European Offshore Wind Deployment Centre

Design Statement

Submitted for approval pursuant to the discharge of Section 36 Consent Condition 14

ABE-ENV-BD-0017

August 2017

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STATUS	**DATE**	**REVISION**	**NAME**	**SIGNATURE**

Revision	Date	Revision changes
1	12/05/2017	First issue
2	10/08/2017	Post-consultation and Removal of Landfall Location Option 2

Design Statement Strategy Overview

Purpose and objectives of the Statement

This Design Statement (DS) has been prepared to address the specific requirements of the relevant condition attached to the Section 36 (S.36) Consent and Marine Licence issued to Aberdeen Offshore Wind Farm Limited (AOWFL).

The overall aim of this DS is to set out the refinements to the European Offshore Wind Deployment Centre (EOWDC) design and layout submitted at the application stage.

This DS confirms that the parameters of the Wind Turbine Generators (WTGs) to be installed align with those considered in the original Application.

All relevant method statements developed by contractors involved in the EOWDC must comply with the parameters set out in this DS.

Scope of the Statement

This DS covers, in line with the requirements of the S.36 Consent condition, the following:

- Details of the layout location for each WTG;
- WTG height, finishes, blade diameter and rotation speed and individual WTG location;
- Lighting requirements (navigation or aviation) for each WTG;
- Visual appraisal of the Development from nine selected and agreed viewpoints at Draft and final DS stages; and
- Confirmation that the scheme design, in so far as it relates to this DS, aligns with that considered in the relevant parts of the Environmental Statement (ES), Supplementary Environmental Information Statement (SEIS), Marine Licence, S.36 Consent and Marine Licence Application.

Structure of the Statement

This DS is structured as follows:

Sections 1 and 2 set out the scope and purposes of the DS and set out statements of compliance.

Section 3 sets out the process for making updates and amendments to this document.

Section 4 provides an overview of the Development.

Section 5 provides a summary of the consultation with statutory consultees undertaken on the draft DS.

Section 6 sets out what changes have been made to the design of the proposed scheme subsequent to the submission of the draft DS.

Section 7 provides a visual appraisal of the amended scheme from agreed viewpoints and compares this with the appraisal undertaken in the draft

Section 8 provides information to demonstrate compliance with the original Application.

Section 9 lists the references used in this DS.

Appendix A comprises the supporting figures and visualisations, which are referred to throughout the DS.

Appendix B illustrates the jacket foundation and WTG design and provides key dimensions.

Appendix C comprises a transcript of statutory consultee responses on the draft DS.

Appendix D demonstrates compliance with the original Application, ES and SEIS.

Appendix E demonstrates compliance with the original Application ES mitigation measures.

Appendix F sets out relevant sections of Scottish Natural Heritage's (SNH) guidance (2012) regarding the assessment of impact on coastal landscape and seascape.

Statement Audience

This DS is intended to be referred to by relevant personnel involved in the construction of the EOWDC, including AOWFL personnel, Contractors and Subcontractors. Compliance with this DS will be monitored by AOWFL and reported to the Marine Scotland Licensing and Operations Team (MS – LOT).

Statement Locations

Copies of this DS are to be held in the following locations:

- At AOWFL Head Office;

- At the premises of any agent, Contractor or Subcontractor (as appropriate) acting on behalf of AOWFL;

- At the AOWFL Marine Coordination Centre; and
- With the Ecological Clerk of Works (ECoW(s)).

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Defined Terms

Term	Definition
the 2010 Act	The Marine (Scotland) Act 2010.
Application	The Application and Environmental Statement submitted to the Scottish Ministers, by the Company on 1st August 2011 and Supplementary Environmental Information Statement submitted to the Scottish Ministers by the Company on 6th August 2012 for consent under section 36 of the Electricity Act 1989 and for a Marine Licence under 20(1) of the Marine (Scotland) Act 2010, for the construction and operation of the European Offshore Wind Deployment Centre (EOWDC) electricity generating station approximately 2 km off the coast of Aberdeenshire in Aberdeen Bay with a generation capacity of up to 100 MW.
Cables	Offshore Export Cables and Inter-array cables.
Commencement of the Development	The date on which the first vessel arrives on the Site of European Offshore Wind Deployment Centre to begin construction in accordance with the section 36 Consent.
Company	Aberdeen Offshore Wind Farm Limited (AOWFL). AOWFL is wholly owned by Vattenfall. AOWFL has been established to develop, finance, construct, operate, maintain and decommission the European Offshore Wind Deployment Centre.
Consent Plans	The plans, programmes or strategies required to be approved by the Scottish Ministers (in consultation with the appropriate stakeholders) in order to discharge conditions attached to the Offshore Consents.
Construction	As defined by the Section 36 Consent, (as per section 64(1) of the Electricity Act 1989, read with section 104 of the Energy Act 2004), construction is defined as follows: "construct", in relation to an installation or an electric line or in relation to a generating station so far as it is to comprise renewable energy installations, includes: • placing it in or upon the bed of any waters; • attaching it to the bed of any waters; • assembling it; • commissioning it; and • installing it.
Construction Method Statement (CMS)	The Statement to be submitted for approval under Condition 13 of the section 36 Consent.
Contractor	Any Contractor/Supplier (individual or firm) working on the project, hired by AOWFL.

Term	Definition
Design Envelope (Rochdale Envelope)	Describes a number of components and all permanent and temporary works required to generate or transmit electricity to the National Grid including the wind farm and the offshore export cable.
Design Statement (DS)	The Statement to be submitted for approval under Condition 14 of the section 36 Consent.
Development	The European Offshore Wind Deployment Centre electricity generating station in Aberdeen Bay, approximately 2 km east of Blackdog, Aberdeenshire, as described in Annex 1 of the section 36 Consent.
Development Area	The area which includes the wind turbine generators, the Inter-array cables and part of the Offshore Export Cable Corridor, including any other works, as shown in Part 4 of the Marine Licence (named as Lease Boundary in the Marine Licence).
Ecological Clerk of Works (ECoW)	Ecological Clerk of Works as required under condition 3.2.1.4 of the Marine Licence primarily, but not exclusively, for environmental liaison to establish and maintain effective communications between the Licensee, Contractors, stakeholders, conservation groups and other users of the sea during the period in which licensed activities authorised under this licence are undertaken.
Electricity Act	the Electricity Act 1989 (as amended).
Environmental Statement (ES)	The Statement submitted by the Company on 1 August 2011 as part of the Application.
Inter-array cables	Electricity cables connecting the WTGs.
the Licensee	Aberdeen Offshore Wind Farm Limited, a company registered in Scotland (registered number SC278869).
Licensing Authority	Scottish Ministers, as defined by the Marine Licence. It is important to note that Marine Scotland is acting on behalf of Scottish Ministers.
Marine Licence	Licence issued by the Scottish Ministers under Part 4 of the Marine (Scotland) Act 2010 for construction works and deposits of substances or objects in the Scottish Marine Area in relation to the Offshore Wind Farm and Offshore Export Cable.
Offshore Consents	• Consent granted under section 36 of the Electricity Act 1989 for the construction and operation of the EOWDC; • Declarations granted under section 36A of the Electricity Act 1989 to extinguish public rights of navigation so far as they pass through those places within the territorial sea where structures forming part of the Offshore Wind Farm

Term	Definition
	are to be located; and • Marine Licence under Part 4 of the Marine (Scotland) Act 2010 for construction works and deposits of substances or objects in the Scottish Marine Area in relation to the Offshore Wind Farm and Offshore Export Cable.
Offshore Export Cable (OEC)	The offshore export cables (and all associated cable protections) connecting the WTGs to the onshore export cables.
Offshore wind farm	An offshore generating station which includes proposed WTGs, inter-array cables, meteorological masts and other associated and ancillary elements and works (such as metocean buoys). This includes all permanent and temporary works required.
Section 36 Consent	Consent granted under section 36 of the Electricity Act 1989 for the construction and operation of the EOWDC.
Scottish Marine Area	The area of sea within the seaward limits of the territorial sea of the United Kingdom adjacent to Scotland and includes the bed and subsoil of the sea within that area.
Subcontractor	Any Contractor/Supplier (individual or firm) providing services to the project, hired by the Contractors (not AOWFL).
Supplementary Environmental Information Statement (SEIS)	The Statement (Addendum) submitted to the Scottish Ministers by the Company on 6th August 2012 as part of the Application.
the Statement	The UK Marine Policy Statement 2011.

Acronym Definitions

Term	Definition
ACC	Aberdeen City Council
AC	Aberdeenshire Council
AOWFL	Aberdeen Offshore Wind Farm Limited
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
cd	Candela
DS	Design Statement
ECOW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EOWDC	European Offshore Wind Deployment Centre
ES	Environmental Statement
HAT	Highest Astronomical Tide
IALA	International Association of Marine Aids to Navigation and Lighthouses
km	Kilometre
LAT	Lowest Astronomical Tide
LiDAR	Light Detection And Ranging
MCA	The Maritime and Coastguard Agency
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MOD	Ministry of Defence
MS	Marine Scotland
MS-LOT	Marine Scotland - Licensing and Operations Team
MSS	Marine Scotland Science
MW	Megawatt
NATS	National Air Traffic Services
NLB	Northern Lighthouse Board
NMP	Navigational Marking Plan
OECs	Offshore Export Cables
OS	Ordnance Survey
rpm	Revolutions per minute
SAR	Search and Rescue

Term	Definition
SCADA	Supervisory Control and Data Acquisition
SEIS	Supplementary Environmental Impact Statement
SNH	Scottish Natural Heritage
SLVIA	Seascape and Landscape Visual Impact Assessment
SPS	Significant Peripheral Structures
S.36	Section 36 (of the Electricity Act 1989)
UXO	Unexploded Ordnance
UTM	Universal Transverse Mercator
WTG	Wind Turbine Generator
ZTV	Zone of Theoretical Visibility

