Section 36C Variation Environmental Statement
KINCARDINE OFFSHORE WINDFARM PROJECT

Document Category
X

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Revision History

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*Purpose of Issue: for information, for review, for approval

Detailed Change Log

Date	Rev. Status	References	Description of changes	Initials

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1. Introduction

In April 2016 Kincardine Offshore Windfarm Limited (KOWL) submitted applications for consent to construct and operate the Kincardine Offshore Windfarm known hereafter as the 'Project'.

The Project is considered a commercial demonstrator site, which will utilise floating foundation technology, and will be one of the world's first array of floating wind turbines. 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 and provides suitable water depth for a floating offshore wind demonstrator development (approximately 60-80m) (Figure 1-1).

In this Variation ES, reference is made to 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 proposed export cables will be 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.

In September 2016 an addendum (ES Addendum), of additional environmental information to the KOWL Environmental Statement (Original ES), was also submitted and in March 2017 consent under Section 36 and Section 36A of the Electricity Act 1989.

Table 1-1 Summary of document timelines

Original Documents	Addendums	Variation
Kincardine Offshore Windfarm ES (**Original ES**)	ES Additional Information Addendum (**ES Addendum**)	**Section 36C Variation ES (Variation ES)**
Kincardine Floating Offshore Wind Demonstrator Project Habitats Appraisal – Information to inform an Appropriate Assessment (**Original HRA**)	ES Addendum: Appendix B: HRA Additional Information Addendum (**HRA Addendum**)	**HRA – Information to Inform an Appropriate Assessment Variation (HRA Variation)**
March 2016	September 2016	November 2017

Since consent was granted, there have been several necessary changes to the Project. As such, this document forms part of the application for a variation of the Section 36 consent granted by the Scottish Ministers under S36C of the Electricity Act 1989.

The changes to the Project, as outlined in this document, fall within the variation guidelines. Therefore, it is not necessary to start a completely new Section 36 application as they are not fundamentally different in terms of character, scale or environmental impacts from what is authorised under the existing consent

The Project as proposed to be varied is hereinafter known as the 'Varied Project'. A further description of the changes as provided in Section 2.

Since the applications were submitted in 2016, changes to the EIA Regulations also came into force in May 2017 transposing the 2014 amended EIA Directive 20014/52/EU into UK Law. The changes have been outlined and have been considered and assessed, where necessary, as part of this Variation ES for the Variation application (Section 6).

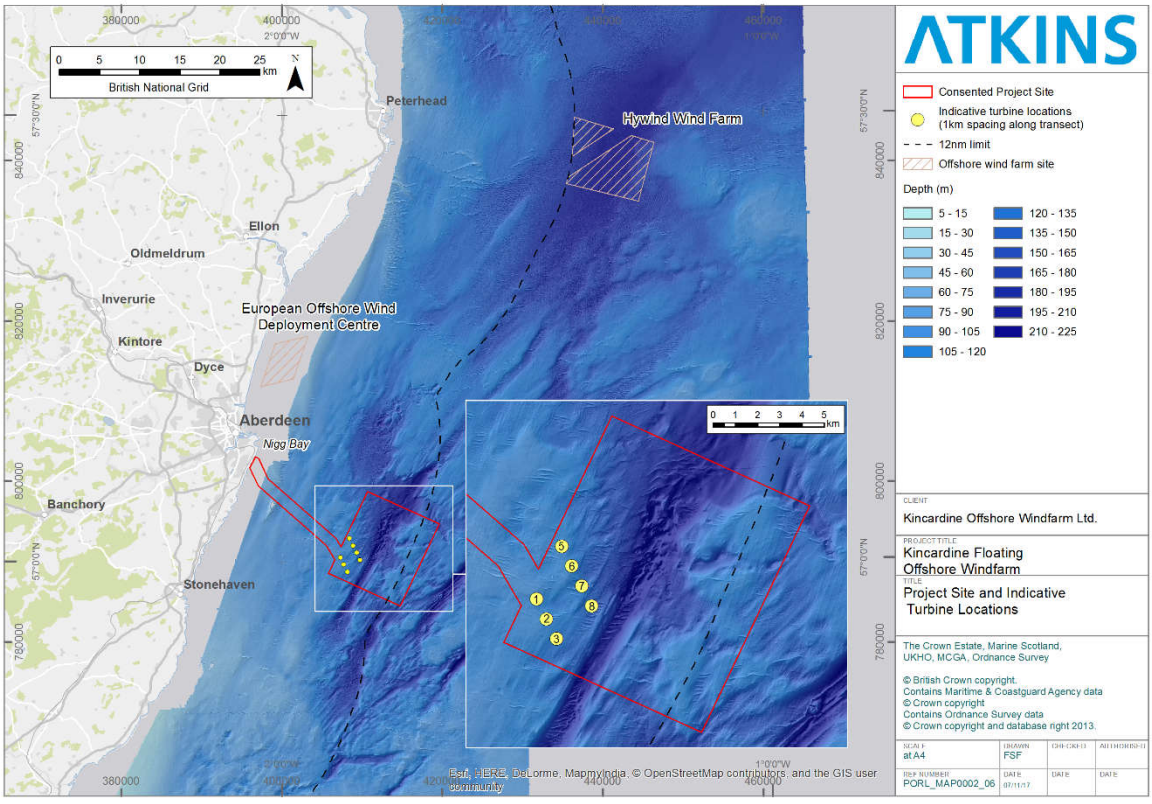


Figure 1-1 Project site and indicative turbine locations

1.1. The Applicant

At the time of the original application (both April and September 2016) the Applicant, KOWL, was a company formed by Pilot Offshore Renewables Limited (PORL) and Atkins Ltd. PORL is an Aberdeen based joint venture between MacAskill Associates Limited and Renewable Energy Ventures (Offshore) Limited; both are Scottish companies with extensive experience in the wind industry. KOWL was established in order to develop, finance, construct, operate, maintain and decommission the Kincardine Offshore Windfarm. Since the application was submitted, Atkins are no longer part of PORL, and the company is now made up of Cobra Instalaciones y Servicios Internacional (CISI) and

PORL. CISI is a construction company within the ACS Group with vast worldwide experience in the construction of energy generation plants, conventional and renewables (Wind, Thermosolar, PV and Biomass).

1.2. Purpose of this Variation

This Section 36C Variation Environmental Statement (Variation ES) has been prepared to outline and assess where any impacts of the Varied Project differ to those assessed in the Original ES and ES Addendum. This document assesses any significant impacts against both the existing criteria and the updated assessment criteria as identified in the new Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.This Variation ES effectively identifies where the Original ES met the requirements of the new Regulations or addresses any new assessment requirements as necessary.

The Variation ES, read together with the Original ES and ES Addendum, provides a full assessment of the likely significant effects of the Varied Project, in accordance with the 2017 EIA Regulations.

All documents submitted as part of the Original consent and this Variation application are available on the Kincardine Offshore Windfarm website and the associated website on the Marine Scotland portal for offshore wind developments at the following addresses:

www.pilot-renewables.com; and

http://www.gov.scot/Topics/marine/Licensing/marine/scoping/Kincardine

It is noted and acknowledged that under the new EIA Regulations the use of Environmental Statement is no longer considered correct and Environmental Impact Assessment Report (EIA Report) should be used. However, for continuity purposes with the Original ES and ES Addendum, Variation ES is used for this document instead of EIA Report.

1.3. Consultation

Pre-Application Consultation

KOWL has undertaken informal pre-application consultation with Marine Scotland Licensing Operations Team (MS LOT), Scottish Natural Heritage (SNH), Royal Society for the Protection of Birds (RSPB), Ministry of Defence (MOD), Aberdeen City Council, Aberdeenshire Council and National Airborne Transport Services (NATS) on the proposed Variation application.

Post Application Process

Once the application has been accepted by MS LOT, an electronic version will be placed on the Kincardine Offshore Windfarm website and the associated website on the Marine Scotland portal for offshore wind developments as noted above.

On acceptance of the Section 36 Consent Variation application, KOWL will publish the notice within the local and national newspapers, and on the Lloyds List and in the Fishing News Bulletin as per the required regulations. This process will seek to invite comment from members of the public and interested parties in relation to the Variation application.

Following the completion of the formal consultation process, the Scottish Ministers will consider all consultation responses and may request further information from KOWL if necessary. On determining the Variation application, Scottish Ministers must provide the reasons for their decision (including for any Variations not requested by the applicant) and, if granted, will provide clean and marked-up versions of the varied Section 36 Consent.

2. Project Technical Changes

As previoulsy consented the Project will involve the installation of wind turbine generator (WTG) units connected by inter-array cables with the resultant power being exported directly to the onshore grid by two 33KV (Kilovolt) export cables. These will then connect into the power grid at Redmoss onshore substation, subject to final agreement with the operator.

Export cables will be buried to a depth of 1.5m where seabed conditions allow. Where burial is not possible, cable protection in the form of concrete mattresses and rock will be required.

The changes to the design of the windfarm are outlined below.

2.1. Turbines

In Chapter 1 (Section 1.5) of Original ES it was stated that '*KOWL intend to install between six and eight turbines, each with a capacity of between 6 to 8MW. The number and capacity of turbines chosen will not exceed the 50MW cap for the demonstrator site. For example, if six turbines were installed these could be of 8MW capacity and remain within the 50MW cap, however if eight turbines were installed these would be of a lower capacity e.g. 6.2MW each to remain within the overall 50MW cap for the Project*'.

KOWL now intend to install up to seven turbines, including a 2MW turbine that will be installed first, followed by six larger turbines over the remainder of the installation period up to 2020. The current proposed turbines would have a rated capacity of up to 8.4MW; however, the maximum generating capacity of windfarm will remain up to 50MW.

The benefit of the smaller 2MW turbine will be to provide four key input requirements for the larger turbines that will be installed in the Development Area as part of the test and demonstration nature of the Varied Project:

- Provide site specific motion and monitoring technical data for the larger turbines;
- Demonstrate and define the procedure for the disconnection and reconnection of a floating offshore wind substructure, which will represent a first of kind operation for floating offshore wind structures;
- Provide proof of concept for installation of the larger machines in the Development Area; and
- Provide the initial site ornithology data as defined by the Project Environmental Monitoring Plan (PEMP).

The installation of the 2MW turbine in 2018 will allow for the all bird monitoring equipment to be installed for approximately 12 to 18 months to gather on-site bird collision data before the remaining larger turbines are installed. Further information on the planned monitoring is being developed in the PEMP through consultation with RSPB, SNH and Marine Scotland Science (MSS), and will be in line with the new requirements imposed under the 2017 EIA Regulations.

