European Offshore Wind Deployment Centre

Construction Noise Management Plan

ABE-ENV-DC-0005

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0	27/02/2017	First issue
1	31/05/2017	Post Consultation and Removal of Cable Landfall Option 2
2	09/07/2017	Further Comments from MS-LOT

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Purpose and Objectives of the Plan

This Construction Noise Management Plan has been prepared to address the specific requirements of the relevant condition attached to the Section 36 Consent (S.36) issued to Aberdeen Offshore Wind Farm Limited (AOWFL).

The overall aim of this Construction Noise Management Plan is to set out the procedures for management of airborne noise at the nearest residential properties, on the adjacent coastline, during the construction of the Development.

This Construction Noise Management Plan confirms that the construction-related mitigation measures detailed in the Application will be applied during installation where these remain relevant.

All relevant method statements developed by Contractors and Subcontractors involved in the European Offshore Wind Deployment Centre (EOWDC) must comply with the procedures set out in this Construction Noise Management Plan.

Scope of the Plan

This Construction Noise Management Plan covers the following:

- Details of the accepted construction noise thresholds;
- Working hours for construction;
- The predicted noise levels during construction;
- Construction noise management; and
- Confirmation that the noise management measures described within this Construction Noise Management Plan align with those considered in the Environmental Statement (ES), where applicable.

Structure of the Plan

This Construction Noise Management Plan is structured as follows:

Sections 1 and 2 set out the scope and objectives of the Construction Noise Management Plan 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 detail on the construction noise thresholds.

Section 6 provides the working hours for construction.

Section 7 details the predicted noise levels during construction.

Section 8 provides detail of noise management measures to be implemented.

Section 9 provides information to demonstrate compliance with the original Application and how the mitigation proposed in the Application will be delivered.

Section 10 provides a reference list for documents cited within the Plan.

Plan Audience

This Construction Noise Management Plan 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 Construction Noise Management Plan will be monitored by AOWFL and reported to the Marine Scotland Licensing and Operations Team.

Plan Locations

Copies of this Construction Noise Management Plan are to be held in the following locations:

- At AOWFL Head Office;

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

- At the AOWFL Marine Coordination Centre at Aberdeen Harbour; and

- With the Ecological Clerk of Works (ECoW(s)).

LIST OF ABBREVI ATIONS AND DEFINITIONS

Defined Terms

Term	Definition
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.
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.
Commencement of the Works	The date on which the first vessel arrives on the Site to carry on any marine Licensable Marine Activity in connection with the construction of the Works, as defined by the Marine Licence.
Company	Aberdeen Offshore Wind Farm Limited (AOWFL). AOWFL is wholly owned by Vattenfall and 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;

Term	Definition
	• attaching it to the bed of any waters; • assembling it; • commissioning it; and • installing it.
Construction Noise Management Plan (CNMP)	The Management Plan to be submitted for approval under Condition 18 of the section 36 Consent.
Contractor	Any Contractor/Supplier (individual or firm) working on the project, hired by AOWFL.
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.
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 WTGs.
Licensable Marine Activity	Any activity listed in section 21(1) of the 2010 Act.
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;

Term	Definition
	• 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 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 Environmental Management Plan (OEMP)	The Management Plan to be submitted for approval under Condition 17 of the section 36 Consent.
Offshore Export Cables (OECs)	The offshore export cables and all associated cable protections up to MHWS.
Offshore Export Cable Corridor (OECC)	The consented area within which the offshore export cables will be laid up to MHWS.
Offshore Export Cable Corridor Landfall	The location where the offshore export cables come ashore.
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 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

Term	Definition
AOWFL	Aberdeen Offshore Wind Farm Limited
dB	Decibel
dB A	A weighted sound pressure level
BS	British Standard
CLS	Cable Laying Strategy
ECoW	Ecological Clerk of Works
EOWDC	European Offshore Wind Deployment Centre
ES	Environmental Statement
ETSU	Energy Technology Support Unit
HSSE	Health, Safety, Security and Environment
km	Kilometre
L_{Aeq}	Equivalent Continuous Level
L_{WA}	A weighted Source Sound Power Level
L_{WAMAX}	A weighted maximum Source Sound Power Level
MHWS	Mean High Water Springs
MW	Megawatt
OECs	Offshore Export Cables
OEMP	Offshore Environmental Management Plan
SEIS	Supplementary Environmental Information Statement
SHE	Safety, Health and Environment
WTG	Wind Turbine Generator

