will be considered, with disposal being the final option. Where prudent and technically possible, all oils/liquids will be removed from the structures prior to tow back to port. However, it is noted that this may not be possible and may have to be done in a port as a more controlled environment.

Marine growth will be assessed throughout the life of the sub-structures due to impacts on performance. These assessments will be used to assess the best practical environmental option (BPEO) for the removal of marine growth, and also assess potential disposal options once onshore, if this option is selected.

6. ENVIRONMENTAL IMPACT ASSESSMENT


As part of the Original ES, the potential significant impacts from the decommissioning process were reviewed. No significant impacts were identified as part of the assessment. The decommissioning process described in Section 5 is compliant with this assessment undertaken in the Original ES, thus KOWL still consider that there are no likely significant environmental impacts associated with decommissioning.

The Summary of Effects and overall impacts of the windfarm, including the process and period following decommissioning are described in the Environmental Statement.

However, when the Project nears the end of the Design Life and the decommissioning process re-considered, a more detailed EIA will be undertaken as part of the application for a licence to undertake the decommissioning.

7. CONSULTATION

Consultation has been key part of the consenting process for the Project and KOWL recognise it is required for the success of the Project going forward and through the construction phase and into the operational phase. Throughout the consenting process KOWL have been in active discussions with all relevant stakeholders especially during the Variation Application and planning the monitoring requirements. KOWL have reviewed the relevant previous decommissioning programmes submitted for floating offshore wind farms to ensure that this document complies with the comments raised during consultation on those.

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KOWL will continue to undertake regular consultation throughout the operational phase of the Project, especially as we work through the remainder of the decommissioning programme stages.

8. COSTS AND FINANCIAL SECURITY (APPENDIX A – CONFIDENTIAL)

All required financial information has been provided in Appendix A. Please note that this information is confidential and should not be made publicly available.

KOWL will provide a financial security for decommissioning the windfarm and the export cables in accordance with the value detailed in Appendix A (5 x 9.5MW turbines, 2MW turbine and the export cables). The security will be provided in accordance the referenced guidelines in Section 1.2 of this document. KOWL propose to set aside £-- per year in years 2028 to 2037 (10 years). The funds will be in a form as required by Section 9 of the Guidelines and more specifically an annually renewable Performance Guarantee, escalating in value each year by £--. The value of the security would be re-assessed in accordance with the Decommissioning Plan one year before the commencement of the accrual (i.e. 2027) to take account of current prices, inflation and other considerations as detailed in Appendix A.

9. SCHEDULE

A full decommissioning schedule will be provided prior to decommissioning activities taking place; at this time only, an indicative schedule has been provided in Figure 8-1 below.

The Project commenced operations in September 2018 and has a design life of 25 years. Therefore, decommissioning is planned to be undertaken in 2043, the works will require a separate Marine Licence. An indicative schedule for decommissioning is given in Figure 9-1. The onshore decommissioning of the marine elements will be continued beyond onsite decommissioning and the full recycling process will extend beyond the schedule noted below.

Indicative Schedule for decommissioning	April	May	June	July	August	September
1 Disconnect machine and tow to port						
2 Recover all mooring lines and anchors						
3 Recover all interarray cables						
4 Retrieve dynamic cable ends of export cables						
5 Burying the end sections of the export cable						


Figure 9-1 Indicative decommissioning programme for 2043

10. PROJECT MANAGEMENT AND VERIFICATION

Currently there is limited information to add to this section of the DP and this will be further expanded towards the final stages of the Project.

Project decommissioning programme reviews will be undertaken at the following times:

- Where a significant change to the Project occurs (e.g. early removal of a WTG);
- At least one year before the start of the financial security provision period (end of operational year 10 – (2028));
- Thereafter annually with confirmation sent to MS-LOT to advise that the review has been carried out and
- 3 years before decommissioning commence discussions with MS-LOT and Nature Scotland

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- Comprehensive review of the decommissioning plan two years before the commencement of decommissioning

11. SEABED CLEARANCE


As noted above KOWL will remove all infrastructure components of the Project from within the Development Area and export cable corridors as part of decommissioning process to ensure the seabed is cleared of Project related material. As part of the process, once all the components have been removed a seabed survey will be undertaken to confirm that all Project related material, including any debris, within a 200m radius of each structure has been removed. The route of the unburied cables, mooring lines and anchor locations will also be surveyed visually. The survey data will be submitted to the relevant licencing authority for approval and signoff.

12. RESTORATION OF THE SITE

The Development Area and cable corridors will be restored, as far as practical, to its pre-construction state. Further details on how the site will be restored will be provided when this DP is updated prior to decommissioning commencing.

13. POST-DECOMMISSIONED SITE MANAGEMENT

As KOWL propose to remove all elements of the Project infrastructure, there will be a limited requirement to undertake post decommissioning activities.

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APPENDIX A Decommissioning Programme Financial Information

THIS INFORMATION IS REDACTED.