The first turbine comprised in the Varied Project to be deployed will be a wind turbine generator and associated substructure, anchors and mooring lines with a generating capacity not exceeding 2MW ("Turbine 1"). A condition in the existing marine licence requires Third Party Certification or Verification (or suitable alternative as agreed, in writing, with the Licensing Authority) for all WTGs, mooring systems and WTG platform structures prior to the commencement of the works. The initial period sought for such certification / verification / suitable agreed alternative of the WTG platform substructure for Turbine 1 will be limited (expected to be three years or less). This is due to the engineering life of

the substructure (ten years from initial substructure construction in 2011). At the expiry of the WTG platform substructure certification, Turbine 1 will only be re-deployed if (i) the platform structure is re-certified following inspection (and only for so long as valid certification is in place) and (ii) if MS-LOT (in consultation with SNH, Historic Environment Scotland, Aberdeen City Council and Aberdeenshire Council) is satisfied that the re-deployment at the proposed location within the Site would not give rise to new or materially different likely significant effects to those identified in the seascape, landscape and visual assessment of the Variation ES. Any further re-certification would follow the same process. If Turbine 1 is not re-deployed within 6 months, it will be decommissioned (in line with condition 5 of the S36 consent on Redundant turbines). It is anticipated this position will be secured by a condition in the marine licence (and if considered necessary, also in the S36 consent).

In the Original ES, it was presented that the turbines would be between 6 to 8MW. The largest turbines (up to 8.4MW) that will now be used have some parameters that are out with the Rochdale Envelope developed for the turbines that were previously assessed for the Original ES and ES Addendum, including increasing the rotor diameter from 154m to 164m. The larger turbines for the remainder of this Variation ES will be referred to as 164m turbines. The dimensions for the 2MW and 164m turbines are shown in Section 2.4 below along with those originally assessed in the Original ES and ES Addendum.

This EIA has been undertaken using the following turbine matrix:

1 x 2MW turbine and 6 x 164m turbines.

2.2. Substructure

In the Original ES, the WindFloat™ Semi-submersible substructure designed by Principle Power was assessed as part of the EIA process, whereas in the ES Addendum the semi-spar substructure designed by Cobra was presented (no further assessments were undertaken in relation to the change in substructure in the ES Addendum). Therefore, both substructures have been assessed previously. The two substructure designs result in different masses and types of material used in the manufacture of the substructures, a change in the displacement of water and in the depth of water the substructure would penetrate to (draft). However, there were no significant impacts identified in the Original ES, and no changes to the conclusions identified in the ES Addendum.

For the installation of the 2MW turbine the semi-submersible WindFloat™ prototype from the demonstrator site in Portugal will be utilised.

The type of substructure to be used for the remainder of the larger turbines is still under development, and it is likely that a combination of the WindFloat™ (steel semi-sub) and Cobra (concrete semi-spar) substructure designs will be used. As no significant impacts were identified from either substructure design in the Original ES (semi-sub) and ES Addendum (semi-spar) respectively no further assessment is required for any receptor related to the substructure (see Table 3-1 for information).

A summary of the maximum temporary and permanent deposits that could be made below MHWS for the construction of the Varied Project is included in Table 2-1 as updated from that included in the Original application documents (both Original and Addendum stage).

Table 2-1 Table of temporary and permenant deposits below MHWS

Element of Windfarm	WTG 1000 tonnes of steel per turbine	Substructures 2300 tonnes of steel per turbine 5,733m³ of concrete per substructure	Anchors 20 tonnes per anchor	Mooring Lines 720m per line (anchor chain, mooring cable or polyester mooring line) x 32	Rock Dumping for Cable Burial and Scour Protection	Concrete Bags Mattresses	Cables 18km*2 export and 30km for interarray	Temp Mooring Buoys x32	Cardinal Markers 3m diameter 6tonnes + mooring x4
Material									
Steel/Iron (Tonnes)	8000	16500	640						
Timber (m^3/tonnes)									
Plastic/Synthetic m^2									
Stone/Rock Gravel m^3					12000				
Concrete Substructures m^3		45864							
Concrete Bags/Mattresses m^3						12000			
Cable m				720 x 32			66000		
Number of Temp Mooring Buoys								32	
Number Cardinal Markers									4

2.3. Construction Programme

An updated indicative Construction Programme is included below as the Programme has now been modified since the Original ES. A final Construction Programme will be provided as a consent condition in due course.

Table 2-2 Updated indicative construction programme

Tranche	Activities	Indicative Start Dates
Tranche 1	Mooring installation Turbine Location 1 Export cable 1 installation Installation of 2MW turbine to Location 1	May 2018 May 2018 June 2018
Tranche 2	Export cable 2 installation Mooring installation Turbine Locations 5-7 Installation of inter-array cables Locations 5-7 Installation of turbines to Locations 5-7	April 2019 April 2019 Aug 2019 Aug 2019
Tranche 3	Mooring installation Turbine Locations 1-3 Installation of inter-array cables Locations 1-3 and 8 Move 2MW to Location 8 (dependent on recertification and consultation as noted above) Installation of turbines to Locations 1-3	March 2020 June 2020 June 2020 June 2020

2.4. Rochdale Envelope

Table 2.2 below shows the Rochdale Envelope as presented in the Original ES, this has been provided along with:

- the amendments which were assessed in the ES Addendum;
- the new parameters identified for the larger turbines; and
- the parameters for the 2MW machine

This table has been utilised for the assessment in the Ornithology Section (Section 4) as part of the worst-case scenario (1x2MW and 6x164m).

Table 2-3 Rochdale Envelopes as defined for the EIAs undertaken for the Original ES, ES Addendum and this Variation ES

Project Component	Parameter	Worst Case Value Original ES	Worst Case Value ES Addendum	Worst Case Value Variation	
Site	Area of Project	110km^2	No Change	No Change	
	Water depth	60-80m	No Change	No Change	
	Development Area size	5.5nm^2	No Change	No Change	
	Distance to shore from closet WTG	8nm/14.8km	No Change	No Change	
Turbine	Number of turbines	8	No Change	7	
	Rated capacity	up to 8MW for each turbine and maximum 50MW for the total array	No Change	up to 8.4MW for each turbine and maximum 50MW for the total array	
	Design	Three-bladed horizontal-axis	No Change	Three-bladed horizontal-axis	
	Turbine Parameters	up to 8MW	No Change	Vestas V80 (2MW)	164m
	WTG Hub Height (to centreline of hub)	Lowest Astronomical tide (LAT) +100m	No Change	66m	104.9m
	WTG Blade Length (to centreline of hub)	76m	No Change	40m	82m
	Effective Tip Height	176m	No Change	106m	191m
	Rotor diameter	152m	No Change	80m	164m
	Max blade width	4.5m	No Change	3.5m	5.4m
	Rotation speed	6.4-10.1.5 rpm	No Change	Up to 17 rpm	4.8-12.1rpm
	Operational wind speed	3.5m/s - 30 m/s	No Change	4.0 ms^{-1} – 30ms^{-1}	4ms^{-1} – 25 ms^{-1}
	Derived mean rotation speed at site	9.3 rpm for 6mw	No Change	15rpm	10.5rpm
	Average pitch	15°	No Change	15º	6º
	Blade clearance	22m maintained at all tidal states (floating sub structure rather than fixed)	No Change	26m	22.9m
	Colour	Pale grey	No Change	No Change	
Substructure	Shape of substructure	Floating turbine (semi-submersible structure) anchored to seabed. Symmetrical in shape, comprising of vertical tubular sections, at each corner; connected by horizontal and vertical diagonal members above and below the water line.	Floating turbine (semi-spar structure) anchored to seabed. Symmetrical in shape comprising of a central column tank and three outer columns tanks (submerged with the tops being 6m below the water surface) connected to the central column tank via pontoon tanks. All pontoon tanks and column tanks are fully submerged when on site, only the upper part of the central column is above the waterline.	No Change	
	Geometry	Equilateral 3 sided	Equilateral 3 sided	No Change	
	Elevation above waterline	12m	25m	No Change	
	Horizontal Face length	70m	35m (from centre of central column tank to outer column tanks). 70m total diameter between and two outer column tanks.	No Change	
	Diameter of vertical columns	12m	18m (outer column tanks)	No Change	
	Access Points	2 boat-landings	2 boat-landings	No Change	
	Electrical Cable Access	3 J-tubes	3 J-tubes	No Change	

Project Component	Parameter	Worst Case Value Original ES	Worst Case Value ES Addendum	Worst Case Value Variation
	Mooring Points	4 point mooring	4 point mooring	No Change
Foundations	Number of anchors	4 per WTG totalling 32	No Change	No Change
	Type of anchor	Drag embedment (Stevpris Mk 6)	No Change	No Change
	Weight of anchor	20 tonnes	No Change	No Change
	Maximum seabed displacement	10 x 10m per anchor 3200m^2 total array	No Change	No Change
	Actual dimensions on seabed	6.8 x 7.6m	No Change	No Change
	Depth of max penetration into seabed	1.6m	No Change	No Change
	Height above seabed	3.2m	No Change	No Change
	Mooring type	Catenary	No Change	No Change
	Number of mooring lines	4 per WTG 32 total array	No Change	No Change
	Mooring line radius	9 x water depth and touchdown within 250m	No Change	No Change
	Clump weights	Steel or reinforced concentre approx. 25 tonnes	No Change	No Change
	Buoys	Temporary surface buoys during construction and Permanent submersible buoys at seabed for ROV recovery. 1 per mooring lines, 32 total array	No Change	No Change
Inter-array Cables	Number	12	No Change	No Change
	Length	2.5km each total 30km	No Change	No Change
	Cable outer diameter	180mm	No Change	No Change
	Total area of seabed coverage	5400m^2	No Change	No Change
	Rated capacity	33kv	No Change	No Change
	Installation	Laid on seabed	No Change	No Change
	Burial	None anticipated, burial during installation if deemed necessary post further surveys prior to installation. Max 10% of total length buried considered for EIA 3km (540m^2)	No Change	No Change
	Scour protection	None considered	No Change	No Change
Export Cable	Number	2	No Change	No Change
	Length	19km	No Change	No Change
	Length offshore	15km	No Change	No Change
	Cable outer diameter	180mm	No Change	No Change
	Installation method offshore	Trenching, laying and burial	No Change	No Change
	Trench width per cable	3m	No Change	No Change
	Trench depth	1.5m	No Change	No Change
	Separation distance between cables	500m	No Change	No Change
	Rated capacity	33kv	No Change	No Change
	Burial at landfall	HDD	No Change	No Change
	Burial offshore if 1.5m depth not achieved	Rock dumping in trench to bury cable if the sediment removed from trench does not provide sufficient material to bury cable. Max anticipated 10% of cable length 1.5km each cable 3km total	No Change	No Change
	Scour protection	None considered – to be monitored during operational phase	No Change	No Change