1 INTRODUCTION

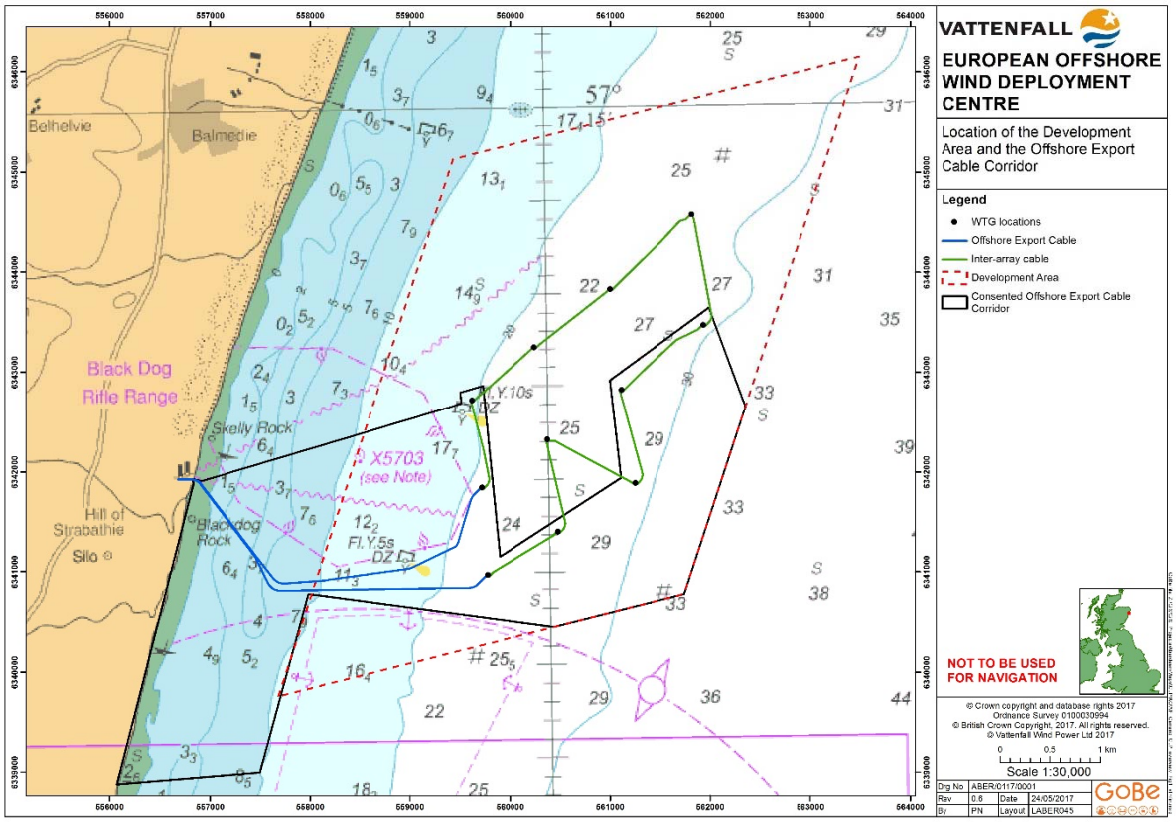
1.1 Background

On 26 March 2013, Aberdeen Offshore Wind Farm Limited (AOWFL) received consent from the Scottish Ministers under Section 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 attained under 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 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 Location of the Development Area and the Offshore Export Cable Corridor.



1.2 Objectives 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 Construction Noise Management Plan (CNMP). The aim of this plan is to set out airborne noise related construction procedures and good working practices in the installation of the EOWDC.