1 INTRODUCTION

1.1 Background

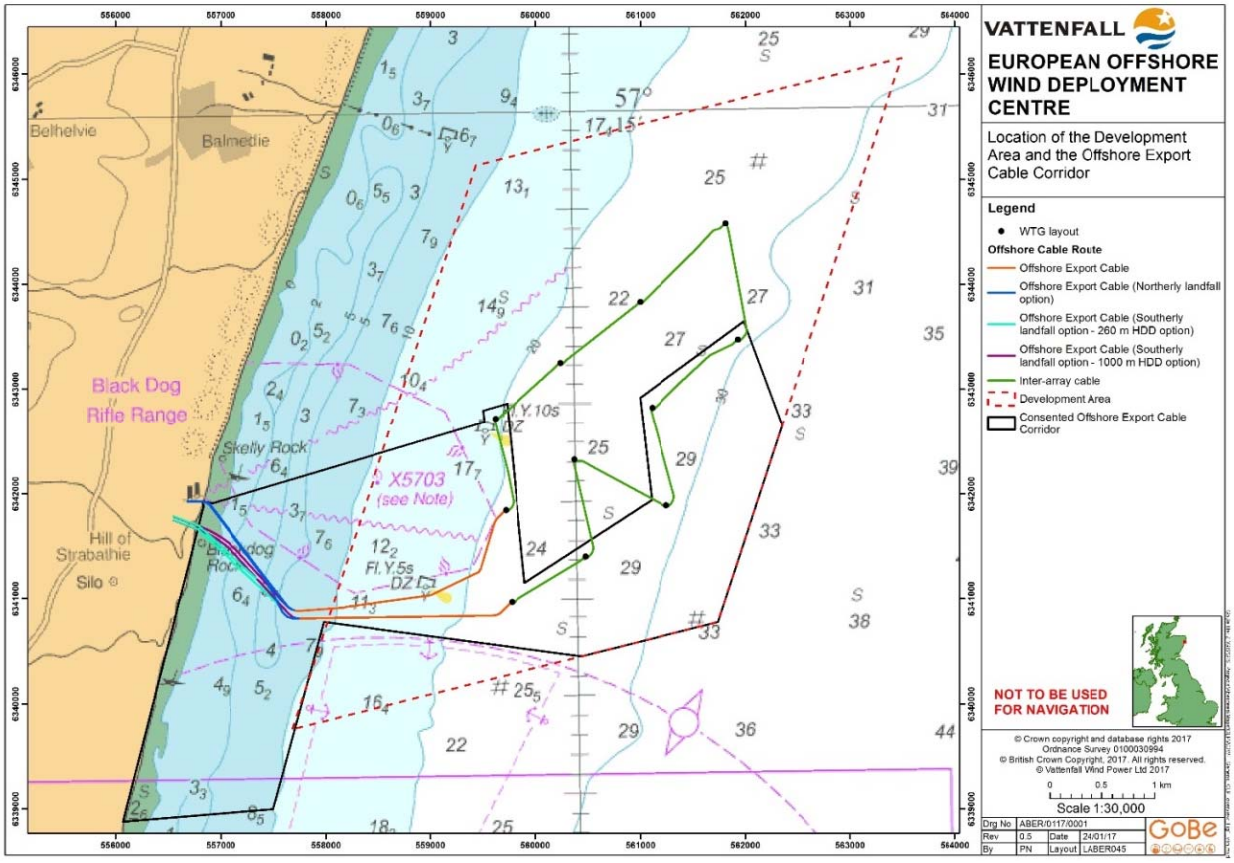
On 26 March 2013, Aberdeen Offshore Wind Farm Limited (AOWFL received consent from the Scottish Ministers under Section S.36 (S.36) of the Electricity Act 1989 for the construction and operation of the European Offshore Wind Deployment Centre (EOWDC – (also known as the Aberdeen Offshore Wind Farm) and on 15 August 2014 a Marine Licence was granted in terms of Section 25 of the Marine (Scotland) Act 2010 (reference 04309/16/0). This Marine Licence was most recently varied on 30 September 2016 (reference 04309/16/1).

The Development is located approximately 2 to 4.5 km offshore to the north east of Aberdeen, Scotland, within Aberdeen Bay. The Offshore Export Cables (OECs) will each be between 3.7 – 4.4 km long (maximum total length ~8 km) and will reach landfall at the adjacent coastline in Aberdeen Bay,at Blackdog (Figure 1).

A further overview of the Development is contained in Section 4 of this document.

AOWFL is a company wholly owned by Vattenfall and was established to develop, finance, construct, operate, maintain, and decommission the EOWDC.

Figure 1 EOWDC Development Area and the Offshore Export Cable Corridor



1.2 Purpose of this Document

The S.36 Consent and Marine Licence contain a variety of conditions that must be discharged through approval by the Scottish Ministers/Licensing Authority prior to the commencement of any offshore construction works. One such requirement is the approval of a Design Statement (DS). The aim of this statement is to set out the basis of refinements to the EOWDC design and layout submitted at application stage, including key criteria and constraints that have informed the final design and layout; and how landscape, seascape and visual impacts have been addressed and mitigated.

The Development is underpinned by an overarching design intent, which sets out to develop a balanced and appropriately scaled layout; that relates well to the physical and visual characteristics of the receiving marine and coastal environment (as described in the baseline of the ES); and is cognisant of the design considerations for offshore wind farms which are set out in SNH (2012) *Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape*.

The relevant condition setting out the requirement for a DS, that is to be discharged by this document, is presented in Table 1.

This Design Statement has been prepared having full regard to the guidance which is set out in SNH (February 2016) *Advice note on Offshore Wind Farm Design Statements* and Scottish Government (August 2003) *Planning Advice Note 68 – Design Statements*.

Table 1 - Conditions to be discharged by this DS

Consent Document	Condition Reference	Condition Text	Where Addressed
S.36 Consent	Condition 14	Prior to the Commencement of the Development, a detailed Design Statement must be submitted by the Company to the Scottish Ministers for their written approval, after consultation by the Scottish Ministers with SNH, Marine and Coastguard Agency, Northern Lighthouse Board, National Air Traffic Services and any such other advisors as may be required at the discretion of the Scottish Ministers.	This document sets out the Design Statement for approval by the Scottish Ministers. Consultation to be undertaken by Scottish Ministers.
		The Design Statement must provide guiding principles for the deployment of the wind turbines. This plan must detail:	
		Layout location for each phase and each turbine;	The WTG layout including co-ordinate information is set out in Section 4.3 (Figure 3 and Table 3). The Development will be implemented in a single phase.
		Turbine height, finishes, blade diameter and rotation speed across each phase, rows and	A description of the WTG dimensions,

Consent Document	Condition Reference	Condition Text	Where Addressed
		individual turbine locations;	technical specifications and finishes is presented in Section4.4; WTG locations are set out in Table 3, Section 4.3.
		Lighting requirements (navigation and aviation) for each turbine / row, or, as the case may be, phase including any anemometer mast;	A summary of the lighting requirements is provided in Section 4.7 and 4.8.
		Further detailed assessment of visual impacts to inform the detailed layout and design of each location and phase of the deployment centre from selected viewpoints to be agreed with the Scottish Ministers and any such other advisors as may be required at their discretion.	A visual appraisal of the proposed development from agreed viewpoints is set out in Section 7; this provides a comparative visual appraisal of the Development presented within the draft DS and the final updated Development.
	Reason	To set out design principles to mitigate, as far as possible, the visual impact of the turbines.	

1.3 Linkages with other Consent Plans

This DS sets out the proposed design for the EOWDC. Ultimately, however, it will form part of a suite of approved documents that will provide the framework for the Development – namely the other Consent Plans required under the S. 36 Consent and Marine Licence.

The other Consent Plans will be submitted for approval by the Scottish Ministers and consistency between these documents will be achieved by AOWFL ensuring that all relevant documents are consistent with the terms of any previously submitted or approved documents.

1.4 Structure of this DS

In response to the specific requirements of the S.36 Consent condition, this DS has been structured so as to be clear that each part of the specific requirements has been met and that the relevant information to allow the Scottish Ministers to approve the DS has been provided. The document structure is set out in Table 2.

Table 2 - DS document structure

Section		Summary of Content
1	Introduction	Background to consent requirements and overview of the DS scope and structure; and identifies those other Consent Plans relevant to the DS and provides a statement of consistency between this DS and those

Section		Summary of Content
		plans.
2	Statements of Compliance	Sets out the AOWFL statements of compliance in relation to the DS Consent Condition and the broader construction process.
3	Procedures for updates and amendments to this DS	Sets out the procedures for any required updating to or amending of the approved DS and subsequent further approval by the Scottish Ministers.
4	Development overview	Provides an overview of the Development including WTG specification and lighting, signage and marking requirements.
5	Consultation on draft DS	Provides a summary of consultation undertaken on the draft DS and sets out how/ where this is addressed in this DS.
6	Updates from the draft DS	Sets out the design changes which have been made subsequent to the issue of the draft DS.
7	Detailed assessment of visual impacts and layout design	Provides an appraisal of visual impacts of the revised scheme from nine agreed representative viewpoints and establishes where the nature of views has changed as a result of the design changes.
8	Compliance with the Application and associated SEIS	Sets out confirmation that the details set out in this DS are in accordance with those assessed in the ES; and Sets out how the mitigation measures related to design and visual impacts identified in the ES are to be delivered (by reference to this DS or other relevant consent plans).
9	References	Lists the documents cited within the DS.
Appendix A - Visualisations		Comprises: a Zone of Theoretical Visibility (ZTV) model based on the amended WTG specification and layout; and a set of wireframes and photomontages from nine agreed viewpoints to illustrate the revised scheme.
Appendix B- Jacket Foundation and WTG Design		Illustrates the jacket foundation and WTG design and provides key dimensions.
Appendix C – Consultation		Comprises a transcript of relevant representations made by statutory consultees on the draft DS.
Appendix D – Compliance with ES Rochdale Envelope Parameters		Demonstrates compliance with the original Application and mitigation set out in the ES and SEIS.
Appendix E – Compliance with Mitigation Measures		Details the ES and SEIS commitments relevant to this DS.
Appendix F – SNH guidance		Sets out relevant sections of SNH guidance (2012) regarding the assessment of impact on coastal landscape and seascape.

2 AOWFL STATEMENTS OF COMPLIANCE

2.1 Introduction

The following statements are intended to reaffirm the AOWFL commitment to ensuring that the Development is constructed and operated in such a manner as to meet the relevant requirements set out by the Offshore Consents, as well as other broader legislative requirements.

2.2 Statements of Compliance

AOWFL, in undertaking the construction and operation of the EOWDC, will ensure compliance with this DS as approved by the Scottish Ministers (and as updated or amended from time to time following the procedure set out in Section 3 of this DS).

AOWFL, in undertaking the construction and operation of the EOWDC, will ensure compliance with other relevant Consent Plans, as approved by the Scottish Ministers, and as identified in Section 1.3 above.

AOWFL, in undertaking the construction and operation of the EOWDC, will ensure compliance with the limits defined by the original application, the project description defined in the Environmental Statement (ES) and Supplementary Environmental Information Statement (SEIS) and referred to in Annex 1 of the S.36 Consent in so far as they apply to this DS (unless otherwise approved in advance by the Scottish Ministers / the Licensing Authority).

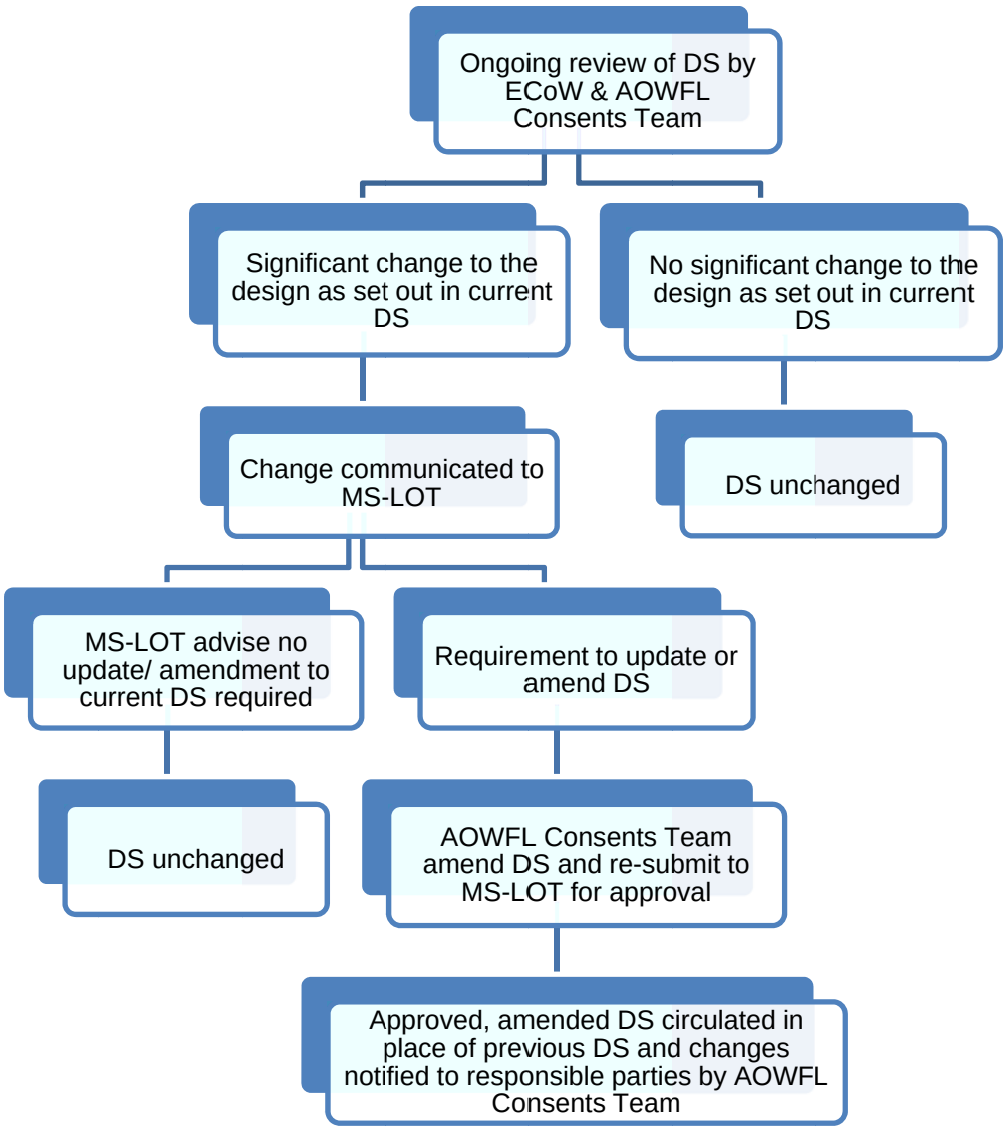
AOWFL, in undertaking the construction and operation of the EOWDC, will comply with AOWFL Health, Safety, Security and Environment (HSSE) systems and standards, the relevant HSSE legislation and such other relevant legislation and guidance so as to protect the safety of construction personnel and other third parties.