Project Component	Parameter	Worst Case Value Original ES	Worst Case Value ES Addendum	Worst Case Value Variation
Pre-Installation	Survey requirements	Single and multibeam bathymetry, Side Scan Sonar, Sub Bottom Profiler, Magnetometer, Sparker or Boomer array, vibrocores, CPT. Metocean buoys.	No Change	No Change
Construction and Installation (does not include weather downtime)	WTG and Substructure construction	Onshore/port area	No Change	No Change
	Installation of mooring lines	2 vessels, 1 day transit, 13 days of operations each = 14 days	No Change	No Change
	Installation of inter-array cables	1 vessel, 1 day transit, 13 days of operations = 14 days	No Change	No Change
	Installation of export cables	1 vessel, 2 days transit and 3 days of operations = 5 days total for both cables	No Change	No Change
	Guard vessel	1 vessel present on site between installation of moorings and WTGs/Substructures being towed to site	No Change	No Change
	Towing of WTGs to site and positioning	1 vessel, 5 days transit and 28 days of operations = 33 days + 2 standby days	No Change	No Change
	WTG installation/hook-up to inter-array cables	1 vessel, 3 days of transit and 2.5 days of operation per turbine resulting in approximately 20 days of onsite operations = 23 days + 8 standby days	No Change	No Change
	Safety zone	500m rolling safety zones during construction	No Change	No Change
	WTG spacing	Minimum of 1,000m (NNW / SSE orientation) and 2,200m (north / south orientation)	No Change	No Change
Operations and Maintenance	Safety zone	50m around each turbine + guard boat	No Change	No Change
	Maintenance vessel	Winter: 1 vessel 5 days a week – emergency cover only at weekends Summer: 2 vessel 5 days a week – emergency cover only at weekends	No Change	No Change
Design Life	Operational duration of the windfarm	25 years	No Change	No Change
Decommissioning	All	All components of removed at end of design life, except for the export cables which are to be left in situ	No Change	No Change

3. Impact Assessment

3.1. Baseline Environment

All baseline site data used for the Original ES and ES Addendum were collected within the last five years and therefore are still valid for the EIA and Appropriate Assessment. All baseline data have been previously submitted as part of the original consent documentation and can be obtained from the Marine Scotland website as noted in Section 1.2.

3.2. Assessment Methodologies

No changes to the assessment methodologies used in the Original ES or ES Addendum have been identified and therefore the methodologies are still considered valid.

3.3. Review of Receptors (Chapters)

A review of the potential impact on all receptors against the changes contained within this Variation ES is shown in Table 3-1. As the changes are only to turbine dimensions, only changes to the above water elements of the Varied Project are considered, the potential impacts to the sub-surface receptors (Physical Environment, Benthic Ecology, Fish and Shellfish, Marine Mammals, Underwater Noise, Marine Navigation, Marine Historic Environment and Commercial Fisheries) have not changed, and therefore the previous assessment process remains relevant and the residual impacts remain unchanged.

For the remaining receptors, the following reviews have been undertaken for this Variation ES:

1. Ornithology – Identified that the change in turbine dimensions could potentially change the current assessment conclusions against the identified bird species (Kittiwake and Puffin only). This is therefore re-assessed in detail in Section 4.
2. Military and Aviation – Identified that larger turbines could impact on the radar reflectance of the site. However, consultation with Ministry of Defence and NATS have identified that there are no additional requirements to re-assess the impacts to radars due to the reduction in turbine numbers at site. Therefore, the previous assessment process remains appropriate and the residual impacts remain unchanged from those shown in the Original ES.
3. Seascape, Landscape Visual Impact Assessment (SLVIA) – It was identified that the Varied Project could change the conclusions of the Original SLVIA. New visualisations were therefore created for the Varied Project and an assessment undertaken on Operational impacts to the identified viewpoints previously used in the Original ES and ES Addendums in Section 5 below.
4. Socio-Economics – The changes to the Varied Project does not change any of the considerations or assumptions used in this chapter of the Original ES or ES Addendum. Therefore, the previous assessment process remains appropriate and the residual impacts remain unchanged from those shown in the Original ES and ES Addendum.
5. Other Marine Users – The changes to the Varied Project does not reduce the blade tip clearance that was considered in the Original ES Therefore, the previous assessment process remains appropriate and the residual impacts remain unchanged from those shown in the Original ES.
6. Onshore – The changes to the Varied Project are only relevant to the offshore elements of the Varied Project. Therefore, the previous assessment process remains appropriate and the residual impacts remain unchanged from those shown in the Original ES and Addendum.

Table 3-1 Summary of the review undertaken for all receptors against the changes to the turbine parameters in the Varied Project

	Original ES Chapters													
Project updates	Physical Environment	Benthic Ecology	Fish and Shellfish	Marine Mammals	Ornithology	Underwater Noise	Maritime Navigation	Military and Aviation	LSVIA	Marine Historic Environment	Socio- Economics	Commercial Fisheries	Other Marine Users	Onshore
Maximum Hub height	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No
Rotor diameter	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No
Revolutions per minute	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No
Height of blade tip	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No

3.4. Mitigation

Mitigation is only considered in respect to those receptors identified above (ornithology) and for the new receptors to be considered from the new EIA regulations as the conclusions from the Original ES and ES Addendum remain unchanged for the remaining receptors.

3.5. Cumulative Impacts

No changes to the other Developments that were considered in the Original ES or ES Addendum have been identified. It is acknowledged that the Forth and Tay Windfarms have put in new Scoping Requests; however as discussed with relevant consultees as these are only at Scoping stage they should not be considered in a cumulative assessment in line with the Regulations as only consented developments should be included. Therefore, the developments that were considered in the Original ES and ES Addendum remain unchanged. Cumulative impacts have therefore only been assessed for the relevant receptors identified above against the currently consented offshore developments as per the Original ES and Addendum.

3.6. Summary and Residual Impacts

A summary and discussion of the residual impacts from the Varied Project is only considered in respect to those receptors identified above (ornithology) and for the new receptors to be considered from the new EIA regulations as the conclusions from the Original ES and ES Addendum remain unchanged for the remaining receptors.

3.7. Impact Assessment Tracker

The following table provides a summary of the receptors where additional assessments have been undertaken since the Original ES to allow for ease of tracking all relevant conclusions.

Table 3.2 Summary of relevant Chapter and Section references in Original ES, ES Addendum and Variation ES

Chapter Ref in Original ES	Section Ref in ES Addendum	Section Ref in Variation ES (i.e. this document)
Chapter 1 Introduction: Table 1-3 Rochdale	Section 1.3 Refinement of Substructure: Table 1-1	Section 2.3 Rochdale Envelope: Table 2-3
Chapter 2 Project Description: Section 2.1 Floating Offshore Wind – Technology Overview	Section 1.3 Refinement of Substructure: Table 1-1	Section 2.2 Substructure
Chapter 7 Ornithology	Section 3 Ornithology	Section 4 Ornithology
Chapter 11 Seascape, Landscape and Visual Impact Assessment	N/A	Section 5 Seascape, Landscape and Visual Impact Assessment
N/A	N/A	Section 6 New EIA Regulations

4. Ornithology

4.1. Conclusions from Previous Assessments

The EIA undertaken and presented in the Original ES included a detailed assessment of all potential bird species that could be potentially impacted by the construction of the Project. This assessment identified that two species that could be potentially impacted by the Project; Kittiwake (collision risk) and Atlantic Puffins (barrier effect). All other bird species were assessed to be at no significant risk from the Project.

Table 4-1**Error! Reference source not found.** below summarises the results of the collision risk model estimates for all birds present on site as presented in the Original ES and Original HRA. Of these species, only Gannet and Kittiwake were effected by collisions. Only two of six the individual Gannets effected were apportioned back to an SPA, the Forth Islands, which equated to approximately 0.002% of its Gannet population. This was negligible and therefore not further assessed as per the Original ES, HRA and HRA Addendum.

Table 4-1 Collision Risk Model Estimates from the Original ES

Species (avoidance rate)	Survey Area	Option 2 (modelled)
Kittiwake (98.9%)	NE3	34
	Kincardine	32
Gannet (98.9%)	NE3	6
	Kincardine	5
Guillemot (98%)	NE3	0
	Kincardine	0
Fulmar (98%)	Kincardine	0
Herring Gull (99% and 99.5%)	Kincardine	1
Razorbill (98%)	Kincardine	0
Puffin (98%)	Kincardine	0

Source: see Table 7-18 of the Original ES

MS-LOT undertook an Appropriate Assessment of the Kincardine Offshore Windfarm as part of the application for consent under Section 36 of the Electricity Act 1989 and Application for a Marine Licence under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 in February 2017. This assessment concluded that, 'based on the content of the following assessment the proposed KOWL project will not on its own or in combination with other projects adversely affect the integrity of the Fowlsheugh SPA, Buchan Ness to Colliston Coast SPA, Troup, Pennan and Lion's Head SPA or Forth Islands SPA.'

The main issues raised during the consultation for the Varied Project were the potential impacts on Black-legged Kittiwake (collision) (Fowlsheugh SPA) and Atlantic Puffin (displacement) (Forth Islands SPA), with all other bird species and SPAs being discounted as not having a significant impact from the Project as noted above. These findings have therefore been used to ensure duplication of work and effort is not undertaken with all other pertinent data found within Original ES, Original HRA and

HRA Addendum, with only Black Legged Kittiwake and Atlantic Puffin being taken forward for review as part of this update.

As the number of turbines is now to be reduced from that originally assessed the potential barrier effect on Atlantic Puffins has also been reduced. Therefore, the conclusions of the Original ES, ES Addendum, Original HRA, HRA Addendum and the current consented Appropriate Assessment still represent the most appropriate review, and therefore does not require additional assessment within the Section 36C variation.

However, as Kittiwake were assessed to be potentially impacted on from collisions with the turbines (only in combination and not by the Project only), an additional assessment is required to assess the potential impacts of the installation of smaller number of turbines with larger rotor sizes, as the parameters are outwith the Rochdale Envelope originally assessed.

The potential effects of the single 2MW turbine on Kittiwake from Fowlsheugh has been included in the overall assessment, alongside the larger 164m machines to determine the overall potential impact from all machines (see Section 4.4 below).