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

It is AOWFL's understanding that the S.36 condition detailing the requirement for this CNMP, as set out in Table 1, was intended to address the potential disturbance to residential properties on the adjacent coastline that might have arisen as a result of airborne noise generated specifically by the installation of the Wind Turbine Generator (WTG) foundations by the use of percussive piling. Percussive piling of foundations is no longer a construction method under consideration for use at the EOWDC which will now use suction bucket foundations. As a result, the potential for very high levels of airborne noise arising from offshore construction activities, and specifically foundation installation, is substantially reduced from that considered in the original Application. The currently proposed offshore construction activities will therefore generate much more limited levels of noise associated with the use of, for example, pumps, generators, cable laying and construction vessel operations.

Nonetheless, AOWFL has prepared this CNMP, for approval, setting out the likely sources and estimated levels of airborne noise from offshore construction activities in seeking to satisfy the requirements of the S.36 Consent, as set out in Table 1.

Table 1 Consent conditions to be discharged by the CNMP

Consent Document	Condition Reference	Condition Text	Where Addressed
S.36 Consent	Condition 18	Prior to the Commencement of Development, a Construction Noise Management Plan must be submitted to, and approved by, the Scottish Ministers, in consultation with any advisors from Aberdeenshire Council and Aberdeen City Council, as identified at the discretion of the Scottish Ministers. The Company must implement the approved Construction Noise Management Plan in full, unless otherwise agreed in writing by the Scottish Ministers.	This document sets out the Construction Noise Management Plan for approval by the Scottish Ministers. Consultation to be undertaken by Scottish Ministers.
	Reason	To ensure the proper environmental control in respect of noise, and to safeguard the amenities of the nearest residential properties.	

1.3 Linkages with other Consent Plans

This CNMP sets out the offshore construction noise management for the EOWDC. However, ultimately it will form part of a suite of approved documents that will provide the framework for the construction process of the EOWDC – namely the other consent plans required under the S.36 Consent and Marine Licence.

1.4 Structure of this Construction Noise Management Plan

In response to the specific requirements of the S.36 Consent and the Marine Licence conditions, this CNMP has been structured so as to be clear that the specific requirements have been met and that the relevant information to allow the Scottish Ministers to approve the CNMP has been provided. The Document Structure is set out in Table 2.

Table 2 Construction Noise Management Plan Document Structure

Section	Title	Overview
1	Introduction	Background to consent requirements and overview of the Construction Noise Management Plan scope and structure and identifies those other Consent Plans relevant to the Construction Noise Management Plan.
2	Statements of Compliance	Sets out the AOWFL statements of compliance in relation to the Construction Noise Management Plan and the broader construction process.
3	Updates and amendments to this CNMP	Sets out the procedures for any required updating to or amending of the approved Construction Noise Management Plan and subsequent further approval by the Scottish Ministers.
4	Development Overview	Provides an overview of the Development.
5	Construction Noise Thresholds	Provides a summary of industry thresholds for construction noise.
6	Working Hours for Construction	Provides the number of working hours per day for construction phases.
7	Predicted Airborne Noise Levels During Construction	Sets out the predicted noise levels for offshore construction.
8	Construction Noise Management	Provides noise management measures for construction noise.
9	Compliance with Application and Supplementary Environmental Information Statement	Sets out how the details in this CNMP are in accordance with those assessed in the original Application and associated Supplementary Environmental Information Statement (SEIS); and how the mitigation measures related to construction noise identified in the Environmental Statement (ES) and SEIS are to be delivered.
10	References	Lists the documents cited within this plan.

2 AOWFL STATEMENTS OF COMPLIANCE

2.1 Introduction

The following statements are intended to re-affirm 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 of the EOWDC, will ensure compliance with this CNMP 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 CNMP).

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 ES and SEIS and referred to in Annex 1 of the S.36 Consent in so far as they apply to this CNMP (unless otherwise approved in advance by the Scottish Ministers / the Licensing Authority).