AOWFL will, in undertaking the construction and operation of the EOWDC, ensure compliance with all other relevant legislation and require that all necessary licences and permissions are obtained by the Contractors and Subcontractors through condition of contract and by an appropriate auditing process.

3 PROCEDURE FOR UPDATES AND AMENDMENTS TO THIS DESIGN STATEMENT

Where it is necessary to update this DS, in the light of any significant new information related to the scheme design, AOWFL proposes to use the change management process set out in Figure 2; identifying such information, communicating such change to the Scottish Ministers, redrafting the DS if required, seeking further approval for the necessary amendments or updates and disseminating the approved changes/amendments to responsible parties.

Figure 2 DS Change Management Procedure



4 DEVELOPMENT OVERVIEW

4.1 Introduction

This section provides a brief overview of the Development, in so far as it is relevant to this DS and Figure 1 shows the location of the Development in Aberdeen Bay.

4.2 Development Overview

The Development will consist of the following main components:

- 11 Wind Turbine Generators (WTGs);
- Three legged jacket substructures each installed on suction bucket foundations;
- A network of circa 9.7 km of Inter-array cables; and
- Two buried or mechanically protected, subsea OECs, totalling up to ~8 km in length, to transmit the electricity from the WTGs to the cable landfall location at Blackdog, within Aberdeen Bay, and connecting to the onshore buried cables for transmission to the onshore substation and connection to the National Grid network.

4.3 Layout

The WTG layout with associated unique identification marking is illustrated in Figure 3; this identification is referred to throughout the DS. The proposed WTG UTM and OS Grid co-ordinates are set out in Table 3. Amendments to the WTG co-ordinates since the submission of the draft DS are discussed in Section 6 and Section 7.2, with any resultant changes in views from the agreed assessment viewpoints considered within the updated appraisal of visual impacts, Section 7.4, and the visualisations presented in Appendix A.

Table 3 - WTG Co-ordinates

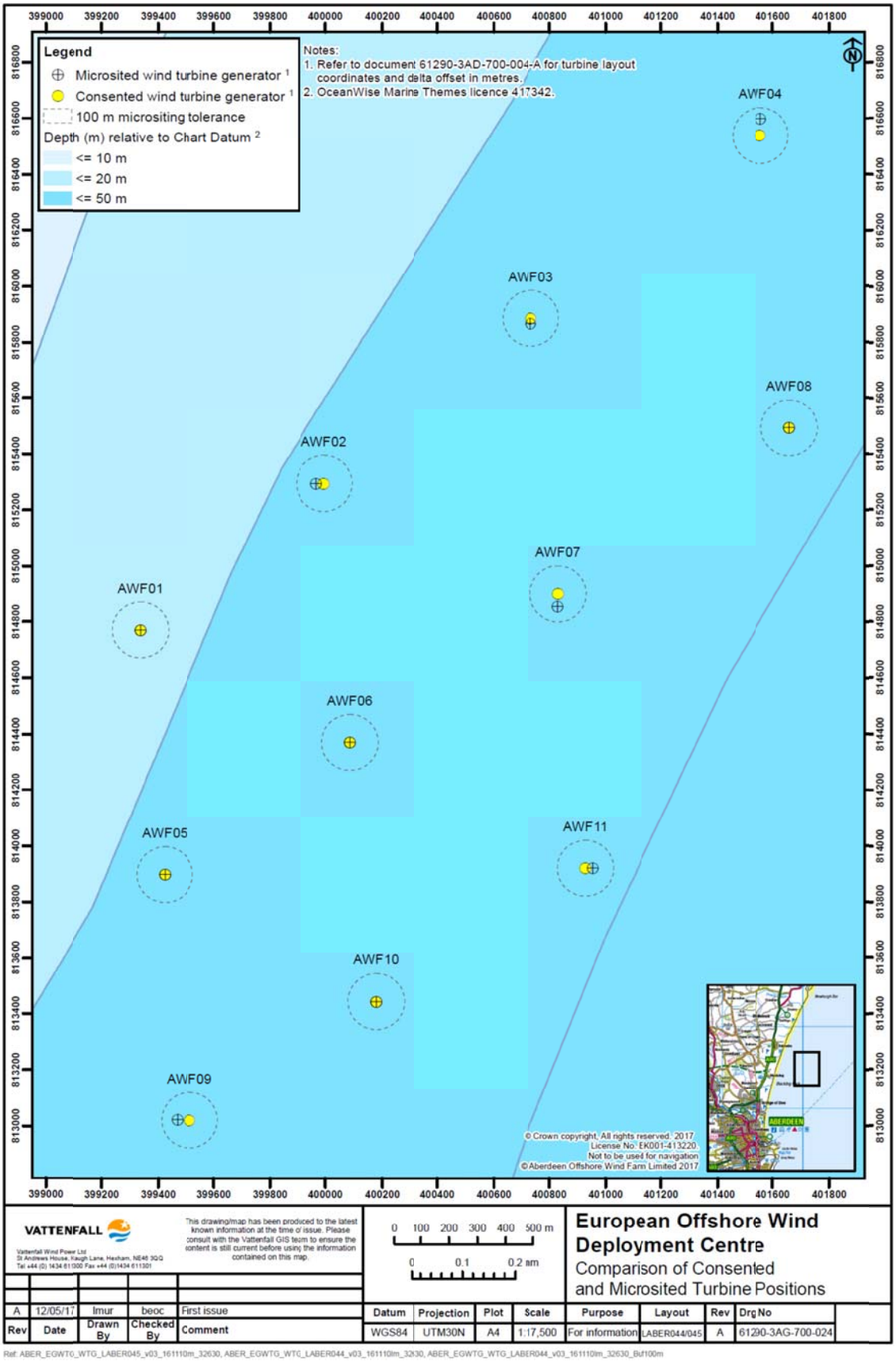
WTG ID	WGS84		OS Grid Coordinates	
	Latitude	**Longitude**	Easting	Northing
AWF01	57° 13' 25.226" N	2° 0' 45.453" W	399337.00	814772.00
AWF02	57° 13' 42.152" N	2° 0' 7.902" W	399966.89	815295.31
AWF03	57° 14' 0.616" N	1° 59' 22.233" W	400732.74	815866.31
AWF04	57° 14' 24.310" N	1° 58' 33.059" W	401557.09	816599.21
AWF05	57° 12' 56.899" N	2° 0' 40.259" W	399424.00	813896.00
AWF06	57° 13' 12.197" N	2° 0' 0.801" W	400086.00	814369.00
AWF07	57° 13' 27.892" N	1° 59' 16.426" W	400830.32	814854.41
AWF08	57° 13' 48.536" N	1° 58' 27.007" W	401659.00	815493.00

WTG ID	WGS84		OS Grid Coordinates	
	Latitude	**Longitude**	Easting	Northing
AWF09	57° 12' 28.585" N	2° 0' 37.615" W	399468.24	813020.46
AWF10	57° 12' 42.251" N	1° 59' 55.259" W	400179.00	813443.00
AWF11	57° 12' 57.630" N	1° 59' 9.030" W	400954.57	813918.64

(Layout Reference LABER045)

The location of each of the WTGs may be subject to slight amendment due to, for example, the need to avoid Unexploded Ordnances (UXOs), local seabed restrictions such as archaeology features, or other seabed obstructions. It should be noted that a 100 m radius allowance for such micro-siting of the WTGs was included within the consent application applied (Layout Reference LABER044) and is permissible under the terms of the consents granted. The micrositing envelope for each WTG (based on the consented scheme) is illustrated in Figure 3.

Figure 3 WTG Identification and Layout



Ref: ABER_EGWTG_WTG_LABER045_v03_161110lm_32630, ABER_EGWTG_WTG_LABER044_v03_161110lm_32630, ABER_EGWTG_WTG_LABER044_v03_161110lm_32630_Buf100m

The spacing between the WTGs is set out in Table 4 below (subject to any micrositing required as set out above). Whilst the spacing between WTGs is not absolutely uniform (as a result of further technical constraints, including wake effects, UXOs, seabed restrictions/ obstructions, as explained above), the appearance from coastal viewpoints, taking into account factors of distance and angle of view, produces a relatively evenly spaced composition. Reference should be made to the appraisal of visual impacts in Section 7 and supporting visualisations in Appendix A.

Table 4 - Separation distances between adjacent WTGs

South-West to North-East Axis			
Row	**WTG ID** Spacing (metres) between adjacent WTGs in Row		
Row 1	**AWF01 - AWF02** 819 m	**AWF02 - AWF03** 955 m	**AWF03 - AWF04** 1,103 m
Row 2	**AWF05 - AWF06** 814 m	**AWF06 - AWF07** 889 m	**AWF07 - AWF08** 1,046 m
Row 3	**AWF09 - AWF10** 827 m	**AWF10 - AWF11** 910 m	
North to South Axis			
Row	**WTG ID** Spacing (metres) between adjacent WTGs in Row		
Row A	**AWF01 - AWF05** 880 m	**AWF05 - AWF09** 877 m	
Row B	**AWF02 - AWF06** 934 m	**AWF06 - AWF10** 931 m	
Row C	**AWF03 - AWF07** 1,017 m	**AWF07 - AWF11** 944 m	
Row D	**AWF04 - AWF08** 1,111 m		

4.4 WTG Specification

WTG Dimensions:

Each WTG will comprise:

- a blade tip height of 191 m above lowest astronomical tide (LAT);
- a hub height of 109 m above LAT;
- a blade diameter of 4.7 m at the interface with the hub and 5.4 m at its widest point, which is approximately 15 m along the blade from the hub interface; and
- a rotor diameter of 164 m.

Foundation Structure:

Maximum dimensions of jacket foundation structure:

- Maximum above water footprint – At LAT jacket 20.6 m (width) / 19.8 m (length):
- Maximum height of foundation is 33.1 m above LAT.

The design of the jacket foundation structure and WTG, including key dimensions, is illustrated in Appendix B.

4.5 Paint Finishes

The proposed paint finishes, described below, are also set out in detail within the Navigational Marking Plan (NMP), which has been consulted upon and approved by the Northern Lighthouse Board (NLB), the Civil Aviation Authority (CAA) and the Maritime and Coastguard Agency (MCA).

WTGs

All 11 WTG towers, nacelles and blades will be painted light grey RAL 7035, lead free pigmentation.

A series of three red dots (RAL 3020 Traffic Red) will be incorporated on each WTG blade (600 mm diameter), located indicatively at 10 m, 20 m and 30 m from the hub as shown in Figure 4.