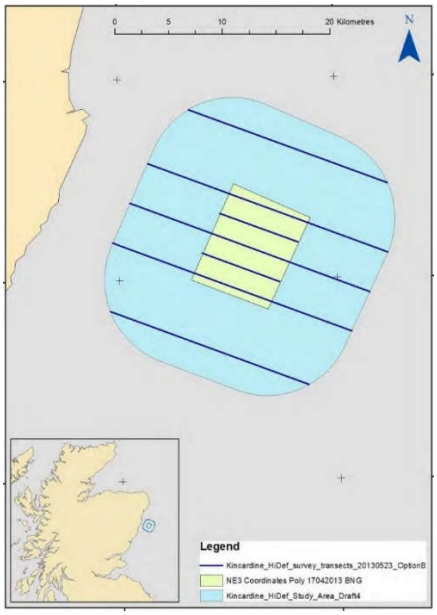
The original collision risk model for Kittiwake submitted as part of the Original ES and HRA submissions shall be used to assess the impacts of the revised turbine models. All parameters within this model will remain unchanged except for the parameters of the wind turbine models being assessed. The original model can be downloaded from the Marine Scotland website to enable verification of this assessment.

4.2. Baseline Environment

The baseline environment for the Ornithology Chapter of the Original ES (Section 7.2) was amended in the ES and HRA Addendums to include additional proposed and draft Special Protected Areas (pSPA) following consultation with the RSPB. All the pSPAs were assessed in the HRA Addendum (Appendix B of ES Addendum). Therefore, within this ES Variation, no other baseline environment data has changed since the ES Addendum and HRA Addendum.

Survey Areas

Bird surveys were undertaken within the NE3 and the Development Area with an 8km buffer (known as Kincardine survey area). These are shown in Figure 4-1 below.



NE3 - Kincardine -

Figure 4-1 Kincardine Bird Survey Areas

4.3. Assessment Methodology

The assessment methodology was defined in Chapter 7.3 of the Original ES remains unchanged.

This assessment is solely based on assessing the collision risk impacts of the revised turbine models (1 x 2MW and 6 x 164m in combination) on Kittiwake from Fowlsheugh SPA, and reviewing the displacement of Atlantic Puffin from Forth Islands SPA. This approach has been discussed with MSLOT, SNH and RSPB. All other impacts to SPA bird species were assessed as not being significant as part of the Original ES, HRA and their respective Addendums (Table 4-1).

This section assesses the collision risk impact of wind turbine model scenarios on Kittiwake from Fowlsheugh SPA. The turbine model scenario is as follows:

- 1 x 2MW turbine followed by 6 x 164m turbines.

4.4. Impact Assessment

The impact assessment is split into the two turbine types to identify the potential collision risk from each system and then combined in the summary to assess the sum of the impact from 1 x 2MW turbine and 6 x 164m turbines.

One 2MW Turbine

The 2MW turbine model is proposed to be the Vestas V-80. The parameters used for the collision risk model are taken from their brochure for the turbine[1]. The key parameters are outlined below.

[1] https://en.wind-turbine-models.com/turbines/19-vestas-v-80-onshore

Operating data
Rated power 2.0MW
Cut-in wind speed 4m/s
Operational rotor speed up to 17rpm
Nominal rotor speed 15rpm

Blade dimensions
Max. chord 3.5m
Pitch 15º

Rotor
Rotor diameter 80m
Rotor Radius 40m
Hub height 66m

The results of the collision risk modelling for one 2MW turbine is outlined in Table 4-2 to Table 4-5 below for both the NE3 and Kincardine survey areas. Based on previous advice from SNH, we have used option 2 of the Band model, which used modelled flight height data.

Table 4-2 Collision Risk Modelling Results for the NE3 and Kincardine (NE3 plus 8km buffer) survey areas

Survey Area	2MW
NE3	3*
Kincardine	3*

*Number of birds per year –CRM Option 2 (modelled flight heights) and an avoidance rate of 98.90%
Note – the percentage number is 2.64 birds

Table 4-3 Collision Risk Modelling Results by month – breeding season months are highlighted in grey

Turbine Size	Option	Survey Area	Month											
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2MW	Option 2	NE3	0	0	0	0	0	0	1	0	0	0	0	0
		Kincardine	0	0	0	0	0	0	1	0	0	0	0	0

Table 4-4 - Bird Collision Impacts - Breeding vs non-breeding

Turbine Size	Survey Area	CRM Option	No of birds potentially impacted	
			Breeding Season	Non-Breeding Season
2MW	NE3	Option 2	1	1
	Kincardine	Option 2	1	1

Kittiwake breeding Season: April – August
Note – Table 4.-4 values represent whole bird numbers.

Apportionment

Given that SPA seabird breeding colonies are situated at different distances from the Varied Project, and that different species have different foraging ranges, a process of apportioning seabird collision impacts to each of the SPAs is required to understand the magnitude of impacts to individual SPAs.

This apportionment was carried out based on the distance of the SPA from the Varied Project, the bird species' colony size and the proportion of foraging range that is out to sea (i.e. in the direction of the Varied Project). The process of apportioning bird collision impacts to individual SPA breeding colonies within Kittiwake foraging range is shown in Table 4-5. This apportionment is a pre-requisite for considering the effects of the windfarm on individual SPAs where these species are qualifying interest features.

Table 4-5 Number of breeding bird collisions apportioned to SPAs and sites outside of SPAs within Kittiwake foraging range

Kittiwake V80 (2MW) – NE3						
SPA Name	**Count of Adult Birds on SPA**	**Distance from Project**	**Proportion of forage range as Sea**	**Resulting Weight for SPA**	**Proportional weight of SPA**	**Total adult collisions from each SPA**
Fowlsheugh	18674	16	0.6	18.33	0.29	0
Buchan Ness to Collieston Coast	25084	27	0.5	7.21	0.11	0
Troup, Pennan and Lions Heads	29792	69	0.6	1.57	0.025	0
Outside of SPAs						1

Kittiwake V80 (2MW) – Kincardine						
SPA Name	**Count of Adult Birds on SPA**	**Distance from Project**	**Proportion of forage range as Sea**	**Resulting Weight for SPA**	**Proportional weight of SPA**	**Total adult collisions from each SPA**
Fowlsheugh	18674	16	0.6	18.33	0.29	0
Buchan Ness to Collieston Coast	25084	27	0.5	7.21	0.11	0
Troup, Pennan and Lions Heads	29792	69	0.6	1.57	0.025	0
Outside of SPAs						1

Six 164m Turbines

The 164m turbine model are proposed to have a rotor diameter up to 164m. The parameters used for the collision risk model are taken from their brochure for the turbine[2]. The key parameters are outlined below.

Operating data
Rated power 8.4MW
Cut-in wind speed 4m/s
Operational rotor speed 4.8 - 12.1rpm
Nominal rotor speed 10.5rpm
Operational temperature range -10 - +25ºC
Extreme temperature range -15 - +35ºC

Blade dimensions
Length 82m
Max. chord 5.4m
Pitch 6º

Nacelle dimensions (incl. hub and coolers)
Height 8m
Length 20m
Width 7.5m

Rotor
Rotor diameter 164m
Rotor radius 82m
Hub height 104.9m

164m Impact Assessment

The results of the collision risk modelling for six 164m turbines are outlined in Table 4-6 to Table 4-9 below for both the NE3 and Kincardine survey areas. They have been compared to the original results for eight 6MW turbines outlined in the Original ES. Based on the joint SNCB guidance[3], the recommended avoidance rate that has been used for Kittiwake is 98.9%.

Based on previous advice from SNH, we have used option 2 of the Band model, which used modelled flight height data.

Table 4-6 Collision Risk Modelling Results for the NE3 and Kincardine (NE3 plus 8km buffer) survey areas

Survey Area	6MW (8 no.)	164m (6 no.)
NE3	34*	33*
Kincardine	32*	31*

*Number of birds per year – using CRM Option 2 (modelled flight heights) and an avoidance rate of 98.90%

[2] http://www.homepages.ucl.ac.uk/~uceseug/Fluids2/Wind_Turbines/Turbines/V164-8MW.pdf
[3] Joint Response from the Statutory Nature Conservation Bodies to the Marine Scotland Science Avoidance Rate Review, Cook, A.S.C.P., Humphries, E.M., Masden, E.A., and Burton, N.H.K. 2014. The avoidance rates of collision between birds and offshore turbines. BTO research Report No 656 to Marine Scotland Science

Table 4-7 Collision Risk Modelling Results by month – breeding season months are highlighted in grey

Turbine Size	Option	Survey Area	Month											
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
6MW	Option 2	NE3	0	0	1	1	2	5	16	4	3	0	1	0
		Kincardine	1	0	1	1	4	5	7	4	4	3	1	1
164m	Option 2	NE3	1	0	1	1	2	4	15	4	3	0	1	0
		Kincardine	1	0	1	1	4	5	8	4	4	3	1	1

Table 4-8 Bird Collision Impacts - Breeding vs non-breeding

Turbine Size	Survey Area	CRM Option	No of birds potentially impacted	
			Breeding Season	Non-Breeding Season
6MW	NE3	Option 2	28	6
	Kincardine	Option 2	21	11
164m	NE3	Option 2	27	6
	Kincardine	Option 2	21	11

Kittiwake breeding Season: April - August

Apportionment

The process of apportioning bird collision impacts to individual SPA breeding colonies within Kittiwake foraging range is shown in Table 4-9 below. This apportionment is a pre-requisite for considering the effects of the windfarm on individual SPAs where these species are qualifying interest features.

Table 4-9 Number of breeding bird collisions apportioned to SPAs and sites outside of SPAs within Kittiwake foraging range. A comparison between eight 6MW and six 8MW turbines.

Kittiwake - 6MW – NE3						
SPA Name	**Count of Adult Birds on SPA**	**Distance from Project**	**Proportion of forage range as Sea**	**Resulting Weight for SPA**	**Proportional weight of SPA**	**Total adult collisions from each SPA**
Fowlsheugh	18,674	16	0.6	18.33	0.29	8
Buchan Ness to Collieston Coast	25,084	27	0.5	7.20	0.11	3
Troup, Pennan and Lions Heads	29,792	69	0.6	1.57	0.02	1
Outside of SPAs						16

Kittiwake - 6MW – Kincardine						
SPA Name	**Count of Adult Birds on SPA**	**Distance from Project**	**Proportion of forage range as Sea**	**Resulting Weight for SPA**	**Proportional weight of SPA**	**Total adult collisions from each SPA**
Fowlsheugh	18,674	16	0.6	18.33	0.29	6
Buchan Ness to Collieston Coast	25,084	27	0.5	7.20	0.11	2
Troup, Pennan and Lions Heads	29,792	69	0.6	1.57	0.02	1
Outside of SPAs						12

Kittiwake – 164m – NE3						
SPA Name	**Count of Adult Birds on SPA**	**Distance from Project**	**Proportion of forage range as Sea**	**Resulting Weight for SPA**	**Proportional weight of SPA**	**Total adult collisions from each SPA**
Fowlsheugh SPA	18674	16	0.6	18.33	0.29	8
Buchan Ness to Collieston Coast SPA	25084	27	0.5	7.20	0.11	3
Troup, Pennan and Lions Heads SPA	29792	69	0.6	1.57	0.02	1
Outside of SPAs						16

Kittiwake – 164m - Kincardine						
SPA Name	**Count of Adult Birds on SPA**	**Distance from Project**	**Proportion of forage range as Sea**	**Resulting Weight for SPA**	**Proportional weight of SPA**	**Total adult collisions from each SPA**
Fowlsheugh	18674	16	0.6	18.33	0.29	6
Buchan Ness to Collieston Coast	25084	27	0.5	7.20	0.11	3
Troup, Pennan and Lions Heads	29792	69	0.6	1.57	0.02	1
Outside of SPAs						12

4.5. CRM Summary for 1 x 2MW and 6 x 164m

Sections 4.3 and 4.4 review the CRM impact for each turbine option alone. This section combines the two into a Varied Project summary and reviews it against the Original ES findings to demonstrate that there is no change between the Original ES findings and those shown in this Variation ES.