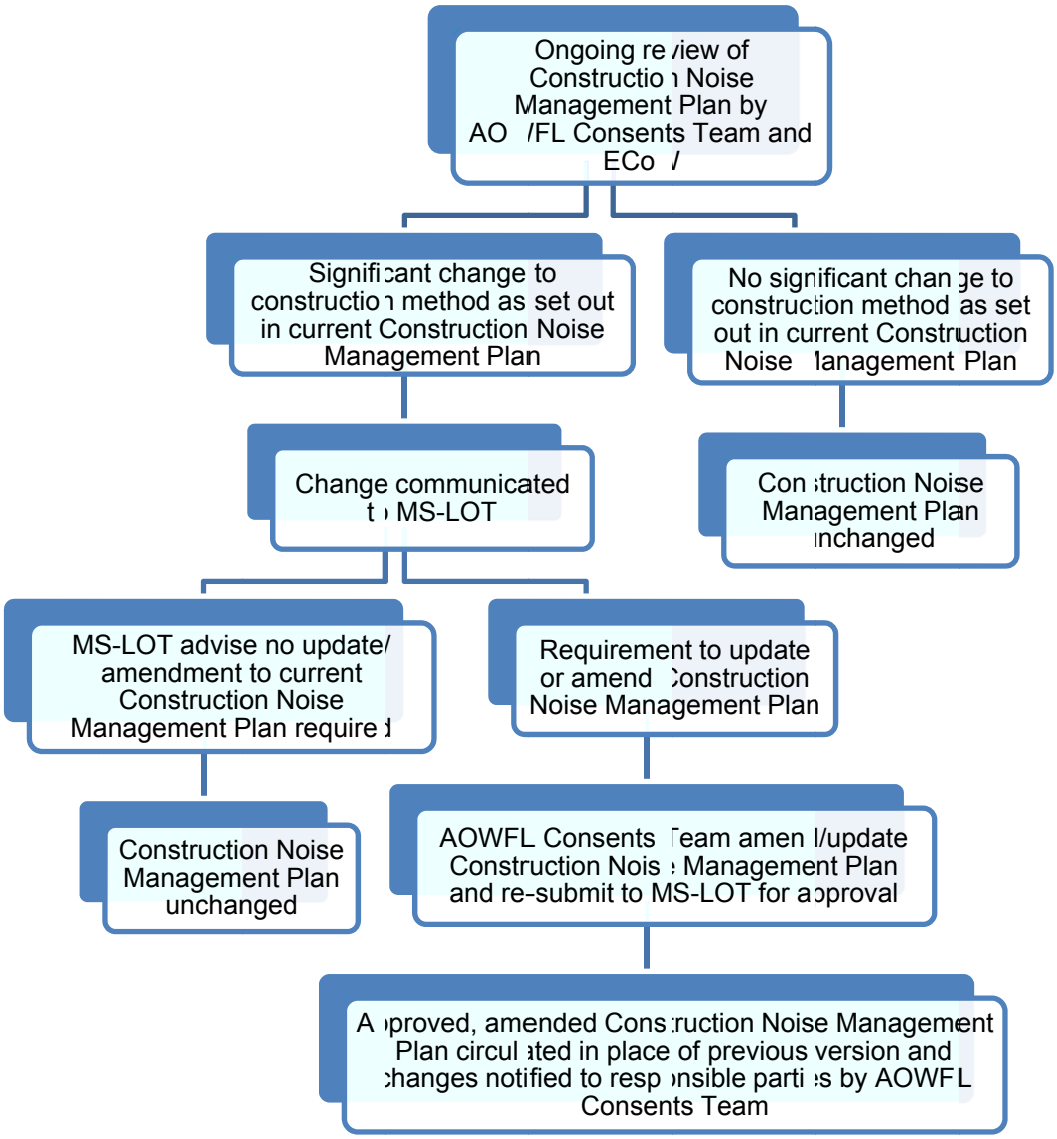
AOWFL, in undertaking the construction of the EOWDC, will comply with AOWFL Health, Safety, Security and Environment (HSSE) systems and standards, the relevant HSSE legislation and such other relevant legislation and guidance so as to protect the safety of construction personnel and other third parties.

AOWFL will, in undertaking the construction 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 UPDATES AND AMENDMENTS TO THIS CONSTRUCTION NOISE MANAGEMENT PLAN

Where it is necessary to update this CNMP in the light of any significant new information related to the construction methods, 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 CNMP if required, seeking further approval for the necessary amendments or updates and disseminating the approved changes/amendments to the responsible parties.