Figure 4 Illustrative blade markings

It is also currently planned to mark the tip of each blade with a 600 mm wide band in Traffic Red (RAL 3020), located as close to the tip as engineering constraints (associated with the solid metal tip) will allow.

The Vattenfall logo and the flag of the European Union will appear on one side of the nacelle only, this will be the right hand side (when viewed from the coast and with the WTG orientated towards the prevailing wind from the south west). The Vattenfall logo will show corporate colours and the measurements for this will be approximately 3.75 m (w) x 1.27 m (h). The flag of the European Union will appear adjacent to the Vattenfall logo (at the same level) and will measure approximately 2 m (w) x 1.5 m (h). A visualisation to show how these will appear from the closest viewpoint (viewpoint 1) is presented in Appendix A. It should be noted that the Vattenfall logo shown in this visualisation has been reduced in size (3.75 m x 1.27 versus the originally proposed 5 m x 2 m). However, AOWFL does not consider the change in size of the Vattenfall logo to be discernible. when compared to this visualisation, and therefore this visualisation should be considered as a worst case scenario than the currently proposed.

Foundations

The transition pieces / foundation of each WTG will be painted in yellow (RAL 1023) lead free pigmentation to a height of 28.46 m above HAT (33.1 m above LAT).

It is not necessary to paint the sections of structures that will lie below LAT at all times.

Heli-Hoist Platforms

The nacelle of each WTG will be installed with a helicopter hoist platform for use in case the need for hoisting operations ever arises. It is noted that hoisting will only be used on an ad hoc basis (for instance, during emergency Search and Rescue (SAR) operations) and it is not expected to form part of normal operations.

Each platform will be painted and marked in line with the relevant guidance in Civil Aviation Publication (CAP) 437 (CAA 2016).

Blade Speed Rotation

All 11 WTGs will rotate in the same direction with a mean operational rotation speed of 9.8 rotations per minute (rpm).

4.6 Signage

WTGs

Each WTG is assigned an ID number of the format “AWFXX”, where XX is a unique two digit number between 01 and 11 (as set out in Table 3).

Each WTG foundation will display identification panels with black letters and/or over a yellow background, corresponding to the ID number associated with each WTG. The ID panels will be 1 metre high and will be visible in all directions, in daylight as well as night, either by the use of reflective material or low illumination. Any illumination will be off during daylight, being controlled by a twilight sensor.

Aviation ID Marking

The nacelle roof of each WTG will be marked with the location ID in 1.5 m high lettering, which can be illuminated upon request via the Supervisory Control and Data Acquisition (SCADA) system.

4.7 Marine Navigation Lighting

The proposed marine navigation lighting, described below, is also set out in detail within the Navigational Marking Plan.

WTGs AWF09, AWF01, AWF04, AWF08, and AWF11 (Figure 4) are designated as Significant Peripheral Structures (SPS), and will each be fitted with lights visible from all horizontal directions. The lights will:

- Flash yellow once every 5 seconds with a range of 5 nautical miles (except tower AWF01, which will have a range of 2 nautical miles);
- Be synchronised;
- Comply with International Association of Marine Aids to Navigation and Lighthouses (IALA) recommendations and have an availability >99.8 % (IALA category 1), calculated over a 3 year rolling period;
- Be mounted below the lowest point on the arc of the rotor blades and higher than 6 m above Highest Astronomical Tide (HAT; and
- Fault status of the navigational lighting will be provided through the SCADA system.

4.8 Aviation Lighting

The proposed aviation lighting, described below, is also set out in detail within the NMP, which has been consulted upon and approved by the CAA, NLB and MCA.

The operational phase aviation lighting and marking of the EOWDC has been directed by the CAA, and is in line with the following guidance:

- CAP 437 – Standards for Offshore Helicopter Landing Areas (CAA 2016);
- CAP 393 – Air Navigation: The Order and the Regulations Article 223 (CAA 2016a); and
- CAP 764 – CAA Policy and Guidelines on Wind Turbines (CAA 2016b).

Aviation lighting will be fitted as required by the CAA (CAA 2016b). Currently all WTGs will be fitted with two medium intensity, 2000 candela (cd) obstruction lights (Orga L550-3E5-W-1RM-G) for passing aircraft that are capable of being dimmed to 200 cd. The lights will flash red with Morse code “W” and all lights will be synchronised, and can be remotely monitored via the SCADA system.

Visibility meters will be attached to two WTGs to control the light intensity between 100 % and 10 %.

For the purposes of SAR operations, and in addition to the main aviation lighting, each WTG will have a low candela (200 cd) red heli-hoist light fitted, which must be remotely operated via the SCADA system.

Infrared lighting has not been requested by the MOD or the MCA and therefore will not be fitted on the WTGs.

4.9 Fog Signals

The proposed fog signal apparatus, described below, is also set out in detail within the NMP, which has been consulted upon and approved by the CAA, NLB and MCA.

WTGs AWF04, AWF09 and AWF11 will be fitted with sound signals (foghorns). These signals will:

- Have a nominal range of 2 nautical miles;
- Be synchronised;
- Be placed between 6 and 30 m above MHWS;
- The character will be rhythmic blasts corresponding to Morse code 'U' every 30 seconds. The minimum duration of the short blast shall be 0.75 seconds and the sound signal shall be operated when the meteorological visibility is <2 nautical miles; and
- Comply with IALA recommendations and have an availability >97.0 % (IALA Category 3), calculated over a rolling 3 year period.

AWF04, AWF09, and AWF11 will also be fitted with visibility meters and the fog signals will be activated when the meteorological visibility is less than two nautical miles.

The SCADA system will offer manual control of the sound signals (on/off), if required, and will also monitor for faults.

5 CONSULTATION ON DRAFT DESIGN STATEMENT

AOWFL submitted a draft DS to Marine Scotland Licensing and Operations Team (MS-LOT) in March 2016 and MS-LOT consulted with statutory consultees on the draft DS. A summary of the responses from each statutory consultee, comprising Aberdeen City Council (ACC), Aberdeenshire Council (AC), MCA, Marine Scotland Science (MSS), NLB, National Air Traffic Services (NATS) and Scottish Natural Heritage (SNH) is set out below (Table 5 - Consultation Summary), including how these comments have been addressed in this version of the DS. A full transcript of each consultation response is provided in Appendix C.

Table 5 - Consultation Summary

Stakeholder	Comment Received	How and where addressed
ACC *(email dated 27 May 2016)*	Method: We are content with the methodology for the viewpoint design appraisal. However, without a pre-mitigation appraisal for comparison it is not clear how this appraisal has influenced the design (as required by condition 14 d), or whether the appraisal it is intended as a description of the 'final' design.	The visual appraisal is intended to describe the final design proposal. A pre-mitigation appraisal would necessarily be predicated on an assessment of a scheme which had not incorporated mitigation measures; such a scheme has not been produced since mitigation is 'embedded' into the design process, and not treated as a secondary exercise to reduce impacts which cannot be designed out of the 'core scheme'. This is relatively unique to wind farms where mitigation opportunities are limited, due to the technical and environmental constraints (including micrositing allowances), together with the inherent scale of the WTGs and (in this case) their relative proximity to the coast. The design changes that have been introduced (and which may be considered as 'mitigation') are set out in Section 7.2 of this DS. These reflect the changes introduced sequentially between the consented layout , the draft DS development and the final DS development.
	Visualisations: Due to time constraints for providing comments we have not had the benefit of seeing full sized printed copies, nor have we been able to view the images in the field. Within these limitations we conclude that the visualisations appear to be of mainly good quality. However, for Viewpoints 5, 7 and 12 the turbines appear to be less well defined than in other viewpoints, even accounting for distance.	Printed copies of all visualisations are provided with this updated DS for review. The clarity and definition of WTGs in each view has been reviewed and it is considered that they all are of an acceptable quality. The updated visualisations are presented in Appendix A of this DS.
AC *(memorandum*	In terms of the requirement for a Design Statement the applicant should confirm the location and specification of any proposed	AOWFL confirms that a permanent offshore anemometer mast will not be installed at the EOWDC. It should be

Stakeholder	Comment Received	How and where addressed
dated 25 June 2016)	anemometer mast(s).	noted that a temporary floating LiDAR (Light Detection And Ranging) is currently deployed (a separate Marine Licence was attained for it).
	I'd also recommend that in terms of minimising adverse visual effects that no advertising, logos or branding etc. appear on any part of the offshore structures.	A company logo and the flag of the European Union will be displayed on the nacelle of each WTG. The incorporation of these elements was set out in Section 3.6.9, paragraph 50 of the ES (Volume 2). A description of the proposal is provided in Section 4.5 of the updated DS, whilst additional visual impacts are recorded in Section 7. A visualisation showing the logo (Figure 2.2), prepared from the nearest viewpoint, located at Balmedie Beach, is included in Appendix A.
	On a general note it may be worth confirming with the applicant the layout of the development with accompanying standard OS grid coordinates for each turbine and any anemometer masts etc.	The OS grid co-ordinates of each WTG are set out in Table 3, Section 4.2. As explained above permanent offshore anemometer masts will not be deployed at the EOWDC.
MCA *(email dated 9 May 2016)*	Could AOWFL please confirm the distances between turbines?	The separation distances between WTGs are set out in Table 4, Section 4.2.
MSS *(letter dated 16 May 2016)*	No further comments/ issues regarding: marine mammals; marine fish ecology; commercial fisheries; benthic ecology; physical environment; diadromous fish; aquaculture.	No amendments required.
NATS *(email, dated 16 May 2016)*	NATS has reviewed the Design Statement and is satisfied that the Scottish Government can proceed to discharge the requirements of condition 14 of the S.36 Consent, awarded to AOWFL.	No amendments required.
NLB *(letter dated 22 April 2016)*	Section 4.1 Marine Lighting, should include the requirement for the Navigation Lights to be synchronised.	As per Section 4.7 of the updated DS the Navigation Lights will be synchronised.
	Section 4.2 Marine Fog Horn, should include the requirement for the Fog Signals to be synchronised.	Fog signals will be synchronised and this is set out in Section 4.9 of the updated DS.
	AOWFL should consult with the MOD regarding the close proximity of Turbine AWF01 to the Northern Special Mark Buoy 'DZ'; and of the export cable route to the Southern Special Mark Buoy 'DZ' marking area X5703.	AOWFL has consulted with the Ministry of Defence (MOD) on this regard. The Blackdog Firing Range Management Plan (as requested in Condition 10 of the S.36 Consent) will be submitted to MS-LOT for consultation with the MOD covering the Danger Zone mark buoys.
SNH *(email dated 13 May 2016)*	SNH has no comments or preference regarding the choice of foundation type. We confirm that the submitted design statement does fulfil its purpose under	No amendments required.

Stakeholder	Comment Received	How and where addressed
	clause (d) of condition 14. It takes account of our recommendations (SNH advice, 15 February 2016) and presents a viewpoint design appraisal which is clear and comprehensive. The content and quality of the visualisations is also very good, provided for the viewpoints agreed through earlier consultation. So we confirm that, from SNH's perspective, there are no outstanding issues to be addressed under this condition in respect of landscape and visual interests.	
SNH *(letter dated 31 October 2016)*	We consider that the draft Design Statement largely follows our Guidance - see email 15 Feb 2016. In terms of finalising the Design Statement, one aspect that could be clarified or further described is the actual design process, including whether there are technological / engineering constraints, which influence the final siting, design and location of turbines.	An updated commentary on the design process is set out in Section 7.2; this takes account of the technological and engineering constraints, which have influenced the final design and layout.

In addition to the consultation process described above, a subsequent meeting was held on the 8th of May 2017 between AOWFL, LDA Design and statutory consultees comprising SNH, Aberdeenshire Council and MS. The comments included in the written representations were discussed and any further clarifications have been incorporated into this final DS.