Table 4-10 below summarises the impact assessments for the wind turbine model scenario in Section 4.3 and 4.4 above. From these results, it is possible to see that there will be no significant differences when compared to the Original ES, with no additional birds being attributed to the Fowlsheugh SPA population.

As such, it can be concluded that using a 2MW turbine in conjunction with six 164m turbines will result in no change to the impact significance levels calculated for eight 6MW turbines that are outlined in Table 7-39 and Section 7.8 of the Original ES.

Table 4-10 Summary of potential collision impacts on Kittiwake from Fowlsheugh SPA

Turbine number and model	Survey Area	Total adult collisions from Fowlsheugh SPA*
8x6MW**	NE3	8
	Kincardine	6
1x 2MW + 6x164m	NE3	8
	Kincardine	6

*Using a 98.9% avoidance rate and option 2 of the Band CRM for the NE3 survey area.
**Proposed in the Original ES.

4.6. Non-breeding season impacts

As shown in Table 4-11 below, the estimated total non-breeding impact to Kittiwake from Fowlsheugh SPA does not change depending on the wind turbine scenario chosen. The addition of a 2MW will not affect the summary value (when the 2MW value is added to the 164m values).

Table 4-11 Non-breeding season impacts

Turbine Size	Survey Area	No of birds potentially impacted
		Non-Breeding Season
8x6MW	NE3	6
	Kincardine	11
1x 2MW + 6x164m	NE3	6
	Kincardine	11

4.7. Displacement - Atlantic Puffin (Forth Islands SPA)

The number of turbines in the Development Area will reduce the potential to displace Atlantic Puffin as assessed in the Original ES, ES Addendum and the consented AA (eight turbines for the Original ES and seven (one smaller and six large) for the Varied Project). Therefore, all displacement assessments are currently compliant with the Original ES/HRA (2016) and remain relevant to the Varied Project so the resulting displacement conclusions of the AA are still appropriate for this Variation ES. See additional Variation HRA report for additional review and findings.

4.8. Mitigation/Monitoring

Based on the impact assessment in Section 4.5 above and 4.7 below, it can be confirmed that no additional mitigation is required. The mitigation measures outlined in Section 2.1 of the HRA Addendum as referred to in the ES Addendum therefore remain unchanged.

For reference, these mitigation measures were outlined as follows:

'This floating offshore wind project is part of the Scottish Governments 'Survey, Deploy and Monitor' scheme, and the design of the sub-structure lends itself well to providing a platform for monitoring the effects of the turbines on seabirds. KOWL have already stated they would welcome SNH, RSPB or other parties (e.g. Masters or PhD, Universities etc.) to be transported out to the structures and use them to install bird detection equipment and carry out monitoring (all subject to agreement with KOWL). As part of the wider Friends of Floating Offshore Wind group and the wider East of Scotland Offshore Windfarm group, cumulative and collaborative monitoring will form a key part of the monitoring phase and with cross sharing of data (e.g. with the European Offshore Wind Demonstrator Centre (EOWDC)) it will provide an enhanced understanding of the possible cumulative impacts these developments will have.

KOWL believe this would be very interesting work and could generate some important results and would be willing to support this going forward.

A review the effectiveness of bird collision monitoring equipment was undertaken by the Strategic Ornithological Support Services[4] that investigated various methods and systems to monitor collisions of birds with offshore windfarms. The results indicate that the potential for some of these systems to aid data collection and monitor interactions of birds with turbines is promising.

One of the recommended systems is called DTbird[5] which includes the ability to add HD cameras, noise based bird deterrents.

The data can then be collected remotely, analysed and displayed online for anyone with access to view, which means a significant reduction in the health and safety risks associated with collecting data from the site in real time or by observers on the platforms.

This is something that KOWL have previously mentioned to RSPB (meeting with Aedan Smith at the RSPB office in Edinburgh on the 6th July 2016), where KOWL asked them which systems they would want to see on board the floating substructure and KOWL suggested they engage with SNH to identify the required monitoring tools. This form will form a key component of the draft Project Environmental Monitoring Plan (PEMP) which confirms the use of a suitable bird monitoring system will be installed on the initial turbine to gather site data from the very start of the development activities.

KOWL consider that the implementation of post construction monitoring of the sort outlined above is line with the Scottish Governments approach to 'Survey, Deploy and Monitor' schemes, and will serve to provide additional data on the potential impacts of offshore Wind devices in the Scottish sector on identified Bird species.

At the same time, it is an opportunity to collect important data to inform and build on current understanding of the potential impacts that offshore wind turbines could have through their interactions with birds.'

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[4] Collier, M.P, Dirksen, S, Krijgsveld, K.L. September 2011, A review of methods to monitor collisions or micro-avoidance of birds with offshore wind turbines. (https://www.bto.org/sites/default/files/u28/downloads/Projects/Final_Report_SOSS03A_Part1.pdf)

[5] http://www.dtbird.com/index.php/

4.9. Cumulative Impacts

The cumulative impacts as defined in Chapter 7.5 of the Original ES remains unchanged. Discussions about the approach taken regarding the cumulative impact assessment impacts of the Project have been undertaken with SNH and the RSPB (see Appendix B - HRA addendum) to monitor these potential impacts.

4.10. Conclusions

Kittiwake

The results from the updated CRM (Table 4-10) demonstrate that predicted total adult collisions from the Fowlsheugh SPA for both potential turbine options are directly comparable to the Original HRA and Appropriate Assessment undertaken in 2017. The conclusions from the Original Appropriate Assessment are therefore consistent and that this that the 'Scheme will have no adverse effects on the integrity on any of the identified SPA associated with Black Legged Kittiwakes alone or in-combination with other plans or projects.'

Atlantic Puffin

As noted in the Appropriate Assessment, the impact from collision risk is negligible for Puffin due to their flight height and the turbine blade height. Displacement affects have been previously assessed for the eight 6MW turbine Project. As the Varied Project contains a smaller number of turbines, with the one small turbine reducing the total barrier effect due to smaller cross-sectional area, the conclusions identified in the Appropriate Assessment are still valid for this Variation ES.

4.11. References

Additional references used in this report have been included below. For the full list of references, please refer to Section 7.9 of the Original ES.

Vestas V80 Turbine Specification. Available at https://en.wind-turbine-models.com/turbines/19-vestas-v-80-onshore

Vestas 164 Turbine Specification. Available at http://www.homepages.ucl.ac.uk/~uceseug/Fluids2/Wind_Turbines/Turbines/V164-8MW.pdf

5. Seascape, Landscape & Visual Impact Assessment

5.1. Baseline Environment

The study area including seascape and landscape character types, viewpoints and receptors was defined in Section 11.2 of the Original ES and remains unchanged.

5.2. Assessment Methodology

The assessment methodology was defined in Section 11.3 of the Original ES and remains unchanged.

5.3. Impact Assessment

Wirelines and Photomontages

The configuration of turbines assessed in the Original ES and the ES Addendum (8 x 6MW) is still considered to be the worst-case scenario in terms of visual impact that the Project could have, as this is the largest number of turbines that could be utilised to generate up to the maximum of 50MW. Furthermore, the turbines that were used in the wirelines and photomontages were conservatively scaled to a blade tip height of 192m in line with the zones of theoretical visibility (ZTV) assessments that were undertaken as part of the Scoping Report. Therefore, the larger turbines that will now be used for the Varied Project are still within the parameters assessed in the Original ES and ES Addendum.

The initial location of the 2MW turbine will be in the first turbine location (Location 1) and the turbine will then be moved to Location 8 during the final construction phase (subject to re-certification). Presently, it is anticapted that Location 4 will not be used in any configuration of the windfarm removing the outermost outlying turbine from the configuration previously assessed and this will further reduce the visual impact of the Varied Project.

New photomontages have been produced for the Varied Project configuration i.e. 7 turbines, but using the turbine parameters as defined in the Original ES (1 x 2MW and 6 x 192m tip height) and are shown in Appendix A. An assessment of the Operational phase of the Varied Project (i.e. 1 x 2MW and 6 x 192m) has been undertaken below and shows that there are no changes to the significance of impacts identified in the Original ES and ES Addendum.

Impact Assessment: Development Area

The key risks and potential impacts within the Development Area were identified as follows in the Original ES and ES Addendum:

- Installation and decommissioning of inter-array cables and anchors;
- Installation and decommissioning of WTGs and floating substructures;
- Maintenance of WTGs and substructures (major component maintenance); and
- Operational windfarm (including night-time assessment for a selected number of viewpoints).