Figure 2 Construction Noise Management Plan Change Management Procedure



4 DEVELOPMENT OVERVIEW

4.1 Introduction

This section provides a brief overview of the EOWDC and Figure 1 shows the location of the EOWDC 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 Wind Turbine Generators (WTGs) to the cable landfall location at Blackdog, within Aberdeen Bay, and connecting to the onshore buried OECs for transmission to the onshore substation and connection to the National Grid network.

Further details of the wind farm layout and design will be set out, for approval, in the Design Statement (ABE-ENV-BD-0017).

5 CONSTRUCTION NOISE THRESHOLDS

In the ES, predicted construction and measured background noise levels at nearby properties onshore were assessed and compared with noise limits derived from the Energy Technology Support Unit (ETSU) guidelines for wind farms and the British Standard (BS) BS 5228:2009 Part 1 for construction noise.

The British Standard dictates that a significant effect is predicted if the total L_{Aeq} noise level, (existing plus construction), is calculated to exceed the threshold levels presented in Table 3 (reproduced from BS 5228-1) for the category appropriate to the ambient noise level, for one month or more. It is considered that a significant effect would occur if the increase in total noise levels is more than 3 decibels (dB) above the ambient noise, should this resultant level be above threshold values.

Table 3 Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB)**		
	Category A [i)]	**Category B** [ii)]	**Category C** [iii)]
Night-time (23.00–07.00)	45	50	55
Evenings and weekends [iv)]	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75

i) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.
ii) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.
iii) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values.
iv) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

Section 7 compares the predicted offshore construction noise levels with the thresholds identified above.

6 WORKING HOURS FOR CONSTRUCTION

Working hours for construction activities are important to consider in the context of the standard noise threshold levels identified in Section 5. For instance, if the noise levels are too high for a certain activity it may be restricted to daytime working hours.

It is proposed that the OECs will be installed by trenching, using one of two different designs which are being considered by AOWFL for the installation of the OECs at the landfall location (see Figure 1). The landfall installation design will be selected once engineering studies are complete. Further detail on the landfall installation designs under consideration are provided, for approval, in the Cable Laying Strategy (CLS) (ABE-ENV-DB-0003).

The anticipated working hours for construction phases are outlined below:

- All offshore activities: working hours will be 24 hours, 7 days a week; and
- Working hours for the export cable installation trenching operations (located landward of the beach) at the landfall location are expected to be during the daytime (08.00−18.00) and on Saturdays (08.00−12.00).

7 PREDICTED AIRBORNE NOISE LEVELS DURING CONSTRUCTION

The main sources of offshore construction airborne noise will be offshore cable installation works, foundation installation works and the noise associated with general vessel movement and operations during the construction period. These activities will represent a marked reduction in airborne noise levels compared to the worst case considered in the original Application, which included specifically the airborne noise arising from the pile driving for monopile foundations.

A summary of the estimated airborne noise levels is provided in Table 4 for the main offshore and cable landfall installation activities.

Table 4 Construction Phase Predicted Noise Levels

Construction Phase	Predicted noise level at source
Offshore Cable Installation works	Estimated between 60-70 dB
Foundation Installation works	Estimated between 65-75 dB(A[1])
Cable Installation activities at landfall (trenching)	Estimated between 60-70 dB

The sensitive noise receptors for offshore construction activities at the EOWDC are the local residential properties onshore, which are cited as the reason for the CNMP by the S.36 consent under Condition 18 (see Table 1). The closest residences are located at a distance of more than 2.4 km from the nearest construction works within the Development Area, although somewhat closer to the nearshore and intertidal export cable installation works.

To put the estimated noise sources in Table 4 into some context, in the ES, predicted levels of noise from offshore piling of wind turbine monopile foundations (source sound power level of L_{WAmax} = 151 dB re:1 pW and L_{WA} = 139 dB re :1 pW) at the nearest residential properties were assessed and compared to the threshold limits set out in Table 3 (Section 5). The predicted noise levels arising from piling during the daytime showed exceedance of the L_{Aeq} daytime noise limits adopted from BS5228:2009 Part 1 (BSI, 2009) at three assessed properties by 1 dB.

Given the much lower source noise levels for the main offshore construction works now proposed and the distance from the nearest sensitive receptors (the coastal residences) it is concluded that airborne noise generated by the offshore installation works will not be audible at the coastline for much of the time and will not exceed the relevant threshold levels as set out in Table 3.