6 UPDATES FROM THE DRAFT DESIGN STATEMENT

The principal scheme changes, which are set out in this version of the DS (as compared to the draft DS submitted in March 2016) relate to a limited change in the location of six WTGs; a minor increase in blade tip height and hub height; and an alteration to the design of the jacket foundations. These changes remain within the parameters set by the Rochdale Envelope assessed as part of the ES and SEIS; this is described more fully in Appendix D and Appendix E. The rationale for scheme changes as part of a comprehensive design review process is set out in Section 7.2.

Table 6 below sets out the principal design parameters, which have been addressed in this version of the DS, noting where these have changed from the draft, DS:

Table 6 - Design Parameter Comparison

Parameter Draft DS	Parameter Final DS	How and where addressed
Blade tip height of 190.5 m above LAT.	Blade tip height of 191 m above LAT.	The very minor increase (0.5 m) in tip height and hub height is captured in the visualisations and updated ZTV presented in Appendix A; the rationale for the change in WTG specification is provided in Section 7.2; changes in the nature of the visual appearance is set out in Section 7.4.
Hub height of 108.5 m above LAT.	Hub height of 109 m above LAT.	
Rotor diameter of 164 m.	Rotor diameter of 164 m.	
Foundation structure: Four legged jacket substructures with an above water footprint of approximately 21 m x 21 m rising to 32.6 m above LAT.	Foundation structure: Three legged jacket substructures with an above water footprint of 20.6 m (width) x 19.8 m (length) rising to 33.1 m above LAT.	The revised design of the jacket substructures has been incorporated into the visualisations presented in Appendix A and addressed in the appraisal of visual impacts, Section 7.4.

The small 0.5 m increase in the foundation structure, and therefore hub and tip height, was required to ensure a safe distance between personnel and equipment on the external work platform of the foundation and the lower arc of the rotating WTG blades.

A comparison between the location of WTGs presented in the draft DS and this final version is set out in Table 7 below and any changes to the appraisal of visual impact arising from this minor alteration to the layout is set out in Section 7.4.

Table 7 - WTG Location Comparison

WTG ID	Draft DS (Layout reference LABER044) OS Grid Coordinates		Final DS (Layout reference LABER045) OS Grid Coordinates		Approximate Distance Moved (m)/ Direction	Reason
	Easting	Northing	Easting	Northing		
AWF01	399337.00	814772.00	399337.00	814772.00	No change	N/A
AWF02	399994.00	815295.00	399966.89	815295.31	27 m / west	To reduce the risk of encountering shallow gas, the WTG has been relocated as close as possible to the sub-bottom profiler lines.
AWF03	400733.00	815884.00	400732.74	815866.31	18 m / south	To avoid sonar target (potentially large boulder).
AWF04	401555.00	816538.00	401557.09	816599.21	61 m / north	To avoid multiple sonar targets identified as potential debris.
AWF05	399424.00	813896.00	399424.00	813896.00	No change	N/A
AWF06	400086.00	814369.00	400086.00	814369.00	No change	N/A
AWF07	400831.00	814901.00	400830.32	814854.41	47 m / south	To avoid uncharted wreck.
AWF08	401659.00	815493.00	401659.00	815493.00	No change	N/A
AWF09	399512.00	813020.00	399468.24	813020.46	44 m / west	To reduce the risk of encountering shallow gas, the WTG has been relocated as close as possible to the sub-bottom profiler lines.
AWF10	400179.00	813443.00	400179.00	813443.00	No change	N/A
AWF11	400929.00	813919.00	400954.57	813918.64	26 m / east	To reduce the risk of encountering shallow gas, the WTG has been relocated as close as possible to the sub-bottom profiler lines.

An additional appraisal is also provided in this version of the DS in relation to the markings on the WTG blades and nacelles, which are described in Section 4.5, comprising:

- Red dot and red band blade markings (as required by MGN 543- Annex 5); and
- Incorporation of the Vattenfall logo and flag of the European Union on each nacelle (required as part of the EU grant).

These features are illustrated in the visualisations presented in Appendix A and described within the appraisal of visual impacts, Section 7.4.

7 VISUAL APPRAISAL AND LAYOUT DESIGN

7.1 Introduction

Paragraph d) of Condition 14 requires that the DS should provide:

> *d) Further detailed assessment of visual impacts to inform the detailed layout and design of each location and phase of the deployment centre from selected viewpoints to be agreed with the Scottish Ministers and any such other advisors as may be required at their discretion.*

LDA Design has prepared this section and it has been approved by Mr Simon Railton, an Associate at LDA Design and a qualified landscape architect with over 10 years' relevant offshore experience.

This section provides an update to the visual appraisal which was presented in the draft DS and is based on the amended scheme parameters which are set out in Section 4.2. The appraisal of visual impacts adopts the same methodology used within the draft DS (also prepared by LDA Design) and which was agreed through consultation with SNH, AC and ACC; the same nine viewpoints, agreed though consultation, are also used. These comprise:

- 01 - Balmedie Beach
- 02 - A90 (Harehill)
- 04 – B999 Whitecairns
- 05 – Aberdeen Beach
- 07 – Torry Battery
- 09 – Forvie Nature Reserve
- 12 – Kincorth Hill
- 13 – Udny Station
- 15 – Brimmond Hill

For ease of cross-referencing, the viewpoint numbering is consistent with the draft DS and ES (in line with the SNH recommendation).

Relevant guidance documents, which underpin this appraisal, are set out in Section 0 of this DS.

7.2 Design Process

The design process has been informed, at all stages, by both technical drivers and by environmental constraints and opportunities, which includes consideration of landscape, seascape and visual impacts from the outset; these factors, in combination, have informed the configuration presented in this version of the DS.

The principles of good design, which are embodied in both SNH (2014) Guidance *'Siting and Designing Wind Farms in the Landscape, version 2'*; and SNH (2012) '*Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape*' have been applied throughout and underpin the consented layout (as assessed in the ES and SEIS), and subsequent scheme refinements, which are described in the draft DS and this final version.

The overarching principles which are set out in Appendix F, relate, in broad terms, to consideration of scale, and form of the WTGs, and to their relationship with the receiving environment (its inherent visual and physical characteristics) and the people who will experience views. At each stage of the design evolution, from scoping to this final DS, electronic wirelines were reviewed and tested against the design criteria as part of the desk based design review/iteration process.

Design refinements of the options presented in the ES and SEIS (as part of the Rochdale Envelope) were introduced and set out in the draft DS; these included the introduction of a single height WTG; a single phase build out and a four legged jacket structure. Following the submission of the draft DS, further refinements were introduced including: selection of a WTG model and specification; consolidation of the foundation design (the rationale for this is set out in more detail below); and a minor amendment to the location of six WTGs (within the 100 m micrositing allowance).

Refinements introduced in the draft DS and final DS were largely driven by technical and operational objectives, and limited by the micrositing allowance. Opportunities to introduce additional mitigation through design similarly were limited by the technical and environmental constraints identified through consultation and by the inherent characteristics of the WTGs, in terms of scale and form, and their proximity to the coastline.

The primary technical and engineering considerations, which informed the selection of the WTG and the foundation design, were:

- Adoption of the MHI Vestas Offshore Wind V164 represented the best overall available technology and performance at the point in time selected. At the point of selection, the WTG was the most powerful offshore WTGs commissioned worldwide, maximise the available electrical output for the 11 locations and allow innovation developments.
- Adoption of a three legged foundation design, which is structurally more efficient and easier to install than the 4-legged jacket. The suction bucket jacket concept was selected predominantly due to the water depth, large turbine size and ground conditions. Rock present below 25 m depth below seabed precluded traditional driven piled foundations and significant amounts of drilling would have been required. The suction buckets are tipped at 13 m below seabed and therefore the challenging soil conditions are avoided.

Furthermore, the current WTG locations achieve an optimal layout taking into account of providing sufficient spacing between the WTGs, maximising electrical output, ground conditions, taking into account of search and rescue requirements, site restrictions and other input factors. Final siting of the WTGs will be determined by the presence of any sub seabed boulders and potential UXO's (subject to the 100 m radius allowance for such micro-siting as set out above).

In design terms, the principles that have been applied and underpin the layout, are consistent with overarching objectives, embodied in the SNH Guidance (2012), to minimise adverse seascape, landscape and visual impacts and this includes:

- The adoption of single height WTGs to create uniformity of appearance – this includes maintaining a consistent minimum clearance of blade tips above MHWS level;
- A single phase build out which reduces the period during which construction stage landscape, seascape and visual effects may be experienced;
- Maintaining as regular a separation of WTGs as practicable within the bounds of environmental, engineering and technical constraints to provide a visually balanced layout with limited overlapping of blades in views for the coast;
- Use of recessive paint colours for the WTGs to blend features into the background as far as practicable and within the constraints imposed by safety and technical standards; and
- Consideration of foundation designs, resulting in the adoption of a more slender three legged jacket solution (compared with the four legged solution presented in the draft DS and ES).

The decision to deploy a single WTG specification, with the same outline foundation design and as a single phase build out, compared with the multiple turbine types in multiple WTG types, foundations and in multiple phases that were proposed and assessed as part of the ES submitted, noticeably simplified the design process. This was acknowledged by SNH in their letter dated 31 October 2016.

7.3 Visualisations

All the figures and visualisations provided have been prepared in accordance with the requirements of SNH (2014) guidance 'Visual Representation of Wind Farms, version 2' as set out in the draft DS (Section 6.4). A minor exception to this is Figure 2.2, which is used to illustrate logos on the nacelle; SNH guidance requires that WTG blades should face the viewer in all visualisations. Given that the logos are situated on the side face of the nacelle (and therefore facing away from the viewer), they would not be visible in a visualisation prepared strictly to SNH standards. This photomontage is therefore for illustrative purposes only, with the nacelle, rather than the blades, facing the viewer, to represent a view, which may occur in reality.

The baseline photography used in the visualisations has not changed between the original application and versions of the DS for reasons of consistency.

The supporting figures and visualisations (scheduled in Table 8) are included in Appendix A, which comprise:

- Figure 1.0 – Comparison ZTV incorporating agreed representative viewpoint; used to illustrate differences in visibility between the draft DS layout and final version;
- Figures 2.0 – 10.2 – Visualisations; these are arranged on a viewpoint basis between wireframes, photomontages and illustrative photomontages as follows:

Table 8 - Visualisation Figures

Viewpoint	Figure Number

	Wireframe	Photomontage	Photomontage Representation of Logo
01	2.0	2.1	2.2
02	3.0	3.1	n/a
04	4.0	4.1	n/a
05	5.0	5.1	n/a
07	6.0	6.1	n/a
09	7.0	7.1	n/a
12	8.0	8.1	n/a
13	9.0	9.1	n/a
15	10.0	10.1	n/a

7.4 Viewpoint Appraisal

The following section considers the design attributes of the Development from the nine agreed viewpoints.

Analysis of the comparison ZTVs (Figure 1.0, Appendix A)

Figure 1.0, Appendix A shows the extent of theoretical visibility arising from the current WTG specification and layout (based on tip height only) and compares this with the layout and specification assessed in the draft DS.

Analysis of the ZTV confirms that the minor increase in blade tip height (equating to 0.5 m) and the repositioning of six out of 11 WTGs has resulted in no perceptible change to the area of theoretical visibility.

Based on review of the ZTVs of the ES, SEIS, draft DS and final DS layouts, and related visualisations from the nine agreed viewpoints and having regard to the absence of perceptible change to the area of theoretical visibility, minor layout and specification changes, it was concluded that no further detailed visual assessment was required.

Accordingly, it is considered that the outcome of the assessment of visual effects set out in the detailed viewpoint assessment in the ES and SEIS remain unchanged and therefore apply to the Development as described in this DS.

SNH has endorsed the approach to providing a viewpoint appraisal of the Development, as recorded in Section 5, Table 5 of this DS.