Table 5-1 Results of the impact assessment for the identified viewpoints and receptors through identification of sensitivity, magnitude of effect and the resultant significance of impact from Original ES, ES Addendum and as part of this Variation ES

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
Operational Windfarm (Daytime)	1 Newburgh (carpark to links)	Seascape	Low	Moderate • Small scale of Project and distance offshore • EOWDC will be in direct line of view closer to shore possible cumulative effects	Minor/ Moderate	Minor/ Moderate
		Visitors/ Walkers/ Residents	Low		Minor/ Moderate	Minor/ Moderate
	2 Balmedie (access to beach)	Seascape	Low	Moderate • Small scale of Project and distance offshore • EOWDC will be in direct line of view closer to shore possible cumulative effects	Minor/ Moderate	Minor/ Moderate
		Visitors/ Walkers/ Residents	Low		Minor/ Moderate	Minor/ Moderate
	3 Regular Ferry Routes	Seascape	Low	Low • Small scale of Project and distance offshore • Current marine activities at	Minor	Minor
		Travellers	Moderate		Minor/ Moderate	Minor/ Moderate

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
				Aberdeen Harbour and Nigg Bay • Main route goes north east out of Aberdeen away from project site		
	4 Eastern Boulevard Aberdeen	Seascape	Moderate	Low • Small scale of Project and distance offshore • Current marine activities at Aberdeen Harbour and Nigg Bay	Minor/ Moderate	Minor/ Moderate
		Visitors/ Walkers	Moderate/High		Moderate	Moderate
	5 East side of Castlehill	Landscape	Low	Low • Small scale of Project and distance offshore • Current marine activities at Aberdeen Harbour and Nigg Bay	Minor	Minor
		Residents	Moderate/High		Minor/ Moderate	Minor/ Moderate
	6 Torry Battery/Girdleness Point	Seascape	Low	Low • Small scale of Project and distance offshore • Direct line of sight	Minor	Minor
		Visitors/ Walkers	Medium to High		Minor/ Moderate	Minor/ Moderate

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
				• Visible in Figure D-1 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-1		
	7 Doonies Farm	Seascape	Moderate	Moderate • Small scale of Project and distance offshore • Direct line of sight to project • Visible in Figure D-2 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-2	Moderate	Moderate
		Visitors/ Walkers	Moderate to High		Minor/ Moderate	Minor/ Moderate
	8 Coastal Path - Finhon (area of Geological interest)	Seascape	Moderate	Moderate • Direct line of sight to Project • Small scale of Project and distance offshore	Moderate	Moderate
		Visitors/ Walkers	High		Moderate/ Major	Moderate/ Major

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
				• Visible in Figure D-3 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-3		
	9 Portlethen (railway station bridge)	Seascape	Moderate	Moderate • Direct line of sight to Project • Small scale of Project and distance offshore • Visible in Figure D-3 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-3	Moderate	Moderate
		Residents	Moderate/Low		Moderate	Moderate
	10 Downies	Seascape	Moderate/High	Moderate Moderate • Direct line of sight to Project	Moderate/ Major	Moderate/ Major
		Residents/ Walkers	High/Moderate		Moderate/ Major	Moderate/ Major

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
				• Small scale of Project and distance offshore • Visible in Figure D-3 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-3		
	11 Cookney (Inland settlement)	Landscape	Moderate	Moderate • Direct line of sight to Project • Small scale of Project and distance offshore • Visible in Figure D-3 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-3	Moderate	Moderate
		Residents	Low		Minor/ Moderate	Minor/ Moderate
	12 Newtonhill	Seascape	Moderate	Moderate • Direct line of sight to Project	Moderate	Moderate
		Residents	Moderate		Moderate	Moderate

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
				• Small scale of Project and distance offshore • Visible in Figure D-3 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-3		
	13 Muchalls	Seascape	Moderate	Moderate • Direct line of sight to Project • Small scale of Project and distance offshore • Slight view in Figure D-4	Moderate	Moderate
		Residents	Moderate/Low		Moderate	Moderate
	14 Railway (bridge of Muchalls)	Seascape	Moderate	Moderate • Direct line of sight to Project • Small scale of Project and distance offshore • Slight view in Figure D-4	Moderate	Moderate
		Travellers	Moderate/Low		Moderate	Moderate

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
	15 A90 Trunk Road	Seascape	Low	Moderate • Direct line of sight to Project • Small scale of Project and distance offshore • Slight view in Figure D-4	Minor/ Moderate	Minor/ Moderate
		Travellers	Moderate/Low		Moderate	Moderate
	16 Stonehaven Golf Course (Garrow Point)	Seascape	Moderate	Moderate • Small scale of Project and distance offshore • Slight view in Figure D-4	Moderate	Moderate
		Visitors/ Walkers	Moderate/High		Moderate /Major	Moderate /Major
	17 Stonehaven Harbour Pier	Seascape	Moderate/High	Low • Very slight view in Figure D-5 • Small scale of Project and distance offshore	Minor/ Moderate	Minor/ Moderate
		Residents	High		Minor/ Moderate	Minor/ Moderate
	18 Stonehaven War Memorial	Seascape	High	Low • Very slight view in Figure D-5 • Small scale of Project and distance offshore	Moderate	Moderate
		Visitors/ Walkers	High		Moderate	Moderate
		Seascape	Moderate	Low	Minor/	Minor/

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
	19 Dunnottar Castle (carpark)			• Very slight view in Figure D-6 • Small scale of Project and distance offshore	Moderate	Moderate
		Visitors/ Walkers	High		Moderate	Moderate
	20 Dunnottar Castle (south of castle on coastal path)	Seascape	High	Low • Very slight view in Figure D-6 • Small scale of Project and distance offshore	Moderate	Moderate
		Visitors/ Walkers	High		Moderate	Moderate
	21 Catterline (south)	Seascape	Moderate/High	Low • Small scale of Project and distance offshore • Very slight view in Figure D-6	Moderate	Moderate
		Visitors/ Walkers/ Residents	High		Moderate	Moderate
	22 Gourdon (eastern end of village at coastal path carpark)	Seascape	Moderate	Low • Small scale of Project and distance offshore • Very slight view in Figure D-6	Minor/ Moderate	Minor/ Moderate
		Visitors/ Walkers/ Residents	Moderate/Low		Minor/ Moderate	Minor/ Moderate
	23 Johnshaven (beach)	Seascape	Moderate	Low	Minor/ Moderate	Minor/ Moderate

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
		Visitors/ Walkers/ Residents	Moderate/Low	• Small scale of Project and distance offshore • Very slight view in Figure D-6	Minor/ Moderate	Minor/ Moderate
Operational windfarm (Night-time)	4 Eastern Boulevard Aberdeen	Seascape	Moderate	Low • Small scale of Project and distance offshore • Current marine activities at Aberdeen Harbour and Nigg Bay	Minor	Minor
		Visitors/ Walkers	Moderate/High		Minor/Moderate	Minor/Moderate
	5 East side of Castlehill	Landscape	Low	Low • Small scale of Project and distance offshore • Current marine activities at Aberdeen Harbour and Nigg Bay	Negligible/Minor	Negligible/Minor
		Residents	Moderate/High		Minor/Moderate	Minor/Moderate
		Seascape	Low		Negligible/Minor	Negligible/Minor

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
	6 Torry Battery/Girdleness Point	Visitors/ Walkers	Medium to High	Low • Small scale of Project and distance offshore • Direct line of sight • Visible in Figure D-1 • Current marine activities at Aberdeen Harbour and Nigg Bay as shown in Figure D-1	Minor/Moderate	Minor/Moderate
	Viewpoint 7 Doonies Farm	Seascape	Moderate	Moderate • Small scale of Project and distance offshore • Direct line of sight to project • Visible in Figure D-2 • Current marine activities at Aberdeen Harbour and Nigg Bay as	Minor	Minor
		Visitors/ Walkers	Moderate to High		Minor/Moderate	Minor/Moderate

Impact	Landscape/Seascape Character Area	Landscape/ Seascape Receptors	Sensitivity of Viewpoint Sensitivity of Receptors	Magnitude of Effect	Significance of Impact Original ES and ES Addendum	Significance of Impact Variation ES
				shown in Figure D-2		

Impact Assessment: Offshore Export Cable Corridor

The changes to the Varied Project do not affect works in the Offshore Export Cable Corridor. Therefore, as there are no changes to the baseline environment or assessment methodology to be taken into consideration, the conclusions of the impact assessment undertaken in the Original ES and ES Addendum remain unchanged and valid.

5.4. Cumulative Impact Assessment

Cumulative Impacts were discussed in Section 11.6 of the Original ES and 4.5 of the ES Addendum. No changes to the other developments that were assessed in combination with the Project have been identified. Therefore, the conclusions of the cumulative impact assessment undertaken in the Original ES and ES Addendum remain unchanged and valid.

5.5. Mitigation

Mitigation was discussed in Section 11.5 of the Original ES and 4.6 of the ES Addendum and stated that no further mitigation is planned or required, this remains unchanged.

5.6. Residual Impacts

There are no changes to the residual impacts identified in Section 11.7 of the Original ES and 4.7 of the ES Addendum.

6. Updated EIA Regulations

The newly amended Environmental Impact Assessment (EIA) Directive 2014/52/EU entered into force on May 15, 2014. Scotland was required to apply the new rules by 16 May 2017. The requirements of the new Directive were enabled in relation to S36 Consents by The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, and in relation to marine licences by the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

6.1. Key Changes to the EIA Regulations

There are several key changes to the EIA Regulations as noted in the table below. Several these are not relevant to the stage at which the Project is currently at (Variation as opposed to pre-application); these have been noted below. Other changes, however, are relevant and where applicable these have also been noted and further work undertaken as part of this Variation ES as outlined in the remainder of this Section.

Table 6-1 Summary of the key changes to the EIA Regulations and applicability to this Variation application

Key Change to EIA Regulations	Relevance to this Variation
Screening for EIAs will be more comprehensive	Not applicable to this Variation
Scoping Opinion, if requested, must form the basis of the EIA	Not applicable to this Variation
Environmental Aspects for consideration – several new environmental topics will be required for consideration at all stages	Applicable to this Variation – See Sections 3 to 16 of the Original ES for these various environmental topics assessed. These include: • The Physical Environment • Benthic Ecology • Fisheries & Shellfish • Marine Mammals • Ornithology • Underwater Marine Noise • Maritime Navigation • Military & Aviation • Landscape, Seascape & Visual Impact Assessment • Marine Historic Environment • Socio-Economics • Commercial Fisheries • Other Marine Users • Onshore Section 3 to 5 of this Variation revisits these topics where appropriate.

	Section 6 (Table 6.2) demonstrates how the new EIA Regulation requirements are addressed within this Variation.
Project description – this will be required to include demolition works, where relevant. Also, the quantities and types of construction waste that will be generated	Applicable to this Variation – Section 2 above for technical changes to the Project and Section 2 of the Original ES for the Project Description. See Section 16.2.2 of the Original ES and 6.2.7 below for waste. The Original ES stated that waste would be articulated through a Waste Management Plan for the Project which will be developed, maintained and managed by the contractors undertaking the construction works.
Baseline scenario to outline the likely evolution of the baseline scenario in the absence of the development, as far as can be assessed 'with reasonable effort' based on available information and scientific knowledge	Applicable to this Variation – See Sections 3.2 to 16.2 of the Original ES for the baseline scenarios (these are still valid for this Variation).
Assessment of effects – Main uncertainties associated with forecasting methods must now be described. Cumulative effects have also been defined as those arising from the development with other existing and approved developments (there is no requirement as such to consider projects in the planning process)	Applicable to this Variation – Sections 3.3 to 16.3 of the Original ES for the assessment of effects (these are still valid for this Variation). See Section1.9 of the Original ES for definition of cumulative effects these are assessed in Sections 3.7 to 16.7 of the Original ES (these are still valid for this Variation).
Assessment of alternatives – The definition of 'reasonable alternatives' to be considered in the assessment has been expanded to include reference to alternatives associated with project design, technology, location, size and scale. However, as the Directive still refers to the alternatives 'studied by the developer', this may be interpreted by some to mean no change	Applicable to this Variation – See Sections 1.5 and 2.1 and 2.2 of the Original ES for the Technology Overview and Project Description in conjunction with Section 2 above and 6.2 below.
Reporting outputs – The findings of the EIA will be presented in an 'Environmental Impact Assessment (EIA) Report' and not in an 'Environmental Statement'	Applicable to this Variation – See Section 1.2 above for justification as to why this has not been used in this case.