As outlined in Section 6, two different designs are being considered by AOWF. for the installation of the OECs (see Figure 1). The landfall installation methodology will be selected once engineering studies are complete.

Trenching works (by use of a standard excavator) at the landfall location will not result in exceedance of the relevant threshold levels.

[1] dB A - A weighted sound pressure level

The landfall installation vessels required to assist with feeding the ducts into the borehole are likely to have diesel engines ticking over during the operation and they will be positioned approximately 700 m from the beach. This equipment would not be expected to result in exceedance of the relevant threshold levels given the source noise levels and distance from the closest sensitive receptors.

8 CONSTRUCTION NOISE MANAGEMENT

Relevant noise management and mitigation measures outlined in the ES (Table 5) were proposed in relation to offshore percussive piling of wind turbine foundations, which is no longer a method under consideration and as such these management and mitigation measures are no longer considered relevant.

Given the low source noise levels arising from the offshore works and the distance from the sensitive receptors of those works no further noise management measures are proposed in relation to the main offshore installation procedures. That said, noise emissions will be minimised by the adoption of standard operating procedures wherever possible for the plant in use on board vessels offshore (for example through the preferential use of modern, silenced and well-maintained equipment, regular equipment checks and maintenance, and the use of plant only when required (with noise emitting plant and machinery powered down or switched off when not in use)).

AOWFL has a Local Liaison Officer who will be in place to cover the construction works and will notify the closest residences of the timings and nature of intended cabling works at the landfall.

If any changes to the working hours or anticipated noise levels are required, this will be discussed with the Local Authority (Aberdeenshire Council) and will not be undertaken prior to the appropriate permissions being attained. The process for updates and amendments to this CNMP, outlined in Section 3, will be followed where appropriate.

Furthermore, should 24 hour operations be required for the cable installation works, AOWFL will contact Aberdeen City Council Environmental Health Service 21 days prior to the proposed out of hours work being undertaken to discuss the nature of works, potential mitigation and community liaison.

9 COMPLIANCE WITH APPLICATION AND ASSOCIATED SEIS

9.1 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 9.2 demonstrates that the parameters of relevance to the CNMP comply with the Application, ES, SEIS and Annex 1 of the S.36 Consent letter.

Section 9.3 shows that the construction noise mitigation commitments made in the Application, ES and SEIS will be delivered.

9.2 Compliance with the Construction Noise Details Assessed in the Application, ES and SEIS

The ES and SEIS described a range of specification and layout options that could be applied during the construction and operation of 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 CNMP (and in other relevant Consent Plans). In order to demonstrate compliance of this refined design, construction noise details described in the ES and associated SEIS are compared to the installation methods and specifications detailed within this CNMP (see Section 7).

9.3 Delivery of the Construction Noise Related Mitigation Proposed in the ES

The ES and associated SEIS detailed a number of mitigation commitments relevant to construction activities. Table 5 sets out where each commitment has been addressed within this CNMP.

Table 5 ES Construction Airborne Noise Commitments.

Source and Reference	Details of Commitment	Implementation
ES – In Air Noise Chapter	• For monopiles, construction times should be limited to daytime hours; • Methods to screen the sound at source could potentially be employed to reduce the impact of pile driving noise during the day; • No piling during the night; and • Good information Policy.	Mitigation was suggested as a result of the piling installation methodology which is no longer under consideration. Consequently mitigation for this impact is no longer required.

10 REFERENCES

AOWF . (2011) European Offshore Wind Deployment Centre Environmental Statement.

AOWF . (2012) European Offshore Wind Deployment Centre Environmental Statement Addendum (SEIS).

Marine Scotland (2013) Section 36 Consent Granted by the Scottish Ministers to Construct and Operate the European Offshore Wind Deployment Centre (EOWDC) Electricity Generating Station, Aberdeen Bay, Approximately 2 km East of Blackdog, Aberdeenshire.

Marine Scotland (2016) Marine Licence for Marine Renewables Construction Works and Deposits of Substances or Objects in the Scottish Marine Area Reference 04309/16/1.