Consequently a viewpoint appraisal of the Development as described in this DS has been carried out. This viewpoint appraisal addresses the constituent aspects of a view as set out in the guidance: '*Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape (SNH, March 2012)*' and in particular chapter 5, paragraphs 5.5

and 5.6 under the sub-heading 'Characteristics of Offshore Windfarms'. The relevant parts of this guidance are included within Appendix F.

Viewpoint Appraisal

The following section comprises an analysis of the revised layout and WTG specification from the nine agreed representative viewpoints assessed in the draft DS. The schedules below are intended to show where the revised scheme has resulted in a change to the nature/ character of the view as assessed in the Draft DS (based on eight design attributes which are derived from the design considerations set out in SNH (2012) guidance included in Appendix F).

Additional commentary is provided on the anticipated visibility of WTG aviation and navigational lighting where applicable at each of the viewpoints; this is described within the 'lighting' section of each viewpoint schedule below (albeit for the final layout only). This has been included at the request of statutory consultees during a pre-submission consultation meeting on the 8th of May 2017. As agreed with the statutory consultees, the commentary does not extend to assessing the impact of lighting on visual receptors, but provides a statement on the anticipated visibility of lighting in the context of the current baseline (which may/ may not include comparable lighting).

Viewpoint 01 – Balmedie Beach (3.5 km from nearest WTG (AWF02))

Figures 2.0 – 2.2, Appendix A

	Design Attribute	**Design Changes, Constraints and Appraisal (Draft DS)**	**Design Changes, Constraints and Appraisal (Revised DS)**
1	WTG layout and grouping	The WTGs will appear as one group in a relatively informal arrangement with two WTGs overlapping.	There is no material change to the visual composition of the group as described in the Draft DS, albeit the revised layout has resulted in a minor increased separation between WTGs AWF04 and AWF08, equating to 1,111 m. Whilst there is a wider gap between AWF04 and AWF08 than between other adjacent WTGs, the layout still reads as a single compact development within the context of the wider panorama across the bay. AWF04 would not therefore be perceived as an 'outlier'. The 'gap' would indeed close as the viewer moves further north and south due to the angle of the view (and therefore this location represents a worst case scenario in terms of the size of gap).
2	Scale-indicators and	There are no focal points within the view although views along the coast	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
	focal points	to Aberdeen and to the north (beyond the panoramas shown) anchor the view. Large ships within the offshore anchor area are a scale indicator albeit transient.	
3	Contextual relationship with coast	The WTGs are clearly set within the marine environment and sited close to the coast but separate to any coastal features.	No change.
4	Height relationship with coastal elements and features	The WTGs appear across the majority of the sea view and will become the focal point out at sea, separate to any coastal features.	No change.
5	Backclothing	The WTGs will be seen against an active marine backcloth.	No change.
6	Scale of WTGs	The WTGs will be prominent elements within the sea view where there are few features aside from passing and anchored boats to provide any ready scale comparison. The informal arrangement and uniform appearance of the WTGs relate to the expansive seaward views and the simple receiving environment within which they are located.	No change.
7	Relationship to surroundings	The WTGs relate well to the simple receiving environment of expansive sea and sky and a broad simple coastal edge.	No change.
8	Visual appearance from coastal settlements	The Development will be a new feature within the close seascape visible from the coastal settlements. The uniform appearance of the WTGs and layout will give the Development a visually cohesive character.	The more tapered foundations are a tangible change which, in terms of scale and form, creates a more comfortable aesthetic combination with the towers, reducing the 'bulkiness' of the lower portion of the WTG.
9	Lighting appraisal	Not included	Aviation and marine navigation lighting, when activated, would be apparent from this location albeit seen in the context of other lighting associated with shipping, lighthouses

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
			(within Aberdeen Bay) and coastal lighting including street lighting.

Illustrative photomontage showing Vattenfall logo and flag of the European Union

The presence of the Vattenfall logo and flag of the European Union is illustrated in Figure 2.2, Appendix A. These elements are unlikely to be clearly seen at a distance of 3.5 km (to the nearest WTG), registering only as a minor colour variation and lacking any detail. Lighting conditions (particularly when the WTGs are in silhouette with the sun on the eastern horizon) would further reduce the ability to pick out any clear detail. The logo and flag would not be discernible from any of the other more distant viewpoints.

Viewpoint 02 – A90 (Harehill) (4.4 km to nearest WTG (AWF09))

Figures 3.0 – 3.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	WTGs will be fairly evenly distributed across the view, appearing as one development with no overlapping or irregular spacing. The coastal landform will obscure the bases of the northern four WTGs. The WTG grouping appears informal and visually comfortable in the view.	Taking the group as a whole, the revised layout and WTG specification have resulted in no material alteration to the composition and resultant visual impact of the group as described in the draft DS.
2	Scale-indicators and focal points	There are few focal points within the view. The relatively low lying foreground landform with the sheltered houses/farms with tree belts provide the key scale-indicators.	No change.
3	Contextual relationship with coast	The WTGs appear close to the coast but are clearly located within the marine environment with a visible separation between the majority of the WTGs and the coastal landform.	No change.
4	Height relationship with coastal elements and features	The WTGs appear below the height of the foreground signage but are taller than the other elements that make up the view. Given the generally low lying landform and lack of any focal points, the WTGs sit comfortably in the background and appear aligned parallel to the coastline.	No change.
5	Backclothing	The WTGs will be partially seen against the marine backcloth breaking the marine / skyline horizon. They also form part of the backcloth to the coastal landform.	No change.
6	Scale of WTGs	The scale of the WTGs complements and relates to the coastal plateau landform, the expansive skies and the simple marine palette. However, they will be relatively close and tall features within the view.	The more tapered foundations are a tangible change which, in terms of scale and form, creates a more comfortable aesthetic combination with the towers, reducing the 'bulkiness' of the lower portion of the WTG.
7	Relationship to surroundings	The WTGs relate comfortably to the coastal landform reflecting the alignment of the coastline.	No change.
8	Visual	The WTGs will be a new feature within the close	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
	appearance from coastal settlements	seascape and be visible from the coastal settlements. The uniform appearance of the WTGs and layout will give the Development a visually cohesive character that sits comfortably within the seascape.	
9	Lighting appraisal	Not included.	Aviation lighting on each of the WTGs, when activated, would be apparent from this location. Marine navigation lighting on WTGs AWF01, AWF08 and AWF11 would similarly be visible. Lighting would be seen against an unlit skyline, albeit lighting from shipping, together with light from the nearest dwellings would be apparent.

Viewpoint 04 - B999 Whitecairns (8.1 km to nearest WTG (AWF01))

Figures 4.0 – 4.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	Only the upper tower and blades will be visible from this viewpoint. The WTGs will appear in six groups of overlapping rows from this direction. In contrast to the ES design, the hub heights are lower and therefore the northern and southern groups of WTGs are potentially further obscured by the intervening landform. The visible WTG grouping appears relatively formal from this view due to the angle of the rows.	There is no material change in the composition of the WTG group in the amended layout. WTG AWF04, to the left of the group, has moved a short distance to the north (equating to c.61 m) and as a result the nacelle is now fully screened behind the rising landform.
2	Scale-indicators and focal points	The landscape within the view is relatively uniform with few focal points. The landform to the north and forestry in the middle ground which extends into the horizon provide the main scale indicators.	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
3	Contextual relationship with coast	There is no visibility of the sea available from this viewpoint which effectively 'visually closes' the perceived distance between the WTGs and the coastline.	No change.
4	Height relationship with coastal elements and features	The upper portion of the WTGs appear above the eastern horizon but sit lower than the more elevated landform to the north. The WTGs remain secondary in scale to the rising landform to the north.	No change.
5	Backclothing	The WTGs will serve as part of the backcloth to the coastal landform. In turn, they will be backclothed against the sky.	No change.
6	Scale of WTGs	The scale of the WTGs works comfortably with the existing landform and features within the view in spite of their more regimented layout when viewed from this location.	No change.
7	Relationship to surroundings	The WTGs will visually sit comfortably within the simple landscape and coastal edge. It is a positive attribute that they are seen nestling behind the lower section of landscape wedged between the higher landform to the north and the rising woodland to the south.	No change.
8	Visual appearance from coastal settlements	The WTGs will remain noticeable but appear as distant features from settlements in this area.	No change.
9	Lighting appraisal	Not included.	Aviation lighting would be apparent on all WTGs with the exception of WTG AWF04 and AWF09. This would be in the context of a unlit skyline and typically dark foreground (given the rural context).

Viewpoint 05 – Aberdeen Beach (7.5 km to nearest WTG (AWF09))

Figures 5.0 – 5.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	The WTGs will appear as one group in an informal clustered layout with some overlapping blades and two WTGs will have overlapping jacket foundations. The WTG grouping appears informal and visually comfortable in the view presenting a new focal point.	The informal clustering and minor overlapping of blades remains despite minor movements of WTGs within the group.
2	Scale-indicators and focal points	There are few focal points or scale indicators within the view, although the distant coastline extending to Peterhead is visible along the horizon. Large ships within the offshore anchor area serve as transient scale indicators.	No change.
3	Contextual relationship with coast	The WTGs appear within the open sea/outer bay and provide a visual link between the Girdleness headland in the south and visible coast to Peterhead in the north.	No change.
4	Height relationship with coastal elements and features	The absence of competing focal points to draw the eye and the location of the WTGs within Aberdeen bay increases the prominence of the WTGs such that they will become the main focal point in the view.	No change.
5	Backclothing	The WTGs will be seen against an intermittently active marine backcloth that is defined by sea and sky.	No change.
6	Scale of WTGs	Whilst the WTGs will become the focal point within the view, their location within the seascape and the lack of other scale indicators within the view allows the WTGs to sit comfortably within the view.	No material change, albeit the reduced mass of the foundations is apparent.
7	Relationship to surroundings	The WTGs will visually sit comfortably within an active seascape of changing appearance under different weather and light conditions.	No change.
8	Visual appearance from coastal settlements	The WTGs will be a new feature within a seascape visible from Aberdeen. The uniform appearance of the WTGs and layout will give the Development a visually cohesive character that sits comfortably within the active seascape.	No change.
9	Lighting appraisal	Not included.	Aviation and marine navigation lighting, when

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
			activated, would be apparent on the horizon from this location albeit seen in the context of other lighting associated with shipping, lighthouses (within Aberdeen Bay) and coastal lighting including street lighting.

Viewpoint 07 – Torry Battery (7.9 km to nearest WTG (AWF09))

Figures 6.0 – 6.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	The WTGs will appear as five groups evenly spaced across the horizon. The WTG grouping appears formal due to the rows of WTGs visible but not uncomfortable within the view. The WTG group sits comfortably on the horizon line between the two breakwaters.	There is a modest, though discernible separation of WTGs in the second and third group from the right of the view when compared with the layout presented in the draft DS; the WTGs however still read as a coherent and distinct group of five with an consistent degree of separation and an inherent formality. The overall visual appearance and impact is unchanged.
2	Scale-indicators and focal points	The lighthouse provides the main focal point and scale indicator within the view. The harbour walls and more distant coastline to the north are also noticeable features. Large ships within the offshore anchor area are another scale indicator albeit transient.	No change.
3	Contextual relationship with coast	The WTGs sit comfortably within the open sea/outer bay between the distant coastline to Peterhead and the lighthouse and harbour walls in the foreground.	No change.
4	Height relationship with coastal	The WTGs are noticeably larger than the coastal landform to the north but are smaller in height to the foreground harbour features	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
	elements and features	including the lighthouse. Due to the distances between the existing features and the WTGs and its offshore position, this arrangement appears visually comfortable.	
5	Backclothing	The WTGs will be seen against an active marine backcloth with a distant recessive coastal landscape.	No change.
6	Scale of WTGs	The WTGs have a comfortable relationship with the foreground lighthouse to the south and due to the separation distance, they do not appear out of place against the distant coastline to the north.	No material change, albeit the reduced mass of the foundations is apparent.
7	Relationship to surroundings	The WTGs will visually sit comfortably within an active seascape of changing appearance under different weather and light conditions.	No change.
8	Visual appearance from coastal settlements	The WTGs will continue to be a new feature within a seascape visible from Aberdeen. The uniform appearance of the WTGs and the relatively tight layout will give the WTGs a visually cohesive character that sits comfortably within the active seascape.	No change.
9	Lighting appraisal	Not included.	Aviation and marine navigation lighting, when activated, would be apparent from this location albeit seen in the context of other lighting associated with shipping, lighthouses (on the harbour walls) and coastal lighting including street lighting.