Monitoring Requirements – Monitoring of any significant adverse effects identified after mitigation will be required to ensure the implementation of mitigation measures and to measure their effectiveness. This includes measures to 'identify unforeseen significant adverse effects'	Applicable to this Variation – See Original ES Sections Chapters: • Benthic 4.6 • Fisheries 5.6 • Marine Mammals 6.7 • Ornithology 7.7 • Underwater Marine Noise 8.5 • Commercial Fisheries 14.6 Section 4.6 of this Variation above and 6.27 below.
Use of competent experts – The EIA Report will need to be prepared by 'competent experts' and determining authorities will have to ensure that they have, or have access to, sufficient expertise to examine the EIA Report	Applicable to this Variation – See Section 6.3.8 below

6.2. Assessment of Alternatives

Introduction

The changes to the Varied Project, as outlined in this document, still fall within the variation guidelines. Therefore, it is not necessary to start a completely new assessment of alternatives as they are not fundamentally different in terms of character, scale or environmental impacts from what is authorised under the existing consent.

Within Chapter 1 (Section 1.5) of the Original ES it was declared that '*KOWL intend to install between six and eight turbines, each with a capacity of between 6 to 8MW'*. The exact number and the specific capacity of the turbines selected will not exceed the 50MW capacity for the demonstrator site. It is now KOWL's intention to install up to seven turbines, this will include a 2MW turbine, to be installed first, followed by 6 larger turbines. The turbines proposed would have a rated capacity of up to 8.4MW with the maximum generating capacity of the windfarm remaining at 50MW.

The design, technologies utilised and location along with the size and scale of the Varied Project broadly remain within the worse-case scenario of the Original ES and the alternatives with which it was assessed. Where they exceed the worse case scenario they have been reassessed against the 2017 regulation. For reference, these are summarised below.

Project Design

The philosophy adopted to aid in the environmental impact assessment of alternative designs was the Rochdale Envelope approach.

The principle of the Rochdale Envelope permits the developer or applicant to provide broad or alternative project engineering and construction parameters, of which one or a selection of parameters or scenarios will be constructed.

Technology
Three different types of floating offshore windfarm systems were assessed for the proposed offshore windfarm development as follows:

- The Tension leg platform. A semi-submerged buoyant structure, anchored to the seabed with tensioned mooring lines, which provide stability;
- Semi-submersible platform: Buoyancy stabilised platform which floats semi-submerged on the surface of the ocean whilst anchored to the seabed with catenary mooring lines; and
- Spar-buoy: A cylindrical ballast-stabilised structure which gains its stability from having the centre of gravity lower in the water than the centre of buoyancy.

Location
During the initial period of site selection by KOWL, two potential sites were identified for the installation of a demonstrator floating offshore windfarm development within Scottish Territorial waters:

- Forth Array (Firth of Forth, north of St Abbs Head) – a Round 2 development site; and
- NE3 – Aberdeen (To be renamed Offshore Wind North East OWNE1 within updated Regional Guidance Location (RGL) guidance).

A review of both sites was undertaken based upon resource availability (wind), depth, grid connectivity, distance from coast, potential for expansion, and wave action within the Original ES.

Size and Scale
The wind turbines will be placed in a layout which gives the best utilisation of the wind resource available while at the same time offering the most harmonic visual impression, whilst fitting any navigation and environmental constraints. The visual impact for the Project is expected to be minimal as the minimum distance to the coastline is 15km, however this is reviewed in detail in Chapter 11 of the Original ES, Section 4 of the ES Addendum and Section 5 of this Variation ES. The final turbine model would not be selected until after all the statutory consents are in place, however, the turbines will be three bladed WTG positioned on a floating semi-submersible support.

Technical, environmental and human use considerations, determined through the baseline site assessment will guide the final layout of the windfarm components including cable and array design and will be fully defined as part of the consent condition discharge process.

6.3. Impact Assessment for New Environmental Topics

Under Article 3(1), an EIA under the revised EIA Regulations is required to identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant impacts of a project on several key topics and interactions between the topics. The updated Regulations (see also Annex III and IV of Directive 2011/92/EU) incorporate changes to the list of environmental topics to be considered as part of the EIA process. The full list of topics which must be described in the EIA Report that are likely to be significantly affected by a development is now listed in the Regulations as those presented in the table below. A cross reference to the Original ES is provided to show where these had already been considered, or where a topic is not applicable to the Project, this has also been noted, where appropriate, and further justification provided below.

Table 6-2 Summary of the new topics to be assessed under the new regulations and indication of where this has previously been assessed in the Original ES or justification for not needing to assess in this Variation

2017 Regulations – New Environmental Topics to be Assessed	Details	Applicability within 2016 ES
Population	Views, noise, flood risk, transport, air quality, water quality	Chapter 9 Maritime Navigation Chapter 10 Civil and Military Aviation Chapter 11 Landscape, Seascape and Visual Impact Assessment Chapter 13 Socio-economics Chapter 14 Commercial Fisheries Chapter 15 Other Marine Users Chapter 16 Onshore And Section 6.3.1 below
Human Health		Not applicable – justification below Section 6.3.1 below
Biodiversity	(fauna and flora)	Chapter 4 Benthic Ecology Chapter 5 Fish and Shellfish Chapter 6 Marine Mammals Chapter 7 Ornithology Chapter 8 Underwater Marine Noise HRA And Section 6.3.2 below
Land	(e.g. land take)	Not applicable

Soil	(e.g. organic matter, erosion, compaction, sealing)	Not applicable
Water	(e.g. hydromorphological changes, quantity and quality)	Not applicable – The 2014 Scoping Report undertook a review of the potential impacts on water & sediment from the Project and did not identify any potential significant impacts.
Air	Air quality	Not applicable – justification in Chapter 16 (Onshore) of the Original ES. In addition, the 2014 Scoping Report undertook a review of the potential impacts air quality from the Project and did not identify any potential significant impacts.
Climate	(e.g. greenhouse gas emissions, resilience to climate change)	Addressed below Section 6.3.3 below
Material Assets	the number of archaeological sites affected by the Project	Chapter 11 Landscape, Seascape and visual assessment, Chapter 12 Marine Historic Environment and Section 6.3.4 below
Cultural Heritage	(including architectural and archaeological aspects)	Chapter 12 Marine Historic Environment and Section 6.3.4 below
Landscape		Chapter 11 Landscape, seascape and visual impact assessment and Section 6.3.4 below

The Regulations emphasise that the assessment should be of the likely significant effects of the Project, with the implication that less significant effects should be excluded from assessment.

The assessment criteria, as amended, have been considered within this Variation in either a revised assessment or confirmation that the previous assessment is not changed with all due cognisance to the revised wording of the new EIA Regulations.

The new EIA Regulations make it a requirement that the EIA Report sets out the likely significant effects of the technologies and materials used by the Development. This has been taken account of in this Variation ES, in as such that where any changes are required to the assessment, because of the changed technologies in the Varied Project, an assessment of the new impacts has been undertaken under the new EIA Regulations.

The new Regulations also stress the importance of quality within the Report. As such, the EIA Report should be prepared by competent experts and the Report must be accompanied by a statement outlining the relevant expertise or qualifications of such experts.

With respect to the EIA for the proposed offshore wind farm consent application, the topics requiring assessment relate directly to: the marine environment; users of the marine environment; and/or topics with direct interactions with the marine environment. Links between the topics listed in the EIA Regulations and those topics assessed in the Original ES are summarised in Table 6-2 above.

6.3.1. Population and Human Health

The potential for an operational offshore wind farm to have direct impact on human health is limited and within this Variation ES there is nothing to change this outcome with all due cognisance to the wording of the new EIA Regulations. In terms of human health, wind farms do not generate any direct atmospheric emissions, or require any discharges to water that would have the potential to harm human health. This also applies to the proposed windfarm Variation application. Impacts that could be considered a nuisance to humans resulting in indirect impacts on human health are considered as part of the Seascape, Landscape and Visual Impact Assessment in the Original ES and ES Addendum. The location of the Development Area is 15km offshore (17km closest turbine) which further reduces the potential for the proposed windfarm to have any impacts on human health associated with airborne noise from construction vessels. There is a small terrestrial element (landfall jointing pit and export cable route to the substation) to the Project which is assessed in Section 16 of the Original ES that covers impacts on Population and Human Health, though it does not use this exact phraseology; the Varied Project will still not have any effect when considered against the EIA Regulations.

With respect to air quality, the main source of atmospheric emissions is from vessels involved in construction, operations and maintenance activities. There is existing vessel traffic within the vicinity of the wind farm (mainly relating to Aberdeen Harbour: oil field production support; fishing vessels; and commercial vessel operations). Effects to air quality would be slight and temporary due to the location of the Varied Project and the relatively low amount of construction work offshore. During operation of the windfarm there would be no atmospheric emissions as a direct result of the energy generated. There will be some atmospheric emissions associated with operational and maintenance activities but they will be insignificant due to the small scale of the Varied Project and therefore air quality was scoped out of the Original ES. Nothing in this Variation ES will have any material effect on the Original ES assessment of this topic despite the wording of the new Regulations.

6.3.2. Impact on Biodiversity (With emphasis on species and habitats protected under the Birds and Habitats Directives)

Biodiversity is the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems along with the ecological complexities of which they are part of. This includes diversity within species, between species, and ecosystems.

Notwithstanding the changes in the EIA Regulations, the assessments undertaken in the Original ES, ES Addendum, Original HRA and HRA Addendum were sufficient to capture the biodiversity, under consultation, across the Project Site.

Biodiversity is assessed and cross referenced across several chapters within the Original ES. This assessment covers the interaction with the Varied Project (including turbine locations, inter-array cables and the cable route to shore). The potential effects on living organisms were considered under: Benthic Ecology; Fish and Shellfish; Marine Mammals; Ornithology; and Underwater Marine Noise.