Viewpoint 09 – Forvie Sands (10.3 km to nearest WTG (AWF04))

Figures 7.0 – 7.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	The Development will appear as three close groups of two, three and six WTGs. The WTGs to the north will appear slightly separate from the other groups but overall the WTGs still would be viewed as one development. The lower sections of the towers on the four WTGs to the south would be obscured by the foreground sand dunes.	A minor shift in WTG positions relative to one another does not alter the overall appearance of the group in this view.
2	Scale-indicators and focal points	There are limited focal points/scale indicators within the view although tower blocks on the edge of Aberdeen are just visible to the south.	No change.
3	Contextual relationship with coast	The sand dunes create small vistas towards the sea and the majority of the WTGs would appear framed within one of these views. The southern WTG hub and blades appear just above the sand dunes. The arrangement and framing of the WTGs increases their visual prominence and their relationship with the coast but the simple palette of elements works well visually.	No change.
4	Height relationship with coastal elements and features	The WTGs will lie below the height of the sand dunes which frame the views and will sit separately within the sea at a distance which gives an acceptable arrangement in relation to the coastal landscape.	No change.
5	Backclothing	The WTGs will be seen against a marine backcloth with clear links to the activity of the bay area around Aberdeen.	No change.
6	Scale of WTGs	The scale of the WTGs works comfortably with the coastal landform due to the separation distance from the coast and the foreground features such that the WTGs do not visually compete with it.	No material change, albeit the reduced mass of the foundations is apparent.
7	Relationship to surroundings	The WTGs, although noticeable features, sit comfortably within the relatively simple view of few defining elements.	No change.
8	Visual	The Development will continue to be a new	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
	appearance from coastal settlements	feature within a seascape visible from settlements within this area. The uniform appearance of the WTGs will give the Development a visually cohesive character that sits comfortably within the seascape.	
9	Lighting appraisal	Not included.	Aviation lighting would be apparent on all WTGs. This would be in the context of an unlit skyline and typically dark foreground (given the rural context). Shipping lighting would provide other contextual lights within this view. It is unlikely that marine navigational lighting would be easily discernible at this distance (in excess of 10 km).

Viewpoint 12 – Kincorth Hill (11.5 km to nearest WTG (AWF09))

Figures 8.0 – 8.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	The WTGs will appear overall as a single group although the northern three WTGs are slightly separate to the rest. The grouping is visually comfortable.	No change despite a very minor shift in the spacing of WTGs within the central portion of the array, leading to some additional overlap of blades from this fixed viewpoint. The composition remains balanced and reads as a single development.
2	Scale-indicators and focal points	The view from Kincorth Hill looks across Aberdeen where the many houses and commercial buildings provide relevant scale indicators. There are no prominent focal points although the church tower of Nigg Kirk rises from the trees into the skyline to the south.	No change.
3	Contextual relationship	The WTGs appear within the open bay area between the built up area of Aberdeen and the	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
	with coast	curving coastline to the north.	
4	Height relationship with coastal elements and features	The WTGs are noticeably larger than the scale of buildings within the mid-ground of the view but the offshore location and the foreground trees which surround the viewpoint reduces the Development's prominence in the view to some degree.	No change.
5	Backclothing	The WTGs will be seen against an active marine backcloth with clear links to the activity of the bay area around Aberdeen. The WTGs will be seen on the horizon line against an expansive coastal panorama.	No change.
6	Scale of WTGs	The scale of the WTGs is large when viewed from this direction and elevation but the separation provided by the sea and the variety of foreground elements helps to moderate the perceived contrast in scale.	No material change, albeit the reduced mass of the foundations is apparent.
7	Relationship to surroundings	The WTGs will become the central focus within the view although the city and constant shipping activity will distract to some degree.	No change.
8	Visual appearance from coastal settlements	The Development will be a new feature within a seascape visible from settlements within this area. The uniform appearance of the WTGs will give the Development a visually cohesive character that sits comfortably within the expansive and active seascape.	No change.
9	Lighting appraisal	Not included.	Aviation lighting would be apparent on all WTGs. This would be in the context of a largely unlit skyline. Shipping lighting in the distance and city lighting in the foreground would provide a lighting context such that this would not be a considered a dark sky location. It is unlikely that marine navigational lighting would be easily discernible at this distance (in excess of 11 km).

Viewpoint 13– Udny Station (12.6 km to nearest WTG (AWF01))

Figures 9.0 – 9.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	The smaller WTGs (compared with those presented in the ES) reduce the number of hubs visible, so that only those of the three WTGs to the north of the array will be visible. Only blade tips of the remaining WTGs will be visible. The grouping of WTGs is broadly linear and parallel to the coastal edge.	Despite a very minor movement of WTGs (notably AWF04 in the left of the view, equating to c.61 m) the overall composition and appearance is unchanged.
2	Scale-indicators and focal points	As a relatively uniform plateau landscape there are few focal points or obvious scale references. Forestry blocks on the horizon and in the mid-ground provide the main landscape features.	No change.
3	Contextual relationship with coast	The coast and sea are not visible from this viewpoint. The relatively even spacing between the WTGs suggests that they are aligned parallel to the coastal edge.	No change.
4	Height relationship with coastal elements and features	From this viewpoint there is no clear view of the sea or the coastal edge. The WTGs otherwise sit comfortably within the broadly flat and expansive coastal landscape.	No change.
5	Backclothing	The WTGs will be a distant feature along the horizon line with only the upper portions of the WTGs visible against the skyline.	No change.
6	Scale of WTGs	The visible blades will rise above the distant tree blocks but due to the distances involved and the partial screening by landform and vegetation the scale difference is not particularly noticeable.	No change.
7	Relationship to surroundings	The WTGs will appear separate to the surroundings but as mostly obscured they will not be particularly detectable. The scale of the WTGs and their alignment reflects that of the coastal plateau.	No change.
8	Visual appearance from coastal settlements	The movement of the blades may draw the eye from settlements within the area but they will not be prominent features within a broadly expansive view.	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
9	Lighting appraisal	Not included.	Aviation lighting is likely to be apparent on the distant horizon on WTGs AWF04, AWF08 and AWF03 only. This would be seen in the context of an unlit skyline and a predominantly dark foreground given the rural context.

Viewpoint 15 – Brimmond Hill (14.4 km to nearest WTG (AWF09))

Figures 10.0 – 10.2, Appendix A

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
1	WTG layout and grouping	The Development will appear overall as one almost linear group with only the three southernmost WTGs spaced slightly further apart from the others.	Despite minor shifts in the position of six WTGs the overall composition and balance remains unaltered.
2	Scale-indicators and focal points	The 360 degree view from Brimmond Hill includes a large variety of elements including the city of Aberdeen, the airport and its associated industry, and the more open landscape to the north. Perwinnes Radar Station and the tower blocks in Aberdeen serve as particular focal points/scale comparators.	No change.
3	Contextual relationship with coast	The Development appears separate from the coastline and seen within the seascape just north of the main settlement areas. The WTG arrangement which appears almost linear from this elevation fits comfortably with the extensive north-south aligned coastline and the seascape views.	No change.
4	Height relationship with coastal elements and features	The WTGs sit within the expansive sea view barely breaking the horizon line. They are noticeably larger than the radar station and tower blocks but are clearly separate to the landscape and the coastline.	No change.
5	Backclothing	The WTGs will be seen against a marine backcloth with clear links to the activity of the	No change.

	Design Attribute	Design Changes, Constraints and Appraisal (Draft DS)	Design Changes, Constraints and Appraisal (Revised DS)
		bay area around Aberdeen.	
6	Scale of WTGs	The scale of the WTGs works acceptably within the coastal landform as they remain below the horizon line and clearly separated from the coastal landscape.	No change. The revised shape of the foundations is unlikely to be discernible from this distance and angle of view.
7	Relationship to surroundings	The WTGs will become a focus within this part of the view although the city and constant shipping activity will distract to some degree. The alignment of the WTGs reflects that of the coastline and their linear character relates well to the coastal plateau.	No change.
8	Visual appearance from coastal settlements	The Development will continue to be a new feature within a seascape visible from settlements within this area. The uniform appearance of the WTGs will give the Development a visually cohesive character that sits comfortably within the active seascape.	No change.
9	Lighting appraisal	Not included.	Aviation lighting would be apparent on all WTGs on the distant horizon. This would be in the context of Aberdeen Bay and lighting from shipping and coastal development. The aviation lighting associated with the adjacent antenna at Brimmond Hill would similarly be visible. It is unlikely that marine navigational lighting would be easily discernible at this distance (in excess of 14 km).

7.5 Summary

The analysis presented in Section 7.4 seeks to establish the nature of any change to the visual appearance of the design, compared to the draft DS, arising from the changes to the WTG layout and specification which is described in previous sections. There are some minor changes to the separation of WTGs in specific views, albeit this does not materially change the uniform, balanced and visually contained characteristics of the layout.

The modest increase in hub height and blade tip height, which equates to a c.0.3% increase in overall height of each WTG, would not be perceptible in any of the views and would not lead to a sense of increase in scale or prominence / dominance of the WTGs in any view.

The alteration to the overall shape of the foundations produces a more tapered solution, which is most apparent from the closest viewpoints (as illustrated by visualisations prepared for viewpoints 1 and 2). This does not materially alter the relative prominence of the foundations, which is derived from their colour.

From coastal views, the Vattenfall logo and flag of the European Union would be barely perceptible features. Their presence would not materially increase the visual prominence of the WTGs, nor detract from the 'cleanness' and simplicity of the WTG structures, derived from inherent characteristics such as simple lines and colour palette.

Overall, based on the appraisal carried out on the final layout, it is concluded that whilst minor changes to the location and dimensions of WTGs may be discernible by comparing the visualisations for the ES and final layout, the nature of impacts and significance of effects assessed in the ES are considered to remain unchanged.

8 COMPLIANCE WITH APPLICATION AND ASSOCIATED SUPPLEMENTARY ENVIRONMENTAL IMPACT STATEMENT

8.1 Introduction

In addition to the conditions presented in Table 1, Condition 7 of the S.36 Consent states:

> *"The Development must be constructed and operated in accordance with the terms of the Application and the accompanying Environmental Statement and the Supplementary Environmental Information Statement, except in so far as amended by the terms of the Section 36 consent and any direction made by the Scottish Ministers."*

Section 8.2 sets out how the design parameters of relevance to the DS complies with the Application, ES, SEIS and Annex 1 of the S.36 Consent letter.

Section 8.3 sets out that the commitments made in the Application, ES and SEIS will be delivered.

8.2 Compliance with Design Parameters Assessed in the Application, ES and SEIS

The ES and associated SEIS described a range of specification and layout options that could be applied to the Development.

Since the S.36 Consent and Marine Licences were awarded, the design of the Development and approach to installation has been substantially refined to that described in this DS (and in other relevant Consent Plans). In order to demonstrate compliance with the ES and SEIS design parameters, the final design parameters of the key components of the Development are compared with the ES and associated SEIS parameters in Appendix D.

8.3 Delivery of the Environmental Management Related Mitigation Proposed in the ES and SEIS

The ES and associated SEIS detailed a number of mitigation commitments relevant to environmental management. Appendix E sets out where each commitment has been addressed within this DS.