The material changes to the Varied Project and their interaction with living organisms has been assessed both within this Variation ES and within the HRA Variation and there has been no material change in significance of impacts from those noted in the Original assessments. More detail on specific topics is set out below:

Benthic Ecology (Chapter 4 of the Original ES)

The impact assessment concluded that the predicted impacts on benthic ecology were not significant. This is due to the low sensitivity of identified habitats and species coupled with the small size and scale of the Project. In addition, no significant cumulative impacts were identified due to the scale and distance from other projects.

Fish and Shellfish (Chapter 5 of ES of the Original ES)

The predicted impacts of the Project on fish and shellfish were determined to be not significant. As with the benthic ecology this was predominantly due to the low sensitivity of identified habitats and species coupled with the small size and scale of the Project. The potential impacts identified as having a cumulative effect from the Project combined with other developments were also classed as not significant. Again, this was due to the small size and scale of the Project and the wider availability of similar habitats in the region.

Marine Mammals (Chapter 6 of ES of the Original ES)

The predicted environmental impacts of the Project on marine mammals were determined to be not significant. The cumulative impact was assessed for the different components of the Project which included the Development Area and Offshore Export Cable Corridor. The assessment concludes that all impacts will be of minor significance or lower. Cumulative impacts also concluded that all impacts will be of minor significance or lower.

Ornithology (Chapter 7 of ES of the Original ES)

During the operation of the windfarm there is the potential for bird collision with the wind turbines.

Only Kittiwake were assessed to be potentially significantly affected by collision impacts with the wind turbines (when assessed in combination only) and barrier effect for Atlantic Puffin (when assessed in-combination only). The in-combination assessment of birds was carried out to take account of the potential cumulative impact of the Project with other offshore windfarms. The conclusion of the

Original ES was that the potential impacts of the Project were all minor in terms of their residual impact. Initially, both SNH and RSPB disagreed with this conclusion (see EIA Consent Decision dated 13th February 2017). While they recognise that impacts from the Project in isolation were small, both had concerns about the cumulative effect of the Project, particularly in-combination with the Forth and Tay windfarms. SNH at first felt that for the Project on its own, there would be no adverse effect on site integrity for Bird interests; however, it would have one in-combination with other proposed offshore windfarms. The RSPB were of the view that if the Forth and Tay offshore wind farms were revised such that their impacts were significantly reduced they would review their position on this Project.

Based on the 50% mortality rated used in the Original ES SNH commented that they could not advise that there was no adverse effect on site integrity for both Kittiwake at Fowlsheugh SPA and Atlantic Puffin at Forth Islands SPA (in the initial response noted in the Consent Decision 13th February 2017). However, both MS and SNH agreed that the 50% mortality rate was too precautionary and a figure of 10% was more appropriate. Therefore, having considered the Project with respect to the reduced mortality rate and non-breeding season effects, SNH advised that the Project would not adversely affect the integrity of the Fowlsheugh SPA with respect to Kittiwake alone or in combination with other east coast windfarms (also icnldued in the EIA Consent Decision dated 13th February 2017).

The ES Addendum considered potential effects on proposed marine SPAs as well as monitoring in relation to impacts on birds.

In terms of the assessment of Atlantic Puffin from Forth Islands SPA SNH could not advise no adverse effect on site integrity but acknowledged that the Project is at the edge of the agreed foraging distance from the Forth Islands SPA and that the impacts of the Project will be proportionately far smaller than those predicted from the Forth and Tay windfarms. SNH also noted that further work is required on the impact assessment methodology for Puffin and supporting modelling work. Based on this advice from SNH and knowledge from previous Appropriate Assessments carried out by MS for the Forth and Tay offshore wind farms MS concluded that there would be no adverse effect on site integrity of the Forth Islands SPA with respect to Puffin.

Ornithological effects from the Varied Project are assessed in Section 4 and conclude that there would be no adverse effects on bird interests. In addition, the HRA Variation found that there would be no change to the conclusions of the Original HRA/HRA Addendum because of the Varied Project design. Therefore, as the Project's potential impact on birds was determined to not be significant, alone or in-combination in the Original ES and this has not changed notwithstanding the wording of the new EIA regulations.

Underwater Marine Noise (Chapter 8 of ES of the Original ES)

The information presented on noise impact ranges in this chapter of the Original ES was used to inform the assessment of impacts of underwater noise on fish and marine mammals (Chapters 5 and 6). Noise monitoring will be carried out as agreed in the project PEMP document to assess the noise performance of the structures during operation. There is no requirement to undertake further marine noise impact assessment works for this Variation the findings of the Original ES as still valid.

Habitats Regulation Appraisal

In line with the EIA Directive 2014/52/EU and the requirement for the coordination of the EIA and HRA process under the new 2017 EIA Regulations, a HRA was undertaken as part of the Original Consent application (Original HRA and HRA Addendum), and has been updated for the Varied Project as referenced in Sections 1 and 4 above.

6.3.3. The Use of Natural Resources, in-particular Land, Soil, Water, Biodiversity, Air and Climate (considering as far as possible the sustainable availability of these resources)

The use of natural resources in terms of the four main types highlighted in the Directive is limited for this Project and were either assessed or scoped out in the Original ES as not be significant due to the location of the Project. It is worth noting that there will be negligible impacts in terms of sterilisation of land, severance of habitats and resources or reduction in biodiversity from the Project. However, there is a potential for increased biodiversity through the protection of marine habitats from commercial activities through the installation of the windfarm and the creation of safety zones around the structures. On site monitoring of the diversity of species that develop around the Project will overtime determine if this is the case.

Land and soils

Potential impacts on land and soils is limited to the onshore components of the Project which was scoped out of the EIA process. However, they were taken into consideration when mitigating nuisance from construction activities (Chapter 16 of ES).

Climate

The impact on climate change on predicted weather patterns has been assessed for the engineering design of the Project and construction process, with most work being undertaken within construction ports, rather than large heavy lift vessels.

The impact from the Project on greenhouse gas emissions has been assessed and it has been estimated that it would generate a saving of approximately 94,735 tonnes of CO_2 per year. It has been estimated that the Project could provide renewable electricity for approximately 55,945 homes. This is approximately 2.3% of all the homes in Scotland (2012 estimate of 2.39 million households by gro-scotland.gov.uk).

The Scottish Ministers were satisfied that, in assessing the previous application, that they acted in accordance with their general duties and that they exercised their functions in compliance with the requirements of the Climate Change (Scotland) Act 2009 (as amended).

6.3.4. Material Assets, Cultural Heritage and the Landscape

Cultural Heritage

For the purposes of clarity and consistency with other Environmental Statements (now referred to as EIA Reports) material assets are interpreted as the number of archaeological sites affected by the Project. As such both the offshore and onshore elements were assessed as Marine Historic Environment (Chapter 12) and Onshore (Chapter 16) respectively in the Original ES.

Archaeological Impacts

The impact assessment for the Marine Historic Environment in the Original ES was undertaken using a baseline environment derived from a desktop survey. A geophysical survey has now been undertaken of both the Development Area and the Offshore Export Cable Corridor and has identified the exact location of wreck sites. The wreck sites will be taken into consideration when siting the elements of the Project. The Crown Estate protocol for new discoveries (2014) will be used to ensure correct recording and reporting procedures are maintained.

Architectural Impacts

No architectural features were identified in the Original ES; therefore, no further assessment is required.

Landscape

This aspect of the new regulations was assessed for both offshore and onshore elements as Landscape, Seascape & Visual Impact Assessment (Chapter 11 of Original ES) and Onshore (Chapter 16 of Original ES) respectively.

For the offshore elements, photomontages were produced, the Original ES shows that very few of the landscapes, seascapes and viewpoints are likely to experience any significant impacts from the Project.

In terms of onshore impacts the Original ES found that the landfall and cable corridor comprise works which once operational will be underground. The landfall marker is a large feature, but there are unlikely to be any significant landscape and visual effects arising from the other onshore work elements due to the use of directional drilling. Once installed there will be no visual impact from the presence of the cable within the cable corridor which remains unchanged from the Original ES.

6.3.5. Vulnerability of the Project to Major Accidents and Disasters

The vulnerability of the Project to relevant risks of major accidents and/or disasters was assessed as part of the Original ES. The most relevant risks were identified as maritime collision, radar interference to both military and civilian aviation and weather events. The assessment of expected significant adverse effects of these risk on the environment due to the Project was assessed in the Original ES.

The vulnerability of the Project was assessed in terms of collision risk in the section on Maritime Navigation (Chapter 9 of Original ES) this included the risk to any commercial fisheries as identified in the section on Commercial Fisheries (Chapter 14 of Original ES). The risks from the construction, operation and decommissioning phases as well as addressing cumulative impacts from other planned developments were all assessed.

The vulnerability of the Project was assessed in terms of interference with radar systems in the Chapter on Military & Aviation (Chapter 10 of Original ES). The risks from the construction, operation and decommissioning phases as well as addressing cumulative impacts from other planned developments were all assessed.

In terms of disasters due to component failure brought about by weather conditions, the Project has been designed for the worst-case scenario to ensure the platforms can cope under extreme conditions i.e. platform movement in a 50-year storm event.

6.3.6. The Impacts of Waste

The method of installation for the intertidal works will be Horizontal Directional Drilling (HDD) which will give rise to the largest waste stream from the Project. The HDD process is unlikely to give rise to significant amounts of waste such as drilling mud but any waste resulting will be disposed of by a licenced waste operator to a licenced facility. The management of waste arising across the whole Project will be articulated and controlled in a waste management plan.

The construction of the various components of the windfarm will be undertaken at various construction facilities that operate under their own waste management plans.

6.2.7. Mitigation and Monitoring

Mitigation and monitoring requirements post-consent are identified throughout the various chapters of the Original ES and ES Addendum.

6.2.8. Environmental Impact Assessment Team

The EIA for the Original ES, ES Addendum and this Variation ES was undertaken by the following technical specialists, confirming that suitable qualified professionals undertook the assessments.

Table 6-3 Summary of the Environmental Impact Assessment Team

Name	Position within Project	Technical Qualifications
Dr Richard Wakefield	**Consent & Environmental Manager/Principal Marine Scientist**	**Fellow IMarEST, CSci, CMarSci**
Amy Parry	**Senior Marine Scientist**	**Member IMarEST CSci, CMarSci**
Will MacLennan	**Senior Marine Scientist**	**Member IMarEST CSci, CMarSci**
Shelley Vince	**Senior Marine Scientist**	**Member IMarEST CSci, CMarSci**
Chris McDougall	**Principal Marine Scientist**	**Member IMarEST CSci, CMarSci**
Abi Cowing	**Senior Marine Scientist**	**Member IMarEST CSci, CMarSci**
Nigel Coulshed	**Environmental Clerk of Works**	**PIEMA, AEECOW**