9 REFERENCES

Scottish Natural Heritage (February 2016) Advice note on Offshore Wind Farm Design Statements.

Scottish Natural Heritage (March 2012) Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape.

Scottish Natural Heritage (December 2014) Visual Representation of Wind Farms, version 2.

Scottish Natural Heritage (May 2014) Siting and Designing Wind Farms in the Landscape, version 2.

Scottish Government (August 2003) Planning Advice Note 68 – Design Statements.

LDA Design on behalf of Beatrice Offshore Windfarm Ltd (November 2015) Design Statement for the Beatrice Offshore Wind Farm.

Maritime and Coastguard Agency (January 2016) Marine Guidance Note 543- Annex 5.

APPENDIX A ZTV AND VISUALISATIONS

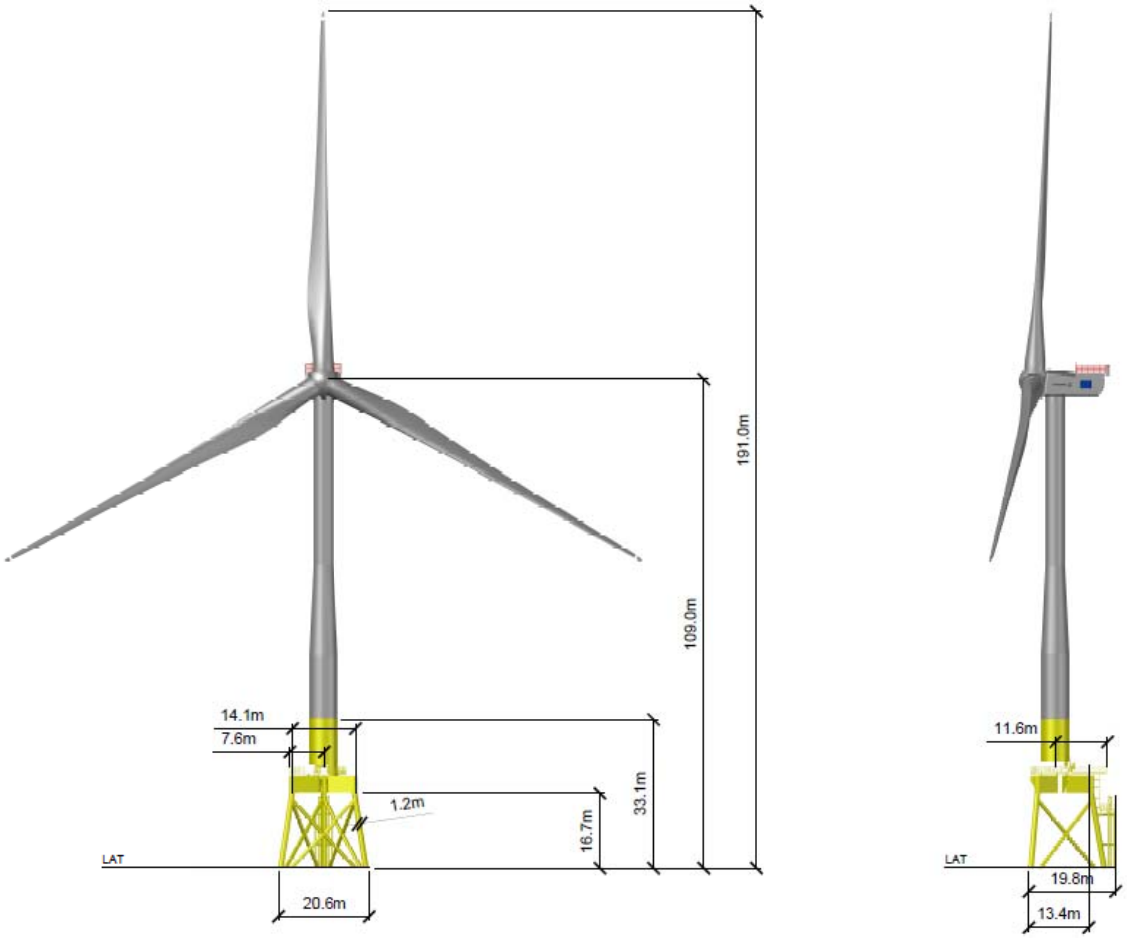
List of Figures

Figure 1.0 – Comparison ZTV incorporating agreed representative viewpoint;

Figures 2.0 – 10.2 – Visualisations (refer to matrix below for detail)

Viewpoint	Figure number		
	Wireframe	**Photomontage**	**Photomontage Representation of Logo**
1	2.0	2.1	2.2
2	3.0	3.1	n/a
4	4.0	4.1	n/a
5	5.0	5.1	n/a
7	6.0	6.1	n/a
9	7.0	7.1	n/a
12	8.0	8.1	n/a
13	9.0	9.1	n/a
15	10.0	10.1	n/a

APPENDIX B JACKET FOUNDATION AND WTG DESIGN WITH KEY DIMENSIONS



APPENDIX C STATUTORY CONSULTEE RESPONSES TO DRAFT DESIGN STATEMENT

APPENDIX D COMPLIANCE WITH ROCHDALE ENVELOPE PARAMETERS

Table D1 presents a comparison of consented parameters relevant to the construction methods, against the details set out in this DS.

Table D1 - Comparison of construction methods detailed within the ES, SEIS, Marine Licence, S.36 and Marine Licence Application and the parameters detailed within this DS.

Parameter	Details of Commitment	Implementation
WTGs		
Number of WTG structures	Not more than 11	11
WTG Tip Height (above LAT)	Up to 198.5 m	191 m
WTG Hub Height (above LAT)	Up to 120 m	109 m
Lowest point of rotor swept above MHWS	22 m	22 m
Number of Rotor Blades	3	3
Maximum rotor radius	86 m	82 m
Minimum spacing	790 m (indicative minimum spacing)	814 m
WTG foundations		
Foundation Types	• Monopiles Jackets • Tripods Gravity base structure • Suction caisson/ buckets	• Three legged jacket substructures installed on suction bucket foundations.
Foundation Parameters	• Four legged jacket. • Maximum above water footprint – At LAT jacket 21 m x 21 m. • Maximum height of foundation is 35 m above LAT.	• Three legged jacket. • Maximum above water footprint – At LAT jacket 20.6 m (width) / 19.8 m (length). • Maximum height of foundation is 33.1 m above LAT.

APPENDIX E COMPLIANCE WITH ES MITIGATION MEASURES

Table E1 presents the commitments made by AOWFL in the ES and associated SEIS to mitigation measures relevant to this DS.

Table E1 - ES and SEIS Construction related mitigation relevant to this DS

Source and Reference	Details of Commitment	Implementation
ES - Project Description	Marine lights/foghorns/or other buoys and markings to the requirements of the NLB, IALA and MCA.	Outlined in the NMP
ES - Project Description	Aviation lights to the requirements of CAA.	Outlined in the NMP.
ES - Project Description	All WTGs would be designed to allow for the following safety features: • manual yawing of the WTGs shall be possible via the remote control • remote parking of the WTGs in an oriented stop, to allow for helihoist operation • remote parking of the WTGs in an oriented stop, to allow for helihoist operation.	The WTGs has been designed to allow for these safety features.
ES - Project Description	For aviation purposes, WTGs would be marked with aviation lighting in line with the following: • each WTG located at the corner would be fitted with aviation lighting • in addition, aviation lighting would be installed along perimeter WTGs so a maximum gap of 3.5 km between lighting	Aviation lighting is outlined in the NMP. Lighting and spacing requirements have been met.
ES - Project Description	Lights would be fitted to be visible in all directions without interruption (the shadowing effect of passing blades is not considered to be an interruption in this context): • the angle of the plane of peak intensity shall be elevated to between 3 and 4 degrees above the horizontal plane • not more than 45 % or less than 20 % of the minimum permitted peak intensity shall be visible at the horizontal plane • not more than 10 % of the minimum peak intensity shall be visible at a depression of 1.5 degrees or more below the horizontal plane.	Aviation lighting is outlined in the NMP. Aviation lights should be visible from 360 degrees above the horizontal plane; two aviation lights will be fitted to achieve this at AOWF. To mitigate impacts on surface vessels the aviation lights are now required (after the application was submitted) to flash Morse W.
ES – EIA	The inherent characteristics of the EOWDC	The Development includes

Source and Reference	Details of Commitment	Implementation
Technical Report Seascape, Landscape and Visual Impact Assessment	suggest that there are very limited opportunities for incorporation of mitigation measures although the scheme has been designed to minimise the risk of aesthetically visually uncomfortable arrangements. The scheme incorporates integral mitigation measures to minimise the risk of aesthetically visually uncomfortable WTG arrangements.	embedded design features to limit as far as practicable adverse seascape and visual impacts and effects (as set out in the SLVIA); these features are consistent with overarching objectives, embodied in the SNH Guidance (2012), to minimise adverse seascape, landscape and visual impacts; this includes: • The adoption of single height WTGs to create uniformity of appearance; • A single phase build out which reduces the period during which construction stage landscape, seascape and visual effects may be experienced; • Maintaining as regular a separation of WTGs as practicable within the bounds of environmental, engineering and technical constraints to provide a visually balanced layout with limited overlapping of blades in views for the coast; • Use of recessive paint colours for the WTGs to blend features into the background as far as practicable and within the constraints imposed by safety and technical standards; and • Consideration of foundation designs, resulting in the adoption of a more slender three legged jacket solution (compared with the four legged solution presented in the draft DS and ES).
ES – EIA Technical Report Seascape, Landscape and Visual Impact Assessment	Also, careful consideration is given to the colour of the WTGs in order to ensure that they remain moderately recessive visually, albeit within the parameters of ensuring sufficient visibility for vessels out at sea. There is a need to balance the objective of reducing their visibility with the existing standard requirements for ensuring visibility of structures out at sea. Thus, the need to paint the lower sections of the WTG columns yellow, in accordance with NLB requirements, is unavoidable.	
ES- Ornithology	Minimise use of lights	Marine and aviation marking, including lights, visual marks, and construction buoyage will be provided in accordance with NLB, MCA and CAA requirements. Detailed information relating to lighting and marking of the EOWDC during the construction and

Source and Reference	Details of Commitment	Implementation
		operation phase is set out in the NMP.
ES-Shipping and Navigation	Structures to be marked and lit in-line with NLB and IALA guidance.	The NMP details navigational marking during construction and operation, temporary lighting and marking; buoyage and vessel safety requirements.

APPENDIX F SNH GUIDELINES ON ASSESSING IMPACT ON COASTAL LANDSCAPE AND SEASCAPE (EXCERPTS)

The attributes considered within the visual appraisal (Section 7.4) are taken from the guidance '*Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape* (SNH, March 2012)' in particular chapter 5, paragraphs 5.5 and 5.6 under the sub-heading '*Characteristics of Offshore Windfarms'*.

These paragraphs are reproduced below for ease of reference.

Paragraph 5.5 states: *SNH's Siting and Designing windfarms in the landscape explores layout and design issues in relation to onshore windfarms. Basic design principles are relevant:*

- *Turbine form, design, size and colour,*
- *Turbine layout/array,*
- *Lighting,*
- *Turbine grouping, relationship to scale-indicators and focal points, especially when viewed in relation to land – be it an island, coastline or backdrop across a firth.*

Paragraph 5.6 states: *For offshore windfarms additional considerations include:*

- *How they relate to the coast, their position within a channel, or firth.*
- *How the height of turbines relates to other coastal elements or features, for example power station chimneys, prominent focal hills or mountains.*
- *Whether they will be back clothed by sea or land.*
- *Their scale if positioned within a firth on a major sea route, or on a tourist/transport route.*
- *How they relate, as a new focal feature, to their surroundings – for example, by replacing the value of existing landmarks.*
- *How they will be viewed from settlements on the coast, as well as those that enjoy an 'outer' marine backcloth.*